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**Conference Paper**

## Does Monetary Policy Affect Mergers and Acquisitions?

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# Does Monetary Policy Affect Mergers and Acquisitions?

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– WORK IN PROGRESS –

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## Abstract

We analyse the effects of monetary policy on mergers and acquisitions (M&A) activity in the United States, both on the aggregate and the firm level. We find that aggregate M&A activity decreases significantly following a monetary policy shock. The aggregate results are confirmed by an analysis of the firm-level M&A activity from the perspective of the acquiring firm. We find that the likelihood of becoming an acquiror decreases significantly following a contractionary monetary policy shock. We find that the acquisition likelihood falls significantly more for relatively more financially constrained firms, suggesting a strong role for the credit channel in the transmission of monetary policy to firms' M&A decisions. We rationalize our empirical findings in a stylized partial-equilibrium model of the firm's M&A decision.

**JEL Classification:** E44, E52, G34

**Keywords:** Monetary Policy, Corporate Finance, Mergers and Acquisitions

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# 1 Introduction

Monetary policy affects the real economy through a number of channels. One such channel that has been widely documented is firms' capital expenditure. Besides regular capital expenditure, however, mergers and acquisitions (M&A) constitute a key instrument through which firms adjust their productive capacities. In fact, with 2.25 trillion US dollar (USD) worth of transactions involving U.S. firms (either as an acquirer, a target, or both), M&A transactions accounted for half of U.S. fixed capital formation, or a tenth of overall U.S. gross domestic product in 2018. This activity constitutes not just a redistribution of ownership rights, but shapes the capital allocation across firms and influences aggregate economic outcomes. Despite the magnitude of this activity, its connection to monetary policy is not yet well understood.

In this paper, our key research question therefore is: How does monetary policy affect M&A activity and how does this affect the quality of the resulting capital reallocation? To address these questions, we study the effects of monetary policy on M&A activity in the U.S., both on the aggregate and on the firm level. We document significant heterogeneity on the firm level that shapes this response along the same lines as, e.g., [Cloyne et al. \(2018\)](#) for capital expenditure. Using cumulative abnormal stock returns to assess deal quality as [Adra et al. \(2020\)](#), we furthermore document how monetary policy affects the quality of M&A transactions (as perceived by capital markets) through the selection of firms engaging in M&A activity. We rationalise our findings in a stylised partial equilibrium model of a firm's M&A decision.

We find that contractionary monetary policy significantly dampens M&A activity, both on the aggregate and the firm level. Using an instrumental-variable Bayesian vector autoregression (BVAR), we find that contractionary monetary policy shocks persistently lower both the aggregate number of deals as well as the overall deal value with a trough approximately one year after the shock. The aggregate finding is mirrored by the individual responses of publicly listed U.S. firms in the Compustat database. Using an instrumental-variable linear probability model, we find that a 1 percentage point increase in the federal funds rate decreases the likelihood of engaging in an M&A transaction by 8% relative to the unconditional transaction likelihood. On both the aggregate and the firm level, we instrument the federal funds rate with the high-frequency surprises of [Gurkaynak et al. \(2005\)](#). Interacting the interest rate with different measures of financial constraints, we show that constrained firms react significantly stronger than unconstrained firms. In a last step, we investigate the cumulative abnormal returns of the acquiring firms around the announcement of a successful M&A transaction as a market-based measure of the transaction quality. We find that M&A announcements are generally associated with substantial positive abnormal returns for the acquiring firm. Somewhat counter-intuitively, a contractionary monetary policy stance is associated with *higher* cumulative abnormal

returns. This effect, however, disappears when controlling for individual acquiror characteristics, implying that monetary policy affects the average deal quality by changing the composition of acquiring firms. Overall, this suggests that on average monetary policy facilitates the reallocation of capital to more productive firms. The marginal transaction, however, reallocates capital to somewhat less productive firms. We propose a partial equilibrium model of the firm’s M&A decision to rationalize these empirical findings. Upon meeting a target firm, the potential acquiror chooses whether or not to engage in a M&A transaction subject to a borrowing constraint. The model illustrates how tighter monetary conditions leaves only more productive firms in a position to engage in M&A transactions, which in turn are of higher quality.

The paper contributes to the literature in several ways. First, we provide a comprehensive investigation of the effect of monetary policy on M&A transaction activity as well as transaction quality. In particular, this is the first paper to study the effect of monetary policy on the likelihood of engaging in an M&A transaction. We thereby extend the literature on the firm-level investment response to monetary policy (e.g. [Bernanke et al., 1999](#); [Ottonello and Winberry, 2020](#); [Cloyne et al., 2018](#)) by investigating a second major channel through which firms expand that has previously not received much attention.

Second, we use high-frequency surprises in interest rate futures contracts within a 30 minute window around monetary policy announcements to identify exogenous movements in the interest rate to enhance our understanding of the effect of monetary policy on aggregate M&A activity and individual firms’ M&A decisions. This is a key difference to [Adra et al. \(2020\)](#) and explains why we find a significant negative response of aggregate deal value to contractionary monetary policy shocks and a positive/zero effect of monetary policy on deal quality while their results point towards a negative relationship.

Finally, we confirm the importance of financial constraints in shaping the firm-level investment response to monetary policy shocks (e.g. [Cloyne et al., 2018](#); [Jeenas, 2018](#); [Drechsel, 2020](#)) for firms’ M&A decisions. In response to a change in interest rates, financially constrained firms adjust their M&A decision significantly more than unconstrained firms.

More generally, our paper is also related to the literature studying the M&A decision of the firm. Firms engage in M&A activity for a variety of reasons, e.g., value creation (e.g., by achieving higher market power, business diversification, lower cost/higher efficiency, or economies of scope), managerial self-interest (in particular “empire building”), or idiosyncratic firm factors like acquisition experience or strategic orientation (for an extensive survey of motives see [Haleblian et al., 2009](#)). Since monetary policy itself is unlikely to be a fundamental motive to engage in a M&A transaction, our paper is particularly related to the literature investigating the facilitators of M&A activity. So far, this literature has provided evidence that M&A activity is related to the business cycle (e.g.

Maksimovic and Phillips, 2001), bidder and target valuations (e.g. Shleifer and Vishny, 2003), corporate liquidity (e.g. Almeida et al., 2011), economic (policy) uncertainty (e.g. Bonaime et al., 2018), business risk (e.g. Garfinkel and Hankins, 2011), and the general macroeconomic environment (e.g. Choi and Jeon, 2011). We control for these different M&A motives and aggregate facilitators in our analysis.

The remainder of the paper continues as follows: Section 2 describes the data used in our analyses. Section 3 presents the empirical approach and the results of our aggregate analysis. Section 4 & 5 discuss the approach and results of our firm-level and deal-level analysis, respectively. Section 6 proposes a model to rationalise the results of the previous sections and Section 7 concludes.

## 2 Data

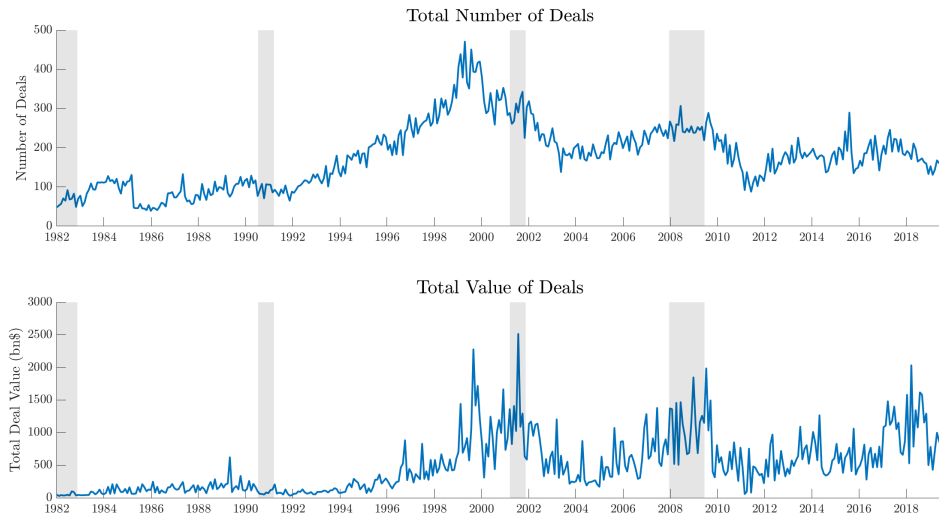
### 2.1 Mergers and Acquisitions Data

Our M&A data are from Refinitiv’s Financial’s Securities Data Company (SDC) and cover the period from 1982M1 to 2016M8. Following Bonaime et al. (2018), we only consider M&A deals with a value of at least \$1 million USD, in which the acquirer owned less than 50% of the target’s shares six months prior to the transaction and owns 90% or more of the shares after the deal is completed. We focus on the acquiror because together with the Compustat database we can construct the acquisition decision of the universe of public U.S. firms. Accounting for any target characteristic would require data on every company worldwide, as this is the universe of potential targets. For our aggregate analysis however, we initially consider both private and public firms that are themselves based in the U.S. or whose ultimate parent is based in the U.S.

Table 1 presents summary statistics for the full sample of deals obtained from SDC and the sample of deals available after merging the SDC M&A data with firm-level information obtained from CRSP-Compustat. Public and private U.S.-based acquirers account for approximately 40% of all deals reported in SDC and approximately 50% of aggregate deal value. Around a quarter of the M&A transactions recorded in SDC are U.S. public firms acquiring domestic, i.e. U.S., targets. In either of the cases the mean transaction value is significantly above the median transaction volume. The great deal of right-skewness in the distribution of transaction values shows that the majority of deals are small with some very large outliers. Figure 1 depicts the evolution of both the number of deals as well as the total deal value in billion USD over the sample period.

**Table 1:** Summary Statistics: M&A Activity

	Deal Vol- ume	Tot deal value (tn \$)	Avg deal size (mil \$)	Med deal size (mil \$)
<b>Panel A: SDC Sample</b>				
All Deals	178,394	40.80	228.70	22.72
US Acquirer	75,169	20.68	275.06	30.58
% of total deals	<i>42.14</i>	<i>50.69</i>	<i>120.27</i>	<i>134.59</i>
Public US Acquirer	54,069	15.41	284.96	30.60
% of total deals	<i>30.31</i>	<i>37.77</i>	<i>124.60</i>	<i>134.70</i>
Public US Acquirer & US Target	43,509	12.80	294.17	30.00
% of total deals	<i>24.39</i>	<i>31.37</i>	<i>128.63</i>	<i>132.06</i>
Public US Acquirer & Non-US Target	10,560	2.61	246.98	36.51
% of total dealss	<i>5.92</i>	<i>6.40</i>	<i>107.99</i>	<i>160.69</i>
<b>Panel B: SDC sample merged with CRSP-Compustat</b>				
US Public Acquirer	35,522	9.64	271.45	33.14
% of total deals	<i>19.91</i>	<i>23.63</i>	<i>118.69</i>	<i>145.88</i>



*Note:* This figure depicts the aggregate deal volume (top panel) and value (bottom panel) of acquisitions conducted by US-based companies. Shaded areas indicate U.S. recessions.

**Figure 1:** M&A activity by U.S. Acquirers

## 2.2 Firm Level Data

For the firm-level analysis, we use the (historic) Committee on Uniform Security Identification Procedures (CUSIP) code of the ultimate parent of each acquirer in our SDC sample to match it with the CRSP-Compustat database. The CRSP-Compustat merged database combines the historical stock return data from CRSP with the comprehensive firm-level information contained in Compustat for all publicly traded U.S. firms. Compustat offers distinct advantages over other firm-level data sources that are important for our study. First, Compustat is quarterly, a frequency high enough to study monetary policy. Second, it is a long panel, allowing us to use within-firm variation. And third, it contains a rich set of balance-sheet information which allows us to construct our key variables of interest. The main disadvantage of Compustat is that it offers balance sheet information on publicly listed companies only. Hence, it excludes private companies which could to be subject to more severe financial frictions. We use WorldScope information (accessed via Datastream) about the firm foundation date (and, if that is missing, firm incorporation date) to compute firm age and merge it with our remaining data using the CUSIP identifier.

We impose a set of sample restrictions: 1) we drop all firms with fewer than 20 consecutive quarters of reported data; 2) we drop observations that clearly appear to be erroneous such as negative assets; 3) we drop observations for which the leverage ratio is negative; 4) we drop observations for which the net-liquidity ratio is smaller than -10 or bigger than 10; 5) for all control variables we trim the 1% on the top if their respective distribution (yearly); 6) all variables in levels such as assets are deflated using the CPI; 7) we follow others in the literature and linearly interpolate single missing values. Section A in the appendix presents the definitions of all variables used in the firm-level regressions and their respective summary statistics.

## 2.3 Deal Data

We obtain the deal-level cumulative abnormal returns by submitting the historic CUSIP of each transaction in our sample along with its announcement date to WRDS' event study tool. Cumulative abnormal returns are computed between one day prior and one day after the announcement date. Abnormal returns are computed relative to the return predicted by the Fama-French three factor model, whose parameters are estimated on a 100 day window that ends 50 days before the event window to rule out any bias from insider activity. See Section A in the appendix for an illustration of the average CAR around announcement dates.

## 2.4 Monetary Policy Shocks

Estimating the dynamic causal effects of monetary policy on any economic outcome variable requires to overcome the potential reverse causality problem: monetary policy affects the economy but the economy also determines the monetary policy stance. To estimate the causal effect of monetary policy on the number and value of M&A deals, we hence need to consider a change in the interest rate that is exogenous to aggregate M&A activity. To identify such an exogenous impulse, we rely on the external instruments approach of [Gurkaynak et al. \(2005\)](#) and [Stock and Watson \(2018\)](#). As an external instrument we use the monetary policy shock series of [Jarociński and Karadi \(2020\)](#), consisting of the changes in the 3m-ahead fed funds future recorded in a 30 minute window around the Federal Open Market Committee’s (FOMC) monetary policy announcements. The identifying assumption is that within this narrow time window no other events except the FOMC announcement occur that could affect private sector interest rate expectations. We sum up all shocks within a month to obtain a monthly series.

## 3 Macro Evidence

In this section, we present our macroeconomic analysis of the relationship between monetary policy and aggregate M&A activity, with a focus on the response of both the aggregate deal *volume* and *value*.

### 3.1 Empirical Specification

To analyse the effect of monetary policy on M&A activity we estimate a Bayesian proxy-SVAR (BP-SVAR) with monthly data. In reduced form, the model can be written as

$$y_t = C + \sum_{l=1}^p A_l y_{t-l} + u_t$$

where  $u_t$  are the reduced-form error terms with zero mean and covariance matrix  $\Sigma$ . Stacking the regressors into a single matrix this can be written as  $Y = XB + u$ . We employ a standard Minnesota prior with optimal hyperparameter selection as in [Giannone et al. \(2015\)](#). Prior and posterior distributions are discussed in more detail in section B of the appendix. The results of a standard proxy-SVAR as in [Gertler and Karadi \(2015\)](#) are almost identical (see Section B of the Appendix).

The vector  $y_t$  includes either the log of the monthly aggregate (inflation adjusted) deal value or the total number of deals. To adequately characterise monetary policy decisions we include the 1y Treasury rate as monetary policy instrument, the log of the industrial production, and the consumer price indices (all obtained from the St. Louis Federal



Reserve). To capture the likely transmission channels as identified in the literature, we furthermore include the excess bond premium (EBP) of Favara et al. (2016) as measure of credit market sentiment and Robert Shiller’s adjusted price-earnings ratio of the S&P500 as a measure of market valuation. The vector of endogenous variables therefore is

$$y_t = [1y\text{-Treasury}_t, EBP_t, IP_t, CPI_t, CAPE_t, MA_t,]'$$

where  $MA_t$  represents either aggregate deal volume or aggregate deal value. Our main specification includes  $p = 2$  lags, as suggested by the BIC.<sup>1</sup> We estimate the BP-SVAR residuals on the full sample from 1982M1 to 2016M8 but execute the proxy identification on the residuals from 1990M2 to 2016M8, matching the availability of the instrument.

### 3.2 Main Results

Figures 2 and 3 present the estimated impulse response functions of our BP-SVAR for the aggregate deal volume and total deal value respectively.<sup>2</sup> Both the aggregate deal volume and aggregate deal value decrease significantly in response to the contractionary shock with a peak response at 10-12 months after the shock. With a peak effect of -19% the total number of M&A transaction decreases less then the total value of M&A transactions, which decreases by up to 32%. In both cases the effect is very persistent and levels off only towards the end of the forecast horizon. The remaining variables respond as expected. A contractionary monetary policy shock increases the 1y-Treasury rate, worsens funding conditions, and depresses industrial output, the price level, and firm valuations.<sup>3</sup>

## 4 Firm-Level Evidence

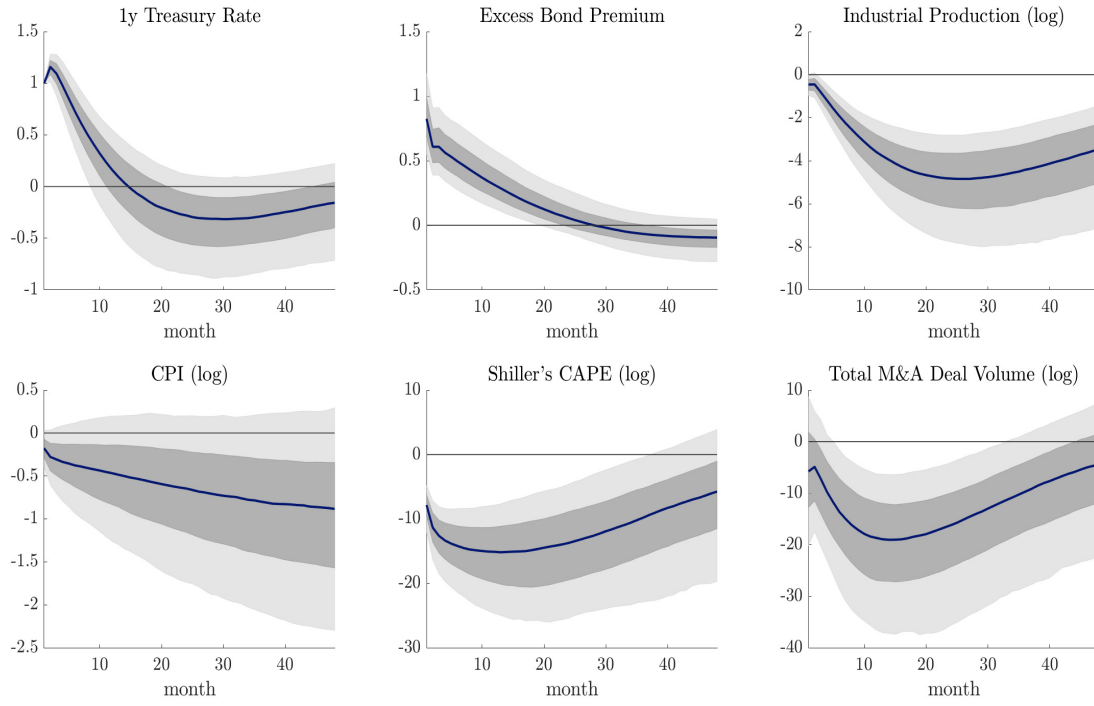
In this section we corroborate and extend our previous results using firm-level data. In particular, we make use of the large panel of publicly listed U.S. firms in Compustat to confirm the findings of the previous section and furthermore establish a clear transmission channel from monetary policy to M&A transactions.

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<sup>1</sup>The BIC suggests 2 lags for both M&A indicators whereas the AIC suggests 3 (4) lags for total deal volume (value). For better comparability of the results we follow the BIC.

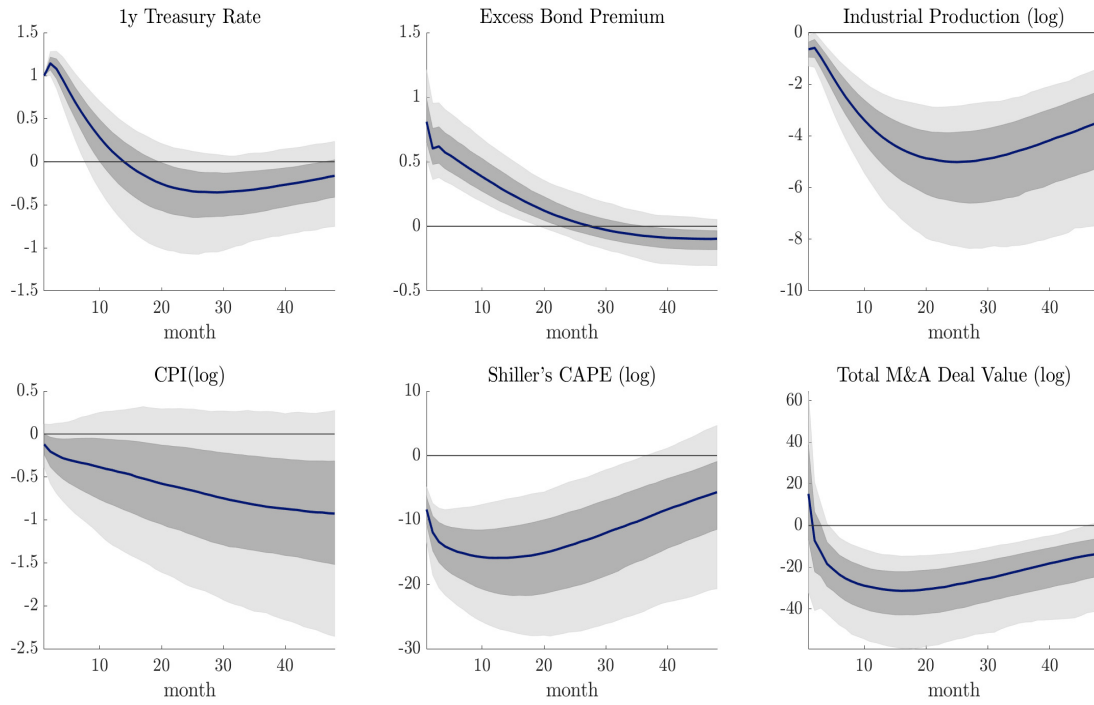
<sup>2</sup>The first-stage regression statistics for the VAR with aggregate deal volume (value) are:  $F = 14.47$  (12.65); Robust  $F = 8.16$  (7.41);  $R^2 = 4.37\%$  (3.84%); adj.  $R^2 = 4.07\%$  (3.53%)

<sup>3</sup>Shiller’s CAPE is based on dividing the current month’s real stock price by the average inflation-adjusted earnings from the previous 10 years up until the previous month, so the initial response in particular is driven exclusively by valuations and not by earnings.



*Note:* Light (dark) grey shaded areas indicate 95% (68%) confidence intervals

**Figure 2:** Response of Aggregate Deal Volume to a Monetary Policy Shock



*Note:* Light (dark) grey shaded areas indicate 95% (68%) confidence intervals

**Figure 3:** Response of Aggregate Deal Value to a Monetary Policy Shock

## 4.1 The Average Effect

**Methodology** In line with the literature on M&A activity (e.g., [Bonaime et al., 2018](#); [Owen and Yawson, 2010](#)) we model the decision to become an acquirer in a given period. The focus on the acquiror is driven by the available data: The Compustat database conveniently lets us model the acquisition decision of the universe of public U.S. firms, whereas accounting for any target characteristic would require data on every company worldwide, as this is the universe of potential targets. Our baseline econometric specification is a linear probability model that estimates the likelihood of a firm to initiate a M&A transaction in a given period as a function of the monetary policy stance. In particular, we estimate the likelihood of firm  $i$  to engage in a M&A transaction between  $t$  and  $t + 3$ , i.e. within 1 year following the change in the interest rate:

$$Pr(\text{Transaction}_{i,\{t,t+3\}} = 1) = \alpha_i + \gamma r_t + \Phi \mathbf{X}_{i,t-1} + \Theta \mathbf{W}_{t-1} + \varepsilon_{i,t} \quad (1)$$

where  $\alpha_i$  is a firm-level fixed effect. The vectors  $\mathbf{X}_t$  and  $\mathbf{W}_t$  contain firm and macro controls, respectively.  $\mathbf{X}_t$  includes 1) the leverage ratio, 2) firm age, 3) (the log of) real assets, 4) the ratio of net liquidity to total assets, 5) Tobin’s Q, 6) the EBITDA to asset ratio as measure of profitability, 7) a dummy indicating whether the firm has paid dividends over the past year, and 8) a dummy variable indicating whether a firm has already acquired another firm in the five years prior. As in [Jeenas \(2018\)](#), all constructed financial ratios in  $\mathbf{X}_t$  (e.g. the leverage ratio) are measured as averages between  $t$  and  $t - 3$ . We also control for the number of M&A transactions within the respective Fama-French 48 industry over the past four quarters to capture any industry merger trends.  $\mathbf{W}_t$  contains the same macro controls as the aggregate VAR, i.e. CPI inflation, industrial production growth, the excess bond premium, and Robert Shiller’s cyclically adjusted price earnings ratio (CAPE). We estimate equation (1) by 2SLS-IV. We instrument the 1y Treasury rate  $r_t$  using the cumulative series of monetary policy shocks. The sample period runs from 1990Q1 to 2016Q3 to match the availability of the monetary policy shocks as well as the availability of the excess bond premium. Following the argument of [Abadie et al. \(2017\)](#), the standard errors in our baseline specification are clustered on the firm level only, since we have clustering neither in treatment nor in sampling. However, the results are robust to clustering on both the firm and the quarterly level, as we will show during our sensitivity analysis.

We choose a linear probability model instead of a non-linear model for several reasons: First, we want to avoid the uncertainty regarding the distribution of regression residuals and the potential problems this causes for the estimation of the standard errors in our panel IV approach. Second, we are more interested in establishing an average causal link between monetary policy and acquisition likelihood for which both linear and non-linear type of models give very similar estimates around the mean of the covariates. Finally,

a non-linear model would significantly complicate testing for heterogeneous responses between groups. In the spirit of [Angrist and Pischke \(2008\)](#) we therefore choose the linear model over the non-linear alternatives.

**Results** Table 2 displays the average response of the likelihood of engaging in an M&A transaction to monetary policy. In line with the aggregate results presented previously, we find that a one percentage point increase in the 1y Treasury rate reduces the likelihood of engaging in a M&A transaction within the following 4 quarters by 1.1 percentage points. Considering that the unconditional likelihood of engaging in a M&A transaction in any given year is 13.5%, this presents an 8% decrease in the likelihood of becoming an acquiror.

In line with the literature on M&A determinants we furthermore find that size, liquidity, valuations (i.e. Tobin's Q), and profitability all increase the likelihood of becoming an acquirer. Higher leverage and prior acquisition history on the other hand decrease acquisition likelihood. This is the case presumably because prior acquisitions lead to higher leverage and the integration of past transactions occupies operational resources, both limiting resources available for new transactions. Firm age has a significantly negative impact on acquisition likelihood. This is somewhat surprising as [Cloyne et al. \(2018\)](#) highlight the role of age as proxy for financial constraints, implying that we would expect the opposite sign. Among the macro controls, inflation and the excess bond premium negatively affect the acquisition likelihood whereas aggregate valuations positively affect the transaction likelihood, thus mirroring the effect of firm level valuations.

**Table 2:** Effect of Monetary Policy on the Likelihood of Engaging in an M&A Transaction

	(1) P(Acq, 1y)	(2) P(Acq, 1y)	(3) P(Acq, 1y)	(4) P(Acq, 1y)
1y Treasury Rate	-0.004*** (0.000)	-0.002*** (0.001)	-0.008*** (0.001)	-0.011*** (0.001)
L.Age			-0.003*** (0.000)	-0.004*** (0.000)
L.Leverage			-0.019*** (0.003)	-0.019*** (0.003)
L.Log Total Assets (real)			0.004** (0.002)	0.004*** (0.002)
L.Net liquidity ratio			0.006*** (0.002)	0.006*** (0.002)
L.Tobin's Q			0.002*** (0.000)	0.002*** (0.000)
L.EBITDA-to-assets ratio			0.051*** (0.007)	0.050*** (0.007)
L.Dividend Payer			-0.004 (0.005)	-0.005 (0.005)
L.# Industry Mergers			0.000*** (0.000)	0.000*** (0.000)
L.Prior Acquisition History			-0.048*** (0.004)	-0.048*** (0.004)
L.IP growth				0.002 (0.002)
L.CPI inflation				-0.014*** (0.003)
L.Excess Bond Premium				-0.031*** (0.002)
L.Shillers's CAPE				0.002*** (0.000)
Constant	0.135*** (0.001)			
N	744,344	744,258	422,047	422,047
FE	No	Firm	Firm	Firm
Cluster	No	Firm	Firm	Firm
Controls	No	No	Firm	Firm, Macro

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4.2 The Credit Channel of Monetary Transmission

The credit channel of monetary policy transmission argues that monetary policy can affect a firm’s (capital) investment expenditure by altering the value of its assets and net worth which subsequently affects the firm’s borrowing constraint. We investigate whether this channel plays a role for a firm’s M&A decision. To that end, we interact the interest rate with different measures,  $Z_{i,t}$ , of financial constraints on the firm-level. Following the literature, we use age (e.g. [Cloyne et al., 2018](#)) and leverage (e.g. [Ottonello and Winberry, 2020](#)), as well as liquidity (e.g. [Jeenas, 2018](#)) and profitability (e.g. [Drechsel, 2020](#); [Lian and Ma, 2020](#)) to proxy financial constraints. Leverage is therefore used as a proxy for asset-based financing constraints while liquidity and profitability proxy earnings-based financing constraints. The regression equation is given by (2). As before, we estimate (2) via 2SLS.

$$Pr(\text{Transaction}_{i,\{t,t+3\}} = 1) = \alpha_i + \gamma r_t + \delta(r_t \times Z_{i,t-1}) + \Phi \mathbf{X}_{i,t-1} + \Theta \mathbf{W}_{t-1} + \varepsilon_{i,t} \quad (2)$$

**Results** Table 3 displays the heterogeneous responses of the likelihood of engaging in an M&A transaction to monetary policy along the different financing constraints. Firms with lower leverage, higher liquidity, and higher profitability react much less to changes in the interest rate compared to their financially more constraint peers. Only age does not seem to proxy any relevant financial constraint, as the associated interaction term is zero and insignificant. These results combined suggest that the credit channel of monetary policy not only shapes the response of capital investment, but also of M&A activity. That is, monetary policy affects firms’ capital and M&A expenditure not just through its effect on financing costs, but also through its effect on borrowing constraints.

**Table 3: Credit Channel of Monetary Policy**

	(1) P(Acq, 1y)	(2) P(Acq, 1y)	(3) P(Acq, 1y)	(4) P(Acq, 1y)
1y Treasury Rate	-0.010*** (0.002)	-0.010*** (0.002)	-0.012*** (0.001)	-0.011*** (0.001)
1y Treasury Rate $\times$ L.Age	-0.000 (0.000)			
1y Treasury Rate $\times$ L.Leverage ratio		-0.004** (0.002)		
1y Treasury Rate $\times$ L.Liquidity ratio			0.004*** (0.001)	
1y Treasury Rate $\times$ L.EBITDA-to-assets ratio				0.025*** (0.004)
L.Age	-0.004*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)	-0.004*** (0.000)
L.Leverage ratio	-0.019*** (0.003)	-0.013*** (0.004)	-0.021*** (0.003)	-0.021*** (0.003)
L.Net liquidity ratio	0.005*** (0.002)	0.005*** (0.002)	-0.003 (0.003)	0.006*** (0.002)
L.EBITDA-to-assets ratio	0.050*** (0.007)	0.050*** (0.007)	0.051*** (0.007)	-0.001 (0.009)
N	422,047	422,047	422,047	422,047
FE	Firm	Firm	Firm	Firm
Cluster	Firm	Firm	Firm	Firm
Controls	Firm, Macro	Firm, Macro	Firm, Macro	Firm, Macro

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 4.3 Robustness Checks

In this section we present a range of sensitivity checks for our main results. In the first two sensitivity checks, we analyze two factors that could interfere with our results, namely the role of market power and capital investment. The other sensitivity checks focus on the identification of the monetary policy shocks and the stability of our results across sub-samples and industries. In particular, we study (i) whether our results are sensitive to using an alternative monetary policy shock series for instrumenting the short-term interest rate, (ii) whether our results are robust to excluding the period after the global financial crisis, (iii) whether our results are robust to clustering on both the firm and the quarter level, and (iv) whether our results are robust to excluding firms in the financial, insurance, and real estate (FIRE) sectors. In the following we discuss the results of these sensitivity checks in detail.

#### 4.3.1 The Role of Market Power

Another possible factor is the role of market power, which could confound our previous results: Firms with high degrees of market power might be more likely to be financially unconstrained and might also be more likely to engage in M&A transactions in order to further foster their dominant position. We investigate whether this channel plays a role for M&A decisions and proxy financial market power by computing the firms' markup

**Table 4:** Monetary Policy, M&A, and Market Power

	(1) P(Acq, 1y)	(2) P(Acq, 1y)	(3) P(Acq, 1y)	(4) P(Acq, 1y)
1y Treasury Rate	-0.012*** (0.001)	-0.013*** (0.002)	-0.011*** (0.001)	-0.010*** (0.001)
1y Treasury Rate $\times$ L.Markup	-0.001 (0.001)			
1y Treasury Rate $\times$ Lerner Index		0.002 (0.003)		
1y Treasury Rate $\times$ Market Share			0.000** (0.000)	
1y Treasury Rate $\times$ Industry Leader				-0.005 (0.004)
L.Markup	0.011** (0.005)			
L.Lerner Index		0.084*** (0.014)		
L.Market Share			-0.002 (0.002)	
L.Industry Leader				0.085*** (0.019)
N	404,228	368,525	422,047	422,047
FE	Firm	Firm	Firm	Firm
Cluster	Firm	Firm	Firm	Firm
Controls	Firm, Macro	Firm, Macro	Firm, Macro	Firm, Macro

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

relative to their respective Fama-French industry average,<sup>4</sup> the Lerner index,<sup>5</sup> the market share relative to their respective Fama-French industry (computed using Compustat sales data only), and a dummy indicating whether the firm is in the 95% percentile in its respective Fama-French industry by market capitalisation (see [Liu et al., 2019](#)).

We find indeed that higher measures of market power predict a higher likelihood of engaging in M&A transactions. However, the reaction to monetary policy does not seem to be driven by heterogeneity in the degree of market power, as basically all the relevant interaction terms are insignificant. Only the market share is significant but the magnitude of the effect is economically meaningless.

<sup>4</sup>To compute this measure of relative mark-ups we use the expression for the markup  $\mu_{i,t}$  from [De Loecker et al. \(2020\)](#)  $\mu_{it} = \theta_{it}^v \frac{P_{it}Q_{it}}{P_{it}^v V_{it}}$  where  $\theta_{it}^v$  is the industry specific output elasticity, and  $\frac{P_{it}Q_{it}}{P_{it}^v V_{it}}$  the revenue share of the variable input. Taking logs and demeaning this expression on the industry level eliminates the industry specific constant and thus returns the markup of the firm relative to its respective industry. We compute  $\frac{P_{it}Q_{it}}{P_{it}^v V_{it}}$  as the ratio of revenue (Compustat item SALES) to cost of goods sold (Compustat item COGS).

<sup>5</sup>Computed as the ratio of Operating Income Before Depreciation (Compustat item OIBDPQ) minus depreciation (Compustat item DPQ) to overall revenue (Compustat item SALES), see ([Gutiérrez and Philippon, 2017](#)).



**Table 5:** Monetary Policy, M&A, and Investment

	(1) P(Acq, 1y)	(2) P(Acq, 1y)
1y Treasury Rate	-0.011*** (0.001)	-0.012*** (0.002)
1y Treasury Rate $\times$ L.CAPEX Intensity	0.000 (0.000)	
1y Treasury Rate $\times$ L.(Perpetual Capital) Investment		0.009** (0.004)
L.CAPEX Intensity	0.000 (0.000)	
L.(Perpetual Capital) Investment		0.015 (0.015)
N	414,730	299,107
FE	Firm	Firm
Cluster	Firm	Firm
Controls	Firm, Macro	Firm, Macro

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

#### 4.3.2 M&A and Capital Investment

We finally investigate whether there any synergies or complementarities between the decision to engage in M&A and capital investment. It could be the case that M&A acts as a complement to capital investment so that the frictions affecting capital investment spill over into the M&A decision. We investigate whether this channel plays a role by interacting the interest rate with the CAPEX intensity (using the differenced Compustat item CAPXY) and the growth rate perpetual capital (as before, both are constructed as lagged 4 quarter averages). We find no evidence for a relation between a firm's capital investment intensity and its M&A policy, neither overall nor in terms of its response to monetary policy changes. However, growing firm, i.e. those increased their (perpetual) capital stock over the past four quarters are more likely to engage in M&A in the first place and also react less to monetary policy changes. The fact that we find a significant effect for the growth of the capital stock but not for investment intensity suggests that the heterogeneous response along capital growth rates reflects some underlying financial constraint, as high growth firms are less likely to be financially constrained.

#### 4.3.3 Identification of monetary policy shocks

This section investigates whether our findings are affected by using Romer & Romer style monetary policy shocks (i.e. the residuals of a Taylor-type rule) instead of using high frequency monetary policy shocks. This furthermore allows us to lengthen our sample period for the firm level regressions.

#### 4.3.4 Sub-Sample Stability and Sector effect

This section investigates whether our findings are affected by dropping the years after the financial crisis (i.e. limiting our sample to 1990Q1:2007Q4), controlling for effects across industrial sectors (including year-sector fixed effects or by dropping FIRE industries), and clustering on the firm as well as on the quarterly level. The results for the average effect are presented in Table C.1, the results for the credit channel are presented in Tables C.2 (with leverage as a proxy) & C.3 (with liquidity as a proxy). The results remain largely unaffected. Only the interaction of the interest rate and the leverage ratio in the subsample between 1990Q1:2007Q4 turns insignificant. However, the other two proxies for financial constraints remain significant even in the pre-crisis subsample.

## 5 Deal Quality

Measuring the quality of M&A transactions is fraught with endogeneity issues, making the assessment of M&A transactions in terms of outcomes very difficult. Therefore, a common approach is to use an event study approach and rely on the market's assessment of the transaction by computing cumulative abnormal returns. The abnormal return  $AR_{i,t}$  of acquiror  $i$  is calculated as

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (3)$$

That is, the abnormal return on day  $t$  of firm  $i$  is the difference between the realised stock return  $R_{i,t}$  and the predicted return  $E(R_{i,t})$ . The expected return is estimate using the three-factor model (3FF) of ?

$$E(R_{i,t}) = \hat{\beta}_i E(R_{m,t} - R_{f,t}) + \hat{\beta}_i^{smb} E(SMB_t) + \hat{\beta}_i^{hml} E(HML_t) \quad (4)$$

where  $R_{f,t}$  is the risk free rate,  $R_{m,t}$  is the overall market return in the same period,  $SMB_t$  is the excess returns of small cap stocks over big cap stocks  $HML_t$  is the excess return of value stocks over growth stocks in the same period. The parameters relevant parameters are estimated over days  $t - 150$  to  $t - 50$ . The cumulative abnormal return is computed as the sum of abnormal returns in a tight window around the announcement day of the transaction. In our case we chose a window starting one day before the announcement day and ending one day after, thus capturing the abnormal returns over three consecutive days.

Abnormal returns accrue both to the acquiror and the target, the sum of which then constitutes the overall merger gain. The literature overwhelmingly suggesting that targets capture the biggest share of the gains. However, as before, we only consider the acquiror side in our estimation, because we can link this data to the firm level balance sheet data

in the Compustat sample. Thus, we study the impact of monetary policy on deal quality by investigating the relationship between realised cumulative abnormal returns of the acquiring firm and the monetary policy stance. We estimate the relationship between the monetary policy stance and the CAR using the following expression:

$$CAR_{t,i} = \alpha + \gamma \bar{r}_{\{t-1|t-4\}} + \Phi \mathbf{W}_{i,t-1} + \Theta \mathbf{X}_{t-1} + \varepsilon_{i,t} \quad (5)$$

where  $\bar{r}_{\{t-1|t-4\}}$  is the average interest rate over the preceding 4 quarters (instrumented using high frequency monetary policy shocks), and the vectors  $\mathbf{X}_t$  and  $\mathbf{W}_t$  contain again firm and macro controls, respectively.

It is reasonable to assume that monetary policy affects the abnormal returns of a given acquiror in a short window only through its effect on the overall M&A decision process and not directly. Therefore, the estimated coefficients, presented in Table 6, are a composite of several ways in which monetary policy can affect the CAR: First, monetary policy affects the composition of firms that engage in M&A. Second, it affects which firms become acquisition targets. Third, it affects the overall macroeconomic setting in which the deal takes place, thereby affecting deal outcomes (e.g. via financing conditions or expected growth rates). Finally, monetary policy can affect the bargaining weights between targets and acquirors, thus changing the distribution of the overall CAR. However, combining these estimates with the results of the previous sections allows us to tease out the main transmission channel of monetary policy on deal quality.

We first note that the average CAR associated with M&A transactions in our sample is significant and large: On average, transactions are associated with an excess return of 0.9%. Furthermore, without controlling for acquiror characteristics, the effect of a contractionary monetary policy stance on transaction CARs is positive and significant, implying that markets assess the average M&A transaction under a contractionary monetary policy stance as of better quality than otherwise. However, this effect disappears when controlling for acquiror characteristics. This strongly suggests that monetary policy affects the average deal quality by changing the composition of acquiring firms. We have shown in the previous section that especially financially constrained firms reduce their M&A activity under tighter monetary policy conditions. Combining this result with the result of the CAR regressions, yields the following transmission channel of monetary policy: Contractionary monetary policy leads to a smaller number of transactions, but this smaller number of transaction is of higher (market perceived) quality because the acquiring firms are in better financial shape, thus offering better post-merger perspectives (e.g. because they are able to afford investment in the target firms' productive capacities or are better suited to realise merger gains).

If monetary policy affected transaction quality through any of the other three channels (different target composition, different bargaining weights, different macro outlook),

**Table 6:** Effect of Monetary Policy on M&A transaction CARs

	(1)	(2)	(3)	(4)
	car	car	car	car
	b/se	b/se	b/se	b/se
L. 1y Treasury Rate (4Q avg.)	0.001** (0.000)	0.001*** (0.000)	-0.000 (0.000)	0.001 (0.000)
L.Shiller's CAPE		-0.000*** (0.000)		-0.000*** (0.000)
L.Excess Bond Premium		-0.001 (0.001)		-0.001 (0.001)
L.IP Growth		-0.000 (0.001)		0.000 (0.001)
L.CPI Growth		-0.003 (0.002)		-0.004 (0.003)
L.Leverage			-0.000 (0.001)	0.000 (0.001)
L.Age			0.000*** (0.000)	0.000*** (0.000)
L.Log Total Assets (real)			-0.006*** (0.000)	-0.005*** (0.000)
L.Liquidity			0.002 (0.001)	0.002* (0.001)
L.Tobin's Q			-0.001*** (0.000)	-0.001** (0.000)
L.EBITDA-to-assets ratio			-0.000 (0.000)	-0.000 (0.000)
L.Dividend Payer			0.005 (0.003)	0.003 (0.002)
Constant	0.009*** (0.001)	0.021*** (0.003)	0.051*** (0.004)	0.056*** (0.004)
N	27,526	25,959	21,188	19980
Controls	No	Macro	Firm	Macro, Firm

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

we would still expect a significant impact on transaction CARs even after controlling for acquiror characteristics. Since this is not the case, we can summarise the effect of monetary policy on M&A transaction quality as the following: Expansionary monetary policy leads to more transactions, which are perceived positively by the acquirors shareholders. However, the marginal transaction is of somewhat lower (perceived) quality, because the marginal acquiror is less financially sound and is expected to realise smaller merger gains. Overall, this suggests that monetary policy leads to more frequent reallocation of capital to more productive firms (otherwise the average acquiror CAR would not be positive), although the marginal transaction reallocates capital to somewhat less productive firms.

## 6 Model

In this section, we lay out the model used to rationalize our empirical findings. In some aspects the model is similar to [David \(2020\)](#) but we focus on a partial equilibrium analysis and introduce capital and monetary policy into the model.

### 6.1 Environment

Time is discrete and runs forever. The economy is populated by a continuum of risk-neutral firms and a central bank.

**Firms** Firms operate a decreasing-returns-to-scale technology, given by

$$y_{i,t} = z_{i,t} k_{i,t}^\alpha \quad (6)$$

where  $i$  denotes the firm,  $t$  indexes time, and  $\alpha$  denotes the elasticity of output with respect to capital.  $k_{i,t}$  and  $z_{i,t}$  denotes firm  $i$ 's capital stock and productivity in period  $t$ . We assume that the firms can grow its capital stock and improve its productivity through mergers with other firms. To finance such a M&A transaction, firms use internal funds  $y_{i,t}$  and borrow  $b$  at an exogenous real interest rate  $r$ . We assume that  $r$  that is controlled by the central bank. Firms make their decisions subject to a standard borrowing constraint which limits the amount of borrowing to a fraction of the firm's capital stock.

$$b_{i,t+1} \leq \theta(1 - \delta)p_{c,t}k_{i,t} \quad (7)$$

where  $\theta$  denotes the tightness of the borrowing constraint and  $p_{c,t}$  denotes the collateral price of capital. We follow [Cloyne et al. \(2018\)](#) and allow for an indirect effect of monetary policy on collateral values via  $p_{c,t}$  as follows

$$\log(p_{c,t}) = \log(\bar{p}_c) + \eta_{c,r}(r_t - \bar{r}) \quad (8)$$

Firms maximize the discounted stream of future dividends  $d_{i,t}$ .

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \left( \frac{1}{1+r} \right)^t d_{i,t} \quad (9)$$

**Central Bank** We assume that the only source of uncertainty comes from the real interest rate  $r_t$  that follows an exogenous process and is controlled by the central bank. The process for  $r_t$  is as follows

$$r_t = (1 - \rho)\bar{r} + \rho r_{t-1} + \sigma_r \varepsilon_{r,t} \quad (10)$$

where  $\bar{r}$  is the unconditional mean for the real interest rate,  $\rho$  is the auto-correlation coefficient, and  $\varepsilon_{r,t}$  is an error term with  $\varepsilon_{r,t} \sim \mathcal{N}(0, 1)$ .

**Mergers and Acquisitions** We assume that there is an exogenous large mass of potential target firms, each characterized by a capital and productivity level,  $k_j$  and  $z_j$ , respectively. We assume that with exogenous probability  $\omega$  an incumbent firm  $i$  meets a potential target firm  $j$ . With the complementary probability  $(1 - \omega)$  it does not meet a target. One can think of the exogenous parameter  $\omega$  as a measure of frictions in the acquisition market. Upon meeting a target firm  $j$ , incumbent firm  $i$  has to decide whether or not to acquire the target. For simplicity, we assume that the target cannot refuse to be acquired. If firm  $i$  decides to acquire, firm  $j$  receives the acquisition price  $\mathcal{P}$  and exits forever. As it is valuation practice in M&A transactions, we assume that the target firm is valued at a multiple over its EBITDA. We assume a size-dependent transaction fee  $\zeta$ . The acquisition price is hence given by

$$\mathcal{P}(k_j, z_j, r) = (1 + \zeta)m(r)y_{j,t} \quad (11)$$

where  $m$  denotes the multiple function and is decreasing in the interest rate  $r$ . We assume that all gains from the merger accrue to the acquiring firm.

Regarding the merger technology, we assume that by acquiring firm  $j$ , firm  $i$  can both grow its capital stock and improve its productivity at the same time. The two synergy functions are given by

$$k_m = s_k(k_{i,t}, k_{j,t}) = k_{i,t} + k_{j,t}^\gamma \quad \text{and} \quad z_m = s_z(z_{i,t}, z_{j,t}) = z_{i,t}^\eta z_{j,t}^\nu$$

Hence, the output of the merged firm is given by

$$y_{m,t} = z_{m,t} k_m^\alpha \quad (12)$$

The firms dividends in period  $t$  are given by

$$d_{i,t} = y_{i,t} + \frac{1}{1+r}b_{i,t+1} - b_{i,t} - \mathbb{I}_{\text{MA}=1}\mathcal{P}(z_j, k_j, r) \quad (13)$$

In this version of the model, we assume for simplicity that M&A transactions are the only means through which a firm can grow its capital stock, i.e. capital of firm  $i$  evolves according to

$$k_{i,t+1} = k_{i,t} + \mathbb{I}_{\text{MA}=1}(k_m - k_i) \quad (14)$$

where  $\mathbb{I}_{\text{MA}=1}$  is an indicator function that takes the value of 1 if the firm decides to acquire the target.

## 6.2 Firm problem

The firm chooses its borrowing level  $b$  and whether it wants to acquire target  $j$  to maximize the discounted stream of future dividends subject to a collateral constraint. We can write the firm's problem recursively as

$$V_i(z_i, r, k_i, b_i) = \max_{b'_i} \left\{ d_i + \frac{1}{1+r} \omega \mathbb{E}_{r'} \hat{V}_i(z'_i, r', k'_i, b'_i, \mathcal{P}) + \frac{1}{1+r} (1-\omega) \mathbb{E}_{r'} V_i(z_i, r', k_i, b'_i) \right\} \quad (15)$$

where

$$\hat{V}_i(z'_i, r', k'_i, b'_i, \mathcal{P}) = \max\{V_i(z_i, r', k_i, b'_i), \underbrace{V_i(z'_m, r', k'_m, b'_i, \mathcal{P})}_{V^{\text{MA}}}\} \quad (16)$$

subject to

$$d_i = y_i + \frac{1}{1+r}b'_i - b_i - \mathbb{I}_{\text{MA}=1}\mathcal{P}(z_j, k_j, r) \geq 0 \quad (17)$$

$$b'_i \leq \theta(1-\delta)p_c k_i \quad (18)$$

$$k'_i = (1-\delta)k_i + \mathbb{I}_{\text{MA}=1}(k_m - k_i) \quad (19)$$

## 6.3 The firm's acquisition decision

[TO BE COMPLETED] We solve the model using discrete value function iteration.

## 7 Conclusion

In this paper, we study the effect of monetary policy on M&A activity in the U.S. both on the aggregate and the firm level. We find that contractionary monetary policy lowers aggregate M&A activity both in terms of the total number of deals and their total value. The macroeconomic evidence is confirmed on the firm level. A one percentage point increase in the 1y Treasury rate reduces the likelihood of engaging in a M&A transaction within the following 4 quarters by 1.1 percentage points. Considering the unconditional likelihood of engaging in a M&A transaction is 13.5% in any given year, this presents an 8% reduction in the likelihood of becoming an acquiror. We show that financially constrained firms react to the monetary policy impulse much more than their more unconstrained peers. This mirrors the heterogeneous response found by the literature on capital investment. We suggest a stylized partial equilibrium model of a firm's M&A decision to rationalize our empirical findings.



## References

- Abadie, A., S. Athey, G. W. Imbens, and J. Wooldridge (2017). When Should You Adjust Standard Errors for Clustering.
- Adra, S., L. G. Barbopoulos, and A. Saunders (2020). The impact of monetary policy on M&A outcomes. *Journal of Corporate Finance* 62(C).
- Almeida, H., M. Campello, and D. Hackbarth (2011). Liquidity mergers. *Journal of Financial Economics* 102(3), 526–558.
- Angrist, J. D. and J. S. Pischke (2008). *Mostly harmless econometrics: An empiricist's companion*.
- Bernanke, B. S., M. Gertler, and S. Gilchrist (1999). The financial accelerator in a quantitative business cycle framework. In *Handbook of Macroeconomics*, Volume 1, Chapter 21, pp. 1341–1393.
- Bonaime, A., H. Gulen, and M. Ion (2018). Does policy uncertainty affect mergers and acquisitions? *Journal of Financial Economics* 129(3), 531–558.
- Choi, S. H. and B. N. Jeon (2011). The impact of the macroeconomic environment on merger activity: Evidence from US time-series data. *Applied Financial Economics* 21(4), 233–249.
- Cloyne, J., C. Ferreira, M. Froemel, and P. Surico (2018). Monetary Policy, Corporate Finance and Investment.
- David, J. (2020). The Aggregate Implications of Mergers and Acquisitions. *Review of Economic Studies*.
- De Loecker, J., J. Eeckhout, and G. Unger (2020). The rise of market power and the macroeconomic implications. *Quarterly Journal of Economics* 135(2), 561–644.
- Drechsel, T. (2020). *Earnings-Based Borrowing Constraints and Macroeconomic Fluctuations*. Ph. D. thesis, London School of Economics.
- Favara, G., S. Gilchrist, K. F. Lewis, and E. Zakrajšek (2016). Recession Risk and the Excess Bond Premium. Technical report, Board of Governors of the Federal Reserve System (U.S.).
- Garfinkel, J. A. and K. W. Hankins (2011). The role of risk management in mergers and merger waves. *Journal of Financial Economics* 101(3), 515–532.

- Gertler, M. and P. Karadi (2015). Monetary Policy Surprises, Credit Costs, and Economic Activity. *American Economic Journal: Macroeconomics* 7(1), 44–76.
- Giannone, D., M. Lenza, and G. E. Primiceri (2015). Prior selection for vector autoregressions. *Review of Economics and Statistics* 97(2), 436–451.
- Gurkaynak, R. S., B. P. Sack, and E. T. Swanson (2005). Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements. *International Journal of Central Banking* 1(1), 55–93.
- Gutiérrez, G. and T. Philippon (2017). Declining Competition and Investment in the U.S.
- Haleblian, J., C. E. Devers, G. McNamara, M. A. Carpenter, and R. B. Davison (2009). Taking stock of what we know about mergers and acquisitions: A review and research agenda. *Journal of Management* 35(3), 469–502.
- Jarociński, M. and P. Karadi (2020). Deconstructing monetary policy surprises-The role of information shocks. *American Economic Journal: Macroeconomics* 12(2), 1–43.
- Jeenas, P. (2018). *Firm Balance Sheet Liquidity, Monetary Policy Shocks, and Investment Dynamics*. Ph. D. thesis, New York University.
- Lian, C. and Y. Ma (2020). Anatomy of Corporate Borrowing Constraints\*. *The Quarterly Journal of Economics* 136(1), 229–291.
- Liu, E., A. R. Mian, and A. Sufi (2019). Low Interest Rates, Market Power, and Productivity Growth. *SSRN Electronic Journal*.
- Maksimovic, V. and G. Phillips (2001). The market for corporate assets: Who engages in mergers and asset sales and are there efficiency gains? *Journal of Finance* 56(5), 2019–2065.
- Ottonello, P. and T. Winberry (2020). Financial Heterogeneity and the Investment Channel of Monetary Policy. *Econometrica* 88(6), 2473–2502.
- Owen, S. and A. Yawson (2010). Corporate life cycle and M&A activity. *Journal of Banking and Finance* 34(2), 427–440.
- Shleifer, A. and R. W. Vishny (2003). Stock market driven acquisitions. *Journal of Financial Economics* 70(3), 295–311.
- Stock, J. H. and M. W. Watson (2018). Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments. *The Economic Journal* 128(5), 917–948.

## A Data

**Table A.1:** Variable Definitions

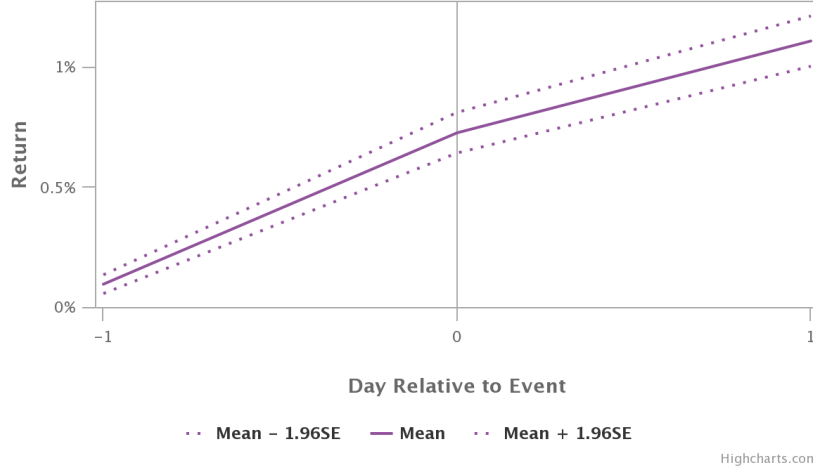
Variable	Definition
Age	—
Leverage	$(\text{DLCQ} + \text{DLTTQ})/\text{ATQ}$
Total Assets	ATQ
Net Liquidity	$(\text{ACTQ} - \text{LCTQ})/\text{ATQ}$
Tobin's Q	$(\text{ATQ} + \text{PRCCQ} * \text{CSHOQ} - \text{CEQQ})/\text{ATQ}$
EBITDA-to-Assets	$\text{EBITDAQ}/\text{L.ATQ}$
Dividend Payer	$\mathbb{I}_{DVQ > 0, \{t, t-3\}}$
Acquisition history	$\mathbb{I}_{\text{Transaction} > 0, \{t, t-19\}}$
# Industry Mergers	$\sum_{i \in \text{find}} \mathbb{I}_{i, \text{Transaction} > 0, \{t, t-3\}}$

**Table A.2:** Summary Statistics

	Observations	Mean	Std. Dev	Min	Max
Age	744,344	24.35	27.31	0.00	235.00
Net leverage	552,376	0.31	2.44	-0.93	79.94
Leverage Ratio	652,727	0.30	0.56	0.00	16.75
EBITDA-to-assets ratio	536,571	-0.01	0.18	-5.55	0.17
Log Total Assets (real)	689,400	5.30	2.77	-6.92	15.09
Tobin's Q	599,325	3.00	9.05	0.44	381.78
Net Liquidity Ratio	568,506	0.13	0.75	-10.00	7.13

*Note:* Firm-level variables are trimmed at the 1<sup>st</sup> and 99<sup>th</sup> percentile. Trimming is done by year.

Cumulative Abnormal Return: Mean & 95% Confidence Limits  
There are 31219 events in total with non-missing returns.



**Figure A.1:** Average Cumulative Abnormal Return Around M&A Announcement Dates

## B Prior and Posterior Distributions

In reduced form, the model can be written as

$$y_t = C + \sum_{l=1}^p A_l y_{t-l} + u_t$$

where  $u_t$  are the reduced-form error terms with zero mean and covariance matrix  $\Sigma$ . Stacking the regressors into a single matrix this can be written as  $Y = XB + u$ . The prior and the posterior belong to the normal-inverse-Wishart distribution, where the posterior takes the form:

$$p(\Sigma|y) = \mathcal{IW}(\alpha_1, S_1)$$

$$p(B|y) = \mathcal{MT}(B_1, S_1, \Phi_1, \alpha_1)$$

where  $\mathcal{IW}$  denotes the Inverted Wishart distribution and  $\mathcal{MT}$  is a matrix-variate student distribution with mean  $B_1$ , scale matrices  $S_1$  and  $\Phi_1$ , and degrees of freedom  $\alpha_1$ . The parameters describing the posterior distribution are related to the prior in the following way

$$B_1 = \Phi_1[\Phi_0^{-1}B_0 + X'Y]$$

$$S_1 = Y'Y + S_0 + B_0'\Phi_0^{-1}B_0 - B_1'\Phi_1^{-1}B_1$$

$$\Phi_1 = [\Phi_0^{-1} + X'X]^{-1}$$

$$\alpha_1 = \alpha_0 + T$$

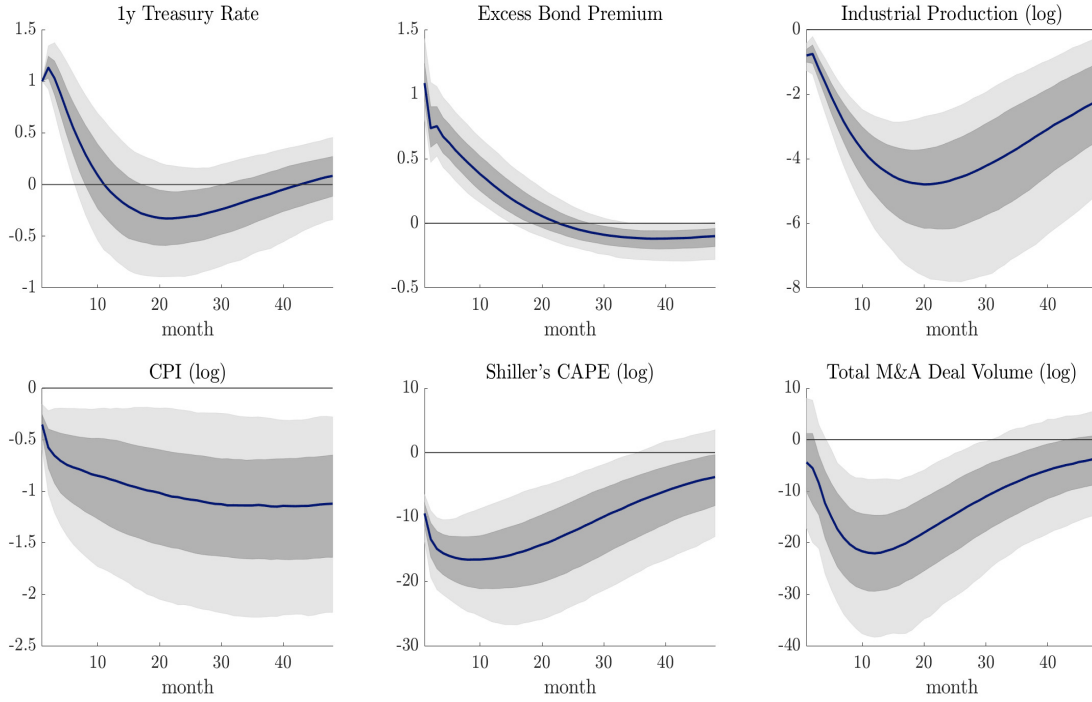
We use a conventional Minnesota prior for  $B_1$ , setting the own first lag coefficients to one and all other coefficients (including the intercept) to zero. This assumes that all the non-

stationarity in the variables is stochastic, and accounted for by the unit-root embedded in the priors. We furthermore set  $\alpha_0 = n + 2$ , the prior scale matrix  $S_0$  to the diagonal covariance matrix obtained from individual AR(1) regressions for each of the respective endogenous variables, and finally

$$\Phi_0 = \text{diag}(\lambda_c, \phi_{1,1}, \dots, \phi_{1,n}, \dots, \phi_{p,1}, \dots, \phi_{p,n})$$

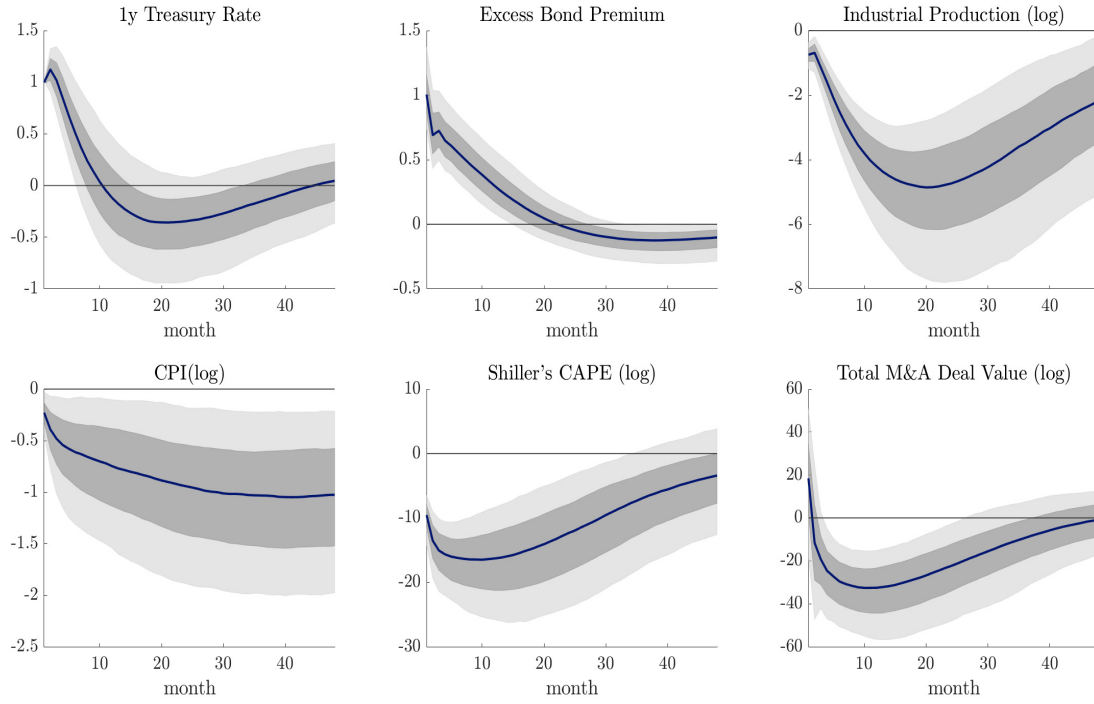
where  $\lambda_c = 10^5$  is the prior variance on the intercept,  $\phi_{li} = \left(\frac{1}{\sigma_i^2}\right) \left(\frac{\lambda^2}{l^2}\right)$ , and  $\lambda$  controls the overall tightness of the priors (with a smaller value placing more weight on the prior). Extending the argument in [Giannone et al. \(2015\)](#), we treat the parameter  $\lambda$  as an additional model parameter coming from a gamma distribution with mean 0.4 and standard deviation 0.1, and choose it as the maximiser of the posterior likelihood.

## B.1 Robustness



*Note:* Light (dark) grey shaded areas indicate 95% (68%) confidence intervals

**Figure B.1:** Response of Aggregate Deal Volume to a Monetary Policy Shock



*Note:* Light (dark) grey shaded areas indicate 95% (68%) confidence intervals

**Figure B.2:** Response of Aggregate Deal Volume to a Monetary Policy Shock

## C Sensitivity Analysis

**Table C.1: Sensitivity Tests - Average Effect**

	(1)	(2)	(3)	(4)
	P(Acq, 1y)	P(Acq, 1y)	P(Acq, 1y)	P(Acq, 1y)
	b/se	b/se	b/se	b/se
1y Treasury Rate	-0.004*** (0.001)	-0.003** (0.001)	-0.011*** (0.001)	-0.011*** (0.003)
L.Leverage	-0.033*** (0.005)	-0.018*** (0.003)	-0.020*** (0.003)	-0.019*** (0.003)
L.Age	-0.000 (0.001)	-0.003*** (0.001)	-0.004*** (0.000)	-0.004*** (0.001)
L.Log Total Assets (real)	0.004* (0.002)	0.004** (0.002)	0.005*** (0.002)	0.004** (0.002)
L.Net liquidity ratio	0.010*** (0.003)	0.007*** (0.002)	0.006*** (0.002)	0.006*** (0.002)
L.Tobin's Q	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
L.EBITDA-to-assets ratio	0.083*** (0.011)	0.050*** (0.007)	0.051*** (0.007)	0.050*** (0.009)
L.Dividend Payer	-0.001 (0.005)	-0.003 (0.005)	-0.005 (0.005)	-0.005 (0.005)
L.# Industry Mergers	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
L.Prior Acquisition History	-0.085*** (0.005)	-0.052*** (0.004)	-0.047*** (0.004)	-0.048*** (0.005)
L.IP growth	0.006*** (0.002)	0.001 (0.001)	0.002 (0.002)	0.002 (0.005)
L.CPI inflation	-0.017*** (0.003)	-0.002 (0.002)	-0.014*** (0.003)	-0.014 (0.011)
L.Excess Bond Premium	-0.030*** (0.002)	-0.009*** (0.002)	-0.031*** (0.002)	-0.031*** (0.006)
L.Shillers's CAPE	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
N	305,751	412,383	408,608	422,047
FE	Firm	Firm, Industry x Year	Firm	Firm
Cluster	Firm	Firm	Firm	Firm, Quarter
Controls	Firm, Macro	Firm, Macro	Firm, Macro	Firm, Macro
Sample	1990Q1 - 2007q4	1990Q1 - 2016Q3	1990Q1 - 2016Q3 (excl. FIRE)	1990Q1 - 2016Q3

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table C.2:** Sensitivity Tests - Credit Channel (Leverage Ratio)

	(1) P(Acq, 1y) b/se	(2) P(Acq, 1y) b/se	(3) P(Acq, 1y) b/se	(4) P(Acq, 1y) b/se
1y Treasury Rate	-0.004*** (0.001)	-0.002 (0.001)	-0.010*** (0.002)	-0.010*** (0.003)
1y Treasury Rate $\times$ L.Leverage Ratio	-0.001 (0.003)	-0.005*** (0.002)	-0.004** (0.002)	-0.004** (0.002)
L.Leverage	-0.028** (0.012)	-0.010*** (0.004)	-0.014*** (0.004)	-0.013*** (0.004)
L.Age	-0.000 (0.001)	-0.003*** (0.001)	-0.004*** (0.000)	-0.004*** (0.001)
L.Log Total Assets (real)	0.004* (0.002)	0.004** (0.002)	0.005*** (0.002)	0.004** (0.002)
L.Net liquidity ratio	0.010*** (0.003)	0.006*** (0.002)	0.005*** (0.002)	0.005*** (0.002)
L.Tobin's Q	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
L.EBITDA-to-assets ratio	0.083*** (0.011)	0.051*** (0.007)	0.051*** (0.007)	0.050*** (0.009)
L.Dividend Payer	-0.001 (0.005)	-0.003 (0.005)	-0.005 (0.005)	-0.005 (0.005)
L.# Industry Mergers	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
L.Prior Acquisition History	-0.085*** (0.005)	-0.051*** (0.004)	-0.047*** (0.004)	-0.048*** (0.005)
L.IP growth	0.006*** (0.002)	0.001 (0.001)	0.002 (0.002)	0.002 (0.005)
L.CPI inflation	-0.017*** (0.003)	-0.002 (0.002)	-0.013*** (0.003)	-0.013 (0.011)
L.Excess Bond Premium	-0.030*** (0.002)	-0.009*** (0.002)	-0.031*** (0.002)	-0.030*** (0.006)
L.Shillers's CAPE	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
N	305,751	412,383	408,608	422,047
FE	Firm	Firm, Industry x Year	Firm	Firm
Cluster	Firm	Firm	Firm	Firm, Quarter
Controls	Firm, Macro	Firm, Macro	Firm, Macro	Firm, Macro
Sample	1990Q1 - 2007q4	1990Q1 - 2016Q3	1990Q1 - 2016Q3 (excl. FIRE)	1990Q1 - 2016Q3

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table C.3:** Sensitivity Tests - Credit Channel (Liquidity Ratio)

	(1) P(Acq, 1y) b/se	(2) P(Acq, 1y) b/se	(3) P(Acq, 1y) b/se	(4) P(Acq, 1y) b/se
1y Treasury Rate	-0.005*** (0.001)	-0.004*** (0.001)	-0.012*** (0.002)	-0.012*** (0.003)
1y Treasury Rate $\times$ L.Liquidity Ratio	0.005*** (0.002)	0.006*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
L.Leverage	-0.035*** (0.005)	-0.021*** (0.003)	-0.022*** (0.003)	-0.021*** (0.003)
L.Age	-0.000 (0.001)	-0.003*** (0.001)	-0.004*** (0.000)	-0.004*** (0.001)
L.Log Total Assets (real)	0.004* (0.002)	0.004** (0.002)	0.005*** (0.002)	0.004** (0.002)
L.Net liquidity ratio	-0.010 (0.008)	-0.007** (0.003)	-0.003 (0.003)	-0.003 (0.003)
L.Tobin's Q	0.003*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
L.EBITDA-to-assets ratio	0.085*** (0.011)	0.053*** (0.007)	0.052*** (0.007)	0.051*** (0.009)
L.Dividend Payer	-0.001 (0.005)	-0.003 (0.005)	-0.005 (0.005)	-0.005 (0.005)
L.# Industry Mergers	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
L.Prior Acquisition History	-0.085*** (0.005)	-0.051*** (0.004)	-0.047*** (0.004)	-0.048*** (0.005)
L.IP growth	0.005*** (0.002)	0.001 (0.001)	0.002 (0.002)	0.002 (0.005)
L.CPI inflation	-0.017*** (0.003)	-0.001 (0.002)	-0.013*** (0.003)	-0.013 (0.011)
L.Excess Bond Premium	-0.030*** (0.002)	-0.009*** (0.002)	-0.031*** (0.002)	-0.031*** (0.006)
L.Shillers's CAPE	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
N	305,751	412,383	408,608	422,047
FE	Firm	Firm, Industry x Year	Firm	Firm
Cluster	Firm	Firm	Firm	Firm, Quarter
Controls	Firm, Macro	Firm, Macro	Firm, Macro	Firm, Macro
Sample	1990Q1 - 2007q4	1990Q1 - 2016Q3	1990Q1 - 2016Q3 (excl. FIRE)	1990Q1 - 2016Q3

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table C.4:** Sensitivity Tests - Credit Channel (EBITDA-to-Assets Ratio)

	(1) P(Acq. 1y) b/se	(2) P(Acq. 1y) b/se	(3) P(Acq. 1y) b/se	(4) P(Acq. 1y) b/se
1y Treasury Rate	-0.004*** (0.001)	-0.003** (0.001)	-0.011*** (0.001)	-0.011*** (0.003)
1y Treasury Rate $\times$ L.EBITDA-to-Assets	0.021** (0.008)	0.019*** (0.004)	0.024*** (0.004)	0.025*** (0.005)
L.Leverage	-0.033*** (0.005)	-0.019*** (0.003)	-0.021*** (0.003)	-0.021*** (0.003)
L.Age	-0.000 (0.000)	-0.003*** (0.001)	-0.004*** (0.000)	-0.004*** (0.001)
L.Log Total Assets (real)	0.004* (0.002)	0.004** (0.002)	0.005*** (0.002)	0.004** (0.002)
L.Net liquidity ratio	0.010*** (0.003)	0.007*** (0.002)	0.006*** (0.002)	0.006*** (0.002)
L.Tobin's Q	0.003*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
L.EBITDA-to-assets ratio	0.011 (0.028)	0.010 (0.010)	0.000 (0.009)	-0.001 (0.010)
L.Dividend Payer	-0.001 (0.005)	-0.003 (0.005)	-0.005 (0.005)	-0.005 (0.005)
L.# Industry Mergers	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
L.Prior Acquisition History	-0.085*** (0.005)	-0.052*** (0.004)	-0.047*** (0.004)	-0.049*** (0.005)
L.IP growth	0.006*** (0.002)	0.001 (0.001)	0.002 (0.002)	0.002 (0.005)
L.CPI inflation	-0.017*** (0.003)	-0.001 (0.002)	-0.013*** (0.003)	-0.013 (0.011)
L.Excess Bond Premium	-0.030*** (0.002)	-0.009*** (0.002)	-0.031*** (0.002)	-0.031*** (0.006)
L.Shillers's CAPE	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
N	305,751	412,383	408,608	422,047
FE	Firm	Firm, Industry x Year	Firm	Firm
Cluster	Firm	Firm	Firm	Firm, Quarter
Controls	Firm, Macro	Firm, Macro	Firm, Macro	Firm, Macro
Sample	1990Q1 - 2007q4	1990Q1 - 2016Q3	1990Q1 - 2016Q3 (excl. FIRE)	1990Q1 - 2016Q3

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$