The Bright Side of Fire Sales

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Abstract

Firms that buy distressed assets in fire sales earn excess returns that are two percentage points higher than in regular acquisitions. Returns are higher when the seller's industry has fewer firms, is in poor financial health, and has less redeployable assets. This suggests that buyers can take advantage of fire sales by distressed companies needing to sell assets while restructuring, and that the overall welfare losses associated with fire sales are smaller than previously thought. These results have implications for policy makers evaluating the merits of bailouts as a tool to prevent potential welfare losses associated with fire sales.

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Firms that buy distressed assets in fire sales earn excess returns that are two percentage points higher than in regular acquisitions. Returns are higher when the seller's industry has fewer firms, is in poor financial health, and has less redeployable assets. This suggests that buyers can take advantage of fire sales by distressed companies needing to sell assets while restructuring, and that the overall welfare losses associated with fire sales are smaller than previously thought. These results have implications for policy makers evaluating the merits of bailouts as a tool to prevent potential welfare losses associated with fire sales.

1. Introduction

An extensive literature documents the costs associated with fire sales of corporate assets, real estate, and equity and debt securities. Pulvino (1998), for example, shows that financially distressed airlines sell their planes at discounts of 10% to 20% compared with other airlines. Fire-sale discounts have also been reported in corporate bankruptcies (LoPucki and Doherty (2007)), real estate (Campbell, Giglio, and Pathak (2011)), and corporate bonds (Ellul, Jotikasthira, and Lundblad (2011)).[1]

Almost the entire focus of this literature has been on the losses suffered by sellers in fire-sale transactions, but little is known about the effect of fire sales on the wealth of the buyers of these assets. This effect is what we study in this paper. If some sellers suffer because they are forced to sell assets below fundamental value, does this result in larger gains for the buyers? Or are potential buyers sidelined because they are constrained themselves, leading to lower overall wealth gains for buyers and sellers, a possibility suggested by Shleifer and Vishny (1992). Addressing this question has implications for the ongoing policy debate about the virtues, or lack thereof, of the bailout of financially distressed firms. Several years after the onset of the financial crisis of 2007-2009, discussion as to whether the government-organized bailouts were welfare improving continues (see, for example, Sapienza and Zingales (2013), Calomiris and Khan (2015), and Goolsbee and Krueger (2015)). One of the ostensible motivations for the bailouts was to avoid fire sales of assets and their associated negative externalities. Any assessment of the welfare implications of such policies must also take into account buyer gains, an issue that here-to-date has received limited attention. One of our goals is to redress this imbalance in coverage.

[1] Other work on this topic includes Coval and Stafford (2007) who document that stocks sold by distressed mutual funds experience negative abnormal returns, and Jotikasthira, Lundblad, and Ramadorai (2012) who find fire-sale effects in emerging market equity prices caused by flows to funds domiciled in developed markets. Acharya, Bharath, and Srinivasan (2007) document that the anticipation of potential fire sales reduces the recovery rates of bondholders for firms that have defaulted on their debt. See Shleifer and Vishny (2011) for a survey of the fire-sale literature.

The ideal laboratory to study this question requires a market-based assessment of the gains achieved by the buyers, and this is what the M&A event study conducted in this paper provides. In particular, we study the stock price response of firms that acquire assets from distressed companies, either in a complete acquisition or through the purchase of certain assets or divisions of distressed companies.

We do so by focusing on what we believe is an exhaustive set of 428 transactions involving distressed target firms and their acquirers over the period of 1982-2012. Transactions are classified as fire sales if the target is in bankruptcy or liquidation at the time of the transaction or if the target is undergoing a debt restructuring.

We find that returns to acquirers are approximately two percentage points higher in fire sales than in regular M&A transactions. This result is robust to controlling for acquirer and deal characteristics. It also holds when we focus solely on public targets, on acquisitions of entire companies or acquisitions of certain assets of companies. Furthermore, our findings continue to hold in models saturated with buyer fixed effects estimated bi-annually or with industry*year and buyer fixed effects. Thus, unlike prior work which stresses the costs to the sellers associated with fire sales, we show that buyers can take advantage of such sales and increase shareholder wealth substantially when engaging in the purchase of firms or assets in fire sales.

Next, we ascertain in more detail why fire-sale acquisitions are more beneficial for acquirers than regular acquisitions, and why the gains for acquirers are not competed away. We start by documenting that there are actually more contested acquisitions when the target is undertaking a fire sale, although the correlation between a fire sale and the acquisition being contested is relatively small. Thus, lack of explicit competition cannot explain our findings. We then explore whether there is less implicit competition for targets by considering the number of other potential buyers from the same industry. We find evidence of reduced buyer returns in fire sales when there are many large firms in the target's industry.

In further tests, we examine whether the returns earned by acquirers depend on industry conditions, the liquidity of the M&A market, and the redeployability of the target's assets. As suggested by Shleifer and Vishny (1992), it is possible that the best potential buyers of certain assets are not always in a good position to acquire them, possibly because they are also distressed or lack funding for the acquisition. Shleifer and Vishny (1992) further suggest that acquirers outside the industry pay a lower price than industry insiders because the specialized nature of the assets makes them less valuable to unrelated buyers or because they fear overpaying as they cannot value the assets properly. We find that returns to acquiring assets in a fire sale are especially high when other firms in the target's industry have low liquidity and are financially constrained. We also document higher buyer returns during economic contractions; during such periods, there are likely to be fewer potential buyers with deep pockets. Acquirer returns are lower when the M&A market in the target's industry is more liquid. Finally, acquirer returns are higher when the target's assets have fewer alternative uses. Thus, acquirers benefit particularly in economic downturns, when the M&A market is less liquid, and when the target's assets have low redeployability. These factors all reduce the bargaining power of the targets. We find no evidence, however, that acquirer returns in fire sales depend on whether the target is from a different industry or not.

In our final set of tests on buyer returns, we document that the returns earned by buyers in fire sales have increased over time. This test is motivated by changes in institutional features of the bankruptcy process that have shifted power away from the equityholders of the bankrupt firms toward their creditors, suggesting that acquirers can profit from increased creditor control (see, for example, Skeel (2003) and Bharath, Panchapagesan, and Werner (2010)).

We also consider a large number of alternative explanations for the increased buyer returns in fire sales: higher quality match, reward for risk-taking, risk-shifting, revelation of good news, unique buyer assets, informational advantage on the part of the buyer and/or seller, and deal anticipation, and show that these explanations are inconsistent with the data.

An important benefit of our research design is that we can compute the returns earned by the public targets and, as such, the combined shareholder wealth gains associated with fire-sale acquisitions. We find that the shareholders of target firms earn significantly lower returns when the firm is in distress. Of course, it is possible that some of the returns accrue to the debtholders of the target firms, but, unfortunately, not enough target firms have listed debt outstanding to allow us to investigate this in detail. Combined bidder and target returns accruing to shareholders are indistinguishable for fire sales versus regular acquisitions. From an overall welfare perspective, these findings suggest that the costs associated with fire sales are smaller than previously thought based on an analysis of seller costs only. From a policy perspective, this result helps in assessing the merits of bailouts as a response to potential losses associated with fire sales of corporate assets.

Besides the literature on fire sales, this paper also contributes to the literature on acquisitions in financial distress and more broadly the literatures on asset sales and mergers and acquisitions. Early work on the role of acquisitions in resolving financial distress is by Hotchkiss and Mooradian (1998). They study acquisitions as a means of restructuring firms in Chapter 11 and, in the process, document positive buyer returns for a sample of 41 acquisitions of bankrupt companies over the period 1979-1992, compared to insignificant returns for a sample of matching buyers in regular acquisitions. We expand upon their work along several dimensions. First, our sample covers distressed as well as bankrupt sellers and also covers partial asset sales over a longer time period. Second, we confirm that the increased buyer returns in fire-sale transactions continue to hold in a multivariate setting. Third, we study in detail the features of the firms and industries affecting the cross-sectional variation in buyer returns, thereby capturing frictions and bargaining power, and link these to the fire-sale literature. Finally, we also report returns accruing to the target firm shareholders as well as combined bidder and target returns.[2]

[2] In recent work Gilson, Hotchkiss, and Osborn (2015) document increased use of M&A in resolving financial distress, which is positively related to secured creditor control, but they do not study the impact of such

We also contribute to the literature on asset sales. Maksimovic and Phillips (2001) report that firms sell assets that are less productive and operate in less productive industries. However, this is not the case for firms in financial distress - these firms sell their most efficient plants instead (see Maksimovic and Phillips (1998)), which suggests that they have less choice as to which assets to liquidate. Schlingemann, Stulz, and Walkling (2002) document that the liquidity of the market for assets plays an important role in determining which assets are divested. We find that this liquidity also adversely affects buyer gains in fire sales.

Finally, we contribute to the broader literature on mergers and acquisitions. The emerging consensus from that literature is that acquirer gains are small or close to zero, on average (see Andrade, Mitchell, and Stafford (2001) and Eckbo (2014) for reviews of the literature). Understanding the nature of the transactions that do create significant shareholder wealth is therefore of chief importance.

The remainder of this paper is organized as follows. In the next section, we describe our data. Section 3 documents acquirer abnormal returns and Section 4 studies why these returns are higher for fire-sale acquisitions. Section 5 discusses changes in Chapter 11 procedures over time and the associated pattern in acquirer returns. Alternative interpretations of our findings are discussed in Section 6. Results on target and combined shareholder returns are presented in Section 7, and Section 8 concludes. Four Appendices contain information on sample construction, further robustness checks, and the estimation of fire-sale discounts.

2. Data

We start by selecting all completed acquisitions listed on the SDC database that were announced over the period 1982-2012. We choose 1982 as the starting year because that is when SDC starts its coverage of distressed acquisitions. The database includes full acquisitions, but also

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transaction on buyer returns. The increased role of creditors is consistent with our view that the management of a distressed firm has a reduced influence on the decision making process.

acquisitions of ownership interests and assets. Next, we apply a number of data screens that are standard in the M&A literature (see, for instance, Moeller, Schlingemann, and Stulz (2004)). First, we remove acquisitions that do not involve US corporate bidders and targets. Second, we require the shares of the bidder to be publicly traded and listed on the CRSP database to allow for a study of the effect of the takeover announcement on the share price of the acquirer. Third, for acquisitions of entire companies, the bidder needs to own more than 50% of the target after completion of the transaction and less than 50% before its initial announcement, and the size of the stake acquired has to be at least 50%. Fourth, we drop deals where target and acquirer identifiers are identical such as in self-tenders, repurchases, recapitalizations and buybacks, and we also exclude equity carve-outs, spin-offs, split-offs and transactions that are announced to the public after they became effective. Fifth, accounting information for our acquirers needs to be available on Compustat. Finally, to make sure that the transactions are of some importance to the bidding firm, we remove transactions for which the deal value is less than 1% of the market value of the acquirer at the end of the last fiscal year before the announcement of the transaction, where market value is defined as book assets minus book equity plus market equity. As such, transactions without information on deal value are also removed. Our final sample consists of 21,850 acquisitions.

To define fire sales, we combine three deal characteristics listed on the SDC database: (1) the target is bankrupt or goes bankrupt during the transaction; (2) the transaction is part of a liquidation plan; (3) the transaction is part of a restructuring whereby the debt on the balance sheet is reduced through a bankruptcy/distressed sale, a tender offer or exchange offer for existing debt securities, or a loan modification. A transaction is defined by SDC as a restructuring only if one or more of the following conditions have been met: (i) the company has publicly confirmed that it has retained a restructuring advisor, has filed for bankruptcy/receivership protection, has publicly confirmed plans to restructure its debt, or has gone into default or has missed a coupon payment, (ii) the company has an S&P/Moody's issuer, issue, or probability of default rating of CCC+/Caa1 or

below either before or in reaction to the announcement of the restructuring plan, (iii) the company has made a debt-for-debt exchange offer where debt holders will exchange their bonds at a discount, or (iv) a credit facility or debt security of the company carries a yield of at least 1,000 bps over US Treasuries. If any of these criteria are met, we classify the acquisition as a fire sale. The common feature of these criteria is that the target management is no longer fully in control of the decision making process in the firm and may be forced to sell the firm or some of its assets.[3]

Based on the above criteria, 428 acquisitions out of the 21,850 deals in our sample are classified as fire-sale acquisitions. It is important to point out that SDC's coverage of distressed transactions is much more comprehensive than the final sample. Without applying any of the sample selection criteria, except that the transaction involves a US corporate bidder and target, SDC covers 3,606 distressed acquisitions out of a total of 162,843 completed transactions over our sample period. Appendix 1 contains detailed information on the number of transactions removed after applying various data filters.

Table 1 provides more detailed information about the composition of our sample. The largest number of fire sales occurs in the late 1980s/early 1990s and at the start of the 2000s. Table 1 also lists the number of acquisitions that meet each of the three (non-mutually exclusive) criteria listed above. The largest number of deals involves firms that are bankrupt, followed by firms that are undergoing a restructuring. There are few liquidations in the sample. About 85% of the fire-sale acquisitions (n=367) are defined by SDC as acquisitions of assets, while the remainder (n=61) are acquisitions of entire companies. We have stock price and accounting data on the target firm for about 21% of the transactions in our sample (n=4,571), and 102 of these meet our definition of fire-sale acquisitions.

[3] In support of this view, Feldhütter, Hotchkiss, and Karakaş (2015) show that creditor control is indeed priced around important events such as defaults, bankruptcy filings, and covenant violations.

3. Acquirer Abnormal Returns

We start by documenting cumulative abnormal returns earned by the acquirers in our sample over the three-day period surrounding the announcement of the acquisitions. Abnormal returns are computed as cumulative residuals of the market model estimated over the 200-day period starting 205 days before the announcement of the acquisition, where the CRSP equally-weighted market index is employed as the market proxy.[4] In the process, we drop one observation where an acquirer in a regular acquisition earns abnormal returns in excess of 400%.[5,6]

Panel A of Table 2 shows positive abnormal returns of 1.24%, on average, for the overall sample, which is similar to the 1.10% figure reported in Netter, Stegemoller, and Wintoki (2011) for a sample of acquisitions made by US firms over the period 1992-2009. The median return is also significantly positive at 0.34%. When we split the sample into fire-sale acquisitions and other acquisitions, the results are striking: acquirer returns are 2.09 percentage points higher, on average, when the transaction is classified as a fire sale relative to regular deals, while the median is 1.01 percentage points higher. In Panel B, we show that these results hold for acquisitions of entire companies as well as acquisitions of assets. For example, average buyer gains are 0.81% when they acquire entire companies that are not in distress, but 4.76% when the target is in distress.

Next, we verify that the above results also hold in a multivariate setting after including various controls that may affect acquirer abnormal returns. We control for acquirer industry and the year in which the transaction took place. We also include dummies for the following deal characteristics: tender offer, hostile, contested (multiple bidders), equity only payment, cash only

[4] A minimum of 100 observations are required to estimate the market model.
[5] The acquirer is a firm with a market capitalization of less than $1 million with very low or zero trading volume in the days running up to the announcement date. Our subsequent findings are essentially unaffected if we include this transaction in our sample.
[6] We do not winsorize abnormal returns. Our findings are very similar if we winsorize the top and bottom 0.5% or 1% of the observations.

payment,[7] unrelated (the three-digit SIC codes of the target and bidder are different), the seller of the assets is public or private (the excluded category is that the target is a subsidiary of a public or private firm), and the transaction is a sale of some assets as opposed to the entire company. In addition, we control for both the log of the size of the transaction and its size relative to the size of the bidder. Finally, we control for bidder Q, leverage, profitability, and equity market value (see Moeller, Schlingemann, and Stulz (2004)). Summary statistics on the control variables are reported in Table 3 of the paper. Panel A contains deal characteristics, while Panels B and C contain acquirer and target characteristics respectively. We present means and medians for fire sales and regular acquisitions, as well as the difference between the two. The two types of acquisitions differ along several characteristics that may affect returns. For example, fire-sale acquisitions are more likely to involve asset sales (86% versus 56%) and they are more likely to be paid entirely in cash (29% versus 24%). Acquirers in fire sales have lower Q ratios (mean of 1.48 versus 1.63) and more leverage (mean of 0.45 versus 0.42) than other acquirers. These differences underscore the importance of including acquirer and deal characteristics in our specifications.

Panel A of Table 4 contains the regression models. In model (1), we include bidder industry fixed effects, defined at the 3-digit SIC code level. Returns for fire-sale acquisitions continue to be 1.76 percentage points higher than for other transactions. In model (2), we also add year fixed effects without materially affecting our finding. Model (3) contains the deal and bidder characteristics that have been employed as control variables in prior work. While the explanatory power of this specification increases substantially, our finding that acquirers outperform when making fire-sale acquisitions persists and its economic and statistical significance is virtually unaffected. Consistent with prior work (see, for example, Servaes (1991), Chang (1998), Fuller, Netter, and Stegemoller (2002), and Moeller, Schlingemann, and Stulz (2004, 2005)), we find that

[7] The form of payment is not always disclosed by SDC. In the reported specifications, both the cash only and stock only payment dummies are set equal to zero for these transactions. Including a separate dummy to indicate that the form of payment is not disclosed does not affect our inferences.

bidder returns are lower when they acquire listed companies and have a low Q ratio; large bidders also make worse acquisitions. Abnormal returns are higher for larger deals, when the bidder makes a tender offer, and pays cash. We also find that buyer returns are 61 basis points lower when the transaction is an asset sale rather than a complete acquisition.

In columns (4) through (6) of Panel A of Table 4, we re-estimate these models, but only for those transactions where the selling firm is listed or is a subsidiary of a listed firm. For this subset of transactions we can also control for target firm characteristics. For ease of comparison with the full sample results, we first report models that include bidder industry fixed effects (model (4)) and both bidder industry and year fixed effects (model (5)) before presenting the full model with transaction, bidder, and target controls (model (6)). The economic significance of our findings is even larger in these models. According to model (6), bidders earn an extra 2.26 percentage points abnormal return when acquiring a distressed target that is listed or the subsidiary of a listed firm.

In columns (7) and (8), we estimate separate regression models for acquisitions of assets and acquisitions of entire companies. Acquirer returns are higher for both sets of fire-sale transactions albeit that the result for acquisitions of entire companies is only marginally significant.[8] Bidder returns in fire sales are 1.30 percentage points higher when they acquire assets and 3.02 percentage points higher when they acquire companies as a whole, compared to regular acquisitions.

In Panel B of Table 4 we saturate the regression models with additional fixed effects to rule out that our results are due to time-varying industry characteristics or unobservable bidder characteristics. While we control for industry and year in the models reported in Panel A, it is possible that the impact of industry on bidder returns varies over time. To address this possibility, we interact industry with year fixed effects and report the results in model (1) of Panel B. Our result persists in this specification: the coefficient on the fire-sale dummy is 1.58 (p-value=0.01). It

[8] When we include four-digit bidder SIC code fixed effects, the coefficient on the fire-sale dummy is 3.55 (p-value=0.03) for acquisitions of entire companies and 1.15 (p-value=0.03) for acquisitions of assets.

is also possible that time invariant unobservable bidder characteristics drive our results. To address this concern, we include acquirer fixed effects in model (2). The fire-sale effect in these models is identified through the comparison of abnormal returns of firms that make both regular and fire-sale acquisitions. The coefficient on the fire-sale dummy is 1.59 percentage points in this specification, significant at the 1% level, which indicates that our findings are not due to unobservable bidder characteristics. Of course, bidder unobservables may change over time. Unfortunately, it is impossible to include separate bidder fixed effects for each year in the sample because identification in this specification comes from firms making both fire-sale and non-fire-sale acquisitions in the same year, but very few firms do so. However, we can come very close. In model (3) of Panel B, we present results with firm fixed effects interacted with dummies for bi-annual periods and continue to find that firms earn positive excess returns in fire-sale acquisitions, with a coefficient of 2.48 percentage points (p-value=0.09). Finally, in model (4), we include both industry*year and firm fixed effects. Even in this fully-saturated model, the fire-sale dummy remains statistically significant and its magnitude is virtually unchanged from the more parsimonious models reported in Panel A.

In sum, acquirer abnormal returns are significantly higher when the transaction is a fire sale compared to a regular acquisition. These findings are very robust and hold after controlling for a variety of deal, industry, and firm characteristics. While much of the literature has focused on the cost to the sellers associated with fire sales, these new findings indicate that other firms can take advantage of these sales and earn excess returns for their shareholders in the process. In Appendix 2, we also show that our findings persist if we match bidders in fire-sale transactions with bidders in regular transactions using a nearest-neighbor matching approach. In Appendix 3, we present results for bidder returns when using weaker measures of distress.[9]

[9] In a related paper, Oh (2014) also shows higher bidder returns in a sample of acquisitions of poorly performing firms that are not in bankruptcy.

4. Why Are Acquirer Abnormal Returns Higher in Fire-Sale Acquisitions?

In this section, we study why acquirers gain more in fire-sale acquisitions by conducting a number of cross-sectional tests in which we include proxies for the bargaining power of the target and the frictions that affect this bargaining power. We expect reduced bargaining power on the part of the target to lead to higher buyer returns. In these specifications, we revert to model (3) reported in Panel A of Table 4 as the base case. The base case includes bidder and deal characteristics and year and industry fixed effects, but not the industry/year interactions. We do so because many of the proxies for bargaining power and frictions are computed at the industry/year level and these proxies would therefore be absorbed by the industry/year dummies employed in the models reported in Panel B.

4.1. Competition for distressed targets

If firms can indeed obtain substantial returns from buying assets in a fire sale, why are these gains not competed away by other bidders? This is the question we address in this section of the paper. We start this analysis by exploring whether fire sales are less likely to be contested, defined by SDC as having multiple bidders. We actually find the opposite: the correlation between the fire-sale dummy and the contested dummy is slightly positive (ρ=0.06). Thus, despite the higher likelihood of competition, acquirers still succeed in reaping higher returns in fire sales. We also explore whether these increased returns only derive from uncontested acquisitions by interacting the fire-sale dummy in the bidder return regression (model (3) of Panel A of Table 4) with the contested dummy.[10] As reported in column (1) of Table 5, this interaction is insignificant (coefficient of -1.46 with a p-value of 0.40). Thus, companies that buy assets in a fire sale earn higher returns, independent of whether the transaction is being contested or not.

[10] Note that we already control for competition in the models reported previously. Here we study whether the impact of fire-sale acquisitions on bidder returns depends on whether the transaction is contested or not.

Next, we study whether differences in returns are due to the lack of *implicit* competition. To proxy for implicit competition, we count the number of firms operating in the target's three-digit SIC code industry that are included in the Compustat database. Shleifer and Vishny (1992) suggest that these are the firms that can make the best use of the target's assets and therefore are able to pay the highest price. Implicit competition can be more important in fire sales than for regular transactions because there is more of an urgency to sell when in distress. In regular transactions, targets can always walk away if the price is deemed inadequate. Therefore, we include this measure as an additional explanatory variable in the buyer return regression, and we also interact it with the fire-sale dummy. This model is presented in column (2) of Table 5. We cluster standard errors at the target industry three-digit SIC code level since we are interested in how variation in the number of firms in the target's industry affects buyer returns. The coefficient on the number of firms in the target's industry is negative and significant at the 1% level, but there is little evidence that this effect strengthens when the target is in distress, as the interaction term between the number of firms and distress has a p-value of 0.16.

One problem with simply counting the number of firms in the target's industry is that some industry peers may be substantially smaller than the potential target and, hence, are not in a position to buy the target. To address this shortcoming, we conduct two alternative counts. First, we count the number of large firms in the industry, defined as firms with book assets in excess of $100 million in the acquisition year. Second, we count the number of firms with book assets larger than the transaction value in the acquisition year (see Boone and Mulherin (2008) for a similar measure). Both counts are then interacted with the fire-sale dummy and included in the basic regression model. The findings are reported in columns (3) and (4) of Table 5. Column (3) illustrates that there is a negative relation between the number of large firms in the target's industry and acquirer abnormal returns for all transactions, but this effect is further accentuated for fire sales. In terms of economic significance, increasing the number of large firms in the industry

from its 25th to its 75th percentile decreases acquirer returns by 0.22 percentage points for regular deals, but by 0.51 percentage points for fire sales. Column (4) shows that the number of firms bigger than the target in a given industry only matters for acquirer returns in fire sales. This evidence supports the view that implicit competition for distressed targets affects the returns earned by their acquirers.

Finally, we investigate whether bidder returns are only higher for fire sales if they are in the same industry as the target. Shleifer and Vishny (1992) point out that acquirers from the same industry are likely to achieve higher synergies in an acquisition and can therefore afford to pay the highest price. We now allow the impact of unrelated acquisitions to depend on the fire-sale dummy to determine whether the gains from fire sales are especially large when the buyer is from within the industry. Model (5) of Table 5 contains the result: bidder gains in fire sales do not depend on whether they are from the same industry as the target firm. This result casts doubt on the view that within-industry buyers stand to gain more from fire sales relative to acquisitions in general.

4.2. Industry financial health and the gains from acquisitions

The literature on fire sales also stresses the idea that other firms in the industry may not be able to purchase distressed assets because these firms are also in a precarious financial position. The above analysis on implicit competition does not incorporate the financial situation of the potential industry buyers. In what follows, we explicitly incorporate target *industry* characteristics in the model of buyer returns. We construct two measures of the financial health of an industry: (a) the average quick ratio, which captures the liquidity in the industry, where the quick ratio is defined as (current assets – inventory) / current liabilities; and (b) the average Kaplan-Zingales index, which captures the extent to which other firms in the industry are capital constrained. The Kaplan-Zingales (KZ) index at time *t* is defined as (see Kaplan and Zingales (1997) and Lamont, Polk and Saá-Requejo (2001)):

$$\text{KZ index}_t = -1.001909\,(\text{Cash Flow}_t / \text{PPE}_{t-1}) + 0.2826389\,Q_t + 3.139193\,\text{Debt}_t / (\text{Debt}_t + \text{Book Equity}_t) - 39.3678\,(\text{Dividends}_t / \text{PPE}_{t-1}) - 1.314759\,(\text{Cash}_t / \text{PPE}_{t-1})$$

Cash flow is computed as Income Before Extraordinary Items + Depreciation and Amortization; Q is computed as (Book Assets – Book Equity – Deferred Taxes + Market Equity) / Book Assets; and Debt is computed as Long-term Debt + Debt in Current Liabilities. A higher KZ index implies that the firm is more financially constrained. We compute these measures at the 3-digit SIC code level in the year of the acquisition, excluding the selling firm, and winsorize the industry average at the 1st and 99th percentiles to reduce the impact of extreme observations.[11] If acquirers of distressed assets experience higher announcement returns because potential industry buyers do not have the means to make the acquisition, we would expect the effect to be more pronounced for acquisitions of firms in industries with a low quick ratio and high financial constraints.

In the first two models of Table 6, we display our basic regression model after including the interaction of each of our measures of industry health with the fire-sale dummy.[12] We also include the industry health measures separately to assess whether they affect acquirer returns for regular acquisitions. Standard errors in these models are clustered at the target industry level. Both models show that fire sales are particularly rewarding for acquirers when the other firms in the target's industry are in weaker financial health. The economic magnitude of the effect varies. Increasing the target industry quick ratio from its 25th percentile to its 75th percentile reduces acquirer abnormal returns for fire sales by 62 basis points relative to regular acquisitions, while increasing the target industry KZ index from its 25th percentile to its 75th percentile is associated with acquirer returns that are 29 basis points higher for fire sales compared to regular acquisitions.[13] Thus, the lack of current liquidity in the target's industry appears to be a stronger driver of acquirer returns than financial constraints in general. As mentioned previously, the lack of

[11] Our results remain significant if we do not winsorize these measures.
[12] For ease of presentation, we divide the computed KZ index by 100 when estimating the regression models.
[13] Our findings persist if we use the Whited-Wu index of financial constraints (Whited and Wu (2006)).

significance of these measures for regular acquisitions may be due to the fact that in those transactions the target can always walk away when the price is deemed inadequate.

In model (3) of Table 6, we focus on the health of the entire economy. Specifically, we create a dummy equal to one if the economy in a given quarter is in a recession as defined by the NBER, and interact it with the fire-sale dummy. If acquirers earn high returns in fire sales because of the lack of competition, we would expect this to be more prominent during recessionary periods, when fewer firms have the resources to buy companies or make other investments. We find that this is indeed the case. Acquirers of assets in fire sales earn 1.34 percentage points more than regular acquirers during normal times, but this difference increases by 3.38 percentage points during recessionary periods.

In sum, the evidence in this section indicates that buyer returns in fire sales are particularly high when the overall financial health of the other firms in the industry is poor, and when the economy is in a recession. These are the circumstances under which the bargaining power of the target is reduced because the most obvious buyers of the assets, i.e., other firms in the industry, are less able to participate in the bidding process.

4.3. Asset redeployability

Another factor that may play a role in the ability of the acquirers to extract gains from a transaction is the extent to which these assets can be redeployed in other industries – higher redeployability will lead to more competition from firms outside of the target's industry.

Constructing a proxy for redeployability without a detailed understanding of the nature of the industry's assets is inherently difficult. One approach, pioneered by Schlingemann, Stulz, and Walkling (2002), is based on the liquidity of the market for corporate assets in an industry. They collect data on the value of all corporate control transactions in an industry from SDC and divide it by the book value of assets in that industry. They find that firms are more likely to divest a segment

in a more liquid market. One shortcoming of this proxy is that it may also measure other aspects of the industry. For example, the industry may have experienced a shock, leading to increased M&A transactions unrelated to alternative uses of the assets in that industry (see, for instance, Mitchell and Mulherin (1996) and Harford (2005)).

An alternative approach proposed by Kim and Kung (2014) employs data from the Bureau of Economic Analysis (BEA) capital flow table. They employ the following two-step procedure. First, for all the BEA asset categories, Kim and Kung compute annually the fraction of all capital expenditures on Compustat spent by industries that use assets in that category. For example, if a specific asset *j* is employed in 2 industries, and these industries' joint capital spending is 10% of all capital spending on Compustat, then the redeployability score of that asset is 10%. Second, for each industry, they value-weight the redeployability scores of each asset used by that industry by the importance of that asset in the industry's total capital spending. For example, if an industry employs two assets with redeployability scores 0.10 and 0.20 and spends half if its capital expenditures on each of these assets, then the industry's redeployability score would be 0.15. This measure appears to be particularly suited to capture alternative uses of an asset. The disadvantage of this measure is that it is focused on the firm's Property, Plant & Equipment (PP&E). A firm that is not capital intensive could have a high redeployability score, while its assets are mainly current assets or intangibles (which could be the case for service enterprises). Such businesses would not necessarily make good targets for buyers from outside the industry.[14]

In our analyses, we employ both the asset liquidity and redeployability proxies. We also estimate models for a subset of firms that belong to the following capital-intensive industries: agriculture, construction, natural resources, manufacturing, transportation, and utilities (SIC codes below 5000), as the Kim and Kung (2014) measure applies in particular to this subset of firms. We compute the asset liquidity measure at the three-digit SIC code level, in line with the other analyses

[14] For related work, see Kim (2012) who studies the effect of asset specificity on target returns and finds lower returns for targets with higher asset specificity, especially when the targets are distressed.

in the previous sections of this paper. In particular, we sum the value of all US domestic M&A transactions announced in an industry/year as reported by SDC, and divide it by the book value of assets in that industry. Kim and Kung (2014)'s asset redeployability score is computed at the BEA industry level. We then re-estimate our regression models after including the redeployability proxies and their interaction with the distress dummy. We cluster standard errors at the industry level at which the proxies are defined.

Table 7 contains our findings. For each proxy, we first report the model for all firms followed by the model for the subset of capital intensive industries. We find strong evidence that fire-sale acquisitions in industries with a more liquid M&A market yield lower buyer returns, albeit that the economic significance of the effect is modest. Increasing the liquidity index from its 25th percentile to its 75th percentile leads to a decline in buyer returns of 32 basis points for all deals and 30 basis points for deals in asset intensive industries.[15] Using the measure of asset redeployability developed by Kim and Kung (2014), we find the strongest results in terms of economic significance when we limit ourselves to asset intensive industries (model (4)). An increase in redeployability from its 25th to its 75th percentile leads to a decline in acquirer returns of 76 basis points, based on the combination of the positive coefficient on redeployability and the negative coefficient on the interaction between redeployability and the fire-sale dummy. When all industries are combined in column (3), there is no significant effect for fire sales, which is not surprising as this redeployability proxy is less meaningful for industries that are not capital intensive.[16]

Overall, these results provide robust evidence that acquirer returns in fire sales are lower when there is more liquidity in the market for the target's assets and when these assets have more alternative uses.

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[15] The regression coefficient is larger for asset intensive industries than for the overall sample, but the interquartile range of the liquidity index is smaller for this subsample. The economic significance for both samples turns out to be similar.

[16] The coefficient on the redeployability measure for regular transactions is positive, which appears counterintuitive. It turns out that combined bidder and targets returns are marginally higher for transactions in which targets have more redeployable assets, and the positive coefficient on the main effect captures this increased overall wealth creation.

5. The Changing Nature of Chapter 11

In this section, we explore whether there are time-series patterns in the returns earned by buyers in fire sales. This analysis is motivated by the work of Skeel (2003) who suggests that Chapter 11 restructurings have become more creditor-friendly over time, and the empirical work by Bharath, Panchapagesan, and Werner (2010) who report a secular decline in the frequency of deviations from absolute priority over time.[17]

Three innovations are at the heart of these changes: Debtor-in-possession (DIP) financing, Section 363 sales, and key employee retention plans (KERPs). Through DIP financing, companies in bankruptcy can obtain additional financing with super priority over other pre-bankruptcy debt claims. According to Skeel (2003), lenders have been able to use the terms of DIP loans to steer the reorganization process to their advantage, which has led to more auctions of, and asset sales by, the bankrupt company. This view is also expounded by Baird and Rasmussen (2003, 2010). Such transactions may benefit debtholders at the expense of shareholders. These sales are often structured under Section 363 of the bankruptcy code, which allows bankrupt firms to sell some or all of their assets on an accelerated basis, free and clear of all debts, upon approval of the bankruptcy court. Importantly, these transactions cannot be reversed upon appeal, thereby further reducing the uncertainty faced by the buyer.

KERP plans provide cash compensation and bonuses to existing management to incentivize them to remain with the company through the restructuring. While they appear perverse in that they provide extra compensation to those who have led the company while it entered bankruptcy in the first place, Skeel (2003) suggests that these managers may still be the best people to run the firm. What is noteworthy, however, is that such plans often reward executives for the speed with

[17] See also Ayotte and Morrison (2009) who study 153 firms that filed for bankruptcy in the second half of 2001. They report that managers and equityholders have little control over the reorganization process, while creditors, and senior lenders in particular, exercise most of the control.

which the bankruptcy is resolved. These ingredients too could lead to more asset sales that are beneficial to the creditors of the firm.

It is important to note that there are no specific regulatory changes during our sample period that have led to the adoption of DIP financing, Section 363 sales, and KERPs. In fact, these tools have been available as part of bankruptcy reorganizations for a long time. But DIP financing did grow substantially during the 1990s compared to the earlier period, as have Section 363 Sales, and adoptions of KERPs. Out of 90 Chapter 11 filings over the period 1979-1989, Bharath, Panchapagesan, and Werner (2010) record no instances of DIP financing and only one instance in which a KERP plan is employed. For the period 1990-2005, on the other hand, they report that DIP financing is employed in 304 out of 536 bankruptcy filings (56.7%) and KERP plans are used in 156 filings (29.1%). What is even more important, according to Skeel (2003), is that the contractual features of these plans are now more aligned with the interests of creditors.[18] In support of this view, Hackbarth, Haselmann and Schoenherr (2015) document that bondholders of distressed firms demand a lower risk premium in the 1990s compared to the 1980s.

To determine whether these changes have affected acquirer returns in fire sales, we estimate separate coefficients for fire sales in the 1980s, 1990s and from 2000 onwards (not reported in a table). Acquirer returns for transactions completed in the 1980s do not significantly depend on whether or not the transaction is a fire sale. From 1990 onwards, however, we find that buyers earn higher returns in fire sales than in other acquisitions. The coefficient on the fire-sale dummy is 2.04 percentage points in the 1990s and 2.36 percentage points from 2000 onwards. Both are significantly different from the coefficient for the 1980s at the 5% level or better. The rise in buyer returns accompanies the use of DIP-financing and the adoption of KERP-plans documented

[18] LoPucki and Doherty (2007) only record three Section 363 sales in the 1980s compared to 52 transactions in the period from 2000 to 2003.

by Bharath, Panchapagesan, and Werner (2010).[19] This evidence supports the view that restructurings in the US have become less favorable for shareholders and that buyers of assets in fire sales have been able to take advantage of this situation. It also suggests that changes in the sales process over time have influenced buyer returns.

6. Alternative Interpretations

The results presented thus far indicate that buyers earn excess returns in fire sales and that these can be explained by the lack of implicit competition, the poor financial health of the target firm's industry and the economy as a whole, and the lack of alternative uses for the target's assets, all factors that influence the bargaining position of the target firm.

In this section, we rule out a number of alternative explanations for our findings. The challenge for these alternatives is that they need not only explain why buyer returns are higher in fire sales, but also the cross-sectional and time-series variation in returns documented in Sections 4 and 5.

Better match between buyer and seller. One possibility is that fire-sale acquisitions simply yield higher returns for buyers and sellers because such transactions create higher synergies, i.e., there is a better match between the buyers and the sellers. The results on combined returns (computed as the weighted average of target and bidder returns) discussed in the next section do not support this argument. In addition, we also control for combined returns in the bidder return regression (not tabulated). The coefficient of the fire-sale dummy in this specification is little changed from our base-line models at 1.93 percentage points, and it remains highly significant (p-value = 0.02). This result rules out any concern that the fire-sale dummy might capture differences in synergies across fire sales and regular transactions.

[19] These findings continue to hold if our models include a dummy for NBER recessions and the interaction between this dummy and the fire-sale dummy.

Compensation for risk taking. A second explanation is that higher returns earned by acquirers serve as compensation for higher risk associated with fire sales. If a specific asset is riskier, however, this will already be reflected in its fundamental value, which will be reduced as a consequence. The excess buyer returns we document, on the other hand, suggest that firms can acquire assets *below* this fundamental value. Thus, the risk-based argument would affect both fundamental value and purchase price, but not the difference between the two. We also conduct an additional test to rule out this alternative story, in which we add a control for target risk in the acquirer return regressions. We estimate target risk as the standard deviation of stock returns over the 200-day period starting 205 days before the acquisition announcement (the same window as used to compute market-model parameters) and adjust it for target leverage. This measure has no effect on buyer returns, nor does it affect the magnitude or significance of the coefficient of the fire-sale dummy.

Risk shifting. A third argument is that acquirer returns are higher in fire sales because such transactions increase the risk of the bidding firm, thereby transferring wealth from the acquirer's bondholders to its shareholders. That is, the returns are due to risk shifting, and it is possible that a distressed acquisition involves the purchase of assets that are indeed more volatile, thereby increasing the benefits from risk shifting. However, this argument is not supported by the sign on the measure of acquirer leverage reported in Table 4. The risk shifting hypothesis would imply higher returns for bidders with higher leverage, but we find a negative sign in all regression specifications, with the coefficient being significant in the firm fixed effects specifications reported in models (2) and (4) of Panel B of Table 4. Thus, we find no support for the risk shifting argument.

Revelation of news about the buyer. A fourth alternative is that a fire-sale acquisition reveals good news about the buyer, leading to an upward revision in its share price. Several pieces of evidence refute this explanation. As documented in models (2) and (3) of Panel B of Table 4, our findings persist when we include buyer fixed effects, and when we allow these fixed effects to vary

every two years. Second, there is no reason for the revelation of positive information to follow the time-series pattern documented in the previous section. To further assuage this concern, we also examine whether the effect of fire sales on bidder stock returns is larger for smaller firms, given that such firms have more asymmetric information, but we find no evidence that this is the case.

Buyer possesses unique assets. Fifth, the possibility that the buyer in a fire sale possesses some unique characteristics that allow it to earn excess returns in an acquisition is ruled out by the fixed effects models discussed in both Section 3 and when addressing the prior alternative.

Better informed buyer. Sixth, one could argue that buyers of assets in fire sales are more informed about the value of these assets than anyone else, and thus earn informational rents when making the acquisition. But this explanation would imply that buyers from outside the industry, who are likely less informed about the target's assets, earn lower returns. As we report in model (5) of Table 5, however, the coefficient on the interaction between the unrelated dummy and the fire-sale dummy is (insignificantly) positive.

Better informed seller. Seventh, buyers in fire sales may be worried that they are buying a lemon and reduce the price paid to compensate for this risk. However, adverse selection is much less of a concern in fire sales because the seller's ability to postpone the transaction is limited compared to regular transactions in which the seller can decide to walk away if the offer is too low.

Deal anticipation. Eighth, one could argue that returns to regular acquisitions are low because such deals are much more likely to be anticipated by the stock market whereas fire-sale acquisitions are more of a surprise. However, this argument would imply that a return differential of two percentage points is imbedded in the share price of the 21,421 firms in our sample that make regular acquisitions, which we believe is unrealistic. In contrast, if there is any deal anticipation it is much more likely that transactions in bankruptcy are anticipated given that it is easily observable that a firm has filed for bankruptcy and may consider a partial or complete sale as a means of restructuring.

Overall, these analyses reinforce our prior conclusion that the excess returns earned by the shareholders of acquirers in fire-sale transactions are due to the poor bargaining position of the target.

7. Target and Combined Returns

Our earlier emphasis on buyer returns suggests that the welfare implications of fire sales are less severe than documented in prior work that focused on documenting fire-sale discounts, but was unable to study the wealth changes for the buyers. One benefit of our event study is that we can also document wealth changes for target firm shareholders. As such, we can compute combined returns and provide some evidence of the overall wealth changes associated with these transactions. This is what we do in this section. Two caveats need to be pointed out, however. First, not all our targets have publicly traded equity and even those that do at one point in time may have been delisted around their bankruptcy filing.[20] As a result, the stock prices needed to compute abnormal returns for target firms around sales transactions are no longer available on the CRSP database. This biases the sample towards firms that are restructuring outside of bankruptcy. In total, we have target return data on 102 acquisitions, 64 of which are restructurings. Second, the creditors of distressed and bankrupt firms may well earn excess returns around acquisitions. However, few of the target firms have public debt outstanding, leaving us with insufficient price data to compute such returns.

To compute abnormal returns for target firms, we employ the same procedure as for acquirers: we estimate the market model for the 200-day period starting 205 days before the acquisition announcement and compute abnormal returns relative to this model for the 3-day period surrounding the announcement day. Total returns are computed as the weighted average of bidder and target returns, using the market value of the equity two days before the announcement

[20] See Dawkins, Bhattacharya, and Bamber (2007) for work on returns of public firms that maintain their listing during the bankruptcy process.

as the weight. If the bidder has prior ownership of the target, we adjust for this effect. More specifically, total abnormal returns are computed as:

$$\frac{CAR_B(MV_B) + CAR_T(MV_T - OWN_B^T MV_T)}{MV_B + MV_T - OWN_B^T MV_T},$$

where CAR is the abnormal return of either the bidder (B) or the target (T), MV is the market value, and OWN_B^T is the fraction of the target owned by the bidder before the announcement of the bid.

Panel A of Table 8 contains univariate statistics on target abnormal returns. Target gains are 11.23%, on average, across all 4,571 acquisitions for which target data are available, with a median of 3.44%. When we subdivide the sample into fire sales and regular acquisitions, the difference is dramatic: the returns for target firms are not significantly different from zero in fire sales. For other acquisitions, on the other hand, the figures are positive and highly significant: the mean is 11.50% and the median 3.55%.

In Panel B of Table 8, we confirm that the univariate results persist after adding various controls in a multivariate setting. The first two columns confirm that target firm returns remain inferior for fire sales after controlling for target three-digit industry SIC codes (column (1)) and both SIC codes and year dummies (column (2)). In column 3, we add further controls for the characteristics of the transactions and both bidders and targets. The results persist: target returns are more than five percentage points lower in fire sales compared to other deals.[21, 22] We study asset sales separately in model (4) and complete takeovers in model (5). The coefficients on the fire-sale dummy remain negative and large in both specifications, but the coefficient for acquisitions of companies is estimated with less precision and is not significantly different from zero.[23] In

[21] This result persists after controlling for the target firm's share price as in Campbell, Hilscher, and Szilagyi (2008).

[22] A related argument is that the fire-sale dummy in specifications for target firms captures the loss in the value of the option of waiting before selling the assets or the company. We do not disagree with this interpretation as such; the essence of a fire sale is that it needs to happen quickly and cannot be postponed.

[23] The adjusted R-squared is negative in the asset sales regression. This is due to the fact that the 244 industry fixed effects that are included in this model are mostly insignificant. If we remove the industry fixed effects,

Appendix 2, we show that our findings persist if we match distressed targets with regular targets using a nearest-neighbor matching approach. In Appendix 4, we present the results of a hedonic regression indicating that complete acquisitions in fire sales occur at a substantial discount compared to regular transactions, consistent with the low returns for selling firms discussed above.

We report combined returns for buyers and sellers in Table 9. Panel A of Table 9 reports that there are no significant differences in combined returns between fire sales and regular transactions; fire-sale returns are 1.79%, on average, versus 1.27% for regular transactions. We confirm these findings in Panel B of Table 9 after controlling for industry, time, and the characteristics of the deal and the firms involved in the transaction. In the full model (model (3)), the coefficient on the fire-sale dummy is 0.38 with a p-value of 0.54. In models (4) and (5) we report separate regression models for acquisitions of assets and of entire companies, respectively. Here too, there is no difference in returns between fire sales and regular transactions.

Overall, the results reported in this section indicate that the joint returns accruing to the shareholders of targets and bidders are not different for fire sales compared to regular deals, even though target returns are lower in fire sales. This evidence suggests that the welfare losses associated with fire sales are less severe than anticipated based on prior work.

8. Conclusion

Firms that make acquisitions of companies that are in financial distress or that buy some of their assets earn abnormal returns that are substantially higher than for regular acquisitions. This result is in contrast to earlier work highlighting the costs of fire sales for sellers and suggests that target shareholders in fire sales may not be in a position to bargain for a higher price or delay the sale altogether. In support of this view, the excess returns earned by acquirers are particularly high when there is less implicit competition for the target and when the target's industry is in poor

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the adjusted R-squared increases to 0.05, while the coefficient on the fire-sale dummy remains negative and significant (coefficient is –4.14, p-value of 0.07).

health, thereby reducing the number of potential buyers for these assets. On the other hand, when the target firm's assets have more alternative uses, thereby increasing the number of potential buyers, bidder returns decline. We also find that bidder returns have increased over time as Chapter 11 reorganizations have become more creditor-friendly.

In relation to the broader literature on M&A, our results highlight an important subset of transactions with large positive acquirer returns. This is in contrast to the general view in the literature that acquirer returns are small or zero, on average.

From an overall welfare perspective, fire sales may therefore be less costly than expected based on prior work that focused on the cost of fire sales to the seller, but ignored the gains to the buyer. In fact, we find no evidence that combined shareholder gains for buyers and sellers are lower in fire-sale transactions compared to regular transactions.

Our results have important policy implications. If the excess returns earned by buyers in fire sales mainly represent a redistribution from sellers, as our evidence suggests, then the need for bailouts to prevent (potential) fire sales is greatly reduced. Of course, a complete welfare analysis of fire sales and bailouts would also have to take into account other externalities associated with fire sales, such as spillover effects on other firms in the seller's industry and the side effects of bailouts, such as moral hazard. Our work is but one step in assessing the overall welfare implications of fire sales since we analyze the returns of buyers and sellers. A joint analysis of wealth changes, spillover effects, and the side effects of bailouts is thus an important area for further work.

Appendix 1: Sample Construction

In this appendix, we list the number of transactions on the SDC database after applying various sample selection criteria that are standard in the M&A literature. Column (1) contains all transactions, column (2) contains the number of fire sales, and column (3) list the specific criteria applied.

Observations Remaining		Criteria
All (1)	Fire Sale (2)	(3)
162,843	3,606	Acquisitions completed over the period 1982-2012 that involve US corporate bidders and targets.
76,110	1,092	Bidder return data available on CRSP to compute announcement returns.
67,382	1,017	Acquisitions of a partial or remaining interest in the target are excluded if the acquisition is of the entire company.
64,396	944	Drop self-tenders, repurchases, recapitalizations, buybacks, equity carve-outs, spin-offs, split-offs and transactions announced to the public after they became effective.
57,514	873	Accounting information for acquirers is available on Compustat.
21,850	428	Deal value available and > 1% of bidder size.

Appendix 2: Nearest-Neighbor Matching for Acquirer and Target Returns

In this appendix we verify that our finding of higher acquirer returns and lower target returns for fire sales compared to regular acquisitions also holds when we employ a nearest-neighbor matching approach instead of a regression approach as documented in Tables 4 and 8.

To test the robustness of acquirer returns, we match each acquirer in a fire sale to the five acquirers in regular transactions that are the nearest neighbors (based on the Mahalanobis distance) according to a number of characteristics. We only match acquisitions of entire companies with each other and asset acquisitions with each other. For some specifications, we also limit ourselves to matches from the same industry and matches that use the same form of payment. The

acquirer and target characteristics we employ are the same as in Tables 4 and 8: market value of equity, Tobin's Q, market leverage, and profitability. For target returns, we employ exactly the same procedure.

Table A1 contains the results. Acquirer returns are displayed in Panel A and target returns in Panel B. Each row represents a different set of characteristics on which acquirers/targets in fire sales are matched with acquirers/targets in regular transactions. Column (6) contains the estimate of the average treatment effect on the treated, which is the extra return earned by acquirers or targets in fire sales versus matched regular deals. The final column contains the number of fire-sale transactions being matched, which varies depending on the matching criteria employed as five perfect matches based on industry, the asset sale dummy and form of payment are not always available for all firms. In addition, we have fewer observations when we match on target characteristics as such matches are only possible for acquisitions of listed firms.

All the comparisons in Panel A illustrate that buyers earn higher returns when making fire-sale acquisitions. The lowest estimate is 1.76% when we match on acquirer financial characteristics and form of payment and the highest is 3.41% when we match on target financial characteristics and target industry. These estimates are very similar to the ones reported in Table 4 of the paper and indicate that the results from our regression specifications are robust.

The target shareholder returns in Panel B also confirm the regression results reported in Table 8 of the paper. Independent of the variables on which we match, we always find lower returns for targets in fire-sale acquisitions, with the difference ranging from -8.53% to -5.22%.

Overall, the results reported in this appendix provide strong evidence that the results based on regression specifications reported in the body of the paper are very robust.

Appendix 3: Weaker Definitions of Distress

In this appendix we investigate whether buyer returns are higher in distressed acquisitions defined using weaker measures of distress. Alternative measures have several shortcomings, however. First, the goal of these alternative measures is often to predict actual financial distress, which our measure already captures perfectly. Thus, if alternative measures of distress are imperfect predictors of actual distress, it would not be surprising that regression specifications with alternative measures yield less precise insights. Second, alternative distress measures often require accounting data or price data on publicly traded equity or debt, which substantially reduces the sample size relative to our measure, which is available for both public and private targets. Third, what is important for bargaining power in acquisitions is whether creditors and/or courts are involved in the transactions, which is less likely to be the case if the firm is not in bankruptcy or in the process of restructuring its debt. Other measures of distress do not capture this change in bargaining power.

Keeping the above caveats in mind, we borrow definitions of distress from the existing literature. Specifically, we employ three alternative proxies for distress. The first proxy is the Z-score as modified by Mackie-Mason (1990). The Z-score is computed as:

Z-score = (3.3 EBIT + Sales + 1.4 Retained Earnings + 1.2 Working Capital) / Assets

The second proxy is the Zmijeweski (1984) score, computed as:

Zmijewski-score = –4.3 – 4.5 Net Income/Total Assets + 5.7 Total Debt/Total Assets
– 0.004 Current Assets/Current Liabilities.

We calculate both of these metrics for all selling firms in our sample with sufficient data available and employ them as continuous measures of financial distress, with lower Z-scores and higher Zmijweski scores reflecting a higher likelihood of distress. The third proxy is based on Asquith, Gertner, and Scharfstein (1994) and classifies a firm as distressed in a given year if the ratio of its EBITDA (Earnings before interest, taxes, depreciation and amortization) to interest expenses is less

than 0.8. Both the Z-score and Zmijewski score are also employed by Acharya, Bharath, and Srinivasan (2007) in their work on recovery rates for defaulted bonds.

It is interesting to note that the correlation between these traditional distress measures and our measure, based on actual debt restructuring and bankruptcy events, is small, suggesting that traditional distress measures do not predict such events with great accuracy. For example, the correlations between our distress measure and the Z-score and Zmijewski scores are only -0.04 and 0.11 respectively. In terms of the coverage measure, 583 selling firms have EBITDA over interest expenses below 0.8. Only 29 of these are fire sales according to our definition. There are an additional 73 fire sales in our sample that do not meet the coverage threshold.

The first three models of Table A2 contain regression models of acquirer abnormal returns as a function of all control variables and each of these alternative distress proxies. In contrast to our earlier findings, we do not find any evidence that acquirers achieve higher abnormal returns when buying companies or the assets of companies that are more likely to be distressed. This is not surprising given the shortcomings of these measures discussed previously and the low correlation between these measures and actual bankruptcy and/or restructuring events. In models (4) through (6) of Table A2, we show that the lack of significance of the other measures is not due to a lack of power caused by the reduction in sample size. When we include our distress measure together with the alternatives, our measure always exceeds 2 percentage points and is significant at the 5% level in all specifications.

Overall, these findings support our view that acquirers can only take advantage of the poor financial health of target firms when the target management is no longer fully in control of the decision making process. Our classification of acquisitions into fire sales and regular transaction is predicated on this loss of control.

Appendix 4: Hedonic Regression of Sales Prices

In this appendix, we report the results of a hedonic regression model documenting lower sales prices for firms sold in fire-sale transactions compared to regular transactions (for other work estimating hedonic regressions in fire sales see, for example, Pulvino (1998), Eckbo and Thorburn (2008), and Campbell, Giglio, and Pathak (2011)). This analysis can only be conducted for complete acquisitions because we require data on the financial characteristics of the acquired assets. Since our sample only contains 18 complete fire-sale acquisitions for which we have target data (two other transactions are of a majority stake), we augment the sample by dropping the requirement that the acquirer has to be publicly traded. As a result of this relaxation of our sampling criteria, the target sample size expands to 5,992 acquisitions, 56 of which are defined as fire-sale transactions. For the regular transactions in this expanded sample, we estimate a regression of the log of the transaction price as a function of: log(assets), Tobin's Q, profitability, and leverage, all measured at the last fiscal year-end before the acquisition. We also include year dummies and industry dummies specified at the 4-digit SIC code level to remove as much industry variation in prices as possible.

We then employ the estimated coefficients to predict sales prices for the fire-sales transactions and compare the predicted prize to the realized price. This comparison yields a discount of 27.4% for fire-sale transactions (p-value=0.06), which supports our classification of acquisitions into regular deals and fire sales.

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Table 1

Number of Transactions by Year and Type

The sample consists of all completed acquisitions listed on the SDC database announced over the period 1982-2012 that meet the following criteria: (a) US corporate bidders and targets; (b) the bidder is listed on CRSP and Compustat; (c) for complete acquisitions, the bidder also needs to own more than 50% of the target after completion of the transaction and less than 50% before its initial announcement, and the size of the stake acquired has to be at least 50%; (d) the deal value has to be more than 1% of the market value of the bidder at the end of the last fiscal year before the transaction, where market value is defined as (book assets minus book equity plus market equity). To define fire-sale acquisitions, we combine three non-mutually exclusive deal characteristics listed on the SDC database: (1) the target is bankrupt or goes bankrupt during the transaction; (2) the transaction is part of a liquidation plan; (3) the transaction is part of a restructuring (abbreviated as restruct.) whereby the debt on the balance sheet is reduced through a bankruptcy/distressed sale, a tender offer or exchange offer for existing debt securities, or a loan modification. A transaction is defined by SDC as a restructuring only if one or more of the following conditions have been met: (i) the company has publicly confirmed that it has retained a restructuring advisor, has filed for bankruptcy/receivership protection, has publicly confirmed plans to restructure its debt, or has gone into default or has missed a coupon payment, (ii) an S&P/Moody's issuer, issue, or probability of default rating of CCC+/Caa1 or below either before or in reaction to the announcement of the restructuring plan, (iii) a debt-for-debt exchange offer where debt holders will exchange their bonds at a discount, or (iv) a credit facility or debt security carries a yield of at least 1,000 bps over US Treasuries. Target Data Available refers to the transaction for which target data are available on CRSP and Compustat.

Table 1 (continued)

	All Transactions							Target Data Available	
Year	All Fire Sales	Bankrupt	Restruct.	Liquidation	Asset Fire Sale	Company Fire Sale	Total	All Fire Sales	Total
1982	1	1	0	0	0	1	219	0	39
1983	1	1	0	0	0	1	382	0	87
1984	6	6	0	0	1	5	426	0	123
1985	4	1	2	1	4	0	244	1	116
1986	17	4	10	5	16	1	346	9	138
1987	13	3	8	2	11	2	272	8	115
1988	17	2	16	0	14	3	325	9	114
1989	23	9	14	1	20	3	371	11	113
1990	20	10	11	0	19	1	363	10	107
1991	22	12	12	1	18	4	399	10	101
1992	24	16	10	1	18	6	561	7	110
1993	19	12	7	0	15	4	748	7	126
1994	20	12	9	0	16	4	915	4	184
1995	12	10	2	1	9	3	999	5	224
1996	17	14	3	0	12	5	1,309	5	252
1997	18	17	0	1	17	1	1,737	4	292
1998	13	13	0	0	12	1	1,728	1	342
1999	11	11	0	0	9	2	1,290	0	293
2000	19	18	1	0	17	2	984	1	204
2001	27	27	0	0	24	3	699	2	184
2002	41	39	1	1	39	2	744	3	155
2003	16	16	0	0	16	0	712	0	138
2004	16	16	0	0	16	0	838	1	138
2005	10	10	0	0	10	0	895	0	151
2006	5	5	0	0	4	1	853	0	123
2007	3	3	0	0	2	1	783	0	131
2008	7	7	3	0	7	0	525	0	77
2009	7	7	5	0	5	2	386	1	95
2010	7	7	2	0	6	1	591	1	107
2011	8	8	4	0	7	1	614	1	97
2012	4	4	1	0	3	1	592	1	95
Total	428	321	121	14	367	61	21,850	102	4,571

Table 2

Acquirer Announcement Returns – Summary Statistics

Abnormal returns are computed as cumulative residuals of the market model over the three-day period starting one day before the announcement of the transaction. The market model is estimated over the 200-day period starting 205 days before the announcement of the acquisition, where the CRSP equally-weighted market index is employed as the market proxy. Abnormal returns are expressed as a percentage. Below the mean (median) abnormal return is the p-value of a t-test (Wilcoxon test) of equality of the abnormal return to zero. The p-value for the differences in means (medians) across groups is from a t-test (nonparametric equality-of-medians test).

Panel A – All Transactions

	All (1)	Fire Sale (2)	No Fire Sale (3)	Difference (2) - (3)
Mean	1.24	3.28	1.20	2.09
	(0.00)	(0.00)	(0.00)	(0.00)
Median	0.34	1.34	0.33	1.01
	(0.00)	(0.00)	(0.00)	(0.00)
N	21,849	428	21,421	

Panel B – Acquisitions of Assets vs. Acquisitions of Companies

		All (1)	Fire Sale (2)	No Fire Sale (3)	Difference (2) - (3)
Assets	Mean	1.55	3.04	1.51	1.53
		(0.00)	(0.00)	(0.00)	(0.00)
	Median	0.59	1.53	0.57	0.96
		(0.00)	(0.00)	(0.00)	(0.00)
	N	12,341	367	11,974	
Companies	Mean	0.83	4.76	0.81	3.95
		(0.00)	(0.02)	(0.00)	(0.00)
	Median	-0.03	1.13	-0.04	1.17
		(0.14)	(0.05)	(0.19)	(0.16)
	N	9,508	61	9,447	

Table 3

Explanatory Variables – Summary Statistics

The fire-sale dummy is defined in Table 1. The following explanatory variables are indicator variables, set equal to one if the specific criterion is met: asset sale, public target, private target, tender offer, hostile, contested, equity only as the form of payment, cash only as the form of payment and unrelated. Asset sale refers to the acquisition of assets or units. Contested is set equal to one if there are multiple bidders according to SDC. Unrelated is set equal to one if the target and acquirer do not share the same 3-digit SIC code. Relative size is the deal value over the market value of the acquirer, where market value is defined as (book assets minus book equity plus market equity). Deal value is the total value of consideration paid by the acquirer, excluding fees and expenses. Acq. MCAP is the acquirer's market value of equity. Acq. Tobin's Q is the market value of the acquirer over its book value of assets. Acq. leverage (mkt.) is the market leverage of the acquirer, where the numerator is book assets minus book equity and where the denominator is the market value of the acquirer. Acq. EBITDA/Assets (Book) is the acquirer's EBITDA over its book value of assets. Accounting and market capitalization data are from the last fiscal year-end before the announcement of the transaction. All dollar values are in constant 2012 dollars (millions). The definitions of the variables for the targets are identical to those for the acquirers. Median results for indicator variables are not displayed. The p-value for the differences in means (medians) across groups is from a t-test (nonparametric equality-of-medians test).

Panel A - Deal Characteristics

	Fire Sale			No Fire Sale			Difference			
	Mean	Median	N	Mean	Median	N	Mean (p-value)		Median (p-value)	
Asset Sale (%)	85.75%		428	55.90%		21,421	29.85%	(0.00)		
Public (%)	16.12%		428	19.76%		21,421	-3.63%	(0.06)		
Private (%)	21.50%		428	50.74%		21,421	-29.24%	(0.00)		
Tender Offer (%)	0.70%		428	3.72%		21,421	-3.02%	(0.00)		
Hostile (%)	0.00%		428	0.35%		21,421	-0.35%	(0.22)		
Contested (%)	6.07%		428	1.09%		21,421	4.98%	(0.00)		
Equity Only (%)	2.57%		428	17.66%		21,421	-15.09%	(0.00)		
Cash Only (%)	28.97%		428	24.49%		21,421	4.48%	(0.03)		
Conglomerate (%)	53.50%		428	56.81%		21,421	-3.30%	(0.17)		
Relative Size	34.55%	7.38%	428	23.39%	6.94%	21,421	11.16%	(0.17)	0.45%	(0.33)
Deal Value (2012 US-$)	282	51	428	457	50	21,421	-175	(0.24)	1	(0.84)

Table 3 (continued)

Panel B - Acquirer Characteristics

	Fire Sale			No Fire Sale			Difference			
	Mean	Median	N	Mean	Median	N	Mean	(p-value)	Median	(p-value)
Acq. MCAP (2012 US-$)	1,727	335	428	2,348	343	21,421	-621	(0.24)	-8	(0.93)
Acq. Tobin's Q	1.48	1.15	428	1.63	1.22	21,421	-0.15	(0.04)	-0.08	(0.00)
Acq. Leverage (Mkt.)	0.45	0.44	428	0.42	0.40	21,421	0.02	(0.05)	0.04	(0.02)
Acq. EBITDA/Assets (Book)	0.10	0.12	428	0.09	0.11	21,421	0.01	(0.32)	0.01	(0.01)

Panel C - Target Characteristics

	Fire Sale			No Fire Sale			Difference			
	Mean	Median	N	Mean	Median	N	Mean	(p-value)	Median	(p-value)
Tar. MCAP (2012 US-$)	2,982	1,128	102	8,600	684	4,469	-5,619	(0.05)	444	(0.32)
Tar. Tobin's Q	1.48	1.21	102	1.65	1.30	4,469	-0.16	(0.24)	-0.09	(0.16)
Tar. Leverage (Mkt.)	0.59	0.59	102	0.42	0.42	4,469	0.17	(0.00)	0.18	(0.00)
Tar. EBITDA/Assets (Book)	0.06	0.09	102	0.09	0.12	4,469	-0.03	(0.13)	-0.03	(0.00)

Table 4

Acquirer Announcement Return Regressions

The dependent variable is the acquirer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. The fire-sale dummy is defined in Table 1. The explanatory variables are defined in Table 3. Year FE refers to year fixed effects. Acquirer Industry FE refers to fixed effects for the acquirer's industry defined at the 3-digit SIC code level. Acquirer FE refers to acquirer fixed effects. Acquirer*Bi-annual FE refers to acquirer fixed effects estimated separately for each bi-annual period. Acquirer Industry*Year FE refers to industry fixed effects defined at the 3-digit SIC code level that are estimated on an annual basis. The Assets column refers to models estimated for acquisitions of assets or units. The Companies column refers to models estimated for full acquisitions of companies. P-values are listed in parentheses.

Table 4 (continued)

Panel A. Main specifications

	All			Target Data Available			Assets	Companies
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fire Sale	1.76	1.66	1.72	3.34	2.95	2.26	1.30	3.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.03)	(0.01)	(0.09)
Asset Sale			-0.61			-1.06		
			(0.00)			(0.07)		
ln(Acq. MCAP)			-0.94			-0.63	-0.92	-0.84
			(0.00)			(0.00)	(0.00)	(0.00)
Public			-3.49			-2.39	-1.53	-3.33
			(0.00)			(0.00)	(0.11)	(0.00)
Private			-0.37				-0.37	-0.38
			(0.02)				(0.02)	(0.42)
Tender Offer			1.92			1.06		1.87
			(0.00)			(0.01)		(0.00)
Hostile			-0.55			0.08		0.06
			(0.39)			(0.91)		(0.93)
Contested			0.02			-1.47	-1.36	0.03
			(0.97)			(0.05)	(0.25)	(0.96)
Equity Only			-0.08			-1.61	0.32	-0.07
			(0.75)			(0.01)	(0.58)	(0.83)
Cash Only			0.35			0.66	-0.04	0.76
			(0.01)			(0.02)	(0.81)	(0.00)
Unrelated			0.03			-0.11	-0.36	0.38
			(0.84)			(0.71)	(0.06)	(0.12)
Relative Size			0.12			-0.26	0.73	0.01
			(0.19)			(0.36)	(0.00)	(0.83)
ln(Deal Value)			0.53			-0.03	0.64	0.33
			(0.00)			(0.81)	(0.00)	(0.00)
Acq. Tobin's Q			0.24			0.02	0.25	0.29
			(0.02)			(0.90)	(0.09)	(0.04)
Acq. Leverage (Mkt.)			-0.70			-0.19	-0.47	-0.86
			(0.12)			(0.84)	(0.36)	(0.31)
Acq. EBITDA/Assets (Book)			-1.47			-0.05	1.48	-3.94
			(0.12)			(0.97)	(0.21)	(0.00)
ln(Tar. MCAP)						0.43		
						(0.00)		
Tar. Tobin's Q						0.08		
						(0.52)		
Tar. Leverage (Mkt.)						1.38		
						(0.08)		
Tar. EBITDA/Assets (Book)						0.31		
						(0.66)		
Year FE	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Acquirer Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	21,849	21,849	21,849	4,571	4,571	4,571	12,341	9,508
Adjusted R-squared	0.01	0.01	0.04	0.01	0.02	0.08	0.04	0.05

Table 4 (continued)

Panel B. Additional fixed effects specifications

	All			
	(1)	(2)	(3)	(4)
Fire Sale	1.58	1.59	2.48	1.77
	(0.01)	(0.01)	(0.09)	(0.02)
Asset Sale	-0.51	-0.46	-0.66	-0.52
	(0.03)	(0.07)	(0.20)	(0.12)
ln(Acq. MCAP)	-0.82	-1.05	-0.97	-1.05
	(0.00)	(0.00)	(0.11)	(0.00)
Public	-3.83	-3.25	-3.21	-3.48
	(0.00)	(0.00)	(0.00)	(0.00)
Private	-0.51	-0.10	0.06	-0.12
	(0.01)	(0.64)	(0.89)	(0.66)
Tender Offer	2.41	1.91	1.00	2.10
	(0.00)	(0.00)	(0.23)	(0.00)
Hostile	-0.03	-0.14	-0.34	0.12
	(0.98)	(0.86)	(0.86)	(0.91)
Contested	-0.34	-0.76	-0.71	-0.50
	(0.60)	(0.21)	(0.53)	(0.50)
Equity Only	-0.02	-0.38	-1.01	-0.46
	(0.95)	(0.26)	(0.22)	(0.32)
Cash Only	0.39	0.25	0.58	0.38
	(0.01)	(0.15)	(0.08)	(0.08)
Unrelated	0.05	-0.27	-0.19	-0.09
	(0.79)	(0.14)	(0.59)	(0.71)
Relative Size	0.28	0.27	0.34	0.33
	(0.38)	(0.49)	(0.56)	(0.48)
ln(Deal Value)	0.45	0.25	0.24	0.18
	(0.00)	(0.04)	(0.20)	(0.23)
Acq. Tobin's Q	0.25	0.06	0.45	0.15
	(0.03)	(0.63)	(0.31)	(0.33)
Acq. Leverage (Mkt.)	-0.26	-3.34	-1.17	-2.50
	(0.65)	(0.00)	(0.74)	(0.03)
Acq. EBITDA/Assets (Book)	-2.27	-5.20	-7.61	-6.10
	(0.02)	(0.00)	(0.13)	(0.00)
Year FE	No	Yes	No	No
Acquirer Industry FE	No	Yes	No	No
Acquirer FE	No	Yes	No	Yes
Acquirer*Bi-annual FE	No	No	Yes	No
Acquirer Industry*Year FE	Yes	No	No	Yes
N	21,849	21,849	21,849	21,849
Adjusted R-squared	0.04	0.26	0.36	0.25

Table 5

Acquirer Abnormal Returns Regressions using Competition Measures

The dependent variable is the acquirer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. Fire Sale x Contested is the interaction of the fire-sale and contested dummies which are defined in tables 1 and 3. # Firms Tar. Ind. is the number of firms on Compustat (in thousands) in the announcement year in the target's 3 digit SIC code industry. Fire Sale x # Firms Tar. Ind. is the interaction of the fire-sale dummy with # Firms Tar. Ind. # Firms Tar. Ind. > $100 mn. is the number of firms on Compustat (in thousands) in the announcement year in the target's 3 digit SIC code industry with a book value of assets of more than $100 million. Fire Sale x # Firms Tar. Ind. > $100 mn. is the interaction of the fire-sale dummy with # Firms Tar. Ind. > $100 mn. # Firms Tar. Ind. > Deal Value is the number of firms on Compustat (in thousands) in the announcement year in the target's 3 digit SIC code industry with a book value of assets larger than the value of the transaction. Fire Sale x # Firms Tar. Ind. > Deal Value is the interaction of the fire-sale dummy with # Firms Tar. Ind. > Deal Value. Fire Sale x Unrelated is a dummy which is 1 if the deal is a fire sale and in a different 3 digit SIC code industry from the acquirer's. The remaining variables are defined in tables 1, 3 and 4. Controls for deal and acquirer characteristics are included but not displayed. P-values are listed in parentheses.

	(1)	(2)	(3)	(4)	(5)
Fire Sale	1.80	1.84	1.98	2.01	1.61
	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)
Fire Sale x Contested	-1.46				
	(0.40)				
# Firms Tar. Ind.		-0.91			
		(0.00)			
Fire Sale x # Firms Tar. Ind.		-1.57			
		(0.16)			
# Firms Tar. Ind. > $100 mn.			-2.27		
			(0.04)		
Fire Sale x # Firms Tar. Ind. > $100 mn.			-7.34		
			(0.07)		
# Firms Tar. Ind. > Deal Value				0.62	
				(0.23)	
Fire Sale x # Firms Tar. Ind. > Deal Value				-5.13	
				(0.01)	
Fire Sale x Unrelated					0.21
					(0.83)
Asset Sale	-0.61	-0.60	-0.61	-0.59	-0.61
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
Acquirer Controls	Yes	Yes	Yes	Yes	Yes
Deal Characteristics Controls	Yes	Yes	Yes	Yes	Yes
Clustering by Tar. Ind.	No	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes
Acquirer Ind. FE	Yes	Yes	Yes	Yes	Yes
N	21,849	20,891	20,891	20,891	21,849
Adjusted R-squared	0.04	0.04	0.04	0.04	0.04

Table 6

Acquirer Abnormal Return Regressions as a Function of Target Industry Health

The dependent variable is the acquirer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. Ind. Quick Ratio is the mean quick ratio of the firms in the target's 3 digit SIC code industry in the year of the transaction, winsorized at the 1st and 99th percentiles. The quick ratio is defined as (current assets – inventory) / current liabilities. Fire Sale x Ind. Quick Ratio is the interaction between the fire-sale dummy and Ind. Quick Ratio. Ind. Kaplan-Zingales Index is the mean of the Kaplan-Zingales Index of the firms in the target's 3 digit SIC code industry in the year of the transaction, winsorized at the 1st and 99th percentiles. The Kaplan-Zingales Index is defined as: KZ index$_t$ = –1.001909 (Cash Flow$_t$ / PPE$_{t-1}$) + 0.2826389 Q$_t$ + 3.139193 Debt$_t$ / (Debt$_t$ + Book Equity$_t$) – 39.3678 (Dividends$_t$ / PPE$_{t-1}$) – 1.314759 (Cash$_t$ / PPE$_{t-1}$). To facilitate the display of the coefficients, the KZ index is divided by 100. Fire Sale x Ind. Kaplan-Zingales Index is the interaction between the fire-sale dummy and the Kaplan-Zingales index. Recession is a dummy which is set equal to 1 if the transaction is announced in a quarter that is a recession quarter according to the NBER. Fire Sale x Recession is the interaction of the fire-sale and recession dummies. The remaining variables are defined in tables 1, 3 and 4. Controls for deal and acquirer characteristics are included but not displayed. P-values are listed in parentheses.

	(1)	(2)	(3)
Fire Sale	2.64	1.87	1.34
	(0.00)	(0.00)	(0.01)
Ind. Quick Ratio	0.04		
	(0.36)		
Fire Sale x Ind. Quick Ratio	-0.36		
	(0.00)		
Ind. Kaplan-Zingales Index		-0.10	
		(0.12)	
Fire Sale x Ind. Kaplan-Zingales Index		1.21	
		(0.05)	
Recession			0.52
			(0.29)
Fire Sale x Recession			3.38
			(0.08)
Asset Sale	-0.63	-0.64	-0.61
	(0.00)	(0.00)	(0.00)
Acquirer Controls	Yes	Yes	Yes
Deal Characteristics Controls	Yes	Yes	Yes
Clustering by Tar. Ind.	Yes	Yes	No
Clustering by Quarter	No	No	Yes
Year FE	Yes	Yes	Yes
Acquirer Ind. FE	Yes	Yes	Yes
N	19,220	19,845	21,849
Adjusted R-squared	0.04	0.04	0.04

Table 7

Acquirer Abnormal Return Regressions as a Function of Redeployability

The dependent variable is the acquirer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. Liquidity Index is the value of all US M&A transactions in the target's 3 digit SIC code industry over the book value of assets in that industry in the year of the announcement. Fire Sale x Liquidity Index is the interaction of the liquidity index and the fire-sale dummy. Asset Redeployability is the measure of asset redeployability developed by Kim and Kung (2014) for the target firm's BEA industry in the year of the announcement. Fire Sale x Asset Redeployability is the interaction of the fire-sale dummy and the redeployability measure. The remaining variables are defined in tables 1, 3 and 4. Controls for deal and acquirer characteristics are included but not displayed. SIC<5000 indicates that the model is estimated only for acquisitions of targets with an SIC code smaller than 5000. P-values are listed in parentheses.

	All	SIC<5000	All	SIC<5000
	(1)	(2)	(3)	(4)
Fire Sale	1.94	2.16	2.65	4.25
	(0.00)	(0.00)	(0.04)	(0.00)
Liquidity Index	0.02	-0.03		
	(0.71)	(0.56)		
Fire Sale x Liquidity Index	-2.14	-2.99		
	(0.07)	(0.03)		
Asset Redeployability			2.15	2.07
			(0.01)	(0.08)
Fire Sale x Asset Redeployability			-2.33	-6.79
			(0.51)	(0.08)
Asset Sale	-0.62	-0.84	-0.71	-1.05
	(0.01)	(0.01)	(0.00)	(0.00)
Acquirer Controls	Yes	Yes	Yes	Yes
Deal Characteristics Controls	Yes	Yes	Yes	Yes
Clustering by Tar. Ind.	SIC	SIC	BEA	BEA
Year FE	Yes	Yes	Yes	Yes
Acquirer Ind. FE	Yes	Yes	Yes	Yes
N	20,462	9,530	18,643	8,524
Adjusted R-squared	0.04	0.05	0.04	0.05

Table 8

Target Announcement Returns and Regression Models

Abnormal returns are computed as cumulative residuals of the market model over the three-day period starting one day before the announcement of the transaction. The market model is estimated over the 200-day period starting 205 days before the announcement of the acquisition, where the CRSP equally-weighted market index is employed as the market proxy. Abnormal returns are expressed as a percentage. Panel A presents summary statistics. Below the mean (median) abnormal return is the p-value of a t-test (Wilcoxon test) of equality of the abnormal return to zero. The p-value for the differences in means (medians) across groups is from a t-test (nonparametric equality-of-medians test). Panel B presents regression models. The dependent variable is the target abnormal return. Target Ind. FE refers to target industry fixed effects defined at the 3-digit SIC code level. Controls for acquirer, deal and target characteristics are included but not displayed. P-values are listed in parentheses.

Panel A – Summary Statistics

	All	Fire Sale	No Fire Sale	Difference
	(1)	(2)	(3)	(2) - (3)
Mean	11.23	-0.76	11.50	-12.26
	(0.00)	(0.73)	(0.00)	(0.00)
Median	3.44	0.54	3.55	-3.02
	(0.00)	(0.18)	(0.00)	(0.00)
N	4,571	102	4,469	

Panel B – Target Announcement Return Regressions

		All		Assets	Companies
	(1)	(2)	(3)	(4)	(5)
Fire Sale	-11.16	-10.67	-5.50	-4.65	-8.47
	(0.00)	(0.00)	(0.04)	(0.06)	(0.28)
Asset Sale			-1.63		
			(0.08)		
Acquirer Controls	No	No	Yes	Yes	Yes
Deal Characteristics Controls	No	No	Yes	Yes	Yes
Target Controls	No	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Target Ind. FE	Yes	Yes	Yes	Yes	Yes
N	4,571	4,571	4,571	2,164	2,407
Adjusted R-squared	0.02	0.04	0.26	-0.02	0.17

Table 9

Combined Announcement Returns and Regression Models

Combined abnormal returns are computed as the weighted average of acquirer and target returns, using the market value of equity two days before the announcement date as the weight. If the buyer has prior ownership of the target, this effect is taken into account by reducing the target's market value. Buyer (target) abnormal returns are defined in Table 2 (8). More specifically, combined returns are computed as:

$$\frac{CAR_B(MV_B) + CAR_T(MV_T - OWN_B^T MV_T)}{MV_B + MV_T - OWN_B^T MV_T},$$

where CAR is the abnormal return of either the buyer (B) or the target (T), MV is the market value of equity, and OWN_B^T is the fraction of the target owned by the buyer before the announcement of the bid. Panel A contains summary statistics. Below the mean (median) abnormal return is the p-value of a t-test (Wilcoxon test) of equality of the abnormal return to zero. The p-value for the differences in means (medians) across groups is from a t-test (nonparametric equality-of-medians test). Panel B presents regression models. The dependent variable is the combined abnormal return. Acquirer Ind. FE refers to acquirer industry fixed effects defined at the 3-digit SIC code level. Controls for acquirer, deal and target characteristics are included but not displayed. P-values are listed in parentheses.

Panel A – Summary Statistics

	All	Fire Sale	No Fire Sale	Difference
	(1)	(2)	(3)	(2) - (3)
Mean	1.28	1.79	1.27	0.52
	(0.00)	(0.01)	(0.00)	(0.39)
Median	0.69	0.50	0.70	-0.19
	(0.00)	(0.01)	(0.00)	(0.32)
N	4,571	102	4,469	

Panel B – Combined Announcement Return Regressions

		All		Assets	Companies
	(1)	(2)	(3)	(4)	(5)
Fire Sale	0.16	-0.01	0.38	1.01	-1.69
	(0.78)	(0.98)	(0.54)	(0.12)	(0.31)
Asset Sale			-0.14		
			(0.67)		
Acquirer Controls	No	No	Yes	Yes	Yes
Deal Characteristics Controls	No	No	Yes	Yes	Yes
Target Controls	No	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Acquirer Ind. FE	Yes	Yes	Yes	Yes	Yes
N	4,571	4,571	4,571	2,164	2,407
Adjusted R-squared	0.03	0.03	0.09	0.03	0.13

Table A1

Nearest-Neighbor Matching

This table contains the result of a nearest neighbor matching approach, using the Mahalanobis distance. Each fire-sale transaction is matched to 5 regular transactions. Asset sales are always matched to asset sales and complete acquisitions to complete acquisitions. Column 1 (3) indicates whether the transactions are matched on acquirer (target) characteristics. These characteristics are the logarithm of the market capitalization of equity, Tobin's Q, market leverage, and profitability. Column 2 (4) indicates whether the transactions are perfectly matched on the 3 digit SIC code of the acquirer (target). Column 5 indicates whether the transactions are perfectly matched on the form of payment. Column 6 reports the average treatment effect for the treated, which is the extra return earned by firms involved in fire-sale acquisitions compared to firms involved in regular acquisitions. The p-value is reported in parentheses. Column 7 reports the number of fire-sale transaction that we are able to match given the matching variables used. Panel A reports the results for acquirer returns. Panel B reports the results for target returns.

Table A1 (continued)

Panel A – Acquirer Returns

Nearest Neighbor Matching on Acquirer Chars.	Exact Matching on Acquirer Industry	Nearest Neighbor Matching on Target Chars.	Exact Matching on Target Industry	Exact Matching on Form of Payment	Average Treatment Effect for the Treated (p-value)	# Fire-Sale Deals Matched
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Yes	No	No	No	No	1.83 (0.00)	428
Yes	Yes	No	No	No	1.93 (0.00)	407
No	No	Yes	No	No	3.33 (0.00)	102
No	No	Yes	Yes	No	3.41 (0.01)	81
Yes	No	Yes	No	No	3.20 (0.00)	102
Yes	No	No	No	Yes	1.76 (0.00)	428
Yes	Yes	No	No	Yes	2.06 (0.00)	376
No	No	Yes	No	Yes	2.61 (0.03)	102
No	No	Yes	Yes	Yes	2.86 (0.08)	67
Yes	No	Yes	No	Yes	3.23 (0.01)	102

Panel B - Target Returns

Nearest Neighbor Matching on Acquirer Chars.	Exact Matching on Acquirer Industry	Nearest Neighbor Matching on Target Chars.	Exact Matching on Target Industry	Exact Matching on Form of Payment	Average Treatment Effect for the Treated (p-value)	# Fire-Sale Deals Matched
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Yes	No	No	No	No	-8.53 (0.00)	102
Yes	Yes	No	No	No	-6.38 (0.03)	83
No	No	Yes	No	No	-7.97 (0.00)	102
No	No	Yes	Yes	No	-7.13 (0.00)	81
Yes	No	Yes	No	No	-5.82 (0.01)	102
Yes	No	No	No	Yes	-6.91 (0.01)	102
Yes	Yes	No	No	Yes	-7.15 (0.02)	65
No	No	Yes	No	Yes	-6.74 (0.01)	102
No	No	Yes	Yes	Yes	-5.22 (0.05)	67
Yes	No	Yes	No	Yes	-5.35 (0.01)	102

Table A2

Acquirer Abnormal Return Regressions Using Weaker Definitions of Target Distress

The dependent variable is the acquirer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. The Target Z-score is computed as (3.3 EBIT + Sales + 1.4 Retained Earnings + 1.2 Working Capital) / Assets. The Target Zmijewski-score is computed as –4.3 – 4.5 Net Income/Total Assets + 5.7 Total Debt/Total Assets – 0.004 Current Assets/Current Liabilities. Target Interest Not Covered is an indicator variable which is one if the ratio of EBITDA to interest expenses is less than 0.8. The remaining variables are defined in tables 1, 3 and 4. Controls for deal, acquirer and target characteristics are included but not displayed. P-values are listed in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Fire Sale				2.28	2.22	2.26
				(0.03)	(0.03)	(0.03)
Target Z-score	0.03			0.04		
	(0.62)			(0.56)		
Target Zmijewski Score		0.09			0.07	
		(0.41)			(0.51)	
Target Interest Not Covered			0.12			0.03
			(0.84)			(0.96)
Asset Sale	-1.00	-1.01	-1.00	-1.07	-1.07	-1.06
	(0.09)	(0.09)	(0.09)	(0.07)	(0.07)	(0.07)
Acquirer Controls	Yes	Yes	Yes	Yes	Yes	Yes
Deal Characteristics Controls	Yes	Yes	Yes	Yes	Yes	Yes
Target Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4,571	4,571	4,571	4,571	4,571	4,571
Adjusted R-squared	0.08	0.08	0.08	0.08	0.08	0.08