

Monetary Policy Shocks and Investment-Price Sensitivity

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Abstract

This paper examines the relationship between monetary policy shocks (MPS) and stock price information for managerial investment decisions under the investment-Q sensitivity framework. Using a panel of U.S. listed firms from 1990 to 2022, we find that tightening MPS significantly enhance investment-price sensitivity, whereas easing MPS have no statistically significant effect. The positive relation between tightening MPS and investment-price sensitivity is primarily driven by the crowding-in of informed traders and heightened managerial incentives to extract information from market signals. Cross-sectional analyses further reveal that this effect is more pronounced for firms facing tighter financial constraints, exhibiting lower disclosure quality, and operating in less competitive product markets. Collectively, our findings highlight monetary policy as a salient determinant of investment-price sensitivity and document a novel channel of monetary transmission operating through managerial learning from stock prices.

JEL classification: E52; G14; G30

Keywords: Monetary policy shocks; Investment sensitivity; Stock price; Managerial learning

Data Availability: Data used in this study are available from the sources identified in the paper

1. Introduction

Investment is a fundamental driver of macroeconomic dynamics, representing a substantial portion of aggregate output and exhibiting considerable volatility over the business cycle (Bernanke and Gertler, 1995). From a policy perspective, a commonly held view is that investment is a key channel of monetary policy transmission. This is reflected in a sizable literature in empirical macroeconomics and corporate finance, which finds that monetary policy significantly influences firm-level investment decisions through the interest rate channel, whereby policy rate changes alter the cost of capital and the present value of future cash flows; and the credit channel, whereby monetary policy affects the availability and terms of external financing (Kashyap and Stein, 1994; Ottonello and Winberry, 2020; Cloyne et al., 2023). However, these studies focus predominantly on the level of investment spending, examining how monetary policy affects how much firms invest. There remains relatively little attention to whether monetary policy also influences the quality of investment decisions, specifically, the extent to which managers incorporate stock price signals into their capital allocation. In our paper, we address this question by exploring whether and how monetary policy shocks (MPS) affect investment-to-price sensitivity.¹

Traditional finance theory suggests that stock prices serve as a critical mechanism for resource allocation in the economy and can meaningfully influence corporate investment decisions (Fama, 1970). This notion is grounded in the information aggregation role of financial markets: market prices reflect the collective knowledge of diverse investors who continuously gather and trade on information about macroeconomic trends, industry prospects, and firm competitive positioning (Hayek, 1984; Grossman and Stiglitz, 1980). While corporate insiders typically possess superior knowledge about their own operations, they may lack timely access to external signals that outside investors have already incorporated into prices (Dow and Gorton, 1997). This informational gap creates incentives for managers to extract useful signals from stock prices when evaluating investment opportunities. Bond et al. (2012) formalize this idea through the concept of revelatory price efficiency, whereby prices convey value relevant information that decision makers inside the firm do not possess. Empirically,

¹In this paper, MPS refers to monetary policy shocks, and *MPS* denotes the annualized monetary policy shocks used in the regression analysis.

the sensitivity of corporate investment to stock prices has been widely adopted as a proxy for the extent of managerial learning from the market (Chen et al., 2007). Prior research has identified several determinants of investment-price sensitivity, including the informativeness of stock prices (Chen et al., 2007; Foucault and Frésard, 2012), internal governance arrangements (Jiang et al., 2011), and managerial attributes (Shen and Xie, 2023). Yet, the influence of macroeconomic conditions, particularly MPS, on investment-price sensitivity remains largely unexplored.

We predict that monetary tightening shocks significantly enhance investment-price sensitivity and propose two potential mechanisms: (i) the informed trader channel, and (ii) the managerial learning motivation channel. First, through the informed trader channel, monetary tightening elevates uncertainty and causes stock prices to deviate from fundamental values (Bloom, 2009), creating profit opportunities that crowd in informed traders who incorporate private information into prices (Grossman and Stiglitz, 1980; Adra and Menassa, 2021). The resulting improvement in price informativeness strengthens the signal value that managers can extract from the market. Second, through the managerial learning motivation channel, monetary tightening impairs managers’ information advantage regarding macroeconomic conditions and elevates financial distress risk (Bloom, 2014), prompting managers to rely more heavily on external information sources when making investment decisions (Huang et al., 2021).

To test this prediction, we measure corporate investment following McLean and Zhao (2014) as the sum of asset growth and research and development expenditures, scaled by lagged total assets. To measure the exogenous MPS, we follow Nakamura and Steinsson (2018) and construct MPS as the first principal component of unexpected changes in five interest rate futures series within a 30-minute window surrounding each Federal Open Market Committee (FOMC) meeting, using all scheduled announcements from 1989 to 2021.

We then examine the relation between MPS and investment-price sensitivity in a panel of 97,865 firm-year observations for 9,520 U.S.-listed firms over 1990–2022. We find that tightening MPS significantly enhance the sensitivity of corporate investment to stock price signals, whereas easing shocks exert no statistically significant effect. This finding is consistent with our argument that monetary tightening crowds in informed traders and strengthens managers’ incentives to learn from

stock prices when making investment decisions.

Next, we address potential concerns about endogeneity. We contend that reverse causality is unlikely, as our MPS measure is constructed using high-frequency changes in asset prices within narrow windows around FOMC announcements, which captures unexpected and exogenous policy innovations that are orthogonal to firm-level investment decisions. Moreover, corporate investment at the firm level is unlikely to influence Federal Reserve policy decisions, as monetary policy targets aggregate macroeconomic conditions rather than firm-specific outcomes (Hu et al., 1999). We also mitigate concerns about omitted variable bias with two identification strategies. First, following Gormley and Matsa (2014), we add high-dimensional fixed effects to our baseline model to address unobserved heterogeneity. In particular, we control for firm and interacted industry-year fixed effects, which help alleviate potential endogeneity concerns arising from unobserved heterogeneity across firms and time-varying heterogeneity across industries. Second, following Ferrara et al. (2012) and Zheng et al. (2025), we conduct placebo tests by randomly shuffling MPS across years and re-estimating our baseline model. The distribution of placebo coefficients is centered around zero, and our actual estimate lies in the right tail of the distribution, with a probability of only 3.8% of obtaining a coefficient as large as ours by chance. Our baseline results remain robust after applying these identification strategies, which effectively alleviate endogeneity concerns.

We conduct multiple robustness checks to confirm the validity of our findings. First, we show that our results are robust to alternative measures of corporate investment, including asset growth alone (McLean and Zhao, 2014) and the sum of capital expenditures and R&D expenses (Shi et al., 2019). Second, we employ alternative measures of Tobin’s Q, including Peters and Taylor Total Q, which accounts for both physical and intangible capital (see, Peters and Taylor, 2017), and changes in Q to better capture the informational content that managers extract from financial markets (Jiang et al., 2011). Third, we use the shadow federal funds rate developed by Wu and Xia (2016) as an alternative measure of monetary policy shocks to address the zero lower bound constraint during the post-2008 period. Fourth, we re-estimate our baseline model by excluding firm-year observations during the global financial crisis and the COVID-19 pandemic. Finally, to mitigate the concern that the documented relation between MPS and investment-price sensitivity is confounded by other firm

characteristics, we include additional controls in our baseline model, such as analyst coverage, leverage, cash holdings, retained earnings, and firm age. Our baseline results still hold after conducting these robustness checks.

We also investigate the mechanisms through which monetary tightening shocks influence investment-price sensitivity. Our cross-sectional analyses show that the positive relation between tightening MPS and investment-price sensitivity is more pronounced among firms whose stock prices contain less private information *ex ante*, measured by price non-synchronicity (Chen et al., 2007), and firms with greater growth opportunities, measured by Tobin’s Q (Zhao et al., 2023). The former finding supports the informed trader channel, whereby monetary tightening crowds in informed traders who incorporate private information into prices, and this effect is stronger when there is more room for improvement in price informativeness. The latter finding supports the managerial learning motivation channel, whereby managers of firms with abundant growth options rely more heavily on external information sources and thus exhibit stronger incentives to learn from stock prices under monetary tightening conditions. We further explore a list of other factors that may induce cross-sectional variation in the relation between tightening MPS and investment-price sensitivity. These results suggest that firms with more limited access to external capital, lower disclosure quality, and weaker competitive benchmarks are more responsive to tightening MPS by increasing their reliance on stock price signals for investment decisions. Moreover, we find that firms with greater investment opportunities issue significantly more equity during monetary tightening periods, consistent with the view that reduced adverse selection costs encourage equity financing when stock prices become more informative (Korajczyk et al., 1991).

Our study makes three key contributions. First, we contribute to the literature on the real effects of monetary policy on corporate decisions. Existing work has extensively examined how monetary policy affects corporate investment through the interest rate channel (Bernanke and Blinder, 1992) and the credit channel (Bernanke and Gertler, 1995; Kashyap and Stein, 1994), focusing primarily on the level of investment spending. Recent studies have further documented heterogeneous investment responses across firms with different financial conditions (Ottonello and Winberry, 2020; Cloyne et al., 2023) and the impact of monetary policy uncertainty on firm risk-taking (Luo et al., 2022). However,

little attention has been paid to how monetary policy shapes the quality of investment decisions. By documenting a positive relation between monetary tightening shocks and investment-price sensitivity, we identify a previously underexplored channel through which monetary policy influences capital allocation efficiency.

Second, we add to the literature on the determinants of investment-price sensitivity. Prior work has linked investment-price sensitivity to stock price informativeness (Chen et al., 2007; Foucault and Frésard, 2012), corporate governance (Jiang et al., 2011; McLean et al., 2012), managerial characteristics (Shen and Xie, 2023), and information acquisition capabilities (Zhao et al., 2023). These studies focus predominantly on firm-level and market-level determinants, while the role of macroeconomic factors remains largely unexplored. Our study fills this gap by establishing monetary policy shocks as a salient macro-level determinant of investment-price sensitivity, echoing the call by Dechow et al. (2010) to connect macroeconomic factors with corporate activities.

Third, we contribute to research on managerial learning from stock prices. The theoretical literature has long recognized that stock prices aggregate dispersed information and can guide managerial decisions (Dow and Gorton, 1997; Bond et al., 2012). Empirical studies have documented that managers indeed learn from stock prices when making investment decisions (Chen et al., 2007; Edmans et al., 2017). Our study extends this line of research by showing that managerial learning is state-dependent: managers rely more heavily on stock price signals during periods of monetary tightening when uncertainty is elevated and their informational advantage is weakened. This finding offers new insights into the conditions under which the feedback effect from financial markets to real economic decisions is most pronounced.

The paper proceeds as follows. Section 2 reviews the relevant literature and proposes our hypothesis. Section 3 describes the sample, variables, and research design. Section 4 presents the descriptive statistics and main empirical results. Section 5 presents supplementary test results. Section 6 concludes the study.

2. Literature review and empirical prediction

2.1. Literature review on investment-price sensitivity

Stock price information is the theoretical foundation of investment-price sensitivity. The efficient market hypothesis posits that in fully functional and competitive stock markets, all valuable information is reflected in stock prices through the continuous trading activities of market participants (Fama, 1970). While managers typically possess superior information regarding their own firms' fundamentals and investment prospects (Myers and Majluf, 1984), stock prices incorporate the dispersed knowledge of numerous traders concerning macroeconomic conditions, industry dynamics, and competitive positioning (Hayek, 1984; Bond et al., 2012). Importantly, beyond ordinary investors, financial markets also comprise specialists and informed traders who acquire and trade on private information about firms and industries (Boot and Thakor, 1997; Christophe et al., 2004; Curtis and Fargher, 2014). This private information, once impounded into stock prices through trading, can reveal insights that managers themselves do not possess, such as the market's assessment of growth opportunities or the implications of prior strategic decisions (Dow and Gorton, 1997). The managers' learning hypothesis thus suggests that stock prices serve as a valuable supplementary information source for corporate decision-makers, and investment-price sensitivity captures the extent to which managers incorporate this price-based information into their investment decisions (Chen et al., 2007; Edmans et al., 2017).

A growing body of empirical research has examined the determinants of investment-price sensitivity. Chen et al. (2007) employ the probability of informed trading to measure stock price informativeness and find a positive relationship between informativeness and investment-price sensitivity. Consistent with this view, Foucault and Frésard (2012) show that cross-listing increases investment-price sensitivity by fostering a more informative trading environment with greater presence of informed investors. Additionally, Kau et al. (2008) find that strong monitoring and well-structured compensation systems boost managers' motivation to incorporate market signals, while Jiang et al. (2011) show that a larger control-ownership wedge is associated with lower investment-price sensitivity, suggesting that managers with stronger private control incentives are less likely to learn from the stock mar-

ket. Recent studies identify additional factors that influence investment-price sensitivity, including oil price uncertainty (Zhu et al., 2022), internet searching (Zhao et al., 2023), and mandatory disclosure of corporate site visits (Wang et al., 2025). Collectively, all the studies suggest that investment-price sensitivity reflects managers' motivations to extract valuable information about their firm's prospects from stock prices.

2.2. Literature review on monetary policy and corporate decisions

The impact of monetary policy on corporate investment and financial decisions has been extensively studied in the macroeconomics and finance literature. Classic theories suggest that monetary policy affects the real economy through two primary channels: the interest rate channel (Hicks, 1937; Bermanke and Blinder, 1992) and the credit channel (Bernanke and Gertler, 1995). The interest rate channel operates by affecting the overall cost of capital. When monetary policy tightens, interest rates rise, leading firms to face higher external financing costs and reduced present value of future cash flows (Bermanke and Blinder, 1992). The credit channel works through financial intermediaries by altering the availability and terms of external financing. More specifically, monetary tightening reduces the supply of bank loans and worsens borrowers' balance sheet conditions, which further constrains firms' ability to finance investment projects (Gertler and Gilchrist, 1994; Kashyap and Stein, 1994).

Empirical studies at the firm level confirm that monetary policy significantly influences corporate investment behavior. Ottonello and Winberry (2020) document substantial heterogeneity in firms' investment responses depending on their financial conditions. Luo et al. (2022) show that monetary policy uncertainty reduces firm risk-taking as firms lower their capital stock to limit risk exposure. Furthermore, Cloyne et al. (2023) use firm-level panel data and high-frequency identified monetary policy shocks to show that younger firms and firms with higher leverage exhibit stronger investment responses to monetary policy changes. Overall, the significant impact of monetary policy on corporate investment and financial decisions has been widely acknowledged.

2.3. MPS and investment-price sensitivity

Given the significant impact of monetary policy on corporate investment and financial decisions discussed above, we examine how monetary policy shocks affect the extent to which managers learn from stock prices. We posit that monetary tightening shocks strengthen investment-price sensitivity for two reasons.

First, monetary tightening shocks crowd in informed traders and increase stock price informativeness. There is robust evidence that uncertainty rises considerably under adverse economic and financial conditions (Bloom, 2009; Basu and Bundick, 2017). Monetary contraction leads to a deterioration in economic performance and raises uncertainty about firms' future prospects (Bloom et al., 2018; Caldara et al., 2016). This uncertainty causes firms' market values to deviate from their fundamental values, as uninformed traders may bid stock prices away from fundamental values when facing uncertainty (Miller, 1977). Informed traders, who specialize in gathering and analyzing information, can identify these value deviations and profit by trading on information that the market and management do not possess. As suggested in the information economics literature, by increasing the marginal return on privately collected information, uncertain conditions are key catalysts of informed trading (Grossman and Stiglitz, 1980). Consistent with this notion, Fricke et al. (2014) discover that informed traders in uncertain environments are motivated to collect more unknown market information to obtain expected returns, and Gao et al. (2019) find that informed trading volume increases when uncertainty is elevated. Moreover, Adra and Menassa (2021) provide direct evidence that conventional monetary contraction leads information-driven traders to intensify their information production activity. This occurs because informed traders, who specialize in gathering and analyzing information, can identify value deviations and profit by trading on information that the market and management do not possess. Consequently, we argue that monetary tightening shocks may affect stock price informativeness and investment-q sensitivity via influencing the behaviors of informed traders.

Second, monetary tightening shocks encourage managers to learn from stock prices by impairing their information advantage and increasing financial distress risk. Managers typically possess superior

information regarding firm-specific matters, such as technical expertise (Jiang et al., 2011). However, in regard to market-wide information, they forfeit this advantage. Monetary policy is one of the key factors affecting macroeconomic conditions, and economy-wide information occupies a substantial portion of the announcements made by the Fed (Nakamura and Steinsson, 2018; Cieslak and Schrimpf, 2019). When confronted with monetary tightening, macroeconomic risks increase, and market information becomes more vital than firm-specific information. Managers may not be able to judge the macroeconomic situation in time and thus are likely to make mistakes. Uncertainty applies pressure to managers when making financial and investment plans (Gulen and Ion, 2016). Moreover, when the economy faces a potential downturn, firms have a higher probability of financial distress (Bloom, 2014). According to Huang et al. (2021), managers are more inclined to learn from stock prices when they are confronted with a crisis on account of the increased probability of bankruptcy. Therefore, in order to avoid bankruptcy risk and make appropriate investment decisions, managers in monetary tightening environments have a stronger tendency to learn from stock prices.

Based on these arguments, we propose the following hypothesis:

Hypothesis: Monetary tightening shocks increase investment-price sensitivity.

3. Sample, variables, and research design

3.1. Data sources and sample

Our initial sample begins with all firms in Compustat during the years 1990 to 2022. We obtain firm-level accounting and financial data from Compustat and stock price data from CRSP. Following standard practice in the literature (e.g., Chen et al., 2007), we exclude firms in the financial industries (SIC code 6000-6999) and utility industries (SIC code 4000-4999). We also exclude firm-year observations with missing or non-positive book value of total assets or book value of equity. To ensure our sample consists of economically significant firms, we require firms to have at least \$10 million in total assets.

To construct MPS variables, we use intraday interest rate futures data from the CME Group (owner of the Chicago Board of Trade and Chicago Mercantile Exchange). The times and dates of

FOMC meetings are collected from the Federal Reserve Board website.² We then merge our firm-level variables with the MPS data, and our final sample consists of an unbalanced panel of 97,865 firm-year observations with 9,520 unique firms.

3.2. Variable definitions

3.2.1. Investment

Following McLean and Zhao (2014), we measure investment (INV) as the sum of asset growth and research and development expenditures, scaled by lagged total assets:

$$INV_{i,t} = \frac{(Asset_{i,t} - Asset_{i,t-1}) + R\&D_{i,t}}{Asset_{i,t-1}} \quad (1)$$

where $Asset_{i,t}$ denotes total assets and $R\&D_{i,t}$ represents research and development expenses. Missing R&D values are set to zero. This comprehensive measure allows us to capture the broadest definition of firm investment, encompassing both balance sheet asset accumulation and off-balance-sheet investment in intangible capital through R&D spending.

In robustness tests, we employ two alternative investment measures to ensure our findings are not sensitive to the specific construction of the dependent variable. First, following McLean and Zhao (2014), we use asset growth alone, defined as the annual change in total assets scaled by beginning-of-year assets. Second, following Shi et al. (2019), we measure investment as the sum of capital expenditures and R&D expenses, scaled by lagged total assets.

3.2.2. Tobin's Q

Following prior literature (see, e.g., Baker et al., 2003; Rauh, 2006; McLean and Zhao, 2014), We measure Tobin's Q as the natural log of the market value of equity minus the book value of equity plus the book value of assets, all scaled by the book value of assets:

$$Q_{i,t} = \log \left(\frac{MV_Equity_{i,t} - BV_Equity_{i,t} + BV_Assets_{i,t}}{BV_Assets_{i,t}} \right) \quad (2)$$

²These data are available on the Fed's website at <http://www.federalreserve.gov/pubs/feds/2006/200628/200628abs.html>.

where $MV_Equity_{i,t}$ is the market value of equity, $BV_Equity_{i,t}$ is the book value of equity, and $BV_Assets_{i,t}$ is the book value of total assets.

3.2.3. MPS

To measure our primary independent variable, *MPS*, we employ the high-frequency identification approach developed by Nakamura and Steinsson (2018). In particular, we construct our monetary policy shock measure as the first principal component of unexpected changes in five interest rate futures series within a 30-minute window surrounding each FOMC announcement.³ The five interest rate futures include: (1) the current-month federal funds rate expectations, (2) the expected federal funds rate for the next scheduled FOMC meeting, and (3) three-month Eurodollar interest rate expectations at two-, three-, and four-quarter horizons.

Mathematically, we calculate the unexpected changes in the two federal funds rate futures (FFR) components as follows. The first component measures the current-month surprise, which captures revisions to market expectations for the FFR during the remaining days of the FOMC meeting month:

$$E_t[r_0] - E_{t-\Delta t}[r_0] = \frac{m_0}{m_0 - d_0}(f_t^1 - f_{t-\Delta t}^1) \quad (3)$$

where m_0 denotes the total number of days in the FOMC meeting month, d_0 denotes the specific day when the announcement occurs, and f_t^1 represents the price of the current-month federal funds futures contract. The subscript t indicates prices observed immediately following the announcement, while $t - \Delta t$ indicates prices observed immediately before. The scaling factor $\frac{m_0}{m_0 - d_0}$ adjusts for the fact that the futures contract reflects the average FFR over the entire month, but the announcement only affects expectations for the remaining portion of the month.

The second component measures expectations about the FFR at the time of the subsequent scheduled FOMC meeting. This next-meeting surprise is computed as:

$$E_t[r_1] - E_{t-\Delta t}[r_1] = \frac{m_1}{m_1 - d_1} \left[(f_t^n - f_{t-\Delta t}^n) - \frac{d_1}{m_1}(E_t[r_0] - E_{t-\Delta t}[r_0]) \right] \quad (4)$$

³Specifically, the 30-minute event window spans from 10 minutes before to 20 minutes after each FOMC announcement.

where m_1 represents the number of days in the month containing the next scheduled meeting, d_1 is the day of that meeting, and f_t^n denotes the corresponding futures contract price. The term r_1 reflects the anticipated average FFR following the next FOMC decision. The adjustment term $\frac{d_1}{m_1}(E_t[r_0] - E_{t-\Delta t}[r_0])$ accounts for the overlap between the current month and the next meeting month.

The remaining three components are computed as the simple price changes in Eurodollar futures contracts at two-, three-, and four-quarter horizons. Our analysis incorporates all scheduled FOMC announcements occurring during our sample period.

The key advantage of constructing a monetary policy shock measure using this broad set of interest rate maturities is that it captures both conventional monetary policy (changes in the current federal funds rate target) and unconventional monetary policy (forward guidance about the future path of interest rates). Additionally, this comprehensive approach is particularly important for our sample period, as the Federal Reserve has increasingly relied on forward guidance as a policy tool, especially following the 2008 financial crisis when the federal funds rate reached the zero lower bound (see, e.g., Gürkaynak et al., 2005; Campbell et al., 2012).

To align with the annual frequency of our firm-level data, we aggregate the individual FOMC-level monetary policy shocks to the fiscal year level. Specifically, $MPS_{i,t}$ is computed as the average of all monetary policy shocks occurring during firm i 's fiscal year t . By construction, positive values of MPS correspond to contractionary monetary policy shocks (unexpected increases in interest rates), while negative values indicate expansionary shocks (unexpected decreases in interest rates).

To explore potential asymmetries in how firms respond to contractionary versus expansionary monetary policy, we decompose our shock measure into two components: *MPS_Tightening* and *MPS_Easing*. *MPS_Tightening* is calculated as $MPS \times I^+$, where I^+ is an indicator variable equal to one if $MPS > 0$ and zero otherwise. Similarly, *MPS_Easing* is defined as $MPS \times I^-$, where I^- equals one if $MPS < 0$ and zero otherwise. This decomposition allows us to examine whether the effect of monetary policy shocks on the investment-price sensitivity differs between tightening and easing episodes.

3.3. Empirical model

To examine the effect of MPS on investment-price sensitivity, we use a firm-level cross-sectional regression for testing our hypothesis following Chen et al. (2007):

$$\begin{aligned} INV_{i,t} = & \beta_0 + \beta_1 Q_{i,t-1} + \beta_2 Q_{i,t-1} MPS_{i,t-1} + \beta_3 MPS_{i,t-1} + \beta_4 CF_{i,t} + \beta_5 MktCap_{i,t-1} \\ & + \beta_6 1/Asset_{i,t-1} + \beta_7 RET_{i,t+3} + \beta_8 Recess_{i,t} + \theta_j + \mu_t + \varepsilon_{i,t} \end{aligned} \quad (5)$$

where subscripts i , t , and j denote firm, year, and industry, respectively. The dependent variable $INV_{i,t}$ is firm i 's investment in year t . $Q_{i,t-1}$ is Tobin's Q measured at the end of year $t-1$. $MPS_{i,t-1}$ is the monetary policy shock series constructed using the high-frequency identification approach at time $t-1$, as outlined in Section 1.2.3.

Following prior literature on corporate investment, our baseline specification includes several control variables to account for key determinants of firm investment decisions. To capture the well-documented effect of internal funds on investment (Fazzari et al., 1987), we include operating cash flow ($CF_{i,t}$), measured as the sum of net income before extraordinary items, depreciation and amortization expenses, and R&D expenses, all scaled by lagged total assets (see McLean et al., 2012). Following Jiang et al. (2011), we include market capitalization ($MktCap_{i,t-1}$) to control for the firm size effect. We also include the inverse of total assets ($1/Asset_{i,t-1}$) to address a potential mechanical correlation between investment and Tobin's Q induced by their common scaling denominator (Chen et al., 2007). Additionally, to control for managerial market timing behavior, whereby firms tend to invest more when their equity appears overvalued, we incorporate future stock returns ($RET_{i,t+3}$) as the value-weighted market-adjusted cumulative return over the three years following the investment year (Loughran and Ritter, 1995; Baker and Wurgler, 2002; Baker et al., 2003). Finally, we include an NBER recession indicator ($Recess_{i,t}$) to account for business cycle effects on investment (McLean and Zhao, 2014). This variable equals one if at least six months of year t fall within an NBER-defined recession period and zero otherwise. We include industry fixed effects (θ_j) and year fixed effects (μ_t) in the baseline regression to absorb time-invariant industry characteristics and common macroeconomic trends. Detailed definitions of all variables are provided in Appendix A.

We expect $\beta_1 > 0$, which reflects the positive association between investment opportunities and capital expenditures documented in prior studies (Bloise and Shieh, 1997; Abel and Eberly, 2011). The coefficient of primary interest is β_2 on the interaction term, which measures how monetary policy shocks affect the responsiveness of corporate investment to stock price signals.

4. Main results

4.1. Summary statistics

Table 1 presents the descriptive statistics of the variables used in our baseline regression. The mean value of INV_t is 0.148 with a standard deviation of 0.405, indicating that the average firm invests approximately 14.8% of its total assets annually. Tobin's Q averages 0.517, showing that the market value of assets is approximately 1.68 times the book value for the typical firm. Additionally, the mean value of MPS_{t-1} in our sample is -0.002, with a standard deviation of 0.027. Among control variables, the average cash flow is 0.048, suggesting that sample firms generate approximately 4.8% of their asset base in operating cash flow per year. $MktCap_{t-1}$ has a mean of 4.329 with a standard deviation of 14.787, reflecting substantial cross-sectional variation in firm size. The inverse of total assets has a mean of 0.011 with a standard deviation of 0.017. Moreover, the mean values of RET_{t+3} and $Recession_t$ are 0.146 and 0.079, respectively. The distributions of these variables are generally comparable to those reported in previous studies.

Table 2 reports the Pearson correlation coefficients among the main variables. As expected, investment is positively correlated with Tobin's Q and statistically significant at the 1% level, supporting the Q-theory of investment. Notably, the interaction term $Q_{t-1} \times MPS_{t-1}$ shows a positive correlation with investment at the 1% significance level, which provides preliminary support for our hypothesis that contractionary MPS increase investment-price sensitivity. The largest pairwise correlation among our control variables, in terms of absolute values, is 0.232 between cash flow and the inverse of assets, suggesting that multicollinearity is not a serious concern in our empirical analyses.

4.2. Baseline regression results

The baseline regression results are presented in Table 3. In Columns (1) and (2), we include Tobin’s Q, MPS, and the interaction term $Q_{t-1} \times MPS_{t-1}$ as independent variables. Column (1) includes industry and year fixed effects, while column (2) includes firm and year fixed effects. Similar to other studies (e.g., Foucault and Frésard, 2012; Andrei et al., 2019), we find a positive and significant relationship between a firm’s Tobin’s Q and its investment in our sample. The coefficients on MPS_{t-1} are negative and statistically significant at the 1% level in both specifications, suggesting a negative association between monetary policy shocks and corporate investment. This finding is consistent with the literature on monetary policy transmission, which posits that contractionary monetary policy raises interest rates and the cost of capital, thereby reducing corporate investment (Meltzer, 1995; Angeriz et al., 2008).

Our main variable of interest is the interaction term $Q_{t-1} \times MPS_{t-1}$, which examines the average change in sensitivity between Tobin’s Q and investment. The coefficients on $Q_{t-1} \times MPS_{t-1}$ are 1.286 (t-statistic = 8.89) in column (1) and 1.043 (t-statistic = 8.43) in column (2), indicating that MPS leads to increased investment-price sensitivity.

In Columns (3) and (4), we follow the literature and add a set of control variables that have been shown to be important determinants of corporate investment (e.g., Jiang et al., 2011; McLean and Zhao, 2014; Bhandari and Javakhadze, 2017). The results show that the coefficients on $Q_{t-1} \times MPS_{t-1}$ remain positive and significant at the 1% level in both specifications. In terms of the economic significance, the estimates from columns (3) and (4) suggest that MPS leads to an 17.3% and 11.3% increase in investment-Q sensitivity, respectively, after controlling for other determinants.

With regard to control variables, firms with are larger ($MktCap_{t-1}$), have higher future stock returns (RET_{t+3}), and are in recession periods ($Recession_t$) invest less. However, firms that have higher cash flows (CF_t) and are smaller (higher values of $1/Asset_{i,t-1}$) invest more. The signs of our control variables are generally consistent with findings in Chen et al. (2007), Jiang et al. (2011) and Shen and Xie (2023).

4.3. Asymmetric effects of monetary policy shocks

Previous studies have documented that monetary policy shocks exert asymmetric effects on macroeconomic and firm-level outcomes. For example, contractionary (tightening) monetary policy shocks generally exhibit stronger effects on unemployment, sales, and oil price uncertainty compared to expansionary (easing) policy shocks, as shown in Barnichon et al. (2017), Kurt (2024), and Tian et al. (2025), respectively. In contrast, Fu and Liu (2015) find that corporate investment adjusts more rapidly during expansionary periods, while Xu et al. (2023) show that easing shocks significantly reduce stock price crash risk, with tightening shocks having no significant effect on this outcome.

To investigate the asymmetric effect of MPS on investment-price sensitivity, we employ the following empirical model:

$$INV_{i,t} = \beta_0 + \beta_1 Q_{i,t-1} + \beta_2 Q_{i,t-1} MPS_Tightening_{i,t-1} + \beta_3 Q_{i,t-1} MPS_Easing_{i,t-1} + \beta_4 MPS_Tightening_{i,t-1} + \beta_5 MPS_Easing_{i,t-1} + \beta_6 Controls_{i,t} + \theta_j + \mu_t + \varepsilon_{i,t} \quad (6)$$

where *MPS_Tightening* denote contractionary (tightening) monetary policy shocks and *MPS_Easing* denote expansionary (easing) monetary policy shocks. The control variables and fixed effects are identical to those in the baseline model, as specified in Equation (5).

We report the regression results for the asymmetric effects of MPS in Table 4. The estimated coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ are positive and statistically significant across all specifications, whereas the estimated coefficients on $Q_{t-1} \times MPS_Easing_{t-1}$ are all statistically insignificant. Taken together, these results provide strong evidence that the positive relationship between MPS and investment-price sensitivity, as documented in Section 4.2, is predominantly attributable to monetary tightening shocks. Therefore, our subsequent empirical analysis concentrates on the effects of monetary tightening shocks on investment-price sensitivity.

4.4. Mitigating endogeneity

In the previous section, we find a positive relationship between monetary tightening shocks and investment-Q sensitivity. We argue that our research design is unlikely to be subject to reverse causality concerns for two reasons. First, our monetary policy shock measure is constructed using high-frequency changes in asset prices within narrow windows around FOMC announcements, which captures unexpected and exogenous policy innovations that are orthogonal to firm-level investment decisions. Second, corporate investment at the firm level is unlikely to influence Federal Reserve policy decisions, as monetary policy targets aggregate macroeconomic conditions rather than firm-specific outcomes (see, Hu et al., 1999). However, concerns related to endogeneity may still arise due to unobserved variables. In this section, we implement two complementary tests to mitigate these endogeneity concerns: (i) high-dimensional fixed effects; and (ii) a placebo test.

4.4.1. High-dimensional fixed effects

In our baseline regressions, we control for observable firm characteristics along with industry and year fixed effects, or alternatively firm and year fixed effects. However, these specifications may not fully account for time-varying heterogeneity across industries. To obtain a more rigorous relationship between MPS and investment-price sensitivity, we adopt high-dimensional fixed effects following Gormley and Matsa (2014) by including firm and interacted industry-year fixed effects.

The empirical results are reported in Table 5. Column (1) presents the regression model that includes firm and industry $\times$ year fixed effects without additional control variables, while column (2) further incorporates the full set of control variables. Across both specifications, the estimated coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ remain positive and statistically significant, whereas the coefficients on $Q_{t-1} \times MPS_Easing_{t-1}$ remain statistically insignificant. These results show that our baseline findings are robust after controlling for unobserved heterogeneity.

4.4.2. Placebo test

To further address concerns about omitted variable bias, we conduct two placebo tests. First, following Ferrara et al. (2012), Ma et al. (2023) and Zheng et al. (2025), we randomly shuffle MPS across years and re-estimate our baseline model. If our results are driven by unobserved confounding factors rather than the true effect of monetary policy shocks, we would expect to find similar coefficients even when MPS is randomly assigned. We repeat this procedure 1,000 times and obtain the empirical distribution of the coefficients on $Q_{t-1} \times MPS_{t-1}$.

Figure 1 presents the distribution of the placebo coefficients. As expected, the distribution of the estimated coefficients on the placebo MPS variable is centered around zero, and our baseline estimate from column 3 of Table 3 (indicated by a vertical line in correspondence of the value 1.420) clearly lies in the right tail of the distribution. The probability of obtaining a placebo coefficient that exceeds our actual estimate is merely 3.8%, suggesting that the effects of MPS on investment-price sensitivity are unlikely to be driven by chance or omitted variables at the time level.

Second, with reference to Zhao et al. (2023), we conduct a placebo test by lagging the MPS variable by one additional period. Specifically, we replace MPS_{t-1} in the baseline regression with MPS_{t-2} , which allows us to examine the effect of monetary policy shocks observed two periods prior to the investment decision. If our results reflect real effects of MPS on investment-price sensitivity, then more distant shocks should have weaker or statistically insignificant effects. We report the estimated results in Table 6. Consistent with our expectation, the coefficients on $Q_{t-1} \times MPS_{t-2}$ are statistically insignificant in all columns.

4.5. Robustness checks

This section presents the results of robustness tests. We continue to use the specification in columns (3) and (4) of Table 4, and we primarily examine the coefficient on $Q_{t-1} \times MPS_Tightening_{t-1}$.

4.5.1. Alternative measures of corporate investment

To ensure the validity of our results, we conduct robustness tests using alternative measures of corporate investment. The first alternative measure of investment, INV_Alt1_t , is constructed based on the approach of McLean and Zhao (2014), which employs the annual growth rate of total assets as an investment proxy. The second alternative measure, INV_Alt2_t , follows the specification of Shi et al. (2019), and defines investment as the sum of changes in total assets and R&D expenditures, scaled by total assets at the beginning of year $t - 1$. Panel A of Table 7 presents the estimation results using these two alternative measures of investment. The dependent variable is INV_Alt1_t in columns (1)–(3) and INV_Alt2_t in columns (4)–(6). The coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ remain positive and statistically significant at the 1% level in all columns. Overall, indicating that our main findings are robust to alternative definitions of corporate investment.

4.5.2. Alternative measures of Tobin’s Q

Our baseline specification employs the conventional measure of Tobin’s Q, which is constructed as the natural logarithm of the ratio of market value to book value of assets (see McLean and Zhao, 2014). While this traditional measure is widely used in the literature, it may understate the true valuation of firms by excluding intangible capital from the denominator. To ensure that our results are not driven by the specific construction of Tobin’s Q, we conduct robustness tests using two alternative measures.

First, we replace our baseline Q with Peter’s and Taylor Total Q ($Total_Q$), which accounts for both physical and intangible capital in the denominator (Peters and Taylor, 2017). Traditional Q measures treat expenditures on intangibles such as R&D and advertising as expenses rather than investments, potentially distorting the relationship between market valuations and investment opportunities. Peters and Taylor (2017) address this limitation by constructing a measure that includes the replacement cost of intangible capital alongside physical capital. This adjustment is particularly relevant given the growing importance of intangible assets for firms in recent decades. Columns (1) and (2) of Table 7 report the estimated results. The coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ remains positive and statistically significant, which are consistent with our baseline findings.

Second, following Jiang et al. (2011), we employ the change in Q (ΔQ) as an alternative proxy for investment opportunities. Since managerial learning occurs through the revelation of new information in stock prices over time, changes in Q may better capture the informational content that managers extract from financial markets. Dow and Gorton (1997) argue that lagged stock returns outperform the level of Q in predicting investment, as insiders' private information tends to be relatively stable over time. Consequently, we compute the change in Peters and Taylor Total Q and re-estimate our models accordingly. As shown in columns (3) and (4) of Table 7, the results using ΔQ yield similar results, with the interaction term between MPS and investment-price sensitivity remaining positive and statistically significant.

Taken together, these findings demonstrate that our baseline results are robust to alternative definitions of Tobin's Q .

4.5.3. Alternative measure of MPS

In our baseline analysis, we measure monetary policy shocks using high-frequency changes in interest rates futures around FOMC announcements following Nakamura and Steinsson (2018). However, following the onset of the 2008 financial crisis, the federal funds rate was effectively constrained at the zero lower bound (ZLB), limiting the ability of conventional interest rate measures to capture the true stance of monetary policy. To address this issue, we adopt the shadow federal funds rate (*Shadow_Rate*) developed by Wu and Xia (2016), which employs a nonlinear term structure model to approximate the overall monetary policy stance when conventional policy rates are at or near the ZLB. We use annual changes in this shadow rate as an alternative measure of monetary policy shocks and re-estimate our baseline regression. The results, as reported in the Panel C of Table 7, show that the coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ remain positive and statistically significant. This confirms that our results are robust to the alternative measure of MPS.

4.5.4. Excluding subsamples during crises periods

Our sample period includes two major crisis episodes: the 2008–2009 global financial crisis (GFC) and the COVID-19 pandemic (2020–2021). Both periods are characterized by significant market

turbulence and unprecedented monetary policy interventions. During financial crises, information asymmetry between informed and uninformed investors tends to intensify. Informed traders possess greater incentives to acquire and exploit private information during periods of heightened uncertainty, as the potential profits from trading on such information are substantially larger than in normal market conditions (Gao et al. (2019)). Similarly, the COVID-19 pandemic triggered extraordinary monetary policy responses, including rapid interest rate cuts and large-scale asset purchases, which may have altered the transmission mechanism of monetary policy to corporate investment (Hoang et al., 2022).

To ensure that our results are not driven by these unusual crisis periods, we exclude firm-year observations during the global financial crisis and Covid-19 pandemic and re-estimate our baseline model. We report the estimated results in Panel D of Table 7. The coefficients of the interaction between MPS and investment-q sensitivity are positive and statistically significant at the 1% level, which indicates that our main findings are robust to the exclusion of crisis periods.

4.5.5. Additional controls

Previous studies suggest that certain firm characteristics may affect the private information incorporated in stock prices and therefore the investment-price sensitivity. For instance, Chen et al. (2007) and Wang et al. (2025) document that analyst coverage influences the extent to which private information is reflected in stock prices, as financial analysts play important roles in information production and dissemination. To control for the potential effect of analyst coverage, we extend Equation (5) by including analyst coverage ($Coverage_{t-1}$) in our baseline model. Additionally, with reference to Edmans et al. (2017), we extend our baseline specification by adding a vector of firm-level determinants of investment. In particular, we include additional controls as follows: log market value of equity (MV_Equity_{t-1}), which is the only additional control used in Foucault and Frésard (2012); leverage ($Leverage_{t-1}$), which is defined as long-term debt divided by total assets; cash holdings ($Cash_{t-1}$), which are cash and short-term investments divided by total assets; retained earnings ($Earnings_{t-1}$), which is calculated as retained earnings scaled by total assets; and firm age (Age_{t-1}), which is measured as the number of years since the firm first appears in the Compustat database. Panel E of Table 7 presents the estimated results. The coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ remain

positive and statistically significant, confirming that our main findings are robust to the inclusion of these additional firm-level controls.

5. Supplementary tests

5.1. Mechanisms

Thus far, we have proven that monetary tightening shocks strengthens investment-price sensitivity. In this section, we investigate the underlying mechanisms driving this relationship. In Section 2.3, we propose two channels through which monetary tightening shocks amplify investment-price sensitivity: the informed trader channel and the managerial learning motivation channel. Under the informed trading channel, monetary tightening shocks lead to an increased participation of informed traders, thereby enhancing the incorporation of private information into stock prices. This improvement in price informativeness strengthens managerial incentives to extract signals from the market. Under the managerial learning motivation channel, however, the heightened uncertainty brought about by monetary tightening weakens managers' informational advantage, prompting them to rely more heavily on external information sources. Therefore, they have greater incentives to learn from stock prices.

In this section, we examine these two channels by exploiting cross-sectional variation in: (i) stock price informativeness, and (ii) managers' reliance on external information.

5.1.1. Stock price informativeness

To validate the informed trader channel, we examine whether the amplifying effect of monetary tightening shocks on investment-price sensitivity varies with the amount of private information already embedded in stock prices. If monetary tightening shocks strengthen investment-price sensitivity by crowding in informed traders who incorporate additional private information into stock prices, this effect should be more pronounced for firms whose stock prices contain less private information *ex ante*. For these firms, the marginal value of additional informed trading is greater, as there is more room for improvement in price informativeness. Conversely, for firms whose stock prices already reflect substantial private information, the incremental contribution of informed trading following monetary

tightening is limited.

Following Chen et al. (2007), we employ price non-synchronicity (*NONSYNC*) to measure the amount of private information incorporated in stock prices. This measure captures firm-specific return variation that is orthogonal to market-wide movements, and has been widely used in prior literature as a proxy for the private information content of stock prices. Specifically, *NONSYNC* is calculated as one minus the R-squared from a regression of firm returns on market and industry returns. A higher value of *NONSYNC* indicates greater firm-specific information embedded in stock prices. We partition the sample into two groups based on the annual median values of *NONSYNC*.

Table 8 presents the estimated results. In columns (1)-(4), we report results for subsamples with low and high *NONSYNC*, respectively. The coefficients on $Q_{t-1} \times MPS_Tightening_{t-1}$ are not only positive but also statistically significantly larger for the sub-sample with low *NONSYNC* compared with the sub-group with high *NONSYNC*. These findings indicate that stocks with a lower degree of private information embedded in their prices experience a more pronounced increase in investment-price sensitivity following monetary tightening shocks. This confirms that private information is a channel that moderates the relationship between monetary tightening shocks and investment-price sensitivity.

5.1.2. Managers' reliance on external information

To validate the managerial learning motivation channel, we examine whether the positive effect of monetary tightening shocks on investment-price sensitivity varies with managers' reliance on external information. Prior research suggests that financial markets possess comparative advantages in evaluating growth options, as such evaluation requires extensive analysis of industry dynamics, peer firm behavior, and macroeconomic trends (Bai et al., 2016; Bird et al., 2021; Zhao et al. (2023)). Managers of firms with abundant growth opportunities therefore tend to rely more heavily on external information, particularly stock price signals, when making investment decisions. If the managerial learning motivation channel is operative, we should observe a stronger positive effect of monetary tightening shocks on investment-price sensitivity for firms with greater growth options.

We use Tobin's Q (Q) as a proxy for growth options and partition the sample into two groups

based on its annual median value (Zhao et al., 2023). The results are presented in columns (5)–(8) of Table 8. The coefficient on $Q_{t-1} \times MPS_Tightening_{t-1}$ are positive and statistically significant only in sub-group with high values of Tobin’s Q, and the difference in coefficients between the two sub-groups are also statistically significant. These findings support our prediction that the positive effect of monetary tightening shocks on investment-price sensitivity is stronger for firms whose managers have greater incentives to learn from stock prices.

5.2. Cross-sectional analyses

In this section, we further induce a list of factors that may induce cross-sectional differences in the empirical relation between monetary tightening shocks and investment-price sensitivity to establish which firms are more sensitive to monetary tightening shocks. We adopt sub-sample analyses and use seemingly unrelated regressions to compare the coefficients between two sub-samples. The model specifications are the same as those in columns (3) and (4) of Table 3. For brevity, we only report the coefficients on the interaction term $Q_{t-1} \times MPS_Tightening_{t-1}$.

5.2.1. Financial constraints

Firms facing greater financial constraints are more likely to experience a significant increase in investment-price sensitivity following monetary tightening shocks, because the cost of suboptimal investment decisions is particularly severe for these firms. With limited access to external capital, financially constrained firms cannot afford to misallocate their scarce resources, which strengthens managerial incentives to extract valuable information from stock prices when making investment decisions. This reasoning is consistent with prior literature documenting that financially constrained firms exhibit higher investment-price sensitivity (Baker et al., 2003; Chen et al., 2007; Wang et al., 2025), as these firms rely more heavily on informative market signals to guide capital allocation. We therefore predict that investment-price sensitivity should be more pronounced for financially constrained firms in response to monetary tightening shocks.

Following Hadlock and Pierce (2010), we employ the SA index (*SA_Index*) as the proxy for firms’

external finance constraints:

$$SA_Index_{i,t} = (-0.737 \times Size_{i,t}) + (0.043 \times Size_{i,t}^2) - (0.04 \times Age_{i,t}) \quad (7)$$

where $Size_{i,t}$ is log of the inflation-adjusted asset size, and $Age_{i,t}$ is the number of years since first appeared in Compustat with non-missing stock price.⁴

A negative SA index with a larger absolute value suggests that the firm faces more severe financial constraints. We divide our sample into two sub-samples based on the annual median of SA_Index , and report the estimated results in columns (1)–(4) of Table 9. The coefficient on $Q_{t-1} \times MPS_Tightening_{t-1}$ is larger in magnitude for the sub-sample of firms that are more financially constrained, and the difference in coefficients between these two groups are statistically significant. These findings support our prediction that the positive relation between monetary tightening shocks and investment-price sensitivity is more pronounced when firms face greater financial constraints.

5.2.2. Voluntary information disclosure

We then examine whether the positive relation between monetary tightening shocks and investment-price sensitivity is more pronounced when firms have lower information disclosure quality, as managers in these firms have less access to public information and thus rely more heavily on stock price signals. When firms disclose less information to the market, stock prices become a more valuable source of private information for managers to guide their investment decisions (Chen et al., 2007). In contrast, managers in firms with higher disclosure quality can obtain sufficient information from public disclosures, reducing their dependence on learning from stock prices. As a consequence, we would expect a stronger positive relation between monetary tightening shocks and investment-price sensitivity for firms with lower level of information disclosure.

Following Kothari et al. (2005), we measure disclosure quality (*Disclosure*) using the absolute value of performance-matched discretionary accruals. Specifically, we first estimate discretionary accruals from the modified Jones model, then adjust for performance by subtracting the median discretionary accruals of firms in the same return on assets (*ROA*) decile. A higher absolute value of discretionary

⁴We follow Hadlock and Pierce (2010) to cap book assets at \$4.5 billion and age at 37 years.

accruals indicates lower disclosure quality. We partition the sample into two groups based on the annual median of this measure.

Columns (5) and (8) of Table 9 present the results. The coefficient on $Q_{t-1} \times MPS_Tightening_{t-1}$ is larger in magnitude for the low disclosure quality subsample, and the difference between the two groups is statistically significant, which is consistent with our prediction.

5.2.3. Product market competition

We next examine whether the positive relation between monetary tightening shocks and investment-price sensitivity is more pronounced when firms operate in less competitive industries, as managers in concentrated markets have fewer alternative information sources and thus rely more heavily on stock price signals. Allen (1993) argues that managers in highly competitive industries can estimate their firms' production functions by observing the actions of numerous rivals, reducing their dependence on stock prices for investment guidance. In contrast, managers in concentrated industries lack such competitor-based information and must turn to stock prices to inform their decisions. When monetary tightening shocks increase uncertainty, this information disadvantage becomes more salient, thus strengthening managerial incentives to learn from stock prices. In line with this intuition, we should observe that the positive effect of monetary tightening shocks on investment-price sensitivity is more pronounced in firms with lower industrial competition than those with higher industrial competition.

To measure market concentration, we use the Herfindahl-Hirschman index (*HHI*), which is calculated as the sum of squared market shares for firms within the same industry, with market shares based on firms' sales (Giroud and Mueller, 2010). A higher *HHI* indicates a more concentrated industry structure with weaker competition. We then partition the sample into two groups based on the annual median values of *HHI*.

Columns (9)–(12) of Table 9 present the results. The coefficient on $Q_{t-1} \times MPS_Tightening_{t-1}$ are only statistically significant for firms with high levels of market competition, and the differences in coefficients between the two sub-groups are also statistically significant. These results indicate that the positive effect of monetary tightening shocks on investment-q sensitivity is indeed more prominent for firms with low industrial competition.

5.3. External financing decisions

Our main findings suggest that monetary tightening shocks enhance investment-price sensitivity by crowding in informed traders and strengthen managerial learning from stock prices. A natural extension is to examine whether these effects also influence firms' external financing decisions. According to Myers and Majluf (1984) and Korajczyk et al. (1991), firms prefer to issue equity when the market is most informed about firm quality, as reduced information asymmetry lowers adverse selection costs associated with equity issuance. Since our findings indicate that monetary tightening shocks increase the incorporation of private information into stock prices, firms may face lower adverse selection costs during these periods, which could increase their willingness to issue equity. Furthermore, since monetary tightening raises the cost of debt financing and tightens credit conditions (Kashyap and Stein, 1994; Bernanke and Gertler, 1995), firms may reallocate their funding strategies by substituting equity for debt, particularly when internal financing is insufficient (Fazzari et al., 1987). This substitution effect is likely to be more pronounced for firms that rely heavily on stock price signals for their investment decisions.

To test this conjecture, we examine the effect of monetary tightening shocks on firms' equity and debt issuance decisions. Following McLean and Zhao (2014), we measure share issuance (*ShareIssuance*) as the change in book equity, plus the change in deferred taxes, minus the change in retained earnings, all scaled by lagged assets. We measure debt issuance (*DebtIssuance*) as the change in assets, minus the change in book equity, minus the change in deferred taxes, all scaled by lagged assets. We then regress these financing variables on the interaction of Tobin's Q and monetary tightening shocks. The results show that the coefficient on $Q_{t-1} \times MPS_Tightening_{t-1}$ is positive and statistically significant for share issuance at the 1% level, while it is only marginally significant at the 10% level for debt issuance when firm fixed effects are included. The substantially larger magnitude of the coefficients for share issuance compared to debt issuance suggests that firms with greater investment opportunities predominantly rely on equity financing during monetary tightening periods, consistent with the notion that reduced adverse selection costs encourage equity financing when stock prices become more informative.

6. Conclusion

This paper examines the relationship between MPS and investment-price sensitivity in a comprehensive sample of U.S. listed firms from 1990 to 2022. We find that tightening MPS significantly enhance the sensitivity of corporate investment to stock price signals, whereas easing MPS exert no statistically significant effect. This baseline result holds up after conducting several robustness tests. We further explore two channels underlying this positive relationship: (i) the informed trader channel, whereby monetary tightening crowds in informed traders who incorporate private information into prices; and (ii) the managerial learning motivation channel, whereby heightened uncertainty strengthens managers' incentives to learn from stock prices. Our cross-sectional analyses further show that the positive relation between tightening MPS and investment-price sensitivity is more pronounced for firms that are more financially constrained, less transparent, and subject to weaker product market competition.

Our findings offer several policy implications. For central banks, our results suggest that monetary tightening may improve the allocative efficiency of capital markets. As tightening MPS crowd in informed traders and incentivize managers to learn from stock prices, investment decisions become more closely aligned with firms' underlying fundamentals. This enhanced efficiency in capital allocation represents a beneficial side effect that partially offsets the contractionary impact of tightening monetary policy on aggregate investment levels. For corporate managers, our findings indicate that stock price signals become particularly valuable during periods of monetary tightening. When macroeconomic uncertainty rises, managers face greater difficulty in assessing investment opportunities using internal information alone. Under such circumstances, systematically incorporating market-based signals into investment decisions can help managers avoid costly misallocation of resources. For investors, our results imply that the real effects of financial markets—the feedback from stock prices to corporate decisions—are state-dependent. During episodes of monetary tightening, the information that investors impound into prices is more likely to influence managerial behavior, suggesting that informed trading generates greater real economic value when uncertainty is elevated.

Appendix A

Table A1. Variable definitions

This table provides variable definitions and corresponding data sources. CME refers to Chicago Mercantile Exchange Group, Atlanta refers to Federal Reserve Bank of Atlanta, CRSP refers to the Centre for Research in Security Prices, NBER refers to National Bureau of Economic Research, and I/B/E/S refers to Institutional Brokers' Estimate System.

Variable	Definition	Source
Measures for investment		
<i>INV</i>	Investment. Total asset growth plus R&D expenditure, all scaled by lagged total assets: $(Assets_t - Assets_{t-1} + R\&D)/Assets_{t-1}$ (McLean and Zhao, 2014).	Compustat
<i>INV_Alt1</i>	Alternative investment measure 1. Annual growth rate of total assets: $(Assets_t - Assets_{t-1})/Assets_{t-1}$ (McLean and Zhao, 2014).	Compustat
<i>INV_Alt2</i>	Alternative investment measure 2. Capital expenditures plus R&D expenses, scaled by lagged total assets: $(CAPX + R\&D)/Assets_{t-1}$ (Shi et al., 2019).	Compustat
<i>Q</i>	Tobin's Q. The natural log of market value (MV) of equity, minus the book value (BV) of equity, plus the book value of assets, all scaled by total assets: $\log((MV \text{ of equity} - BV \text{ of equity} + BV \text{ of assets})/BV \text{ of assets})$ (McLean and Zhao, 2014).	Compustat
<i>Total_Q</i>	Peters and Taylor Total Q, which accounts for both physical and intangible capital in the denominator (Peters and Taylor, 2017).	Compustat
ΔQ	Change in Peters and Taylor Total Q from year $t - 2$ to year $t - 1$.	Compustat
Measures for monetary policy shocks		
<i>MPS</i>	Monetary policy shocks. The average of monetary policy shocks around FOMC announcements within a fiscal year. The individual monetary policy shocks around FOMC announcements is the first principal component of 5 interest rate futures over a 30-minute window around FOMC announcement (Nakamura and Steinsson, 2018).	CME
<i>I⁺</i>	Monetary tightening dummy. Equals to one if $MPS_{i,t}$ is larger than 0.1*the full sample standard deviation of <i>MPS</i> and zero otherwise.	
<i>I⁻</i>	Monetary easing indicator. Equals to one if $MPS_{i,t}$ is smaller than -0.1*the full sample standard deviation of <i>MPS</i> and zero otherwise.	
<i>MPS_Tightening</i>	Contractionary monetary policy shock. Defined as $MPS \times I^+$, where I^+ is an indicator equal to one if $MPS > 0$ and zero otherwise.	CME
<i>MPS_Easing</i>	Expansionary monetary policy shock. Defined as $MPS \times I^-$, where I^- is an indicator equal to one if $MPS < 0$ and zero otherwise.	CME

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Variable	Definition	Source
<i>Shadow_Rate</i>	Alternative monetary policy shock measure based on the shadow federal funds rate, which approximates the overall monetary policy stance when conventional policy rates are at or near the zero lower bound (Wu and Xia, 2016).	Atlanta
Firm-level variables		
<i>CF</i>	Cash flow. Net income before extraordinary items plus depreciation and amortization plus R&D expenses, all scaled by lagged assets (McLean et al., 2012).	Compustat
<i>MktCap</i>	Market capitalization. The product of stock price and shares outstanding at the end of fiscal year, in billions of dollars.	CRSP
<i>1/Asset</i>	Inverse of total assets. One divided by total assets at the end of fiscal year.	Compustat
<i>RET_{t+3}</i>	Future stock returns. Value-weighted market-adjusted cumulative return over the three years following the investment year (Baker et al., 2003).	CRSP
<i>Recession</i>	Recession dummy. Equals one if more than 6 months in a fiscal year is during recessions as classified by the NBER recession indicator.	NBER
<i>Coverage</i>	Analyst coverage. The number of analysts following the firm during the fiscal year.	I/B/E/S
<i>MV_Equity</i>	Natural logarithm of market value of equity at the end of fiscal year.	Compustat
<i>Leverage</i>	Leverage ratio. Long-term debt divided by total assets at the end of fiscal year.	Compustat
<i>Cash</i>	Cash holdings. Cash and short-term investments divided by total assets at the end of fiscal year.	Compustat
<i>Earnings</i>	Retained earnings scaled by total assets at the end of fiscal year.	Compustat
<i>Age</i>	Firm age. The number of years since the firm first appears in the Compustat database with non-missing stock price.	Compustat
<i>NONSYNC</i>	Price non-synchronicity. One minus R-squared from regressing daily stock returns on market and industry returns over a fiscal year. Higher values indicate greater firm-specific information embedded in stock prices (Chen et al., 2007).	CRSP
<i>Size</i>	The natural logarithm of total assets.	Compustat
<i>SA_Index</i>	Size-Age index of financial constraints. It is calculated as $(-0.737 \times Size) + (0.043 \times Size^2) - (0.04 \times Age)$, where <i>Size</i> is log of inflation-adjusted assets (capped at \$4.5 billion) and <i>Age</i> is capped at 37 years. More negative values indicate greater financial constraints (Hadlock and Pierce, 2010).	Compustat

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Table A1 - continued from previous page

Variable	Definition	Source
<i>Disclosure</i>	Disclosure quality. The absolute value of performance-matched discretionary accruals. Discretionary accruals are estimated from the modified Jones model and adjusted by subtracting the median discretionary accruals of firms in the same ROA decile. Higher values indicate lower disclosure quality (Kothari et al., 2005).	Compustat
<i>HHI</i>	Herfindahl-Hirschman Index. The sum of squared market shares for firms within the same industry, with market shares based on firms' sales. Higher values indicate more concentrated industries with weaker competition (Giroud and Mueller, 2010).	Compustat
<i>Informativeness</i>	One minus R-squared from regressing daily return on the Fama-French 3 factors over a fiscal year (Chen et al., 2007).	CRSP
<i>ROA</i>	Yearly ROA is measured as operating income scaled by lagged assets (McLean and Zhao, 2014).	Compustat
<i>ShareIssuance</i>	Change in book equity, plus the change in deferred taxes, minus the change in retained earnings, all scaled by lagged assets (McLean and Zhao, 2014).	Compustat
<i>DebtIssuance</i>	Change in assets, minus the change in book equity, minus the change in deferred taxes, all scaled by lagged assets (McLean and Zhao, 2014).	Compustat

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Figure 1. Placebo Test: Distribution of Estimated Coefficients. This figure plots the kernel density estimates of the placebo test. We randomly shuffle MPS across years and re-estimate our baseline model specified in Equation (5). The placebo estimation is repeated 1,000 times, and we obtain the empirical distribution of the coefficients on $Q_{t-1} \times MPS_{t-1}$. The x-axis represents the distribution range of the placebo coefficients, and the y-axis represents kernel density. The vertical dashed line marks the position of the baseline regression coefficient from Column (3) of Table 3. The blue curve represents the reference normal distribution with mean 0.016 and standard deviation 0.797.

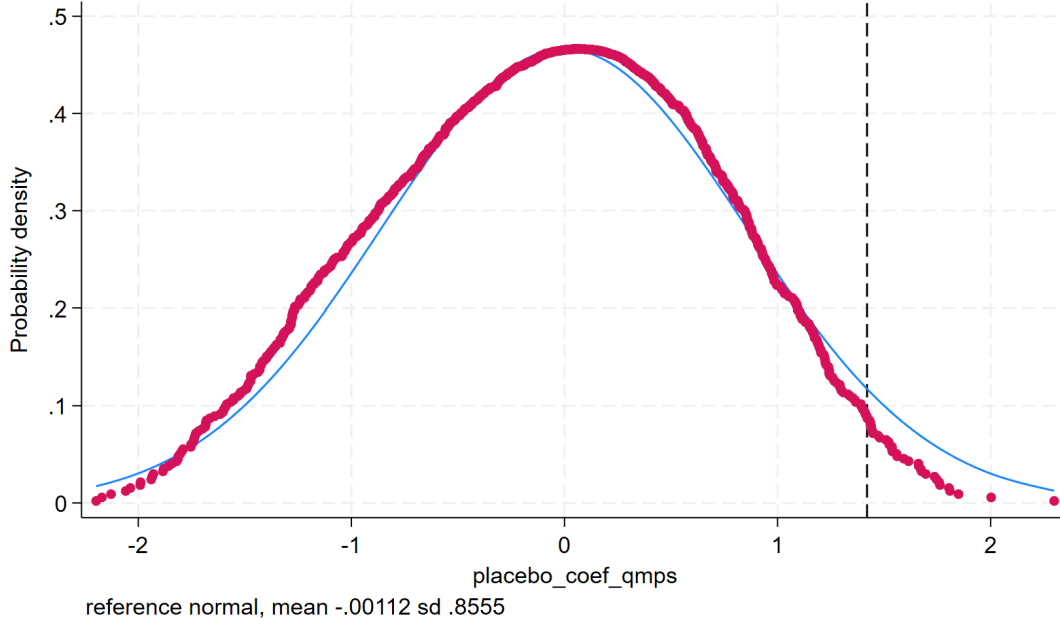


Table 1. Summary statistics

This table reports the summary statistics of the variables used in our baseline regression. Our sample consists of 97,865 firm-year observations over the fiscal years 1990-2022. The number of observations, mean, standard deviation, 1st percentile, 25th percentile, median, 75th percentile, and 99th percentile are reported from left to right, in sequence for each variable. All continuous variables are winsorized at the 1% and 99% levels. All variables are defined in Appendix A.

Variable	Obs.	Mean	S.D.	p1	p25	Median	p75	p99
Dependent variable								
INV_t	97,865	0.148	0.405	-0.433	-0.033	0.066	0.198	1.928
Independent variables of interest								
Q_{t-1}	97,865	0.517	0.597	-0.560	0.087	0.406	0.851	2.203
MPS_{t-1}	97,865	-0.002	0.027	-0.081	-0.012	0.003	0.016	0.043
$MPS_Tightening_{t-1}$	97,865	0.009	0.011	0.000	0.000	0.003	0.016	0.046
MPS_Easing_{t-1}	97,865	-0.011	0.021	-0.081	-0.012	0.000	0.000	0.000
Control variables								
CF_t	97,865	0.048	0.189	-0.710	0.019	0.083	0.139	0.389
$MktCap_{t-1}$	97,865	4.329	14.787	0.006	0.087	0.392	1.879	80.032
$1/Asset_{t-1}$	97,865	0.011	0.017	0.000	0.001	0.003	0.012	0.081
RET_{t+3}	97,865	0.146	2.921	-1.643	-0.622	-0.199	0.313	7.122
$Recession_t$	97,865	0.079	0.269	0.000	0.000	0.000	0.000	1.000

Table 2. Pearson correlation matrix

This table presents pairwise Pearson correlation coefficients for all variables used in our main empirical analyses. The sample consists of 97,865 firm-year observations from 1990 to 2022. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Variable definitions are provided in Appendix A.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) INV_t	1.000								
(2) Q_{t-1}	0.321***	1.000							
(3) $Q_{t-1}MPS_{t-1}$	0.090***	0.074***	1.000						
(4) CF_t	0.079***	-0.023***	-0.038***	1.000					
(5) $MktCap_{t-1}$	-0.021***	0.128***	0.021***	0.116***	1.000				
(6) $1/Asset_{t,t-1}$	0.108***	0.064***	0.000	-0.232***	-0.174***	1.000			
(7) RET_{t+3}	-0.072***	-0.067***	-0.004	-0.073***	-0.023***	0.038***	1.000		
(8) $Recession_t$	-0.079***	-0.026***	0.001	-0.032***	-0.008***	-0.012***	0.068***	1.000	

Table 3. Baseline regression: MPS and investment-price sensitivity

This table reports the panel regressions of corporate investment on Tobin's Q, monetary policy shocks (MPS), interaction of Tobin's Q with MPS, and control variables. The sample covers 97,865 firm-year observations with non-missing values for the regression variables during 1990-2022. Investment (INV_t) is defined as total asset growth plus R&D expenditure, all scaled by the lagged total assets. Tobin's Q (Q_{t-1}) is defined as the natural logarithm of market value of equity plus assets minus book value of equity, all scaled by total assets in year $t - 1$. MPS_{t-1} is defined as the unanticipated changes in monetary policy decisions and is measured using the high-frequency approach developed by Nakamura and Steinsson (2018). The key variable of interest is $Q_{t-1} \times MPS_{t-1}$. All variables are defined in Appendix A. The coefficients of the Fama–French 48 industry, year, and firm fixed effects are suppressed for brevity in the respective columns. t-statistics based on robust standard errors are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t			
	(1)	(2)	(3)	(4)
Q_{t-1}	0.229*** [68.73]	0.334*** [66.52]	0.222*** [62.36]	0.289*** [52.44]
$Q_{t-1} \times MPS_{t-1}$	1.286*** [8.89]	1.043*** [8.43]	1.420*** [9.81]	1.222*** [10.03]
$MPS_t - 1$	-0.615*** [-5.24]	-0.534*** [-4.92]	-0.572*** [-4.88]	-0.471*** [-4.43]
CF_t			0.249*** [15.84]	0.429*** [19.10]
$MktCap_{t-1}$			-0.002*** [-28.11]	-0.003*** [-20.01]
$1/Asset_{t-1}$			2.467*** [24.41]	8.508*** [36.80]
RET_{t+3}			-0.006*** [-5.04]	-0.008*** [-7.29]
$Recession_t$			-0.039*** [-5.31]	-0.036*** [-4.65]
Constant	0.027*** [16.25]	-0.026*** [-10.74]	0.004*** [1.94]	-0.098* [-29.48]
Industry fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	97,865	97,865	97,865	97,865
Adjusted R^2	0.134	0.226	0.155	0.274

Table 4. Asymmetric effects of MPS on investment-price sensitivity

This table reports the asymmetric effects of MPS on investment-price sensitivity. The sample covers 97,865 firm-year observations with non-missing values for the regression variables during 1990–2022. The dependent variable is corporate investment (INV_t). The key variables of interest are $Q_{t-1} \times MPS_Tightening_{t-1}$ and $Q_{t-1} \times MPS_Easing_{t-1}$. All variables are defined in Appendix A. The control variables are the same as those reported in Table 3. The coefficients of the Fama–French 48 industry, year, and firm fixed effects are suppressed for brevity in the respective columns. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t			
	(1)	(2)	(3)	(4)
Q_{t-1}	0.202*** [36.42]	0.306*** [47.76]	0.192*** [33.80]	0.254*** [37.79]
$Q_{t-1} \times MPS_Tightening_{t-1}$	2.768*** [6.45]	2.471*** [6.36]	3.045*** [6.98]	2.975*** [7.60]
$Q_{t-1} \times MPS_Easing_{t-1}$	0.194 [1.36]	0.094 [0.67]	0.217 [1.52]	0.049 [0.35]
$MPS_Tightening_{t-1}$	-1.642*** [-5.03]	-1.878*** [-6.38]	-1.814*** [-5.57]	-2.322*** [-7.99]
MPS_Easing_{t-1}	-0.337*** [-2.76]	-0.129 [-1.14]	-0.215* [-1.75]	0.139 [1.23]
CF_t			0.252*** [16.19]	0.437*** [19.66]
$MktCap_{t-1}$			-0.002*** [-28.14]	-0.003*** [-19.60]
$1/Asset_{t-1}$			2.478*** [24.57]	8.524*** [36.86]
RET_{t+3}			-0.006*** [-5.05]	-0.008*** [-7.31]
$Recession_t$			-0.042*** [-5.54]	-0.045*** [-5.64]
Constant	0.041** [11.70]	-0.007*** [-2.09]	0.021*** [5.29]	-0.071*** [-16.58]
Industry fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	97,865	97,865	97,865	97,865
Adjusted R^2	0.136	0.227	0.1250.275	0.275

Table 5. High-dimensional fixed effects

This table shows the regression results with high-dimensional fixed effects for the relationship between MPS and investment-price sensitivity. The sample consists of U.S. firm-year observations over the sample period 2010–2019, with required data for the regressions. We control for firm fixed effects and interacted industry-year effects in both columns. All variables are defined in Appendix A. The coefficients of the fixed effects are suppressed for brevity in the respective columns. t-statistics based on standard errors clustered at the firm level are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t	
	(1)	(2)
Q_{t-1}	0.305*** [73.87]	0.254*** [61.58]
$Q_{t-1} \times MPS_Tightening_{t-1}$	2.396*** [15.05]	2.758*** [17.81]
$Q_{t-1} \times MPS_Easing_{t-1}$	-0.033 [-0.30]	-0.058 [-0.53]
$MPS_Tightening_{t-1}$	-1.794*** [-7.42]	-2.176*** [-9.24]
MPS_Easing_{t-1}	-0.053 [-0.39]	0.209 [1.57]
CF_t		0.410*** [39.47]
$MktCap_{t-1}$		-0.003*** [-18.58]
$1/Asset_{t-1}$		8.536*** [59.83]
RET_{t+3}		-0.008*** [-18.91]
$Recession_t$		-0.051*** [-4.64]
Constant	-0.007** [-2.01]	-0.069*** [-17.85]
Firm fixed effects	Yes	Yes
Industry $\times$ Year fixed effects	Yes	Yes
Observations	97,860	97,860
Adjusted R^2	0.244	0.288

Table 6. Placebo test

This table reports the results of the second placebo test for our model specification, in which we replace the baseline MPS variable with MPS_{t-2} . MPS_{t-2} refers to the constructed MPS corresponding to period $t - 2$. The sample consists of U.S. firm-year observations over the sample period 2010–2019, with required data for the regressions. The key variable of interest is $Q_{t-1} \times MPS_{t-2}$. We include the same set of control variables as those reported in Table 3. All variables are defined in Appendix A. The coefficients of the Fama–French 48 industry, year, and firm fixed effects are suppressed for brevity in the respective columns. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t			
	(1)	(2)	(3)	(4)
Q_{t-1}	0.209*** [61.90]	0.315*** [58.21]	0.202*** [54.59]	0.270*** [44.94]
$Q_{t-1} \times MPS_{t-2}$	0.044 [0.43]	-0.120 [-1.24]	0.147 [1.47]	0.031 [0.33]
MPS_{t-2}	-0.401*** [-4.11]	-0.380*** [-4.02]	-0.386*** [-4.06]	-0.388*** [-4.32]
CF_t			0.266*** [15.56]	0.491*** [19.96]
$MktCap_{t-1}$			-0.002*** [-26.09]	-0.002*** [-18.37]
$1/Asset_{t-1}$			2.166*** [19.83]	8.553*** [31.24]
RET_{t+3}			-0.006*** [-6.18]	-0.008*** [-7.04]
$Recession_t$			-0.049*** [-5.82]	-0.038*** [-4.28]
Constant	0.028*** [16.97]	-0.025*** [-10.11]	0.008*** [4.09]	-0.094*** [-27.07]
Industry fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	87,322	86,189	87,322	87,322
Adjusted R^2	0.119	0.201	0.139	0.250

Table 7. Robustness checks

Panel A. Alternative measures of investment. This panel reports the relation between monetary tightening shocks and investment-price sensitivity. We estimate the measures of corporate investment using alternative definitions of investment: INV_Alt1_t and INV_Alt2_t . The key variable of interest is $Q_{t-1} \times MPS_Tightening_{t-1}$. We include the same set of control variables as those reported in Table 3. All variables are defined in Appendix A. The coefficients of control variables and fixed effects are suppressed for brevity. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_Alt1_t		INV_Alt2_t	
	(1)	(2)	(3)	(4)
$Q_{t-1} \times MPS_Tightening_{t-1}$	3.030*** [6.66]	3.000*** [7.29]	3.030*** [6.66]	3.000*** [7.29]
Constant	0.018*** [4.22]	-0.078*** [-16.36]	0.018*** [4.22]	-0.078*** [-16.36]
Control variables	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	85,810	85,533	85,810	85,533
Adjusted R^2	0.277	0.161	0.277	0.161

Panel B. Alternative measures of Tobin's Q. This panel reports the relation between monetary tightening shocks and investment-price sensitivity using alternative measures of Tobin's Q. In columns (1) and (2), we use Peters and Taylor's (2017) Total Q ($Total_Q$), which incorporates both physical and intangible capital. In columns (3) and (4), we use the change in Peters and Taylor Total Q (ΔQ). The key variable of interest is $Q_{t-1} \times MPS_Tightening_{t-1}$. The controls are the same as those in Table 3. All variables are defined in Appendix A. The coefficients of control variables and fixed effects are suppressed for brevity. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t			
	(1)	(2)	(3)	(4)
$Q_{t-1} \times MPS_Tightening_{t-1}$	0.043** [2.39]	0.039** [2.11]	0.057*** [2.69]	0.084** [2.13]
Constant	0.093*** [21.74]	0.018*** [3.97]	0.109*** [26.84]	0.027*** [6.00]
Control variables	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	97,118	97,093	86,583	85,453
Adjusted R^2	0.072	0.205	0.065	0.187

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Panel C. Alternative measure of MPS. This panel reports the relation between monetary tightening shocks and investment-price sensitivity. We construct an alternative MPS series by employing the shadow rates ($ShadowRate$) developed by Wu and Xia (2016). The shadow rate is defined as an affine function of state variables and offers a tractable proxy for monetary policy in the zero lower bound (ZLB) environment. The annual change in shadow rates is taken to measure actual monetary policy stances. The key variable of interest is $Q_{t-1} \times MPS_Tightening_{t-1}$. We include the same set of control variables as those reported in Table 3. All variables are defined in Appendix A. The coefficients of control variables and fixed effects are suppressed for brevity. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t	
	(1)	(2)
$Q_{t-1} \times MPS_Tightening_{t-1}$	0.236*** [4.79]	0.222*** [5.16]
Constant	-0.001 [-0.49]	-0.102*** [-27.10]
Control variables	Yes	Yes
Industry fixed effects	Yes	No
Firm fixed effects	No	Yes
Year fixed effects	Yes	Yes
Observations	97,469	97,430
Adjusted R^2	0.154	0.273

Panel D. Excluding subsamples during crises periods. This panel reports the re-estimated baseline results obtained after excluding subsamples the stock market crisis and the COVID-19 pandemic periods. The key variable of interest is $Q_{t-1} \times MPS_Tightening_{t-1}$. We include the same set of control variables as those reported in Table 3. All variables are defined in Appendix A. The coefficients of control variables and fixed effects are suppressed for brevity. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t	
	(1)	(2)
$Q_{t-1} \times MPS_Tightening_{t-1}$	0.014*** [8.45]	0.011*** [6.63]
Constant	0.025*** [3.84]	-0.073*** [-10.74]
Control variables	Yes	Yes
Industry fixed effects	Yes	No
Firm fixed effects	No	Yes
Year fixed effects	Yes	Yes
Observations	97,786	97,786
Adjusted R^2	0.154	0.272

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Table 7 – continued from previous page

Panel E. Alternative measures of investment. This panel reports results after including additional firm-level control variables: analyst coverage ($Coverage_{t-1}$), log market value of equity (MV_Equity_{t-1}), book leverage ($Leverage_{t-1}$), cash holdings ($Cash_{t-1}$), retained earnings ($Retained_{t-1}$), and firm age (Age_{t-1}). The key variable of interest is $Q_{t-1} \times MPS_Tightening_{t-1}$. We include the same set of control variables as those reported in Table 3. All variables are defined in Appendix A. The coefficients of control variables and fixed effects are suppressed for brevity. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	INV_t	
	(1)	(2)
$Q_{t-1} \times MPS_Tightening_{t-1}$	3.181*** [5.22]	3.158*** [6.07]
Constant	0.046*** [4.12]	0.449*** [17.17]
Control variables	Yes	Yes
Industry fixed effects	Yes	No
Firm fixed effects	No	Yes
Year fixed effects	Yes	Yes
Observations	66,929	66,335
Adjusted R^2	0.170	0.310

Table 8. Mechanisms

This table examines the mechanisms of the impact of the monetary tightening shocks on investment-price sensitivity. From columns (1) to (8), we divide our sample into two sub-samples based on price non-synchronicity measured by *NONSYNC* (Chen et al., 2007); growth options measured by *Q* (Zhao et al., 2023). The dependent variable is corporate investment (*INV_t*). The key variables of interest are $Q_{t-1} \times MPS_Tightening_{t-1}$ and $Q_{t-1} \times MPS_Easing_{t-1}$. All variables are defined in Appendix A. The control variables are the same as those reported in Table 3. The coefficients of the Fama–French 48 industry, year, and firm fixed effects are suppressed for brevity in the respective columns. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	<i>NONSYNC</i>				<i>Q</i>			
	<i>INV_t</i>		<i>INV_t</i>		<i>INV_t</i>		<i>INV_t</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Low	High	Low	High	Low	High	Low	High
$Q_{t-1} \times MPS_Tightening_{t-1}$	4.138*** [6.60]	2.039*** [3.40]	4.240*** [7.32]	1.131*** [2.63]	0.079 [0.18]	5.190*** [7.19]	-0.918** [-1.98]	4.770*** [7.13]
Constant	0.024*** [3.99]	0.023*** [4.53]	-0.061*** [-9.33]	-0.084*** [-13.31]	0.004 [1.18]	0.028*** [2.62]	-0.043*** [-9.97]	-0.115*** [-9.81]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,603	48,586	48,625	48,640	48,930	48,935	47,881	47,853
Adjusted R^2	0.186	0.143	0.319	0.257	0.118	0.133	0.246	0.272
p-value for difference in coefficients	0.007**		0.000***		0.000***		0.000***	

Table 9. Cross-sectional analyses

This table examines the cross-sectional variations of the impact of the monetary tightening shocks on investment-price sensitivity based on firms' characteristics. From columns (1) to (12), we divide our sample into two sub-samples based on financial constraints measured by *SA_index* (Hadlock and Pierce, 2010); information disclosure quality measured by *Disclosure* (Kothari et al., 2005); product market competition measured by *HHI* (Giroud and Mueller, 2010). The dependent variable is corporate investment (INV_t). The key variables of interest are $Q_{t-1} \times MPS_Tightening_{t-1}$ and $Q_{t-1} \times MPS_Easing_{t-1}$. All variables are defined in Appendix A. The control variables are the same as those reported in Table 3. The coefficients of the Fama-French 48 industry, year, and firm fixed effects are suppressed for brevity in the respective columns. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	<i>SA_Index</i>				<i>Disclosure</i>				<i>HHI</i>			
	INV_t		INV_t		INV_t		INV_t		INV_t		INV_t	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
$Q_{t-1} \times MPS_Tightening_{t-1}$	3.383*** [6.33]	1.392*** [2.80]	3.030*** [6.69]	1.014** [2.53]	3.544*** [6.33]	1.663*** [3.09]	3.452*** [6.50]	1.797*** [3.72]	0.883 [1.50]	3.746*** [7.29]	0.644 [1.23]	3.717*** [8.11]
Constant	0.035*** [5.73]	0.009** [2.16]	-0.136*** [-17.68]	-0.066*** [-13.96]	0.020*** [3.28]	0.023*** [4.86]	-0.083*** [-12.01]	-0.053*** [-9.87]	0.008* [1.65]	0.025*** [4.01]	-0.078*** [-13.33]	-0.059 [-9.04]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	48,911	48,954	48,625	48,640	51,517	46,658	50,474	45,045	48,168	49,697	46,638	48,393
Adjusted R^2	0.169	0.139	0.330	0.225	0.172	0.133	0.290	0.269	0.138	0.175	0.268	0.280
p-value for difference in coefficients	0.013**		0.005***		0.016**		0.034**		0.000***		0.000***	

Table 10. External financing decisions

his table reports the relation between monetary tightening shocks and firms' external financing decisions. The dependent variables are share issuance (*ShareIssuance*) and debt issuance (*DebtIssuance*). Following McLean and Zhao (2014), *ShareIssuance* is measured as the change in book equity, plus the change in deferred taxes, minus the change in retained earnings, all scaled by lagged assets. *DebtIssuance* is measured as the change in assets, minus the change in book equity, minus the change in deferred taxes, all scaled by lagged assets. The key variable of interest is $Q_{t-1} \times MPS_Tightening_{t-1}$. We include the same set of control variables as those reported in Table 3. All variables are defined in Appendix A. The coefficients of control variables and fixed effects are suppressed for brevity. t-statistics based on robust standard errors clustered by firm are reported in brackets. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Variables	<i>ShareIssuance_t</i>		<i>DebtIssuance_t</i>	
	(1)	(2)	(3)	(4)
$Q_{t-1} \times MPS_Tightening_{t-1}$	2.777*** [8.09]	3.089*** [7.98]	0.087 [0.90]	0.172* [1.78]
Constant	-0.046*** [-16.60]	0.022*** [13.29]	0.006*** [3.25]	0.033*** [29.24]
Control variables	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	No	Yes	No
Firm fixed effects	No	Yes	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	91,560	91,624	92,947	93,003
Adjusted R^2	0.413	0.332	0.123	0.058