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The Bright Side of Fire Sales

Finance Working Paper N° 435/2014
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Abstract

Firms that buy assets in fire sales earn excess returns that are two percentage points higher than in regular acquisitions. The mechanism behind this result is the reduced bargaining power of the seller. We find no difference in real effects or in the combined returns for buyers and sellers between fire sales and regular acquisitions, suggesting that the quality of the match is similar in both types of transactions. The externalities of fire sales for other stakeholders are limited. These results indicate that the welfare losses associated with fire sales are smaller than previously thought.

Keywords: Fire Sales, Mergers and Acquisitions, Distress, Bankruptcy, Restructuring, Bailouts

JEL Classifications: G14, G32, G33, G34, G38, H81

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This Draft: October 2018

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The Bright Side of Fire Sales

Abstract

Firms that buy assets in fire sales earn excess returns that are two percentage points higher than in regular acquisitions. The mechanism behind this result is the reduced bargaining power of the seller. We find no difference in real effects or in the combined returns for buyers and sellers between fire sales and regular acquisitions, suggesting that the quality of the match is similar in both types of transactions. The externalities of fire sales for other stakeholders are limited. These results indicate that the welfare losses associated with fire sales are smaller than previously thought.

1. Introduction

An extensive literature documents the costs associated with fire sales of corporate assets, real estate, and equity and debt securities.[1] While the focus of this literature has been on the losses suffered by sellers in fire-sale transactions, little is known about the effect of fire sales on the wealth of the buyers of these assets. This 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 distressed firms. Several years after 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.

Fire sales are forced sales of assets, which often happen at a dislocated price (Shleifer and Vishny (2011)). The sale is forced because the seller needs the proceeds to satisfy creditors or meet other cash shortfalls. The resulting price is often dislocated because not all potential buyers are in a position to acquire the asset and the transaction cannot be postponed until a higher price can be achieved. As a result, the highest value user may not become the owner of the asset, reducing overall welfare. Furthermore, if the

[1] Pulvino (1998) shows that distressed airlines sell planes at discounts of 10% to 20%. Fire sales 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)). Coval and Stafford (2007) document that stocks sold by distressed mutual funds experience negative abnormal returns. Jotikasthira, Lundblad, and Ramadorai (2012) find fire-sale effects in emerging market equity prices caused by fund flows in developed markets. Acharya, Bharath, and Srinivasan (2007) document that the anticipation of potential fire sales reduces the recovery rates of defaulted bonds. See Shleifer and Vishny (2011) for a survey of the fire-sale literature.

company is sold piecemeal, the going concern value of the firm may not be preserved. This could lead to layoffs and a potential disruption of the supply chain, affecting both suppliers and customers (Goolsbee and Krueger (2015)). Further externalities could accrue to the industry peers of the seller if the asset sale places downward pressure on the value of similar assets held by non-distressed firms (Benmelech and Bergman (2011) and Campbell, Giglio, and Pathak (2011)). Bailouts avoid the fire sale discount and its associated negative externalities, but they may increase moral hazard in the future (Duchin and Sosyura (2014)), and bailouts could be distorted due to political connections (Faccio, Masulis, and McConnell (2006), Duchin and Sosyura (2012)). Moreover, receiving a bailout can subject firms to political influences, which can yield to distortions in corporate policies (Chavaz and Rose (2018)). Importantly, bailouts should not be contemplated without considering the bright side of fire sales, which is that buyers of distressed assets may gain from the acquisition. These positive gains can offset some of the negative consequences of fire sales, thereby reducing the need for a bailout. We explore the buyers' gains in fire sales in this paper. In addition, we shed light on many of the aforementioned externalities.

The ideal laboratory to study whether buyers gain in fire sales 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. 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 focus on an exhaustive set of 428 transactions involving distressed sellers and their buyers over the period of 1982-2012. Transactions are classified as fire sales if the seller is in bankruptcy or liquidation at the time of the transaction or if the seller is undergoing a debt restructuring.

The key result of the paper is that announcement returns to buyers are approximately two percentage points higher in fire sales than in regular M&A transactions. This finding is robust to controlling for buyer and deal characteristics, focusing on public sellers, on acquisitions of entire companies or acquisitions of 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. We also confirm that buyers earn excess returns in fire sales if we study stock returns up to the completion of the transaction. This establishes

a longer-term effect of fire sales and also addresses the concern that fire sales differ with respect to anticipated deal completion relative to regular deals. 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 fire-sale acquisitions.

An additional contribution of our paper relative to the existing literature on fire sales is that we uncover the mechanism behind our results, which is that the seller's bargaining power in a fire sale is reduced. We start the investigation of the mechanism by asking why the gains for buyers in fire sales are not competed away, given that they are so large. We first document that there are actually more contested acquisitions when the seller is undertaking a fire sale. Thus, a lack of explicit competition cannot explain our findings. We then explore whether there is less implicit competition for sellers by considering the number of other potential buyers from the same industry. We find reduced buyer returns in fire sales when there are many large firms in the seller's industry.

We continue our investigation of the mechanism by employing additional proxies for bargaining power. Returns to acquiring assets in a fire sale are higher when other firms in the seller's industry have low liquidity and are financially constrained. We also document higher buyer returns during economic contractions, when there are likely to be fewer potential buyers with deep pockets. Buyer returns are also lower when the M&A market in the seller's industry is more liquid. Finally, buyer returns are higher when the seller's assets have fewer alternative uses. These factors all reduce the bargaining power of the sellers.

For acquisitions from sellers that are in bankruptcy, we show that measures of creditor control, which reduce the seller's bargaining power, yield additional gains for the buyers. Thus, even within the sample of fire sales, our proposed mechanism has explanatory power for buyer returns.

To conclude our investigation of the mechanism, we use a measure developed by Ahern (2012) to capture the relative gain of the buyer versus the seller. We find that the buyer's share of the gains is significantly higher in fire sales compared to regular acquisitions.

Next, we study the real effects associated with fire sales. We do not find that fire sales yield better accounting performance for the buyers after the acquisitions, or that fire sales are more or less successful

based on news reports in the years after the transaction. This indicates that the buyer returns are not due to a higher quality match between the buyer and the seller or the revelation of good news about the buyer. Instead, these results support our argument that buyers are able to purchase assets at a low, dislocated price.

In addition, we rule out an exhaustive set of alternative explanations for the key result that buyers gain substantially in fire sales: reward for risk-taking, risk-shifting, unique buyer assets, informational advantage on the part of the buyer and/or seller, and deal anticipation on the buyer's side.

We also compute the returns earned by the public sellers and the combined shareholder wealth gains associated with the acquisitions in our sample. The shareholders of seller 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 selling firms, but, unfortunately, not enough sellers have listed debt outstanding to allow us to investigate this in detail. Combined buyer and seller returns accruing to shareholders are indistinguishable for fire sales versus regular acquisitions. We recognize that the seller's shareholders might anticipate a fire sale, such that it is already partially priced into the seller's share price. This would imply that we overstate the seller's announcement returns and the combined gains. However, the fact that fire sales do not have worse post-acquisition operating performance or success rates is consistent with announcement returns that are similar to those of regular acquisitions. We also compute that more than half of the value loss associated with fire sales would have to be imbedded in the seller's share price for the combined gains in fire sales to be significantly lower than in regular transactions, which seems unlikely given the above evidence on the quality of the match.

Finally, we study the externalities of fire sales. We find no difference between fire sales and regular transactions in the stock price response of the seller's peers, its customers, and its suppliers. We do find a decline in employment relative to regular acquisitions, but not relative to bankruptcy restructurings that are not accompanied by asset sales.

Overall, our analysis considers a large number of stakeholders that could be negatively affected by a fire sale but finds little evidence for such negative effects. The main effect of fire sales is a wealth transfer from the seller to the buyer. This implies that from a welfare perspective, the costs associated with fire sales

of corporate assets are much smaller than previously thought based on an analysis of seller costs only. From a policy perspective, these findings indicate that the merits of bailouts as a response to the potential losses associated with fire sales are limited, especially given the moral hazard and the other distortions caused by bailouts.

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 document positive buyer returns for a sample of 41 acquisitions of bankrupt companies. We compare fire sales to a sample of regular acquisitions to identify the fire-sale effect. In addition, we study the mechanism behind the findings (reduced bargaining power), and link these findings to the fire-sale literature.

The literature on asset sales documents positive returns to buyers and sellers in the transaction (see, for example, Hite, Owers, and Rogers (1987) and Sicherman and Pettway (1987)), and there is also some evidence that buyers earn higher returns when sellers perform poorly (Sicherman and Pettway (1992) and Datta, Iskandar-Datta, and Raman (2003)).[2] However, many of the findings we report control for seller and buyer performance in general, and we continue to find a sizeable excess return for buyers in fire sales. In addition, we study the mechanism behind our findings in greater detail. Maksimovic and Phillips (2001) document that productivity increases post asset sale for the purchased plants if the buyer is more productive than the seller, and Maksimovic and Phillips (1998) show that bankrupt firms sell their more productive assets. However, these results do not imply that buyers earn higher excess returns in fire sales, because what matters is the price at which the assets can be purchased.

Our analysis of the relation between creditor control and buyer gains in acquisitions where the seller is bankrupt also contributes to the literature on the changing nature of Chapter 11 over time (see Skeel

[2] Sichermann and Pettway (1992) find higher buyer dollar returns when the seller was recently downgraded. Our findings continue to hold if we include this control, but the downgrade dummy itself is insignificant. Datta, Iskandar-Datta, and Raman (2003) find that buyer returns are higher when there is monitoring by private lenders. Our findings continue to hold when we control for the ratio of bank debt to total debt, but this ratio itself is insignificant. We do not include these proxies in our main specification because they are only available for 12% and 23% of our sample, respectively.

(2003), Ayotte and Morrison (2009), and Bharath, Panchapagesan, and Werner (2010)) and the literature on bankruptcy and the resolution of financial distress more broadly.

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 literature reviews). Understanding the nature of the transactions that do create significant shareholder wealth is therefore of chief importance.

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 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 buyers and sellers. Second, we require the shares of the buyer 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 buyer. Third, for acquisitions of entire companies, the buyer needs to own more than 50% of the firm 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 seller and buyer 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 the buyers needs to be available on Compustat. Finally, to have transactions of importance to the buying firm, we remove deals for which the transaction value is less than 1% of the market value of the buyer 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 variables listed on the SDC database: (1) the seller 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 seller's management is no longer fully in control of the decision making process 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 in the final sample. Without applying any of the sample selection criteria, except that the transaction involves a US corporate buyer and seller, 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.

To further assess whether these transactions are indeed fire sales, we search through SEC filings for information on who initiated the deal and how the assets are sold.[4] The fire sales are seller initiated in 99%

[3] Feldhütter, Hotchkiss, and Karakaş (2016) show that creditor control is priced around defaults and bankruptcy filings.
[4] As in Ahern and Sosyura (2014), we search through the following filings to find the information: DEFM14A, DEFA14A, DEFR14A, DEF14A, PREM14A, PRER14A, S-4/A, S-4, 424B3, 424B2, F-4, 497, 10-K, 8-K, N-148C/A, SC13E3, SC13E3/A, and SCTO-T/A. In addition, because we study asset sales in addition to mergers, we also search 10-Q, 10-12G/A, 10-K/A, 10-K405, 10-K405/A, 10-Q/A, 10KSB, 10KSB40, 10KT405, 10QSB, 10QSB/A, 11-K, 15-12B, 15-12G, 424A, 424B1, 424B4, 424B5, 425, 486BPOS, 8-A12B, 8-A12B/A, 8-A12G, 8-A12G/A, ARS, DEF

of the transactions for which we could find information (183 out of 185 transactions with sufficient information) and 69% are sold through an auction (104 out of 150 transactions with sufficient information). This is mainly a reflection of the fact that about three quarters of our fire sales are out of bankruptcy and auctions are the most natural sales process to dispose assets in a bankruptcy.[5] These figures are significantly higher than for a set of matching transactions[6] (71% seller initiated and 7.5% auctions) and the figures reported in the literature (Aktas, de Bodt, and Roll (2010), Boone and Mulherin (2007), Masulis and Simsir (2018)). We also compare the motives for the acquisition for fire sales and regular transactions. The motive for the deals is reported as *purpose codes* in SDC for the vast majority of the transactions from 2000 onwards. While the purpose codes are often constructed from the buyer's perspective, we nevertheless find that 16.5% of all fire sales are classified as 'Sell a loss making/bankrupt operation', compared to 0.1% of regular deals.[7]

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, after which there is a substantial decline in their number. This does not imply that fire sales have become less relevant, however. In fact, there is no evidence of a decline in fire sales if we consider all buyers and not just listed buyers (not reported in the table), which suggests that more of the recent buyers in fire sales are private entities, such as private equity firms and vulture funds.

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

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14C, DEFM14C, DEFS14A, DFAN14A, NT 10-K, NT 10-Q, NTN 10K, POS AM, PRE 14A, PRE 14C, PREC14A, PREM14C, PRES14A, S-3, S-3/A, S-3MEF, S-8, SC 13D, SC 13D/A, SC 13G, SC 13G/A, SC 14D1, SC 14D1/A, SC 14D9, SC 14D9/A, SC TO-I, and SC TO-T filings.

[5] See Trans World Airlines, Inc. bankruptcy (Case No. 01-00056), United States Bankruptcy Court for the District of Delaware, April 2, 2001.

[6] We employ the first matching procedure outlined in Appendix 2 (matching on the logarithm of the market capitalization of equity, Tobin's Q, market leverage, profitability, and the asset sale dummy), except that we only pick the closest matching firm.

[7] We also find that 4.6% of all fire sales are classified as: 'proceeds used to pay down existing outstanding debt,' compared to 0.9% for regular deals. We find little difference between fire sales and regular transactions in the frequency of the other purpose codes.

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 seller for 21% of the transactions (n=4,571), and 102 of these are fire sales.

3. Buyer Abnormal Returns

We start by documenting cumulative abnormal returns earned by the buyers 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.[8] In the process, we drop one observation where a buyer in a regular acquisition earns abnormal returns in excess of 400%.[9]

Panel A of Table 2 shows positive abnormal returns of 1.24%, on average, which is similar to the 1.10% figure reported in Netter, Stegemoller, and Wintoki (2011). 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: buyer 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. Panel B shows 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 seller is in distress.

Next, we verify that the above results also hold in a multivariate setting. We control for buyer 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 payment,[10]

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[8] A minimum of 100 observations are required to estimate the market model.

[9] This buyer has a market value of less than $1 million with very low or zero trading volume in the run up to the announcement date. Our subsequent findings are essentially unaffected if we include this transaction in our sample.

[10] 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.

unrelated (the three-digit SIC codes of the seller and buyer are different), the seller of the assets is public or private (the excluded category is that the seller 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 buyer. Finally, we control for buyer 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 buyer and seller 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. For example, fire-sale acquisitions are more likely to involve asset sales (86% versus 56%) and buyers in fire sales have lower Q ratios (mean of 1.48 versus 1.63). These differences underscore the importance of controlling for buyer and deal characteristics.

Panel A of Table 4 contains the regression models. In model (1), we include buyer industry fixed effects, defined at the three-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 buyer characteristics that have been employed as control variables in prior work. While the explanatory power of this specification increases substantially, our finding that buyers 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), Fuller, Netter, and Stegemoller (2002), and Moeller, Schlingemann, and Stulz (2004, 2005)), we find that buyer returns are lower when they acquire listed companies and have a low Q ratio; large buyers also make worse acquisitions. Abnormal returns are higher for larger deals, when the buyer 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 selling firm's characteristics. We first report models that include buyer industry

fixed effects (model (4)) and both buyer industry and year fixed effects (model (5)) before presenting the full model with transaction, buyer, and seller controls (model (6)). The economic significance of our findings is even larger in these models. According to model (6), buyers earn an extra 2.26 percentage points abnormal return when acquiring assets in a fire sale from a listed seller.

In columns (7) and (8), we estimate separate regression models for acquisitions of assets and acquisitions of entire companies. Buyer 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 buyer characteristics. While we include industry and year fixed effects in the models reported in Panel A, it is possible that the impact of industry on buyer returns varies over time. Thus, we interact industry with year fixed effects and report the results in model (1) of Panel B. For the sake of parsimony, we do not report the coefficients on the control variables in this panel. Our result persists with a coefficient on the fire-sale dummy of 1.58 (*p*-value=0.01). It is also possible that time invariant unobservable buyer characteristics drive our results. Therefore, we include buyer 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 buyer characteristics. Of course, buyer unobservables may change over time. Unfortunately, it is impossible to include separate buyer fixed effects for each year in the sample because identification in this specification would come from firms making both fire-sale and non-fire-sale acquisitions in the same year, but very few firms do so. However, we 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 Panel C of Table 4, we assess whether our findings are due to influential observations or because we employ a short event window. In model (1), we re-estimate our base case model with all controls (model (3) of Panel A) after winsorizing abnormal returns at the 1% level. Buyers in fire sales earn 1.51 percentage points additional abnormal returns in this specification, which is only slightly below the base case estimate. Model (2) is estimated using median regressions instead of OLS. Our findings also persist, and while the reported excess return of fire sales buyers of 82 basis points is lower than in the other regressions, it is in line with the univariate median results reported in Table 2. In model (3), we cumulate returns from the day before the announcement of the transaction until the day after the deal closes. While these longer-term returns are noisier than the announcement effect traditionally studied in the M&A literature, they fully reflect the resolution of any uncertainty about the deal. If a firm makes both a regular acquisitions and a fire sales over this window, we remove both transactions because the transaction type is undefined. We also remove overlapping fire sales because we would be double counting the fire-sale effect. The fire-sale effect in this specification is 3.13%, confirming that buyers gain substantially in such transactions. These results also indicate that the differential announcement effect is not due to anticipated differences in the likelihood of deal completion. To maximize the signal-to-noise ratio and for consistency with the M&A literature (see, for example, Moeller, Schlingemann, and Stulz (2004, 2005) and Netter, Stegemoller, and Wintoki (2011)), our subsequent tests employ the short-run announcement effect as the dependent variable.

To further assess whether our findings could be due to influential observations, we conduct a placebo test in which we pool all the fire sales and regular transactions and randomly pick a sample of 428 placebo fire sales. We then conduct our main analyses using this placebo sample, and repeat this exercise 10,000 times. Only in 4 cases out of 10,000 do we find a fire-sale effect that is larger than what we report in the paper, and the mass of the distribution of the point estimates is also far to the left of our base case estimate of 1.72 percentage points.

In sum, buyer abnormal returns are significantly higher when the transaction is a fire sale compared to a regular acquisition, and this result survives many robustness checks. While much of the literature has focused on the cost to the sellers associated with fire sales, this new finding indicates 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 buyers in fire-sale transactions with buyers in regular transactions using a nearest-neighbor matching approach. In Appendix 3, we present results for buyer returns when using weaker measures of distress.

4. Mechanism

In this section, we study why buyers 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 seller. We argue that reduced bargaining power on the part of the seller leads to higher buyer returns. In these specifications, we revert to model (3) of Panel A of Table 4. This base case includes buyer 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 of Table 4.

4.1. Competition for distressed sellers

If firms can obtain substantial returns from buying assets in a fire sale, why are these gains not competed away by other bidders? We start this analysis by exploring whether fire sales are less likely to be contested, defined by SDC as having multiple bidders. We 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, buyers 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 buyer

return regression (model (3) of Panel A of Table 4) with the contested dummy.[11] As reported in column (1) of Table 5, this interaction is insignificant (coefficient of -1.46 with a *p*-value of 0.40).

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 seller's three-digit SIC code industry in the Compustat database. Shleifer and Vishny (1992) suggest that these are the firms that can make the best use of the seller'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, potential sellers can always walk away if the price is deemed inadequate. Therefore, we include this measure as an additional explanatory variable 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 seller industry three-digit SIC code level. The coefficient on the number of firms in the seller's industry is negative and significant at the 1% level, but there is little evidence that this effect strengthens when the seller 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 seller'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. We therefore conduct two alternative tests. 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. Column (3) illustrates that there is a negative relation between the number of large firms in the seller's industry and buyer abnormal returns for all transactions, and 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 buyer 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

[11] We already control for the main effect of competition. Here we also study its interaction with fire sales.

the sellers in a given industry only matters for buyer returns in fire sales. This evidence supports the view that implicit competition for distressed sellers affects the returns earned by their buyers.

Finally, we investigate whether buyer returns are higher for fire sales if they are in the same industry as the seller. Shleifer and Vishny (1992) point out that buyers from the same industry are likely to achieve higher synergies in an acquisition and can therefore afford to pay the highest price. We now test whether the impact of unrelated acquisitions differs across fire sales and regular transactions but this hypothesis is rejected as illustrated in Model (5) of Table 5.

4.2. Industry financial health and the gains from acquisitions

The literature on fire sales 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. To examine this, we explicitly incorporate seller *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 financially constrained. The Kaplan-Zingales (KZ) index at time *t* is defined as (see Kaplan and Zingales (1997) and Lamont, Polk and Saá-Requejo (2001)):

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

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 a firm is more financially constrained. We compute these measures at the three-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 outliers.[12] If buyers of distressed assets experience higher announcement returns because potential industry buyers do not have the means to make an 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.[13] We also include the industry health measures separately to assess whether they affect buyer returns for regular acquisitions. Standard errors in these models are clustered at the seller industry level. Both models show that fire sales are particularly rewarding for buyers when the other firms in the seller's industry are in weaker financial health. The economic magnitude of the effect varies. Increasing the seller industry quick ratio from its 25th percentile to its 75th percentile reduces buyer abnormal returns for fire sales by 62 basis points relative to regular acquisitions, while increasing the seller industry KZ index from its 25th percentile to its 75th percentile is associated with buyer returns that are 29 basis points higher for fire sales compared to regular acquisitions.[14] Thus, the lack of liquidity in the seller's industry appears to be a stronger driver of buyer returns than financial constraints in general. As mentioned previously, the lack of significance of these measures for regular acquisitions may be due to the fact that in those transactions the potential seller 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 buyers 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. Buyers of assets in fire

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

sales earn 1.34 percentage points more than regular buyers during normal times, but this difference increases by 3.38 percentage points during recessionary periods.

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 seller is reduced because the most obvious buyers of the assets – 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 buyers 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 seller'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.

An alternative approach proposed by Kim and Kung (2017) employs data from the Bureau of Economic Analysis (BEA) capital flow table. They employ a 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 two 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 is 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. We therefore estimate the Kim and Kung (2017) measure only for the following capital-intensive industries: agriculture, construction, natural resources, manufacturing, transportation, and utilities (SIC codes below 5000).

In our analyses, we employ both the asset liquidity and redeployability proxies. We compute the asset liquidity measure at the three-digit SIC code level, in line with the other analyses 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 (2017)'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 fire-sale dummy. We cluster standard errors at the industry level at which the proxies are defined.

Table 7 contains our findings. We find strong evidence that fire-sale acquisitions in industries with a more liquid M&A market yield lower buyer returns. Increasing the liquidity index from its 25th percentile to its 75th percentile leads to a decline in buyer returns in fire sales of 32 basis points. Using the measure of asset redeployability developed by Kim and Kung (2017), we find that an increase in redeployability from its 25th to its 75th percentile leads to a decline in buyer 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.[15]

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

[15] The coefficient on the redeployability measure for regular transactions is positive, which appears counterintuitive. It turns out that combined buyer and seller returns are marginally higher for transactions in which sellers 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 focus on the returns earned in fire sales by buyers who purchase assets out of bankruptcy. We pay particular attention to these transactions for two reasons. First, studying bankruptcies allows us to develop additional proxies for the seller's bargaining power. As such, we can further test our conjecture that this is the mechanism explaining excess buyer returns. Second, a recent literature on the changing nature of Chapter 11 reveals an emerging consensus that the bargaining power between creditors and the debtor/the debtor's management in Chapter 11 has been changing over time, from more debtor friendly in the 1980s to more creditor friendly in the 1990s and 2000s (see, for example, Skeel (2003), Ayotte and Morrison (2009), and Bharath, Panchapagesan, and Werner (2010)). We contribute to this literature on the changing nature of Chapter 11, and to the literature on bankruptcy and the resolution of financial distress more generally by investigating whether differences in creditor control affect the pricing of M&A deals in bankruptcy.

Two innovations are at the heart of these changes in creditor control: Debtor-in-possession (DIP) financing and key employee retention plans (KERPs). Through DIP financing, companies in bankruptcy can obtain additional financing with super priority over pre-bankruptcy debt claims. According to Skeel (2003) and Baird and Rasmussen (2003, 2010), 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, bankrupt companies. 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 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 and KERPs. In fact, these tools have been available as part of bankruptcy reorganizations for a long time. But DIP financing and the adoption of KERPs grew substantially during the 1990s compared to the earlier period (Bharath, Panchapagesan, and Werner (2010)). According to Skeel (2003) the contractual features of KERPs are now also more aligned with the interests of creditors. 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 buyer returns in fire sales by bankrupt firms, we construct a creditor control metric that ranges from zero to two depending on whether DIP financing and/or a KERP plan is in place. These data are gathered from various sources: SEC filings, Factiva, Google searches, the LoPucki bankruptcy database (http://lopucki.law.ucla.edu), and LPC Dealscan. Out of 297 transactions for which we have data, 77 have a DIP, but no KERP, 12 have a KERP but no DIP and 42 have both. We then estimate a regressions of buyer returns on the creditor control variable. To be consistent with prior work (see, for example, Jiang, Li, and Wang (2012), Kalay, Singhal, and Tashjian (2007), Ayotte and Morrison (2009)), we control for a large number of other aspects of the bankruptcy process in these regression models: (a) whether the sale was under section 363 of the bankruptcy code; (b) whether the bankruptcy was a prepackaged or prenegotiated transaction[16]; (c) whether the bankruptcy ended up as a liquidation (Chapter 7) instead of a reorganization (Chapter 11); (d) whether the bankruptcy was filed in the state of Delaware or not; (e) whether the bankruptcy was voluntary or not; (f) whether there was a 'stalking horse' bidder.[17] All these data are also obtained from the aforementioned data sources.

[16] A bankruptcy is pre-packaged if the debtor drafted the reorganization plan, submitted it to a vote of the impaired classes, and claimed to have obtained the acceptances necessary for consensual confirmation before filing the case. In a pre-negotiated bankruptcy, the debtor may have an agreement with a large creditor, but not the other creditors and a vote has not taken place.

[17] A stalking horse is a potential bidder selected by the seller or its investment bank, who commits to buying the assets at a pre-specified price in case a higher price does not materialize during the auction.

The results of this regression are reported in Table 8. As in our base case regression, the model also contains deal and buyer controls. The results show that within the sample of fire sales by bankrupt companies, each unit of creditor control increases buyer returns by 1.73 percentage points. Thus, even among fire sales, features that reduce seller bargaining power lead to additional buyer gains, providing further support for the mechanism behind our findings. These results support the view that creditor control benefits buyers of assets in bankruptcy.[18]

6. Real Effects

Our analyses thus far have focused on the stock price response surrounding the announcement of the acquisition. In this section, we investigate the real effects of the acquisition by studying post-merger accounting performance of the buyer, qualitative measures of the success or failure of the acquisition, and whether the assets were retained or disposed (see Kaplan and Weisbach (1992) for a similar approach). We track the assets for three years after the acquisition. Accounting data are obtained from Compustat for all sample firms. Information on the success of the acquisition and what happens to the assets that were acquired are obtained from news searches on Factiva. We gather this information for all fire sales as well as for a matching sample of regular transactions using the matching approach discussed in Appendix 2, except that we only use the closest matching firm.

We measure operating performance as the change in the buyer's industry-adjusted EBITDA/Assets from the year prior to the acquisitions up to 3 years after the acquisition closes. As in our prior analyses, industry is defined at the three-digit SIC code level. We then estimate regressions of performance, expressed as a percentage, as a function of the fire-sale dummy and all the acquisition and buyer controls that we employ in our prior regressions. Panel A of Table 9 contains the results. We find no evidence that the accounting performance of buyers in fire sales is better compared to regular acquisitions. This illustrates

[18] Gilson, Hotchkiss, and Osborn (2016) 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 transactions 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.

that the source of the excess returns earned around the announcement of the acquisition is not the expected improvement in performance.

We also study whether the announcement returns are related to post-acquisition performance improvements. To do so, we re-estimate our base case model, but include post-acquisition performance and its interaction with the fire sale dummy as additional explanatory variables. We report the results in Panel B of Table 9. We find a positive relation between announcement returns and post-acquisition performance, but the effect is only significant when performance is measured one year after the acquisition. Beyond year one, the relation is not estimated very precisely. Also note that the relation between announcement returns and accounting performance is the same for fire sales and regular deals. Importantly, the fire sale dummy remains positive and highly significant in these specifications. This result implies that the fire-sale effect is not due to anticipated performance improvements, but the ability of the buyer to secure a better price in a fire sale.

In unreported models, we further examine whether there is a relation between post-merger performance and the bargaining power proxies discussed in Section 4. We find that the bargaining power proxies are unrelated to the quality of the match.

Next, we investigate whether the acquisitions are successful according to news reports. Acquisitions are divided into three groups: success, neutral, and failure, based on press reports and financial releases in Factiva and on Google searches. Panel C of Table 9 contains the distribution of the outcomes. There is little difference between fire sales and regular acquisitions in terms of outcome, and a Chi-square test does not reject the hypothesis that outcome and type of acquisition are independent.[19] In Panel D of Table 9, we track what happens to the assets. The vast majority of the assets are retained and operated continuously, but this fraction is even higher for fire sales (85%) than for regular acquisitions (78%). Thus, buyers are not earning abnormal returns based on the expectation that they can 'flip' the assets at a profit. We do find that the assets bought in a fire sale are slightly more likely to be shut down or downsized (6%)

[19] We also confirm that there is no relation between deal outcome and acquisition type after controlling for acquisition and buyer characteristics in a multinomial logit model.

than those bought in regular acquisitions (4%). Finally, in Panel E of Table 9 we relate the announcement returns to success or failure and whether the assets are divested or not, while including the fire sale dummy. Model (1) illustrates that the announcement return of acquisitions that are eventually deemed to be a failure have announcement returns that are 3.9 percentage points lower than acquisitions in the neutral category (the omitted category). Successful acquisitions have higher announcement returns, but the effect is not significant. Importantly, after controlling for the outcome, we continue to find that fire sales yield higher announcement returns of 1.9 percentage points relative to regular acquisitions. In model (2) we assess whether announcement returns are related to whether the assets will be retained or not. As in Kaplan and Weisbach (1992), we find no evidence that announcement returns are related to whether the assets are sold or not (the omitted category is 'retain assets'); however, acquisitions that are eventually shut down or downsized are associated with a negative stock price response of more than five percentage when announced. Importantly, the fire-sales effect remains strong and positive at 2.18 percentage points.

Overall, the analysis in this section provides additional support for our conclusion that the abnormal announcement returns in fire sales are due to the strong bargaining position of the buyer.

7. Alternative Interpretations

The results presented so far indicate that buyers earn excess returns in fire sales due to the weak bargaining position of the selling firm. In this section, we consider a number of additional alternatives for our results and conduct tests to rule them out. The challenge for these alternatives is that they need not only explain why buyer returns are higher in fire sales, but also the evidence of the bargaining power mechanism, the variation in buyers returns in bankruptcies due to creditor control, and the results on the real effects.

Better match between buyer and seller. One possibility is that fire-sale acquisitions yield higher returns for buyers because such transactions create higher synergies, i.e., there is a better match between the buyers and the sellers. The analysis of the real effects in Section 6 suggests that this is not the case since fire sales are not more successful than regular acquisitions, using both quantitative and qualitative measures of success. The results on combined returns (computed as the weighted average of seller and buyer returns)

discussed in the next section do not support this argument either. In addition, we also control for combined returns in the buyer 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). These arguments rule out any concern that the fire-sale dummy might capture differences in synergies across fire sales and regular transactions.

Compensation for risk taking. A second explanation is that higher returns earned by buyers 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 selling firm risk in the buyer return regressions. We estimate seller 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 seller 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 buyer returns are higher in fire sales because such transactions increase the risk of the bidding firm, thereby transferring wealth from the buyer'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 buyer leverage reported in Table 4. The risk shifting hypothesis would imply higher returns for buyers with higher leverage, but we find a negative sign in all regression specifications. 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 reported in Section 6, good news about the buyer would imply superior subsequent

operating performance, but we find no evidence for this. 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. To further assuage this concern, we also examine whether the effect of fire sales on buyer 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 seller's assets, earn lower returns. As reported 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.

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

8. Seller and Combined Returns

Our earlier emphasis on buyer returns suggests that the welfare implications of fire sales are less negative 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 selling firm's 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 sellers have publicly traded equity and even those that do at one point in time may have been delisted by the time of their bankruptcy filing.[20] This biases the sample towards firms that are restructuring outside of bankruptcy. In total, we have selling firm 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 selling firms have public debt outstanding, leaving us with insufficient price data to compute such returns.

To compute abnormal returns for selling firms, we employ the same procedure as for buyers. Total returns are computed as the weighted average of buyer and seller returns, using the market value of the equity two days before the announcement as the weight. If the buyer has prior ownership of the seller, we adjust for this effect. More specifically, total abnormal returns are computed as:

$$\frac{CAR_B(MV_B) + CAR_S(MV_S - OWN_B^S MV_S)}{MV_B + MV_S - OWN_B^S MV_S},$$

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

Panel A of Table 10 contains univariates on seller abnormal returns. Selling firm gains are 11.23%, on average, across all 4,571 acquisitions for which data are available, with a median of 3.44%. When we subdivide the sample into fire sales and regular transactions, the difference is dramatic: the returns for selling

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

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 10, we confirm that the univariate results persist after adding various controls in a multivariate setting. The first two columns confirm that selling firm returns remain inferior for fire sales after controlling for seller 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 buyers and sellers. The results persist: seller returns are 5.5 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 Appendix 2, we show that our findings persist if we match distressed sellers with regular sellers 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 11. Panel A of Table 11 shows 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 other transactions.

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

[22] A related argument is that the fire-sale dummy in specifications for selling 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 because most of the 244 industry fixed effects in this model are insignificant. Without the industry fixed effects, the adjusted R-squared increases to 0.05, while the coefficient on the fire-sale dummy is –4.14, with a *p*-value of 0.07.

Since there is no difference in the combined returns for buyers and sellers between fire sales and regular acquisitions, our results point to a transfer of wealth between the transacting parties, but no loss in welfare to the transacting parties combined. One concern with this conclusion is that from the seller's perspective the fire sale may be partially anticipated. As such, for sellers, the actual difference in returns between fire sales and regular acquisition may be larger than the 5.5 percentage points documented in Panel B of Table 10. This would imply that the combined returns in fire sales could be lower than in regular deals. To assess this possibility, we compute how important this anticipation needs to be for the combined returns in fire sales to be lower than in regular deals at the 10% significance level. This sensitivity analysis suggests that to achieve this result, seller returns would need to be 11.31 percentage points lower, which would imply that 51% of the negative return [(11.31-5.5)/11.31] is already imbedded in the selling firm's share price. We believe that this unlikely, given that the real effects discussed in Section 6 do not show any difference in post-merger performance between fire sales and regular transactions. Those results indicate that there is no significant difference in the quality of the transactions. Moreover, even if the combined returns were lower in fire sales than in regular acquisitions, our conclusion that buyers earn substantial positive returns is unaffected.

The computation of seller gains also allows us to conduct an additional test of the bargaining power mechanism using a measure of the relative gain of the seller over the buyer, developed by Ahern (2012). Ahern proposes the following metric:

$$\frac{\text{Seller abnormal dollar gain} - \text{Buyer abnormal dollar gain}}{MV_S + MV_B}.$$

We compute this metric using the dollar gain based on the 3-day abnormal return around the announcement and the market values of the seller and the buyer (MV_S and MV_B) 30 days before the announcement day. We multiply this measure by minus 100, so that it captures the buyer's bargaining power relative to the seller's. We makes this sign switch so that the sign of the measure is consistent with the sign of the fire sale dummy, which is positive throughout the paper. We multiply it by 100 so that the regression coefficient is easier to display. We also adjust the measure for prior ownership by the buyer in the seller. This modified

Ahern measure should be larger in fire sale transactions where the buyer has more bargaining power. To test this, we re-estimate our base case model with this measure as the dependent variable. The results reported in Table 12 indicate that, relative to regular transactions, buyers in fire sales gain 1.71 cents more than sellers for each dollar of combined market value. The use of this measure confirms our argument that sellers in fire sales have less bargaining power.[24]

9. Externalities

To complete our welfare analysis of fire sales, this section studies the spillover effects of fire sales on the seller's peers, its suppliers and customers, and its employees. We start by analyzing the seller's peers. One argument made in the literature is that a fire sale puts downward pressure on the value of similar assets held by non-distressed firms (Benmelech and Bergman (2011) and Campbell, Giglio, and Pathak (2011)). Peers are obtained using the text-based network industry classifications from the Hobergphillips.usc.edu website (Hoberg and Phillips (2010, 2016)). We use the classification that has the same granularity as the three-digit SIC codes and data for the fiscal year prior to the acquisitions. The data are available for peers of public firms from 1996 onwards. We then estimate a regression model similar to our base-case model, but we employ peer stock returns (controls) instead of the buyer returns (controls). The model is estimated using weighted least squares, where the weight is one over the number of peers per transaction. This procedure ensures that each acquisition receives the same weight (our results are very similar if we employ OLS models instead). The results, displayed in column (1) of Table 13, show that the sellers' peers do not suffer as a result of the fire sale relative to regular transactions (the coefficient on the fire sale dummy is positive, but insignificant), suggesting that there are no severe externalities for the sellers' peers.

Next, we study the customers and suppliers of the sellers. If the company is sold piecemeal or if critical assets are sold, the going concern value of the firm may not be preserved. This can lead to disruption

[24] If there is deal anticipation on the seller's side in fire sales such that the gains to the sellers are overstated, this would imply even larger relative gains for buyers.

of the supply chain with negative consequences for customers and suppliers (see Goolsbee and Krueger (2015)). We identify major customers and suppliers using the data set provided by Andrea Frazzini (http://people.stern.nyu.edu/afrazzin/data_library.htm), based on Cohen and Frazzini (2008). This dataset is based on firms' disclosures of their major customers in their 10K filings, and is therefore based on public firms' disclosures only. Firms do not have to disclose customers if they do not account for 10% of their sales. The resulting sample size is therefore relatively small, but the customer-supplier links are economically very important. The customers of the selling firm that we identify are important for the seller since they account for at least 10% of its sales, but it is not always the case that the seller is as important for the customer. This will likely attenuate the customer relative to the supplier effect. For the suppliers, we know that the customer – the seller in our sample – accounts for at least 10% of its sales. We employ the customer-supplier links for the last fiscal year before the acquisition takes place, and re-estimate our base case regression, but use supplier and customer data instead. As we do for peers, we estimate the models using weighted least squares where the weight is one over the number of customers/suppliers per transaction, such that each acquisition gets the same weight (again, our results are very similar if we employ OLS models instead). The coefficients on the fire sale dummies for customers and suppliers of the seller are reported in columns (2) and (3) of Table 13. As for the seller's peers, we find no significant externalities relative to regular acquisitions.[25]

Finally, we study employment. Using data on the number of employees listed on Compustat, we study the change in employment in the selling and buying firms combined from the year before until the year after the asset sale. It is important to consider the buying firm's employment as well because the asset sale will likely result in the transfer of employees from the seller to the buyer. We divide the change in employees by the number of employees in the seller in the year before the acquisition. This measure is

[25] The reported models for peers, customers, and suppliers do not include deal controls because, a priori, there is no reason to believe that the specifics of the deal (such as the form of payment, for example), would affect the stock price response of these stakeholders. The coefficients on the fire-sale dummy continue to be insignificant if we include deal controls, however. In the models for customers and suppliers, we do not include industry fixed effects because we would have few degrees of freedom left to estimate the fire-sale effect in the customer regression. The coefficients on the fire-sale dummy continue to be insignificant if we include industry controls in these models.

independent of the scale of the buyer. For example, suppose the acquisition of a company with 100 employees leads to 40 job losses. Our measure of employment loss would be 40%, irrespective of the number of employees in the acquiring firm. Because employee numbers are very volatile, we winsorize this change at the 1st and 99th percentiles. We regress the change in employment on the fire-sale dummy and the usual control variables. The findings reported in column (4) of Table 13 indicate that employment in firms engaged in fire sales declines by more than 32 percentage points relative to regular transactions.

Together, the evidence reported in Table 13 suggests that the externalities of fire sales compared to regular transactions are limited to employee job losses. It is important to note, however, that when studying externalities, instead of the current counterfactual of regular acquisitions, one could also consider an alternative counterfactual: a restructuring or bankruptcy reorganization of the selling firm that is not accompanied by asset sales. Prior work suggests that bankruptcy filings have negative consequences for the firm's peers (Lang and Stulz (1992)), and its suppliers and customers (Hertzel, et al. (2008)). Our results indicate that asset sales do not have significant spillover effects beyond the filing effects documented in these papers. With regards to employees, Bernstein, Colonnelli, and Iverson (2018) find that employment in establishments that experienced a bankruptcy reorganization declines by about 30% in the two years after bankruptcy.[26] Thus, the decline in employment reported in Table 13 is not different relative to this counterfactual, which we believe is the more appropriate one when studying employment changes.

10. 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 it suggests that the selling firm's 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 bargaining power mechanism, we find that the excess returns earned by buyers are

[26] Since we compare employment from the year before until the year after the transaction, the right benchmark in the Bernstein, Colonnelli, and Iverson (2018) paper is two years since filing for bankruptcy.

particularly high when there is less implicit competition for the seller and when the seller's industry is in poor health, thereby reducing the number of potential buyers for these assets. On the other hand, when the selling firm's assets have more alternative uses, thereby increasing the number of potential buyers, buyer returns decline. Within the sample of fire sales conducted by selling firms that have filed for bankruptcy, features that reduce seller bargaining power yield further increases in buyer returns.

Our analysis of the real effects indicates that fire sales are not different from regular acquisitions, which supports our contention that the increase in buyer gains is due to the proposed bargaining power mechanism and not due to the quality of the match. Finally, we find no evidence of negative externalities of fire sales compared to other deals for the peers, customers, and suppliers of sellers in fire sales. Employment declines substantially relative to regular transactions, but not relative to bankruptcy reorganizations that are not accompanied by asset sales.

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, especially because bailouts have further downsides, such as moral hazard, distortions due to political connections, and political capture of bailed out firms. Of course, a complete welfare analysis of fire sales would also have to take into account the wealth effects of the seller's debtholders, and would consider employee wages, not just the number of employees. We recognize that our work comes short of such a full welfare analysis but while most of the literature has focused on one party only, we consider the consequences for a large number of stakeholders.

Appendix 1: Sample Construction

In this appendix, we list the number of transactions on the SDC database after applying various data filters that are standard in the M&A literature. Column (1) contains all transactions, column (2) contains the number of fire sales, and column (3) lists 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 buyers and sellers.
76,110	1,092	Buyer 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 deals announced after they became effective.
57,514	873	Accounting information for buyers is available on Compustat.
21,850	428	Deal value available and > 1% of buyer's size.

Appendix 2: Nearest-Neighbor Matching for Buyer and Seller Returns

In this appendix, we verify that our finding of higher buyer returns and lower seller 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 10.

To test the robustness of buyer returns, we match each buyer in a fire sale to the five buyers 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 buyer and seller characteristics used are the same as in Tables 4 and 10: market value of equity, Tobin's Q, market leverage, and profitability. For seller returns, we employ exactly the same procedure.

Table A1 contains the results. Buyer returns are displayed in Panel A and seller returns in Panel B. Each row represents a different set of characteristics on which buyers (sellers) in fire sales are matched with buyers (sellers) in regular transactions. Column (6) contains the estimate of the average treatment effect on the treated, which is the extra return earned by buyers or sellers 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 seller 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 buyer financial characteristics and form of payment and the highest is 3.41% when we match on seller financial characteristics and seller 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 seller shareholder returns in Panel B also confirm the regression results reported in Table 10 of the paper. Independent of the matching variables, we always find lower returns for sellers 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 the 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. 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 sellers. 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.

The first three models of Table A2 contain regression models of buyer 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 buyers 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. 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 buyers can only take advantage of the poor financial health of selling firms when the seller's 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 seller data (two other transactions are of a majority stake), we augment the sample by dropping the requirement that the buyer has to be publicly traded. As a result of this relaxation of our sampling criteria, the seller sample size expands to 5,992 acquisitions, 56 of which are defined as fire sales. 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 and compare the predicted price 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 buyers and sellers; (b) the buyer is listed on CRSP and Compustat; (c) for complete acquisitions, the buyer also needs to own more than 50% of the seller 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 buyer 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 variables listed on the SDC database: (1) the seller is bankrupt or goes bankrupt during the transaction; (2) the seller is in liquidation; (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) 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. Seller Data Available refers to the transactions for which seller data are available on CRSP and Compustat.

Table 1 (continued)

	All Transactions							Seller Data Available	
Year	All Fire Sales	Bankrupt	Restruc-turing	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

Buyer 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 variables are indicator variables, set equal to one if the specific criterion is met: asset sale, public seller, private seller, tender offer, hostile, contested, equity only as payment, cash only as payment and unrelated. Asset sale refers to the acquisition of assets or units. Contested equals one if there are multiple bidders according to SDC. Unrelated equals one if the seller and buyer do not share the same 3-digit SIC code. Relative size is the deal value over the market value of the buyer, where market value is defined as (book assets minus book equity plus market equity). Deal value is the total value of the consideration paid by the buyer, excluding fees and expenses. Buyer MCAP is the buyer's market value of equity. Buyer Tobin's Q is the market value of the buyer over its book value of assets. Buyer leverage (mkt.) is the market leverage of the buyer, where the numerator is book assets minus book equity and where the denominator is the market value of the buyer. Buyer EBITDA/Assets (Book) is the buyer's EBITDA over its book value of assets. The definitions of the variables for the sellers are identical to those for the buyers. 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 *p*-value for the difference in means (medians) across groups is from a *t*-test (nonparametric equality-of-medians test). Median results for indicator variables are not displayed.

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)		
Unrelated (%)	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 - Buyer Characteristics

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

Panel C - Seller Characteristics

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

Table 4

Buyer Announcement Return Regressions

The dependent variable in Panels A and B, and in models (1) and (2) of Panel C is the buyer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. In model (1) of Panel C, the buyer abnormal return is winsorized at the 1st and 99th percentiles. The dependent variable in model (3) of Panel C is the buyer abnormal return computed from the day before the announcement of the transaction until the day after the transaction becomes effective. In this model, we remove fire sales and regular transactions conducted by the same firm if their return windows overlap, and multiple fire sales conducted by the same firm if their return windows overlap with each other. The fire-sale dummy is defined in Table 1. The explanatory variables are defined in Table 3. Year FE refers to year fixed effects. Buyer Industry FE refers to fixed effects for the buyer's industry defined at the 3-digit SIC code level. Buyer FE refers to buyer fixed effects. Buyer*Bi-annual FE refers to buyer fixed effects estimated for bi-annual periods. Buyer Industry*Year FE refers to yearly industry fixed effects defined at the 3-digit SIC code level. The Assets (Companies) column in Panel A refers to models estimated for acquisitions of assets or units (full acquisitions of companies). *p*-values are listed in parentheses.

Table 4 (continued)

Panel A. Main Specifications

	All			Seller 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(Buyer 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)
Buyer Tobin's Q			0.24			0.02	0.25	0.29
			(0.02)			(0.90)	(0.09)	(0.04)
Buyer Leverage (Mkt.)			-0.70			-0.19	-0.47	-0.86
			(0.12)			(0.84)	(0.36)	(0.31)
Buyer EBITDA/Assets (Book)			-1.47			-0.05	1.48	-3.94
			(0.12)			(0.97)	(0.21)	(0.00)
ln(Seller MCAP)						0.43		
						(0.00)		
Seller Tobin's Q						0.08		
						(0.52)		
Seller Leverage (Mkt.)						1.38		
						(0.08)		
Seller EBITDA/Assets (Book)						0.31		
						(0.66)		
Year FE	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Buyer 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

	(1)	(2)	(3)	(4)
Fire Sale	1.58	1.59	2.48	1.77
	(0.01)	(0.01)	(0.09)	(0.02)
Buyer Controls	Yes	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	No
Buyer Industry FE	No	Yes	No	No
Buyer FE	No	Yes	No	Yes
Buyer*Bi-annual FE	No	No	Yes	No
Buyer 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

Panel C. Further Robustness Checks

	Winsorized	Median regression	Long event window
	(1)	(2)	(3)
Fire Sale	1.51	0.82	3.13
	(0.00)	(0.00)	(0.02)
Buyer Controls	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Buyer Industry FE	Yes	Yes	Yes
N	21,849	21,849	20,184
Adjusted R-squared	0.05	-	0.02
Pseudo R-squared	-	0.03	-

Table 5

Mechanism: Buyer Abnormal Returns Regressions using Competition Measures

The dependent variable is the buyer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. Fire Sale * Contested is the interaction of the fire-sale and contested dummies which are defined in Tables 1 and 3. # Firms Seller Ind. is the number of firms on Compustat (in thousands) in the announcement year in the seller's 3-digit SIC code industry. Fire Sale * # Firms Seller Ind. is the interaction of the fire-sale dummy with # Firms Seller Ind. # Firms Seller Ind. > $100 mn. is the number of firms on Compustat (in thousands) in the announcement year in the seller's 3-digit SIC code industry with a book value of assets of more than $100 million. Fire Sale * # Firms Seller Ind. > $100 mn. is the interaction of the fire-sale dummy with # Firms Seller Ind. > $100 mn. # Firms Seller Ind. > Deal Value is the number of firms on Compustat (in thousands) in the announcement year in the seller's 3-digit SIC code industry with a book value of assets larger than the value of the transaction. Fire Sale * # Firms Seller Ind. > Deal Value is the interaction of the fire-sale dummy with # Firms Seller Ind. > Deal Value. Fire Sale * Unrelated is a dummy which is one if the deal is a fire sale and in a different 3-digit SIC code industry from the buyer's. The remaining variables are defined in Tables 1, 3 and 4. Controls for deal and buyer 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 * Contested	-1.46				
	(0.40)				
# Firms Seller Ind.		-0.91			
		(0.00)			
Fire Sale * # Firms Seller Ind.		-1.57			
		(0.16)			
# Firms Seller Ind. > $100 mn.			-2.27		
			(0.04)		
Fire Sale * # Firms Seller Ind. > $100 mn.			-7.34		
			(0.07)		
# Firms Seller Ind. > Deal Value				0.62	
				(0.23)	
Fire Sale * # Firms Seller Ind. > Deal Value				-5.13	
				(0.01)	
Fire Sale * Unrelated					0.21
					(0.83)
Buyer Controls	Yes	Yes	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes	Yes	Yes
Clustering by Seller Industry	No	Yes	Yes	Yes	No
Year FE	Yes	Yes	Yes	Yes	Yes
Buyer Industry 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

Mechanism: Buyer Abnormal Return Regressions as a Function of Seller Industry Health

The dependent variable is the buyer 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 seller'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 * 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 seller'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 * Ind. Kaplan-Zingales Index is the interaction between the fire-sale dummy and the Kaplan-Zingales index. Recession is a dummy which equals one if the transaction is announced in a quarter that is a recession quarter according to the NBER. Fire Sale * 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 buyer 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 * Ind. Quick Ratio	-0.36		
	(0.00)		
Ind. Kaplan-Zingales Index		-0.10	
		(0.12)	
Fire Sale * Ind. Kaplan-Zingales Index		1.21	
		(0.05)	
Recession			0.52
			(0.29)
Fire Sale * Recession			3.38
			(0.08)
Buyer Controls	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes
Clustering by Seller Industry	Yes	Yes	No
Clustering by Quarter	No	No	Yes
Year FE	Yes	Yes	Yes
Buyer Industry FE	Yes	Yes	Yes
N	19,220	19,845	21,849
Adjusted R-squared	0.04	0.04	0.04

Table 7

Mechanism: Buyer Abnormal Return Regressions as a Function of Redeployability

The dependent variable is the buyer 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 seller's 3-digit SIC code industry over the book value of assets in that industry in the year of the announcement. Fire Sale * 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 (2017) for the selling firm's BEA industry in the year of the announcement. Fire Sale * 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 buyer characteristics are included but not displayed. SIC<5000 indicates that the model is estimated only for acquisitions where the seller has an SIC code smaller than 5000. *p*-values are listed in parentheses.

	All (1)	SIC<5000 (2)
Fire Sale	1.94	4.25
	(0.00)	(0.00)
Liquidity Index	0.02	
	(0.71)	
Fire Sale * Liquidity Index	-2.14	
	(0.07)	
Asset Redeployability		2.07
		(0.08)
Fire Sale * Asset Redeployability		-6.79
		(0.08)
Buyer Controls	Yes	Yes
Deal Controls	Yes	Yes
Clustering by Seller Industry	SIC	BEA
Year FE	Yes	Yes
Buyer Industry FE	Yes	Yes
N	20,462	8,524
Adjusted R-squared	0.04	0.05

Table 8

Buyer Returns for Fire Sales in Bankruptcy as a Function of Creditor Control

The dependent variable is the buyer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. The sample for this analysis consists of acquisitions from firms in bankruptcy for which we could collect the following information: chapter of the bankruptcy code, the bankruptcy court, who filed for the bankruptcy, and whether it was a voluntary bankruptcy. Creditor Control is set equal to 0, 1, or 2 based on whether the bankrupt firms has DIP financing and/or a KERP plan in place. Section 363 is set equal to one if the sale is conducted under section 363 of the bankruptcy code. Prepack/Prenegotiated is set equal to one if the bankruptcy is prepackaged or prenegotiated. Not Chapter 11 is a dummy equal to one if the seller is in Chapter 7 or transferred from Chapter 11 to Chapter 7. Delaware Filing is set equal to one if the bankruptcy is filed in Delaware. Involuntary Filing is set equal to one if the bankruptcy is not filed by the debtor. Stalking Horse is set equal to one if a stalking horse bidder is involved in the transaction. Controls for deal and buyer characteristics are included but not displayed. *p*-values are listed in parentheses.

	(1)
Creditor Control	1.73
	(0.06)
Section 363	-0.94
	(0.51)
Prepack/Prenegotiated	3.19
	(0.11)
Not Chapter 11	4.49
	(0.52)
Delaware Filing	2.40
	(0.10)
Involuntary Filing	1.92
	(0.45)
Stalking Horse	-1.16
	(0.47)
Buyer Controls	Yes
Deal Controls	Yes
N	297
Adjusted R-squared	0.16

Table 9
Real Effects

In Panel A, we estimate a regression of post-acquisition operating performance as a function of the fire-sale dummy. Operating performance is the change in the buyer's industry-adjusted EBITDA/Assets from the year prior to the acquisition up to 3 years after the acquisition announcement. In Panel B, we estimate regressions of the announcement return on the fire-sale dummy and post-acquisition operating performance. In Panels C and D, we document the post-acquisition success rate and disposition of the assets as obtained from Factiva and Google searches. In Panel E, we estimate regressions of the announcement return on the fire-sale dummy, and either measures of acquisition success or the disposition of the assets. The sample in Panels A and B consists of all buyers with operating performance data available on Compustat. The sample in Panels C through E consists of all fire sales with post-acquisition information on success rates and disposition of the assets available on Factiva or in Google searches and a matched sample of control firms for which these data are available. The announcement return is the buyer's abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. Controls for deal and buyer characteristics are included in Panels A, B, and E, but not displayed. *p*-values are listed in parentheses.

Panel A – Post-Acquisition Operating Performance

	Year 1	Year 2	Year 3
	(1)	(2)	(3)
Fire Sale	-0.32	-0.05	0.04
	(0.60)	(0.94)	(0.95)
Buyer Controls	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Buyer Industry FE	Yes	Yes	Yes
N	16,422	15,218	14,106
Adjusted R-squared	0.15	0.18	0.19

Panel B – Relation Between Announcement Returns and Post-Acquisition Operating Performance

	Year 1	Year 2	Year 3
	(1)	(2)	(3)
Fire Sale	1.51	1.61	1.85
	(0.01)	(0.00)	(0.00)
Ind. Adj. Δ EBITDA/Assets	0.02	0.01	0.004
	(0.04)	(0.30)	(0.61)
Fire Sale * Ind. Adj. Δ EBITDA/Assets	0.01	0.01	-0.02
	(0.91)	(0.91)	(0.68)
Buyer Controls	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Buyer Industry FE	Yes	Yes	Yes
N	16,422	15,218	14,106
Adjusted R-squared	0.05	0.05	0.02

Table 9 (continued)

Panel C – Measuring Acquisition Success

	Fire Sale	No Fire Sale
Success	163 (51.9%)	138 (53.5%)
Neutral	96 (30.6%)	74 (28.7%)
Failure	55 (17.5%)	46 (17.8%)
N	314 (100%)	258 (100%)

Chi-square test for independence 0.25 (0.89)

Panel D – Rates of Divestiture

	Fire Sale	No Fire Sale
Retained	268 (85.4%)	200 (77.5%)
Shut Down/Downsized	20 (6.4%)	10 (3.9%)
Sold/Partly Sold	26 (8.3%)	48 (18.6%)
N	314 (100%)	258 (100%)

Chi-square test for independence 14.41 (0.00)

Panel E – Relation Between Announcement Returns and Real Outcomes

	(1)	(2)
Fire Sale	1.89	2.18
	(0.09)	(0.06)
Success	1.57	
	(0.18)	
Failure	-3.92	
	(0.02)	
Sold/Partly Sold		1.54
		(0.32)
Shut Down/Downsized		-5.08
		(0.03)
Buyer Controls	Yes	Yes
Deal Controls	Yes	Yes
Year FE	Yes	Yes
Buyer Industry FE	Yes	Yes
N	572	572
Adjusted R-squared	0.06	0.04

Table 10

Seller 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 difference 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 seller abnormal return. Seller Industry FE refers to seller industry fixed effects defined at the 3-digit SIC code level. Controls for buyer, deal and seller 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 – Seller 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)
Buyer Controls	No	No	Yes	Yes	Yes
Seller Controls	No	No	Yes	Yes	Yes
Deal Controls	No	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Seller Industry 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 11

Combined Announcement Returns and Regression Models

Combined abnormal returns are computed as the weighted average of buyer and seller returns, using the market value of equity two days before the announcement date as the weight. If the buyer has prior ownership of the seller, this effect is taken into account by reducing the seller's market value. Buyer (seller) abnormal returns are defined in Table 2 (10). More specifically, combined returns are computed as:

$$\frac{CAR_B(MV_B) + CAR_S(MV_S - OWN_B^S MV_S)}{MV_B + MV_S - OWN_B^S MV_S},$$

where CAR is the abnormal return of either the buyer (B) or the seller (S), MV is the market value of equity, and OWN_B^S is the fraction of the seller 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 difference 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. Buyer Industry FE refers to buyer industry fixed effects defined at the 3-digit SIC code level. Controls for buyer, deal and seller 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)
Buyer Controls	No	No	Yes	Yes	Yes
Deal Controls	No	No	Yes	Yes	Yes
Seller Controls	No	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes
Buyer Industry 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 12
Buyer Relative Gain Analysis

This table employs a modification of the Ahern (2012) relative gain measure as the dependent variable. The relative gain measure is computed as:

$$\frac{Seller\ abnormal\ dollar\ gain - Buyer\ abnormal\ dollar\ gain}{\mathrm{MV_S} + \mathrm{MV_B}},$$

where the dollar gain is computed based on the 3-day abnormal returns around the announcement of the acquisition and the market values of seller (MV_S) and buyer (MV_B) are computed 30 days before the announcement day. We modify this measure by multiplying it by -100 and by adjusting it for prior ownership by the buyer in the seller. Multiplying it by -100 ensures consistency with the sign of the fire-sale dummy, which is positive throughout the paper, and facilitates display of the regression coefficient. Controls for buyer, deal and seller characteristics are included but not displayed. The explanatory variables are defined in Table 3. *p*-values are listed in parentheses.

	(1)
Fire Sale	1.71
	(0.01)
Buyer Controls	Yes
Seller Controls	Yes
Deal Controls	Yes
Year FE	Yes
Buyer Industry FE	Yes
N	4,571
Adjusted R-squared	0.17

Table 13
Externalities

Models (1) through (3) are regression models of abnormal returns of the seller's peers, customers, and suppliers. Abnormal returns are cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. Models (1) through (3) are estimated using weighted least squares, where the weight is (1/number of firms employed for each transaction). Model (4) is a regression models of the change in combined employment of the buyer and the seller in the year after the acquisition relative to the year before the acquisition, divided by the seller's employment in the year before the acquisition, expressed as a percentage and winsorized at the 1st and 99th percentiles. Standard errors are clustered at the transaction level. *p*-values are listed in parentheses.

	Seller Peers (1)	Seller Customers (2)	Seller Suppliers (3)	Employment (4)
Fire Sale	0.45	0.08	0.08	-32.35
	(0.51)	(0.95)	(0.95)	(0.02)
Firm Controls	Yes	Yes	Yes	Yes
Deal Controls	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	Yes
N	202,442	367	1,770	1,958
Adjusted R-squared	0.01	-0.02	0.02	0.08

Table A1
Nearest-Neighbor Matching

This table contains the result of a nearest neighbor matching approach, using the Mahalanobis distance. Each fire sale is matched to five regular transactions. Asset sales are matched to asset sales and complete acquisitions to complete acquisitions. Column 1 (3) indicates whether the transactions are matched on buyer (seller) 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 buyer (seller). Column 5 indicates whether the transactions are perfectly matched on the form of payment. Column 6 reports the average treatment effect for the treated—the return differential between fire-sale acquisitions and regular acquisitions. The *p*-value is reported in parentheses. Column 7 reports the number of fire-sale transaction matched given the matching variables used. Panel A reports the results for buyer returns. Panel B reports the results for seller returns.

Panel A – Buyer Returns

Matching on Buyer Chars. (1)	Matching on Buyer Industry (2)	Matching on Seller Chars. (3)	Matching on Seller Industry (4)	Matching on Form of Payment (5)	Average Treatment Effect Treated (*p*-value) (6)	# Fire-Sale Deals Matched (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 - Seller Returns

Matching on Buyer Chars. (1)	Matching on Buyer Industry (2)	Matching on Seller Chars. (3)	Matching on Seller Industry (4)	Matching on Form of Payment (5)	Average Treatment Effect Treated (*p*-value) (6)	# Fire-Sale Deals Matched (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

Buyer Abnormal Return Regressions Using Weaker Definitions of Seller Distress

The dependent variable is the buyer abnormal return cumulated over three days starting one day before the announcement of the transaction, expressed as a percentage. The Seller Z-score is computed as (3.3 EBIT + Sales + 1.4 Retained Earnings + 1.2 Working Capital) / Assets. The Seller 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. Seller Interest Not Covered is an indicator variable set equal to 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, buyer and seller 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)
Seller Z-score	0.03			0.04		
	(0.62)			(0.56)		
Seller Zmijewski Score		0.09			0.07	
		(0.41)			(0.51)	
Seller Interest Not Covered			0.12			0.03
			(0.84)			(0.96)
Buyer Controls	Yes	Yes	Yes	Yes	Yes	Yes
Deal Controls	Yes	Yes	Yes	Yes	Yes	Yes
Seller Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Buyer Industry 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

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