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The Income Statement Channel of Monetary Policy

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We study the dynamic transmission of monetary policy shocks into corporate profitability. We find an initial negative association between monetary policy shocks and corporate revenues and expenses. The revenue response is consistent with a consumer substitution effect, while the expense response is consistent with a firm cost of capital effect. The expense effect exceeds the revenue effect, yielding a positive relation between the shocks and profitability in the short run. Both effects are concentrated in cash revenues and expenses. Results vary predictably with consumers' and firms' financial constraints, firms' business models, and the accounting treatment of investment outlays.

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1. Introduction

Recent accounting studies explore the two-way relation between the macroeconomy and firms' accounting information. Specifically, "micro to macro" research examines how aggregated firm-level accounting information relates to macroeconomic variables (e.g., Gallo, Hann, and Li 2016), while "macro to micro" research examines how macroeconomic variables predict firm-level accounting measures (e.g., Li, Richardson, and Tuna 2014). While both streams of literature document significant associations between accounting measures and macroeconomic variables, how monetary policy affects individual firms' financial performance remains an open issue (see the discussion by Gallo and Kothari 2019). In this paper, we address this issue by examining how monetary policy shocks map into corporate income statement components and corporate profitability. We conduct analysis at the firm level instead of the aggregate level, which allows us to examine the cross-sectional heterogeneity of consumers' and managers' dynamic reactions to monetary policy shocks.

We focus on this question for three reasons. First, we respond to calls for more macro-to-micro research on the effects that macroeconomic variables have on firm-level earnings via the actions of economic agents (e.g., Shivakumar 2010). Second, we use monetary policy shocks as our macroeconomic variable of interest as they are an important source of aggregate market fluctuations and a primary tool of monetary policymakers (e.g., Gallo and Kothari 2019). Third, we respond to calls from policymakers for more research on heterogeneous responses to monetary policy shocks helping to better understand monetary policy transmission mechanisms (Bernanke 2003; Yellen 2016).

To guide our empirical predictions, we adopt a simplified version of the standard New Keynesian general equilibrium model (Kydland and Prescott 1982; Calvo 1983) and examine how consumers' and managers' reactions to FFR changes affect firms' revenues, expenses, and profits. Focusing on consumer behavior first, we assume that consumers maximize their lifetime utility. In equilibrium, interest rate changes affect current period consumption through substitution, income,

and signaling effects. On the one hand, interest rate changes can have a negative association with current consumption. For example, when interest rates increase, consumers can substitute away from current-period to future-period consumption (substitution effect). On the other hand, interest rate changes will have a positive association with current consumption if consumers preferring smooth consumption can spread the additional savings income between current and future consumption (income effect). Similarly, central banks engaging in countercyclical monetary policy (i.e., increasing rates in good times and decreasing rates in bad times) signal their private growth expectations to consumers by increasing rates when they expect the economy to perform well (Taylor 1993; Clarida, Galí, and Gertler 2000; Romer and Romer 2000), thus inducing higher consumption (signaling effect) (Melosi 2017). While it is theoretically unclear which effect will dominate, our model links monetary policy shocks to corporate revenues via the effect on consumer behavior.

Modeling managers' reactions to unexpected rate shocks, we show that interest rate changes affect current period investment both through cost of capital and signaling effects. Interest rate increases raise firms' cost of capital, which discourages investment (cost of capital effect) (Tobin 1969; Hayashi 1982). However, if managers infer central banks' private growth expectations from rate changes, then increases could spur investment (signaling effect). Regardless of which effect will dominate, our model maps monetary policy shocks into corporate expenses via the effect on managers' investments (e.g., Fairfield, Whisenant, and Yohn 2003; Zhang 2007).

Our model illustrates why it is necessary to focus on *unexpected* rate changes when examining the firm-level transmission of monetary policy.[1] Central banks' monetary policy decisions, consumers' consumption decisions, and managers' investment decisions are jointly determined by economic conditions (Lucas 1976). Positive (negative) aggregate shocks induce central banks to increase (decrease) rates to prevent the economy from overheating (to soften the harm of a recession). At the

[1] We use the terms "unexpected rate changes," "monetary policy shocks," and "rate shocks" interchangeably.

same time, positive (negative) aggregate shocks induce consumers and managers to increase (decrease) consumption and investment (Angeletos, Hellwig, and Pavan 2006). A naïve regression of corporate outcomes on unconditional interest rate changes would mirror the effect of both aggregate shocks and rate changes, impairing identification. While consumers' and managers' responses to expected rate changes will mirror the joint effect of rate changes and economic conditions, their response to unexpected rate changes that are unrelated to economic conditions reflects the causal effect of monetary policy on their decision-making.

Our empirical strategy modifies the profitability model of Hou, Van Dijk, and Zhang (2012) by including expected and unexpected rate changes. In addition, we control for firm fixed effects, aggregate growth, macroeconomic uncertainty, and real GDP, inflation, and unemployment news (Gallo et al. 2016; Binz 2022). We measure the effect of rate changes on corporate profits through the effects on revenues and expenses, which are functions of changing consumption and investment, respectively. By tracking the relation between rate changes and corporate revenues and expenses, not only in the quarter of the rate change but also in future quarters, we map the dynamic transmission of monetary policy into corporate profitability. We measure monetary policy shocks using changes in the Federal Funds Rate (FFR) set by the Federal Open Market Committee (FOMC). Specifically, we use FFR futures data to estimate the market's expectation of FFR changes around FOMC meetings. Then, we calculate the unexpected rate change, our proxy for monetary policy shocks, as the difference between the actual FFR change and the expectation (Kuttner 2001; Nakamura and Steinsson 2018a).

Focusing on *overall* rate changes first, our baseline estimations show that firms' current and future revenues and expenses exhibit a positive association with rate changes. When we split overall rate changes into their expected and unexpected components, we find a positive association between expected rate changes and both current and future revenues and expenses, mirroring the findings for overall rate changes. This finding is consistent with changes in aggregate conditions influencing central

bankers' monetary policy, consumers' consumption, and managers' investment decisions: when aggregate growth expectations are high, central bankers raise rates, consumers consume more, and managers invest more.

By contrast, our estimations show that *unexpected* rate changes, reflecting the causal effect of monetary policy, exhibit a negative relation with current revenues and expenses. The expense effect outweighs the revenue effect in the current and subsequent quarter, resulting in a positive association between monetary policy shocks and corporate profits. An unexpected rate change of 1% leads to a 1.3% (1.1%) increase in the current (subsequent) quarter earnings. Two quarters after the unexpected rate change, the effects on both revenues and expenses partially reverse and the effect on profits turns insignificant. This dynamic pattern suggests that the substitution and cost of capital channels outweigh the income and signaling channels, respectively.

We disaggregate cash and accrual components of revenues and expenses to determine whether our results are driven by consumers' and managers' real decisions or by accounting accrual estimates. The evidence indicates that real decisions constitute the majority of the immediate revenue and expense responses to monetary policy shocks. Cash revenues fall less than cash expenses in the current quarter, resulting in a positive relation between cash earnings and unexpected rate changes.

After establishing our baseline results, we test whether the relation between monetary policy shocks and corporate revenues and expenses varies in the cross-section, as predicted by theory. Focusing on consumer behavior first, we document that monetary policy shocks affect corporate revenues more when consumers are more heavily indebted and when firms belong to a consumer-facing industry. Focusing on manager behavior next, we document that monetary policy shocks affect corporate expenses more when firms are financially stable. These tests highlight the credit channel as a mechanism underlying our results and are consistent with prior research showing that financially constrained consumers (managers) are more (less) responsive to monetary policy shocks (Luo 2017;

Ottonello and Winberry 2020). Finally, we document that monetary policy shocks affect corporate expenses more for technology firms whose primary investments (i.e., human capital, intangible assets, computer code, and research) are immediately expensed under US accounting rules, highlighting how the accounting treatment influences our results.

In subsequent analyses, we explore how managers' reactions to monetary policy shocks affect firms' disaggregated expenses (i.e., cost of goods sold; sales, general, and administrative expense (SG&A); depreciation). Consistent with our findings for technology firms, the timing and magnitude of monetary policy shocks on individual expense accounts varies with the accounting treatment of these expense accounts. Specifically, SG&A, which includes many investments that are expensed immediately such as advertising, research and development (R&D), and investments in human capital, shows an immediate and strong relation with monetary policy shocks. In contrast, depreciation expense, which allocates the expense of tangible asset investments over time, shows a delayed and weak relation with monetary policy shocks.

Our paper makes three contributions. First, we respond to calls by Dechow, Ge, and Schrand (2010), Richardson, Tuna, and Wysocki (2010), and Shivakumar (2010) for more macro to micro research showing the effects of macroeconomic conditions on corporate outcomes; we do so by providing evidence on how monetary policy affects corporate profitability.[2] In a related paper, Nissim and Penman (2003) show that changes in 1-, 5-, and 10-year interest rates relate positively to aggregate earnings. We extend their analysis by providing a theoretical foundation and causal evidence on how

[2] The literature shows that macroeconomic conditions explain significant variation in firm-level earnings (Ball, Sadka, and Sadka 2009; Bonsall, Bozanic, and Fischer 2013); that macroeconomic uncertainty drives firms' management guidance, revenues, expenses, earnings, and media coverage (Rogers, Skinner, and Van Buskirk 2009; Kim, Pandit, and Wasley 2015; Bonsall, Green, and Muller 2020; Binz 2022); that inflation influences how investors analyze firms' financial reports (Chordia and Shivakumar 2005; Basu, Markov, and Shivakumar 2010; Konchitchki 2011); and that macroeconomic estimation errors drive firms' investment, production, and earnings (Binz, Mayew, and Nallareddy 2022).

monetary policy in the form of open market operations, a source of interest rate changes important to policy makers,[3] affects firm-level revenues, expenses, and earnings.

Second, we contribute to the literature seeking to understand the drivers of corporate earnings. While most of this literature focuses on firm-level factors (e.g., Fama and French 2000; Nissim and Penman 2001; Hou et al. 2012), a few papers focus on macroeconomic conditions and show that aggregate growth expectations and uncertainty drive earnings (Li et al. 2014; Jackson, Plumlee, and Rountree 2018; Carabias 2018; Binz 2022). We show that consumers' and managers' reactions to monetary policy shocks drive a dynamic pattern in corporate revenues and expenses, resulting in a positive net effect on profitability in the short term. This evidence complements Gallo et al. (2016) who document a positive relation between aggregate earnings and future monetary policy shocks by showing that corporate earnings not only influence but are also influenced by monetary policy shocks.

Finally, we contribute to the literature that examines the effects of monetary policy on corporate outcomes. By adopting our simple general equilibrium model featuring consumers and managers, we respond to former US Federal Reserve chair Janet Yellen's call for more micro-foundational evidence on the transmission of monetary policy to firms' revenues and expenses and on how the transmission of monetary policy varies in the cross-section (Yellen 2016; Gallo and Kothari 2019). Importantly, by conducting our analyses at the firm level, we provide evidence on the cross-sectional heterogeneity of consumers' and managers' dynamic reactions to monetary policy shocks. As noted by former Federal Reserve chair Ben Bernanke (2003) "understanding how monetary policy affects the broader economy necessarily entails understanding both how policy actions affect key financial markets, as well as how changes in asset prices and returns in these markets in turn affect the behavior of households, firms, and other decisionmakers." By showing how the effects of

[3] Other determinants of interest rates include aggregate growth and uncertainty, the levels of government debt and deficit, individual and corporate saving, capital market expectations, inflation, and residential and non-residential investment (e.g., Feldstein and Eckstein 1970).

monetary policy vary in the cross-section, we provide insights that remain relevant even when the composition of firms in the economy changes (Nakamura and Steinsson 2018b).

2. Background and Hypotheses Development

2.1. Monetary Policy: Instrument and Transmission

The US Federal Reserve (Fed) has been responsible for the implementation of monetary policy in the United States since the Federal Reserve Act of 1913. Its goals include maintaining near full employment and stable, sustainable growth. The main instrument to achieve these goals is the Federal Open Market Committee's (FOMC) open market operations. The FOMC meets eight times a year to set a target for the federal funds rate (FFR), that is, the rate on noncollateralized overnight loans at which banks lend to each other.[4] Through its open market operations, the FOMC affects short- and long-term interest rates, foreign exchange rates, and the amount of money and credit outstanding in the economy with the goal of influencing aggregate economic activity (Friedman and Schwartz 1963; Romer and Romer 1989).[5]

Given the importance of monetary policy and its implications, academics have extensively studied how the Fed achieves its policy goals through FOMC operations. For example, there is evidence that monetary policy drives macroeconomic outcomes, such as consumption and investment (Friedman and Schwartz 1963; Romer and Romer 1989), and that most of the equity risk premium is realized around FOMC rate announcements (Ai and Bansal 2018; Cieslak, Morse, and Vissing-Jorgensen 2018).

[4] Once a target has been set, the New York Fed's trading desk implements the desired FFR level by buying or selling short-term US Treasury bills from and to banks. For example, if the FOMC wants to decrease the FFR, the trading desk will buy Treasuries from banks. In response, banks can obtain cash more cheaply by trading with the Fed than by borrowing from other banks, which reduces borrowing demand and lowers the FFR. If the FOMC wants to increase the FFR, the trading desk will sell Treasuries to banks. As a result, banks can purchase Treasuries at favorable prices, which increases their demand to borrow from other banks to buy more. In consequence, the FFR rises.

[5] See Garin, Lester, and Sims (2018, ch. 33.5) for a discussion of how changes in the FFR affect interest rates on long-term government bonds and interest rates on corporate bonds with default risk through substitution effects.

Following Yellen's call for studies on firm-level effects and responses to monetary policy, recent academic research uses disaggregated data to document cross-sectional variation in the equity market response to monetary policy shocks. In particular, Gorodnichenko and Weber (2016) find that the stickiness of firms' product prices positively affects firms' stock return volatility after a monetary policy shock. Ozdagli (2018) and Armstrong, Glaeser, and Kepler (2019) provide conflicting evidence on the role of information frictions on equity market responses to monetary policy shocks. While Ozdagli (2018) shows that returns exhibit a weaker reaction to monetary policy shocks when firms have greater informational frictions (measured using financial constraints), Armstrong et al. (2019) show that firms with lower accounting quality exhibit a stronger response.

Prior research relies primarily on returns-based dependent variables to evaluate the cross-sectional firm-level response to monetary policy shocks. As discussed by Gallo and Kothari (2019), using stock returns to study monetary policy transmission has its limitations. Specifically, while returns-based measures can reflect an immediate response to monetary policy shocks and are of interest to capital market participants, they reflect firms' response to policy shocks only indirectly. To gauge the firms' response more directly, researchers have also examined how firms adapt their investments after a monetary policy shock. The aforementioned studies (with the exception of Ozdagli 2018) present evidence of a negative relation between investments and policy shocks. However, Gallo and Kothari (2019) point out that using an investment variable is also potentially problematic, given its lower frequency of measurement and its lag in implementation, as compared to the Fed's policy shock.

For these reasons, we examine how monetary policy shocks map into corporate profitability via revenues and expenses. Our approach offers two advantages. First, we use quarterly revenues and expenses to track the mapping of monetary policy shocks into profitability across quarters. While not as timely as stock returns, revenues and expenses are less lumpy than investments in the form of

capital expenditures (e.g., Penman 1992). In our analysis, we focus on all expenses and thus consider the broadest category of investments that firms can adjust to respond to monetary policy shocks (e.g., working capital, advertising, wages, R&D, etc.).

Second, our focus on corporate profitability provides direct evidence of the link between monetary policy shocks, firm fundamentals, and valuation. Since firm value is the sum of future discounted cash flows, monetary policy shocks can affect value through both the numerator and the denominator in the valuation formula. Rate shocks directly affect firm value through the discount rate in the denominator. Research has presented limited direct evidence that rate shocks also affect the numerator, that is, firms' cash flows. Our focus on the relation between monetary policy shocks and corporate profits addresses this gap in the literature.

2.2. Economic Model and Hypotheses Development

2.2.1. Model Setup

We develop our hypotheses using a simple infinite-horizon version of the standard New Keynesian dynamic stochastic general equilibrium model (Kydland and Prescott 1982; Calvo 1983), the dominant framework in current macroeconomics research (Galí 2018). Our model considers a representative consumer, a representative firm, and a central bank.

Consumers generate utility $u(\cdot)$ from consumption (C) and own the firm. The utility function exhibits nonsatiation ($u'(\cdot) > 0$) and decreasing marginal utility ($u''(\cdot) < 0$). The representative consumer is impatient and discounts expected future utility by a discount factor β. She chooses consumption to maximize her expected lifetime utility (U):

$$\max\ U = \sum_{t=0}^{\infty} \beta^t E[u(C_t)] \tag{1}$$

subject to her budget constraint:

$$C_t + S_t \leq (1 + r_{t-1})S_{t-1} + Y_t. \quad (2)$$

That is, the consumer can either consume or save (S) the output generated by the firm (Y). Savings deposited with a financial intermediary returns the prevailing real interest rate r_t.

The firm is led by a manager who maximizes firm value (V) by maximizing discounted expected cash flows from the firm to the consumer. The manager invests in capital (K_t) to produce output via a production function (F), which is increasing ($F'(\cdot) > 0$) and concave ($F''(\cdot) < 0$), multiplied by a productivity shock (A_t):

$$Y_t = A_t F(K_t). \quad (3)$$

The capital stock develops over time, according to the accumulation condition:

$$K_{t+1} = I_t + (1 - \delta)K_t. \quad (4)$$

Capital in the future period equals depreciated current period capital (δ equals the depreciation rate) plus current period investment (I_t). Firms finance investment by borrowing from the financial intermediary at the prevailing interest rate. This yields the manager's optimization problem:

$$\max V = \sum_{t=0}^{\infty} \Delta_t E[A_t F(K_t) - (1 + r_{t-1})I_{t-1}], \quad (5)$$

where $\Delta_t = \prod_{t=1}^{\infty} E(1 + r_t)^{-1}$ and $\Delta_0 = 1$.

Prices exhibit some degree of stickiness or nominal rigidity, which prevents instantaneous adjustments to changes in macroeconomic conditions.[6] As a consequence, the central bank can influence the real interest rate by changing the money supply, according to the Taylor rule:

$$r_t = M(E[Y_t|\widetilde{A_t}]) + u_t. \quad (6)$$

[6] Nominal rigidity arises, for example, because firms face a small menu cost of changing the prices of their products or because they entered into contracts with third parties, such as employees or suppliers, whose terms include payments that are fixed in nominal terms (Romer 2012). See also Gorodnichenko and Weber (2016). If prices are perfectly flexible, the model converges to the standard neoclassical model and changes in nominal variables do not have effects on real variables.

The interest rate is the sum of a monetary policy function $M(\cdot)$ that is increasing in the central bank's expectation about output ($M'(\cdot) > 0$), given its private information about productivity growth ($\widetilde{A_t}$) – that is, the central bank increases (decreases) interest rates to prevent the economy from overheating (to cushion the consequences of a recession) (Taylor 1993; Clarida et al. 2000; Angeletos et al. 2006) – and a monetary policy shock (u_t). In the presence of nominal rigidity, increases in the money supply decrease the real interest rate.

2.2.2. Solving the Optimization Problem

The consumer saves or consumes all income as leftover income does not generate utility. Hence Eq. (2) holds with equality. Combining Eq. (1) and (2), taking the first-order derivative with respect to consumption, and setting the derivative equal to zero yields the consumer's Euler equation:

$$E[u'(C_t)|r_t] = \beta(1 + r_t)E[u'(C_{t+1})|r_t]. \quad (7)$$

In words, the expected utility of a marginal increase in consumption in the current period equals the decline in the present value of marginal utility of the resulting loss in expected future consumption.

Similarly, combining Eq. (4) and Eq. (5), taking the derivative with respect to capital, and setting this derivative equal to zero yields the manager's Euler equation:

$$r_t + \delta = E[A_t|r_t]F'(K_{t+1}). \quad (8)$$

The manager increases future capital via investing more until the marginal benefit of holding future period capital equals its marginal cost.

2.2.3. Hypotheses Development

Our model from the previous section provides the starting point of our hypotheses development on how monetary policy rate changes will affect firms' revenues, expenses, and profits.

The effect on revenues is a function of consumer behavior, while the effect on expenses is a function of managers' investment decisions.[7] We discuss both below.

2.2.3.1. Revenues

The effect of monetary policy on firms' revenues depends on the effect of rate changes on consumers' purchasing decisions. Consumers purchase consumption goods and services from firms, which increases firms' revenues. To understand consumer behavior, we refer to the consumer's Euler equation (7), which shows the direct (income and substitution) and indirect (signaling) effects of rate changes on consumption. The equation shows that an increase in the rate r_t increases the right-hand side of Eq. (7). Therefore, for Eq. (7) to remain in balance, current and future consumption need to adjust. This adjustment can take the form of two effects: a substitution or an income effect.

On the one hand, the substitution effect indicates that higher interest rates encourage saving by increasing its returns, thus crowding out current and increasing future consumption. Because marginal utility is decreasing in consumption ($u''(\cdot) < 0$), the substitution effect of rate changes balances Eq. (7) by increasing $u'(C_t)$ and decreasing $u'(C_{t+1})$. On the other hand, the income effect indicates that an increase in interest rates reduces consumers' need to save to obtain a fixed level of future consumption. As a result, current savings fall, and both current and future consumption rise. However, to balance Eq. (7), the income effect requires that future consumption C_{t+1} increases more than current consumption C_t.

Whether the substitution or income effect dominates depends on how much consumers value a smooth income stream. If the utility function exhibits less curvature (i.e., consumers are more willing to let their consumption vary over time), the substitution effect dominates, and current consumption

[7] Revenues are also affected by managers' decisions to extend more credit to consumers, a form of working capital investment (Arif et al. 2016). Similarly, expenses, such as cost of goods sold and SG&A, are also affected by consumers' purchasing decisions (Anderson, Banker, and Janakiraman 2003).

falls while future consumption rises when rates increase. If the utility function exhibits more curvature, the income effect dominates, and both current and future consumption rise.[8]

Eq. (7) also reveals that monetary policy affects consumers through signaling effects (Melosi 2017). Interest rates increase in central bank productivity growth expectations (Eq. (6)), which allows consumers to infer some of the central bank's private information from interest rate announcements. For example, unexpected rate increases signal to consumers that the central bank anticipates strong productivity growth and induces consumers to increase consumption. Indeed, there is evidence that market participants learn from central bank rate change announcements (Romer and Romer 2000).

In total, rate changes discourage consumption and thereby decrease revenues via a substitution effect, and encourage consumption and thereby increase revenues via income and signaling effects. The net effect of rate changes is therefore an empirical issue leading to our first hypothesis (stated without specifying a direction):

Hypothesis 1. *Monetary policy shocks affect firms' revenues.*

2.2.3.2. Expenses

To map the effects of monetary policy into expenses, we consider managements' investment decisions after a rate shock (e.g., Fairfield et al. 2003; Zhang 2007). Following Dixit and Pindyck (1994), who define investments broadly as activities incurring an immediate cost in expectation of future rewards, we consider firms' expenses, such as cost of goods sold and operating expenses, to be a function of, among others, investment in raw materials; new property, plant, and equipment (PP&E); R&D; advertising; and hiring. Under US GAAP, some investments, such as the purchase of new PP&E, are capitalized and expensed over the expected useful life. Other investments, such as

[8] This discussion assumes that consumers are net savers. However, if consumers are, on average, net borrowers, their income is reduced, because they need to pay more to service their debt. As a consequence, consumers reduce current and future consumption. Thus, when consumers are net borrowers, both the income and substitution effects lead to a fall in current period consumption. However, while the substitution effect increases future consumption, the income effect decreases in future consumption.

investments in R&D, training, human capital, software development before technological feasibility, and routine maintenance, are immediately expensed (Bushman, Lerman, and Zhang 2016). Thus, the accounting treatment affects how investments map into expenses, a point we elaborate on in Section 7.

Adopting this setup, our model shows how monetary policy can affect managers' investment decisions and corporate expenses. We consider two possible channels that describe the effects of rate changes on investment. The first builds on the manager's Euler equation (8) to reveal the effect of a rate shock on managers' investment decisions. To illustrate, an increase in r_t will increase the left-hand side of Eq. (8). For Eq. (8) to remain in balance, its right-hand side, or $E[A_t|r_t]F'(K_{t+1})$, must increase as well. Building on Eq. (4), this implies that $E[A_t|r_t]F'(I_t + (1-\delta)K_t)$ must increase. Since $F''(\cdot) < 0$ and since K_t and δ are outside of the managers' control in period t, this increase can only be achieved if managers reduce investment I_t. In other words, when interest rates increase, the opportunity costs for firms increase, raising firms' cost of capital and lowering investment (Tobin 1969; Hayashi 1982). We refer to this as the cost of capital channel.

As for consumers, the signaling channel affects managers as they infer some of the central bank's productivity growth expectations from interest rate announcements. Rate increases signal that the central bank expects productivity growth to be high, encouraging firms to invest.

In total, rate changes discourage investment and thereby decrease expenses via a cost of capital effect, and encourage investment and thereby increase expenses via a signaling effect. The net effect of rate changes is therefore an empirical issue leading to our second hypothesis (stated without specifying a direction):

Hypothesis 2. *Monetary policy shocks affect firms' expenses.*

2.2.3.3. Profits

Since both Hypotheses 1 and 2 do not make directional predictions about the effect of rate changes on revenues, which increase profits, and expenses, which decrease profits, we also state our third hypothesis without specifying a direction:

Hypothesis 3. *Monetary policy shocks affect profits.*

Figure 1 summarizes our hypothesis development: the net effect of unexpected rate changes on profits depends on the relative effects of the income, substitution, and signaling channels on the demand side and the effects of the cost of capital and signaling channels on the supply side.

3. Research Design

We evaluate the effect of monetary policy shocks on corporate outcomes by estimating two models:[9,10]

$$Dependent\ Variable_{i,t+k} = \beta_1 \Delta r_t + Controls + \Gamma_i + \varepsilon_{i,t} \tag{9}$$

and

$$Dependent\ Variable_{i,t+k} = \beta_1 \Delta r_t^u + \beta_2 \Delta r_t^e + Controls + \Gamma_i + \varepsilon_{i,t}. \tag{10}$$

In Eq. (9) Δr denotes the FFR change in quarter t. Firm-level outcomes (*Dependent Variable*) include seasonally adjusted changes in total revenues (*ΔRevenues*); cash revenues (*ΔCash Revenues*); accrual revenues (*ΔAccrual Revenues*); total net expenses (*ΔExpenses*); cash net expenses (*ΔCash Expenses*); accrual net expenses (*ΔAccrual Expenses*); total earnings (*ΔEarnings*); cash earnings (*ΔCash Earnings*); accrual earnings (*ΔAccrual Earnings*); cost of goods sold (*ΔCOGS*); sales, general, and administrative expense (*ΔSG&A*); and depreciation expense (*ΔDepreciation*). Following prior literature (Hou et al.

[9] Vector autoregression (VAR) models iterate forward the estimated response of the one-period-ahead dependent variable to the current-period monetary shock to construct impulse response functions. This approach relies on the strong assumption that the effect of monetary policy shocks does not depend on the length of the forecast horizon. In contrast, our approach of estimating separate regressions for each forecast horizon imposes minimal structure (apart from linearity) and is thus more robust (Jordà 2005; Nakamura and Steinsson 2018b).

[10] The FOMC also uses forward guidance by providing information about the likely course of future monetary policy to the public as an additional policy tool. Forward guidance became prevalent in the aftermath of the global financial crisis of 2007–2008, which is after our sample period. For more information see https://www.federalreserve.gov/faqs/what-is-forward-guidance-how-is-it-used-in-the-federal-reserve-monetary-policy.htm.

2012; Gallo et al. 2016; Binz 2022), we control for aggregate growth (*Real GDP*), macroeconomic uncertainty measured as GDP forecaster disagreement (*Macroeconomic Uncertainty*), GDP news measured as GDP forecast revisions (*GDP News*), inflation news measured as inflation forecast revisions (*Inflation News*), unemployment news measured as unemployment forecast revisions (*Unemployment News*), log total assets (*Log(Total Assets)*), seasonally adjusted changes in dividends (*ΔDividend Yield*), an indicator for dividend-paying firms (*Dividend Payer*), and an indicator for loss firms (*Loss*).[11] Finally, we include firm fixed effects (I). Appendix A provides variable definitions.

While Eq. (9) is our baseline specification, we focus predominantly on the specification in Eq. (10) to evaluate our predictions for two reasons. First, examining the effects of monetary policy requires a measure for unexpected interest rate changes, as rational agents will already adapt to expected changes (Sargent and Wallace 1975; Lucas 1976). Second, as illustrated by our model, the Fed's monetary policy decisions are an endogenous response to macroeconomic conditions. During good times, the Fed raises rates to prevent the economy from growing unsustainably, and, during bad times, the Fed lowers rates to ameliorate recessions. To address these concerns, we follow Kuttner (2001) and Bernanke and Kuttner (2005) to separate Δr into its expected and unexpected components, Δr^e and Δr^u in Eq. (10). The unexpected change in the FFR is the change in the implied FFR around FOMC meetings calculated using Chicago Mercantile Exchange futures market data.[12] If financial markets are efficient, all publicly available information about past, present, and future economic

[11] The Hou et al. (2012) model includes accrual earnings as an additional control variable. Accrual earnings is one of our dependent variables. Therefore, we do not include it as a control variable in our main analysis. However, in untabulated analyses, we include accrual earnings as an additional control variable in all models except for the accrual earnings model. Our inferences remain unchanged.

[12] Kuttner (2001) describes the calculation details. Computing expectation shocks using futures market data provides several benefits over constructing shocks based on rational expectations via VAR models. As noted by Gennaioli, Ma, and Shleifer (2016), (1) expectations are statistically and substantively important predictors of both planned and actual corporate decisions and (2) expectations do not appear to be rational in the sense that expectational errors are predictable, which violates the implicit rational expectations assumption of VAR models. Further, estimating exogenous shocks via VAR models relies on delta approximations and is prone to misspecification, due to nonlinearities (Jordà 2005). In contrast, expectation shocks derived from futures market data circumvents these issues by directly measuring the unexpected component in FFR changes.

conditions is reflected in futures prices and thereby in expected rate changes at the time of the FOMC announcement. In contrast, unexpected rate changes result from changes in variables unrelated to economic conditions, such as variation in the FOMC members' idiosyncratic preferences, experiences, beliefs, and goals, that are unlikely to affect our dependent variables of interest through other channels than through their direct effect on monetary policy (Nakamura and Steinsson 2018a, 2018b). Following Armstrong et al. (2019) and Ottonello and Winberry (2020), we aggregate expected and unexpected rate changes over the quarter to align them with quarterly firm-level data.

4. Data and Descriptive Statistics

We obtain quarterly firm fundamental data from Compustat. Data on monetary policy surprises, computed using the FFRs futures data, comes from Kenneth Kuttner's website. Data for macroeconomic control variables comes from the Federal Reserve Bank of St. Louis (FRED) and the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters (SPF). We start our sample in 1989, the year of inception for the FFR futures market. Following Gallo et al. (2016), we end our sample in 2008, the last year in which the Fed used open market operations as its main policy tool before the zero lower bound effectively eliminated interest rate decreases from the Fed's toolkit.[13] Following Armstrong et al. (2019), we exclude financial services firms (SIC 6000 to 6999), because their business model allows them to pass interest rate changes on to their borrowers and depositors.[14]

[13] The Fed began to raise interest rates in 2016, reinstating open market operations as a viable monetary policy tool. At the same time, the Fed continued the use of quantitative easing (i.e., the purchase of securities other than Treasury bills, such as long-term government bonds, mortgage-backed securities, and corporate bonds), which targets different interest rates than the FFR. To identify the effects of open market operations as cleanly as possible, this paper focuses on the pre-2008 period when open market operations were the Fed's dominant monetary policy tool.

[14] Several papers examine the effects of monetary policy on financial services firms' profits (Samuelson 1945; Flannery 1981; Hancock 1985; Borio, Gambacorta, and Hofmann 2017; Altavilla, Boucinha, and Peydró 2018). These papers generally document an increase in interest income after a rate increase, which increases profits. In this paper, we focus on industrial firms. In contrast to financial services firms, monetary policy affects industrial firms predominantly through its impact on their revenues and operating investment, and not through its impact on interest-bearing financial assets.

To examine the current and future period effects of rate changes, we require firms to have non-missing values for all variables. Our final sample contains 223,487 firm-quarter observations.

Table 1 presents descriptive statistics for the main variables in our sample. We observe that the mean of Δr is negative (-0.09), suggesting that the Fed decreases interest rates over our sample period. The distribution of Δr exhibits significant volatility, with a standard deviation of 0.52% and the largest cumulative absolute change over a firm-quarter being a decrease of 2.00%. Figure 2 Panel A plots the FFR's development over time. Over our sample period, the FFR declines from 9.50% to 2.00%. FFR decreases generally concentrate around recessions (shaded in gray), such as the oil crisis of the early 1990s and the dot-com bubble of the early 2000s, when the Fed used monetary policy to soften the adverse effects of downward movements in the business cycle.

Table 1 shows that the market anticipates most of the FFR changes. The 1st, 25th, 75th, and 99th percentile magnitudes of expected FFR changes, Δr^e (-1.33, -0.17, 0.23, and 0.78%), exceed those of unexpected FFR changes, Δr^u (-0.67, -0.09, 0.00, and 0.23%). Markets do not consistently overestimate or underestimate FFR changes. For Δr^u, the mean (-0.07%) and median (-0.01%) are close to zero. Figure 2 Panel B plots Δr^u over time and shows both positive and negative unexpected FFR changes. Overall, we observe larger negative unexpected FFR changes than positive ones, suggesting that investors typically expect rates to fall less than they do during our sample.[15] On average, real GDP grows by 3.01% per year and GDP, inflation, and unemployment forecast revisions are close to zero.

[15] The largest unexpected rate cut occurred on January 22nd, 2008, when, following an unscheduled meeting held a week before the next regularly scheduled FOMC meeting on January 29th, 2008, the Fed cut rates by 75 basis points from 4.25% to 3.5%. In a press release the Fed justified the rate cut by citing the poor economic outlook at the time: "The Committee took this action in view of a weakening of the economic outlook and increasing downside risks to growth. While strains in short-term funding markets have eased somewhat, broader financial market conditions have continued to deteriorate and credit has tightened further for some businesses and households. Moreover, incoming information indicates a deepening of the housing contraction as well as some softening in labor markets." (See https://www.federalreserve.gov/newsevents/pressreleases/monetary20080122b.htm). Other large unexpected rate cuts occurred on April 18th, 2001, following another unscheduled meeting held in response to the US Commerce Department's announcement that the trade deficit fell to its lowest level in 14 months during the collapse of the dot-com bubble, and on July 2nd, 1992, following a peak in the unemployment rate.

We calculate firm-level variables as the seasonally adjusted changes from the same quarter in the previous year and scale all variables by average total assets. We winsorize all continuous firm-level variables at the 1st and 99th percentiles. We observe that, on average, revenues increase with a mean and a median of 0.03 and 0.02. However, some firms experience significant revenue changes, as evidenced by Δ*Revenues'* 1st (-0.35) and 99th (0.49) percentiles. Net expenses compare to revenues in terms of their mean and median but exhibit higher volatility (standard deviation: 0.17 vs. 0.11), and thicker tails (1st and 99th percentiles: -0.64 and 0.72 vs. -0.35 and 0.49) than revenues. Average and median earnings changes are both zero, but Δ*Earnings* exhibits volatility, especially in the tails (1st and 99th percentiles of -0.45 and 0.48). Cash revenues, expenses, and earnings are similarly distributed to total revenues, expenses, and earnings. Accrual revenues, expenses, and earnings are approximately evenly distributed around zero, consistent with accruals eventually reversing. Cost of goods sold, SG&A, and depreciation all appear symmetrically distributed around zero. The firms in our sample report on average $106 million in total assets. Changes in dividend yields are small, 27% of firms pay a dividend, and 38% of observations are loss-quarters.

Table 2 presents our correlation matrix. We observe that Δr and its components Δr^e and Δr^u correlate positively with all components of revenues, expenses, and earnings with the exceptions of accrual expenses and cash earnings. These correlations indicate that rate increases generally occur during good times in which consumers purchase more, firms expand, and profits rise. However, these univariate correlations do not account for confounding factors, such as expected rate changes or general economic conditions. As shown in Figure 2 Panel A, the Fed tends to increase (decrease) rates during good (bad times) times. Since unexpected rate changes occur during both peaks and troughs of the business cycle, our tests need to control for these factors.

5. Main Results

Tables 3 to 5 present our main results. We regress seasonally adjusted changes in total, cash, and accrual revenues, net expenses, and earnings in the current and the subsequent three quarters on $\triangle r$ (in Eq. (9)), $\triangle r^u$ and $\triangle r^e$ (in Eq. (10)), macro-level and firm-level controls, and firm-fixed effects. We cluster standard errors by firm and quarter.

5.1. Revenues

In Table 3, we test how consumers' reaction to monetary policy shocks affects firms' revenues in the quarter of the rate changes and the three subsequent quarters. The different columns in Panel A show the results of estimating Eq. (9) and (10) in each of these quarters with total revenues as the dependent variable. Focusing first on the quarter of the rate change in columns (1) and (2), we find that the relation between $\triangle r$ and $\triangle Revenues$ is positive, which is intuitive as central banks tend to raise rates in good times when firms' sales increase. Column (2) shows that the coefficient on the expected component of rate change $\triangle r^e$ is positive, again consistent with the Fed raising interest rates in good times when revenues are growing. However, the coefficient on the unexpected component of rate change $\triangle r^u$ is significantly negative (β_1 = -0.010, t = -2.01), suggesting that the substitution effect of rate changes outweighs the income and signaling effects.[16]

The specifications in columns (3) through (8) show the dynamic effects of monetary policy shocks on $\triangle Revenues$ in subsequent quarters. Across all specifications, the coefficients on $\triangle r$ or $\triangle r^e$ are positive and statistically significant. For unexpected rate changes, our results show evidence of a near-term reduction in spending and increased future spending, consistent with a substitution effect. Specifically, the effect of unexpected rate changes $\triangle r^u$ on $\triangle Revenues$ is insignificant one quarter ahead (β_1 = -0.007, t = -1.25) but becomes positive two and three quarters ahead. In terms of economic

[16] In untabulated analyses, we document that these effects are weakened for firms with segments in multiple countries, which is intuitive as foreign consumers should be less affected by domestic monetary policy.

magnitude, an unexpected 1% rate change in the current quarter leads to a 1.3% (1.5%) revenue change two (three) quarters ahead. The absolute magnitude of the two and three-quarter-ahead revenue changes exceeds that of the current-quarter revenue change.[17] Across specifications in Panel A, the coefficients on the macro-level and firm-level controls behave as in prior literature (Hou et al. 2012; Binz 2022).

To determine whether our results are driven by consumers' real consumption decisions or by managers' accrual estimates, Panel B and C break total revenues into their cash and accrual components. Panel B shows a significant decrease in cash revenues in both the current and subsequent quarter. This decrease partially reverses two and three quarters after the rate shock. Overall, the pattern in cash revenues is similar to the pattern in total revenues, but with larger coefficient magnitudes in earlier quarters. In contrast, Panel C shows a relatively weaker but positive relation between accrual revenues and unexpected rate changes. In the quarter of the rate change, the effect of Δr^u on Δ*Accrual Revenues* is insignificant. In the next two quarters, the effect is positive and significant.

Collectively, we find a negative, short-term revenue reaction to monetary policy shocks, which reverses in subsequent quarters. Consistent with the results deriving from consumers' real decisions rather than managers' accrual estimates, the initial negative effect concentrates in cash revenues. Accrual revenues counteract this effect, leading to a weaker relation between total revenues and monetary policy shocks.

5.2. Expenses

Next, we focus on how rate changes affect firms' expenses via managers' investment decisions. Table 4 mirrors the structure of Table 3 but replaces total, cash, and accrual revenues with total, cash,

[17] These results are consistent with the substitution effect dominating the income effect when consumers are net borrowers. The income effect predicts that net borrowers decrease their future and current consumption in response to rate increases. However, we document a decrease in current revenues and an increase in future revenues, which is more consistent with the substitution effect.

and accrual expenses as the dependent variable. The pattern of coefficients on Δr, Δr^e, and Δr^u across specifications largely mirrors the findings in Table 3. Table 4 Panel A columns (1) and (2) show positive coefficients on total and expected rate changes (Δr and Δr^e) in the quarter of the change, consistent with the Fed changing rates as a function of the economic circumstances—for example, rate increases correspond to higher economic activity, leading to more investments and increasing expenses. In contrast, the coefficient on unexpected rate changes Δr^u is significantly negative (β_1 = -0.024, t = 3.14). An unexpected change in FFR of 1% changes expenses by 2.4%. The negative relation is consistent with the cost of capital channel outweighing the signaling channel in the quarter of the unexpected rate change.

As with Δ*Revenues* in Table 3 Panel A, the coefficients on Δr or Δr^e are positive in subsequent quarters across specifications in columns (3) through (8). In addition, the negative coefficient on Δr^u persists one quarter ahead in column (4), becomes insignificant two quarters ahead in column (6), and then reverses three quarters ahead (β_1 = 0.015, t = 1.77) in column (8). This pattern is consistent with the cost of capital channel outweighing the signaling channel. To illustrate, an unexpected rate decrease lowers the firms' cost of capital, thus affecting the set of positive net-present-value projects available to management and leading to higher investments and expenses in the short run. This short-term increase partially reverses three quarters after the rate shock.

To determine whether managers' real investment decisions or managers' accrual estimates drive our results, Panel B and C break total expenses into their cash and accrual components. Consistent with the cash revenue analysis, cash expenses fall in the current quarter of the monetary policy shock. In addition, expense accruals *decrease* in unexpected rate changes (columns (4) and (8)).

5.3. Earnings

After exploring consumers' and managers' reactions to monetary policy shocks, we next examine the consequences for corporate profits. Our evidence so far shows both Δ*Revenues* and

$\Delta Expenses$ moving in sync across quarters in response to an unexpected rate change. This leaves us with an uncertain prediction for the effects of monetary policy shocks on corporate profit.

Table 5 shows the results of estimating Eq. (9) and (10) across different quarters using total, cash, and accrual earnings as the dependent variable. Panel A columns (1) and (2) show that the effect of unexpected rate changes in the current and subsequent quarter on total earnings is significantly positive ($\beta_1 = 0.013$, t = 3.12 and $\beta_1 = 0.011$, t = 2.87, respectively). Managers' responses to monetary policy shocks seemingly outweigh consumers' reactions in the short run, amplifying the expense effects. In terms of economic magnitude, the coefficient estimates indicate that an unexpected rate change of 1% leads to a 1.3% (1.1%) increase in return-on-assets in the current (subsequent) quarter. In the second and third quarters after the rate change, the coefficient on Δr^u becomes insignificant. The earnings component analysis in Panels B and C reveals that the increase in current-quarter earnings is approximately evenly reflected in both cash and accrual earnings.

Collectively, the results suggest that consumers' behavior is consistent with substitution effects outweighing income and signaling effects, and that managers' behavior is consistent with cost of capital effects outweighing signaling effects. The net effect of this pattern is that, in the short run, profits move in the direction of the rate change: managers' impact on expenses is stronger than consumers' impact on revenues. The results are also consistent with most of the effect deriving from real (cash) effects rather than bookkeeping (accrual) effects, suggesting that consumers' and managers' decisions rather than the accounting for the outcomes of these decisions drive our results.[18]

[18] We conduct two additional untabulated tests to examine the robustness of our findings in this section. First, our model does not distinguish between rate increases and rate decreases. However, asymmetries could arise if consumers and managers face different adjustment costs to their consumption or investments depending on whether rates increase or decrease (see the discussion in Gallo and Kothari 2019). To examine the presence of potential asymmetries, we separately estimate our main tests for firm-quarters that experience unexpected rate increases and for firm-quarters that experience unexpected rate decreases. Consistent with Cover (1992), we find that our results concentrate in firm-quarters experiencing unexpected rate decreases. Second, we examine the robustness of our main tests to alternative winsorization levels and alternative scalars, including the beginning of the year, end of the year, and average total assets and market value of equity. Our inferences from these robustness tests remain unchanged.

6. Cross-Sectional Variation in the Response to Unexpected Rate Changes

We conduct four cross-sectional tests to examine whether the relations between the monetary policy shocks and corporate revenues and expenses vary as predicted by theory. We expect a pronounced revenue reaction when consumers are more likely to default on their debts and for business-to-consumer firms that sell directly to consumers. We expect a pronounced expense reaction for technology firms whose intangible investments are immediately expensed and for financially stable firms that can more easily finance additional investment.

6.1. Financially Constrained Consumers

First, Luo (2017) hypothesizes and finds that financially constrained consumers with higher default risk are more sensitive to monetary policy shocks (see also Wong 2019). In a model featuring consumers with varying tolerance to default, he shows that the decision to borrow in normal times reveals consumers' type to financial intermediaries, who in turn ration credit for risky types. Once interest rates change, safe types adjust their borrowing. This reduces the signaling value of borrowing and allows risky types to pool with safe types. We test whether Luo's (2017) findings for consumption map into revenues by estimating the following regression:

$$\Delta Revenues_{i,t+k} = \beta_1 \Delta r_t^u \times Household\ Debt_t + \beta_2 \Delta r_t^u + \beta_3 \Delta r_t^e + Controls + \Gamma_i + \varepsilon_{i,t} \qquad (11)$$

where *Household Debt* is an indicator that the seasonally adjusted ratio of total consumer credit owed and securitized to GDP is above the 75th percentile of our sample period.[19] If the revenue effect of monetary policy shocks is stronger when consumers are more financially constrained, we expect a negative coefficient β_1.

Table 6 Panel A shows the results of estimating Eq. (11). The last two rows show the sum of Δr_t^u's and the interaction term's slope coefficients and present the p-value of an F-test testing whether

[19] The results are robust to using seasonally adjusted household debt service payments as a percent of disposable personal income to measure consumers' financial constraints.

this sum is equal to zero. Columns (1) and (2) show that the coefficient on the interaction term is negative in the current and subsequent quarter. Firms experience a 2.5% (3.1%) decrease in $\Delta Revenues$ in the quarter of (after) a 1% monetary policy shock when households are heavily indebted. When households are not heavily indebted, the effect is statistically insignificant, suggesting significant time-series heterogeneity in firms' exposure to monetary policy shocks. Similar to the main effect of rate changes on revenues, the coefficient on the interaction term turns positive two quarters ahead. Three quarters ahead, the coefficient turns insignificant.

6.2. Business-to-Consumer Firms

Second, our model predicts that the revenue effect is a function of consumers reducing their purchases. If so, the negative relation between monetary policy shocks and future revenue changes should be pronounced for business-to-consumer firms that sell directly to end consumers (Ozdagli and Weber 2017). We test this prediction by replacing H*ousehold Debt* in Eq. (11) with *B2C,* an indicator that the firm belongs to an industry that sells 75% or more of its output directly to end consumers according to the 2007 Bureau of Economic Analysis 405 industries Use table.[20]

Table 6 Panel B presents the results. We expect a negative coefficient β_1 if the revenue effect of monetary policy shocks is stronger for consumer-facing firms. We find that the negative revenue reaction is strengthened for business-to-consumer firms. The interaction term between *B2C* and Δr_t^u is significantly negative in the quarters after the rate shock. In response to an unexpected rate change of 1%, business-to-consumer firms experience a -1.7%, -2.3%, -1.0%, and -0.6% decrease in $\Delta Revenues$ in the current and three subsequent quarters. This economic magnitude is 1.7 (4.6) times the size of the base effect in the current (subsequent) quarter and more than offsets the reversal of the base effect two and three quarters ahead.

[20] The results are robust to using the Luffarelli, Markou, Stamatogiannakis, and Gonçalves (2019) business-to-consumer industry classification.

6.3. Financially Stable Firms

Third, Ottonello and Winberry (2020) hypothesize and find that financially stable firms with lower default risk are more sensitive to monetary policy shocks. Higher default risk increases the slope of the marginal borrowing cost curve the firm faces, which decreases risky firms' propensity to invest when rates change.[21] We test whether Ottonello and Winberry's (2020) findings for investment map into expenses by replacing $\measuredangle$*Revenues* and *Household Debt* in Eq. (11) with $\measuredangle$*Expenses* and *Financially Stable*, an indicator that the firm's leverage is below the 25th percentile of the cross-sectional leverage distribution in a given quarter.

Table 7 Panel A presents the results. If the expense effect of monetary policy shocks is stronger for financially stable firms, we expect a negative coefficient β_I. Columns (1) and (2) show that the negative expense reaction is pronounced for financially stable firms in the current and subsequent quarter. In response to a 1% unexpected rate cut, financially stable firms' expenses increase by 3.4% (2.9%) in the current (subsequent) quarter, which is 1.6 (1.9) times the size of the base effect. The effect turns insignificant two and three quarters ahead.

6.4. Technology Firms

Fourth, we examine whether the expense reaction to monetary policy shocks is pronounced for firms in the technology industry. These firms tend to invest heavily into intangibles such as software code, patents, human capital, customer relations, research, and their brand. As discussed in Bushman et al. (2016) and Penman (2021), US GAAP requires firms to immediately expense most of these intangible investments because the anticipated revenue growth associated with such investments

[21] For a graphical illustration of this point see Ottonello and Winberry's (2020) Figure 2.

is highly uncertain.[22] Thus, we expect that the investment response to monetary policy shocks of technology firms will map into expenses more quickly, resulting in a stronger negative relation between monetary policy shocks and technology firm expenses. We test this prediction by replacing $\Delta Revenues$ and *Household Debt* in Eq. (11) with $\Delta Expenses$ and *Technology*, an indicator that the firm is a member of the communications, computer, or measuring equipment Fama and French (1997) 48 industries.

Table 7 Panel B presents the results. If the expense effect of monetary policy shocks is stronger for technology firms, we expect a negative coefficient β_1. Consistent with a direct mapping of investment into expenses for intangibles-intensive technology firms, the interaction term between Δr^u and *Technology* is significantly negative in the current and subsequent quarter but not thereafter. An unexpected rate change of 1% decreases technology firms' expenses by 4.2% in the current and 3.6% in the subsequent quarter. While the previous cross-sectional analyses focus on variation due to economic behavior, the technology firm analysis indicates that the associations we document depend, in part, on the relevant accounting rules. Firms that make more intangible investments (e.g., new technology, human capital, etc.) experience a stronger expense-reaction to monetary policy shocks due to accounting methods that require immediate expensing of these outlays. We find no significant difference in the magnitude of the reversal between technology and non-technology firms.

7. Specific Account Responses to Unexpected Rate Changes

To further understand the effect of unexpected rate changes on net expenses documented in Section 5, in this section we evaluate the effect of monetary policy shocks on specific expense accounts (i.e., cost of goods sold, SG&A, and depreciation).

[22] There are, of course, a few intangible investments that are capitalized. For example, SFAS No. 86 requires firms to capitalize certain software development costs. However, the proportion of firms capitalizing software development cost is small and has been falling over time (Givoly and Shi 2008).

Table 8 Panels A to C mirror the structure of Table 4 Panel A but with cost of goods sold, SG&A, and depreciation as the dependent variables. The different expense accounts represent types of investments made by managers. As discussed above, the appropriate accounting treatment differs by expense type. For example, cost of goods sold (COGS) captures the cost of purchasing or producing inventory (i.e., the cost of labor, raw materials, and shipping) and the accounting treatment requires a matching between revenue and COGS.[23] Below gross profit, the primary operating expenses are SG&A and depreciation expense. As noted in Bushman et al. (2016), most intangible investments, such as advertising or R&D, require immediate expensing and are recognized in SG&A.[24] In contrast, most tangible investments are capitalized on the balance sheet and the firm recognizes depreciation expense over the expected useful life of these investments. Due to these accounting differences, we expect SG&A to experience a larger and more immediate reaction to monetary policy shocks than depreciation.[25]

Panel A presents the results for cost of goods sold. The effect of monetary policy shocks on cost of goods sold is similar to that on revenues in the current quarter. This association is to some extent mechanical as US GAAP requires the recognition of cost of goods sold expense at the same time as revenues are recognized. However, managers also take real actions that affect the realized value of inventory, such as changing the raw material inputs, negotiating discounts, or altering payment timing. While our analysis of cost of goods sold does not allow us to disentangle how much of the

[23] In practice, cost of goods sold includes depreciation charges if the depreciation of a long-lived asset can directly be attributed to a specific piece of inventory. However, S&P removes such depreciation from cost of goods sold and reallocates them to depreciation expense when compiling their Compustat database (Standard & Poor's 2021).

[24] SG&A captures period expenses from the sales, marketing, and management functions and investment in research on new technologies or products in the form of R&D. In untabulated analysis, we also estimate the effect of unexpected rate changes on R&D. Similar to SG&A, the negative effect of unexpected rate changes on R&D is multiple times as large as the negative effect of unexpected rate changes on depreciation. However, R&D expense is missing for most observations. Therefore, these results should be interpreted with caution.

[25] Another income statement line item is interest expense. Ippolito, Ozdagli, and Perez-Orive (2018) show that most corporate debt features floating interest rates, which would lead to a positive relation between monetary policy shocks and interest expense, a non-operating expense account. Indeed, in untabulated analyses, we document a positive relation between monetary policy shocks and changes in interest expense three quarters ahead. However, the relation is insignificant in all other quarters, suggesting that managers adjust their firms' outstanding floating rate debt in response to rate shocks.

change in cost of goods sold is driven by its relation to revenues and how much is driven by managers' cost-cutting, we can examine this issue with a focus on two additional expense accounts that do not vary mechanically with revenues: SG&A and depreciation.

We begin by discussing the results related to spending on research, human capital, and other non-tangible investments. Panel B presents the results for SG&A. As for total expenses, there is an immediate negative effect of monetary policy shocks. The coefficient on Δr^{u} is negative and significant at the 0.01 level in the quarter of and the quarter after the rate shock. Two quarters after the shock, the coefficient turns insignificant. The immediate and strong negative effect of monetary policy shocks on SG&A is consistent with the cross-sectional analysis of technology firms in Table 7 Panel B. US GAAP requires firms to immediately expense intangible investments, such as advertising and R&D, leading to a one-to-one mapping between investment and these expenses, which manifests itself in an immediate and strong effect of monetary policy shocks.

Finally, Panel C presents the results for depreciation, the primary expense related to capitalized tangible investments. The depreciation response magnitude is smaller than the SG&A response and remains similar up to two quarters ahead. This evidence further complements the technology firms and SG&A analyses by shedding further light on how investment maps into expenses. In contrast to intangibles investment, which tends to be expensed immediately, tangible investments in long-lived assets are capitalized and expensed over time (via depreciation expense), leading to a delayed and weaker effect of monetary policy shocks. Taken together, the findings on the effects of monetary policy shocks on specific expense accounts both confirm and sharpen the findings in Tables 4 and 7. They confirm that, while the effects on revenues and expenses are directionally similar, the effects on expenses are more pronounced. The results also highlight how the effect timing and size vary with the nature and accounting treatment of the underlying expense account.

8. Conclusion

Monetary policy decisions affect consumers and managers. We study how consumers' and managers' responses to unexpected Federal Funds Rate changes, our proxy for monetary policy shocks, relate to corporate profitability. Our findings show that the net effect of consumers' and managers' responses leads to an initially negative association between monetary policy shocks and both corporate revenues and expenses. The revenue effect is consistent with a substitution effect as consumers adjust purchases after unexpected rate changes. Similarly, the expense effect is consistent with a cost of capital effect on corporate expenses as managers adjust investments. The effect concentrates in the cash component and is weakened (strengthened) by accrual revenues (expenses).

We observe that the expense effect exceeds the revenue effect in the current and subsequent quarter, yielding a positive relation between unexpected rate changes and corporate profits. Two quarters after the shock the revenue and expense effects partially reverse in a balanced way, resulting in no further net effect on corporate profits. We complement these baseline findings with evidence that the documented effects vary with consumers' and firms' financial constraints, firms' business model, and the accounting treatment of firms' investments. We find significantly larger effects when consumers are financially constrained, for business-to-consumer firms, financially stable firms, and technology firms, suggesting substantial heterogeneity in firms' responses to monetary policy shocks. Finally, we show how the documented effects flow through specific expense accounts. Our paper addresses the call for policy-related research on heterogeneous firm-level implications of monetary policy shocks and their transmission through the responses of both consumers and managers.

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Appendix A: Variable Definitions

Macroeconomic Variables

Variable	Description
Δr	Aggregate change in the Federal Funds Rate over the quarter.
Δr^u	Unexpected aggregate change in the Federal Funds Rate over the quarter estimated using futures market data as described in Kuttner (2001).
Δr^e	Expected aggregate change in the Federal Funds Rate over the quarter estimated using futures market data as described in Kuttner (2001).
Real GDP	Seasonally adjusted growth in real gross domestic product (FRED: GDPC1_PC1).
Macro Uncertainty	Cross-sectional dispersion of real GDP forecasts (SPF: RGDP_D2(T)).
GDP News	Change in the median forecast for next quarter's real GDP growth (SPF: $DRGDP2_t - DRGDP3_{t-1}$).
Inflation News	Change in the median forecast for next quarter's real GDP deflator inflation (SPF: $(1+DNGDP2_t/100)/(1+DRGDP2_t/100) - (1+DNGDP3_{t-1}/100)/(1+DRGDP3_{t-1}/100)$).
Unemployment News	Change in the median forecast for next quarter's unemployment (SPF: UNEMP2t – UNEMP3t-1).
Household Debt	Indicator that total consumer credit owned and securitized (FRED: TOTALSL) scaled by GDP (FRED: GDP) is above the 75th percentile for our sample period.

Firm-Level Variables

Variable	Definition
ΔRevenues	Seasonally adjusted change in revenues (Compustat: $SALEQ_t$) scaled by average total assets.
ΔCash Revenues	Seasonally adjusted change in accrual revenues (Compustat: *ΔRevenues* – *ΔAccrual Revenues*).
ΔAccrual Revenues	Seasonally adjusted change in accrual revenues (Compustat: $RECTQ_t - RECTQ_{t-1}$) scaled by average total assets.
ΔExpenses	Seasonally adjusted change in net expenses (Compustat: *ΔRevenues* – *ΔEarnings*) scaled by average total assets.
ΔCash Expenses	Seasonally adjusted change in cash expenses (Compustat: *ΔCash Revenues* – *ΔCash Earnings*) scaled by average total assets.
ΔAccrual Expenses	Seasonally adjusted change in accrual expenses (Compustat: *ΔAccrual Revenues* – *ΔAccrual Earnings*) scaled by average total assets.
ΔEarnings	Seasonally adjusted change in earnings (Compustat: IBQ_t) scaled by average total assets.
ΔCash Earnings	Seasonally adjusted change in cash earnings (Compustat: $CHECHQ_t$ + *ΔDividends*) scaled by average total assets.
ΔAccrual Earnings	Seasonally adjusted change in accrual earnings (Compustat: *ΔEarnings* – *ΔCash Earnings*) scaled by average total assets.
ΔCOGS	Seasonally adjusted change in cost of goods sold (Compustat: $COGSQ_t$) scaled by average total assets.
ΔSG&A	Seasonally adjusted change in sales, general and administrative expenses (Compustat: $XSGAQ_t$) scaled by average total assets.
ΔDepreciation	Seasonally adjusted change in depreciation expense (Compustat: DPQ_t) scaled by average total assets.
Log(Total Assets)	Log average total assets (Compustat: $\log(ATQ_t)$).

⊿Dividends	Seasonally adjusted change in distributions to owners (Compustat: IBQ_t – ((ATQ_t – LTQ_t) – (ATQ_{t-1} – LTQ_{t-1}))) scaled by average total assets.
Dividend Payer	Indicator that the firm pays a dividend.
Loss	Indicator that the firm is making a loss.
B2C	Indicator that the firm is a member of an industry that less 75% or more of its output to end consumers according to the Bureau of Economic Analysis 405 industries Use table for 2007 (4-digit SIC codes: 8748, 8299, 8299, 8249, 8244, 8243, 8243, 8071, 7997, 7993, 7992, 7991, 7933, 7911, 7521, 7389, 7384, 7331, 7299, 7251, 5812, 5461, 4899, 4493, 3999, 3961, 3949, 3944, 3942, 3915, 3914, 3911, 3751, 3692, 3479, 3172, 3069, 2844, 2835, 2834, 2771, 2741, 2099, 2099, 2096, 2087, 2085, 2084, 2068, 2053, 2052, 2051, 2038, 2037, 2034, 2032, 2015, 0752, 0742, 0741, 0182, 0181, 0161, 0139, 0134, 8734, 8699, 8661, 8641, 8422, 8412, 8399, 8361, 8361, 8351, 8322, 8222, 8221, 8099, 8093, 8092, 8082, 8069, 8063, 8062, 8059, 8052, 8051, 8049, 8043, 8042, 8041, 8031, 8021, 8011, 7996, 7993, 7389, 7299, 7261, 7241, 7231, 6798, 6733, 6732, 6726, 6722, 6553, 6531, 6371, 6331, 6324, 6321, 6311, 5995, 5812, 5712, 5699, 5149, 3999, 3851, 3716, 3199, 3172, 3171, 3161, 3151, 3149, 3144, 3143, 3142, 3131, 3111, 3069, 3021, 2986, 2711, 2591, 2519, 2515, 2514, 2514, 2512, 2511, 2499, 2399, 2396, 2395, 2389, 2387, 2386, 2385, 2384, 2381, 2371, 2369, 2361, 2353, 2342, 2341, 2339, 2337, 2335, 2331, 2329, 2326, 2325, 2323, 2322, 2321, 2311, 2259, 2254, 2253, 2252, 2251, 2141, 2131, 2121, 2111, 2099, 2098, 2097, 2082, 2052, 2047, 2045, 2043).
Financially Stable	Indicator that the firm's leverage (Compustat: ($DLTTQ_t$+$DLCQ_t$)/ATQ_t)) is below the 25th percentile for the quarter.
Technology	Indicator that the firm is a member of the communications, computer, or measuring equipment industries according to the Fama and French (1997) 48 industries classification (4-digit SIC codes: 4800, 4810:4813, 4820:4822, 4830:4839, 4840:4841, 4880:4889, 4890:4892, 4899, 3570:3579, 3680:3689, 3695, 7373, 3811, 3820:3839).

Figure 1. Hypotheses Development

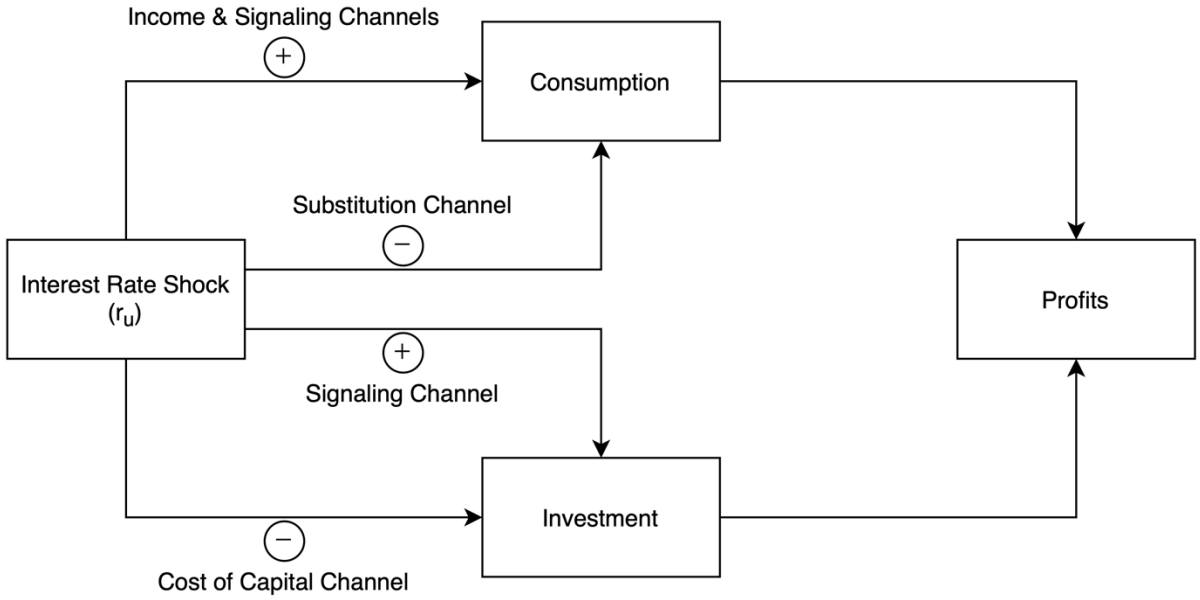

Figure 1 illustrates our hypotheses development. The figure outlines the four possible pathways in which an interest rate shock can affect profits:

1. The income and signaling channels outweigh the substitution channel (consumers purchase more), and the cost of capital channel outweighs the signaling channel (managers invest less). As a result, profits increase.
2. The income and signaling channels outweigh the substitution channel (consumers purchase more), and the signaling channel outweighs the cost of capital channel (managers invest more). The net effect on profits is uncertain.
3. The substitution and signaling channels outweigh the income channel (consumers purchase less), and the cost of capital channel outweighs the signaling channel (managers invest less). The net effect on profits is uncertain.
4. The substitution and signaling channels outweigh the income channel (consumers purchase less), and the signaling channel outweighs the cost of capital channel (managers invest more). As a result, profits decrease.

Figure 2. Federal Funds Rate Changes

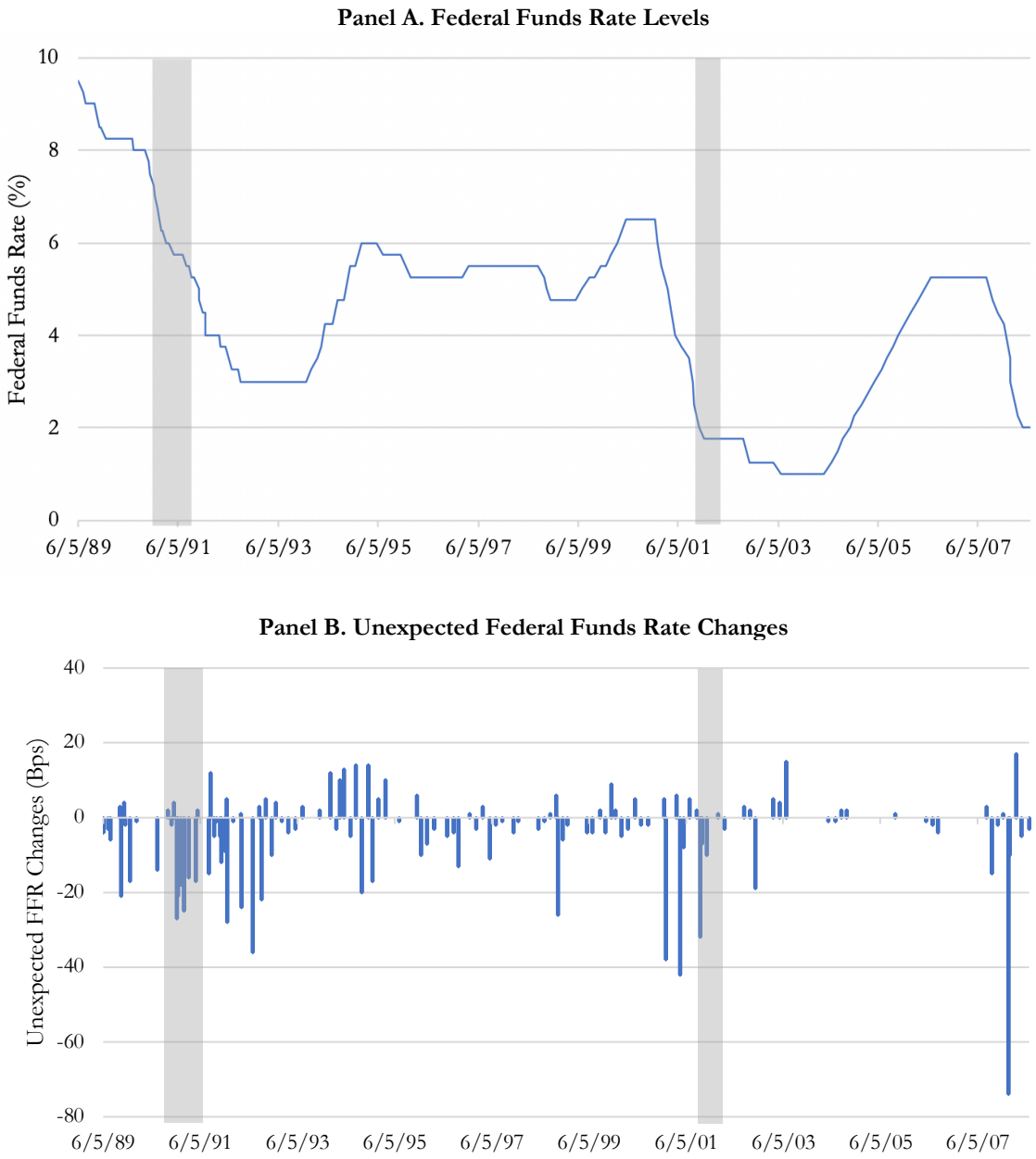

Figure 2 Panel A plots the development of the Federal Funds Rate from 1989 to 2007. Panel B plots unexpected Federal Funds Rate changes as estimated in Kuttner (2001). National Bureau of Economic Research recessions are shaded in grey.

Table 1. Descriptive Statistics

Variable	N	Mean	StD	P1	P25	Median	P75	P99
Macro Variables								
Δr	223,487	-0.09	0.52	-2.00	-0.25	0.00	0.25	0.75
Δr^{a}	223,487	-0.07	0.16	-0.67	-0.09	-0.01	0.00	0.23
Δr^{e}	223,487	-0.02	0.41	-1.33	-0.17	0.00	0.23	0.78
Real GDP	223,487	3.01	1.38	-0.95	2.14	3.22	4.23	5.24
Macro Uncertainty	223,487	0.89	0.32	0.38	0.72	0.83	0.98	2.32
GDP News	223,487	-0.25	0.93	-4.71	-0.66	-0.20	0.34	1.33
Inflation News	223,487	0.03	0.36	-0.81	-0.18	-0.01	0.24	0.75
Unemployment News	223,487	-0.04	0.17	-0.30	-0.15	-0.03	0.03	0.70
Firm Variables								
Δ*Revenues*	223,487	0.03	0.11	-0.35	-0.01	0.02	0.06	0.49
Δ*Cash Revenues*	223,487	0.03	0.12	-0.42	-0.01	0.02	0.06	0.52
Δ*Accrual Revenues*	223,487	0.00	0.06	-0.24	-0.02	0.00	0.02	0.26
Δ*Expenses*	223,487	0.03	0.17	-0.64	-0.01	0.02	0.06	0.72
Δ*Cash Expenses*	223,487	0.03	0.22	-0.80	-0.04	0.02	0.08	0.92
Δ*Accrual Expenses*	223,487	0.00	0.18	-0.74	-0.04	0.00	0.04	0.73
Δ*Earnings*	223,487	0.00	0.11	-0.45	-0.01	0.00	0.01	0.48
Δ*Cash Earnings*	223,487	0.00	0.17	-0.73	-0.03	0.00	0.03	0.68
Δ*Accrual Earnings*	223,487	0.00	0.18	-0.72	-0.04	0.00	0.04	0.76
Δ*COGS*	223,487	0.02	0.09	-0.28	-0.01	0.01	0.04	0.38
Δ*SG&A*	223,487	0.01	0.05	-0.23	0.00	0.00	0.01	0.25
Δ*Depreciation*	223,487	0.00	0.01	-0.03	0.00	0.00	0.00	0.03
Log(Total Assets)	223,487	4.67	2.31	-1.12	3.09	4.68	6.25	10.11
Δ*Dividends*	223,487	0.00	0.18	-0.80	-0.01	0.00	0.01	0.76
Dividend Payer	223,487	0.27	0.44	0.00	0.00	0.00	1.00	1.00
Loss	223,487	0.38	0.49	0.00	0.00	0.00	1.00	1.00

Table 1 presents the descriptive statistics. Appendix A lists all variable definitions.

Table 2. Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Δr	1	1.00	0.78*	0.97*	0.57*	-0.22*	0.65*	0.12*	-0.52*	0.07*	0.05*	0.03*	0.04*	0.05*	-0.02*	0.01*	-0.02*	0.03*	0.00	-0.02*	0.00	-0.06*
Δr^m	2	0.60*	1.00	0.61*	0.40*	-0.16*	0.44*	-0.02*	-0.41*	0.04*	0.03*	0.02*	0.02*	0.03*	-0.01*	0.01*	-0.02*	0.02*	0.01*	-0.02*	-0.01*	-0.03*
Δr^e	3	0.95*	0.38*	1.00	0.58*	-0.22*	0.65*	0.17*	-0.50*	0.07*	0.06*	0.02*	0.05*	0.05*	-0.01*	0.00	-0.02*	0.02*	0.00	-0.02*	0.01*	-0.06*
Real GDP	4	0.55*	0.28*	0.59*	1.00	-0.28*	0.53*	-0.09*	-0.45*	0.08*	0.07*	0.01*	0.06*	0.06*	-0.01*	-0.01*	-0.02*	0.01*	0.00	-0.01*	0.00	-0.05*
Macro Uncertainty	5	-0.20*	-0.19*	-0.22*	-0.24*	1.00	-0.13*	0.06*	0.13*	-0.05*	-0.05*	0.00	-0.04*	-0.03*	0.00	0.00	0.01*	0.00	-0.03*	0.00	0.00	0.03*
GDP News	6	0.58*	0.37*	0.58*	0.54*	-0.05*	1.00	-0.04*	-0.71*	0.05*	0.03*	0.02*	0.03*	0.03*	-0.01*	0.00	-0.02*	0.02*	0.00	-0.03*	0.00	-0.05*
Inflation News	7	0.16*	-0.02*	0.18*	-0.14*	-0.02*	-0.16*	1.00	-0.01*	0.01*	0.01*	0.00	0.01*	0.00	0.00	0.00	0.00	0.00	0.03*	0.01*	0.00	-0.01*
Unemployment News	8	-0.46*	-0.25*	-0.48*	-0.46*	0.12*	-0.61*	0.10*	1.00	-0.05*	-0.04*	-0.02*	-0.04*	-0.03*	0.00	0.00	0.01*	-0.01*	-0.01*	0.01*	0.00	0.04*
ΔRevenues	9	0.10*	0.05*	0.10*	0.11*	-0.07*	0.05*	0.01*	-0.06*	1.00	0.82*	0.18*	0.66*	0.52*	0.00	0.11*	-0.01*	0.07*	0.01*	-0.02*	-0.01*	-0.23*
ΔCash Revenues	10	0.08*	0.03*	0.08*	0.09*	-0.07*	0.03*	0.01*	-0.05*	0.78*	1.00	-0.38*	0.58*	0.55*	-0.11*	0.05*	0.09*	-0.06*	0.02*	0.04*	0.00	-0.18*
ΔAccrual Revenues	11	0.03*	0.03*	0.03*	0.02*	0.00	0.03*	-0.01	-0.02*	0.18*	-0.32*	1.00	0.07*	-0.10*	0.18*	0.10*	-0.16*	0.22*	-0.02*	-0.09*	-0.01	-0.05*
ΔExpenses	12	0.08*	0.03*	0.08*	0.10*	-0.07*	0.04*	0.01*	-0.05*	0.77*	0.65*	0.10*	1.00	0.55*	0.24*	-0.63*	-0.19*	-0.22*	0.01*	-0.16*	0.00	-0.05*
ΔCash Expenses	13	0.07*	0.03*	0.07*	0.08*	-0.05*	0.04*	0.01*	-0.04*	0.56*	0.61*	-0.09*	0.56*	1.00	-0.62*	-0.18*	-0.75*	0.56*	0.00	-0.57*	0.00	-0.09*
ΔAccrual Expenses	14	-0.02*	-0.02*	-0.02*	-0.01*	0.00	-0.02*	0.00	0.00	-0.01*	-0.15*	0.25*	0.14*	-0.61*	1.00	-0.33*	0.67*	-0.90*	0.00	0.49*	0.00	0.06*
ΔEarnings	15	0.05*	0.04*	0.04*	0.02*	-0.01*	0.02*	0.00	-0.02*	0.32*	0.21*	0.15*	-0.18*	0.06*	-0.22*	1.00	0.25*	0.38*	-0.01*	0.19*	-0.01*	-0.16*
ΔCash Earnings	16	-0.02*	-0.01*	-0.02*	-0.02*	0.00	-0.03*	0.00	0.01*	0.01*	0.12*	-0.19*	-0.08*	-0.59*	0.63*	0.13*	1.00	-0.74*	0.01*	0.72*	0.00	-0.03*
ΔAccrual Earnings	17	0.04*	0.03*	0.03*	0.02*	0.00	0.03*	0.00	-0.02*	0.12*	-0.03*	0.25*	-0.07*	0.53*	-0.78*	0.33*	-0.78*	1.00	-0.01*	-0.52*	0.00	-0.08*
Log(Total Assets)	18	0.01*	0.02*	0.01*	-0.01*	-0.03*	0.00	0.03*	-0.01*	0.03*	0.02*	-0.01*	0.00	0.01*	0.00	-0.01*	-0.01	0.00	1.00	0.01*	0.41*	-0.31*
ΔDividends	19	-0.02*	-0.02*	-0.02*	-0.01*	0.00	-0.05*	0.02*	0.02*	-0.04*	0.02*	-0.11*	-0.07*	-0.33*	0.33*	0.02*	0.47*	-0.40*	0.01*	1.00	0.00	-0.01*
Dividend Payer	20	-0.01*	-0.02*	0.00	0.00	0.00	-0.01*	0.00	0.00	0.00	-0.01*	0.00	-0.02*	0.00	0.00	-0.02*	-0.01*	0.00	0.40*	0.01*	1.00	-0.25*
Loss	21	-0.04*	-0.01*	-0.05*	-0.05*	0.03*	-0.03*	-0.01*	0.03*	-0.29*	-0.23*	-0.06*	-0.10*	-0.15*	0.09*	-0.34*	-0.02*	-0.13*	-0.30*	0.00	-0.25*	1.00

Table 2 presents the correlations between our main variables of interest. * indicates significance at the 1% level. Pearson (Spearman) correlations are above (below) the diagonal. Appendix A lists all variable definitions.

Table 3. Monetary Policy Shocks and Revenues, Expenses, and Earnings

Panel A. Total Revenues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\Delta Revenues_t$		$\Delta Revenues_{t+1}$		$\Delta Revenues_{t+2}$		$\Delta Revenues_{t+3}$	
Δr_t	0.004*		0.006*		0.013***		0.013***	
	(1.75)		(1.83)		(6.24)		(5.50)	
$\boldsymbol{\Delta r_t^u}$		**-0.010****		**-0.007**		**0.013****		**0.015****
		(-2.01)		**(-1.25)**		**(2.41)**		**(2.39)**
Δr_t^e		0.010***		0.011***		0.014***		0.013***
		(4.25)		(4.02)		(5.60)		(4.15)
Real GDP$_t$	0.005***	0.005***	0.005***	0.004***	0.003***	0.003***	0.001	0.001
	(5.60)	(5.34)	(5.78)	(5.45)	(3.88)	(3.73)	(0.89)	(0.92)
Macro Uncertainty$_t$	-0.005	-0.004	-0.005**	-0.005**	-0.008***	-0.008***	-0.011***	-0.012***
	(-1.48)	(-1.48)	(-2.11)	(-2.11)	(-4.78)	(-4.80)	(-5.96)	(-5.94)
GDP News$_t$	-0.003*	-0.003**	-0.000	-0.001	-0.000	-0.000	0.000	0.000
	(-1.85)	(-2.35)	(-0.28)	(-0.87)	(-0.32)	(-0.35)	(0.33)	(0.37)
Inflation News$_t$	0.001	-0.001	0.001	-0.001	-0.002	-0.002	-0.005**	-0.005**
	(0.33)	(-0.47)	(0.31)	(-0.55)	(-1.36)	(-1.40)	(-2.15)	(-2.13)
Unemployment News$_t$	-0.010*	-0.012**	-0.004	-0.006*	0.002	0.002	0.005	0.005
	(-1.93)	(-2.15)	(-1.24)	(-1.82)	(0.69)	(0.65)	(1.16)	(1.14)
Log(Total Assets)$_t$	-0.015***	-0.015***	-0.021***	-0.020***	-0.026***	-0.026***	-0.031***	-0.031***
	(-12.25)	(-12.17)	(-15.17)	(-14.98)	(-18.35)	(-18.49)	(-19.08)	(-19.25)
$\Delta Dividends_t$	-0.010***	-0.010***	-0.023***	-0.023***	-0.025***	-0.025***	-0.023***	-0.023***
	(-4.31)	(-4.35)	(-10.16)	(-10.18)	(-10.60)	(-10.59)	(-11.19)	(-11.18)
Dividend Payer$_t$	0.002	0.002	0.001	0.001	0.000	0.000	0.001	0.001
	(1.02)	(0.95)	(0.41)	(0.35)	(0.23)	(0.23)	(0.57)	(0.58)
Loss$_t$	-0.058***	-0.058***	-0.039***	-0.038***	-0.026***	-0.026***	-0.013***	-0.013***
	(-39.14)	(-39.12)	(-26.61)	(-26.59)	(-22.48)	(-22.50)	(-10.86)	(-10.88)
Constant	0.108***	0.106***	0.127***	0.126***	0.158***	0.158***	0.183***	0.184***
	(14.59)	(14.46)	(17.48)	(17.33)	(22.63)	(23.10)	(23.60)	(23.89)
Observations	223,487	223,487	213,775	213,775	205,826	205,826	198,642	198,642
Adjusted R-squared	0.226	0.227	0.213	0.213	0.208	0.208	0.206	0.206
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel B. Cash Revenues

Variable	(1) $\Delta Cash\ Revenues_t$	(2) $\Delta Cash\ Revenues_t$	(3) $\Delta Cash\ Revenues_{t+1}$	(4) $\Delta Cash\ Revenues_{t+1}$	(5) $\Delta Cash\ Revenues_{t+2}$	(6) $\Delta Cash\ Revenues_{t+2}$	(7) $\Delta Cash\ Revenues_{t+3}$	(8) $\Delta Cash\ Revenues_{t+3}$
Δr_t	0.003		0.003		0.012***		0.015***	
	(1.25)		(1.16)		(6.44)		(5.85)	
Δr_t^{μ}		**-0.014****		**-0.016*****		**0.009***		**0.013****
		(-2.48)		**(-3.15)**		**(1.69)**		**(2.26)**
Δr_t^{ε}		0.010***		0.011***		0.013***		0.015***
		(3.71)		(4.41)		(6.18)		(5.34)
Real GDP$_t$	0.005***	0.005***	0.005***	0.004***	0.004***	0.003***	0.002***	0.002**
	(4.82)	(4.62)	(5.66)	(5.33)	(4.56)	(4.36)	(2.75)	(2.63)
Macro Uncertainty$_t$	-0.005	-0.005	-0.004	-0.004	-0.006***	-0.006***	-0.010***	-0.010***
	(-1.51)	(-1.52)	(-1.43)	(-1.37)	(-3.51)	(-3.51)	(-5.35)	(-5.41)
GDP News$_t$	-0.004*	-0.004**	-0.000	-0.001	-0.001	-0.001	-0.001	-0.001
	(-1.91)	(-2.26)	(-0.26)	(-0.93)	(-1.25)	(-1.44)	(-1.06)	(-1.10)
Inflation News$_t$	0.001	-0.001	0.001	-0.001	-0.000	-0.000	-0.005**	-0.005**
	(0.45)	(-0.35)	(0.36)	(-0.81)	(-0.00)	(-0.21)	(-2.33)	(-2.37)
Unemployment News$_t$	-0.010	-0.012	-0.010**	-0.012***	-0.003	-0.003	0.006*	0.006*
	(-1.26)	(-1.45)	(-2.01)	(-2.77)	(-0.70)	(-0.79)	(1.88)	(1.74)
Log(Total Assets)$_t$	-0.011***	-0.011***	-0.016***	-0.015***	-0.022***	-0.022***	-0.027***	-0.027***
	(-9.15)	(-9.07)	(-12.54)	(-12.44)	(-16.86)	(-16.87)	(-18.19)	(-18.25)
$\Delta Dividends_t$	0.027***	0.027***	-0.020***	-0.020***	-0.022***	-0.022***	-0.023***	-0.023***
	(9.72)	(9.70)	(-7.54)	(-7.56)	(-8.60)	(-8.61)	(-9.81)	(-9.80)
Dividend Payer$_t$	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
	(1.05)	(0.98)	(0.46)	(0.36)	(0.65)	(0.63)	(0.58)	(0.57)
Loss$_t$	-0.047***	-0.047***	-0.042***	-0.042***	-0.030***	-0.030***	-0.018***	-0.018***
	(-35.72)	(-35.71)	(-32.87)	(-32.89)	(-25.18)	(-25.18)	(-15.71)	(-15.72)
Constant	0.083***	0.081***	0.103***	0.101***	0.132***	0.131***	0.158***	0.158***
	(10.74)	(10.66)	(14.87)	(14.65)	(20.05)	(20.40)	(22.30)	(22.57)
Observations	223,487	223,487	213,376	213,376	204,444	204,444	197,135	197,135
Adjusted R-squared	0.170	0.171	0.171	0.172	0.169	0.169	0.167	0.167
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel C. Accrual Revenues

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\perp Accrual\ Revenues_t$		$\perp Accrual\ Revenues_{t+1}$		$\perp Accrual\ Revenues_{t+2}$		$\perp Accrual\ Revenues_{t+3}$	
$\perp r_t$	0.002		0.003**		0.002**		-0.001	
	(1.42)		(2.13)		(2.05)		(-1.38)	
$\boldsymbol{\Delta r_t^u}$		**0.003**		**0.009*** **		**0.005** **		**0.001**
		(1.35)		**(3.23)**		**(2.01)**		**(0.56)**
$\perp r_t^e$		0.001		-0.000		0.001		-0.002*
		(0.69)		(-0.14)		(0.75)		(-1.67)
Real GDP$_t$	-0.000	0.000	-0.000	-0.000	-0.001***	-0.001***	-0.001***	-0.001***
	(-0.03)	(0.06)	(-0.55)	(-0.17)	(-3.22)	(-3.08)	(-4.07)	(-3.83)
Macro Uncertainty$_t$	0.001	0.001	-0.001	-0.001	-0.002**	-0.002***	-0.002*	-0.002*
	(1.06)	(1.05)	(-0.44)	(-0.53)	(-2.57)	(-2.67)	(-1.73)	(-1.78)
GDP News$_t$	0.001	0.001	0.000	0.000	0.001	0.001	0.001**	0.001**
	(1.34)	(1.38)	(0.16)	(0.66)	(1.24)	(1.57)	(2.45)	(2.60)
Inflation News$_t$	-0.000	-0.000	-0.000	0.000	-0.002**	-0.002**	-0.000	0.000
	(-0.44)	(-0.20)	(-0.24)	(0.45)	(-2.56)	(-2.33)	(-0.06)	(0.21)
Unemployment News$_t$	0.000	0.001	0.005**	0.006**	0.005**	0.005**	-0.001	-0.001
	(0.09)	(0.14)	(2.16)	(2.46)	(2.53)	(2.64)	(-0.49)	(-0.39)
Log(Total Assets)$_t$	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	(-12.44)	(-12.31)	(-12.97)	(-13.68)	(-13.41)	(-14.02)	(-12.85)	(-13.12)
$\perp Dividends_t$	-0.032***	-0.032***	-0.005***	-0.004***	-0.003**	-0.003**	0.000	0.000
	(-19.54)	(-19.56)	(-3.04)	(-3.01)	(-2.26)	(-2.25)	(0.28)	(0.29)
Dividend Payer$_t$	-0.000	-0.000	0.000	0.000	-0.001*	-0.001*	0.000	0.000
	(-0.26)	(-0.22)	(0.03)	(0.18)	(-1.75)	(-1.69)	(0.01)	(0.06)
Loss$_t$	-0.010***	-0.010***	0.004***	0.004***	0.003***	0.003***	0.005***	0.005***
	(-18.41)	(-18.37)	(7.21)	(7.23)	(6.49)	(6.48)	(9.25)	(9.25)
Constant	0.026***	0.026***	0.026***	0.026***	0.028***	0.029***	0.028***	0.028***
	(10.75)	(10.80)	(10.15)	(10.48)	(15.86)	(17.23)	(12.80)	(13.10)
Observations	223,487	223,487	214,072	214,072	205,198	205,198	197,999	197,999
Adjusted R-squared	-0.002	-0.002	-0.012	-0.012	-0.012	-0.012	-0.014	-0.014
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Table 3 presents the results of estimating different specifications of Eq. (9) and (10). We regress seasonally adjusted current and future total revenues ($\perp$*Revenues*) in Panel A, seasonally adjusted current and future cash revenues ($\perp$*Cash Revenues*) in Panel B, and seasonally adjusted current and future accrual revenues ($\perp$*Accrual Revenues*) in Panel C on FFR changes ($\perp r_t$), the unexpected component of FFR changes ($\perp r_t^u$), the expected component of FFR changes ($\perp r_t^e$), control variables, and firm fixed effects. Appendix A lists all variable definitions. Standard errors are clustered by firm and quarter. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10% levels.

Table 4. Monetary Policy Shocks and Expenses

Panel A. Total Expenses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\Delta Expenses_t$		$\Delta Expenses_{t+1}$		$\Delta Expenses_{t+2}$		$\Delta Expenses_{t+3}$	
Δr_t	0.001		0.001		0.010***		0.014***	
	(0.45)		(0.30)		(4.10)		(5.37)	
$\boldsymbol{\Delta r_t^u}$		**-0.024*** **		**-0.018*** **		**0.008**		**0.015***
		(-3.14)		**(-2.89)**		**(1.16)**		**(1.77)**
Δr_t^e		0.012***		0.009***		0.011***		0.014***
		(3.39)		(3.09)		(3.81)		(3.40)
Real GDP$_t$	0.007***	0.006***	0.007***	0.006***	0.005***	0.005***	0.002***	0.002***
	(5.02)	(4.76)	(5.63)	(5.44)	(4.51)	(4.42)	(2.94)	(2.95)
Macro Uncertainty$_t$	-0.006	-0.005	-0.007*	-0.007*	-0.009***	-0.009***	-0.013***	-0.013***
	(-1.17)	(-1.12)	(-1.80)	(-1.80)	(-2.84)	(-2.84)	(-3.39)	(-3.32)
GDP News$_t$	-0.003	-0.004	-0.000	-0.001	0.001	0.001	-0.001	-0.001
	(-1.14)	(-1.52)	(-0.03)	(-0.52)	(0.42)	(0.36)	(-0.48)	(-0.48)
Inflation News$_t$	0.003	0.000	0.003	0.001	-0.000	-0.001	-0.005**	-0.005**
	(1.01)	(0.14)	(1.17)	(0.32)	(-0.18)	(-0.28)	(-2.40)	(-2.21)
Unemployment News$_t$	-0.013	-0.016	-0.009	-0.012*	0.006	0.006	-0.000	-0.000
	(-1.02)	(-1.20)	(-1.40)	(-1.78)	(1.12)	(1.05)	(-0.04)	(-0.04)
Log(Total Assets)$_t$	-0.008***	-0.008***	-0.016***	-0.016***	-0.024***	-0.024***	-0.032***	-0.032***
	(-5.05)	(-4.88)	(-10.10)	(-10.03)	(-14.29)	(-14.24)	(-16.81)	(-16.64)
$\Delta Dividends_t$	-0.138***	-0.138***	-0.062***	-0.062***	-0.053***	-0.053***	-0.037***	-0.037***
	(-12.41)	(-12.43)	(-10.53)	(-10.56)	(-9.85)	(-9.85)	(-7.85)	(-7.85)
Dividend Payer$_t$	0.010***	0.010***	0.008***	0.007***	0.006***	0.006***	0.005***	0.005***
	(4.49)	(4.43)	(3.70)	(3.64)	(2.88)	(2.86)	(2.66)	(2.66)
Loss$_t$	-0.003	-0.003	-0.024***	-0.024***	-0.024***	-0.024***	-0.023***	-0.023***
	(-1.17)	(-1.15)	(-15.28)	(-15.27)	(-17.81)	(-17.79)	(-17.95)	(-17.99)
Constant	0.047***	0.044***	0.094***	0.092***	0.137***	0.137***	0.183***	0.183***
	(4.38)	(4.15)	(10.36)	(10.27)	(16.26)	(16.24)	(20.54)	(19.81)
Observations	223,487	223,487	213,737	213,737	205,783	205,783	198,593	198,593
Adjusted R-squared	0.151	0.151	0.141	0.141	0.144	0.144	0.150	0.150
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel B. Cash Expenses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\Delta Cash\ Expenses_t$		$\Delta Cash\ Expenses_{t+1}$		$\Delta Cash\ Expenses_{t+2}$		$\Delta Cash\ Expenses_{t+3}$	
Δr_t	0.002		0.005		0.012***		0.015***	
	(0.67)		(1.31)		(4.36)		(4.76)	
$\boldsymbol{\Delta r_t^u}$		**-0.022*** (-3.04)**		**-0.009 (-1.22)**		**0.010 (1.15)**		**0.025** (2.43)**
Δr_t^e		0.012***		0.010***		0.012***		0.011**
		(2.95)		(2.87)		(3.03)		(2.31)
Real GDP$_t$	0.008***	0.007***	0.005***	0.005***	0.003***	0.003***	0.001	0.001
	(5.62)	(5.23)	(5.07)	(4.90)	(2.98)	(2.93)	(0.79)	(0.94)
Macro Uncertainty$_t$	-0.005	-0.005	-0.008**	-0.008**	-0.011***	-0.011***	-0.018***	-0.018***
	(-1.26)	(-1.17)	(-2.02)	(-2.07)	(-3.55)	(-3.54)	(-5.96)	(-5.85)
GDP News$_t$	-0.004	-0.005**	0.002	0.001	0.002	0.002	-0.001	-0.001
	(-1.65)	(-2.08)	(1.25)	(0.87)	(1.15)	(1.08)	(-0.77)	(-0.55)
Inflation News$_t$	0.006**	0.004	0.001	-0.000	-0.002	-0.002	-0.006*	-0.005
	(2.08)	(1.25)	(0.49)	(-0.05)	(-0.88)	(-0.90)	(-1.94)	(-1.63)
Unemployment News$_t$	-0.007	-0.010	-0.001	-0.003	0.005	0.005	0.001	0.002
	(-0.68)	(-0.92)	(-0.24)	(-0.53)	(0.62)	(0.58)	(0.12)	(0.27)
Log(Total Assets)$_t$	-0.012***	-0.012***	-0.024***	-0.024***	-0.033***	-0.033***	-0.042***	-0.042***
	(-7.85)	(-7.73)	(-14.68)	(-14.57)	(-18.15)	(-18.09)	(-19.91)	(-19.82)
$\Delta Dividends_t$	-0.689***	-0.689***	-0.103***	-0.103***	-0.069***	-0.069***	-0.044***	-0.044***
	(-61.64)	(-61.58)	(-13.89)	(-13.92)	(-10.48)	(-10.49)	(-6.96)	(-6.96)
Dividend Payer$_t$	0.005**	0.005**	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000
	(2.54)	(2.46)	(-0.42)	(-0.48)	(-0.29)	(-0.30)	(-0.13)	(-0.08)
Loss$_t$	-0.038***	-0.038***	-0.044***	-0.044***	-0.034***	-0.034***	-0.023***	-0.023***
	(-22.42)	(-22.47)	(-24.82)	(-24.77)	(-20.14)	(-20.15)	(-15.85)	(-15.89)
Constant	0.077***	0.074***	0.144***	0.143***	0.195***	0.195***	0.241***	0.243***
	(7.46)	(7.23)	(16.28)	(16.16)	(21.31)	(21.11)	(22.95)	(22.79)
Observations	223,487	223,487	212,721	212,721	203,440	203,440	196,111	196,111
Adjusted R-squared	0.387	0.387	0.099	0.099	0.094	0.094	0.096	0.096
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel C. Accrual Expenses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\Delta Accrual\ Expenses_t$		$\Delta Accrual\ Expenses_{t+1}$		$\Delta Accrual\ Expenses_{t+2}$		$\Delta Accrual\ Expenses_{t+3}$	
Δr_t	-0.001		-0.004**		-0.001		-0.000	
	(-0.46)		(-2.17)		(-0.45)		(-0.23)	
$\boldsymbol{\Delta r_t^u}$		**-0.004**		**-0.010****		**-0.002**		**-0.010***
		(-1.01)		**(-2.31)**		**(-0.24)**		**(-1.76)**
Δr_t^e		0.001		-0.001		-0.001		0.003
		(0.34)		(-0.53)		(-0.17)		(1.14)
Real GDP$_t$	-0.001	-0.001	0.001*	0.001*	0.002**	0.002***	0.001**	0.001**
	(-1.47)	(-1.58)	(1.89)	(1.69)	(2.63)	(2.66)	(2.22)	(2.14)
Macro Uncertainty$_t$	-0.001	-0.001	0.000	0.000	0.001	0.001	0.005*	0.005**
	(-0.74)	(-0.73)	(0.13)	(0.19)	(0.66)	(0.66)	(1.93)	(2.14)
GDP News$_t$	0.001	0.001	-0.002	-0.002	-0.002	-0.002	0.001	0.001
	(0.93)	(0.77)	(-1.18)	(-1.34)	(-1.32)	(-1.34)	(0.88)	(0.55)
Inflation News$_t$	-0.001	-0.002	0.001	0.000	0.001	0.001	0.001	-0.000
	(-0.87)	(-1.13)	(0.60)	(0.26)	(0.78)	(0.77)	(0.44)	(-0.05)
Unemployment News$_t$	-0.004	-0.005	-0.008	-0.009	0.002	0.002	-0.001	-0.002
	(-0.85)	(-0.90)	(-1.08)	(-1.16)	(0.34)	(0.32)	(-0.13)	(-0.33)
Log(Total Assets)$_t$	0.003***	0.003***	0.006***	0.006***	0.008***	0.008***	0.009***	0.009***
	(3.04)	(3.09)	(5.40)	(5.56)	(6.80)	(6.86)	(8.23)	(8.29)
$\Delta Dividends_t$	0.504***	0.504***	0.047***	0.047***	0.016***	0.016***	0.002	0.002
	(69.95)	(69.94)	(6.91)	(6.89)	(2.81)	(2.82)	(0.29)	(0.28)
Dividend Payer$_t$	0.005***	0.005***	0.009***	0.009***	0.006***	0.006***	0.005***	0.005***
	(5.73)	(5.68)	(7.07)	(7.06)	(5.74)	(5.80)	(4.42)	(4.31)
Loss$_t$	0.035***	0.035***	0.020***	0.020***	0.010***	0.010***	-0.001	-0.001
	(20.35)	(20.35)	(14.24)	(14.26)	(9.58)	(9.59)	(-1.07)	(-1.06)
Constant	-0.023***	-0.023***	-0.043***	-0.044***	-0.051***	-0.052***	-0.054***	-0.055***
	(-4.64)	(-4.76)	(-6.91)	(-7.10)	(-7.40)	(-7.30)	(-8.03)	(-8.16)
Observations	223,487	223,487	212,867	212,867	203,590	203,590	196,288	196,288
Adjusted R-squared	0.246	0.246	0.010	0.010	0.004	0.004	0.002	0.002
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Table 4 presents the results of estimating different specifications of Eq. (9) and (10). We regress seasonally adjusted current and future total expenses (*ΔExpenses*) in Panel A, seasonally adjusted current and future cash expenses (*ΔCash Expenses*) in Panel B, and seasonally adjusted current and future accrual expenses (*ΔAccrual Expenses*) in Panel C on FFR changes (Δr_t), the unexpected component of FFR changes (Δr_t^u), the expected component of FFR changes (Δr_t^e), control variables, and firm fixed effects. Appendix A lists all variable definitions. Standard errors are clustered by firm and quarter. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10% levels.

Table 5. Monetary Policy Shocks and Earnings

Panel A. Total Earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\Delta Earnings_t$		$\Delta Earnings_{t+1}$		$\Delta Earnings_{t+2}$		$\Delta Earnings_{t+3}$	
Δr_t	0.003*		0.004***		0.003**		-0.001	
	(1.90)		(2.87)		(2.16)		(-0.58)	
$\boldsymbol{\Delta r_t^u}$		**0.013*** **		**0.011*** **		**0.006**		**0.001**
		(3.12)		**(2.87)**		**(1.35)**		**(0.28)**
Δr_t^e		-0.002		0.001		0.002		-0.002
		(-0.85)		(0.79)		(1.00)		(-0.67)
Real GDP$_t$	-0.001**	-0.001*	-0.002***	-0.001***	-0.002***	-0.002***	-0.002***	-0.002***
	(-2.24)	(-1.97)	(-2.95)	(-2.81)	(-3.16)	(-3.15)	(-2.98)	(-2.98)
Macro Uncertainty$_t$	0.001	0.001	0.002	0.001	0.000	0.000	0.001	0.001
	(0.44)	(0.33)	(0.81)	(0.78)	(0.15)	(0.13)	(0.31)	(0.29)
GDP News$_t$	0.000	0.001	0.000	0.000	-0.001	-0.001	0.001	0.001
	(0.17)	(0.46)	(0.04)	(0.30)	(-0.72)	(-0.62)	(0.95)	(0.99)
Inflation News$_t$	-0.002	-0.001	-0.002	-0.001	-0.002	-0.001	0.000	0.000
	(-1.56)	(-0.84)	(-1.53)	(-1.03)	(-1.21)	(-1.02)	(0.02)	(0.17)
Unemployment News$_t$	0.003	0.004	0.005	0.006	-0.002	-0.002	0.005	0.005
	(0.32)	(0.46)	(1.04)	(1.16)	(-0.61)	(-0.53)	(1.35)	(1.34)
Log(Total Assets)$_t$	-0.009***	-0.009***	-0.006***	-0.007***	-0.005***	-0.005***	-0.003**	-0.003**
	(-8.81)	(-8.92)	(-6.82)	(-7.02)	(-5.19)	(-5.30)	(-2.50)	(-2.53)
$\Delta Dividends_t$	0.107***	0.108***	0.033***	0.033***	0.026***	0.026***	0.013***	0.013***
	(12.92)	(12.93)	(7.00)	(7.01)	(6.19)	(6.19)	(3.25)	(3.25)
Dividend Payer$_t$	-0.008***	-0.008***	-0.007***	-0.006***	-0.005***	-0.005***	-0.004***	-0.004***
	(-9.90)	(-9.85)	(-8.03)	(-8.03)	(-6.19)	(-6.24)	(-4.56)	(-4.53)
Loss$_t$	-0.056***	-0.056***	-0.016***	-0.016***	-0.002**	-0.002**	0.011***	0.011***
	(-30.65)	(-30.72)	(-13.31)	(-13.35)	(-2.51)	(-2.51)	(12.80)	(12.79)
Constant	0.069***	0.070***	0.044***	0.044***	0.033***	0.034***	0.016***	0.016***
	(11.38)	(11.51)	(8.18)	(8.42)	(5.75)	(5.81)	(2.72)	(2.73)
Observations	223,487	223,487	213,884	213,884	205,939	205,939	198,775	198,775
Adjusted R-squared	0.117	0.117	0.052	0.052	0.048	0.048	0.051	0.051
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel B. Cash Earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	$\Delta Cash\ Earnings_t$		$\Delta Cash\ Earnings_{t+1}$		$\Delta Cash\ Earnings_{t+2}$		$\Delta Cash\ Earnings_{t+3}$	
Δr_t	0.000		-0.002		-0.000		-0.000	
	(0.15)		(-1.04)		(-0.14)		(-0.14)	
$\boldsymbol{\Delta r_t^{\mu}}$		**0.006***		**-0.008***		**-0.002**		**-0.009**
		(1.97)		**(-1.71)**		**(-0.36)**		**(-1.40)**
Δr_t^{ε}		-0.002		0.000		0.000		0.003
		(-1.02)		(0.07)		(0.15)		(1.22)
Real GDP$_t$	-0.002***	-0.002***	-0.000	-0.001	0.001	0.000	0.001	0.001
	(-4.55)	(-4.05)	(-0.74)	(-0.88)	(0.89)	(0.84)	(1.36)	(1.21)
Macro Uncertainty$_t$	-0.000	-0.000	0.003	0.003	0.005**	0.005**	0.007***	0.008***
	(-0.06)	(-0.12)	(1.62)	(1.58)	(2.45)	(2.40)	(4.24)	(4.11)
GDP News$_t$	0.000	0.001	-0.002*	-0.002**	-0.003**	-0.003**	0.000	-0.000
	(0.29)	(0.58)	(-1.77)	(-2.06)	(-2.17)	(-2.12)	(0.02)	(-0.29)
Inflation News$_t$	-0.005***	-0.004***	-0.001	-0.001	0.002	0.002	0.001	-0.000
	(-3.60)	(-3.11)	(-0.29)	(-0.59)	(1.46)	(1.33)	(0.56)	(-0.06)
Unemployment News$_t$	-0.003	-0.002	-0.009	-0.010*	-0.005	-0.006	0.004	0.003
	(-0.73)	(-0.53)	(-1.65)	(-1.83)	(-0.88)	(-0.90)	(0.73)	(0.58)
Log(Total Assets)$_t$	-0.000	-0.001	0.006***	0.006***	0.009***	0.009***	0.012***	0.012***
	(-0.93)	(-1.10)	(6.45)	(6.59)	(8.57)	(8.49)	(10.44)	(10.25)
$\Delta Dividends_t$	0.688***	0.688***	0.080***	0.080***	0.046***	0.046***	0.019***	0.019***
	(79.87)	(79.80)	(11.88)	(11.85)	(9.37)	(9.37)	(3.24)	(3.23)
Dividend Payer$_t$	-0.003***	-0.003***	0.002	0.002	0.002	0.002	0.001	0.001
	(-5.17)	(-5.07)	(1.49)	(1.45)	(1.67)	(1.65)	(1.31)	(1.22)
Loss$_t$	-0.011***	-0.011***	-0.000	-0.000	0.004***	0.004***	0.005***	0.005***
	(-16.14)	(-16.27)	(-0.23)	(-0.22)	(4.02)	(4.03)	(4.84)	(4.85)
Constant	0.014***	0.015***	-0.031***	-0.032***	-0.052***	-0.052***	-0.070***	-0.071***
	(3.12)	(3.23)	(-5.84)	(-5.94)	(-8.91)	(-8.61)	(-10.53)	(-10.15)
Observations	223,487	223,487	213,179	213,179	204,152	204,152	196,922	196,922
Adjusted R-squared	0.510	0.510	0.026	0.026	0.015	0.015	0.016	0.016
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Panel C. Accrual Earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	Δ*Accrual Earnings*$_t$		Δ*Accrual Earnings*$_{t+1}$		Δ*Accrual Earnings*$_{t+2}$		Δ*Accrual Earnings*$_{t+3}$	
Δr_t	0.002		0.006**		0.003		-0.000	
	(1.05)		(2.34)		(1.21)		(-0.15)	
$\boldsymbol{\Delta r_t^u}$		**0.007***		**0.020*****		**0.007**		**0.011**
		(1.67)		**(3.16)**		**(0.86)**		**(1.64)**
Δr_t^e		-0.000		0.001		0.001		-0.005
		(-0.20)		(0.25)		(0.33)		(-1.61)
Real GDP$_t$	0.001	0.001	-0.001*	-0.001	-0.003***	-0.003***	-0.003***	-0.002***
	(1.19)	(1.35)	(-1.73)	(-1.43)	(-3.30)	(-3.25)	(-3.28)	(-3.19)
Macro Uncertainty$_t$	0.002	0.002	-0.001	-0.001	-0.004	-0.004	-0.006**	-0.007***
	(0.88)	(0.87)	(-0.27)	(-0.35)	(-1.59)	(-1.60)	(-2.42)	(-2.67)
GDP News$_t$	0.000	0.000	0.002	0.003	0.002	0.002	0.001	0.001
	(0.05)	(0.21)	(1.14)	(1.47)	(1.39)	(1.51)	(0.53)	(0.86)
Inflation News$_t$	0.001	0.002	-0.001	0.000	-0.004*	-0.004*	-0.001	0.000
	(0.76)	(1.13)	(-0.41)	(0.12)	(-1.82)	(-1.74)	(-0.51)	(0.04)
Unemployment News$_t$	0.005	0.006	0.014	0.016*	0.002	0.002	0.000	0.001
	(0.66)	(0.73)	(1.62)	(1.80)	(0.27)	(0.34)	(0.02)	(0.22)
Log(Total Assets)$_t$	-0.007***	-0.008***	-0.012***	-0.012***	-0.013***	-0.013***	-0.014***	-0.014***
	(-7.92)	(-7.96)	(-9.57)	(-10.03)	(-10.06)	(-10.29)	(-11.56)	(-11.78)
Δ*Dividends*$_t$	-0.545***	-0.545***	-0.050***	-0.050***	-0.022***	-0.022***	-0.001	-0.001
	(-70.29)	(-70.29)	(-7.96)	(-7.92)	(-3.94)	(-3.94)	(-0.16)	(-0.15)
Dividend Payer$_t$	-0.005***	-0.005***	-0.009***	-0.009***	-0.007***	-0.007***	-0.005***	-0.005***
	(-5.43)	(-5.36)	(-6.07)	(-6.01)	(-5.12)	(-5.16)	(-3.74)	(-3.68)
Loss$_t$	-0.046***	-0.046***	-0.015***	-0.015***	-0.006***	-0.006***	0.007***	0.007***
	(-26.63)	(-26.65)	(-10.51)	(-10.57)	(-5.39)	(-5.41)	(6.10)	(6.07)
Constant	0.051***	0.052***	0.071***	0.073***	0.081***	0.082***	0.083***	0.084***
	(9.14)	(9.38)	(9.71)	(10.11)	(10.34)	(10.31)	(11.65)	(11.90)
Observations	223,487	223,487	213,179	213,179	204,152	204,152	196,922	196,922
Adjusted R-squared	0.291	0.291	0.015	0.015	0.008	0.008	0.007	0.007
Fixed Effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Table 5 presents the results of estimating different specifications of Eq. (9) and (10). We regress seasonally adjusted current and future total earnings (Δ*Earnings*) in Panel A, seasonally adjusted current and future cash earnings (Δ*Cash Earnings*) in Panel B, and seasonally adjusted current and future accrual earnings (Δ*Accrual Earnings*) in Panel C on FFR changes (Δr_t), the unexpected component of FFR changes (Δr_t^u), the expected component of FFR changes (Δr_t^e), control variables, and firm fixed effects. Appendix A lists all variable definitions. Standard errors are clustered by firm and quarter. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10% levels.

Table 6. Cross-Sectional Variation in the Revenue Effect

Panel A. Household Debt

Variable	(1) $\Delta Revenues_t$	(2) $\Delta Revenues_{t+1}$	(3) $\Delta Revenues_{t+2}$	(4) $\Delta Revenues_{t+3}$
$\Delta r_t^u \times$ *Household Debt*$_t$	**-0.024*** (-3.25)**	**-0.032*** (-3.30)**	**0.020* (1.86)**	**0.023 (1.62)**
Household Debt$_t$	-0.006** (-2.48)	-0.001 (-0.30)	0.003 (1.47)	0.005** (2.11)
Δr_t^u	-0.002 (-0.28)	0.001 (0.22)	0.009* (1.70)	0.010 (1.61)
Δr_t^e	0.011*** (4.15)	0.013*** (5.34)	0.014*** (6.02)	0.013*** (4.37)
Observations	223,487	213,775	205,826	198,642
Adjusted R-squared	0.227	0.214	0.208	0.206
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES
$\Delta r_t^u + \Delta r_t^u \times$ *Household Debt*$_t$	-0.025	-0.031	0.029	0.032
P($\Delta r_t^u + \Delta r_t^u \times$ *Household Debt*$_t$)	0.000	0.001	0.003	0.013

Panel B. Business-to-Consumer Firms

Variable	(1) $\Delta Revenues_t$	(2) $\Delta Revenues_{t+1}$	(3) $\Delta Revenues_{t+2}$	(4) $\Delta Revenues_{t+3}$
$\Delta r_t^u \times B2C_t$	**-0.008 (-1.18)**	**-0.017*** (-2.67)**	**-0.025*** (-3.36)**	**-0.023*** (-3.17)**
Δr_t^u	-0.010* (-1.82)	-0.005 (-0.90)	0.015*** (2.79)	0.017*** (2.74)
Δr_t^e	0.010*** (4.26)	0.011*** (4.04)	0.014*** (5.58)	0.013*** (4.14)
Observations	223,487	213,775	205,826	198,642
Adjusted R-squared	0.227	0.213	0.208	0.206
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES
$\Delta r_t^u + \Delta r_t^u \times B2C_t$	-0.017	-0.023	-0.010	-0.006
P($\Delta r_t^u + \Delta r_t^u \times B2C_t$)	0.024	0.003	0.230	0.509

Table 6 Panels A (Panel B) presents the results of regressing current and future seasonally adjusted revenues ($\Delta Revenues$) on the unexpected component of FFR changes (Δr_t^u), the expected component of FFR changes (Δr_t^e), and the interaction term between unexpected FFR changes and an indicator that the consumer debt to GDP ratio is above the 75th percentile of the sample distribution (*Household Debt*) (an indicator the firm is a member of an industry that directly sells more than 75% of its output to consumers (*B2C*)). We also include control variables and firm fixed effects. The last two rows show the sum of Δr_t^u's and the interaction term's slope coefficients and present the p-value of an F-test testing whether this sum is equal to zero. Appendix A lists all variable definitions. Standard errors are clustered by firm and quarter. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10% levels.

Table 7. Cross-Sectional Variation in the Expense Effect

Panel A. Financially Stable Firms

Variable	(1) $\Delta Expenses_t$	(2) $\Delta Expenses_{t+1}$	(3) $\Delta Expenses_{t+2}$	(4) $\Delta Expenses_{t+3}$
Δr_t^u × Financially Stable$_t$	**-0.013****	**-0.014****	**-0.002**	**0.002**
	(-2.00)	**(-2.45)**	**(-0.29)**	**(0.30)**
Financially Stable$_t$	0.002	0.008***	0.012***	0.015***
	(0.86)	(3.10)	(4.83)	(6.07)
Δr_t^u	-0.021***	-0.015**	0.008	0.014*
	(-2.78)	(-2.30)	(1.22)	(1.69)
Δr_t^e	0.012***	0.009***	0.011***	0.014***
	(3.38)	(3.06)	(3.80)	(3.39)
Observations	223,487	213,737	205,783	198,593
Adjusted R-squared	0.151	0.141	0.144	0.151
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES
$\Delta r_t^u + \Delta r_t^u \times$ *Financially Stable$_t$*	-0.034	-0.029	0.006	0.017
P($\Delta r_t^u + \Delta r_t^u \times$ *Financially Stable$_t$*)	0.001	0.000	0.421	0.100

Panel B. Technology Firms

Variable	(1) $\Delta Expenses_t$	(2) $\Delta Expenses_{t+1}$	(3) $\Delta Expenses_{t+2}$	(4) $\Delta Expenses_{t+3}$
Δr_t^u × Technology$_t$	**-0.020****	**-0.020*****	**-0.007**	**-0.004**
	(-2.43)	**(-2.80)**	**(-0.83)**	**(-0.54)**
Δr_t^u	-0.022***	-0.016**	0.008	0.015*
	(-2.85)	(-2.50)	(1.31)	(1.84)
Δr_t^e	0.012***	0.009***	0.011***	0.014***
	(3.39)	(3.09)	(3.81)	(3.40)
Observations	223,487	213,737	205,783	198,593
Adjusted R-squared	0.151	0.141	0.144	0.150
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES
$\Delta r_t^u + \Delta r_t^u \times$ *Technology$_t$*	-0.042	-0.036	0.001	0.011
P($\Delta r_t^u + \Delta r_t^u \times$ *Technology$_t$*)	0.000	0.000	0.892	0.328

Table 7 Panels A (Panel B) presents the results of regressing current and future seasonally adjusted expenses ($\Delta Expenses$) on the unexpected component of FFR changes (Δr_t^u), the expected component of FFR changes (Δr_t^e), and the interaction term between unexpected FFR changes and an indicator that the firm's leverage is below the 25th percentile for the quarter (*Financially Stable*) (an indicator the firm is a member of the communications, computer, or measuring equipment Fama and French (1997) 48 industry (*Technology*)). We also include control variables and firm fixed effects. The last two rows show the sum of Δr_t^u's and the interaction term's slope coefficients and present the p-value of an F-test testing whether this sum is equal to zero. Appendix A lists all variable definitions. Standard errors are clustered by firm and quarter. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10% levels.

Table 8. Specific Expense Accounts

Panel A. COGS

Variable	(1) $\Delta COGS_t$	(2) $\Delta COGS_{t+1}$	(3) $\Delta COGS_{t+2}$	(4) $\Delta COGS_{t+3}$
Δr_t^u	**-0.008****	**-0.004**	**0.010****	**0.010****
	(-2.07)	**(-1.04)**	**(2.59)**	**(2.63)**
Δr_t^e	0.008***	0.007***	0.009***	0.009***
	(4.14)	(3.65)	(5.02)	(4.33)
Observations	223,487	211,726	203,922	196,687
Adjusted R-squared	0.184	0.191	0.182	0.189
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES

Panel B. SG&A

Variable	(1) $\Delta SG\&A_t$	(2) $\Delta SG\&A_{t+1}$	(3) $\Delta SG\&A_{t+2}$	(4) $\Delta SG\&A_{t+3}$
Δr_t^u	**-0.009*****	**-0.005****	**0.001**	**0.002**
	(-3.94)	**(-2.25)**	**(0.37)**	**(0.82)**
Δr_t^e	0.004***	0.004***	0.004***	0.005***
	(3.80)	(4.91)	(5.23)	(3.62)
Observations	223,487	212,052	203,300	195,282
Adjusted R-squared	0.162	0.163	0.163	0.171
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES

Panel C. Depreciation

Variable	(1) $\Delta Depreciation_t$	(2) $\Delta Depreciation_{t+1}$	(3) $\Delta Depreciation_{t+2}$	(4) $\Delta Depreciation_{t+3}$
Δr_t^u	**-0.002*****	**-0.002*****	**-0.001****	**-0.000**
	(-2.83)	**(-4.10)**	**(-2.21)**	**(-0.71)**
Δr_t^e	-0.000	-0.000	-0.000	0.000
	(-0.72)	(-0.32)	(-0.04)	(1.43)
Observations	223,487	209,506	199,717	190,769
Adjusted R-squared	0.134	0.143	0.145	0.161
Fixed Effects	Firm	Firm	Firm	Firm
Controls	YES	YES	YES	YES

Table 8 Panels A to D presents the results of regressing current and future seasonally adjusted cost of goods sold ($\Delta COGS$); sales, general, and administrative expense ($\Delta SG\&A$); and depreciation expense ($\Delta Depreciation$) on the unexpected component of FFR changes (Δr_t^u), the expected component of FFR changes (Δr_t^e), control variables, and firm fixed effects. Appendix A lists all variable definitions. Standard errors are clustered by firm and quarter. Robust t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10% levels.