Working Paper No. 2016001

北京大學 汇丰商学院
Peking University HSBC Business School
商界军校

PHBS

Economic Policy Uncertainty and Peer Effects in Corporate Investment Policy

Hyun Joong Im

Ya Kang

Young Joon Park

Economic Policy Uncertainty and Peer Effects in Corporate Investment Policy*

Hyun Joong Im†
HSBC Business School
Peking University

Ya Kang‡
NUS Business School
NUS

Young Joon Park§
HSBC Business School
Peking University

February 15, 2016

Abstract

This study investigates whether peer firms affect corporate investment policies, using accounting and stock market data of Chinese manufacturing firms over the period 1999-2013. Using peer-firm-average idiosyncratic return shock as an instrumental variable for *ex post* peer-firm-average investment, we show that peer firms play an important role in determining corporate investment policies, and that peer effects are causal. We also show that economic policy uncertainty magnifies peer effects in corporate investment decisions, and this effect is more pronounced in the under-investment sample. This suggests that peer effects could exacerbate industry-wide under-investment problems when economic policy uncertainty is higher.

JEL classification: G31, E22, D81, G32

Keywords: corporate investment policy, peer effects, economic policy uncertainty, underinvestment

---

*Corresponding Author: Young Joon Park

†Address: HSBC Business School, Peking University, University Town, Nanshan District, Shenzhen, 518055, China; Tel: +86 (0)755 2603 3627; Fax: +86 (0)755 2603 5344; Email: hyun.im@phbs.pku.edu.cn

‡Address: Department of Finance, NUS Business School, National University of Singapore, BIZ 2 Building #B1-3, 1 Business Link, 117592, Singapore; Tel: +65 8647 3952; Email: kangya@u.nus.edu

§Address: HSBC Business School, Peking University, University Town, Nanshan District, Shenzhen, 518055, China; Tel: +86 (0)755 2603 2019; Fax: +86 (0)755 2603 5344; Email: yjpark@phbs.pku.edu.cn

1 Introduction

There is growing interest in peer effects in financial decisions, e.g. capital structure (Leary and Roberts, 2014), institutional investment (Choi and Sias, 2009) and analysts' behavior (Jegadeesh and Kim, 2010). A peer effect is said to exist if an individual agent's decision is affected by its peers' decisions. Several rationales behind peer effects can be found in the literature. First, an individual agent's decision and its peers' decisions may be strategic complements or strategic substitutes, depending on the industry (Bulow *et al.*, 1985). Under such situation, firms' best response reaction to other firms' decisions would naturally take a form similar to typical peer effects. Second, due to agency motives, decision-makers may have incentives to mimic peers (Scharfstein and Stein, 1990). Managers who are concerned with own reputation for future employment opportunities may make similar choices with their peer firms in order to 'share the blame' in case the decision turned out to be suboptimal. Finally, according to the information cascades model, a herding behavior can arise with the belief that peers have made their decisions based on superior information (Bikhchandani *et al.*, 1992). Intuitive as they may seem, the existence of and reasons behind peer effects in corporate investment policy have been understudied. Due to endogeneity problems, it is a challenge to identify the causal effects of peer firms' investment decisions on a firm's investment decision[1]. In this paper, we try to improve our understanding of the existence, direction and determinants of peer effects in corporate investment policy.

We examine whether peer firms influence corporate investment policies, using accounting and stock market data of Chinese manufacturing firms over the period 1999-2013. Numerous theories, such as the basic neoclassical theory of investment (Jorgenson, 1963), the Tobin-Hayashi Q theory of investment (Hayashi, 1982), or the real option theory of investment under uncertainty (Dixit and Pindyck, 1994) identify various determinants of corporate investment decisions. Given the risky

[1] See Manski (1993), Leary and Roberts (2014) and Angrist (2014) for more details on endogeneity issues.

nature of investment decision-making and the cost of acquiring relevant information, however, firms may tend to learn from and even mimic the decisions of other firms with similar attributes. For instance, Foucault and Fresard (2014) have shown that a firm's investment is influenced by peer firms' stock prices. Their model describes the situation in which managers learn information from their own and peers' stock prices and empirically confirms that firms' investment is positively related to stock price of their peer firms. Generally, however, peer firms' stock prices could be affected by common factors that also affect the firm's investment. In order to address this endogeniety issue, we utilize peer-firm-average idiosyncratic return shock proposed by Leary and Roberts (2014) as an instrumental variable for peer-firm-average investment.

We further investigate whether economic policy uncertainty (EPU) magnifies peer effects in corporate investment behavior. In most cases, economic policies implemented by regulators alter business environments. Thus, uncertain economic policies bring about business uncertainty for firms. Intuitively, higher business uncertainty would worsen agency problems and make it more costly to make accurate investment decisions due to higher costs of information. Therefore, peer effects are more likely to arise when economic policy uncertainty is higher. Baker *et al.* (2013) develop EPU indices for the world's major economies based on a textual analysis of economic policy news. We utilize the EPU index for the Chinese economy as China has had more frequent and significant economic policy changes over the last several decades[2]. A brief inspection of the index reveals that there are three spikes during our sample period, i.e., China's World Trade Organization (WTO) entry in 2001, declining exports and US$580 billion rescue package due to the global financial crisis in 2008, and the Euro debt crisis and trade protectionism, economic growth slowdown expectations, an anti-corruption campaign and political elections in 2011-2012. In addition, we explore more closely whether economic policy uncertainty affects the peer effects asymmetrically between

[2]The Chinese EPU index is calculated using a text-based analysis and is in accordance with the frequency of the economic policy uncertainty discussed by South China Morning Post, a leading English-language newspaper in Hong Kong. See the website for detailed information: http://www.policyuncertainty.com/china_monthly.html.

over-investment firms and under-investment firms.

2 Hypotheses development

There are abundant evidence of peer effects and herding behaviors in various financial decisions[3]. Foucault and Fresard (2014) provide a theoretical model in which peer firms' stock prices increase a firm's investment because the firm learns from its peers' stock prices. However, they do not try to identify such peer effects, although they show some evidence of peer effects in corporate investment decisions using the data of US public firms. Meanwhile, Leary and Roberts (2014) find evidence that a firm's capital structure is influenced by its peers' capital structure decisions, using a method designed to address some endogeneity issues that arise when we study peer effects. We use a similar approach to identify peer effects in corporate investment decisions. Specifically, we use peer-firm-average idiosyncratic return shock as an instrumental variable for peer-firm-average investment.

Chinese manufacturing industry data is appropriate to study whether peer effects exist in corporate investment decision-making and whether economic policy uncertainty affects peer effects in corporate investment for the following two reasons. First, China's manufacturing industry is the most dynamic in the world and virtually everything is being "made in China" nowadays. Unlike manufacturing firms in most of advanced economies such as United States and Europe, Chinese manufacturing firms had lots of investment opportunities during our sample period, and thus they, on average, might have made more important investment decisions more frequently during the sample period. Second, Chinese economy is a (at least partly) centrally planned and fast developing economy, and thus economic policies including industrial policies might have had more significant influences on corporate investment decision-making in China than in most developed economies. In addition, an inspection of the EPU index for Chinese economy reveals that China's economic policy

[3] See Spyrou (2013) for a review of recent developments in this field.

is more uncertain at certain times than other times.

Before we investigate whether economic policy uncertainty magnifies peer effects in corporate investment policy, we first investigate whether peer effects exist in Chinese manufacturing firms' investment decision-making. Thus, our first hypotheses is stated as follows:

Hypothesis 1. *There exist peer effects in Chinese manufacturing firms' investment policy.*

Economic policy, especially industrial policy, often alters business environment, and thus uncertain economic policies bring about business uncertainty for firms. Business uncertainty that firms face would make agency problems more severe and make it more costly to make accurate investment decisions owing to higher costs of information acquisition. Thus, economic policy uncertainty may increase the peer effects. We use the EPU index constructed by Baker *et al.* (2013) as a proxy for economic policy uncertainty prevalent in the economy. They construct the EPU indices for major economies in the world based on a textual analysis of economic policy news. Thus, our second hypothesis is stated as follows:

Hypothesis 2. *Higher economic policy uncertainty magnifies peer effects in corporate investment policy.*

Firms change their investment behaviors and adjust their investment strategies reflecting their expectations about economic policies. Gulen and Ion (2015), Wang *et al*. (2014), and Kang *et al*. (2014) document that EPU has a negative impact on corporate investment. Gulen and Ion (2015) further verify that the cross-sectional relation between EPU and corporate investment is not uniform. Specifically, as real option theories suggest, they find that economic policy uncertainty increases the benefits that a firm might have from delaying its investment spending, using a few different proxies for investment irreversibility. Moreover, they find that more government-dependent firms are more negatively affected by policy uncertainty.

However, almost nothing has been studied about whether the impacts that EPU has on peer effects in corporate investment are asymmetric between over-investment and under-investment firms. The real-option-based investment theories suggest that higher EPU are likely to magnify peer effects more strongly for under-investment firms than for over-investment firms, because these firms would delay their investment spending together. This view is also consistent with observations of Gulen and Ion (2015), Wang *et al*. (2014), and Kang *et al*, which all report higher EPU hampers corporate investments. Nevertheless, no one has directly studied whether EPU has heterogenous effects on investment peer effects between over-investment and under-investment firms. So our last hypotheses is stated as follows:

Hypothesis 3. *The magnifying effects of economic policy uncertainty on investment peer effects are stronger for under-investment firms than for over-investment firms.*

3 Data and methodology

Our primary source of data comes from the China Stock Market & Accounting Research (CSMAR) database, which contains financial statements and stock market information for Chinese listed companies. This study covers the sample period 1999-2013 for all listed manufacturing firms[4]. We carry out a series of data cleaning procedures, including the following ones. First, we drop observations without the key variables described below, including lagged investment. Second, we drop the information on B-share stocks as B-share stocks are restricted to foreign investors. Third, we drop ST (i.e., special treatment) firms as those firms suffered losses for two or more consecutive years and are not comparable with non-ST firms due to high default and delisting risks (Jiang *et al.*, 2009). All continuous variables are winsorized at the 1st and 99th percentiles. Our final sample consists of

[4]The stock return data started from 1990 as the Chinese stock market opened in that year, but cash flow data started from 1998 as firms were required to report cash flow statements from 1997 onwards. For more details, see State Administration of Taxation website: http://www.chinatax.gov.cn/jypx/jckj/jxnr/1/kjfg03.htm.

7,366 firm-year observations, corresponding to 994 firms. The total number of three-digit industries (i.e., peer groups) is 39 and we have on average some 29 firms per industry-year subsample. Panel A of Table 1 summarizes definition of each variable.

[Insert Table 1 Here]

To examine if peer firms affect corporate investment policy, we extend an empirical model used by Hubbard (1998) and Richardson (2006) by adding an *ex post* peer-firm-average investment measure to capture peer effects. Our baseline model is specified as follows:

$$
\begin{aligned}
INV_{i,t} \quad = \quad & \beta_0 + \beta_1 INV_{i,t-1} + \beta_2 INV_{i,t}^{peer} + \beta_{CONTROLS} CONTROLS \\
& + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{i,t}, \qquad (1)
\end{aligned}
$$

where $INV_{i,t}$ is defined as firm i's net capital expenditures plus net acquisitions less sales of fixed assets at the end of year t scaled by total assets at the beginning of year t (Richardson, 2006; Bloom *et al.*, 2007). $INV_{i,t}^{peer}$ is calculated as the average of the investment rates of all the firms in firm i's peer group, excluding itself. Peer groups are defined based on three-digit industry classification codes developed by China Securities Regulatory Commission (CSRC). We expect that β_2 or the coefficient of $INV_{i,t}^{peer}$ to be significantly positive. *CONTROLS* includes the natural logarithm of total assets ($LNTA_{i,t-1}$), Tobin's Q ($TQ_{i,t-1}$), leverage ($LEV_{i,t-1}$), cash holdings to total assets ($CASH_{i,t-1}$), the natural logarithm of the time elapsed since stock listing ($LNAGE_{i,t-1}$), and earnings before interests and taxes to total assets ($EBIT_{i,t-1}$). The control variables are similar to those in Richardson (2006). To examine whether a firm reacts to peer firms' characteristics in addition to peer firms' investment decisions, we also include peer-firm-average characteristics such as $LNTA_{i,t-1}^{peer}$ and $TQ_{i,t-1}^{peer}$ in some regression models. In addition, we include year dummies to control for year fixed effects. Panel B of Table 1 presents summary statistics with respect to firm-specific and peer-firm-average variables.

However, the inclusion of a peer-firm-average investment measure ($INV_{i,t}^{peer}$) on the right-hand side of Equation (1) is subject to some endogeneity problems in that (*i*) there should be confounding effects, as firms within the same peer group are exposed to the same or a similar investment environment; and (*ii*) there may be a reverse causality running from $INV_{i,t}^{peer}$ to $INV_{i,t}$. To address these endogeneity concerns, we adopt peer-firm-average idiosyncratic return shocks as an instrumental variable for peer-firm-average investment ratios $INV_{i,t}^{peer}$ similarly to Leary and Roberts (2014). The estimation model is shown below in Equation (2):

$$r_{ijt} = \alpha_{ijt} + \beta_{ijt}^{MKT}(r_{mt} - r_{ft}) + \beta_{ijt}^{IND}(\bar{r}_{-ijt} - r_{ft}) + \eta_{ijt}, \tag{2}$$

where i, j and t denote firm i, peer group j and month t, respectively. r_{ijt} is firm i's monthly return. r_{mt} refers to monthly market return and r_{ft} refers to monthly risk free rate. $\bar{r}_{-ijt}$ is the peer-firm-average monthly return for firm i (excluding firm i's own monthly return). Essentially, Equation (2) is a revised capital asset pricing model in which one additional component—excess peer group return $(\bar{r}_{-ijt} - r_{ft})$—is added to capture the common factors within the same peer group. This model is estimated on a rolling annual basis using monthly returns during the previous five-year period (with at least 24 observations). On average, adjusted R^2 is as high as 53.8%. It is interesting to notice that a firm's monthly stock returns are weighted averages of market factors and industry factors, with one-third and two-thirds being weights, respectively, given that the constant is close to zero and the sum of the two factor loadings is almost one. Mean idiosyncratic return is around -10 basis points, which is comparable to that for US firms, as reported in Leary and Roberts (2014). The results of regressions to estimate return shocks are summarized in Table 2.

[Insert Table 2 Here]

For each firm, we annualize actual monthly stock returns and expected monthly returns estimated from Equation (2). The difference between the two is firm *i*'s annualized idiosyncratic shocks $IDIO_{i,t}$. Peer-firm-average idiosyncratic return shocks denoted by $IDIO_{i,t}^{peer}$, our main variable of interest, are then obtained by taking the average of peer firms' annualized idiosyncratic shocks (excluding firm *i*'s). The correlation coefficients between main variables are reported in Table 3. It is noteworthy that we use a contemporaneous peer return shock measure ($IDIO_{i,t}^{peer}$) instead of the lagged measure $IDIO_{i,t-1}^{peer}$ because the contemporaneous peer effect is much stronger than the lagged peer effect based on the correlation analysis.

[Insert Table 3 Here]

4 Results

4.1 Identification of peer effects using dynamic panel regressions

To investigate whether peer firms play an important role in determining a firm's investment policy, we first examine if peer-firm-average investment has a significant effect on a firm's investment. Table 4 gives empirical results corresponding to the model specified in Equation (1). The first three columns display results based on pooled ordinary least squares (OLS) (which ignores firm fixed effects), Within-Groups (henceforth referred to as FE) and System GMM estimators, respectively[5]. According to Nickell (1981) and Bond (2002), a pooled OLS estimator is likely to produce $\widehat{\beta}_1$ that is biased upwards, while a Within-Groups (FE) estimator is likely to generate $\widehat{\beta}_1$ that is biased down-

[5] Although Difference GMM estimators developed by Arellano and Bond (1991) are consistent provided the instruments are valid, the instruments become weak if the series are highly persistent (Blundell and Bond, 1998). In this case, System GMM estimator, proposed by Arellano and Bover (1995) and developed by Blundell and Bond (1998), is potentially more efficient than Difference GMM estimator. This estimator augments the system of equations in first-differences with additional equations in levels and uses the lagged first-difference of the dependent variable and explanatory variables as instruments for the equations in levels. We implement System GMM in Stata using the *xtabond2* command proposed by Roodman (2009).

wards when the length of time periods is not long enough. As a result, the estimated coefficients on other explanatory variables, such as peer-firm-average investment ($INV_{i,t}^{peer}$), are also likely to be biased when using both an OLS estimator and an FE estimator. Our estimation results seems to be highly consistent with their predictions: $\widehat{\beta}_1^{OLS} = 0.460$; $\widehat{\beta}_1^{FE} = 0.281$. The coefficient estimated by System GMM ($\widehat{\beta}_1^{GMM} = 0.405$), on the other hand, comfortably falls between the pooled OLS estimate and FE estimate. The GMM-style instruments used in Column (3) include the second to sixth lags of INV and the second to third lags of INV^{peer} and firm-specific control variables for the equations in first-differences, and the first lag of their first-differences for the equations in levels. The year dummies are used as IV-style instruments for the equations in levels only. The Sargan-Hansen test of overidentifying restrictions does not reject this specification, and there is no significant evidence of second-order serial correlation in the first-differenced residuals. The goodness-of-fit score of the reported System GMM model (0.323) is much higher than that of the FE model (0.118), and similar to that of the OLS model (0.337).

[Insert Table 4 Here]

The coefficient estimates of peer-firm-average investment, $\widehat{\beta}_2$, are significantly positive across all three models, providing strong evidence for peer effects in corporate investment policy. Note also that the magnitude of $\widehat{\beta}_2$ based on System GMM is greater than those based on OLS or FE. Estimated coefficients for control variables suggest that firms with more investment opportunities, more cash holdings, a bigger size and higher profitability tend to invest more, while firms that exist longer and are more likely to be in the later period of their life cycle invest less. In Column (4), we extend the model to examine the role of peer-firm-average characteristics as in Leary and Roberts (2014) and Foucault and Fresard (2014). No significant empirical evidence is found regarding the role of peer-firm-average characteristics in determining firms' investment policies. The additional instruments used in Column (4) are the second and third lags of peer-firm-average characteristics for the equations in first-differences, and the first lag of first-differences of peer-firm-average characteristics for the equations in levels. The Sargan-Hansen test of overidentifying restrictions and Arellano-Bond second-order serial correlation test are comfortably satisfied. The goodness-of-fit score does not increase at all when we add peer-firm-average control variables.

4.2 Addressing endogeneity concerns using dynamic panel IV regressions

However, as we have discussed earlier, endogeneity problems arise if a peer-firm-average investment measure is put on the right-hand side of the equation, with a firm's investment measure being the dependent variable. Thus, we use an instrumental variable, $IDIO_{i,t}^{peer}$ described in Section 3, to address these problems. We consider the following two model specifications:

Reduced-form specification

$$\begin{aligned} INV_{i,t} &= \beta_0 + \beta_1 INV_{i,t-1} + \beta_2 IDIO_{i,t}^{peer} + \beta_3 IDIO_{i,t} + \beta_{CONTROLS} CONTROLS \\ &\quad + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

Structural-form specification

$$\begin{aligned} INV_{i,t} &= \beta_0 + \beta_1 INV_{i,t-1} + \beta_2 \widehat{INV_{i,t}^{peer}} + \beta_3 IDIO_{i,t} + \beta_{CONTROLS} CONTROLS \\ &\quad + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{i,t}. \end{aligned} \tag{4}$$

Results for the reduced-form specification are shown in Columns (1) and (2) in Table 5[6]. In Column (2), we include peer-firm-average characteristics. The GMM-style instruments used in these two models are the same as those in Table 4, except that the current value and all available

[6]We use $IDIO_{i,t}^{peer}$ instead of $IDIO_{i,t-1}^{peer}$ based on the correlation matrix documented in Table 3.

lags of $IDIO^{peer}$ and $IDIO$ and the first lag of their first-differences, instead of peer-firm-average-investment-related instruments, are used as instruments for the equations in first-differences and for the equations in levels, respectively. Again, the Sargan-Hansen test and Arellano-Bond test are comfortably satisfied. The goodness-of-fit score increases a bit when we add peer-firm-average control variables. Significantly positive coefficients of $IDIO_{i,t}^{peer}$ in both columns indicate that there are strong *causal* peer effects in corporate investment decisions.

[Insert Table 5 Here]

In Columns (3) and (4), we report the results for the structural-form specification based on two-stage System GMM (2SGMM). 2SGMM is a combination of IV estimation and System GMM estimation. To implement this, we use a pooled OLS regression at the first stage, with $IDIO_{i,t}^{peer}$ being the instrument. Then, at the second stage, we use the fitted values of $INV_{i,t}^{peer}$ to estimate a dynamic panel regression model using System GMM. Coefficients of $IDIO_{i,t}^{peer}$ from the first-stage regression are significantly positive at the 1% level of significance, indicating that $IDIO_{i,t}^{peer}$ is a relevant instrumental variable for $INV_{i,t}^{peer}$. The instruments used to estimate a dynamic panel regression model in Columns (3) and (4) are the same as those used in Columns (1) and (2), respectively. Sargan-Hansen and Arellano-Bond tests are comfortably satisfied again. Consistent with the reduced form specification results, coefficients of $\widehat{INV_{i,t}^{peer}}$ in both Column (3) and Column (4) are significantly positive and their magnitudes are comparable to coefficients for first-lagged investment rate, confirming that there are strong *causal* peer effects in corporate investment decisions. When we compare empirical results with and without peer firms' characteristics, the goodness-of-fit scores are very close. In addition, the coefficients of those peer firms' characteristics variables remain insignificant in Column (4), suggesting that firms react to their peer firms' actual investment policies rather than to the peer firms' characteristics. Overall, our results suggest that peer firms' actual investment decisions, a neglected factor in classical investment theories, play a very important role in determining a firm's investment policy.

4.3 Does economic policy uncertainty magnify peer effects in corporate investment policy?

To examine whether economic policy uncertainty is the main driver for the peer effects, we test whether more uncertain economic policy magnifies peer effects in corporate investment policy. The original EPU index has a large variation across time periods, ranging from 9 to 393, and its mean value is 112. As the EPU index is a monthly measure, we first take its annual average, and then divide the annualized EPU index by 100 and take the logarithm to get our proxy for economic policy uncertainty $LNEPU_t$, as in Kang *et al.* (2014). We consider the following specification:

$$\begin{aligned} INV_{i,t} \quad = \quad & \beta_0 + \beta_1 INV_{i,t-1} + (\gamma_0 + \gamma_1 LNEPU_t + \gamma_2 LNEPU_t^2) \times IDIO_{i,t}^{peer} + \beta_3 IDIO_{i,t} \\ & + \beta_{CONTROLS} CONTROLS + \mathit{Firm\ Fixed\ Effects} + \mathit{Year\ Fixed\ Effects} + \varepsilon_{i,t}, \end{aligned} \tag{5}$$

where we allow the coefficient of $IDIO_{i,t}^{peer}$, β_2, to be a linear or quadratic function of $LNEPU_t$. We expect only the coefficient of $LNEPU_t \times IDIO_{i,t}^{peer}$ to be significantly positive, but we consider a quadratic form just in case there is a nonlinear relationship between economic policy uncertainty and the magnitude of peer effects in corporate investment policy. Table 6 summarizes the results. In Columns (1) to (3), we find, interestingly, that $LNEPU_t$ does not have any significant direct impact on $INV_{i,t}$. This finding is different from some of the previous studies[7]. Columns (4) and (5) present corresponding empirical results based on the full sample with appropriate control for peer-firm average characteristics. In addition to the instruments used in Column (1) in Table 5,

[7]Gulen and Ion (2015), Wang *et al.* (2014), and Kang *et al.* (2014) all find negative relation between EPU and corporate investment. It seems that some of the direct effects of EPU on investment have been captured by year fixed effects in our models.

the current value and all available lags of $LNEPU \times IDIO^{peer}$ are included in the instrument set in Column (4), and those of both $LNEPU \times IDIO^{peer}$ and $LNEPU^2 \times IDIO^{peer}$ in Column (5). Again, the Sargan-Hansen test and Arellano-Bond test are comfortably satisfied. The results show that the coefficients of $LNEPU_t \times IDIO_{i,t}^{peer}$ are significantly positive in both columns, while the coefficient of $LNEPU_t^2 \times IDIO_{i,t}^{peer}$ in Column (5) is not significant. These results show that the relationship between economic policy uncertainty and the magnitude of peer effects is closer to being linear than it is to being quadratic. The significantly positive coefficients of $LNEPU_t \times IDIO_{i,t}^{peer}$ suggest that higher economic policy uncertainty amplifies the peer effects in corporate investment policy.

[Insert Table 6 Here]

4.4 Does EPU more significantly amplify peer effects for under-investment firms?

To further explore the impact that economic policy uncertainty have on the peer effects in investment inefficiency, we divide our sample into two parts, i.e., over-investment firms and under-investment firms[8]. To determine which firms over-invest or under-invest, we first cross-sectionally estimate Richardson's (2006) model for each industry-year group, with at least 20 observations, to obtain optimal investment. We then define an over-investment (under-investment) firm as a firm whose actual investment is greater (less) than the optimal investment. Empirical results are shown in Table 7. First of all, we find that peer effects as measured by the coefficients of $IDIO_{i,t}^{peer}$ are stronger for over-investment firms than for under-investment firms. Interestingly, however, we also find that the coefficient of the interaction term $LNEPU_t \times IDIO_{i,t}^{peer}$ is significantly positive in the under-investment sample but insignificant in the over-investment sample, indicating that the result in the

[8]Investment efficiency refers to a situation in which firms undertake all and only projects with positive net present value. Consistent with prior research (Biddle *et al*., 2009; Li and Wang, 2010), we define investment inefficiency as deviations from optimal investment using a model that predicts investment as a function of growth opportunities.

full sample is mainly driven by under-investment firms. This implies that when economic policy uncertainty is higher, under-investment firms react to their peers' under-investment behavior. This result is consistent with the real-option-based investment theory (Dixit and Pindyck, 1994; Bloom *et al.*, 2007). Higher uncertainty would deter investment due to the irreversible nature of corporate investment. An under-investment firm's peer effect becomes severe with higher economic policy uncertainty. In other words, when economic policy is more uncertain, firms are more likely to heavily mimic their peers and to give up some of their valuable (i.e., positive net present value (NPV)) investment opportunities. The significantly positive coefficients of $IDIO_{i,t}^{peer}$ in the over-investment sample suggest that this effect may have been dominated by other channels, such as agency costs or asymmetric information.

[Insert Table 7 Here]

4.5 Robustness tests

Our major findings are robust to: *i)* using the change in fixed assets divided by lagged total assets as an alternative investment measure, *ii)* using the Difference GMM estimator suggested by Arellano and Bond (1991), *iii)* using the Within-Groups estimator at the first stage regression to estimate the structural model as specified in Equation (4), and *iv)* using 4-digit CSRC industry classification codes to define peer groups.

5 Conclusions

We investigate whether there are peer effects in corporate investment policies, and find that a firm tends to invest more when peer firms invest more. Using peer-firms-average idiosyncratic return shock as an instrumental variable for *ex post* peer-firm-average investment, we confirm that positive causal peer effects in corporate investment policies exist. We further document that such peer effects are significantly stronger when economic policy uncertainty is higher. Analyzing over-investment and under-investment firms separately, we further find that economic policy uncertainty only exacerbates peer effects when firms invest less than their optimal investment levels. This result suggests that higher economic policy uncertainty could cause industry-wide under-investment problems to last longer, slowing down the recovery from a recession. Based on our empirical findings, we argue that economic policy should be planned and executed in a consistent, reliable, predictable and transparent manner, especially during a recession.

References

[1] Angrist, J.D., 2014, "The perils of peer effects," *Labour Economics*, 30, 98-108.

[2] Arellano, M. and Bond, S.R., 1991, "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations," *Review of Economic Studies*, 58, 277-297.

[3] Arellano, M. and Bover, O., 1995, "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics*, 68, 29-52.

[4] Baker, S.R., Bloom, N., and David, S.J., 2013, "Measuring economic policy uncertainty," Chicago Booth Research Paper, No.13-02.

[5] Biddle, G.C., Hilary, G., and Verdi, R.S., 2009, "How does financial reporting quality relate to investment efficiency?" *Journal of Accounting and Economics*, 48, 112-131.

[6] Bikhchandani, S., Hirshleifer, D., and Welch, I., 1992, "A theory of fads, fashion, custom, and cultural change as informational cascades," *Journal of Political Economy*, 100, 992-1026.

[7] Bloom, N., Bond, S., and Van Reenen, J., 2007, "Uncertainty and investment dynamics," *Review of Economic Studies*, 74, 391-415.

[8] Blundell, R. and Bond, S., 1998, "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics*, 87, 115-143.

[9] Bond, S.R., 2002, "Dynamic panel data models: a guide to micro data methods and practice," *Cemmap working paper CWP 09/02*, Institute for Fiscal Studies, London.

[10] Bulow, J., Geanakoplos, J., and Klemperer, P., 1985, "Multimarket oligopoly: strategic substitutes and strategic complements," *Journal of Political Economy*, 93, 488-511.

[11] Choi, N. and Sias, R.W., 2009, "Institutional industry herding," *Journal of Financial Economics*, 94, 469-491.

[12] Dixit, A. and Pindyck, R., 1994, "Investment under uncertainty," *Princeton University Press*, Princeton, NJ.

[13] Foucault, T. and Fresard, L., 2014, "Learning from peers' stock prices and corporate investment," *Journal of Financial Economics*, 111, 554-577.

[14] Gulen, H. and Ion, M., 2015, "Policy Uncertainty and Corporate Investment," *Review of Financial Studies*, Forthcoming.

[15] Hayashi, F., 1982, "Tobin's marginal q and average q: A neoclassical interpretation," *Econometrica*, 1982, 213-224.

[16] Hubbard, R.G., 1998, "Capital-market imperfections and investment," *Journal of Economic Literature*, 36, 193-225.

[17] Jegadeesh, N. and Kim, W., 2010. “Do analysts herd? An analysis of recommendations and market reactions,” *Review of Financial Studies*, 23, 901-937.

[18] Jiang, F., Yi, Z., and Su, F., 2009, “Management background and corporate overinvestment behaviors,” *Management World*, 2009, 130-139.

[19] Jorgenson, D.W., 1963, “Capital theory and investment behavior,” *American Economic Review*, 1963, 247-259.

[20] Kang, W., Lee, K., and Ratti, R.A., 2014, “Economic policy uncertainty and firm-level investment,” *Journal of Macroeconomics*, 39, 42-53.

[21] Leary, M.T. and Roberts, M.R., 2014, “Do peer firms affect corporate financial policy?” *Journal of Finance*, 69, 139-178.

[22] Li, Q. and Wang, T., 2010, “Financial reporting quality and corporate investment efficiency: Chinese experience,” *Nankai Business Review International*, 1, 197-213.

[23] Manski, C.F., 1993, “Identification of endogenous social effects: The reflection problem,” *Review of Economic Studies*, 60, 531-542.

[24] Nickell, S., 1981, “Biases in dynamic models with fixed effects,” *Econometrica*, 49, 1417-1426.

[25] Richardson, S., 2006, “Over-investment of free cash flow,” *Review of Accounting Studies*, 11, 159-189.

[26] Roodman, D., 2009, “How to do xtabond2: An introduction to “Difference” and “System” GMM in Stata,” *Stata Journal*, 9, 86-136.

[27] Scharfstein, D.S. and Stein, J.C., 1990, “Herd behavior and investment,” *American Economic Review*, 80, 465-479.

[28] Spyrou, S., 2013, “Herding in financial markets: a review of the literature,” *Review of Behavioral Finance*, 5, 175-194.

[29] Wang, Y., Chen, C., and Huang, Y.S., 2014, “Economic Policy Uncertainty and Corporate Investment: Evidence from China,” *Pacific-Basin Finance Journal*, 26, 227-243.

[30] Windmeijer, F., 2005, “A finite sample correction for the variance of linear efficient two-step GMM estimators,” *Journal of Econometrics*, 126, 25-51.

Table 1: Variable definitions and summary statistics

Panel A. Variable definitions

Abbreviation	Definition	Calculation
Firm-specific variables		
$INV_{i,t}$	Investment rate	Net capital expenditures plus net acquisitions less sale of fixed assets scaled by total assets at the beginning of the year *t*
$LNTA_{i,t-1}$	Firm size	Natural logarithm of total assets
$TQ_{i,t-1}$	Investment opportunities	Tobin's Q
$LEV_{i,t-1}$	Leverage	Book leverage ratio
$EBIT_{i,t-1}$	Profitability	Earnings before interest expenses and taxes scaled by total assets at the beginning of the year *t*
$CASH_{i,t-1}$	Cash holdings	Cash plus tradable financial assets divided by total assets
$LNAGE_{i,t-1}$	Age	Natural logarithm of the time elapsed since stock listing
$IDIO_{i,t}$	Idiosyncratic return shock	Annualized idiosyncratic stock returns
Peer-firm-average variables		
$INV_{i,t}^{peer}$	Peer-firm-average investment rate	Peer-firm-average $INV_{i,t}$ (excluding firm *i*)
$LNTA_{i,t-1}^{peer}$	Peer-firm-average firm size	Peer-firm-average $LNTA_{i,t-1}$ (excluding firm *i*)
$TQ_{i,t-1}^{peer}$	Peer-firm-average investment opportunities	Peer-firm-average $TQ_{i,t-1}$ (excluding firm *i*)
$LEV_{i,t-1}^{peer}$	Peer-firm-average leverage	Peer-firm-average $LEV_{i,t-1}$ (excluding firm *i*)
$EBIT_{i,t-1}^{peer}$	Peer-firm-average profitability	Peer-firm-average $EBIT_{i,t-1}$ (excluding firm *i*)
$CASH_{i,t-1}^{peer}$	Peer-firm-average cash holdings	Peer-firm-average $CASH_{i,t-1}$ (excluding firm *i*)
$LNAGE_{i,t-1}^{peer}$	Peer-firm-average age	Peer-firm-average $LNAGE_{i,t-1}$ (excluding firm *i*)
$IDIO_{i,t}^{peer}$	Peer-firm-average idiosyncratic return shock	Peer-firm-average $IDIO_{i,t}$ (excluding firm *i*)

Panel B. Summary statistics

VARIABLES	Mean	SD	Q1	Median	Q3
Firm-specific variables					
$INV_{i,t}$	0.067	0.079	0.016	0.045	0.092
$INV_{i,t-1}$	0.071	0.082	0.018	0.047	0.096
$LNTA_{i,t-1}$	21.637	1.160	20.863	21.523	22.267
$TQ_{i,t-1}$	1.797	1.309	1.145	1.406	1.958
$LEV_{i,t-1}$	0.230	0.155	0.108	0.222	0.334
$EBIT_{i,t-1}$	0.064	0.083	0.028	0.056	0.096
$CASH_{i,t-1}$	0.147	0.104	0.073	0.122	0.195
$LNAGE_{i,t-1}$	2.104	0.437	1.792	2.079	2.485
$IDIO_{i,t}$	-0.059	0.538	-0.272	-0.060	0.145
Peer-firm-average variables					
$INV_{i,t}^{peer}$	0.069	0.031	0.046	0.066	0.087
$LNTA_{i,t-1}^{peer}$	21.583	0.612	21.201	21.487	21.863
$TQ_{i,t-1}^{peer}$	1.850	0.848	1.303	1.621	2.193
$LEV_{i,t-1}^{peer}$	0.228	0.073	0.170	0.222	0.272
$EBIT_{i,t-1}^{peer}$	0.062	0.036	0.041	0.059	0.079
$CASH_{i,t-1}^{peer}$	0.147	0.042	0.119	0.146	0.172
$LNAGE_{i,t-1}^{peer}$	2.030	0.282	1.818	2.081	2.229
$IDIO_{i,t}^{peer}$	-0.058	0.138	-0.090	-0.039	-0.005
Industry characteristics					
Number of firms per industry-year	28.86	18.67	13	26	43
Number of industries	39				
Sample characteristics					
Observations	7,366				
Number of firms	994				

Table 2: Stock return factor regression results

VARIABLES	Mean	SD	Q1	Median	Q3
Regression summary					
α_{ijt}	0.004	0.013	-0.004	0.003	0.010
β_{ijt}^{MKT}	0.327	0.645	-0.066	0.268	0.671
β_{ijt}^{IND}	0.688	0.615	0.344	0.745	1.062
Observations per regression	59.79	1.077	60	60	60
Adjusted R^2	0.528	0.158	0.430	0.544	0.644
Avg. monthly return	0.014	0.052	-0.021	0.003	0.042
Avg. expected monthly return	0.015	0.048	-0.013	0.006	0.038
Avg. idiosyncratic monthly return	-0.001	0.032	-0.019	-0.002	0.016

Table 3: Correlation matrix

	$LNTA_{i,t-1}$	$TQ_{i,t-1}$	$LEV_{i,t-1}$	$EBIT_{i,t-1}$	$CASH_{i,t-1}$	$LNAGE_{i,t-1}$	$IDIO_{i,t-1}$	$IDIO_{i,t}$	$IDIO^{peer}_{i,t-1}$	$IDIO^{peer}_{i,t}$	$INV^{peer}_{i,t}$	$INV_{i,t-1}$
$TQ_{i,t-1}$	-0.297***											
$LEV_{i,t-1}$	0.082***	-0.183***										
$EBIT_{i,t-1}$	0.244***	0.183***	-0.226***									
$CASH_{i,t-1}$	-0.002	0.154***	-0.357***	0.249***								
$LNAGE_{i,t-1}$	0.230***	0.115***	-0.021*	0.016	0.023*							
$IDIO_{i,t-1}$	-0.001	0.077***	-0.023*	0.084***	0.022*	-0.003						
$IDIO_{i,t}$	-0.018	-0.067***	-0.027**	-0.054***	-0.011	-0.009	-0.040***					
$IDIO^{peer}_{i,t-1}$	0.053***	-0.017	0.004	0.004	-0.001	0.040***	-0.005	-0.009				
$IDIO^{peer}_{i,t}$	0.059***	0.070***	-0.009	0.061***	0.024	0.014	0.000	-0.004	-0.076***			
$INV^{peer}_{i,t}$	0.100***	0.020	0.109***	0.125***	-0.097***	-0.013	0.006	0.021*	0.014	0.106***		
$INV_{i,t-1}$	0.304***	-0.079***	0.151***	0.321***	-0.053***	-0.069***	0.008	-0.058***	0.043***	0.056***	0.217***	
$INV_{i,t}$	0.190***	0.034***	0.056***	0.292***	0.022*	-0.078***	0.032**	0.016	0.003	0.047***	0.232***	0.564***

Table 4: Identification of peer effects in corporate investment decisions—Dynamic panel regression results

	(1)	(2)	(3)	(4)
ESTIMATION METHOD	OLS	FE	SYS GMM	SYS GMM
VARIABLES	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$
$INTERCEPT$	-0.055**	0.383***	-0.144***	-0.061
	(0.021)	(0.069)	(0.052)	(0.065)
$INV_{i,t-1}$	0.460***	0.281***	0.405***	0.406***
	(0.015)	(0.018)	(0.021)	(0.020)
Peer-effect-related variable				
$INV_{i,t}^{peer}$	0.267***	0.130***	0.319***	0.510***
	(0.031)	(0.041)	(0.073)	(0.055)
Firm-specific characteristics				
$LNTA_{i,t-1}$	0.003***	-0.018***	0.007***	0.006***
	(0.001)	(0.003)	(0.002)	(0.002)
$TQ_{i,t-1}$	0.003**	0.005***	0.006***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)
$LEV_{i,t-1}$	0.005	-0.035***	-0.002	-0.006
	(0.006)	(0.012)	(0.012)	(0.011)
$EBIT_{i,t-1}$	0.103***	0.090***	0.063***	0.070***
	(0.015)	(0.017)	(0.019)	(0.020)
$CASH_{i,t-1}$	0.021**	0.108***	0.092***	0.083***
	(0.009)	(0.015)	(0.021)	(0.019)
$LNAGE_{i,t-1}$	-0.012***	0.008	-0.010***	-0.010***
	(0.002)	(0.010)	(0.003)	(0.003)
Peer-firm-average characteristics				
$LNTA_{i,t-1}^{peer}$				-0.005
				(0.004)
$TQ_{i,t-1}^{peer}$				-0.001
				(0.004)
$LEV_{i,t-1}^{peer}$				0.035
				(0.026)
$EBIT_{i,t-1}^{peer}$				-0.025
				(0.043)
$CASH_{i,t-1}^{peer}$				-0.045
				(0.037)
$LNAGE_{i,t-1}^{peer}$				0.015
				(0.009)
Firm fixed effects	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	7,366	7,366	7,366	7,366
Number of firms	994	994	994	994
Goodness of fit—$Corr(INV_{i,t}, \widehat{INV}_{i,t})^2$	0.337	0.118	0.323	0.323
Second-order serial correlation (p-value)			0.606	0.708
Sargan/Hansen (p-value)			0.211	0.672

Note: Year dummies are included in all regression models. In Columns (1) and (2), we report standard errors that allow for intra-firm correlation. In Columns (3) and (4), we report two-step GMM coefficients and standard errors that are asymptotically robust to both heteroskedasticity and serial correlation, and which use the finite-sample correction proposed by Windmeijer (2005). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Identification of peer effects in corporate investment decisions—Dynamic panel IV regression results

	(1)	(2)	(3)	(4)
ESTIMATION METHOD	SYS GMM	SYS GMM	2-STAGE SYS GMM	2-STAGE SYS GMM
VARIABLES	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$
$INTERCEPT$	-0.125***	-0.197***	-0.138***	-0.135**
	(0.044)	(0.059)	(0.044)	(0.064)
$INV_{i,t-1}$	0.411***	0.415***	0.410***	0.415***
	(0.020)	(0.019)	(0.020)	(0.019)
Peer-effect-related variable				
$IDIO_{i,t}^{peer}$	0.011**	0.012**		
	(0.005)	(0.005)		
$\widehat{INV}_{i,t}^{peer}$			0.449**	0.531**
			(0.218)	(0.245)
Firm-specific characteristics				
$LNTA_{i,t-1}$	0.007***	0.005**	0.006***	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
$TQ_{i,t-1}$	0.004**	0.005**	0.004**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
$LEV_{i,t-1}$	-0.001	0.002	-0.009	-0.001
	(0.012)	(0.012)	(0.012)	(0.012)
$EBIT_{i,t-1}$	0.086***	0.088***	0.066***	0.079***
	(0.020)	(0.020)	(0.022)	(0.020)
$CASH_{i,t-1}$	0.085***	0.076***	0.099***	0.080***
	(0.020)	(0.019)	(0.021)	(0.019)
$LNAGE_{i,t-1}$	-0.010***	-0.012***	-0.009***	-0.012***
	(0.003)	(0.003)	(0.003)	(0.003)
$IDIO_{i,t}$	0.008***	0.008***	0.007***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
Peer-firm-average characteristics				
$LNTA_{i,t-1}^{peer}$		0.006*		-0.000
		(0.003)		(0.004)
$TQ_{i,t-1}^{peer}$		0.002		-0.001
		(0.003)		(0.003)
$LEV_{i,t-1}^{peer}$		0.055**		0.010
		(0.026)		(0.033)
$EBIT_{i,t-1}^{peer}$		0.160***		-0.022
		(0.041)		(0.093)
$CASH_{i,t-1}^{peer}$		-0.091**		-0.028
		(0.038)		(0.046)
$LNAGE_{i,t-1}^{peer}$		-0.007		0.016
		(0.009)		(0.014)
First-stage instrument				
$IDIO_{i,t}^{peer}$			0.025***	0.022***
			(0.003)	(0.003)
Observations	7,366	7,366	7,366	7,366
Number of firms	994	994	994	994
Goodness of fit—$Corr(INV_{i,t},\widehat{INV}_{i,t})^2$	0.318	0.331	0.318	0.331
Second-order serial correlation (p-value)	0.461	0.476	0.451	0.476
Sargan/Hansen (p-value)	0.526	0.774	0.499	0.774

Note: Year dummies are included in all regression models. We report two-step GMM coefficients and standard errors that are asymptotically robust to both heteroskedasticity and serial correlation, and which use the finite-sample correction proposed by Windmeijer (2005). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Impacts of economic policy uncertainty on peer effects in corporate investment decisions: Full sample

	(1)	(2)	(3)	(4)	(5)
ESTIMATION METHOD	SYS GMM	SYS GMM	SYS GMM	SYS GMM	SYS GMM
VARIABLES	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$
$INTERCEPT$	-0.157***	-0.145***	-0.145***	-0.185***	-0.185***
	(0.050)	(0.045)	(0.045)	(0.058)	(0.058)
$INV_{i,t-1}$	0.418***	0.414***	0.414***	0.416***	0.416***
	(0.021)	(0.020)	(0.020)	(0.019)	(0.019)
Economic policy uncertainty and peer-effect-related variables					
$LNEPU_t$	0.000	0.001	0.001		
	(0.004)	(0.004)	(0.004)		
$IDIO_{i,t}^{peer}$		0.016***	0.016**	0.015***	0.013**
		(0.006)	(0.007)	(0.005)	(0.007)
$LNEPU_t \times IDIO_{i,t}^{peer}$		0.041**	0.040**	0.038**	0.036**
		(0.017)	(0.017)	(0.018)	(0.018)
$LNEPU_t^2 \times IDIO_{i,t}^{peer}$			0.000		0.014
			(0.036)		(0.039)
Firm-specific characteristics					
$LNTA_{i,t-1}$	0.008***	0.008***	0.008***	0.005**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$TQ_{i,t-1}$	0.007***	0.006***	0.006***	0.005**	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$LEV_{i,t-1}$	-0.007	0.001	0.001	0.004	0.004
	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)
$EBIT_{i,t-1}$	0.060***	0.083***	0.083***	0.085***	0.085***
	(0.019)	(0.019)	(0.019)	(0.020)	(0.020)
$CASH_{i,t-1}$	0.090***	0.082***	0.082***	0.079***	0.079***
	(0.019)	(0.019)	(0.019)	(0.020)	(0.020)
$LNAGE_{i,t-1}$	-0.013***	-0.010***	-0.010***	-0.013***	-0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$IDIO_{i,t}$		0.008***	0.008***	0.008***	0.008***
		(0.002)	(0.002)	(0.002)	(0.002)
Peer-firm-average characteristics					
$LNTA_{i,t-1}^{peer}$				0.005	0.005
				(0.003)	(0.003)
$TQ_{i,t-1}^{peer}$				0.002	0.002
				(0.003)	(0.003)
$LEV_{i,t-1}^{peer}$				0.058**	0.058**
				(0.026)	(0.026)
$EBIT_{i,t-1}^{peer}$				0.169***	0.170***
				(0.044)	(0.044)
$CASH_{i,t-1}^{peer}$				-0.095**	-0.094**
				(0.043)	(0.043)
$LNAGE_{i,t-1}^{peer}$				-0.008	-0.008
				(0.009)	(0.009)
Observations	7,248	7,248	7,248	7,248	7,248
Number of firms	994	994	994	994	994
Goodness of fit—$Corr(INV_{i,t}, \widehat{INV}_{i,t})^2$	0.308	0.318	0.318	0.330	0.330
Second-order serial correlation (p-value)	0.380	0.325	0.327	0.352	0.351
Sargan/Hansen (p-value)	0.151	0.447	0.436	0.294	0.284

Note: Year dummies are included in all regression models. We report two-step GMM coefficients and standard errors that are asymptotically robust to both heteroskedasticity and serial correlation and which use the finite-sample correction proposed by Windmeijer (2005). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Impacts of economic policy uncertainty on peer effects in corporate investment decisions: Over-investment sample vs. Under-investment sample

	Over-investment sample			Under-investment sample		
	(1)	(2)	(3)	(4)	(5)	(6)
ESTIMATION METHOD	SYS GMM	SYS GMM	SYS GMM	SYS GMM	SYS GMM	SYS GMM
VARIABLES	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$	$INV_{i,t}$
$INTERCEPT$	-0.140	-0.142	-0.141	-0.241***	-0.214***	-0.214***
	(0.102)	(0.097)	(0.097)	(0.063)	(0.060)	(0.060)
$INV_{i,t-1}$	0.508***	0.514***	0.514***	0.344***	0.356***	0.357***
	(0.040)	(0.038)	(0.038)	(0.028)	(0.028)	(0.028)
Economic policy uncertainty and peer-effect-related variables						
$IDIO_{i,t}^{peer}$	0.047**	0.051**	0.048*	0.011	0.023**	0.030**
	(0.021)	(0.021)	(0.029)	(0.012)	(0.011)	(0.014)
$LNEPU_t \times IDIO_{i,t}^{peer}$		0.098	0.088		0.095**	0.118**
		(0.073)	(0.108)		(0.039)	(0.054)
$LNEPU_t^2 \times IDIO_{i,t}^{peer}$			0.023			-0.060
			(0.175)			(0.099)
Firm-specific characteristics						
$LNTA_{i,t-1}$	0.008	0.008*	0.008*	0.011***	0.010***	0.010***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
$TQ_{i,t-1}$	0.012***	0.012***	0.012***	0.005*	0.006**	0.006**
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
$LEV_{i,t-1}$	0.006	0.023	0.023	-0.031*	-0.017	-0.016
	(0.027)	(0.026)	(0.026)	(0.017)	(0.016)	(0.017)
$EBIT_{i,t-1}$	0.088**	0.095**	0.095**	0.035	0.043*	0.042*
	(0.039)	(0.039)	(0.039)	(0.025)	(0.024)	(0.024)
$CASH_{i,t-1}$	0.120***	0.102**	0.102**	0.071***	0.062***	0.062***
	(0.043)	(0.042)	(0.042)	(0.022)	(0.022)	(0.022)
$LNAGE_{i,t-1}$	-0.015***	-0.016***	-0.016***	-0.008***	-0.008***	-0.008***
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
$IDIO_{i,t}$	0.012***	0.012***	0.012***	0.008***	0.007***	0.007***
	(0.004)	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)
Observations	2,042	2,042	2,042	2,543	2,543	2,543
Number of firms	651	651	651	680	680	680
Goodness of fit—$Corr(INV_{i,t}, \widehat{INV}_{i,t})^2$	0.403	0.412	0.412	0.473	0.488	0.488
Sargan/Hansen (p-value)	0.194	0.246	0.238	0.244	0.274	0.259

Note: Year dummies are included in all regression models. We report two-step GMM coefficients and standard errors that are asymptotically robust to both heteroskedasticity and serial correlation and which use the finite-sample correction proposed by Windmeijer (2005). ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.