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Does the Uncertainty of Monetary Policy Affect the Efficacy of Interest Rate Transmission Mechanisms? Micro-Evidence from the Investment-Capital Cost Sensitivity of Chinese Enterprises

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ABSTRACT

The uncertainty of monetary policy, as a latent cost of monetary policy regulation, increasingly captures the attention of the theoretical community and policy authorities worldwide. Employing empirical analysis on data from China's A-share non-financial listed companies between 2003 and 2019, it is found that monetary policy uncertainty undermines corporate confidence in development, leading to a diminished enthusiasm for adjusting investment strategies in response to economic fluctuations. This hampers the sensitivity of corporate investment to capital costs, suggesting that monetary policy uncertainty impedes market entity decision-making, not only impairing the effectiveness of monetary policy interest rate transmission mechanisms but also reducing the efficiency of corporate investment. Mechanism tests indicate that corporate confidence in development plays a crucial role in investment decisions in uncertain economic environments.

KEYWORDS

Interest Rate Transmission Mechanism; Monetary Policy Uncertainty; Corporate Investment; Capital Cost.

1. INTRODUCTION

In order to promote the modernization of the national governance system and governance capacity, the report of the 20th National Congress of the Communist Party of China emphasized that improving the macroeconomic governance system, as the main means of macroeconomic regulation and control, whether the monetary policy operates effectively and how to affect the real economy are the core issues that must be clarified in the regulation and control of monetary policy. However, at this stage, China's monetary policy rules are still in the process of changing from quantity to price, and the complex domestic and foreign situation requires timely adjustment of monetary policy. When and how to change the current monetary policy to form a stable consensus expectation has triggered monetary policy uncertainty (Liu Guanchun et al., 2019, Tian Guoqiang and Li Shuangjian, 2020), which subtly changes the economic environment and interferes with the decision-making of market players, and monetary policy uncertainty as a potential cost of monetary policy regulation (Wang Liyong and Wang Shenling, 2020) may make the task of policy regulation more arduous, and its impact on the effectiveness of monetary policy has been increasingly closely watched by the theoretical community and national policy authorities. In view of this, it is necessary and urgent to answer the question of how monetary policy uncertainty affects the effectiveness of monetary policy.

In order to cope with the downward pressure brought about by the sluggish global economic situation, the Monetary Policy Committee of the People's Bank of China continued to emphasize "unblocking the monetary policy transmission mechanism" at its quarterly meetings in 2023. In 2015, the basic liberalization of deposit and loan interest rate control marks that China's interest rate marketization process has entered the stage of deepening reform, interest rate has become the core tool of counter-cyclical regulation and directional regulation, and the smooth interest rate transmission mechanism is an important guarantee for the effectiveness of monetary policy, and the poor transmission of interest rates will greatly affect the effect of monetary policy regulation (Chen Shoudong et al., 2016), which has attracted the attention of academics, practitioners and the government. Therefore, it is of great benefit to answer the above questions by taking the interest rate transmission channel as the starting point to explore whether the uncertainty of monetary policy affects the effectiveness of the monetary policy interest rate transmission mechanism and the influence channel, and to seek countermeasures.

There are different views on the extent to which China's interest rate transmission mechanism is effective (Zhang Yishan et al., 2017; He Dexu, Yu Jingjing, 2019; Liu Chong et al., 2022; Qi Yuqing, 2023; Zheng Manni et al., 2023). The mystery of the decline in China's industrial investment rate remains, that is, the investment rate has been declining continuously, and easing and stimulus measures have not significantly improved the situation (Zhang Chengsi and Zhang Butan, 2016). Some studies have pointed out that the government intends to reduce the financing cost of enterprises by lowering interest rates to encourage enterprises to invest, but the uncertainty contained in the frequency and magnitude of adjustment will also affect corporate investment decisions, causing corporate behavior to deviate from the original intention of the policy, which is relatively subtle and has not attracted enough attention (Zhang Chengsi and Liu Guanchun, 2018). In fact, in recent years, the high uncertainty has brought great changes to the micro basis of monetary policy regulation and the market environment, whether this change is an important reason for the failure of the investment rate to respond to the reduction of interest rates, and the answer to this question is helpful to evaluate the impact of monetary policy uncertainty on the efficiency of monetary policy interest rate transmission channels.

In view of the fact that corporate investment is an important part of investment, and interest rate is the main component of the cost of capital, and also the key factor that determines corporate investment, these relationships play an important role in understanding the transmission mechanism of monetary policy interest rates, and existing studies support the role of interest rate transmission channels in influencing corporate investment, and the research points out that the sensitivity of corporate investment to the cost of capital is an important condition and micro basis for the effectiveness of price-based monetary policy monetary policy tools, which is helpful to identify whether the transmission channels of monetary policy interest rates are smooth or not (Chirinko et al., 1999; Xu Mingdong, Tian Suhua, 2013; Xu Mingdong, Chen Xuebin, 2012, 2019) 。 Based on the above analysis, this paper attempts to provide new evidence for monetary policy uncertainty to interfere with interest rate transmission channels, affect the effectiveness of monetary policy and its impact mechanism at the micro level by studying whether and how monetary policy uncertainty affects the sensitivity of corporate investment to the cost of capital, and explore ways to deal with it, so as to provide theoretical support and empirical evidence for reducing its adverse effects, stimulating the vitality of micro subjects, improving the transmission efficiency of monetary policy, improving the effect of policy regulation and control, and improving the macroeconomic governance system.

The marginal contributions of this paper are mainly reflected in the discovery of new theoretical mechanisms and the provision of new evidence from a new research perspective: (1) It innovatively provides theoretical analysis and new micro evidence for the effectiveness of the impact of monetary policy uncertainty on the transmission mechanism of interest rates from the perspective of corporate investment-cost of capital sensitivity, enriches the research on the impact mechanism of monetary policy uncertainty, adds new content to the micro mechanism of policy uncertainty affecting policy effectiveness, promotes the understanding of the policy transmission obstruction mechanism of uncertainty, and puts forward new ideas to deal with the challenge of uncertainty. (2) Different from the explanations made by existing studies from the perspective of corporate financialization (Zhang Chengsi, Zhang Butan, 2016; Zhang Chengsi, Liu Guanchun, 2018; Liu Guanchun et al., 2020), this paper is the "mystery of the decline of China's industrial investment rate" under easing policy and stimulus measures from the perspective of monetary policy uncertainty It not only enriches the research on the influencing factors of investment sensitivity, provides suggestions for better incentives for investment, but also enriches the policy regulation ideas under the uncertainty of monetary policy, and proposes a method to stabilize the important micro basis of policy transmission, so as to provide a reference for scientific and effective policy regulation and control of the smooth monetary policy transmission mechanism. In addition, considering that the cost of capital is an important factor affecting corporate investment, and the sensitivity of investment to the cost of capital is related to investment efficiency, this study provides new micro evidence for the impact of monetary policy uncertainty on corporate investment efficiency and its mechanism. (3) Theoretical modeling and empirical analysis of the mechanism of monetary policy uncertainty reducing the sensitivity of enterprises' investment capital cost are carried out before domestic and foreign research, and the expansion of the theoretical model is helpful for further research. The research in this paper is of practical significance: on the one hand, it provides a reference for policy making. In policy practice, it is common to maintain low interest rates to reduce the financing cost of enterprises, thereby stimulating investment (Wolfgang et al., 2018; Sharpe, Suarez, 2021), and the sensitivity of corporate investment to the cost of capital is related to whether such policy measures can achieve practical resultsThe quantitative analysis of the sensitivity of the cost of capital of enterprise investment can evaluate the mechanism and effectiveness of policy tools such as interest rates, and then provide an important basis for judging the process of interest rate liberalization.

2. THEORETICAL MODELS AND RESEARCH HYPOTHESES

The cost of capital and expected (future) cash flows together form the core of investment decisions, and their influence on firms' investment decisions depends not only on their size (i.e., marginal impact) but also on the degree to which they react to them (i.e., sensitivity) (Sharpe, Suarez, 2021), but the latter has been neglected in previous studies. In this part, the theoretical model of enterprise investment is established under the framework of enterprise optimal investment decision-making, which is helpful to analyze the impact of some economic factors on enterprise investment, and then combined with the conclusions of existing research, the monetary policy uncertainty is introduced into the benchmark model, which makes it possible to analyze the impact of this uncertainty on the investment sensitivity of enterprises, and this model is also helpful to analyze the channels of monetary policy uncertainty affecting corporate investment decisions. For ease of interpretation, define the following variables:

In period t, the enterprise value is $V(a_t, K_t)$, According to the net present value method, the income of the enterprise is $\pi(a_t, K_t)$, and the capital adjustment cost is $c(I_t, K_t)$, where K_t is the capital stock, a_t is the profit shock, I_t is the investment, and δ is the capital depreciation rate($\delta \in (0,1)$), r_t is the cost of capital ($r_t \in (0,1)$) mentioned by Abel and Blanchard (1986). ϕ is the parameter that adjusts the cost ($\phi > 0$), the set of information available to the enterprise is Ω_t. The capital adjustment cost function is linearly homogeneous for I_t and K_t, i.e., $c(I_t, K_t) = I_t + \phi/2 \cdot (I_t/K_t)^2 K_t$.

The process of capital accumulation is $K_{t+1} = K_t(1-\delta)+I_t$. In order to simplify the derivation process, we assume that all enterprises are homogeneous. Enterprise investment objective is to maximize the expected present value:

$$V(a_t, K_t) = E\left\{\sum_{j=0}^{\infty}\frac{\pi(a_{t+j}, K_{t+j}) - c(I_{t+j}, K_{t+j})}{\Pi_{s=1}^{j}(1+r_{t+s})} \mid \Omega_t\right\} \tag{1}$$

Formula (1) is the result under the risk-neutral assumption (Frank, Shen, 2016), without considering the impact of risk. If the impact of risk is considered, equation (1) becomes:

$$V(a_t, K_t) = E\left\{\sum_{j=0}^{\infty}\frac{\pi(a_{t+j}, K_{t+j}) - c(I_{t+j}, K_{t+j})}{\Pi_{s=1}^{j}(1+r_{t+s})}\cdot\frac{1}{1+\vartheta_{t+j}^2} \mid \Omega_t\right\} \tag{2}$$

In this section, the influence of risk ϑ_{t+j}, specifically referring to the uncertainty in monetary policy, is manifested as a monotonically increasing non-negative function of risk. The transition from Equation (1) to Equation (2) can be elucidated from two perspectives: Firstly, from the standpoint of risk and return, undertaking risk implies that a firm faces a certain probability of incurring losses. Under a risk-free scenario, the expected return is $E\left[\pi(a_{t+j}, K_{t+j}) - c(I_{t+j}, K_{t+j})\right]$, whereas under the sway of monetary policy uncertainty, firms anticipate with probability p_{t+j} (where $p_{t+j} = \vartheta_{t+j}^2 / (1+\vartheta_{t+j}^2)$) a null return, and with probability $1-p_{t+j}$ a return equivalent to the risk-free situation, akin to a call option. Thus, the expected return considering the impact of monetary policy uncertainty is a weighted average of these probabilities and the corresponding attainable returns. Relative to the risk-free return, $E\left[\left(\pi(a_{t+j}, K_{t+j}) - c(I_{t+j}, K_{t+j})\right)\vartheta_{t+j}^2 / (1+\vartheta_{t+j}^2)\right]$ represents the expected loss for firms under the influence of monetary policy uncertainty. Secondly, extant research suggests that policy uncertainty negatively impacts firms' future net cash flow expectations, with increased uncertainty lowering future cash flow expectations, augmenting cash flow volatility, and elevating capital adjustment costs (Bloom et al., 2007; Tan Xiaofen, Zhang Wenjing, 2017; Zhang Chengsi, Liu Guanchun, 2018). This formulation ensures that, in scenarios unmarred by uncertainty, the impact is normalized to 1, while scenarios adversely affected by uncertainty are expressed as $(1+\vartheta_{t+j}^2)^{-1}$. Both expositions illuminate how monetary policy uncertainty erodes corporate prognostications for future operational efficacy, aligning Equation (2) with scholarly consensus that policy uncertainty depreciates firm value (Yang et al., 2019; Li Haoju et al., 2016). Importantly, Equation (2) integrates the effect of monetary policy uncertainty as an autonomous element, predicated on findings that policy uncertainty significantly curtails firms' future cash flows without markedly influencing external financing costs (Zhang Chengsi, Liu Guanchun, 2018). Consequently, the evolution from Equation (1) to Equation (2) embodies the notion that monetary policy uncertainty shapes corporate investment decisions by impacting firms' confidence in their future trajectory, thereby examining the influence of monetary policy uncertainty on corporate investment sensitivity.

According to the first-order condition of investment, the optimal investment that achieves the objective can be formulated as

$$\frac{I_t}{K_t} = -\frac{1}{\phi} + \frac{1}{\phi}\cdot q_t \tag{3}$$

and

$$q_t = E\left\{\sum_{j=1}^{\infty}\frac{(1-\delta)^{j-1}\left[\pi_K(a_{t+j}, K_{t+j}) - c_K(I_{t+j}, K_{t+j})\right]}{\Pi_{s=1}^{j}(1+r_{t+s})}\cdot\frac{1}{1+\vartheta_{t+j}^2} \mid \Omega_t\right\} \tag{4}$$

The ratio I_t/K_t signifies the proportion of a unit of capital allocated for investment, while q_t denotes the aggregated present value of all anticipated future marginal benefits derived from an additional unit of capital under the sway of monetary policy uncertainty. If q_t, the direct observation of these values, were feasible, further extrapolation would be redundant. However, in the realm of practicality, direct quantification of q_t is unattainable. Hence, we adopt the methodology of Abel and Blanchard (1986), employing a vector autoregression approach to decompose it into several fundamental driving factors. By defining the discount factor $\beta_{t+s} = (1-\delta)/(1+r_{t+s})$ (owing to $\delta, r_{t+s} \in (0,1)$, $\beta_{t+s} \in (0,1)$) and the marginal output of capital $M_{t+j} = \left[\pi_K(a_{t+j}, K_{t+j}) - c_K(I_{t+j}, K_{t+j})\right]/(1-\delta)$, we can recast q_t as

$$q_t = E\left\{\sum_{j=1}^{\infty}(\Pi_{s=1}^{j}\beta_{t+s})M_{t+j}\cdot\frac{1}{1+\vartheta_{t+j}^2}\,|\,\Omega_t\right\} \tag{5}$$

Subsequently, we simplify by assuming $F(\vartheta) = 1/(1+\vartheta^2) \in (0,1)$, and replacing the time-varying β_{t+s} and M_{t+s} in Equation (5) with their mean values. A first-order Taylor expansion around these mean values leads to

$$q_t = E\left\{\left[\frac{\bar{M}\bar{\beta}}{(1-\bar{\beta})} + \sum_{j=1}^{\infty}\bar{\beta}^j(M_{t+j}-\bar{M}) + \frac{\bar{M}}{(1-\bar{\beta})\bar{\beta}}\cdot\sum_{j=1}^{\infty}\bar{\beta}^j(\beta_{t+j}-\bar{\beta})\right]\cdot F(\vartheta)\,|\,\Omega_t\right\} \tag{6}$$

Following the approach of Frank and Shen (2016), we employ an AR(1) model to characterize the dynamic changes in β_{t+s} and M_{t+s}

$$\beta_{t+s} = \bar{\beta} + \rho_\beta(\beta_{t+s-1} - \bar{\beta}) + \sigma_\beta\varepsilon_{\beta,t+s} \tag{7}$$

$$M_{t+s} = \bar{M} + \rho_M(M_{t+s-1} - \bar{M}) + \sigma_M\varepsilon_{M,t+s} \tag{8}$$

Equations (7) and (8) are then utilized to calculate the three terms on the right side of Equation (6), with the first being a constant, the second being

$$\begin{aligned} &E\left\{\sum_{j=1}^{\infty}\bar{\beta}^j(M_{t+j}-\bar{M})\cdot F(\vartheta)\,|\,\Omega_t\right\} = \sum_{j=1}^{\infty}\bar{\beta}^j\rho_M^j(M_t-\bar{M})\cdot F(\vartheta) \\ &= \frac{\bar{\beta}\rho_M F(\vartheta)\cdot(M_t-\bar{M})}{1-\bar{\beta}\rho_M} \end{aligned} \tag{9}$$

And the third being

$$\begin{aligned} &E\left\{\frac{\bar{M}}{(1-\bar{\beta})\bar{\beta}}\cdot\sum_{j=1}^{\infty}\bar{\beta}^j(\beta_{t+j}-\bar{\beta})\cdot F(\vartheta)\,|\,\Omega_t\right\} = \frac{\bar{M}}{(1-\bar{\beta})\bar{\beta}}\cdot\sum_{j=1}^{\infty}\bar{\beta}^j\rho_\beta^j(\beta_t-\bar{\beta})\cdot F(\vartheta) \\ &= \frac{\bar{M}\rho_\beta F(\vartheta)\cdot(\beta_t-\bar{\beta})}{(1-\bar{\beta})(1-\bar{\beta}\rho_\beta)} \end{aligned} \tag{10}$$

Finally, by employing Equations (9) and (10) to substitute the corresponding terms in Equation (6), we derive:

$$q_t = \frac{\bar{M}\bar{\beta}F(\vartheta)}{(1-\bar{\beta})} + \frac{\bar{\beta}\rho_M F(\vartheta)\cdot(M_t-\bar{M})}{1-\bar{\beta}\rho_M} + \frac{\bar{M}\rho_\beta F(\vartheta)\cdot(\beta_t-\bar{\beta})}{(1-\bar{\beta})(1-\bar{\beta}\rho_\beta)} \tag{11}$$

By applying a first-order approximation to β_t, it is deduced that $\beta_t \approx 1-\delta-r_t$. Assuming that the unobservable marginal profit equals the observable average profit, that is, $\pi_K(a_t, K_t) - c_K(I_t, K_t) = \left[\pi(a_t, K_t) - c(I_t, K_t)\right]/K_t$, the ratio of cash flow to capital (CF_t/K_t) is commonly used as a proxy for average profit. Here, $WACC$ represents the capital cost, expressed as the weighted sum of the cost of debt capital and the cost of equity capital. The investment equation of Formula (3) then becomes:

$$\frac{I_t}{K_t} = \alpha_0 + \alpha_1 F(\vartheta)\cdot\frac{CF_t}{K_t} + \alpha_2 F(\vartheta)\cdot WACC \tag{12}$$

In this context, $\alpha_0 = -1/\phi + \left(\bar{M}\bar{\beta}/(\phi(1-\bar{\beta})) - \alpha_1\bar{M} - \alpha_2\overline{WACC}\right)\cdot F(\vartheta)$, $\overline{WACC} = 1-\delta-\bar{\beta}$, $\alpha_1 = \bar{\beta}\rho_M/[\phi(1-\delta)(1-\bar{\beta}\rho_M)]$, and $\alpha_2 = -\bar{M}\rho_\beta/[\phi(1-\bar{\beta})(1-\bar{\beta}\rho_\beta)]$. Given that $\phi, \bar{M} > 0$ and $\delta, \bar{\beta}, \rho_\beta, \rho_M \in (0,1)$, it follows that $\alpha_1 > 0$ and $\alpha_2 < 0$. The intercept term α_0 in $\bar{M}\bar{\beta}/(1-\bar{\beta})$ represents the long-term marginal revenue q in a risk-free situation (considering the impact of monetary policy uncertainty, q becomes $\bar{M}\bar{\beta}F(\vartheta)/(1-\bar{\beta})$). The term $(\alpha_1\bar{M} + \alpha_2\overline{WACC})$ denotes the long-term impact of cash flow and changes in capital costs in a risk-free scenario. Assuming that the mean values of capital costs and cash flow remain unchanged in the long term, α_0 is a constant term. Essentially, this includes the impact of all future marginal profit shocks on optimal investment, where $\bar{\beta}\rho_M/(1-\bar{\beta}\rho_M)$ is a composite of the discount parameter $\bar{\beta}$ and the marginal profit shock persistence parameter ρ_M. The $\rho_\beta/[\phi(1-\bar{\beta})(1-\bar{\beta}\rho_\beta)]$ can be viewed as a proportional factor, the product of which with c indicates a reduction in marginal output of capital caused by a unit increase in capital cost. Changes in these two aspects induce variations in marginal profits, thereby determining the current optimal investment.

Equation (12) conveys two principal implications. Firstly, $F(\vartheta)=(1+\vartheta^2)^{-1}\in(0,1)$ indicates that under the sway of monetary policy uncertainty, the proportion of capital allocated for investment is likely to diminish when compared to scenarios unaffected by such uncertainty. Secondly, disregarding the influence of monetary policy uncertainty equates to assigning a value of 1 to $F(\vartheta)$, with the impact of cash flow on investment being determined by the corresponding coefficient $\alpha_1>0$. When considering the effect of uncertainty, this influence is modified to become $\alpha_2F(\vartheta)$. Given that the specified variables satisfy certain conditions that $\alpha_2F(\vartheta)<0$ and $|\alpha_2F(\vartheta)|<|\alpha_2|$, it implies that monetary policy uncertainty does not alter the direction of cash flow's influence on investment (which remains positively promotive) but rather diminishes the degree of this influence, or in other words, weakens the responsiveness and sensitivity of investment to cash flow variations. In the transformation from Equation (11) to Equation (12), for the sake of analyzing the impact of capital costs, a first-order approximation is employed, with the directional change of the variables being opposite. This implies a certain relational dynamic. Similarly, when a particular variable equals 1, the impact of capital costs on investment is determined by its coefficient, and when considering the effect of monetary policy uncertainty, this influence transforms. Since the specified variables fulfill certain criteria, it means that monetary policy uncertainty does not change the negative influence of capital costs on investment but diminishes the extent of this influence, or put differently, lessens the investment's reaction and sensitivity to changes in capital costs. Integrating the analysis of Equation (2), the underlying mechanism of these outcomes is as follows: In an environment of heightened monetary policy uncertainty, enterprises tend to underestimate their future operational efficacy, adopting a more conservative stance towards enhancing future profitability through optimized resource allocation. They perceive that adjusting current investment strategies will not significantly impact expected returns (or may even have a negative effect), hence showing a reduced responsiveness to changes in significant economic factors.

In summation, the analysis of the theoretical model indicates that the presence of monetary policy uncertainty impacts corporate investment decisions. Firstly, in an environment of pronounced monetary policy uncertainty, the level of enterprise investment is likely to decrease. When considering only the effects of cash flow and capital costs, an increase in cash flow would foster investment, while an increase in capital costs would inhibit it. Secondly, when the influence of monetary policy uncertainty is accounted for, it does not change the direction of the impact of economic factors like capital costs on enterprise investment, but it does suppress the degree of the enterprise's responsiveness (or sensitivity) to these factors. This conclusion aligns with Bloom's (2014) notion of a 'chilling effect' of uncertainty, where uncertainty reduces the sensitivity of economic participants to changes in the business environment, thereby inhibiting the reallocation of resources among enterprises. Since resource reallocation drives much of the total productivity growth (Foster et al., 2006), uncertainty hinders productivity improvement, offering an explanation for pro-cyclical productivity. This also implies that the efficacy of using policy tools to stabilize the economy is diminished in highly uncertain environments. While some studies have found that uncertainty reduces market entities' sensitivity or response to economic signals (Foote et al., 2000; Bertola et al., 2005; Bloom et al., 2007; Drobetz et al., 2018), the micro-mechanisms behind this remain unclear. This paper interprets this from the perspective of market entities' expectations, attributing this inhibitory effect to monetary policy uncertainty undermining enterprises' confidence in their future operational performance, thereby weakening their incentive to optimize resource allocation for improved future profitability. This leads to a decline in enterprises' eagerness to adjust investment strategies timely in response to changes in economic factors like capital costs, manifesting as reduced investment sensitivity.

Based on the aforementioned analysis, the following hypothesis is proposed: The presence of monetary policy uncertainty does not change the negative impact of capital costs on enterprise investment but reduces the sensitivity of enterprise investment to capital costs.

3. RESEARCH DESIGN AND DATA SOURCES

3.1. 3.1. Econometric Model

Combining the analysis in Chapter III Section II regarding the impact of monetary policy uncertainty and capital costs on enterprise investment, as well as the results derived from the enterprise investment theoretical model, the following examines the effect of monetary policy uncertainty on enterprise investment decisions, setting the econometric model in the form of a linear function based on Formula (12) of the enterprise investment theoretical model. The specific testing strategy is divided into three steps: firstly, testing the direct impact of monetary policy uncertainty on enterprise investment decisions; secondly, examining the impact of capital costs on enterprise investment decisions; and finally, assessing the influence of monetary policy uncertainty on the sensitivity of enterprise investment to capital costs.

First, testing the direct impact of monetary policy uncertainty on enterprise investment decisions. Following the approach of Li Fengyu and Yang Mozu (2015), Gulen and Ion (2016), Tan Xiaofen and Zhang Wenjing (2017), Zhang Chengsi and Liu Guanchun (2018), etc., the following panel data model is constructed:

$$Inv_{it} = \alpha_0 + \alpha_1 MPU_{t-1} + \alpha_2 CF_{it-1} + \sum_{i=1}^{5} \alpha_{2+i} CV_{it-1} + \alpha_8 GDP_{t-1} + \mu_i + \varepsilon_{it} \tag{13}$$

In this model, the investment of a business in a given period, denoted as Inv_{it}, serves as the dependent variable. The core explanatory variable used is the lagged value of the monetary policy uncertainty index, MPU_{t-1}, rather than its current value, primarily for the purpose of mitigating endogeneity concerns. CF_{it-1} represents the level of the enterprise's operational cash flow. Other control variables (CV) at the enterprise level, such as the leverage ratio Lev_{it-1}, business size $Size_{it-1}$, and the growth rate of operating income $Grow_{it-1}$, are incorporated to manage investment opportunities at the enterprise level. The model also introduces individual fixed effects μ_i, to control for the influence of inherent, unobservable characteristics of the business that do not vary over time. Furthermore, the lagged value of the economic growth rate GDP_{t-1} is included, aiding in the depiction of the macroeconomic environment independent of business variations and reflecting the macro-level investment opportunities faced by the enterprise.

Secondly, the impact of capital costs on corporate investment decisions is assessed. The primary objective is to determine the direction of this impact, thereby validating the theoretical model's expectations regarding the relationships among the variables, while setting aside the influence of monetary policy uncertainty. Following the approach of Frank and Shen (2016), capital costs are incorporated into the econometric model, constructing the following panel data model:

$$Inv_{it} = \beta_0 + \beta_1 WACC_{it-1} + \beta_2 CF_{it-1} + \sum_{i=1}^{5} \beta_{2+i} CV_{it-1} + \beta_8 GDP_{t-1} + \mu_i + \upsilon_t + \varepsilon_{it} \tag{14}$$

Here, the lagged one-period capital cost of the enterprise, denoted as $WACC_{it-1}$, is used as the key explanatory variable, again to mitigate endogeneity. CV represents other control variables at the enterprise level. In addition to macro-level investment opportunities and individual fixed effects, time fixed effects are also introduced to control for time-related unobservable factors that do not vary with the individual.

Thirdly, the influence of monetary policy uncertainty on the sensitivity of corporate investment to capital costs is examined. Drawing from theoretical model (12), the study explores the changes in investment's responsiveness to capital costs under the impact of monetary policy uncertainty. To this end, the interaction term of monetary policy uncertainty and capital costs, $MPU_{t-1}\times WACC_{it-1}$, is introduced into the econometric model, constructing the following panel data model:

$$\begin{aligned}Inv_{it} &= \gamma_0+\gamma_1 MPU_{t-1}\times WACC_{it-1}+\gamma_2 WACC_{it-1}+\gamma_3 MPU_{t-1}\\ &+\gamma_4 CF_{it-1}+\sum_{i=1}^{5}\beta_{4+i}CV_{it-1}+\gamma_{10}GDP_{t-1}+\mu_i+\upsilon_t+\varepsilon_{it}\end{aligned} \tag{15}$$

In econometric models (13) to (15), the coefficients to be estimated, α_1, β_1, γ_1, and γ_2, are the focus of the research. α_1 depicts the impact of monetary policy uncertainty on corporate investment, β_1 represents the influence of capital costs on corporate investment, and γ_1 illustrates the effect of monetary policy uncertainty on the sensitivity (responsiveness) of corporate investment to capital costs. Theoretical analysis and conclusions from the theoretical model indicate that an increase in monetary policy uncertainty suppresses corporate investment, as does an increase in capital costs. However, monetary policy uncertainty reduces the sensitivity of corporate investment to capital costs. Based on this, the expected parameters for models (13) to (15) are as follows: α_1 should be significantly negative, as should β_1 and γ_2, while γ_1 is expected to be significantly positive.

3.2. Selection of Indicators

(1) Corporate Investment Investments. Following the research of Li Fengyu and Yang Mozu (2015), Chen Guojin and Wang Shaoqian (2016), Zhang Chengsi and Liu Guanchun (2018), etc., corporate investment is defined as the sum of cash payments made by enterprises for the construction of fixed assets, intangible assets, and other long-term assets, normalized by total assets.

(2) Monetary Policy Uncertainty. Huang and Luk (2020) utilized major mainstream newspapers in mainland China, such as the Beijing Youth Daily and Guangzhou Daily, which are known for their accuracy and authority in economic reporting. They compiled a monetary policy uncertainty index by counting the number of articles published each month by these newspapers that contained key phrases like "monetary policy," "People's Bank of China," "central bank," and terms indicating uncertainty like "uncertain," "unclear," "fluctuations," etc. This index, to some extent, overcomes the issue of reporting bias and is more detailed and applicable to the Chinese context (Zhang Zhe et al., 2021). Furthermore, it has been tested for robustness, shows minimal media bias effects, and is widely used in studies related to monetary policy uncertainty (Luo Daqing, Fu Buben, 2020; Kuang Xiong et al., 2019). To align with sample data, the monthly monetary policy uncertainty index is converted into an annual indicator. To avoid conversion method biases, two methods are used for empirical comparison: the arithmetic mean method and the geometric mean method. The indicators derived from these methods are respectively MPU_1 and MPU_2, with higher values indicating greater levels of uncertainty in monetary policy.

(3) Capital Costs. Enterprises primarily finance through two channels: debt financing and equity financing, with capital costs mainly arising from these sources. Drawing upon the approaches of Frank and Shen (2016), Chen Guojin and Wang Shaoqian (2016), Drobetz et al. (2018), Xu Mingdong and Chen Xuebin (2019), etc., the weighted sum of debt capital cost and equity capital cost (weighted capital cost) is used to measure an enterprise's capital costs: $WACC=\frac{D}{V}\times r_D+\frac{E}{V}\times r_E$. Here, D represents the book value of the enterprise's debt, E the book value of equity, and V the total value

of the enterprise, which is the sum of the book values of debt and equity. r_D indicates the cost of debt capital. Considering the tax shield effect of corporate debt, r_D should deduct the tax-deductible portion from the average cost of debt capital. Therefore, r_D is calculated as the product of (interest expense/total debt) and (1 - corporate tax rate), with the corporate tax rate determined by the ratio of income tax to total profits. As for the measurement of the cost of equity capital r_E, in line with the actual situation of equity financing in Chinese enterprises, models like PEG, MPEG, OJ, KR, and CAPM are used to measure r_E. The weighted average of the implied equity capital costs derived from the PEG, MPEG, OJ, and KR models (r_{E_ave}) is also employed as a new measure for r_E. Among these, the capital costs calculated based on the PEG, MPEG, OJ models, and the weighted average of the four types of implied equity capital costs r_{E_ave} are used for empirical analysis. The capital costs derived from the KR model and the CAPM model are utilized for robustness checks.

(4) Other Variables.Corporate Cash Flow Level (CF): Represented by the ratio of operating cash flow to total assets. Company Size ($Size$): Expressed as the natural logarithm of the enterprise's total assets (in billion yuan). Leverage Ratio (Lev): Defined as the ratio of total liabilities to total assets. Investment Opportunities ($Grow$): Indicated by the growth rate of the enterprise's business income. The nature of property rights of enterprises, based on the actual controller's characteristics, is divided into state-owned ($SOE=1$) and non-state-owned ($SOE=0$). Economic Growth Rate (GDP): Used as a proxy for macro-level investment opportunities, represented by the annual year-over-year growth rate of GDP.

3.3. Data Sources and Descriptive Statistics

Table 1. Descriptive Statistics of Main Variables

Variable	Observations	Mean	Standard Deviation	P25	P50	P75
Inv	34822	0.0522	0.0506	0.0154	0.0366	0.0724
MPU_1	44374	1.2418	0.4877	0.8500	1.2300	1.5400
MPU_2	44374	3.2009	1.5183	1.9454	3.1125	4.0771
CF	34852	0.0485	0.0721	0.0088	0.0477	0.0899
r_D	30717	0.0177	0.0144	0.0060	0.0153	0.0258
r_{E_peg}	14301	0.0990	0.0550	0.0521	0.0933	0.1366
r_{E_mpeg}	14143	0.1076	0.0587	0.0572	0.1010	0.1474
r_{E_oj}	13417	0.1285	0.0586	0.0781	0.1220	0.1682
r_{E_kr}	18964	0.1152	0.0497	0.0791	0.1081	0.1420
r_{E_ave}	21563	0.1152	0.0541	0.0721	0.1090	0.1490
r_{E_capm}	27536	0.1615	0.0907	0.0993	0.1384	0.1931
$WACC_{peg}$	14301	0.0600	0.0368	0.0306	0.0540	0.0805
$WACC_{mpeg}$	14143	0.0649	0.0393	0.0334	0.0580	0.0864
$WACC_{oj}$	13417	0.0765	0.0403	0.0458	0.0691	0.0982
$WACC_{kr}$	18964	0.0688	0.0323	0.0457	0.0636	0.0854
$WACC_{ave}$	21563	0.0690	0.0359	0.0418	0.0631	0.0882
$WACC_{capm}$	27519	0.0853	0.0333	0.0595	0.0812	0.1066

Note: $WACC_{peg}$, $WACC_{mpeg}$, $WACC_{oj}$, $WACC_{kr}$, $WACC_{ave}$, and $WACC_{capm}$ refer to the Weighted Average Cost of Capital (WAC) calculated using six different methods for estimating the cost of equity capital, denoted as r_{E_peg}, r_{E_mpeg}, r_{E_oj}, r_{E_kr}, r_{E_ave} and r_{E_capm}, respectively. These represent various approaches to calculating the cost of equity, and each contributes to the determination of the overall weighted cost of capital ($WACC$) for a company.

This study utilizes annual data from 2003 to 2019 of Chinese A-share non-financial listed companies as the sample, excluding ST category listed companies with abnormal financial conditions. The original data at the enterprise level were sourced from the CSMAR and RESSET databases, the economic growth rate from the CEIC database, and the monetary policy uncertainty index was derived from the category-specific policy uncertainty index compiled by Huang and Luk (2020). To reduce the impact of outliers on regression results, continuous variables at the enterprise level were subjected to tail-trimming at the 1% and 99% levels.

3.4. Empirical Testing and Results Analysis

Table 2. Analysis of the Impact of Monetary Policy Uncertainty and Capital Costs on Corporate Investment

Variables	Model (13)		Model (14)			
	(1)	(2)	(3)	(4)	(5)	(6)
MPU	-0.0036*** (-3.19)	-0.0012*** (-3.20)				
WACC			-0.1526*** (-7.65)	-0.1370*** (-7.29)	-0.1435*** (-7.35)	-0.1560*** (-9.92)
CF	0.0246*** (5.44)	0.0246*** (5.44)	0.0258** (3.58)	0.0262*** (3.61)	0.0280*** (3.73)	0.0226*** (3.90)
Grow	0.0005** (2.02)	0.0005** (2.02)	-0.0003 (-0.85)	-0.0003 (-0.87)	-0.0003 (-0.85)	0.0001 (0.12)
Size	0.0015* (1.87)	0.0015* (1.87)	0.0023* (1.86)	0.0022* (1.79)	0.0023* (1.77)	0.0006 (0.57)
Lev	-0.0412*** (-12.14)	-0.0412*** (-12.14)	-0.0457*** (-8.60)	-0.0456*** (-8.52)	-0.0499*** (-8.98)	-0.0529*** (-11.31)
GDP	1.0629*** (20.65)	1.0701*** (20.42)	1.2382*** (15.14)	1.2319*** (15.08)	1.2277*** (14.23)	1.2110*** (19.52)
SOE	-0.0077*** (-3.25)	-0.0077*** (-3.25)	-0.0107*** (-2.96)	-0.0106*** (-2.94)	-0.0103*** (-2.79)	-0.0083** (-2.54)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes	Yes	Yes
N	32761	32761	13464	13503	12605	20522
Adj-R^2	0.105	0.105	0.135	0.134	0.132	0.141

Note: (1) Clustering at the enterprise level, with T-values calculated based on cluster-robust standard errors in parentheses. (2) *, **, and *** denote significance at the 0.1, 0.05, and 0.01 levels, respectively. (3) Tables 3 and 4 are treated identically.

The regression analysis of models (13) - (15) was conducted, with the explained variable being the investment level of enterprises. The regression adjusted for standard errors at the enterprise level through clustering, and the estimated results are shown in Tables 2 and 3. The research design section provided two proxies for monetary policy uncertainty, MPU_1 and MPU_2, as well as six proxies for the cost of capital (WACC). These consist of the weighted sum of six measures of equity capital cost and debt capital cost, of which four ($WACC_{peg}$, $WACC_{mpeg}$, $WACC_{oj}$ and $WACC_{ave}$) are used for analysis. The remaining two measures of capital cost are used for robustness tests. In Table 2, columns (1) - (2) show the results of regression using these two proxies for monetary policy uncertainty in model (13), while columns (3) - (6) show the results of regression using these four proxies for capital costs in model (14). Similarly, since model (15) includes both monetary policy uncertainty and capital cost, as well as their interaction terms, columns (1a) - (4b) in Table 3 use 1-4 to distinguish among the four proxies for capital costs used in the regression, and a and b to differentiate between the two proxies for monetary policy uncertainty used.

Table 3. Analysis of the Impact of Monetary Policy Uncertainty on the Sensitivity of Corporate Investment to Capital Costs

Variables	Model (15)			
	(1a)	(1b)	(2a)	(2b)
MPU×WACC	0.0742*** (2.72)	0.0247*** (2.85)	0.0757*** (3.00)	0.0251*** (3.14)
WACC	-0.2523*** (-6.10)	-0.2397*** (-6.66)	-0.2396*** (-6.23)	-0.2265*** (-6.76)
MPU	-0.0142*** (-4.72)	-0.0047*** (-4.81)	-0.0150*** (-4.99)	-0.0049*** (-5.09)
CF	0.0256*** (3.58)	0.0256*** (3.59)	0.0260*** (3.62)	0.0261*** (3.63)
Grow	-0.0004 (-1.13)	-0.0004 (-1.13)	-0.0005 (-1.17)	-0.0005 (-1.18)
Size	0.0034*** (2.73)	0.0034*** (2.72)	0.0034*** (2.69)	0.0034*** (2.68)
Lev	-0.0460*** (-8.69)	-0.0460*** (-8.69)	-0.0460*** (-8.61)	-0.0460*** (-8.61)
GDP	1.4181*** (13.95)	1.4367*** (13.70)	1.4181*** (13.97)	1.4373*** (13.72)
SOE	-0.0112*** (-3.14)	-0.0112*** (-3.15)	-0.0111*** (-3.12)	-0.0111*** (-3.12)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes
N	13464	13464	13503	13503
Adj-R^2	0.138	0.138	0.137	0.138

Variables	Model (15)			
	(3a)	(3b)	(4a)	(4b)
MPU×WACC	0.0648** (2.54)	0.0216*** (2.67)	0.0580*** (2.72)	0.0195*** (2.91)
WACC	-0.2308*** (-5.94)	-0.2200*** (-6.49)	-0.2315*** (-7.05)	-0.2225*** (-7.81)
MPU	-0.0155*** (-4.75)	-0.0051*** (-4.85)	-0.0157*** (-6.38)	-0.0052*** (-6.53)
CF	0.0276*** (3.72)	0.0277*** (3.72)	0.0219*** (3.79)	0.0219*** (3.80)
Grow	-0.0005 (-1.14)	-0.0005 (-1.14)	-0.0001 (-0.16)	-0.0001 (-0.17)
Size	0.0035*** (2.68)	0.0035*** (2.68)	0.0022* (1.91)	0.0022* (1.91)
Lev	-0.0503*** (-9.09)	-0.0504*** (-9.09)	-0.0535*** (-11.49)	-0.0535*** (-11.49)
GDP	1.4197*** (13.45)	1.4399*** (13.24)	1.4457*** (18.09)	1.4685*** (17.79)
SOE	-0.0109*** (-3.01)	-0.0109*** (-3.01)	-0.0091*** (-2.81)	-0.0091*** (-2.81)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes
N	12605	12605	20522	20522
Adj-R^2	0.136	0.136	0.145	0.145

Note: (1) Columns (1a) - (4b) in Table 3 present the regression results for eight different combinations. The labels 'a' and 'b' are used to differentiate between two proxy variables for monetary policy uncertainty, while '1-4' distinguish the four proxy variables for capital costs. Table 4 undergoes a similar process.

In Table 2, columns (1) and (2) report the regression results of model (13). Overall, the impact of monetary policy uncertainty on corporate investment is significantly negative. Specifically, as shown in column (1), the coefficient estimate of monetary policy uncertainty is significantly negative, indicating that an increase in monetary policy uncertainty reduces corporate investment. This aligns with the expectations of theoretical model formula (12) and is consistent with the findings of existing research that policy uncertainty reduces investment (Li Fengyu, Yang Mozu, 2015; Gulen, Ion, 2016; Zhang Chengsi, Liu Guanchun, 2018). Model (14) primarily investigates the impact of capital cost on corporate investment. Here, four proxies for capital costs are used, with the results shown in columns (3) - (6). These results consistently indicate that an increase in capital costs significantly inhibits corporate investment, in line with the assertions of related research (Xu Mingdong, Tian Suhua, 2013; Frank, Shen, 2016; Xu Mingdong, Chen Xuebin, 2012, 2019). For instance, in column (3), the coefficient estimate of capital costs is significantly negative, suggesting that an increase in capital costs will reduce corporate investment. Notably, in the results reported in columns (3) - (6), the coefficient estimates of capital costs are consistently negative, while the coefficient estimates of cash flow level (CF) are consistently positive, consistent with the performance in columns (1) and (2), and aligning with the expectations of the theoretical model. The regression results of models (13) and (14) are consistent with the conclusions derived from the theoretical model and indicate that this theoretical framework can be applied to study the impact of monetary policy uncertainty and capital costs on corporate investment in the Chinese context.

In Table 3, Model (15) conducts regressions using two proxy variables for monetary policy uncertainty and four for capital costs, with columns (1a) - (4b) presenting the regression results of these eight combinations. The coefficient estimates reveal that in all eight combinations, the interaction term coefficients of capital costs and monetary policy uncertainty are significantly positive, while the coefficients of capital costs remain consistently negative as in Model (14). Specifically, taking column (1a) as an example, the coefficient estimate for capital costs is -0.2105, and for the interaction term with monetary policy uncertainty is 0.0760, both significant at the 1% level. This indicates that, ceteris paribus, corporate investment decreases (increases) with rising (falling) capital costs. However, the extent of corporate investment's sensitivity to changes in capital costs diminishes when firms are impacted by monetary policy uncertainty.

Upon examination, the empirical results obtained using different measures of capital costs and monetary policy uncertainty are consistent with the conclusions drawn from the theoretical model. Specifically, a highly uncertain monetary policy environment not only causes a decline in the level of corporate investment but also has a dampening effect on the sensitivity of corporate investment to capital costs, thereby validating the hypothesis. These results indicate that if the government intends to stimulate corporate investment through monetary policy adjustments, achieving policy objectives may be challenging under the influence of high monetary policy uncertainty. Policy measures aimed at reducing capital costs (e.g., lowering interest rates) can only be effective in achieving their goals when corporate investment is sufficiently sensitive to capital costs, a sensitivity diminished by monetary policy uncertainty. Therefore, in the process of monetary policy regulation, attention should not only be given to the short-term stimulative effects of policies but also to the impact of uncertainty generated during this process on the efficacy of monetary policy. In the context of China's monetary policy framework transitioning towards a price-based system, these results provide micro-level evidence that monetary policy uncertainty diminishes the effectiveness of monetary policy regulation.

3.5. Mechanism test

The empirical analysis section validates a key conclusion of the corporate investment theory model within the framework of optimal corporate investment decisions: monetary policy uncertainty reduces the sensitivity of corporate investment to capital costs. According to the theoretical model, this is a result of monetary policy uncertainty diminishing corporate confidence in their own development prospects. The influencing mechanism can be summarized as follows: Confidence in future prospects motivates corporations to optimize resource allocation, giving them the impetus to adjust resource allocation promptly. This makes corporate investment sensitive to changes in the prices of economic factors. However, under the influence of monetary policy uncertainty, corporate confidence in their own development prospects wanes, weakening the incentive to optimize resource allocation to enhance future profitability. Consequently, corporations fail to adjust their investment strategies promptly in response to changes in crucial investment factors like capital costs, significantly reducing investment sensitivity. This manifests as a suppressive effect of monetary policy uncertainty on the sensitivity of corporate investment to capital costs.

To test the aforementioned mechanism, the study design incorporates an indirect examination, considering the unobservability of corporate confidence. Drawing from the theoretical model analysis, corporate confidence is rooted in expectations of future earnings through operations. The suppressive effect of monetary policy uncertainty is exerted by influencing this expectation. Consequently, the inference is made: the extent to which a corporation values its future operational earnings impacts the magnitude of this suppressive effect. The more a corporation values future operational earnings, the stronger the suppressive effect on its investment sensitivity, and vice versa. The degree to which a corporation values future operational earnings essentially reflects its sensitivity to capital, with those placing a higher value on future earnings being more sensitive to capital changes. Therefore, the study indirectly tests the influence mechanism by examining the relative sensitivity of corporations to capital. Given the challenge in directly measuring a corporation's capital sensitivity, observable indicators affecting this sensitivity are sought to indirectly test the mechanism's validity. A corporation's sensitivity to capital depends on its growth potential, investment opportunities, and developmental constraints, particularly financing constraints. Enterprises facing stringent financing constraints are more sensitive to changes in capital to seize investment opportunities and realize their value. Based on this analysis, corporations are divided into two groups: those with high capital sensitivity (i.e., placing a high value on future operational earnings) and those with low capital sensitivity (i.e., placing a low value on future operational earnings). By examining the differences in the effect of monetary policy uncertainty on capital cost sensitivity between these two groups, the study indirectly validates the effectiveness of the influence mechanism. If significant differences are found, and the suppressive effect is stronger in corporations facing stringent financing constraints, it would indicate the reasonableness of the analysis of the aforementioned influence mechanism.

There are various metrics to measure and categorize the extent of financing constraints faced by enterprises. This study adopts the approach of Hadlock and Pierce (2010), using two relatively exogenous variables – firm size and firm age – to construct a financing constraint index. Based on the magnitude of this index in each year, enterprises are classified into groups facing high financing constraints and low financing constraints. Subsequently, the study conducts group regressions based on the degree of financing constraints encountered by these enterprises. The corresponding coefficient estimation results are presented in the following Table 4.

The coefficient estimation results from Table 4 indicate that, in enterprises facing relatively high financing constraints, the coefficient estimates for both capital costs and monetary policy uncertainty are negative at the 1% significance level, and their interaction terms are positive at the same level of significance. In contrast, in enterprises with relatively low financing constraints, the significance of the coefficient estimates for capital costs and monetary policy uncertainty is reduced, and their interaction terms are not significant. The study further employs the Chow test to examine the differences in estimated coefficients across grouped samples. The test results reveal significant differences at the 1% level in the coefficients of the interaction terms between capital costs and monetary policy uncertainty across all columns from (1a) to (4b). These coefficients are significantly higher in enterprises with high financing constraints compared to those with low constraints, suggesting a stronger suppressive effect of monetary policy uncertainty on the sensitivity of corporate investment to capital costs in enterprises facing high financing constraints.

This part of the analysis, which categorizes enterprises based on the degree of financing constraints and, consequently, their varying emphasis on future operational earnings, shows that the suppressive effect of monetary policy uncertainty on the sensitivity of corporate investment to capital costs is influenced by the degree to which enterprises value future operational earnings. This effect is stronger in enterprises under high financing constraints and weaker in those under low constraints, indirectly validating the effectiveness of the influence mechanism from the perspective of financing constraints. This has two implications: First, corporate development expectations play a crucial role in investment decisions in uncertain economic environments. Therefore, policy measures should be actively adopted to stabilize and guide these expectations, boosting corporate confidence. This would help stimulate corporate vitality, improve resource allocation efficiency, and enhance the effectiveness of monetary policy. Second, the sensitivity of corporate investment to capital costs is state-dependent, easily influenced by the economic environment and the characteristics of the enterprise itself. Not only is it suppressed under the influence of monetary policy uncertainty, but this suppressive effect is also influenced by the degree to which enterprises value future operational earnings.

Table 4. Regression Results Grouped by the Degree of Financing Constraints Faced by Enterprises

Variables	(1a)		(1b)	
	Stringent Financing Constraints	Lenient Financing Constraints	Stringent Financing Constraints	Lenient Financing Constraints
MPU×WACC	0.1515*** (3.57)	-0.0311 (-0.86)	0.0483*** (3.63)	-0.0091 (-0.80)
WACC	-0.3012*** (-4.65)	-0.1474*** (-2.59)	-0.2679*** (-4.84)	-0.1571*** (-3.15)
MPU	-0.1964*** (-5.86)	-0.0615** (-2.29)	-0.0744*** (-6.11)	-0.0230** (-2.31)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes
N	6927	7188	6927	7188
Adj-R^2	0.166	0.092	0.167	0.092
Variables	(2a)		(2b)	
	Stringent Financing Constraints	Lenient Financing Constraints	Stringent Financing Constraints	Lenient Financing Constraints
MPU×WACC	0.1421*** (3.64)	-0.0228 (-0.68)	0.0453*** (3.71)	-0.0065 (-0.62)
WACC	-0.2815*** (-4.70)	-0.1453*** (-2.76)	-0.2506*** (-4.89)	-0.1531*** (-3.31)
MPU	-0.2034*** (-6.15)	-0.0664** (-2.47)	-0.0768*** (-6.41)	-0.0248** (-2.49)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes
N	6961	7194	6961	7194
Adj-R^2	0.169	0.090	0.170	0.090
Variables	(3a)		(3b)	
	Stringent Financing Constraints	Lenient Financing Constraints	Stringent Financing Constraints	Lenient Financing Constraints
MPU×WACC	0.1237*** (3.10)	-0.0255 (-0.76)	0.0396*** (3.17)	-0.0075 (-0.70)
WACC	-0.2527*** (-4.10)	-0.1478*** (-2.82)	-0.2264*** (-4.29)	-0.1558*** (-3.38)
MPU	-0.1923*** (-5.79)	-0.0706*** (-2.63)	-0.0726*** (-6.00)	-0.0261*** (-2.65)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes
N	6536	6705	6536	6705
Adj-R^2	0.167	0.089	0.168	0.089
Variables	(4a)		(4b)	
	Stringent Financing Constraints	Lenient Financing Constraints	Stringent Financing Constraints	Lenient Financing Constraints
MPU×WACC	0.1149*** (3.39)	-0.0133 (-0.48)	0.0371*** (3.51)	-0.0034 (-0.39)
WACC	-0.2666*** (-5.12)	-0.1464*** (-3.34)	-0.2434*** (-5.48)	-0.1523*** (-3.99)
MPU	-0.2180*** (-8.35)	-0.0969*** (-4.33)	-0.0819*** (-8.56)	-0.0360*** (-4.32)
Firm and time fixed effects, constant term	Yes	Yes	Yes	Yes
N	10213	11058	10213	11058
Adj-R^2	0.175	0.098	0.176	0.098

4. ROBUSTNESS TESTS

4.1. Considering the Impact of Equity Division Reform and Corporate Management Characteristics

The conclusion that monetary policy uncertainty suppresses corporate investment sensitivity is derived from a theoretical corporate investment model, which posits maximizing enterprise value (i.e., maximizing shareholder interests) as the goal of corporate investment decisions. Although the theoretical model does not consider the influence of corporate owners and managers, in reality, their characteristics may affect judgments about maximizing enterprise value, thereby influencing corporate investment decisions and leading to endogeneity issues in the analysis. To ensure that the identified suppressive effect of monetary policy uncertainty is not erroneously concluded by neglecting the characteristics of corporate owners and managers, this section tests the robustness of the conclusion from two aspects: equity division reform and corporate management characteristics.

First, the robustness of the conclusion is tested through equity division reform. Considering that the study focuses on publicly listed companies, the equity division reform ended the historical coexistence of two types of shares and two prices in listed companies, strengthening the common interest foundation among various shareholders. Taking into account the implementation of the new accounting standards in 2007 and the completion of equity division reform, the study adjusts the time span of the sample to 2007-2019 and re-analyzes Model (15). The size and significance of the main variable coefficient estimates remain largely unchanged, indicating that the conclusions of this study still hold. The empirical results are not repeated in the main text.

Second, the study controls for corporate management characteristics from four aspects: the size of the board of directors, the independence of the board, the shareholding percentage of the management, and the controlling power of the major shareholders. After incorporating these management characteristics into the control variables and reanalyzing Model (15), the size and significance of the main variable coefficient estimates remain largely unchanged. The empirical results continue to support the conclusion of this study.

4.2. Robustness Test Based on Variable Substitution

Robustness test by substituting capital cost measurement indicators. The measurement of capital costs is composed of equity capital costs and debt capital costs. Firstly, the method of measuring equity capital costs is changed by substituting the capital cost calculated based on the KR model and the CAPM model for the capital cost variable used in the empirical analysis. Repeating the empirical analysis process, there are no significant differences between the empirical conclusions and the baseline conclusions of this study. Furthermore, the measurement indicator for debt capital cost is substituted. Following the approach of Chen Guojin and Wang Shaoqian (2016), the total amount of long-term and short-term debts is used to measure interest-bearing liabilities. This result is then weighted and summed with the results of six different equity capital cost measurements to obtain a new proxy indicator for capital costs. After substituting the original indicator and repeating the empirical analysis process, the empirical results still support the baseline conclusion of this study.

4.3. Robustness Test Based on Cluster Adjustment

Regression results based on panel data may be affected by heteroskedasticity and serial correlation. To mitigate this impact, clustering at the enterprise individual level was performed in the study, and conclusions were drawn based on cluster-robust estimates at the individual level. Here, a re-analysis is conducted at a higher level of clustering to examine the impact of clustering levels on the conclusions. Considering the potential industry clustering of corporate investment, which may lead to interconnected investments among enterprises within the same industry, cluster adjustments are made at the industry level when estimating regression coefficient standard errors. The results show that the estimated values of the robust standard errors of regression coefficients obtained using these two clustering methods differ very little, and the significance of the estimated results of important variables has not changed noticeably after cluster adjustment. The empirical results still support the conclusions of this study.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

This study constructs a theoretical model within the framework of optimal corporate investment decisions, incorporating monetary policy uncertainty to examine its impact and the mechanism of influence on the sensitivity of corporate investment to capital costs. Using samples of non-financial listed companies in China's A-share market from 2003 to 2019 for empirical testing, the study finds that a highly uncertain monetary policy environment not only reduces corporate investment but also suppresses its sensitivity to capital costs. Given that capital costs are a crucial factor influencing corporate investment, the sensitivity of corporate investment to capital costs is vital not only for investment efficiency but also as a fundamental condition for the effectiveness of price-based monetary policy tools. It enables the identification of whether the monetary policy interest rate transmission channel is unobstructed. The findings suggest that an uncertain monetary policy environment disrupts market entities' decision-making, affecting the effectiveness of the interest rate transmission channel and impairing corporate investment efficiency.

The underlying mechanism of this suppressive effect is that monetary policy uncertainty undermines corporate confidence in business development, weakening the incentive to optimize resource allocation to enhance future profitability. This leads to a reduced eagerness in enterprises to adjust investment strategies promptly in response to economic factor changes, manifesting as a decreased sensitivity of investment to capital costs and other key influencers. This provides empirical evidence for the chilling effect of uncertainty emphasized by Bloom (2014) and explains the internal mechanism of this effect, showing that uncertainty can hinder productivity improvement by suppressing the reallocation of resources among enterprises. From the perspective of uncertainty, it offers a new explanation for the "mystery of the decline in China's industrial investment rate" under loose policies and stimulus measures.

The study validates the reasonableness of the impact mechanism from the perspective of financing constraints. These results also indicate heterogeneity in the suppressive effect among enterprises: those facing high financing constraints, due to their greater emphasis on future operational earnings, experience a stronger suppressive effect of monetary policy uncertainty on their investment sensitivity. The results of the mechanism test have two implications: First, corporate confidence in development plays a crucial role in investment decisions in uncertain economic environments. Policy measures should actively stabilize and guide corporate development expectations to boost corporate confidence, which is significant for stimulating corporate vitality, enhancing resource allocation efficiency, and increasing the effectiveness of monetary policy. Second, the heterogeneity of the suppressive effect indicates that the sensitivity of corporate investment to capital costs is state-dependent and easily influenced by the economic environment and corporate characteristics. It is not only suppressed in an environment of monetary policy uncertainty but also affected by the extent to which enterprises value future operational earnings. This enriches the research on factors influencing investment sensitivity.

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REFERENCES

[1] Baker, S. R., Bloom, N., & Davis, S. J. "Measuring Economic Policy Uncertainty." Quarterly Journal of Economics, 2016, 131(4): 1593-1636.

[2] Bertola, G., Guiso, L., & Pistaferri, L. "Uncertainty and Consumer Durables Adjustment." Review of Economic Studies, 2005, 72(4): 973-1007.

[3] Bloom, N. "Fluctuations in Uncertainty." Journal of Economic Perspectives, 2014, 28(2): 153-176.

[4] Bloom, N., Bond, S., & Van Reenen, J. "Uncertainty and Investment Dynamics." The Review of Economic Studies, 2007, 74(2): 391-415.

[5] Chirinko, R. S., Fazzari, S. M., & Meyer, A. P. "How Responsive is Business Capital Formation to its User Cost? An Exploration with Micro Data." Journal of Public Economics, 1999, 1(74): 53-80.

[6] Chen Guojin, Wang Shaoqian. "How Economic Policy Uncertainty Affects Corporate Investment Behavior." Finance & Trade Economics, 2016(05): 5-21.

[7] Chen Shoudong, Zhang Xiu, Liu Yang. "The Interest Rate Transmission Mechanism under Uncertainty Shocks." Research on Economics and Management, 2016, 37(06): 67-73.

[8] Cooper, R. W., & Haltiwanger, J. C. "On the Nature of Capital Adjustment Costs." Review of Economic Studies, 2006, 73(3): 611-633.

[9] Fang Jianzhen, Hu Cheng. "Exploration of the Impact of Economic Policy Uncertainty on Corporate Cash Holdings." Journal of Beijing University of Posts and Telecommunications (Social Sciences Edition), 2020, 22(02): 49-57.

[10] Foote, C., Hurst, E., & Leahy, J. "Testing the (S, s) Model." American Economic Review, 2000, 90(2): 116-119.

[11] Foster, L., Haltiwanger, J., & Krizan, C. J. "Market Selection, Reallocation, and Restructuring in the U.S. Retail Trade Sector in the 1990s." Review of Economics and Statistics, 2006, 88(4): 748-758.

[12] Frank, M. Z., & Shen, T. "Investment and the Weighted Average Cost of Capital." Journal of Financial Economics, 2016, 119(2): 300-315.

[13] Gulen, H., & Ion, M. "Policy Uncertainty and Corporate Investment." The Review of Financial Studies, 2016, 29(3): 523-564.

[14] Hadlock, C. J., & Pierce, J. R. "New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index." The Review of Financial Studies, 2010, 23(5): 1909-1940.

[15] He Dexu, Yu Jingjing. "Study on the Real Challenges and Solutions of China's Monetary Policy Transmission." Economic Perspectives, 2019(08): 21-39.

[16] Huang, Y., & Luk, P. "Measuring Economic Policy Uncertainty in China." China Economic Review, 2020, 59, No. 101367.

[17] Julio, B., & Yook, Y. "Political Uncertainty and Corporate Investment Cycles." The Journal of Finance, 2012, 67(1): 45-83.

[18] Li Fengyu, Shi Yongdong. "Economic Policy Uncertainty and Corporate Cash Holding Strategies – An Empirical Study Based on the China Economic Policy Uncertainty Index." Journal of Management Sciences in China, 2016, 19(06): 157-170.

[19] Li Fengyu, Yang Mozu. "Does Economic Policy Uncertainty Inhibit Corporate Investment? - An Empirical Study Based on the China Economic Policy Uncertainty Index." Journal of Financial Research, 2015(04): 115-129.

[20] Li Haoju, Cheng Xiaoke, Zheng Lidong. "Economic Policy Uncertainty, Working Capital Management, and Corporate Value." Journal of Central University of Finance & Economics, 2016(03): 72-81.

[21] Li Wenjing, Zheng Manni. "Inflation Expectations, Corporate Growth and Corporate Investment." Statistical Research, 2016, 33(05): 34-42.

[22] Liu Chong, Pang Yuanchen, Liu Liya. "Structural Monetary Policy, Financial Regulation, and Interest Rate Transmission Efficiency – Evidence from China's Bond Market." Economic Research Journal, 2022, 57(01): 122-136.

[23] Liu Guanchun, Duan Yuzhu, Liu Yuanyuan. "Economic Policy Uncertainty, Asset Reversibility, and Fixed Asset Investment." Economic Research Journal, 2019, 54(08): 53-70.

[24] Liu Guanchun, Liu Yuanyuan, Zhang Jun. "Economic Policy Uncertainty and Asset Portfolio Allocation of Chinese Listed Companies – Discussing the 'Financialization' Trend of Real Enterprises." The Journal of World Economy, 2020, 20(05): 65-86.

[25] Mao Xinshu, Ye Kangtao, Zhang Di. "Measurement and Evaluation of Equity Capital Cost of Listed Companies – Empirical Test Based on China's Securities Market." Accounting Research, 2012(11): 12-22+94.

[26] Pu Wenyan, Zhang Honghui, Xiao Hao. "Debt Conservatism, Investment Opportunities, and Capital Investment of Chinese Listed Companies." Management Review, 2012, 24(04): 36-44.

[27] Qi Yuqing. "Analysis and Reflections on China's Monetary Policy Transmission Channels and Effects." Macro-Economic Research, 2023(07): 4-20.

[28] Rao Pingui, Yue Heng, Jiang Guohua. "Study on Economic Policy Uncertainty and Corporate Investment Behavior." The Journal of World Economy, 2017, 40(02): 27-51.

[29] Sharpe, S. A., & Suarez, G. A. "Why Isn't Investment More Sensitive to Interest Rates: Evidence From Surveys." Management Science, 2021, 67(2): 720-741.

[30] Tan Xiaofen, Zhang Wenjing. "Channel Analysis of How Economic Policy Uncertainty Affects Corporate Investment." The Journal of World Economy, 2017, 40(12): 3-26.

[31] Tian Guoqiang, Li Shuangjian. "Economic Policy Uncertainty and Bank Liquidity Creation: Evidence from China." Economic Research Journal, 2020, 55(11): 19-35.

[32] Wolfgang, D., Sadok, E. G., Omrane, G., & Malte, J. "Policy Uncertainty, Investment, and the Cost of Capital." Journal of Financial Stability, 2018, 39: 28-45.

[33] Xu Mingdong, Chen Xuebin. "Analysis of Capital Cost Sensitivity of China's Industrial Enterprise Investment." Economic Research Journal, 2012, 47(03): 40-52+101.

[34] Xu Mingdong, Chen Xuebin. "Estimation of Capital Cost Sensitivity of Chinese Listed Company Investment." Journal of Financial Research, 2019(08): 113-132.

[35] Xu Mingdong, Tian Suhua. "Reform of Transition Economy and Capital Cost Sensitivity of Enterprise Investment – Based on Micro-Evidence from Chinese State-Owned Industrial Enterprises." Management World, 2013(02): 125-135+171.

[36] Yang Xingquan, Qi Yunfei, Wu Haomin. "Does Industry Growth Influence Corporate Cash Holdings?" Management World, 2016(01): 153-169.

[37] Yang, Z., Yu, Y., Zhang, Y., & Zhou, S. "Policy Uncertainty Exposure and Market Value: Evidence from China." Pacific-Basin Finance Journal, 2019, 57, No. 101178.

[38] Zhang Chengsi, Liu Guanchun. "Research on the Investment and Financing Decision Mechanism of China's Industrial Sector – From the Perspective of Economic Policy Uncertainty and Financing Constraint Heterogeneity." Economic Research Journal, 2018, 53(12): 51-67.

[39] Zhang Chengsi, Zhang Butan. "The Mystery of the Decline in China's Industrial Investment Rate: A Financialization Perspective." Economic Research Journal, 2016, 51(12): 32-46.

[40] Zhang Yishan, Meng Xianchun, Li Tianyu. "Study on China's Monetary Policy Transition Mechanism – Based on an International Experience Perspective." Quantitative Economic Research, 2017, 8(01): 14-28.

[41] Zhang Zhe, Chen Lei, Chen Ping. "Monetary Policy Uncertainty and Yield Curve Transmission." Journal of Financial Economics, 2021, 36(01): 49-63.

[42] Zheng Manni, Li Wenjing, Liu Jianhua. "Micro-Effects of Interest Rate Liberalization: Empirical Evidence from Chinese Listed Companies' Investment after the 2008 Global Financial Crisis." Statistical Research, 2023, 40(07): Certainly! Here's the combined list of C, arranged in alphabetical order.