Stock Market's Assessment of Monetary Policy Transmission: The Cash Flow Effect*

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Abstract

Looking at firm level stock price changes around monetary policy announcements, we find that firms that have more cash flow exposure see their stock prices affected more, depending on the maturity and type of debt issued by the firm and the forward guidance provided by the Fed. This is not rule of thumb behavior: the marginal stock market participant studies and reacts to firms' liability structures. The cash flow exposure at the time of monetary policy actions predicts future net worth, investment, and assets, verifying the stock price reaction and providing evidence of cash flow effects on firms' real behavior.

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1 Introduction

In VAR studies, monetary policy appears to have large and long-lasting effects on real activity. In standard macroeconomic models, it is very hard to generate monetary policy effects that are nearly as pronounced or persistent. An influential branch of the literature has focused on financial conditions to amend the standard models to better fit the data, which also helps explain why financial markets are so important and financial crises so destructive. These models, in which the Modigliani-Miller theorem fails, collectively require cash in the firm to be more valuable than cash outside it. The financial accelerator models tell a compelling story, but the literature remains relatively thin on empirical evidence for many of these financial conditions-based channels due to the difficulty of finding identified effects.

Similarly, our understanding of the effects of monetary policy on stock prices remains much weaker than that of monetary policy effects on bond prices. This is at least in part because individual stocks–unlike Treasury bonds which differ in coupon rates, maturity, and inflation protection but not much else–are heterogeneous in many dimensions and the interaction of monetary policy with firm heterogeneity and how these are reflected in stock pricing is only a nascent literature. Monetary policy effects on stock prices are more often studied at the aggregate or industry level, as in the influential work of Bernanke and Kuttner (2005).

In this paper, we study stock market reaction to monetary policy at the level of individual firms' equity prices, which reflects the stock market participants' beliefs about monetary policy's effects on the performances of different firms. Our object of interest is the difference caused by fixed versus floating rate obligations of otherwise similar firms. Fixed rate liabilities are, in a net present value sense, lowered by higher interest rates, and their future cash flows are *unchanged* by these. For floating rate liabilities, their net present values are either unchanged or mildly lowered, but future cash flow obligations *increase* with higher interest rates. Positive contractionary interest rate surprises lower stock prices on average but should affect stock prices of firms that have more cash flow exposure more.

In general, an increase in the policy rate, apart from its standard macroeconomic and discount rate impacts, creates two effects. The first one is mechanical: it causes a cash transfer from equity holders to bond (or loan) holders if debt is a floating rate one, and the effect is larger the longer the maturity of the debt and stronger the forward guidance (increase in expected future rates). There is a transfer in the net present value sense in the opposite direction for firms with fixed rate liabilities. Whether this effect is priced in at high frequency, in response to monetary policy surprises, is an interesting question. We study this.

The second effect arises due to firms' cash flow exposures. Current and expected future cash flows change in response to monetary policy surprises based on the amount and maturity of floating rate liabilities on firms' balance sheets, and whether these liabilities are hedged. Financial accelerator channels require cash in the firm to be more valuable than cash outside it. If these channels are present in the data, as higher interest rates induce cash outflows, firms with more cash flow exposure should be more adversely affected by higher interest rates. This again should lower firm values for firms with high cash flow exposures and, importantly, also lead to changes in real outcomes for these firms. We study this as well.

The first effect, if present in the data, is a balance sheet effect that leads to a redistribution. But, if the Modigliani-Miller theorem holds, it will not have direct effects on firm behavior—a reshuffling of liabilities between loan and bond holders and residual claimants (stock holders) will have no real effects.[1] However, the second possible effect, which leads to changes in real outcomes at the firm level due to cash flow exposure, is a direct channel of monetary policy transmission and also a test of the Modigliani-Miller theorem, which we study in this paper. We find strong evidence for both effects.

We proceed in two steps. Our first test is whether firms that have more cash flow exposure due to having issued more and longer maturity floating rate debt see their stock prices respond more to monetary policy surprises regarding forward guidance in high frequency. This is indeed the case. We show that the relevant measure of monetary policy is not the surprise in the current setting of interest rates but surprises about future path of rates, and that it is the interaction of this surprise with cash flow exposure, which depends not only on the amount but also on the maturity of floating rate obligations. We further show that, when measured this way, stock market reactions to monetary policy surprises as a function of cash flow exposure of firms have not changed during the Zero Lower Bound (ZLB) period: forward guidance has been as effective during the ZLB as it had been before it.

Before proceeding to real effects, we take a detour and ask what we find to be an interesting question: is it the case that the marginal stock market investor actually knows the balance sheet of the relevant firm, how much cash flow exposure it has, and prices in the interaction of cash flow exposure and monetary policy at high frequency, or is it that because cash flow exposure is quite persistent for most firms, stock market participants learn rules of thumb where certain firms fare worse in, say, tightening cycles? In other words, is the marginal

[1] To the extent that changes in stock prices lead to wealth effects and there is heterogeneity between stock and bond holders' consumption elasticities, this may lead to changes in consumption at aggregate level and be a channel of monetary policy transmission in itself. We do not focus on this question in this paper.

stock market investor sophisticated enough to know firm balance sheets and understand the interactions of payments to stock and bond holders with monetary policy? We devise tests to answer this question and find that what drives these stock price effects in high frequency is indeed knowledge of balance sheets and understanding of their interactions with monetary policy rather than rules of thumb. The marginal stock market investor is quite sophisticated.

Lastly, we show that firms that have more cash flow exposure fare worse in real outcomes in the quarters following policy rate increases. In particular, we show that following a monetary policy tightening their net worth and total assets are lower and capital investment expenditures decline, providing evidence for the real effects of a cash flow channel of monetary policy transmission. These effects are based on balance sheet changes due to monetary policy actions external to the firm and constitute strong empirical evidence for real effects of cash flows for firms. It is notable that we find these effects for S&P500 firms, which are often thought of as the least financially constrained corporations.

The paper is structured as follows: Section 2 describes the literature we build on and discusses our contribution. Section 3 describes our data and provides relevant summary statistics; Section 4 presents the main results of our paper concerning the cash flow channel of monetary policy and high-frequency stock price responses; Section 5 then asks whether stock market participants understand this channel or use rules of thumb when differentially repricing firms' stocks in response to monetary policy surprises. Section 6 extends the analysis in Section 4 to real effects on investment and assets which enables the cash flow effect interpretation of the policy channel; and Section 7 concludes.

2 Related Literature

Our work brings together methods and ideas from the monetary policy event study literature, the firm valuation and stock pricing sub-strands of corporate finance and asset pricing literatures, and the literature on the role of financial frictions in monetary policy transmission.

There is an extensive literature studying the relationship between asset prices and monetary policy. Some examples are Thorbecke (1997) and Ehrmann and Fratzscher (2004) who study the relationship between monetary policy and stock returns, and Kuttner (2001) and Gürkaynak et al. (2005) who introduce the high frequency identification of monetary policy surprises and examine their impact on stock prices and bond yields, which Campbell et al. (2012) and Swanson (2018) extend to consider the effectiveness of unconventional monetary policy in recent years. Gorodnichenko and Weber's (2016) work is particularly pertinent to

ours in that they provide evidence for stock market participants' awareness of different sectors' price stickiness and how such information is priced following monetary policy announcements. We provide related evidence on stock market participants' sophistication, but in the context of firms' liability structures.

The literature on the interplay between monetary policy and financial frictions is rich, especially in theoretical work. Some examples in this vein include Gertler and Gilchrist (1994), Kiyotaki and Moore (1997, 2018), Bernanke et al. (1999), Gertler and Kiyotaki (2010), Adrian et al. (2012), Ciccarelli et al. (2013), and Gertler and Karadi (2015) whose works are mainly concerned with the credit channel of monetary policy. However, as Boivin et al. (2010) argue, the literature on unconventional or non-neoclassical transmission mechanisms is still thin, and this is mainly due to the lack of supporting empirical evidence.

There is also interest in the effects of monetary policy on firm liabilities. Kashyap et al. (1993) and Becker and Ivashina (2014), among others, have shown that firms try to substitute other forms of borrowing when bank loans decline, suggesting the existence of a bank lending channel. Three recent papers in this literature that are relevant for our work are English et al. (2018) who demonstrated how interest rate shocks transmit to bank equity evaluations through interactions with maturity mismatch between bank assets and liabilities; Greenwald (2019), who found that changes in interest rates also push firms closer to interest coverage covenants, which has real effects; and Ippolito et al. (2018) who showed that bank loan leverage, which is mostly floating rate, matters in stock price response to monetary policy surprises but that this relationship broke down during the ZLB episode.

The household finance side of this question was studied by Di Maggio et al. (2017), who showed that households with adjustable rate mortgages saw greater effects of low interest rates and larger real reactions.[2] Even more related to our work, Garriga et al. (2017) found that it was the combination of long-duration adjustable rate mortgages and persistent monetary policy shocks that had the largest effects on household balance sheets and housing investment. We think of a firm balance sheet analogue of this mechanism.

We show that floating rate exposure should be measured taking into account the maturity of liabilities, not only leverage; that the relevant measure of monetary policy is the guidance about future interest rates, which drive future floating rate payments; and that when exposure and policy surprises are measured as described, one sees the differential effect of monetary policy surprises on stock prices of firms with different cash flow exposures and that this has

[2] Hughson et al. (2016) and Flodén et al. (2017) show similar real repercussions of cash flow effects of monetary policy on household balance sheets in Australia and Sweden, respectively.

not changed during the zero lower bound period. What mattered has always been forward guidance, and forward guidance worked the same way when the policy rate was stuck at zero. Importantly, by conditioning on these measures, we find real effects that were not previously observed, even for S&P500 firms.[3]

On the real side of monetary policy transmission, we inform the cash flow sensitivity of investment debate which goes back to Fazzari et al. (1988) and Kaplan and Zingales (1997). Our proposed measure of a firm's exposure to interest rate risks enables a structured and better identified analysis of the cash flow effect of monetary policy, which propagates through the firm's liability structure and ultimately impinges on its investment behavior. Investment is sensitive to cash flow.

Lastly and obviously, we contribute to the literature on stock price determination. This is a very large literature with important contributions in different dimensions including determinants of firm performance and stock prices such as Fama and French (1992, 1993, 1995), and responses of stock prices to monetary policy such as Bernanke and Kuttner (2005), Ippolito et al. (2018), and Gorodnichenko and Weber (2016). We interpret our findings as evidence of investor sophistication, which is intimately tied to the issue of stock market efficiency. Some examples from this literature are Maloney and Mulherin (2003) who provide evidence in support of stock market sophistication by studying price discovery in the aftermath of the Challenger crash, and Chen et al. (2018) who document how hedge funds' information acquisition activities mitigate the impairment to information flows following exogenous reductions in analyst coverage due to the closures of brokerage firms. We contribute by showing that market participants know the current liability structure of S&P500 firms and quickly price in interactions of this with monetary policy forward guidance after FOMC announcements.

3 Data and Summary Statistics

This section describes the data and provides summary statistics relevant for our analysis. The baseline sample period, which ranges from 2004 to 2008, is identical to that of Ippolito et al. (2018) whose analysis of the bank loan channel of monetary policy is related to our analysis of the cash flow effect of monetary policy. We then turn to a longer sample, from 2004 to 2014, when our data set ends. There were 95 FOMC announcements between January 2004 and

[3]S&P500 firms are are by definition large and, with exceptions, older firms. Hadlock and Pierce (2010) find large and old firms do not face tight financial constraints. Looking at S&P500 directly, Brisker et al. (2013) show that the inclusion in the index relaxes financial constraints of firms and note that S&P500 firms should not be thought of being financially constrained. We will show that even for these firms cash flow matters.

December 2014. We employ our preferred measures of floating rate exposure while controlling for bank debt leverage to make sure that our results are not driven by leverage, as in Ippolito et al. (2018).

Whereas individual firms differ in many dimensions, our interest will be on their cash flows. In particular, we will be looking at changes in expected cash outlays of firms on days of monetary policy surprises due to unhedged floating rate obligations on their balance sheets controlling for other firm characteristics. To do so, we first look at the construction of monetary policy surprise measures and firm balance sheet information, before proceeding to event studies based on these variables.

3.1 Monetary Policy Data

In low frequencies, such as with quarterly observations, establishing causal links between stock prices and monetary policy is difficult hence the literature has moved towards high frequency event studies. This literature uses daily or higher frequency changes in prices of short-dated money market instruments or derivatives to measure monetary policy surprises on policy dates, and the reaction of stock prices to these. The standard is to use the scaled changes in spot-month Federal Funds Futures contracts, as pioneered by Kuttner (2001). Figure 1 shows the aggregate S&P500 reaction to these monetary policy surprises.

First, looking at monetary policy surprise measures, it is rather clear that there had been very few policy surprises in the Kuttner surprise sense between 2004, when our data begins, and 2008, when the Global Financial Crisis hit and monetary policy in the US reached the ZLB, with no surprises in the policy setting for several years afterwards. This is not because monetary policy had no surprises in this period, but because policy surprises came from the statement, changing expectations about the future course of policy rates, rather than surprises in the immediate policy setting. In fact, this had been the case before the ZLB as well: the FOMC signaled its policy decision fairly transparently before the meetings took place, hence the surprise in the 21st century always came mainly from what is now called forward guidance.

We use Gürkaynak et al. (2005) measures of monetary policy surprises (GSS surprises henceforth) in our analysis. The GSS surprises are constructed under the identifying assumption that the FOMC announcement drives changes in asset prices in a thirty-minute window bracketing the announcement. Therefore, the asset price changes during this window of time can be attributed to a genuine monetary policy surprise which could not have been anticipated on the basis of what was known up until the announcement is made. The use of the narrow window makes this identifying assumption credible, which is also the identifying assumption

underlying the Kuttner surprises.

GSS surprises, unlike Kuttner's measure of monetary policy surprises employed by Ippolito et al. (2018), are two-dimensional. The first dimension is exclusively related to the change in the current policy setting and the second dimension to the change in the market perceptions of future policy rates (e.g., forward guidance). Following Gürkaynak et al. (2005), we refer to them as "target factor" and "path factor" respectively. These are the first two principal components of the change in the yield curve up to one year maturity in a thirty-minute window bracketing an FOMC announcement, rotated such that one factor (path) is orthogonal to the Kuttner surprise. Hence, the path factor captures only the revisions to expectations of interest rates up to a year ahead that are not driven by the surprise in the current policy action (target), and the two rotated factors remain orthogonal to each other by construction. Campbell et al. (2016) and Swanson (2017) discuss the mechanics of the GSS surprises and extend these to help think about other questions. The temporal separation afforded by the GSS surprises is particularly useful in light of the fact that floating rate debt maturity, which relates firm liabilities to future expected interest rates, plays an important role in our analysis.

Figure 2 shows the S&P500 response to monetary policy, this time separately to the target and path surprises. The target factor is essentially the Kuttner surprise hence the top panel of the figure is about the same as Figure 1. The bottom panel is striking and shows both that path surprise variance has been high in this period and that aggregate stock prices have responded strongly to these.

While introducing the path surprises allows capturing much more of the monetary policy surprise variance and the resulting changes in aggregate stock returns, one can make little inference from these aggregate stock price responses that is useful in understanding the transmission of monetary policy. We therefore turn to individual stock prices, where we can use cross-sectional variations in firms' cash flow exposure to study a particular type of financial accelerator as well as testing market participants' understanding of firm balance sheets and monetary policy effects on these.

3.2 Firm-level Data

To analyze how the FOMC announcements affect the financial market's assessments of individual firms' exposures to floating rate debts and stock prices in turn, we construct a panel data set whose cross-sectional dimension corresponds to firms in the S&P500 and event dimension to the FOMC announcement dates. Appendix A lists the data we utilize, their frequencies, and sources.

Our sample is the set of firms that were part of S&P500 at any point between 1957 (creation of the index) and 2014 (end of our sample) whose balance sheet data are also available in Capital IQ (CIQ) database. This gives us 728 firms in total.[4] The stock return we focus on is computed using the log-difference of the closing quotes of stock prices the day before and the day after an FOMC announcement, obtained from the Center for Research in Security Prices (CRSP) database.[5]

We relate the stock return to a measure of a firm's cash flow exposure, stemming from floating rate debts. These are financial obligations whose interest rates vary with benchmark rates, most often the London Interbank Offered Rate (LIBOR) over the course of their contract periods. To calculate cash flow exposure, we require detailed information about the firm's debt structures beyond face values, such as debt categories (e.g., bank loans, notes, bonds, etc.), interest rate types (fixed vs. floating rate), and maturity per category/type. These are available at annual frequency in 10-K forms of CIQ database[6] that are filed at the end of each firm's fiscal year.[7]

Floating rate exposure of each firm in our sample is constructed as follows: First, floating rate debt items which are convertible, issued in currencies other than US Dollars, or are non-recourse as well as debt items which have already defaulted are removed. These are collectively a small fraction of all debt issuance and are removed as they understandably behave very differently from other debt. Second, for each item, its maturity is set to either the final payment date that is stipulated on the contract or the simple average of the lower and upper bound of the designated payment interval depending on which case is applicable. The maturity of a perpetuity is set to 100 years. Finally, the maturity of each debt item from the previous step is multiplied by the corresponding leverage ratio (i.e., outstanding value of the debt item over total assets of the firm) and summed across the items to give the firm's exposure to floating rate debts:

$$Exposure_i = \sum_j \frac{FRDA_{ij}}{TA_i} FRDM_{ij} \tag{1}$$

[4] Our results are robust to using a much smaller sample of firms that have never left the index.

[5] Similarly, our results are robust to using a one-day window, from the close of the day before the FOMC meeting, to the close of the day of the announcement.

[6] To the extent that there is other relevant information that is utilized by market participants, such as unaudited 10-Q forms or other firm communication, our measure of cash flow exposure will be subject to measurement error and will bias results towards insignificance.

[7] Tables B-1 and B-2 in Appendix B provide breakdowns of total debts and total floating rate debts issued by firms in our data set respectively, and Table B-3 gives descriptive statistics for floating rate debt items. Table B-4 in the same appendix presents breakdowns of debts according to debt maturity and interest rate types, and Table B-5 provides descriptive statistics for debts at different maturities.

where subscript i indexes firm and subscript j debt item. Time subscript is omitted for simplicity. *FRDA* and *FRDM* are the amount and maturity of floating rate debt item respectively, and *TA* stands for total assets. By construction, this measure captures both maturity and leverage of a firm's floating rate obligations, and is thus a measure of its future cash flow exposure. For this reason, we use the expressions "floating rate exposure" and "cash flow exposure" interchangeably when referring to it.

The standard balance sheet items are obtained from the Compustat database. Based on these, we compute size, profitability, book leverage, and market-to-book ratio and other firm characteristics that are used as control variables in our analysis. These are available at quarterly frequency and their properties are discussed below. Our empirical work also employs short-term debt as a control variable. Size is deflated by CPI and recast in real terms. Floating rate exposure and leverage, market-to-book ratio, profitability, and short-term debt, which are scaled by total assets, are not deflated by CPI.

We employ two measures of floating rate leverage. First is bank debt leverage (as a fraction of total assets) as in Ippolito et al. (2018), which assumes bank debts constitute the floating component of firm liabilities. We also consider floating rate debt leverage, which is total floating rate debts (all obligations including bank debt indicated to have variable interest rates) over total assets. Both measures are calculated using CIQ and Compustat and are included in our analysis to distinguish leverage from exposure, where the latter also uses information on debt maturities.

Figure 3, which plots floating rate debt leverage against bank debt leverage, shows that the two measures are closely related. Figure 4, however, reveals that our preferred measure of cash flow exposure contains variations that are differentially informative over and above those contained in the leverage measures. These figures visually suggest that maturity matters, independently of leverage. Our econometric work will formalize that argument. Similarly, Figure 5 provides the simple average of the exposure measure in each decile of bank debt leverage. It confirms the positive relationship between the two as shown in Figure 4, but also indicates that the relationship is neither linear nor monotonic.

We address firms interest rate risk hedging behavior in a way that keeps our measure close to that of Ippolito et al. (2018). We first construct a dummy variable for hedging by using as inputs the 10-K reports from the Securities and Exchange Commission (SEC) database (which are the original source of 10-K forms in CIQ). The reports, which every firm regulated by the SEC is required to file at the end of its fiscal year, provide textual information about the firm's hedging decisions related to interest rate risks. We set the dummy variable for hedging to 1

if the following phrases are found on the report: "hedge interest rate," "hedge against interest rate," "interest rate swap," or their variants.[8] As will be seen later, the positive interaction effect among the path surprise, the cash flow exposure, and the hedging dummy provides further evidence for the cash flow channel of monetary policy.

To control for the possibility that interest rate derivatives are purchased for speculative purposes rather than hedging motives, the firms which invest in interest rate derivatives even though their floating rate leverage ratios (i.e., total floating rate debts over total assets) are below 1% are dropped from the sample. This decreases the number of firms to 652 in the baseline sample (from January 2004 to December 2008) and 667 in the extended sample (from January 2004 to December 2014). We finally drop financial firms as these are very different from other firms in many dimensions and the final sample sizes are 550 and 563 respectively.[9] We conduct our empirical analysis on these samples.

We merge the event window stock returns and the GSS factors with the firm-level variables described above, taking into account the fact that the end of fiscal year differs across firms. This allows matching the latest available balance sheet information in CIQ (available at annual frequency) to the FOMC announcements at quarterly frequency rather than using calendar year which sacrifices resolution. Because the SEC requires 10-K forms to be released to public within 90 days following the end of a firm's fiscal year, we assume that both Compustat and CIQ variables are observed with one quarter delay.[10]

Table 1 provides the summary statistics for the firm-level variables used in our analysis. It shows that on average the firms that hedge against interest rate risks of their floating rate debts are not different from those that do not, especially in terms of their floating rate leverage (bank debts as well as all floating rate debts) and exposure.

4 Cash Flow Channel of Monetary Policy

This section tests the joint hypothesis that monetary policy affects cash flows of firms based on their unhedged floating rate debt exposures and that market participants reflect this in stock prices at high frequency. We indeed find strong evidence in favor of this conjecture. Based

[8] We also check for false positives such as "not hedge interest rate," "not use interest rate swap," etc.

[9] Although we drop financial firms for comparability to earlier literature, our results are insensitive to whether financial and/or utility firms are in the sample.

[10] In our sample, 97% of firms file their 10-K forms within 90 days. Our results continue to hold under a more conservative data matching scheme which assumes that firm balance sheet variables are observed with a 180-day delay, as in Fama and French (1992), or with a one year delay as in Ippolito et al. (2018), who use annual data.

on our event study of the FOMC announcements, we further find that floating rate exposure, not floating rate leverage, is an important determinant of stock market reactions to monetary policy surprises, and that the cash flow channel of monetary policy operates through the path factor of monetary policy, not the target factor. The cash flow channel manifests itself in the negative interaction effect between the cash flow exposure and the monetary policy path (forward guidance) surprise. The interaction of hedging and these variables has a positive effect, showing that interest rate hedging is indeed perceived by stock market participants as protecting against this floating rate effect.

We also find that the monetary policy channel discussed above was not changed at the ZLB, which confirms the view that forward guidance was a dominant source of monetary policy surprises, operating symmetrically in and out of the ZLB. This is consistent with the recent work of Debortoli et al. (2019) and Swanson (2018) who, looking at different metrics of policy effectiveness, also argue that monetary policy transmission was not different at the ZLB.

Figure 6 illustrates the motivation behind our event study and highlights the importance of focusing on exposure rather than leverage. The top panel provides partial regression plots between stock returns and both floating rate exposure (triangles) and floating rate leverage (squares) for the FOMC announcement on March 28, 2006. This event was associated with a (contractionary) path surprise of about 18 basis points. On this day, the firm level stock return and exposure correlation is -0.40, consistent with a cash flow channel working through exposure. On the other hand, the correlation between stock returns and leverage is about 0.53, which does not indicate a cash flow effect. The figure shows that the range of exposure is much wider than that of leverage, as maturity variance is also present in exposure. Based on the evidence for that day, it is visually clear that the maturity of debt matters in understanding the interaction between monetary policy surprises and stock price reactions.

The bottom panel presents similar partial regression plots for the FOMC announcement on August 8, 2006, which was associated with a path surprise of about -3 basis points. In contrast to the top panel, now the correlation between stock return and the exposure measure is about 0.42, which reflects the expansionary nature of the surprise. Again, this supports our proposition regarding the cash flow channel where stock prices of firms with higher exposure to floating rates fare better in high frequency. The correlation between stock return and the leverage measure, on the other hand, is -0.43 whose sign again goes against the mechanics of a cash flow channel. The figure and the associated correlations on these dates suggest that floating rate exposure, not floating rate leverage, is the appropriate measure for studying the

cash flow effect of monetary policy.[11] In what follows, our event study will investigate this systematically, taking full advantage of the panel structure of our data set.

4.1 Empirical Design

As discussed by Gürkaynak and Wright (2013), the event study methodology based on high-frequency data allows researchers to circumvent endogeneity issues related to omitted variable bias and reverse causality. This is especially useful in the current context because there is evidence that at low frequencies the FOMC decisions are influenced by stock market movements (Rigobon and Sack, 2004; D'Amico and Farka, 2011).

Identification is established by conditioning on the timing of FOMC releases and high-frequency responses to the surprise components of these. By definition of the surprise, the target and path factors are independent over time, therefore analysis can be done via OLS. The panel structure of our data lends itself naturally to fixed effects estimation, where we include firm-level fixed effects and cluster standard errors at the event (time) level.

The model we estimate is

$$\begin{aligned}
\triangle p_{it} = {} & \beta_0 + \beta_1 target_t + \beta_2 path_t + \beta_3 exposure_{it-1} \\
& \beta_4 target_t * exposure_{it-1} + \beta_5 hedge_{it-1} * exposure_{it-1} + \beta_6 hedge_{it-1} * target_t * exposure_{it-1} \\
& + \beta_7 path_t * exposure_{it-1} + \beta_8 hedge_{it-1} * path_t * exposure_{it-1} \\
& + \beta_9 leverage_{it-1} + \beta_{10} target_t * leverage_{it-1} + \beta_{11} hedge_{it-1} * leverage_{it-1} \\
& + \beta_{12} hedge_{it-1} * target_t * leverage_{it-1} + \beta_{13} path_t * leverage_{it-1} + \beta_{14} hedge_{it-1} * path_t * leverage_{it-1} \\
& + \lambda(remaining\ controls\ and\ interaction\ terms) + \varepsilon_{it} \qquad (2)
\end{aligned}$$

where i is the firm subscript, t is the FOMC announcement subscript, $\triangle p_{it}$ is the stock return bracketing an FOMC announcement,[12] $target_t$ is the monetary policy target (Kuttner) surprise, $path_t$ is the monetary policy forward guidance surprise, $hedge_{it-1}$ is the hedging dummy whose value is equal to one if firm i hedges against interest rate risks, $leverage_{it-1}$ is

[11] Note that these are partial regression plots for exposure conditional on leverage (and other controls) and vice versa which are consistent with the panel data analysis that will be presented below. This is the pattern of correlations for the vast majority of events in our sample irrespective of the size of monetary policy surprises.

[12] We use a two-day window which also includes the day after an FOMC announcement for comparability with earlier literature, but find similar, albeit somewhat noisier, effects based on a narrower one-day window which includes only the day of the announcement.

the floating rate leverage measure (i.e., bank debt leverage), and $exposure_{it-1}$ is the floating rate exposure measure. The controls include size, profitability, book leverage ratio, and market-to-book ratio. All variables in the regression other than the monetary policy surprise and the stock price change are lagged by a quarter (or more, in robustness) to make sure that the relevant variables are in the market participants' information sets.

4.2 Results

We first analyze the pre-ZLB periods in the US (January 2004 to December 2008), which helps us show that the mechanism works through the interaction of cash flow *exposure* and the monetary policy *path* surprise. We then use this finding to reinterpret the ZLB period.

4.2.1 Pre-ZLB Results

Table 2 shows the baseline findings of our paper. The first column is analogous to Ippolito et al. (2018) with our data, and shows that when there is a surprise in the policy action (target) firms that have more floating rate leverage see their stock prices more affected; however, having hedged against interest rate risk mitigates this effect.[13] Thus, in this regard our data has the same properties as those used in earlier work.

Our contribution begins with the second column which shows that when we use our exposure measure and allow both target and path surprises as well as both leverage and exposure, the relevant variable turns out to be exposure's interaction with path. Once again, having hedged against interest rate risk lessens the impact of the cash flow exposure on stock prices of the firms. Note that the R^2 more than doubles as we move from target and leverage to path and exposure, showing the importance of the additional information on maturity embedded in the exposure measure in understanding stock price reactions to monetary policy.

The third column of the table shows that when all covariates are included in the regression, the information in the exposure measure encompasses that of leverage and only the interaction of exposure with path exerts a statistically significant effect on firm level stock prices. Note that including the leverage and its interactions does not help in an R^2 sense either, further suggesting that it is the exposure measure that matters, and leverage works in regressions excluding exposure because it partially proxies for the more informative measure. And note

[13] Here we use bank debt to measure floating rate leverage rather than debt that is explicitly identified as floating rate. This is different from our exposure measure, which uses all debt that is declared to be on floating rate. Appendix B-6 shows that using this floating rate leverage measure rather than bank debt in this and other regressions would not have affected our results.

again that hedging against interest rate risks counteracts the negative effect on stock prices.

Finally, the last column of the table employs Fama-French adjusted stock return (i.e., the difference between raw stock return and expected stock return based on the Fama-French three-factor model, Fama and French (1992, 1993, 1995)) over the event window as an alternative dependent variable.[14] R^2 increases substantially in this case, indicating that our floating rate exposure measure accounts for a substantial proportion of variations in stock returns that are not attributed to the standard Fama-French factors.

While Table 2 shows the statistical importance of floating rate exposure on firm valuations, the economic effect is harder to assess with the interaction effects present. A good way to see the effect is to note that while the marginal effect of a 25 basis point path surprise is -2.52% for a hedged firm at the 90th percentile of exposure distribution, a non-hedged firm at the same point will see its stock price decline by a further percentage point, with the stock price changing by -3.64%, indicating a substantial effect of non-hedged cash flow exposure. At the 95th percentile of exposure, the effect is -2.58% for a hedged firm and -4.14% for a non-hedged firm, and at the 99th percentile the effects are -2.70% and -5.24% respectively. Clearly, this channel has economic as well as statistical significance.

This point is worth emphasizing: although for simplicity we often model interest rates and debt to be of one period, for some questions debt maturity is of paramount importance. The effect of forward guidance on firm balance sheets turns out to be one such question.

These results suggest that market participants pay attention to firms' balance sheets, in particular to their liability structures, and factor in the transfer between debt and stock holders that arise when expectations of interest rates change (path surprise) in pricing stocks. This is a high level of sophistication, an issue we return to in section 5. It should be clear that Table 2 by itself is silent on whether monetary policy's impact through floating rate exposure has real effects. The transfer between debt and stock holders alone will qualitatively generate Table 2, even if the Modigliani-Miller theorem holds and this balance sheet effect has no real repercussions. We study the monetary policy transmission effects in section 6.

4.2.2 Did Monetary Policy Work Differently at the ZLB?

A nascent literature argues that monetary policy at the ZLB worked just like unconstrained monetary policy, through the use of forward guidance and quantitative easing (Debortoli et al. (2019); Swanson (2018)). An important exception is Ippolito et al. (2018), who find that the

[14] This entails excluding the Fama-French-type firm-level control variables as regressors as these are embedded in the factors.

floating rate channel only worked before the ZLB and ceased to exist when the constraint was binding.

Table 3 shows that the floating rate channel remained intact during the ZLB. We test for a change in the relationship at the ZLB by including a binary variable for the post 2008 period (from January 2009 onward) and interacting it with the cash flow channel variables. None of those interactions are statistically significant, showing that the binding constraint on immediate policy actions did not materially affect the cash flow channel, which depends on the interaction of path (forward guidance) and cash flow exposure.

Thus, when measured using our exposure measure, the cash flow channel effects at the ZLB are also consistent with the notion that the ZLB did not pose a major impediment to monetary policy effectiveness during the Great Recession.[15] Tables B-7, B-8, and B-9 in Appendix B demonstrate that our findings for the pre-ZLB and ZLB periods are robust under an alternative measure of floating rate leverage and with additional control variables. The results also pass falsification tests where we look at two-day stock returns one week before FOMC announcements and find no relationship.

What this result shows, other than the fact that monetary policy transmission to financial markets was unchanged during the ZLB in this dimension as well, is that fully measuring the cash flow exposure of firms–inclusive of debt maturity–and the monetary policy component this interacts with–forward guidance–are important constituent parts of answers to substantive questions. The balance sheet and monetary policy surprise measures we propose are theoretically coherent and make a difference in empirical application.

5 Sophistication or Rules of Thumb?

We interpreted the results above as evidence for a good understanding of firm liability structures and their interaction with monetary policy surprises by stock market participants. An interesting question is whether financial market participants indeed study the balance sheets of the firms and, understanding the effect of monetary policy path surprises, price stocks accordingly, or given the persistence of exposure learn rules of thumb such that certain firms fare better or worse as interest rates begin to increase or decrease. In this section we show that the marginal stock market investor is quite sophisticated in that the repricing of stocks

[15] Ippolito et al. (2018) use the change in the 10-year yield as the policy surprise during the ZLB. We have verified that the difference between our results stem from our inclusion of maturity information in the exposure measure, not from the using path versus change in 10-year yield. Gürkaynak et al. (2005). show that change in the 10-year yield around policy announcements is driven by path, hence this is not surprising.

in high frequency is not based on rules of thumb but on knowledge of current balance sheet conditions.

We devise three tests of stock market participants' sophistication in studying and interpreting firm liability structures and their interaction with monetary policy. These tests are designed to differentiate between investors' following current firm liability structures versus using rules of thumb to react to monetary policy surprises. Our weakest test is to separately look at firms that have recently had IPOs. These firms would not have stock market histories to allow for rules of thumb and hence should not show the effect due to exposure that we find if market participants do not study their balance sheets. We therefore interact a dummy for firms that have had IPOs in the past 8 quarters with our variables of interest.

The first column of Table 4 shows that IPO interaction effects are not statistically significant, suggesting that these firms' stock price reactions, as a function of their cash flow exposures and the path surprise, are not different from other firms'. Since rules of thumb based on past stock price performance under different monetary conditions are by definition not present for these firms, these results suggest that investors are indeed paying attention to current balance sheets.

While verifying our conjecture, this is a relatively weak test due to two reasons. The first is, the firms that have IPOs and then enter our sample very soon after are small in number (even though the firms that are in the S&P500 during any time in its history are in the sample). Hence, standard errors of variables interacted with the dummy are quite wide. The second reason is that, firms that have had recent IPOs do not have stock price histories but do have balance sheet histories. If market participants follow rules of thumb or look at past profits, etc., it is not clear what the implications for a firm with a recent IPO are. If they use some form of heuristic (derived from past performance) for all firms that also applies to newly traded firms, we would again find no recent IPO effect.

While these concerns make this test a relatively weak one, they inform our next test. Our second test separates the firms that have seen the largest positive and negative changes in their floating rate exposure in the sample. We provide separate dummies for the largest 20 percent[16] of firm-quarters based on the distribution of positive and negative *changes* (separately) of exposure between two filings of 10-K forms. Here, the number of observations for which the large positive change (more exposure) and large negative change (less exposure) dummy variables are 1 constitute 20 percent of observations each, by construction.

[16] We check robustness using a variety of alternative threshold levels and find similar results.

Further, the implications under the null and the alternative are clear. If market participants are sophisticated and follow current balance sheets and assess their interactions with monetary policy, these categories are irrelevant and dummy interactions will be insignificant. If, on the other hand, they base pricing on rules of thumb based on past performance, firms that have increased (decreased) their exposure will be treated like lower (higher) exposure firms and the dummy interaction will be positive (negative). Hence, this is a much less ambiguous and statistically stronger test.

The second column of Table 4 shows that neither of these dummies, in their interactions with our variables of interest, has statistically significant effects on firms' stock price reactions to monetary policy. This is strong evidence that market participants pay attention to current liability structures of firms, understand effects of floating rate exposure, and reprice when future expected interest rates change.

Our final test is in similar vein but is based on an even stricter sophistication criterion. If market participants behave based on rules of thumb derived from past performance (in terms of our variables of interest), which is related to past exposure that is slow moving, then including past exposure in the analysis will be more helpful than having current exposure. When both past and current exposure are included in the analysis, under the rules of thumb interpretation past exposure should matter and under the sophistication interpretation current exposure should matter for stock price reactions.

The last column of Table 4 shows that when we employ this test, *only* current exposure matters. This is a very strong test to identify whether stock market investors pay attention to the ebbs and flows of firms' balance sheets. They do.

6 Real Effects of Cash Flow Exposure

So far we looked only at the stock price reactions to monetary policy surprises at firm level, which transmit through cash flow exposures of these firms. We found a statistically and economically significant relationship and showed that market participants pay attention to current balance sheets of firms.

Floating rate exposure changes cash flows of firms as interest rates change. This is part of a mechanism that underlies all financial accelerator mechanisms, which collectively require cash in the firm to be more valuable than cash outside it. While our results so far are consistent with these models, the stock market reaction by itself does not settle the question as the transfer between debt and stock holders of the firm as a result of interest rate changes will produce

these findings even if the Modigliani-Miller theorem holds. Hence, we directly look at future real outcomes of firms with different cash flow exposures when interest rates change to study whether there is a transmission mechanism to real outcomes that works through cash flows.

Note the clear establishment of causality here. We are not looking at the effect of a change in interest rates on firm behavior, as average firm behavior will be cyclical and endogenous to monetary policy. Rather, our focus is on the effect of changes in interest rates, *through changes in cash flows based on firm balance sheets*, on firm behavior. Individual firms' balance sheets are exogenous to monetary policy changes and our identification comes from the cross sectional variation in cash flow exposure. Ippolito et al. (2018), using similar methodology with leverage as the floating rate measure, find mixed effects, and that only when studying strongly financially constrained firms which excludes the bulk of our sample that comprises S&P500 firms. We will show that, unambiguously, differences in firms' balance sheets lead to differences in real outcomes when the liability structure and monetary policy surprises are measured as we propose, and that this effect is present even for S&P500 firms.

Figure 7 shows the path of three-month LIBOR, our choice of monetary policy indicator, over our sample period. We use LIBOR as this is the rate the majority of floating rate contracts are contingent on, and is therefore the most relevant rate to measure cash flow effects. During the ZLB period the level of this interest rate was about zero and changes in it were negligible. We do not expect to see real effects of those minuscule fluctuations, hence in this section our sample excludes the ZLB period.[17]

Our balance sheet regressions take the form

$$bsv_{it+x} = \beta_0 + \beta_1 exposure_{it-1} + \beta_2 change_t * exposure_{it-1} + \beta_3 hedge_{it-1} * change_t * exposure_{it-1}$$

$$+ \lambda(remaining\ controls\ and\ interaction\ terms) + \varepsilon_{it+x} \tag{3}$$

for $x = 1, 2, ..., 8$ where t is the reference quarter. bsv_{it+x} is one of the balance sheet variables that are defined below and $change_t$ is the change in the average 3-month LIBOR rate during the reference quarter relative to the previous quarter. The control variables include the firm balance sheet variables in Table 1 with appropriate lags.[18] The regressions also feature both year-quarter fixed effects and firm-level fixed effects.[19]

[17] Finding stock price effects during the ZLB is consistent with this, as changes in expectations of future interest rates, path surprises, were not small at all due to forward guidance in this period. It was the realized interest rates, the actual floating-rate-based cash flows, that did not change.

[18] The results are robust to conditioning on the hedging indicator and the balance sheet variables as of the reference quarter t instead, as well as being robust to also controlling for bank debt or floating rate leverage.

[19] We show abridged versions of regression output for readability. Appendices B-10 to B-16 present full

We first look at the cash flow effect on capital investment which has remained an important debate in the corporate finance literature since the influential work of Fazzari et al. (1988) and Gilchrist and Himmelberg (1995). To measure capital investment, we consider both the cumulative change in capital stock in $t+x$ relative to the value in $t-1$ as a fraction of total assets in $t-1$, and the cumulative percent change in capital stock in $t+x$ with respect to the value in $t-1$. These appear as the first two panels in Table 5 respectively. A positive (contractionary) monetary policy change interacts with cash flow exposure of a firm to generate a persistent negative effect on capital investment, whether it is measured relative to the value of the firm's initial assets or capital stock. However, the firms that hedge against the interest rate risk of their floating rate obligations are well-protected, as indicated by the positive coefficient on the interaction term involving the hedging indicator, LIBOR change, and floating rate exposure. Overall, these results provide strong evidence for cash flow sensitivity of investment.

Next, we turn to net worth which is a key variable for all financial accelerator mechanisms. Here, net worth is defined as the difference between total assets and total liabilities. As was the case for capital investment, we measure it as both the cumulative change relative to initial total assets and the cumulative percent change relative to its initial value. The results are provided in the the third and fourth panels of Table 5. Our findings, which are consistent with those for capital investment above, again demonstrate the cash flow channel in action. The effect, which is persistent and statistically significant, empirically validates a mechanism that exists in a wide class of financial accelerator models where having less cash in the firm leads to persistently lower net worth. Moreover, the results indicate that the stock market reactions documented in Section 4 are also justified by realized future firm outcomes.

The decline in net worth documented above can take place through either a decrease in total assets or an increase in liabilities, or both. The break-down of the cash flow effect, which is interesting in itself as it provides stylized facts that the theory of business cycles should be mindful of, is what we now take on. To do so, we study total assets, current liabilities, and long-term debt in turn. These are measured as the cumulative percent change relative to the initial value. The last three panels of Table 5 present results for these variables respectively. We see that the decline in net worth is partly driven by the decline in total assets, and that this effect is temporally consistent with previous results as it is followed by the decline in capital investment. The decline in net worth also takes place through the increases in current and long-term debts, which reflect additional interest payments associated with floating rate

tables.

liabilities when interest rates increase.[20] The important point is that we find this effect even though the measurements we have for current and long-term debts are far from ideal.[21] Also, note again that the cash flow effect is absent for the firms that hedge against their floating rate risks in these applications as well.

Our findings indicate real effects of monetary policy, whose transmission is through the cash flow exposure of firms and the ensuing actual changes in cash flows due to changes in interest rates. Significantly, we find these effects for S&P500 firms that are older, larger, and are thought to be less financially constrained than other firms (Hadlock and Pierce (2010)). Cash flow sensitivity is an important concern for even these firms and their behavior responds to monetary policy in part through interest rate effects on their balance sheets.

7 Conclusions

Cash flow matters. Stock market participants know that firms that have higher unhedged floating rate obligations will fare worse in an increasing interest rate environment, and better in a decreasing one. And they are right, both because of the mechanical effect of higher interest rates redistributing firm income from dividends to interest payments, and because as future cash flow obligations increase, firm investment and net worth also decreases. That is, for these firms, higher interest payments lead to higher cash outflows, and firms cannot costlessly substitute external financing for internal funds. This is a clear financial accelerator channel that is intimately linked to monetary policy as the rates on firms' new fixed rate debt, as well as the payments of their previously issued floating debts depend on current interest rates.

We find that looking at the maturity structure of debt obligations is important in understanding the interaction between monetary policy decisions and the cash flow channel. Bank debt and floating rate debt leverage do not sufficiently capture the cash flow obligations and how these change in response to monetary policy surprises, as these measures are based on the principal value rather than the commitments for future payments, which depend on maturity as well as the principal value. This distinction becomes especially important when studying the zero lower bound period as leverage and future cash flow obligations behaved differently in this period as well as when looking at real effects. We empirically see the relevance of debt maturity information.

[20] Due to the practice of accrual accounting and the structure of the data set employed in our study, the cash flow effect we are looking for is better captured by these than interest expenses.

[21] Because these are measurement errors on the left-hand-side, they do not pose identification problems.

In answering related questions, the choice of monetary policy surprise measure also matters. The path, or forward guidance, component of monetary policy is the surprise about future path of interest rates. It is natural that this is the component that has a sizable bearing on future cash flow obligations, and is therefore the component that stock market participants pay attention to when updating their beliefs about firms' cash flows and reassessing stock prices according to new information. We show that this distinction is important for aggregate stock index changes in response to monetary policy, as well as for individual firms' stock price changes, both before and after the zero lower bound.

Asking whether in high frequency stock prices respond to monetary policy surprises in an understandable way that depends on firms' balance sheets is the joint test of the existence of such an effect and market participants' ability to price it in shortly after a policy announcement. Finding the effect naturally leads to the question of whether market participants actually pay attention to firm balance sheets and understand how they interact with monetary policy, or follow rules of thumb as cash flow exposure is quite persistent. We show that market participants indeed pay attention to balance sheets and differentiate firms by their current liabilities when repricing stocks due to monetary policy surprises. This is of independent interest.

Lastly, we show that cash flow exposure has real effects. More exposed firms–those that have more unhedged long maturity floating rate obligations–see their investment, assets, and net worth change more in quarters following monetary policy changes. This is very strong evidence in favor of a financial friction where cash in the firm is more valuable than cash outside it. There is indeed an external finance premium, and unhedged cash flow exposure triggers it.

We leave to future work to study the aggregate effects of this channel and questions related to further differences in balance sheets, such as callability of debt, existence of untapped lines of credit and the like. Also left for future work is how monetary policy should be carried out in light of this mechanism that changes our understanding of real effects of forward guidance.

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9 Tables and Figures

Table 1: Summary Statistics for Balance Sheet Variables

	Hedge=0		Hedge=1		Entire Sample	
	Mean	SD	Mean	SD	Mean	SD
Exposure	0.56	0.77	0.58	1.03	0.58	0.95
Bank Debt Leverage	0.12	0.13	0.13	0.15	0.13	0.14
Floating Rate Debt Leverage	0.12	0.13	0.12	0.15	0.12	0.14
Size	4.21	1.34	5.04	1.47	4.73	1.48
Book Leverage	0.34	1.60	0.53	10.65	0.46	8.43
Market-to-book Ratio	1.70	1.35	1.28	0.84	1.44	1.09
Profitability	0.04	0.03	0.03	0.02	0.03	0.03
No. of Observations	22,920					

The dummy variable Hedge = 1 for firms which engage in hedging activities against interest rate risks of their floating rate obligations. Exposure is the sum of maturity weighted floating rate debts as a fraction of total assets. Bank Debt Leverage is the ratio of total bank debts to total assets. Floating Rate Debt Leverage is the ratio of total floating rate debts to total assets. Size is the logarithm of the book value of total assets, Book Leverage is the ratio of total debts to the sum of total debts and the book value of equity, Market-to-book Ratio is the ratio of the sum of the market value of equity and total debts to total assets, and Profitability is the ratio of operating income before depreciation to total assets.

Table 2: Pre-ZLB

VARIABLES	(1) Stock Return	(2) Stock Return	(3) Stock Return	(4) Stock Return
target	-18.75***	-30.18***	-33.03***	-13.26***
	(5.73)	(6.90)	(8.37)	(4.28)
path		-9.60***	-9.54***	-8.18***
		(2.95)	(2.74)	(2.24)
exposure		0.05	0.19	0.88**
		(0.23)	(0.28)	(0.40)
target#exposure		-0.17	5.52	5.37*
		(1.10)	(3.31)	(2.91)
hedge#exposure		0.07	-0.79	-1.64
		(0.28)	(0.92)	(1.04)
hedge#target#exposure		-2.25	-11.63***	-7.58**
		(1.46)	(3.64)	(3.11)
path#exposure		-2.28***	-3.59***	-3.83***
		(0.63)	(0.81)	(0.60)
hedge#path#exposure		1.83*	3.21***	4.07***
		(0.92)	(0.95)	(0.99)
leverage	2.03		0.75	-0.86
	(1.44)		(1.93)	(1.40)
target#leverage	-16.31**		-22.49*	-19.32
	(7.88)		(13.11)	(12.32)
hedge#leverage	-0.63		6.05	9.15
	(1.42)		(5.91)	(7.14)
hedge#target#leverage	16.51**		34.21	20.51
	(7.89)		(21.70)	(22.93)
path#leverage			6.68	10.00**
			(5.16)	(3.80)
hedge#path#leverage			-7.40	-10.88
			(7.46)	(7.20)
Observations	11,480	7,560	5,613	6,120
R-squared	0.05	0.10	0.10	0.61
Firm FE	YES	YES	YES	YES
Firm Controls/Contr*Surp	YES	YES	YES	NO

The dependent variable is the two-day stock return bracketing an FOMC announcement. The sample covers 47 FOMC announcements between January 2004 and December 2008. The dummy variable hedge = 1 if a firm enters into interest rate swaps to protect against interest rate risks of their floating rate obligations. Firm-level control variables are size, book leverage, market-to-book ratio, profitability, and their interactions with target and path surprises. (1) replicates Ippolito et al. (2018) using our data. (2) replaces their bank debt leverage measure with our floating rate exposure, and includes both target and path surprises. (3) adds bank debt leverage as a separate regressor. (4) replaces raw stock return with Fama-French adjusted stock return as the dependent variable. The regression coefficients of control variables are not shown here for brevity. The numbers in the parentheses are standard errors. All regressions are run with firm-level fixed effects, and standard errors are clustered at the event-level. Only the firms whose floating rate debts constitute more than 1 percent of total assets are included to control for potentially speculative interest rate derivative investments. We also drop financial firms. 550 firms remain in the sample after these procedures. Market-to-book ratio and exposure are trimmed at the bottom and top 1 percent. * stands for $0.05 < p \leq 0.1$, ** for $0.01 < p \leq 0.05$, and *** for $p \leq 0.01$.

Table 3: Including ZLB

VARIABLES	Stock Return
target	-33.06***
	(7.18)
path	-6.22*
	(3.31)
exposure	-0.06
	(0.22)
target#exposure	5.49*
	(3.23)
hedge#exposure	-0.39
	(0.58)
hedge#target#exposure	-11.22***
	(3.34)
zlb#exposure	0.06
	(0.35)
zlb#target#exposure	-6.48
	(15.33)
hedge#zlb#exposure	0.30
	(0.61)
hedge#zlb#target#exposure	16.00
	(22.59)
path#exposure	-3.66***
	(0.78)
hedge#path#exposure	3.22***
	(0.86)
zlb#path#exposure	1.62
	(1.31)
hedge#zlb#path#exposure	1.58
	(1.45)
leverage	1.75
	(1.36)
target#leverage	-19.66
	(12.97)
hedge#leverage	3.56
	(4.44)
hedge#target#leverage	33.58
	(20.32)
zlb#leverage	1.42
	(2.06)
zlb#target#leverage	-29.18
	(95.82)
hedge#zlb#leverage	-7.30
	(5.27)
hedge#zlb#target#leverage	96.39
	(141.65)
path#leverage	7.36*
	(4.15)
hedge#path#leverage	-7.05
	(7.19)
zlb#path#leverage	-6.30
	(6.77)
hedge#zlb#path#leverage	23.22**
	(10.13)
Observations	15,439
R-squared	0.08
Firm FE	YES
Firm Controls/Contr*Surp	YES

The dependent variable is the two-day stock return bracketing an FOMC announcement. The sample covers 95 FOMC announcements between January 2004 and December 2014, which includes the zero lower bound period. This is incorporated into the regression model using a dummy variable (denoted by "zlb" in the table, where zlb = 1 from January 2009 onward). It augments (3) in Table 2 using the dummy variable. All other conventions are identical to those in Table 2. 563 firms remain in the sample after controlling for potentially speculative derivative investments and dropping financial firms.

Table 4: Stock Market Sophistication

VARIABLES	(1) (Dummy for Initial 8 Quarters after IPO) Stock Return	(2) (Dummy Large Changes) Stock Return	(3) (Current and Lagged Exposure) Stock Return
target	-33.34***	-33.54***	-31.63***
	(7.02)	(7.11)	(6.53)
path	-5.93*	-5.98*	-6.15**
	(3.51)	(3.48)	(3.02)
path#exposure	-3.08***	-3.17***	-4.38***
	(0.73)	(0.75)	(1.60)
hedge#path#exposure	3.41***	3.36***	4.43**
	(0.72)	(0.73)	(1.78)
positive dummy		1.84*	
		(1.06)	
positive dummy#path		4.40	
		(10.80)	
positive dummy#exposure		-0.71	
		(0.51)	
positive dummy#path#exposure		0.65	
		(5.07)	
negative dummy		0.13	
		(0.55)	
negative dummy#path		4.86**	
		(2.38)	
negative dummy#exposure		0.18	
		(0.35)	
negative dummy#path#exposure		2.24	
		(2.28)	
path#exposure lagged			1.44
			(1.57)
hedge#path#exposure lagged			-1.37
			(1.82)
IPO dummy	-1.54*		
	(0.88)		
IPO dummy#path	-6.24		
	(4.39)		
IPO dummy#exposure	0.81		
	(0.82)		
IPO dummy#path#exposure	3.89		
	(3.35)		
Observations	15,439	15,439	12,905
R-squared	0.07	0.07	0.08

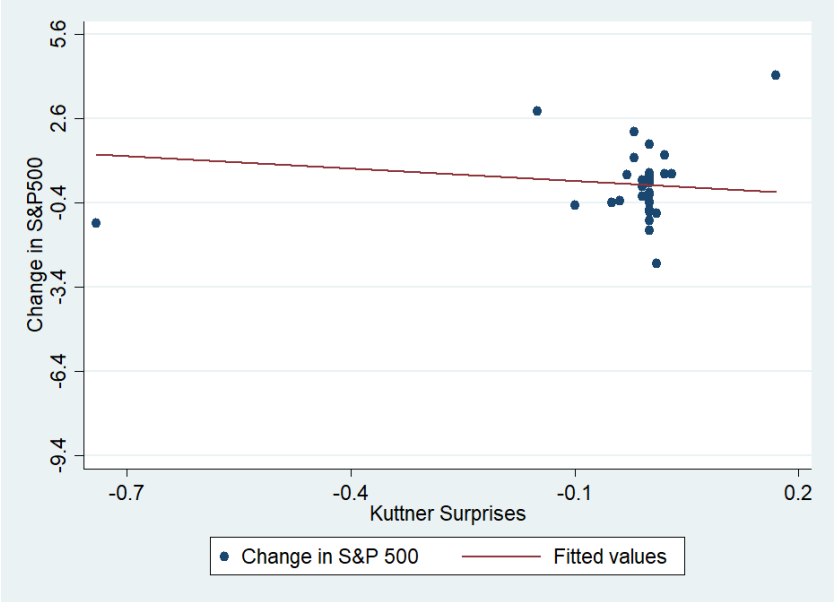
The sample period ranges from January 2004 and December 2014. The zero lower bound dummy is not included here, given the result that the transmission mechanism of monetary policy has not changed in and out of the zero lower bound. The dependent variable is the two-day stock return bracketing an FOMC announcement. "IPO dummy" indicates that firms are within the first two years of IPO. "positive dummy" corresponds to the observations that belong to top 20 percent of positive changes in exposure in the sample. Similarly, "negative dummy" stands for the observations that belong to top 20 percent of (absolute values of) negative changes in exposure. (1) and (2) use these dummy variables respectively. For (1), similar results follow when firms within the first two years of IPO are more finely categorized (e.g., within the first quarter of IPO, within the second quarter of IPO, so on). (3) includes both current and lagged exposure and their interaction terms. Other conventions are identical to those in the tables above.

Table 5: Pre-ZLB Sample Balance Sheet Regressions

Capital Investment (Cum. Change in Cap.Inv to Assets)	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	-0.51***	-0.62**	-1.39***	-1.82***	-2.50***	-3.01***	-3.68***	-4.49***
	(0.19)	(0.26)	(0.34)	(0.41)	(0.53)	(0.59)	(0.69)	(0.82)
change#exposure	-0.47**	-0.78**	-1.01**	-0.80*	-0.46	-0.54	-0.50	-0.64
	(0.20)	(0.32)	(0.42)	(0.43)	(0.48)	(0.55)	(0.70)	(0.92)
hedge#change#exposure	0.53**	0.95**	1.49***	1.91***	1.69**	1.81**	1.84**	-0.03
	(0.22)	(0.38)	(0.50)	(0.69)	(0.69)	(0.89)	(0.88)	(1.55)
Capital Investment (Cum. Perc. Change)								
exposure	-0.78	-1.03	-1.59**	-2.63***	-3.87***	-5.55***	-7.33***	-7.89***
	(0.59)	(0.70)	(0.80)	(0.91)	(1.01)	(1.14)	(1.31)	(1.45)
change#exposure	-0.31	-0.96	-1.93**	-1.75*	-1.56*	-2.02**	-2.37**	-3.67***
	(0.57)	(0.67)	(0.93)	(0.91)	(0.89)	(0.93)	(1.02)	(1.36)
hedge#change#exposure	0.60	1.78**	2.82**	2.56**	2.39**	2.49**	0.30	2.48
	(0.67)	(0.88)	(1.17)	(1.26)	(1.14)	(1.19)	(1.57)	(1.81)
Net Worth (Cum. Change in Net Worth to Assets)								
exposure	-0.40	-0.19	-0.53	-0.58	-0.73	-1.37	-1.67	-2.05
	(0.43)	(0.53)	(0.62)	(0.78)	(0.97)	(1.12)	(1.22)	(1.26)
change#exposure	-0.18	-0.44	-1.81**	-2.83***	-3.23***	-3.27***	-4.87***	-5.30***
	(0.48)	(0.73)	(0.86)	(0.93)	(1.05)	(1.20)	(1.24)	(1.38)
hedge#change#exposure	0.18	-0.13	1.27	1.42	1.51	2.59*	3.84**	4.29**
	(0.58)	(0.84)	(1.08)	(1.14)	(1.31)	(1.53)	(1.51)	(1.73)
Net Worth (Cum. Perc. Change)								
exposure	2.17	-0.18	-2.35	-2.68	-2.17	-1.20	-1.32	-1.24
	(1.69)	(1.82)	(2.11)	(2.82)	(3.71)	(3.96)	(4.35)	(4.36)
change#exposure	0.33	0.41	-4.03*	-6.99***	-6.54**	-7.69**	-13.08***	-10.87**
	(1.63)	(2.12)	(2.43)	(2.65)	(3.22)	(3.53)	(4.27)	(4.48)
hedge#change#exposure	2.77	0.22	4.53	6.29	8.19	6.89	15.57***	14.08**
	(2.07)	(3.04)	(4.11)	(4.61)	(5.36)	(5.31)	(5.91)	(6.45)
Total Assets (Cum. Perc. Change)								
exposure	-0.91	-0.16	-0.83	-1.18	-2.00**	-2.29*	-3.02**	-4.01**
	(0.70)	(0.83)	(0.95)	(1.02)	(1.00)	(1.19)	(1.46)	(1.66)
change#exposure	0.97	0.25	-1.46	-2.58*	-2.59	-2.76	-3.83*	-3.30
	(0.83)	(1.04)	(1.37)	(1.36)	(1.67)	(1.81)	(2.00)	(2.27)
hedge#change#exposure	-1.00	-0.70	1.42	4.59**	5.88***	7.39***	7.69***	7.30***
	(1.17)	(1.22)	(1.82)	(1.99)	(2.05)	(2.21)	(2.22)	(2.64)
Long-term Debt (Cum. Perc. Change)								
exposure	8.13	13.99*	11.01	4.20	-9.54	-18.19	-23.22	-50.15*
	(7.36)	(8.03)	(10.58)	(12.76)	(14.97)	(17.46)	(19.09)	(25.63)
change#exposure	9.46**	15.44**	6.93	18.78	24.57	22.73	16.67	-17.59
	(4.24)	(7.26)	(8.61)	(15.01)	(17.12)	(17.26)	(17.67)	(32.41)
hedge#change#exposure	-4.92	-12.02	-8.55	-15.81	-19.11	-15.32	-10.89	20.81
	(5.22)	(8.38)	(9.48)	(15.32)	(16.81)	(17.13)	(17.43)	(32.83)
Other Current Liabilities (Cum. Perc. Change)								
exposure	1.56	2.14	-0.21	-0.74	-2.90	3.70	6.17	1.20
	(3.51)	(5.08)	(2.74)	(5.66)	(5.03)	(7.17)	(5.78)	(8.29)
change#exposure	7.96	1.52	8.36**	9.63*	10.01	8.30	10.06*	17.78**
	(5.50)	(5.92)	(3.35)	(5.57)	(6.92)	(6.98)	(5.88)	(8.47)
hedge#change#exposure	-10.26	-2.96	-17.54***	-22.17***	-18.92**	-14.98	-12.54	-23.53**
	(7.74)	(8.82)	(5.06)	(8.30)	(9.44)	(9.24)	(8.23)	(11.94)
Firm and time FEs	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls interacted with Change	YES	YES	YES	YES	YES	YES	YES	YES

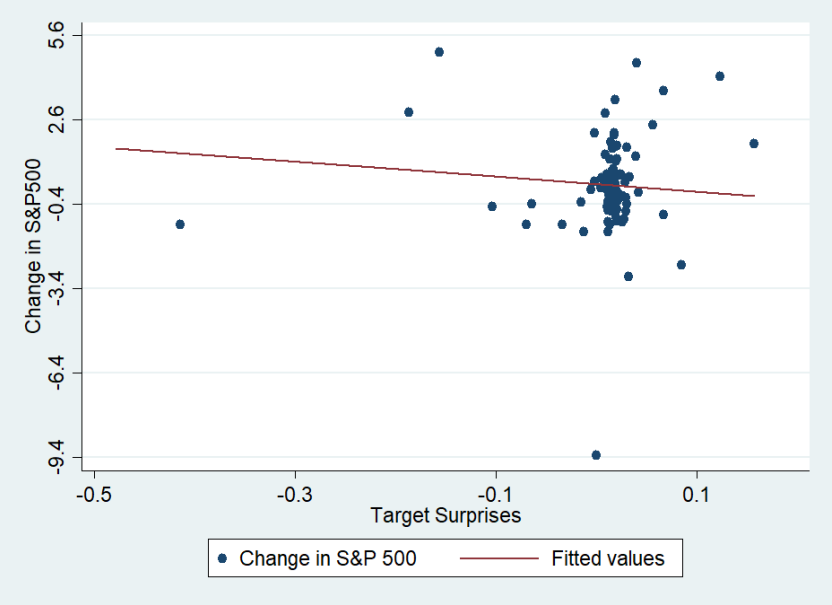
Table 5 analyzes how monetary policy, through interactions with firms' exposure to floating rate liabilities, affects their balance sheet conditions and decisions. We consider capital investment, net worth, total assets, long-term debt, and other current liabilities. For capital investment and net worth we use two different measures: cumulative changes over initial total assets, $(Y_{i,t+x} - Y_{i,t-1})/Assets_{i,t-1}$ and cumulative percentage change with respect to initial value, $(Y_{i,t+x} - Y_{i,t-1})/Y_{i,t-1}$. For the rest we report only the latter. The sample period is from January 2004 to December 2008. The LHS variables are trimmed at 1 percent. They are multiplied by 100 to facilitate interpretation. "Change" is the change in the quarterly average of 3-month LIBOR rate relative to the previous quarter. We control for book leverage, size, market-to-book ratio, profitability, and short-term debt which are also interacted with change (In long-term debt and other current liabilities regressions we remove short-term debt to avoid multi-collinearity). We also include firm and year-quarter fixed effects, and cluster standard errors at the industry-quarter level. The numbers in the parentheses are standard errors. * stands for $0.05 < p \leq 0.1$, ** for $0.01 < p \leq 0.05$, and *** for $p \leq 0.01$.

Figure 1: Daily Aggregate Stock Price Changes in Response to Kuttner Surprises

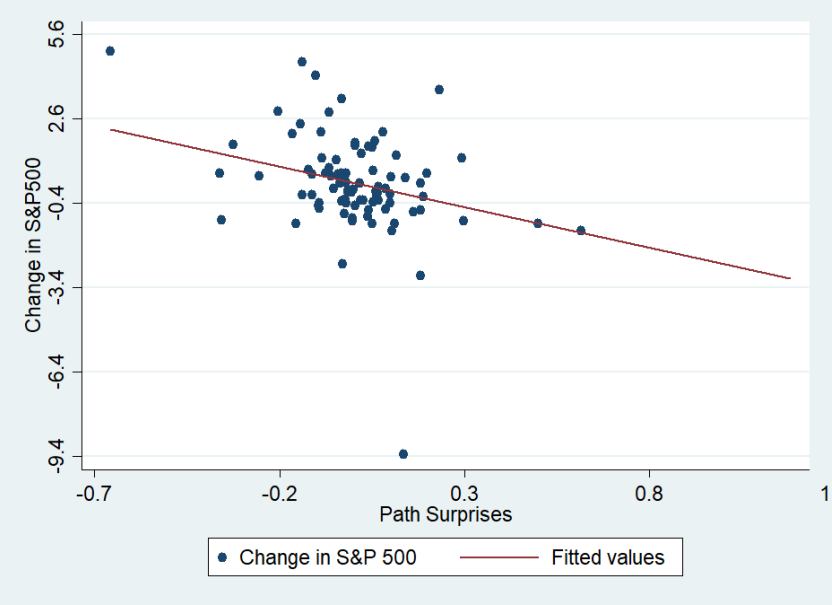


The figure plots daily changes in S&P500 Index against Kuttner surprises on the FOMC announcement dates between January 2004 and December 2008. The line marks the OLS fitted values.

Figure 2: Daily Aggregate Stock Price Changes in Response to GSS Surprises



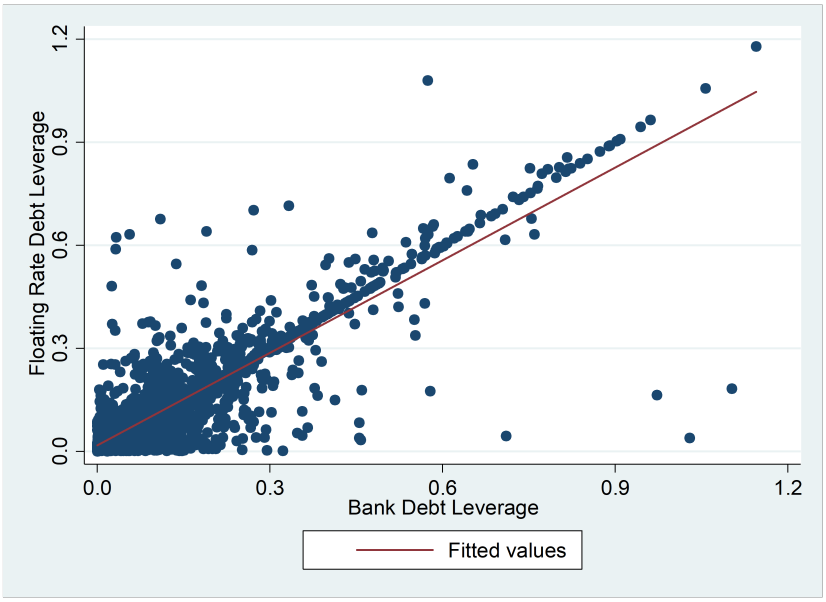
(a) Target Surprises



(b) Path Surprises

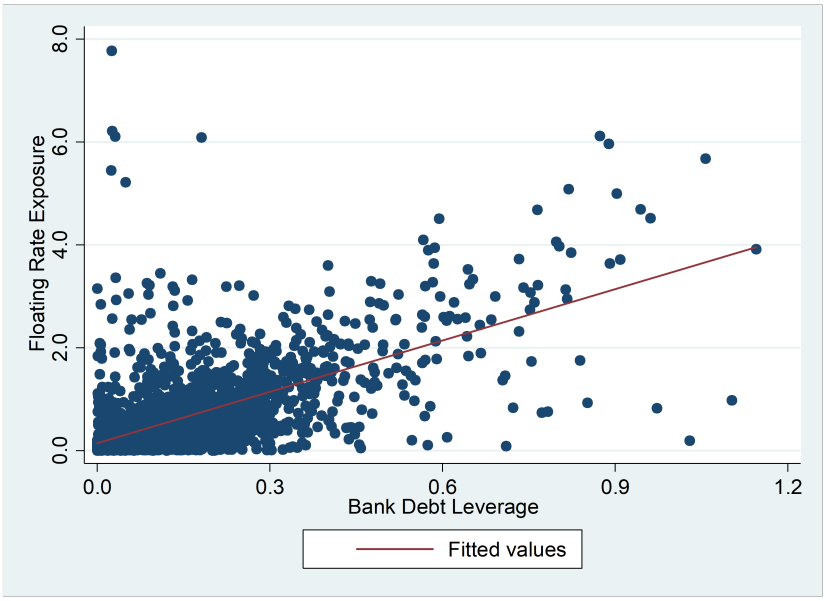
The panel above plots daily changes in S&P500 Index against the target surprises on the FOMC announcement dates between January 2004 and December 2014, and the panel below the same time series against the path surprises. The lines give the OLS fitted values.

Figure 3: Floating Rate Debt Leverage and Bank Debt Leverage



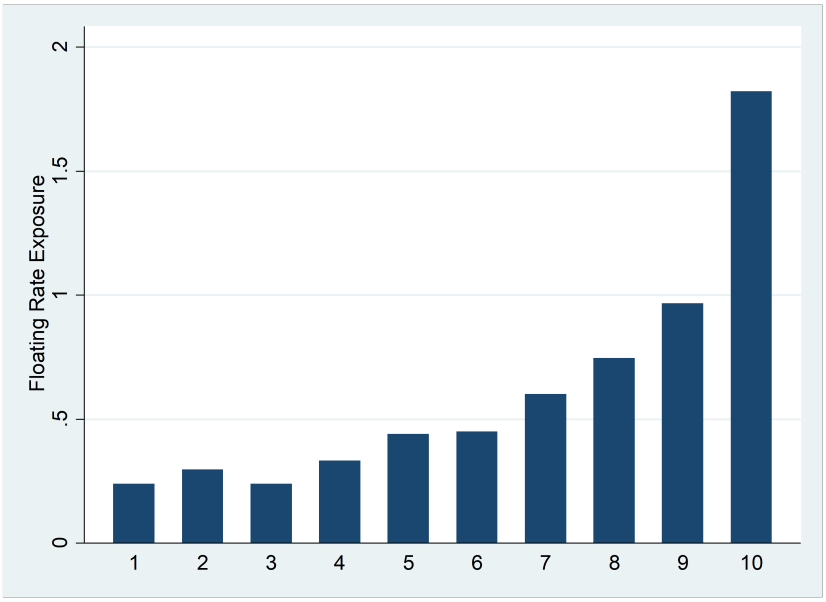
Floating rate debt is all obligations whose interest rates are variable. Bank debt is the sum of term loans and (drawn) credit lines. They are expressed as fractions of total assets to give "Floating Rate Debt Leverage" and "Bank Debt Leverage" respectively. The line plots OLS fitted values.

Figure 4: Floating Rate Exposure and Bank Debt Leverage



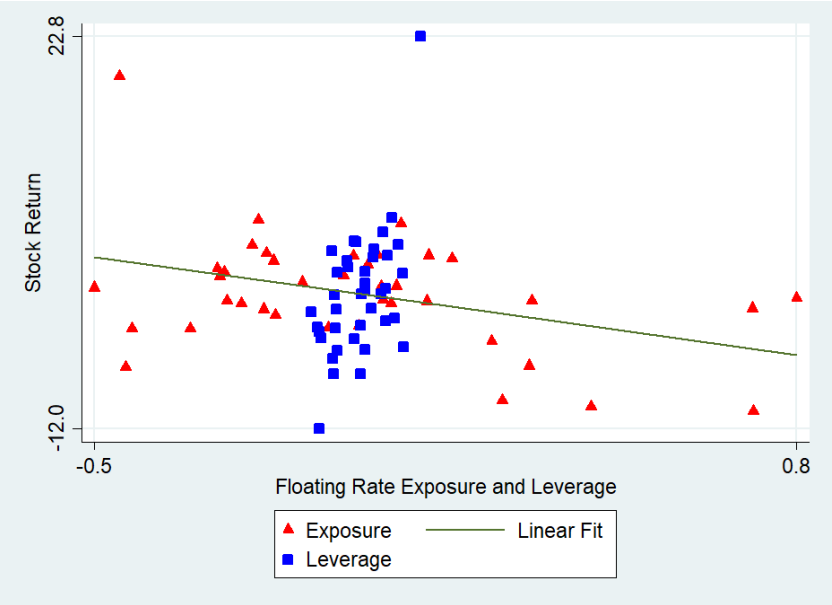
"Bank Debt Leverage" is the ratio of bank debts (term loans + credit lines) to total assets. "Floating rate exposure" is constructed by multiplying each floating rate debt item by its maturity and expressing the resulting sum as a fraction of total assets. The line gives the OLS fitted values.

Figure 5: Floating Rate Exposure over Deciles of Bank Debt Leverage

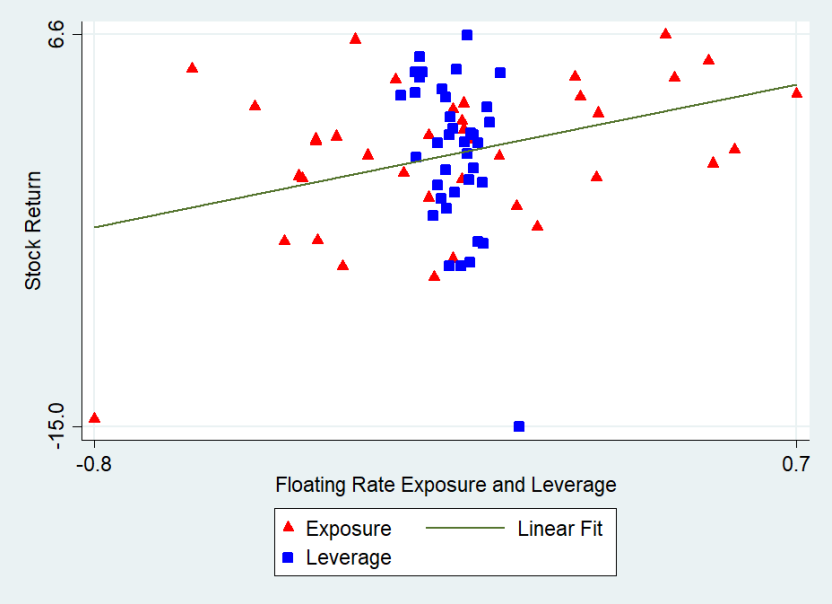


The figure provides the simple average of the floating rate exposure in each decile of the bank debt leverage. "1" along the horizontal axis means between the bottom and the 1st decile, "2" means between the 1st and the 2nd decile, and so on.

Figure 6: Partial Regression Plots with Floating Rate Exposure and Leverage for Non-hedgers



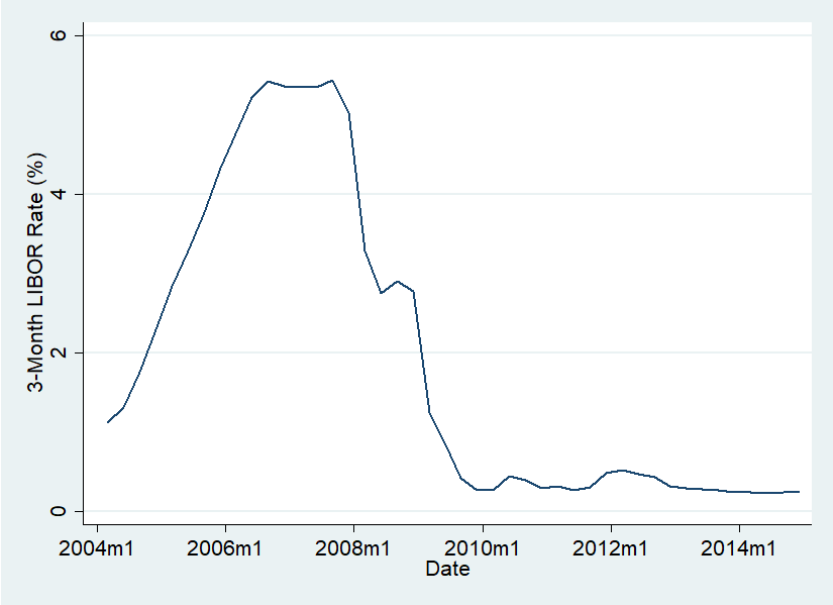
(a) March 28, 2006



(b) August 8, 2006

The figure gives partial regression plots between stock return and floating rate exposure (in triangle) and floating rate leverage (in square) respectively for non-hedgers, on the same figure. The OLS fitted line for the former is also provided. The top panel is for the FOMC announcement on March 28, 2006, which was associated with path surprise of 0.18 (contractionary). The bottom panel is for the FOMC announcement on August 8, 2006 whose path surprise was -0.03 (expansionary).

Figure 7: Average 3-Month LIBOR Rate



10 Appendices

A Definitions of Variables

Variable (Frequency)	Type	Definition	Data Source
Stock return (daily)	Regressand	Log-difference of a stock price the day before and the day after an FOMC announcement	CRSP database
Monetary policy target and path surprises (FOMC meetings)	Regressor	Market-based (i.e., futures contracts) monetary policy innovations Target factor: a surprise to the current policy target Path factor: a surprise to the future policy rates	Authors' calculation following Gürkaynak, Sack and Swanson (2005)
Floating rate exposure (annual)	Regressor	The sum of maturity weighted floating rate debts, expressed as a fraction of total assets (ATQ)	CIQ and Compustat database
Bank debt leverage (annual)	Regressor	Bank debts (= term loans + (drawn) credit lines), expressed as a fraction of total assets (ATQ)	CIQ and Compustat database
Floating rate debt leverage (annual)	Regressor	Total floating rate debts, expressed as a fraction of total assets (ATQ)	CIQ and Compustat database
Hedge (annual)	Regressor	A dummy variable whose value is one if a firm hedges against interest rate risks of its floating rate obligations by entering into interest rate derivative contracts	10-K reports in SEC database
ZLB (FOMC meetings)	Regressor	A dummy variable whose value is one from January 2009 to December 2014 (the end period of the extended sample)	The Federal Reserve website
Size (quarterly)	Regressor	Book value of total assets (ATQ) deflated by CPI, in logarithm	Compustat database
Book leverage (quarterly)	Regressor	The ratio of total debts (DLCQ + DLTTQ) to the sum of total debts and the book value of equity (DLCQ + DLTTQ + CEQQ)	Compustat database
Market-to-book ratio (quarterly)	Regressor	The sum of the market value of equity and total debts (PRCCQ*CSHOQ + DLCQ + DLTTQ), expressed as a fraction of total assets (ATQ)	Compustat database
Profitability (quarterly)	Regressor	Operating income before depreciation (OIBDPQ), expressed as a fraction of total assets (ATQ)	Compustat database
Short-term debt ratio (quarterly)	Regressor	Short-term debt (DLCQ), expressed as a fraction of total assets (ATQ)	Compustat database
Capital investment definition 1 (quarterly)	Regressand	Cumulative change in total fixed capital (property, plant, and equipment; PPENTQ), expressed as a fraction of initial total assets (ATQ)	Compustat database

Capital investment definition 2 (quarterly)	Regressand	Cumulative percentage change in total fixed capital (property, plant, and equipment; PPENTQ) relative to the initial quarter	Compustat database
Net worth definition 1 (quarterly)	Regressand	Cumulative change in net worth (ATQ - LTO), expressed as a fraction of initial total assets (ATQ)	Compustat database
Net worth definition 2 (quarterly)	Regressand	Cumulative percentage change in net worth (ATQ - LTQ) relative to the initial quarter	Compustat database
Total assets (quarterly)	Regressand	Cumulative percentage change in total assets (ATQ) relative to the initial quarter	Compustat database
Long-term debt (quarterly)	Regressand	Cumulative percentage change in long-term debt (DLTTQ) relative to the initial quarter	Compustat database
Other current liabilities (quarterly)	Regressand	Cumulative percentage change in other current liabilities (LCOQ) relative to the initial quarter	Compustat database
Change (quarterly)	Regressand	Change in the quarterly average of 3-month LIBOR rate relative to the previous quarter	Bloomberg and authors' calculation

B Breakdowns of Debt Items and Additional Regression Results

Table B-1: Total Debt Composition

Categories	No. of Observations	Percentage	Cum. Percentage
Notes payable	36,321	44.48	44.48
Other borrowings	6,106	7.48	51.96
Debentures	5,925	7.26	59.21
Revolving credit facility	4,352	5.33	64.54
Bonds and notes	4,081	5.00	69.54
Capital leases	3,983	4.88	74.41
Trust Preferred Securities	3,243	3.97	78.39
Revolving credit	3,185	3.90	82.29
Term loan	2,848	3.49	85.77
Mortgage bonds	2,610	3.20	88.97
Commercial paper	2,185	2.68	91.65
Bank loans	1,766	2.16	93.81
Mortgage notes	1,283	1.57	95.38
FHLB borrowings	715	0.88	96.26
Mortgage loans	652	0.80	97.05
Securities sold under agreement to repurchase	500	0.61	97.67
Term loan facility	384	0.47	98.14
Commercial paper facility	328	0.40	98.54
Securitization facility	323	0.40	98.93
Federal Funds Purchased	261	0.32	99.25
Bank overdraft	255	0.31	99.57
Securities loaned	162	0.20	99.76
Notes Payable Facility	64	0.08	99.84
Federal Reserve Bank Borrowings	41	0.05	99.89
Letter of Credit Outstanding	40	0.05	99.94
Letter of Credit Facility	12	0.01	99.96
FHLB Facility	11	0.01	99.97
Federal Reserve Facility	11	0.01	99.98
Bank overdraft facility	6	0.01	99.99
General borrowings	5	0.01	100.00
Bills payable	3	0.00	100.00
Total	81,661	100.00	

Table B-2: Total Floating Rate Debt Composition

Categories	No. of Observations	Percentage	Cum. Percentage
Revolving credit facility	2,727	20.70	20.70
Notes payable	2,304	17.49	38.18
Revolving credit	1,921	14.58	52.76
Term loan	1,558	11.82	64.58
Trust Preferred Securities	917	6.96	71.54
Bank loans	808	6.13	77.67
Bonds and notes	772	5.86	83.53
Other borrowings	366	2.78	86.31
Term loan facility	312	2.37	88.68
Commercial paper	293	2.22	90.90
FHLB borrowings	247	1.87	92.78
Mortgage bonds	235	1.78	94.56
Securitization facility	140	1.06	95.62
Mortgage notes	121	0.92	96.54
Debentures	106	0.80	97.34
Mortgage loans	102	0.77	98.12
Capital leases	89	0.68	98.79
Commercial paper facility	52	0.39	99.19
Securities sold under agreement to repurchase	34	0.26	99.45
Bank overdraft	18	0.14	99.58
Letter of Credit Outstanding	18	0.14	99.72
Notes Payable Facility	18	0.14	99.86
Letter of Credit Facility	9	0.07	99.92
Federal Funds Purchased	6	0.05	99.97
Federal Reserve Bank Borrowings	3	0.02	99.99
Federal Reserve Facility	1	0.01	100.00
Total	13,177	100.00	

Table B-3: Descriptive Statistics for Floating Rate Debt Items

	Mean	SD
Bank loans	6.11	18.60
Bank overdraft	2.21	2.99
Bonds and notes	10.22	39.27
Capital leases	1.00	1.07
Commercial paper	6.78	13.32
Commercial paper facility	18.90	19.14
Debentures	7.65	21.76
FHLB borrowings	28.97	78.77
Federal Funds Purchased	64.49	77.99
Letter of Credit Facility	9.28	4.90
Letter of Credit Outstanding	7.81	4.84
Mortgage bonds	4.18	14.47
Mortgage loans	1.46	1.80
Mortgage notes	1.67	2.22
Notes Payable Facility	1.90	1.35
Notes payable	16.82	57.97
Other borrowings	29.61	143.16
Revolving credit	3.26	5.50
Revolving credit facility	9.96	27.14
Securities sold under agreement to repurchase	284.45	774.41
Securitization facility	10.93	33.50
Term loan	6.92	14.04
Term loan facility	8.43	21.53
Trust Preferred Securities	2.33	4.11
Total	10.38	58.01
Observations	13,177	

We divide each item (in million USD) by CPI. The table shows means and standard deviations in real terms.

Table B-4: Maturity/Interest Rate Type Pairs for Debts

	Not Available	Variable	Fixed	Zero Coupon	Total
0-1 year	354	890	2,820	7	4,071
1-5 years	3,876	6,086	17,736	34	27,732
5-10 years	1,403	1,961	13,999	29	17,392
10-20 years	1,486	929	6,391	34	8,840
20-30 years	503	1,004	7,627	19	9,153
30 years or more	7,437	2,307	4,696	33	14,473
Total	15,059	13,177	53,269	156	81,661

The entries give numbers of observations.

Table B-5: Descriptive Statistics for Debts by Maturity

	Mean	SD
0-1 year	5.37	26.73
1-5 years	11.66	91.75
5-10 years	8.83	66.22
10-20 years	25.56	325.75
20-30 years	23.51	555.81
30 years or more	22.10	130.72
Total	15.43	230.24
No. of Observations	81,661	

We divide each item (in million USD) by CPI. The table shows means and standard deviations in real terms.

Table B-6: A Replication of Ippolito et al. (2018)

	(1)	(2)
	(Bank Debt Leverage)	(Floating Rate Debt Leverage)
VARIABLES	Stock Return	Stock Return
target	-19.23***	-18.75***
	(5.13)	(5.73)
leverage	2.10	2.03
	(1.52)	(1.44)
target#leverage	-17.23*	-16.31**
	(9.25)	(7.88)
hedge#leverage	0.01	-0.63
	(2.08)	(1.42)
hedge#target#leverage	24.19**	16.51**
	(11.53)	(7.89)
Observations	10,657	11,480
R-squared	0.05	0.05

The event studies above are based on 47 FOMC announcements between January 2004 and December 2008. The first column follows Ippolito et al.'s model specification with the two-day stock return bracketing an FOMC announcement as the dependent variable. Firm-level controls (size, book leverage, market-to-book ratio, profitability) and their interactions with policy surprise are included. This also appears as the first column of Table 2 and is included for the ease of comparison. The second column is based on the same specification, but with floating rate debt leverage in place of bank debt leverage. The numbers in the parentheses are standard errors. The regression is run with firm-level fixed effects, and standard errors are clustered at the event-level. * stands for $0.05 < p \leq 0.1$, ** for $0.01 < p \leq 0.05$, and *** for $p \leq 0.01$.

Table B-7: Robustness in Pre-ZLB

	(1) (Floating Rate Debt Leverage)	(2) (Bank Debt Leverage + Excess Return)	(3) (Floating Rate Debt Leverage + Excess Return)	(4) (Floating Rate Debt Leverage + F-F Adjusted Return)
VARIABLES	Stock Return	Stock Return	Stock Return	Stock Return
target	-29.83***	-25.48***	-23.27***	-11.74***
	(6.88)	(7.00)	(5.07)	(3.40)
path	-9.86***	-4.29*	-4.69**	-7.33***
	(2.88)	(2.33)	(2.21)	(2.07)
exposure	0.05	0.47*	0.21	0.29
	(0.21)	(0.24)	(0.20)	(0.20)
target#exposure	0.39	4.91	0.56	0.21
	(2.28)	(3.77)	(2.15)	(2.81)
hedge#exposure	-0.46	-1.09	-0.68	-1.14
	(0.76)	(0.90)	(0.76)	(0.83)
hedge#target#exposure	-2.63	-10.38**	-2.51	-1.13
	(3.06)	(3.97)	(2.93)	(3.79)
path#exposure	-3.41***	-2.70**	-2.82***	-3.16***
	(0.60)	(1.08)	(0.57)	(0.77)
hedge#path#exposure	4.13***	2.58**	3.64***	4.40***
	(0.98)	(1.10)	(0.95)	(1.24)
leverage	0.25	0.11	0.51	1.05
	(2.00)	(1.95)	(1.90)	(1.99)
target#leverage	-3.35	-25.42**	-7.52	-4.77
	(14.49)	(12.05)	(14.45)	(17.33)
hedge#leverage	3.19	6.87	3.26	5.09
	(3.92)	(5.88)	(3.90)	(4.99)
hedge#target#leverage	2.08	34.32	6.02	2.94
	(20.27)	(21.13)	(19.55)	(22.42)
path#leverage	7.78*	6.13	8.66**	4.87
	(4.12)	(5.10)	(3.94)	(4.54)
hedge#path#leverage	-14.58**	-7.23	-14.66**	-13.90**
	(6.21)	(7.32)	(5.86)	(6.30)
excess market return		1.11***	1.09***	
		(0.08)	(0.07)	
Observations	7,560	5,613	7,560	8,276
R-squared	0.10	0.19	0.20	0.64
Firm FE	YES	YES	YES	YES
Firm Controls/Contr*Surp	YES	YES	YES	NO

Table B-7 provides robustness checks for regression (3) in Table 2. (1) has the same specification as (3) in Table 2 except for bank debt leverage being replaced by floating rate debt leverage. (2) and (3) augment regression (3) in Table 2 and (1) in this table respectively by including the excess market return, which is defined as the difference between aggregate stock return and risk-free T-Bill return, as an additional control variable. (4) employs Fama-French adjusted stock return as the dependent variable and uses floating rate debt leverage instead of bank debt leverage. These models are estimated using the baseline sample (January 2004 to December 2008). Other conventions are identical to those in Table 2.

Table B-8: Robustness including ZLB

VARIABLES	(1) (Floating Rate Debt Leverage) Stock Return	(2) (Bank Debt Leverage + Excess Return) Stock Return	(3) (Floating Rate Debt Leverage + Excess Return) Stock Return	(4) (Floating Rate Debt Leverage + F-F Adjusted Return) Stock Return	(5) (Bank Debt Leverage + F-F Adjusted Return) Stock Return
target	-30.06***	-25.66***	-23.49***	-11.65***	-13.20***
	(6.13)	(6.16)	(4.48)	(3.32)	(4.17)
path	-6.49**	-3.54	-3.39	-7.24***	-8.02***
	(3.11)	(2.15)	(2.04)	(2.16)	(2.35)
exposure	0.01	0.14	0.11	0.01	0.25
	(0.18)	(0.23)	(0.18)	(0.20)	(0.25)
target#exposure	0.29	4.82	0.39	0.14	5.22*
	(2.07)	(3.77)	(1.96)	(2.69)	(2.82)
hedge#exposure	-0.56	-0.60	-0.62	-0.86	-0.97
	(0.56)	(0.59)	(0.55)	(0.60)	(0.63)
hedge#target#exposure	-2.33	-9.95***	-2.11	-1.05	-7.59**
	(2.81)	(3.76)	(2.62)	(3.62)	(3.07)
zlb#exposure	0.17	0.02	0.16	0.10	-0.40
	(0.41)	(0.36)	(0.37)	(0.42)	(0.39)
zlb#target#exposure	-9.26	-14.49	-8.67	-4.29	2.64
	(20.43)	(15.41)	(17.38)	(18.99)	(14.35)
hedge#zlb#exposure	0.38	0.47	0.38	0.72	1.00
	(0.68)	(0.61)	(0.67)	(0.72)	(0.66)
hedge#zlb#target#exposure	12.66	18.98	14.78	7.33	5.29
	(22.91)	(24.06)	(22.22)	(23.32)	(22.57)
path#exposure	-3.29***	-2.64***	-2.64***	-3.09***	-3.73***
	(0.61)	(0.98)	(0.55)	(0.73)	(0.52)
hedge#path#exposure	4.18***	2.21**	3.47***	4.24***	3.77***
	(0.91)	(0.97)	(0.88)	(1.06)	(0.83)
zlb#path#exposure	0.28	0.12	-0.16	2.97	4.48**
	(1.34)	(1.40)	(1.17)	(2.02)	(2.02)
hedge#zlb#path#exposure	-1.34	2.04	-0.13	-3.84	-1.33
	(2.00)	(1.53)	(1.86)	(2.50)	(2.03)
leverage	1.02	1.18	0.82	1.83	0.84
	(1.40)	(1.38)	(1.36)	(1.37)	(1.08)
target#leverage	0.47	-24.16**	-5.08	-3.95	-18.64
	(13.51)	(11.65)	(13.26)	(16.43)	(11.65)
hedge#leverage	3.66	3.94	3.29	4.07	5.39
	(3.63)	(4.40)	(3.53)	(4.00)	(4.86)
hedge#target#leverage	0.21	34.14*	4.40	2.30	21.83
	(18.84)	(19.33)	(18.00)	(21.20)	(21.82)
zlb#leverage	0.47	2.00	0.49	-0.51	2.79
	(2.42)	(2.08)	(2.27)	(2.18)	(1.70)
zlb#target#leverage	7.62	-51.53	-51.14	8.45	-50.85
	(106.21)	(92.41)	(105.38)	(91.27)	(80.05)
hedge#zlb#leverage	-5.42	-6.80	-4.28	-5.56	-9.05*
	(5.00)	(5.24)	(4.78)	(4.94)	(5.32)
hedge#zlb#target#leverage	60.82	30.33	26.70	52.11	108.66
	(127.08)	(142.78)	(117.15)	(117.99)	(131.99)
path#leverage	7.84**	5.27	8.00**	4.66	9.19***
	(3.73)	(4.20)	(3.61)	(4.08)	(3.20)
hedge#path#leverage	-14.38**	-5.41	-13.79**	-13.39**	-9.21
	(6.18)	(6.97)	(5.71)	(5.75)	(6.77)
zlb#path#leverage	-0.30	-10.54*	-5.66	1.48	-7.77
	(6.82)	(6.29)	(6.18)	(5.68)	(6.81)
hedge#zlb#path#leverage	34.32***	18.42*	25.80**	31.73***	23.68**
	(12.39)	(10.02)	(11.73)	(11.32)	(10.99)
excess market return		1.13***	1.11***		
		(0.04)	(0.04)		
Observations	18,478	15,439	18,478	19,818	16,493
R-squared	0.08	0.24	0.25	0.64	0.63
Firm FE	YES	YES	YES	YES	YES
Firm Controls/Contr*Surp	YES	YES	YES	NO	NO

Table B-8 shows robustness checks for the regression in Table 3. These models are estimated based on the extended sample (January 2004 to December 2014) that includes the zero lower bound period (incorporated into the regression models above with the dummy variable "zlb"). Other conventions are identical to those in Table B-7.

Table B-9: Falsification Tests

VARIABLES	(1) (Contol Bank Debt Leverage) Stock Return	(2) (Control Floating Rate Debt Leverage) Stock Return	(3) (Contol Bank Debt Leverage) Stock Return	(4) (Control Floating Rate Debt Leverage) Stock Return
target	0.24	2.90	-3.22	0.60
	(11.63)	(10.71)	(10.14)	(9.74)
path	0.69	1.70	5.73	4.22
	(5.49)	(5.93)	(5.22)	(5.30)
path#exposure	-0.19	-0.36	-0.50	-0.72
	(1.17)	(1.17)	(1.23)	(1.27)
hedge#path#exposure	1.11	1.35	2.04	1.70
	(1.17)	(1.14)	(1.49)	(1.29)
zlb#path#exposure			1.44	0.94
			(1.36)	(1.84)
hedge#zlb#path#exposure			-1.56	-3.10*
			(1.65)	(1.82)
Observations	5,614	7,561	15,441	18,480
R-squared	0.09	0.09	0.07	0.09

The dependent variable is the two-day stock return one week before an FOMC announcement. Regressions (1) and (2) use the regression specification (3) in Table 2, and (3) and (4) the specification (1) in Table 3.

Table B-10: Regressions for Capital Investment (Cumulative Change as a Ratio of Initial Total Assets)

Capital Investment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	-0.51***	-0.62**	-1.39***	-1.82***	-2.50***	-3.01***	-3.68***	-4.49***
	(0.19)	(0.26)	(0.34)	(0.41)	(0.53)	(0.59)	(0.69)	(0.82)
change#exposure	-0.47**	-0.78**	-1.01**	-0.80*	-0.46	-0.54	-0.50	-0.64
	(0.20)	(0.32)	(0.42)	(0.43)	(0.48)	(0.55)	(0.70)	(0.92)
hedge#change#exposure	0.53**	0.95**	1.49***	1.91***	1.69**	1.81**	1.84**	-0.03
	(0.22)	(0.38)	(0.50)	(0.69)	(0.69)	(0.89)	(0.88)	(1.55)
hedge	0.10	0.51	0.75**	0.69	0.99**	1.04*	0.80	1.08
	(0.19)	(0.33)	(0.38)	(0.43)	(0.49)	(0.55)	(0.61)	(0.68)
hedge#change	-0.72***	-0.75*	-1.21**	-1.68***	-1.71***	-2.14***	-2.40***	-2.02***
	(0.20)	(0.39)	(0.48)	(0.54)	(0.52)	(0.63)	(0.62)	(0.76)
hedge#exposure	0.19	0.22	0.63	1.36***	2.39***	3.14***	3.81***	3.77***
	(0.20)	(0.31)	(0.39)	(0.49)	(0.64)	(0.68)	(0.76)	(0.91)
size	-1.73***	-3.99***	-5.70***	-8.43***	-11.64***	-14.11***	-16.96***	-20.56***
	(0.35)	(0.62)	(0.78)	(0.98)	(1.27)	(1.41)	(1.78)	(1.99)
change#size	0.11**	0.23*	0.39**	0.70***	0.65**	0.54**	0.50**	0.79**
	(0.05)	(0.12)	(0.18)	(0.23)	(0.25)	(0.22)	(0.24)	(0.31)
markettobook	0.73***	1.32***	1.73***	1.53***	2.60***	3.28***	2.88***	2.68***
	(0.17)	(0.27)	(0.35)	(0.43)	(0.67)	(0.82)	(0.96)	(0.97)
change#markettobook	0.21*	0.11	0.13	-0.21	-0.02	-0.09	-0.69	-0.27
	(0.12)	(0.18)	(0.28)	(0.39)	(0.43)	(0.49)	(0.60)	(0.78)
booklev	-0.02	-0.03	-0.04	-0.04	-0.07	-0.11	-0.14	-0.24**
	(0.01)	(0.02)	(0.04)	(0.05)	(0.06)	(0.08)	(0.09)	(0.10)
change#booklev	0.26*	0.33	0.52	0.47	0.79	1.30	1.58	2.82**
	(0.15)	(0.23)	(0.43)	(0.59)	(0.69)	(0.96)	(1.03)	(1.20)
short debt ratio	0.50	-1.41	-1.02	-3.66	-2.97	-2.52	-4.03	-4.70
	(1.38)	(2.19)	(2.65)	(3.26)	(3.99)	(4.74)	(5.26)	(5.45)
change#short debt ratio	1.12	2.03	-1.21	-1.36	-3.11	-5.60	-6.35	-9.02*
	(1.07)	(1.77)	(2.03)	(2.55)	(3.25)	(3.78)	(4.67)	(5.44)
profitability	10.11**	8.62*	11.54*	22.21**	24.89**	30.47*	45.72*	47.15*
	(4.03)	(4.92)	(6.70)	(9.65)	(12.16)	(16.42)	(25.74)	(27.62)
change#profitability	-1.47	-1.95	13.10	28.64*	30.23*	31.32*	64.12***	53.78*
	(4.96)	(8.11)	(12.39)	(16.35)	(18.35)	(17.99)	(24.17)	(28.33)
Observations	2,541	2,521	2,503	2,491	2,481	2,456	2,442	2,413
R-squared	0.69	0.67	0.71	0.74	0.75	0.79	0.82	0.81

This table presents regressions for capital investment where the LHS is defined as $100*(Y_{i,t+x} - Y_{i,t-1})/Assets_{i,t-1}$. The explanations are provided under Table 5.

Table B-11: Regressions for Capital Investment (Cumulative Percentage Change)

Capital Investment	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	-0.78	-1.03	-1.59**	-2.63***	-3.87***	-5.55***	-7.33***	-7.89***
	(0.59)	(0.70)	(0.80)	(0.91)	(1.01)	(1.14)	(1.31)	(1.45)
change#exposure	-0.31	-0.96	-1.93**	-1.75*	-1.56*	-2.02**	-2.37**	-3.67***
	(0.57)	(0.67)	(0.93)	(0.91)	(0.89)	(0.93)	(1.02)	(1.36)
hedge#change#exposure	0.60	1.78**	2.82**	2.56**	2.39**	2.49**	0.30	2.48
	(0.67)	(0.88)	(1.17)	(1.26)	(1.14)	(1.19)	(1.57)	(1.81)
hedge	1.76***	2.35***	3.78***	3.26***	2.52***	2.11**	0.41	0.48
	(0.61)	(0.73)	(0.84)	(0.92)	(0.98)	(1.05)	(1.34)	(1.51)
hedge#change	-2.28***	-2.65***	-3.59***	-3.48***	-3.25***	-3.34***	-2.44**	-3.21**
	(0.69)	(0.89)	(1.03)	(1.07)	(1.04)	(1.05)	(1.07)	(1.26)
hedge#exposure	-0.78	-0.41	-0.33	1.34	3.04***	4.37***	5.49***	5.86***
	(0.64)	(0.77)	(0.81)	(0.98)	(1.12)	(1.26)	(1.42)	(1.63)
size	-7.52***	-13.93***	-18.61***	-22.95***	-26.76***	-31.83***	-37.44***	-43.17***
	(1.10)	(1.46)	(1.58)	(1.86)	(2.09)	(2.47)	(2.76)	(3.07)
change#size	0.78***	0.73**	0.99***	0.89**	0.77**	0.75*	0.38	0.26
	(0.27)	(0.29)	(0.34)	(0.40)	(0.39)	(0.40)	(0.45)	(0.58)
markettobook	3.57***	5.42***	5.63***	6.60***	7.75***	8.81***	9.09***	8.93***
	(0.51)	(0.70)	(0.78)	(1.07)	(1.14)	(1.25)	(1.29)	(1.40)
change#markettobook	0.78*	0.54	0.53	0.57	0.41	0.25	-0.20	-0.20
	(0.44)	(0.55)	(0.73)	(0.80)	(0.85)	(0.90)	(0.89)	(1.02)
booklev	-0.02	-0.04	-0.07	-0.09	-0.10	-0.13	-0.21	-0.19
	(0.04)	(0.06)	(0.08)	(0.10)	(0.11)	(0.14)	(0.14)	(0.15)
change#booklev	0.24	0.51	0.86	1.07	1.19	1.49	2.42	2.20
	(0.50)	(0.75)	(0.92)	(1.13)	(1.26)	(1.59)	(1.62)	(1.79)
short debt ratio	7.94*	4.10	1.13	-3.50	-2.13	2.85	-1.82	-4.73
	(4.50)	(5.48)	(6.16)	(7.10)	(7.96)	(8.99)	(9.19)	(9.46)
change#short debt ratio	2.56	6.15	5.85	4.41	3.69	5.32	9.48	7.24
	(3.75)	(5.10)	(5.59)	(7.41)	(8.32)	(8.62)	(9.45)	(10.08)
profitability	11.43	29.84*	61.99***	75.28***	81.16***	89.22***	106.58***	113.28***
	(11.98)	(17.73)	(21.42)	(25.24)	(27.72)	(29.06)	(29.47)	(33.53)
change#profitability	-11.32	-19.48	11.53	18.37	27.18	23.47	57.81*	60.51
	(17.77)	(24.94)	(29.55)	(31.82)	(35.63)	(37.14)	(34.15)	(39.71)
Observations	2,587	2,572	2,565	2,552	2,527	2,506	2,492	2,468
R-squared	0.48	0.55	0.64	0.69	0.73	0.76	0.77	0.77

This table gives regressions for capital investment where the LHS is defined as $100*(Y_{i,t+x} - Y_{i,t-1})/Y_{i,t-1}$. The explanations are provided under Table 5.

Table B-12: Regressions for Net Worth (Cumulative Change as a Ratio of Initial Total Assets)

Net Worth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	-0.40	-0.19	-0.53	-0.58	-0.73	-1.37	-1.67	-2.05
	(0.43)	(0.53)	(0.62)	(0.78)	(0.97)	(1.12)	(1.22)	(1.26)
change#exposure	-0.18	-0.44	-1.81**	-2.83***	-3.23***	-3.27***	-4.87***	-5.30***
	(0.48)	(0.73)	(0.86)	(0.93)	(1.05)	(1.20)	(1.24)	(1.38)
hedge#change#exposure	0.18	-0.13	1.27	1.42	1.51	2.59*	3.84**	4.29**
	(0.58)	(0.84)	(1.08)	(1.14)	(1.31)	(1.53)	(1.51)	(1.73)
hedge	1.26***	2.14***	3.16***	2.89***	2.24**	2.40***	2.41**	2.50**
	(0.46)	(0.63)	(0.71)	(0.79)	(0.92)	(0.92)	(0.94)	(0.97)
hedge#change	-1.20**	-0.81	-1.04	-1.46	-1.93**	-1.46	-1.36	-0.88
	(0.47)	(0.62)	(0.91)	(0.89)	(0.96)	(1.05)	(1.03)	(1.33)
hedge#exposure	-0.27	-0.65	-0.79	-0.14	1.17	1.57	1.88	2.58*
	(0.51)	(0.63)	(0.72)	(0.86)	(1.15)	(1.29)	(1.38)	(1.46)
size	-2.65***	-6.22***	-10.75***	-14.47***	-18.47***	-20.83***	-24.49***	-28.08***
	(0.92)	(1.16)	(1.26)	(1.57)	(1.66)	(2.05)	(2.08)	(2.26)
change#size	0.38***	0.45**	0.73***	0.76***	0.77***	0.61**	0.37	0.25
	(0.14)	(0.22)	(0.26)	(0.26)	(0.28)	(0.28)	(0.30)	(0.32)
markettobook	2.05***	2.36***	1.97***	1.39*	0.15	-0.96	-1.46	-1.10
	(0.51)	(0.60)	(0.64)	(0.75)	(0.80)	(0.95)	(1.02)	(1.11)
change#markettobook	1.14***	0.93**	-0.18	-0.66	-0.74	-2.15***	-2.97***	-3.35***
	(0.36)	(0.45)	(0.58)	(0.61)	(0.67)	(0.73)	(0.75)	(0.85)
booklev	-0.04	0.65**	2.14***	0.06	-0.02	0.36*	0.33*	0.24
	(0.04)	(0.32)	(0.63)	(0.09)	(0.14)	(0.20)	(0.18)	(0.17)
change#booklev	0.18	-0.53	-3.30**	-1.31	-0.38	-4.78**	-4.48**	-3.44*
	(0.50)	(0.74)	(1.28)	(1.01)	(1.65)	(2.30)	(2.11)	(2.01)
short debt ratio	9.01***	7.16	7.99	25.84***	41.39***	50.12***	64.76***	71.99***
	(3.07)	(5.35)	(6.22)	(7.01)	(8.34)	(8.82)	(9.55)	(10.03)
change#short debt ratio	-5.61	-4.88	-6.18	-11.23	-12.90*	-3.64	-1.11	-0.55
	(3.76)	(6.53)	(7.54)	(7.68)	(7.41)	(7.44)	(7.00)	(7.98)
profitability	18.88	33.36**	44.58***	51.39***	53.13***	45.52**	61.12**	44.43
	(13.46)	(15.57)	(16.93)	(19.58)	(20.51)	(21.74)	(25.54)	(28.90)
change#profitability	-34.68**	-49.38**	-5.11	32.29	25.43	40.90	60.63*	24.05
	(17.60)	(21.95)	(28.75)	(28.25)	(27.38)	(27.77)	(31.69)	(40.93)
Observations	2,601	2,584	2,567	2,555	2,539	2,522	2,505	2,487
R-squared	0.47	0.53	0.61	0.67	0.70	0.73	0.76	0.78

This table shows regressions for net worth where the LHS is defined as $100*(Y_{i,t+x} - Y_{i,t-1})/Assets_{i,t-1}$. The explanations are provided under Table 5.

Table B-13: Regressions for Net Worth (Cumulative Percentage Change)

Net Worth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	2.17	-0.18	-2.35	-2.68	-2.17	-1.20	-1.32	-1.24
	(1.69)	(1.82)	(2.11)	(2.82)	(3.71)	(3.96)	(4.35)	(4.36)
change#exposure	0.33	0.41	-4.03*	-6.99***	-6.54**	-7.69**	-13.08***	-10.87**
	(1.63)	(2.12)	(2.43)	(2.65)	(3.22)	(3.53)	(4.27)	(4.48)
hedge#change#exposure	2.77	0.22	4.53	6.29	8.19	6.89	15.57***	14.08**
	(2.07)	(3.04)	(4.11)	(4.61)	(5.36)	(5.31)	(5.91)	(6.45)
hedge	8.74***	11.78***	11.99***	11.39***	10.22***	12.36***	7.31	7.44
	(2.36)	(3.17)	(3.54)	(3.52)	(3.70)	(3.56)	(5.92)	(6.40)
hedge#change	-3.81**	-0.60	1.00	-1.88	-6.54	-8.52**	-8.62*	-2.75
	(1.91)	(2.52)	(3.31)	(3.59)	(4.04)	(3.81)	(4.62)	(5.58)
hedge#exposure	-4.21**	-6.45***	-7.55**	-4.88	-0.30	-0.57	1.19	2.60
	(2.07)	(2.44)	(2.93)	(3.61)	(4.20)	(4.82)	(5.24)	(5.55)
size	-7.59**	-12.17***	-21.53***	-31.35***	-39.07***	-52.09***	-77.90***	-81.68***
	(3.67)	(4.07)	(4.18)	(5.29)	(5.72)	(6.48)	(9.53)	(10.18)
change#size	2.77***	3.09***	2.45**	3.13***	3.98***	4.25***	3.10**	2.11
	(0.66)	(1.17)	(1.02)	(1.13)	(1.28)	(1.25)	(1.31)	(1.37)
markettobook	7.55***	9.84***	9.54***	9.67***	5.88*	5.35	1.82	-2.89
	(1.91)	(2.41)	(3.06)	(3.32)	(3.25)	(3.79)	(4.02)	(4.07)
change#markettobook	3.50***	2.85*	0.38	-2.06	-3.49	-2.77	-5.08*	-8.82***
	(1.22)	(1.70)	(2.44)	(2.67)	(2.66)	(2.65)	(2.80)	(3.08)
booklev	0.03	0.25	-0.08	-0.59	-0.85	-1.63**	-0.44	0.01
	(0.37)	(0.51)	(0.56)	(0.64)	(0.69)	(0.71)	(0.93)	(1.08)
change#booklev	0.41	-0.78	2.90	8.46	10.64	19.42**	5.19	-0.20
	(4.33)	(5.90)	(6.41)	(7.46)	(8.09)	(8.29)	(10.85)	(12.69)
short debt ratio	22.82	25.39	36.50	40.72	30.63	24.68	58.59	45.07
	(15.19)	(18.82)	(25.91)	(34.12)	(36.98)	(36.57)	(36.01)	(36.07)
change#short debt ratio	-24.31*	-13.63	-24.04	0.20	33.72	23.18	52.50*	68.76*
	(13.93)	(21.35)	(26.45)	(30.52)	(28.94)	(28.43)	(31.50)	(36.68)
profitability	-7.34	-8.40	61.46	-20.80	-40.68	-84.53	80.36	161.86*
	(42.99)	(48.43)	(53.01)	(64.91)	(73.21)	(78.36)	(96.35)	(95.18)
change#profitability	-133.79**	-108.36	-104.54	-4.90	49.35	94.96	29.79	44.78
	(60.55)	(74.11)	(89.31)	(100.50)	(102.33)	(93.85)	(116.38)	(128.81)
Observations	2,576	2,548	2,534	2,524	2,508	2,492	2,483	2,462
R-squared	0.34	0.42	0.46	0.52	0.55	0.59	0.58	0.60

This table provides regressions for net worth where the LHS is defined as $100*(Y_{i,t+x} - Y_{i,t-1})/Y_{i,t-1}$. The explanations are provided under Table 5.

Table B-14: Regressions for Total Assets (Cumulative Percentage Change)

Total Assets	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	-0.91	-0.16	-0.83	-1.18	-2.00**	-2.29*	-3.02**	-4.01**
	(0.70)	(0.83)	(0.95)	(1.02)	(1.00)	(1.19)	(1.46)	(1.66)
change#exposure	0.97	0.25	-1.46	-2.58*	-2.59	-2.76	-3.83*	-3.30
	(0.83)	(1.04)	(1.37)	(1.36)	(1.67)	(1.81)	(2.00)	(2.27)
hedge#change#exposure	-1.00	-0.70	1.42	4.59**	5.88***	7.39***	7.69***	7.30***
	(1.17)	(1.22)	(1.82)	(1.99)	(2.05)	(2.21)	(2.22)	(2.64)
hedge	0.21	2.72**	4.37***	3.57**	1.81	2.50	2.08	1.67
	(0.86)	(1.21)	(1.31)	(1.54)	(1.56)	(1.54)	(1.73)	(1.95)
hedge#change	-0.17	-0.95	-2.09	-3.14	-4.95***	-5.13***	-4.30**	-2.24
	(1.13)	(1.22)	(1.63)	(1.94)	(1.81)	(1.86)	(1.81)	(2.25)
hedge#exposure	-0.37	-1.65*	-1.89*	-0.47	0.83	1.48	2.65	3.57*
	(0.81)	(1.00)	(1.11)	(1.23)	(1.21)	(1.41)	(1.66)	(1.93)
size	-12.44***	-23.88***	-34.29***	-44.31***	-55.15***	-62.59***	-68.54***	-76.72***
	(1.31)	(2.02)	(2.52)	(3.23)	(3.98)	(4.58)	(4.79)	(5.19)
change#size	-0.45	-0.01	0.53	-0.02	-0.37	-0.01	-0.12	-0.35
	(0.35)	(0.51)	(0.60)	(0.58)	(0.56)	(0.61)	(0.58)	(0.68)
markettobook	4.65***	5.93***	6.71***	7.89***	9.17***	7.20***	7.97***	8.38***
	(0.87)	(1.08)	(1.25)	(1.45)	(1.73)	(1.83)	(1.99)	(2.12)
change#markettobook	0.83	0.62	0.10	-0.13	-0.27	-1.21	-2.06*	-2.75**
	(0.71)	(0.76)	(0.88)	(1.01)	(1.02)	(1.00)	(1.06)	(1.11)
booklev	0.04	-0.10	-0.12	0.00	0.03	0.14	-0.02	-0.10
	(0.07)	(0.11)	(0.13)	(0.14)	(0.16)	(0.10)	(0.13)	(0.16)
change#booklev	-0.37	1.15	1.19	0.10	-0.42	-1.83	0.15	1.29
	(0.83)	(1.29)	(1.54)	(1.69)	(1.82)	(1.17)	(1.53)	(1.88)
short debt ratio	-5.34	-1.36	7.73	12.10	15.47	14.58	28.82**	29.78**
	(7.31)	(9.38)	(10.33)	(12.03)	(13.71)	(13.95)	(13.94)	(14.31)
change#short debt ratio	1.34	7.54	13.62	7.62	6.37	11.21	6.69	3.26
	(5.73)	(9.24)	(10.98)	(13.12)	(13.52)	(12.70)	(11.89)	(14.48)
profitability	43.70**	101.26***	107.11***	96.09***	140.25***	178.39***	237.94***	226.12***
	(18.48)	(24.56)	(26.37)	(32.47)	(37.79)	(43.14)	(47.10)	(46.18)
change#profitability	-61.52*	-106.25***	-51.95	-41.95	-35.47	-10.96	59.99	64.76
	(32.12)	(33.58)	(45.18)	(45.18)	(47.20)	(52.68)	(61.40)	(64.27)
Observations	2,589	2,571	2,547	2,541	2,531	2,507	2,490	2,475
R-squared	0.45	0.55	0.63	0.66	0.73	0.75	0.79	0.80

This table presents regressions for total assets where the LHS is defined as $100*(Y_{i,t+x} - Y_{i,t-1})/Y_{i,t-1}$. The explanations are provided under Table 5.

Table B-15: Regressions for Long-term Debt (Cumulative Percentage Change)

Long-term debt	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	8.13	13.99*	11.01	4.20	-9.54	-18.19	-23.22	-50.15*
	(7.36)	(8.03)	(10.58)	(12.76)	(14.97)	(17.46)	(19.09)	(25.63)
change#exposure	9.46**	15.44**	6.93	18.78	24.57	22.73	16.67	-17.59
	(4.24)	(7.26)	(8.61)	(15.01)	(17.12)	(17.26)	(17.67)	(32.41)
hedge#change#exposure	-4.92	-12.02	-8.55	-15.81	-19.11	-15.32	-10.89	20.81
	(5.22)	(8.38)	(9.48)	(15.32)	(16.81)	(17.13)	(17.43)	(32.83)
hedge	-4.71	0.81	-7.83	-17.20*	-29.11***	-35.87***	-40.45***	-82.67**
	(4.62)	(5.36)	(7.68)	(9.28)	(10.15)	(11.31)	(11.15)	(36.23)
hedge#change	0.63	9.28	5.03	17.01	19.47	17.85	15.15	-18.18
	(3.75)	(6.75)	(8.48)	(15.54)	(16.63)	(15.93)	(15.93)	(34.67)
hedge#exposure	-11.64*	-17.75**	-16.66*	-11.42	-0.55	3.99	5.22	30.27
	(6.73)	(7.36)	(9.44)	(11.61)	(13.66)	(15.71)	(17.12)	(24.37)
size	-38.00***	-58.97***	-74.77***	-71.83***	-61.30***	-65.56***	-71.26***	-107.03***
	(6.58)	(8.35)	(9.63)	(12.85)	(17.30)	(19.73)	(22.47)	(39.41)
change#size	-0.27	2.92	2.74	2.03	4.37	3.91	5.82	3.30
	(1.02)	(2.26)	(2.76)	(3.49)	(3.98)	(3.82)	(3.76)	(7.72)
markettobook	6.33	8.28	11.25*	5.57	19.78	43.57**	56.97***	59.50***
	(3.99)	(5.52)	(6.45)	(12.22)	(18.16)	(18.84)	(19.95)	(22.95)
change#markettobook	0.10	3.19	8.85**	7.14	16.97*	14.22	18.05*	19.03*
	(2.13)	(3.11)	(3.99)	(7.01)	(9.07)	(9.50)	(10.04)	(11.06)
booklev	-0.25	-0.36	-0.66*	-0.50	-0.70	-0.59	-0.72	-0.82
	(0.21)	(0.32)	(0.37)	(0.44)	(0.50)	(0.55)	(0.57)	(0.76)
change#booklev	0.24	1.85	5.27	4.10	6.23	5.00	6.51	8.07
	(2.50)	(3.61)	(4.18)	(5.04)	(5.88)	(6.58)	(6.80)	(8.97)
profitability	62.23	126.61*	221.43***	228.15*	246.41	164.16	174.98	33.74
	(54.78)	(72.69)	(82.97)	(128.62)	(151.75)	(175.88)	(180.97)	(280.92)
change#profitability	-135.71*	-317.94***	-455.97***	-582.47***	-852.27***	-923.66***	-1,064.32***	-1,227.67***
	(75.43)	(111.99)	(141.94)	(216.36)	(274.34)	(292.27)	(312.61)	(356.30)
Observations	2,594	2,590	2,571	2,561	2,541	2,519	2,499	2,477
R-squared	0.22	0.28	0.35	0.41	0.39	0.44	0.48	0.37

This table gives regressions for long-term debt where the LHS is defined as $100*(Y_{i,t+x} - Y_{i,t-1})/Y_{i,t-1}$. The explanations are provided under Table 5.

Table B-16: Regressions for Other Current Liabilities (Cumulative Percentage Change)

Other Current Liabilities	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	(t+1)	(t+2)	(t+3)	(t+4)	(t+5)	(t+6)	(t+7)	(t+8)
exposure	1.56	2.14	-0.21	-0.74	-2.90	3.70	6.17	1.20
	(3.51)	(5.08)	(2.74)	(5.66)	(5.03)	(7.17)	(5.78)	(8.29)
change#exposure	7.96	1.52	8.36**	9.63*	10.01	8.30	10.06*	17.78**
	(5.50)	(5.92)	(3.35)	(5.57)	(6.92)	(6.98)	(5.88)	(8.47)
hedge#change#exposure	-10.26	-2.96	-17.54***	-22.17***	-18.92**	-14.98	-12.54	-23.53**
	(7.74)	(8.82)	(5.06)	(8.30)	(9.44)	(9.24)	(8.23)	(11.94)
hedge	1.49	7.51*	5.16	6.99	1.56	4.62	1.03	2.85
	(4.30)	(4.12)	(3.45)	(6.12)	(7.31)	(7.26)	(4.40)	(4.67)
hedge#change	13.32**	5.27	11.77***	14.14**	13.29*	11.24	5.43	18.41**
	(5.97)	(6.64)	(4.01)	(7.04)	(7.62)	(7.63)	(6.12)	(8.77)
hedge#exposure	-3.35	-5.05	0.21	-2.00	1.73	-3.63	-3.03	-4.80
	(3.73)	(5.20)	(3.25)	(5.89)	(5.58)	(7.13)	(5.95)	(8.46)
size	-22.35***	-38.97***	-34.86***	-56.38***	-60.45***	-64.55***	-61.76***	-73.66***
	(7.91)	(9.41)	(4.90)	(9.33)	(9.04)	(10.23)	(7.43)	(10.37)
change#size	-1.81	-1.81	-2.31*	-1.63	-2.76	-2.54	1.26	-0.32
	(2.45)	(2.50)	(1.31)	(2.91)	(2.85)	(2.57)	(1.78)	(2.95)
markettobook	4.73	4.91	0.96	-0.84	-4.52	-5.50	-0.93	2.38
	(3.78)	(4.04)	(2.60)	(4.98)	(6.16)	(6.15)	(4.46)	(6.13)
change#markettobook	-0.08	-4.26	-4.27*	-6.15*	-7.69*	-3.70	-4.29	-7.20
	(2.59)	(3.84)	(2.32)	(3.34)	(4.20)	(4.08)	(3.07)	(5.09)
booklev	0.15	-0.03	-3.73**	0.14	0.48	0.39	0.00	0.10
	(0.29)	(0.32)	(1.46)	(0.50)	(0.47)	(0.48)	(0.39)	(0.55)
change#booklev	-1.29	-1.58	5.57*	-2.69	-7.63	-7.23	-1.96	-1.01
	(3.30)	(3.65)	(3.16)	(5.60)	(5.24)	(5.38)	(4.45)	(6.42)
profitability	145.34	5.29	66.07	-132.57	82.03	2.76	52.86	-131.52
	(110.98)	(105.57)	(72.96)	(109.26)	(135.84)	(134.11)	(112.05)	(146.81)
change#profitability	-30.40	111.17	116.35	167.24	322.15	39.28	81.96	70.82
	(158.83)	(208.52)	(89.42)	(173.35)	(236.53)	(223.66)	(145.02)	(261.55)
Observations	2,526	2,511	2,449	2,482	2,463	2,447	2,393	2,412
R-squared	0.23	0.25	0.36	0.31	0.33	0.35	0.41	0.39

This table shows regressions for other current liabilities where the LHS is defined as $100*(Y_{i,t+x}-Y_{i,t-1})/Y_{i,t-1}$. The explanations are provided under Table 5.