

Liao, Shushu; Errico, Marco

**Article — Published Version**

## Corporate investment and stock market valuation

Journal of Business Finance & Accounting

**Provided in Cooperation with:**

John Wiley & Sons

*Suggested Citation:* Liao, Shushu; Errico, Marco (2022) : Corporate investment and stock market valuation, Journal of Business Finance & Accounting, ISSN 1468-5957, Wiley, Hoboken, NJ, Vol. 50, Iss. 3-4, pp. 795-819,  
<https://doi.org/10.1111/jbfa.12649>

This Version is available at:

<https://hdl.handle.net/10419/287844>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<http://creativecommons.org/licenses/by/4.0/>

## ARTICLE

# Corporate investment and stock market valuation

Shushu Liao<sup>1</sup>  | Marco Errico<sup>2</sup>

<sup>1</sup>Department of Leadership and Management, Kühne Logistics University, Hamburg, Germany

<sup>2</sup>ESADE Business School, University Ramon Llull

**Correspondence**

Shushu Liao, Department of Leadership and Management, Kühne Logistics University, Hamburg, Germany.

Email: [Shushu.Liao@the-klu.org](mailto:Shushu.Liao@the-klu.org)

**Abstract**

We study the driving forces behind the positive association observed between corporate investment and stock market valuation, and how they interact with managerial equity incentives and informativeness of investment. We build a dynamic model where managers use investment choices to influence investors' opinions about firms' future prospects and increase the market valuation. The incentives to manipulate the valuation processes increase with managerial equity incentives and informativeness of investment. Our empirical findings support the model's predictions that the tendency of using investment to boost market valuation is stronger when managerial stock ownership is high or when earnings quality is low (i.e., there is strong reliance on investment for information).

**KEYWORDS**

compensation, equity incentives, executives, financial report quality, investment, investment informativeness, misvaluation, stock market, top management team

**JEL CLASSIFICATION**

G34, G31, G14

## 1 | INTRODUCTION

Are firms' investment decisions affected by the deviation of market valuation from fundamentals or can the level of investment lead market value to deviate from firms' underlying fundamentals? The connections between corporate investment and stock market valuation have been examined by numerous studies, with conflicting results. Among

---

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2022 The Authors. *Journal of Business Finance & Accounting* published by John Wiley & Sons Ltd.

them, Morck et al. (1990) and Blanchard et al. (1993) argue that nonfundamental movements in stock prices do not possess explanatory power on real investment decisions. In contrast, Barro (1990), Galeotti and Schiantarelli (1994) and Chirinko and Schaller (1996) find that stock prices can influence real investment spending. Stock market valuation can impact investments through several channels. First, Gilchrist et al. (2005) and Baker et al. (2003) investigate an equity issuance channel and argue that firms can exploit high stock prices by issuing new shares at inflated prices and thus lowering the cost of capital and increasing investments (see also, e.g., Campello & Graham, 2013; Chirinko & Schaller, 1996; Warusawitharana & Whited, 2016). Dow and Gorton (1997), Subrahmanyam and Titman (1999) and more recently, Chen et al. (2007) emphasize the managerial learning channel and show that stock prices aggregate information from many different participants who do not communicate directly with the firms. Thus, stock prices may contain information that managers do not have. The greater the amount of private information in stock prices, the more managers can learn from them and use the information to guide their investment policies.

Despite extensive research on the real effects of the stock market, most studies focus on the direction that runs from stock market valuation to investment decisions. Ovtchinnikov and McConnell (2009) model the relation between investment and stock prices in the opposite direction. In particular, they find that an improvement in growth opportunities as manifested in the investment of capital leads to an increase in stock prices.

Moreover, a more natural question that arises is what happens if firms do not issue equity to fund their projects? Pecking order theory popularized by Myers and Majluf (1984) argues that firms tend to rely on internal sources of funds and prefer debt to equity. Polk and Sapienza (2008), instead of resorting to the equity issuance channel, put forward a “catering” channel, where market participants can misprice the stock market according to the levels of investment made by managers. Similarly, Jensen (2005) argues that when stock prices get high, in order to produce performance required to justify the overvalued stock price, managers may engage in excessive spending and invest in negative-net present value risky projects that the market thinks are value-enhancing. To the extent that managers can use investments to boost or maintain stock prices, a positive relation between investment and stock price can arise without triggering the effects of “cheap” equity financing and price inefficiency. In this study, we examine the catering channel through which managers’ investment decisions lead stock price valuation to deviate from underlying fundamentals by catering to investors’ information needs regarding future firm performance.

We start with a standard dynamic structural model featuring a manager who makes investment decisions by acting in the best interest of shareholders, and corporate insiders do not have superior information over outsiders. Then, we extend the neoclassical model by considering information asymmetry between inside managers and outside investors and a team of self-interested managers who aim to optimize the expected value of their utility functions, which is the weighted average of the discounted present value of dividends to shareholders and their equity stakes in the firm. Uninformed investors are not able to perceive firms’ future growth potential due to information asymmetry and have to extract additional information from investment decisions to set stock prices. Given that investors price the market based on levels of investment, managers are motivated to boost their market-based compensation through the investment decisions they have made for the firm. Incentives to manipulate the valuation processes are more prevalent when managers’ compensation packages are strongly linked to their firm’s market value and investors rely more on investment policies to evaluate the firm’s profitability.

We define misinvestment as the difference of investments between a model with perfect alignment of interests and information transparency and a model with conflicts of interests and information asymmetry. Such deviation of investment gauges the catering effect of investment, in which managers use investment to enhance investors’ forecasted value for the firm and their associated market-based compensation. The model simulation results show that both misinvestment and misvaluation rise with the levels of equity incentives granted to managers and the degree of investment informativeness. Equity-based compensation and reliance on investment to predict firms’ future prospects also enlarge the effects of investment on misvaluation, based on our model-generated data.

Next, we use empirical data to corroborate our theoretical results. Using ordinary least squares (OLS) estimation with firm and year fixed effects, we find that the coefficient on investment of misvaluation is positive and significant, which is consistent with the view that managers tend to take advantage of investment to boost market valuation. We

also show that the evidence continues to hold in a simultaneous-equation two-step generalized methods of moments (GMM) regression framework, in which misvaluation and investment both appear as dependent variables and regressors in the equations.<sup>1</sup> The simultaneous-equation GMM allows for the correlation of the residuals across these equations and thereby accounts for simultaneity between investment and stock misvaluation (Brown & Petersen, 2011; MacKay & Phillips, 2005).

We then proceed with an investigation of the influence of managerial equity holdings and earnings report quality (ERQ) on the sensitivity of stock market misvaluation to investment (note that a lower ERQ indicates a higher tendency of uninformed investors to resort to investment choices for information). First, we document that the association between investment and misvaluation is stronger when ERQ is low, as captured by higher discretionary accruals, analysts' forecast errors and a larger *F-Score* (Dechow et al., 2011). Second, we find that, consistent with the model predictions, the effects of investment on misvaluation are more pronounced for firms with greater CEO or top management team's (TMT's) stock ownership and a higher delta, which gauges the sensitivity of executives' wealth to stock prices. Finally, we provide additional analyses by examining the implications of insider sale transactions and managerial CAPEX guidance. In particular, we show that the tendency of investment policy's manipulation to create stock mispricing is more prominent preceding insider sales as captured by a positive net sales ratio (NSR).<sup>2</sup> Moreover, investment is related to higher insider sales' trading profits. We further discover that, based on the evidence from managerial CAPEX guidance, the stock price response to the *actual* investment is attenuated when the level of managerial CAPEX guidance forecast errors is low (i.e., the information quality of CAPEX guidance is high).

The study adds to the literature that explores the managerial incentives to influence market valuation. Baker et al. (2009) suggest that managers increase the supply of the securities for which investors are willing to pay a premium for. Focusing on the design of executives' compensation contracts, Bizjak et al. (1993) find that a short-termist manager has an incentive to manipulate market inferences about a firm's prospects through observable investment choices. Strobl (2014) argues that managers overinvest to induce information production by outside investors. Our approach emphasizes the effect of investment policies on guiding investors' opinions about firms' future profitability. Most importantly, we show that such incentives to influence market evaluations through investment generates a positive relation observed between corporate investment and stock valuation.

Second, our research contributes to the bulk of the literature that examines the association between corporate investment and stock market valuation. The most common view on this relationship is that firms issue overvalued stocks and use the proceeds for investment, making the stock market an important predictor of real investment decisions (e.g., Baker et al., 2003). Nonetheless, Polk and Sapienza (2008) cast doubt on the equity issuance channel and posit that managers of firms with short-horizon shareholders could cater to current investment if market participants misprice firms based on the observed investment choices. Strobl (2014) shows that managers overinvest in suboptimal projects to increase information flows to the market. In contrast to Strobl (2014) and Polk and Sapienza (2008), our arguments are predicated on the argument of Jensen (1986) that managers might *not* act in the best interests of shareholders and derive private benefits by investing the excess cash. Our framework extends beyond the work of Polk and Sapienza (2008), as we show that stock ownership imparts short-termism in managers and causes them to misallocate investments, even if shareholders are long-term investors. The presence of equity compensation packages diverges the interests of corporate insiders from those of long-term shareholders and the positive relation observed between investment and stock market valuation is symptomatic of agency problems that cannot be resolved (or that are even worsened) by using stock ownership.

Last, our paper is related to the theoretical literature that assesses the influence of agency frictions on corporate outcomes. Nikolov and Whited (2014), Morellec et al. (2012) and Wu (2018) establish a utility function for managers and find that managers' self-interest has a nonnegligible impact on the corporate decision-making process. Similar to

<sup>1</sup> Specifically, we use the first differences of the variables to account for firm fixed effects, and employ the twice-lagged levels of the same variables as instruments.

<sup>2</sup> A positive NSR occurs when the total number of insider sales transactions is larger than the total number of insider purchase transactions.

Wu (2018), we consider the fact that investors might not have full knowledge of firms' future profitability and have to extract additional information from corporate decisions made by managers. We show that managers have the incentives to manipulate investors' opinions by investing beyond the optimal level, which explains the positive association between investment and the stock market.

The remainder of the paper is structured as follows. Section 2 develops a dynamic structural model where managers make investment decisions each period to maximize their expected value of utility and presents the impact of insider ownership and information asymmetry on misinvestment based on the model-simulated data. Section 3 shows our baseline empirical results and examines the influence of CEO stock ownership and earnings quality on the sensitivity of misvaluation to investment. Section 4 provides additional evidence based on insider trading profits and managerial CAPEX guidance forecast errors. Section 5 concludes the paper.

## 2 | MODEL SETUP AND SOLUTIONS

The standard neoclassical investment model assumes that managers make investment decisions by equating the marginal adjustment cost of investment with its marginal value (Mussa, 1977). Recently, Nikolov and Whited (2014), Morellec et al. (2012) and Wu (2018) find that managers' self-interest has a nontrivial impact on corporate policies. In this section, we present a dynamic model of investment with managerial incentives and the information role of investment. We specify self-interested managers' utility problems in which managers set their firms' investment decisions each period to maximize their expected value of utility. We consider an infinitely lived firm in discrete time. As in Wu (2018), in each period, the manager chooses how much to invest in capital goods by observing the underlying profitability shocks. Unlike managers, investors are only able to perceive realized profits as well as managers' investment decisions. The realized profit is not a sufficient statistic for investors to understand the firm's future growth opportunities as the future profitability may vary with its persistence and uncertainty levels that are not readily observable for outsiders. Investors have to extract additional information such as managers' investment decisions to improve their knowledge of the firm's future performances and aid them in setting more efficient stock prices. The informativeness of investment thereby generates endogenous price reactions. Following Nikolov and Whited (2014), managers are concerned about the discounted present value of dividends to equity holders (shareholders' utility) as well as the value of stock prices because equity stakes are part of the managers' compensation package.

### 2.1 | Basic setup

We first consider a standard neoclassical setting where managers act in the best interests of shareholders and there are no information asymmetry between managers and investors. We use the superscript  $F$  to denote this fundamental scenario. The firm is characterized by a production technology that uses only one input: capital ( $K_t^F$ ). Denote  $\tau$  as the corporate tax rate and  $\alpha$  as the curvature on the profit function. Capital stock is subject to a depreciation rate of  $\delta$ .  $z_t$  is the stochastic profitability shock managers observe when making investment decisions. After-tax profits observed by the managers are therefore

$$\Pi(z_t, K_t^F) = (1 - \tau)z_t(K_t^F)^\alpha + \tau\delta K_t^F. \quad (1)$$

The stochastic profitability shocks evolve according to an AR(1) process

$$\log(z_{t+1}) = \rho \log(z_t) + \varepsilon_{t+1}, \quad (2)$$

where  $\rho$  is the autocorrelation coefficient and  $\varepsilon_{t+1}$  is an independent and identically distributed random variable with a normal distribution of zero mean and variance of  $\sigma^2$ . As capital depreciates at a rate of  $\delta$ , the capital at time  $t + 1$  becomes

$$K_{t+1}^F = (1 - \delta)K_t^F + I_t^F. \quad (3)$$

Due to the presence of installation costs or the costs of disrupting the old production process, convex capital adjustment costs are modeled for the investment process

$$G(I_t^F, K_t^F) = \frac{1}{2} \gamma \frac{(I_t^F)^2}{K_t^F}. \quad (4)$$

As in Riddick and Whited (2009), a firm can finance its capital with internal liquidity before resorting to external equity. If  $\Pi(z_t, K_t^F) - I_t^F - G(I_t^F, K_t^F) > 0$ , the firm is making dividend distributions to equity holders. If  $\Pi(z_t, K_t^F) - I_t^F - G(I_t^F, K_t^F) < 0$ , the firm is issuing equity to cover the financing shortfalls with per-unit cost of  $\eta$ . Therefore, we define dividends to the existing equity holders as

$$d(z_t, K_t^F) = (\Pi(z_t, K_t^F) - I_t^F - G(I_t^F, K_t^F)) \times (1 + \eta \mathbf{1}_{\{(\Pi(z_t, K_t^F) - I_t^F - G(I_t^F, K_t^F)) < 0\}}). \quad (5)$$

Managers act in the best interest of shareholders and maximize the expected discounted streams of dividends to equity holders with a constant discount rate of  $r$ , by solving the following Bellman equation:

$$V^F(z_t, K_t^F) = \max_{I_t^F} \{d(z_t, K_t^F) + \frac{1}{1+r} \mathbf{E}_{z_{t+1}|z_t} [V(z_{t+1}, K_{t+1}^F)]\}. \quad (6)$$

The first term represents the immediate dividends inflow/outflows to equity holders and the second term represents the continuation value of the firm. The expectation is taken by integrating over the conditional distribution of  $z_t$ .  $I_t^F$  is considered as the first-best investment level to maximize shareholders' value.

We extend the neoclassical model by first considering information asymmetry between the inside managers and outside investors.  $z_t$  is *not* known by investors. Uninformed investors make forecasts by extracting information from announcements about investment policies made by the managers. We use superscript  $S$  to denote firm value and corporate policies from the perspectives of investors. At  $t$ , investors predict the value of profitability at time  $t + 1$  (denoted as  $\bar{z}_{t+1}$ ) based on the levels of investment (denoted as  $I_t^S/K_t^S$ ). Also, due to the persistence of earnings level, investors can recover partial information about future profitability by observing the current realized profits. We assume a linear relationship between investors' predicted value of the profitability  $\bar{z}_{t+1}$  and capital stock  $K_{t+1}^S$

$$\log(\bar{z}_{t+1}) = a I_t^S / K_t^S + \kappa \log(z_t), \quad (7)$$

where  $\kappa$  controls the degree of information concerning future profitability, investors can recover by observing the current profitability of the firm.  $a$  measures the informativeness of investment uninformed investors use to make forecasts of future profitability. For simplicity, we assume that a unit level of degree of informativeness for earnings, that is,  $\kappa = 1$ , and  $a$  captures the informativeness of investments relative to earnings' informativeness. A high  $\kappa$  relative to  $a$  indicates good quality of earnings and their usefulness to predict future profitability. Therefore, Equation (7) can be viewed as a form of partial learning by these uninformed investors. The forecasted value of profits that are used by investors to set stock market prices is

$$\Pi^S(\bar{z}_t, K_t^S) = (1 - \tau) \bar{z}_t (K_t^S)^\alpha + \tau \delta K_t^S. \quad (8)$$

Given the forecasted profitability process, the dividend perceived by the market participants is

$$d(z_t, K_t^S) = \left( \Pi(z_t, K_t^S) - I_t^S - G(I_t^S, K_t^S) \right) \times (1 + \eta \mathbf{1}_{\{(\Pi(z_t, K_t^S) - I_t^S - G(I_t^S, K_t^S)) < 0\}}), \quad (9)$$

and the market value of the firm is

$$V^S(z_t, K_t^S) = \max_{I_t^S} \{ d(z_t, K_t^S) + \frac{1}{1+r} \mathbf{E}_{z_{t+1}|z_t} [V(z_{t+1}, K_{t+1}^S)] \}. \quad (10)$$

Next, we model managers' utility functions. Part of a manager's income is stock compensation, and managers aim to maximize the market value of the stock as well as the dividend flows to equity holders. We use the superscript  $M$  to denote the corporate policies managers choose to maximize their value of utility. Managers choose the optimal path of capital by maximizing their discounted present value of utility functions given by<sup>3</sup>

$$U(z_t, K_t^M) = \max_{I_t^M} \{ \beta V^S + (1 - \beta) V^F \}, \quad (11)$$

where  $U(z_t, K_t^M)$  in Equation (11) denotes the managers' utility,  $\beta$  determines their ownership fraction on their company stocks,  $V^S$  and  $V^F$  correspond to stock market value and fundamental value of the firm. In the absence of information asymmetry ( $a = 0$ ) and managerial equity incentives ( $\beta = 0$ ), managers' utility  $U(z_t, K_t^M)$  is equivalent to fundamental firm value  $V^F$ , which represents the expected sum of the discounted present value of dividends to shareholders, and investment policies  $I_t^M$  is equivalent to its fundamental level  $I_t^F$ . By considering managers' utility as a combination of both market value and fundamental value, the model has the implication that managers, by overinvesting to increase  $V^S$ , may destroy the fundamental component of firm value. The presence of  $\beta$  also captures the documented positive relation between CEO compensation and market capitalization (Gabaix & Landier, 2008). The setting also abstracts from Bolton et al. (2006) in which, by introducing differences of opinions among investors, the optimal compensation contract may emphasize the speculative component in the stock price and lead stock prices to deviate from underlying fundamentals; moreover, such short-termism can become an equilibrium outcome.

Investors forecast profitability and price stock value according to the levels of investment. Therefore, managers, with the presence of equity incentives, are motivated to bolster the firm's market value by overinvesting as long as the benefits of boosting investors' perceptions of earnings outweigh the costs of losing dividends as investment is one source of cash outflows. The existence of information asymmetry and equity incentives induces managers to act as if capital is more productive compared to a situation where managers act in the best interests of shareholders. The level of misinvestment, shown by the difference of  $I_t^M$  and  $I_t^F$  in the model, provides a lens to test the catering effect of investment in which managers use investments to promote their market-based compensation by catering to investors' information needs for the firm's future prospects.

## 2.2 | Simulated policy and value functions

The solution of the model must be solved numerically. The numerical solution for the basic model setup is obtained by using an iterative algorithm (value iteration). The parameter selection follows closely the estimation results in Nikolov and Whited (2014) that are further calibrated to match the moments from the model-generated data and the moments from the actual data as shown in Nikolov and Whited (2014, table IV). Managerial stock ownership,  $\beta$ , is set to equal 0.051 following Nikolov and Whited (2014). In the model, the degree of investment informativeness (relative to earn-

<sup>3</sup> Different from Wu (2018), managers stay indefinitely with the firm and wage income is a fixed component of their utility function.

**TABLE 1** Target moments and parameters

Panel A: Sample moments									
Moments	Model	Actual							
Average investment	0.14	0.12							
SD of investment	0.12	0.08							
Average distribution	0.12	0.05							
SD of distribution	0.05	0.04							
Average profits	0.21	0.16							
SD of profits	0.09	0.06							
Average Q	2.85	2.01							
SD of Q	0.68	0.72							
Panel B: Parameter setup									
Parameter	$\alpha$	$\gamma$	$\eta$	$\rho$	$\sigma$	$\tau$	$r$	$\beta$	$a$
Value	0.83	0.84	0.35	0.64	0.36	0.2	0.04	0.05	0.50

Note Panel A summarizes the actual and model-simulated moments calculated on an annual basis and Panel B lists the parameters used to generate the moments. The actual moments are drawn from Nikolov and Whited (2014, table IV). The definitions of parameters can be found in Subsection 2.1.

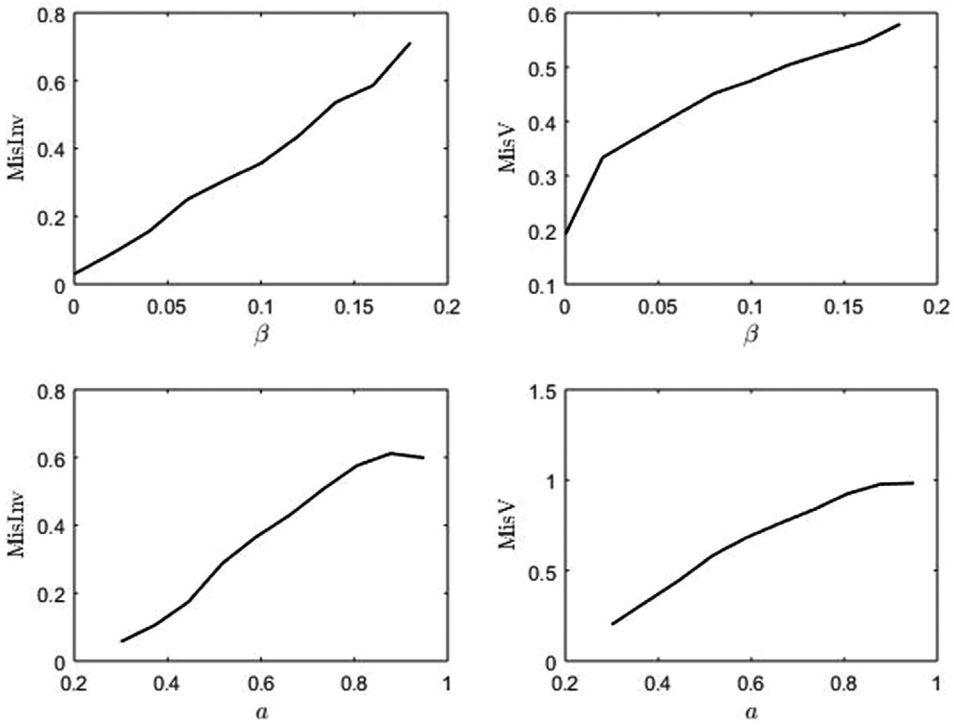
ings informativeness) is set to equal 0.5. Panel A of Table 1 presents firm-level actual moments extracted from Nikolov and Whited (2014) and simulated moments; and Panel B of Table 1 lists the calibrated parameters used in the simulation. Table 1 reveals that the model successfully replicates the mean and standard deviation of investment, dividend distributions, profits and Tobin's  $q$ . In general, the results show that the selected parameters provide a good fit for the empirical data.

Based on the calibrated parameters shown in Table 1, we next examine the investment policy as well as firm value. The top left and the bottom left panels of Figure 1 depict the levels of misinvestment ( $\frac{I_t^M}{K_t^M} - \frac{I_t^F}{K_t^F}$ ), defined as the difference between investment rates in the benchmark case with nonzero managerial equity incentives and information asymmetry ( $\beta = 0.18$ ,  $\alpha = 0.50$ ) and the case where  $\beta$  and  $a$  are equal to 0. All investment levels are scaled by their capital levels at period  $t$ . The top and bottom right panels depict the deviation of market value from fundamental value ( $V_t^S/V_t^F - 1$ ). The top (bottom) left panel shows the relation between misinvestment ( $MisInv$ ) and  $\beta$  ( $a$ ) and the top (bottom) right panel shows the relation between misvaluation ( $MisV$ ) and  $\beta$  ( $a$ ). These results show that both misinvestment and misvaluation increase with the levels of equity incentives granted to managers ( $\beta$ ) and the degree of investment informativeness ( $a$ ). To the extent that managers invest more than what is best for shareholders in order to influence investors' forecasts about firms' productivity, any deviations of investments from the optimal level that maximizes shareholders' value capture the catering effect of investment. The upward-sloping trends shown in Figure 1 demonstrate that the catering effect of investment is stronger when managers own a larger fraction of their company stocks and investors are more likely to glean information about future firm performance from investment policies.

### 2.3 | Empirical predictions

With the model intuition at hand, we now turn to examine the model predictions for empirical regression results. It is helpful to conduct comparative static statistics to examine the impact of model parameters on investment regressions. In particular, we investigate the effect of managerial compensation contracts and investment informativeness on (1) whether firms' misvaluation is more dependent on investment, and (2) whether firms' investment is more sensitive to



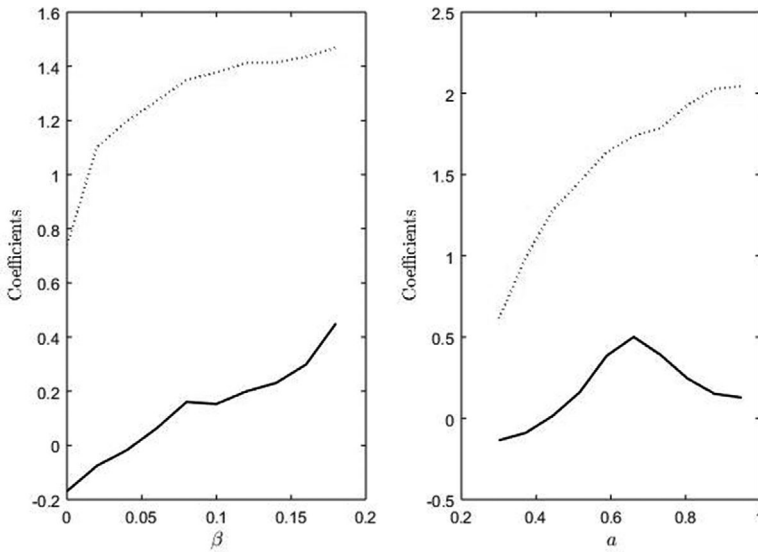


**FIGURE 1** Misinvestment and misvaluation.  $\beta$  determines managers' fraction of ownership of their company's stocks.  $a$  modulates the degree of informativeness of investment. The top and bottom left panel depicts the levels of misinvestment ( $\frac{I_t^M}{K_t^M} - \frac{I_t^F}{K_t^F}$ ) in percentage terms, defined as the difference in investment rates between the benchmark case and the case where  $\beta$  and  $a$  are equal to 0. The top and bottom right panel depicts the ratio of the market value to the fundamental value minus one ( $V_t^S / V_t^F - 1$ ). The top (bottom) left panel show the relation between misinvestment and  $\beta$  ( $a$ ) and the top (bottom) right panel shows the relation between misvaluation and  $\beta$  ( $a$ ). All the other parameters are set at the baseline values, except for the parameter of interest.

the misvaluation. We estimate the following equations based on the model-generated data:

$$MisV = b_0 + b_1 Inv + u, \quad Inv = c_0 + c_1 MisV + c_2 Fund q + c_3 Cash flow + e. \tag{12}$$

MisV (computed as  $\frac{V_t^S - V_t^F}{K_t^M}$ ) represents the levels of misvaluation.  $Inv$  (computed as  $\frac{I_t^M}{K_t^M}$ ) is investment-to-capital ratio.  $Fund q$  (computed as  $\frac{V_t^F}{K_t^M}$ ) represents the ratio of fundamental firm value to capital stock.  $Cash flow$  (computed as  $\frac{z_t(K_t^M)^\alpha}{K_t^M}$ ) is profit-to-capital ratio.  $b_1$  shows the effect of investment in elevating market valuations and  $c_1$  is the sensitivity of investment to misvaluation, which replicates the regression models from Campello and Graham (2013). The intent of these reduced-form regressions is to understand the effects of model parameters  $\beta$  and  $a$  in altering the sensitivity of investment to market valuation observed in the real world. The dotted line of Figure 2 plots the estimated effects of investment on market valuation ( $b_1$ ) and the solid line delineates the estimated effects of misvaluation on investment ( $c_1$ ). The dotted lines of both panels show that, when the direction runs from misvaluation to investment, an increase of either managerial equity incentives ( $\beta$ ) or the degree of investment informativeness ( $a$ ) is associated with a higher impact of investment on market valuation ( $b_1$ ). The solid line of the left panel shows that, when the direction runs from investment to misvaluation, an increase in managerial equity incentives ( $\beta$ ) leads to higher investment



**FIGURE 2** Regression coefficients with simulated data.  $\beta$  determines managers' fraction of ownership of their company's stocks.  $a$  modulates the degree of informativeness of investment. The dotted line depicts the coefficients ( $b_1$ ) of regressing misvaluation on investment:  $MisV = b_0 + b_1 Inv + u$ . The solid line depicts the coefficients on the misvaluation ( $c_1$ ) of regressing investment on misvaluation, fundamental  $q$  and cash flow:  $Inv = c_0 + c_1 MisV + c_2 Fund\ q + c_3 Cash\ flow + e$ .

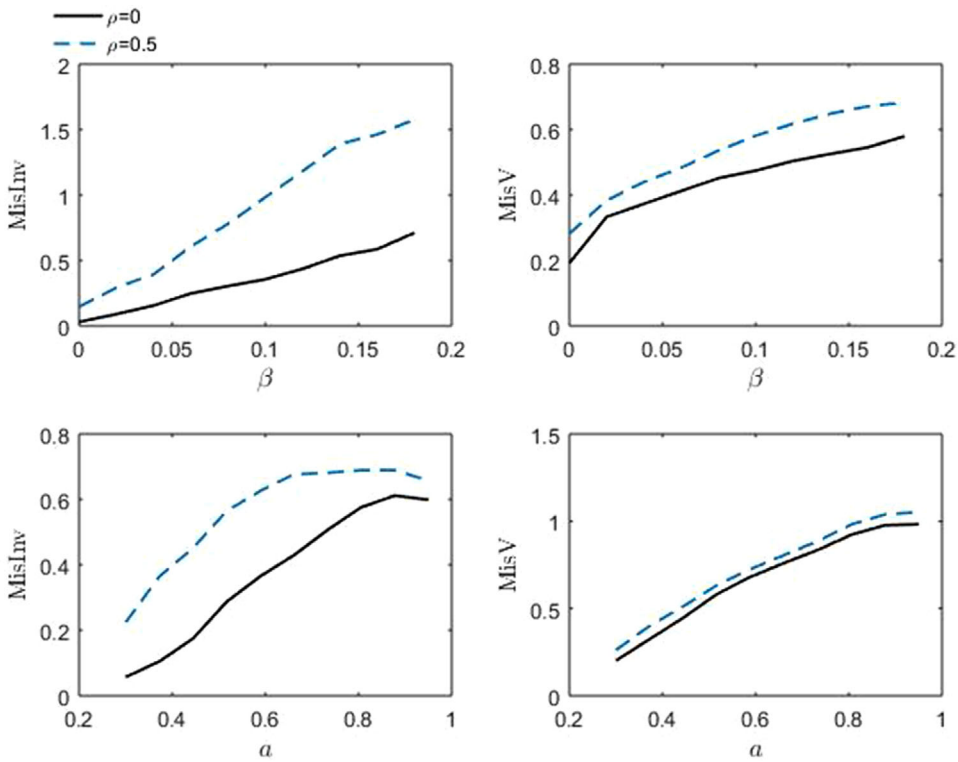
sensitivity to misvaluation ( $c_1$ ). For the solid line in the right panel, it reveals that investment sensitivity to misvaluation ( $c_1$ ) rises initially with  $a$ . Then  $c_1$ , though positive, starts to decline with  $a$  when the  $a$  is sufficiently high. In all, the positive association of  $b_1$  with  $\beta$  or  $a$  implies that firms have stronger incentives to use investments to boost market valuations when managerial equity incentives or investment informativeness is high, even though such incentives are not necessarily captured by the OLS coefficients of investment on misvaluation ( $c_1$ ).

## 2.4 | Price impact of equity transactions

The model presented above rests on the assumption that equity transaction costs remain the same regardless of the levels of misvaluation. Therefore, the model implies that there is a connection between investment and misvaluation in the absence of an equity financing channel. In this section, we aim to relax this assumption and allow misvaluation to operate by virtue of lowering equity financing costs. High equity prices can relax financing constraints and affect corporate decisions because firms can issue equity and use their proceeds to fund investment opportunities (Baker et al., 2003; Campello & Graham, 2013; Warusawitharana & Whited, 2016). Managers can use a high level of investment to mislead uninformed investors and the consequential high market prices can lower the costs of financing. In this section, we attempt to map the misvaluation onto the costs of equity financing. Specifically, we rewrite equity financing parameter  $\bar{\eta}$  as a linear function of the ratio of fundamental value to market value:

$$\bar{\eta}_t = \eta \left( 1 + \rho \left( \frac{V_t^F}{V_t^M} - 1 \right) \right). \quad (13)$$

When  $\rho$  is equal to 0, market valuations driven by firms' investment policies become irrelevant for the costs of funds. The costs of equity financing stays at  $\eta$  regardless of the market value. When  $\rho$  is positive, the value of  $V_t^M$  has a nega-



**FIGURE 3** Misinvestment and misvaluation with an equity financing channel.  $\beta$  determines managers' fraction of ownership of their company's stocks.  $a$  modulates the degree of informativeness of investment. The solid line delineates the scenario in which equity financing costs remain the same regardless of the levels of misvaluation ( $\rho = 0$ ). The dashed line delineates the scenario in which equity financing costs decrease with overvaluation ( $\rho = 0.5$ ). The top and bottom left panel depicts the levels of misinvestment ( $\frac{I_t^M}{K_t^M} - \frac{I_t^F}{K_t^F}$ ) in percentage terms, defined as the difference in investment rates between the benchmark case and the case in which  $\beta$  and  $a$  are equal to 0. The top and bottom right panel depicts the ratio of the market value to the fundamental value minus one ( $V_t^S/V_t^F - 1$ ). The top (bottom) left panel show the relation between misinvestment and  $\beta$  ( $a$ ) and the top (bottom) right panel shows the relation between misvaluation and  $\beta$  ( $a$ ). All the other parameters are set at the baseline values, except for the parameter of interest.

tive impact on the costs of funds. Specifically, the higher the market value  $V_t^M$  vis-à-vis the fundamental value  $V_t^F$ , the lower the costs of equity financing. By imposing a positive value for  $\rho$ , we manage to model the endogenous nature of external financial constraints by allowing investment policies to have an effect on the costs of funds.

We proceed to reproduce the relationship in Figure 1 with both  $\rho = 0$  and  $\rho = 0.5$ . The solid line of Figure 3 delineates the relation between model parameters (namely,  $\beta$  or  $a$ ) and misinvestment ( $MisInv$ ) or misvaluation ( $MisV$ ) in which equity financing costs remain the same regardless of the levels of misvaluation ( $\rho = 0$ ). The dashed line of Figure 3 delineates the scenario in which equity financing costs decrease with overvaluation ( $\rho = 0.5$ ). In all graphs, the dashed line stays above the solid line. It shows that for the same level of managerial stock ownership  $\beta$  and investment informativeness  $a$ , an equity financing channel with positive  $\rho$  leads to a higher level of misinvestment and misvaluation. This is in line with the view of, for example, Campello and Graham (2013), that a value-maximizing manager responds to misvaluation by issuing overvalued equity and investing the proceeds. Therefore, they can use investments as a signal to improve the valuation of the firm, which in turn drives down the costs of equity capital, and consequentially leads to more (mis)investment.

### 3 | EMPIRICAL EVIDENCE

In the following sections, we test our theoretical findings with empirical evidence.

#### 3.1 | Data sample

The sample starts with all US firms covered by the Compustat industry annual and quarterly file between 1980 and 2015. Consistent with the extant literature, we exclude financial firms, utility and quasi-government firms (i.e., firms with SIC codes between 6000 and 6999 or 4900 and 4999 or 9000 and 9999). Following Almeida et al. (2004), we also delete the firms that have sales or asset growth exceeding 100% to eliminate the effect of business discontinuities. We drop the observations with missing values in assets or sales and firms with capital stock less than USD 1 million to eliminate the effect of outliers. Information of analysts' earnings forecast is drawn from the Institutional Brokers Estimate System (I/B/E/S) and CEO compensation data are taken from the Compustat Executive Compensation (ExecuComp) database.

#### 3.2 | Variables definitions and descriptive statistics

We next introduce the main regression variables used in the empirical analyses with the data name in the Compustat industry annual/quarterly file shown in parenthesis. Investment (denoted as *Inv*) is capital expenditure (*capx*) normalized by gross property, plant and equipment (*ppegt*). Cash flow (denoted as *Cash flow*) is income before extraordinary items (*ib*) plus depreciation (*dp*), normalized by gross property, plant and equipment (*ppegt*). The calculation of a firm's intrinsic value follows closely the method in Dong et al. (2021) and is similar to the calculation of Lee et al. (1999). Specifically, we estimate the intrinsic value by employing a residual income model (RIV) (Frankel & Lee, 1998; Ohlson, 1995). Intrinsic value is winsorized at the 1st and 99th percentiles of their distributions to mitigate the concerns of measurement errors. Details for calculating the intrinsic value are shown in the Appendix. Misvaluation (denoted as *MisV*) is defined as the ratio of stock price (*prcc\_q*) in the following quarter of the current fiscal year to a firm's intrinsic value at the current year end. It corresponds to the inverse of value-to-price ratio used in Dong et al. (2021). Apart from Dong et al. (2021), there is strong support for the use of the price-to-value ratio as an indicator of mispricing (e.g., Ali et al., 2003; Frankel & Lee, 1998; Lee et al., 1999). Fundamental *q* (denoted as *Fund q*) is built in a similar way to market-to-book ratio except that we substitute intrinsic value for stock price. That is, fundamental *q* is computed as the intrinsic value multiplied by the number of shares outstanding (*csho*) plus total assets (*at*) minus book value of equity (*ceq*) minus deferred tax (*txdb*), normalized by gross property, plant and equipment (*ppegt*). We winsorize these variables at the 1st and 99th percentiles of their distributions. Finally, we delete observations that report nonmissing values in our baseline regressions discussed in the next section.

Table 2 reports the sample descriptive statistics for our main variables in levels and in first-differences. Panel A shows the mean, standard deviation, 25th, 50th and 75th percentiles of our variables in levels. The average value of the investment rate is 0.126, which is comparable to the values in the extant literature (e.g., Nikolov & Whited, 2014). The average value of misvaluation is 1.497, which is comparable to the inverse of the average value-to-price ratio shown in Dong et al. (2021), which is around 0.6. Fundamental *q* is heavily skewed to the right with the average value (4.077) substantially higher than its median value (2.498).<sup>4</sup> To account for firm fixed effects in the GMM estimation, we use the first differences of the variables. Hence, we also present the mean, standard deviation and 25th, 50th and

<sup>4</sup> Note that our average value of Fundamental *q* is larger than Tobin's *q* in Erickson and Whited (2012) and Peters and Taylor (2017) because we do not remove current assets from our numerator. Compared to the construction of Campello and Graham (2013), we deflate the value by capital stock rather than total assets and do not truncate the ratio at the value of 10.

**TABLE 2** Summary statistics

Variables	Observations	Mean	SD	p25	p50	p75
Panel A: OLS regression variables:						
Inv	12,857	0.126	0.097	0.068	0.102	0.153
Total_Inv	12,857	0.199	0.215	0.087	0.140	0.232
MisV	12,857	1.497	2.143	0.685	1.073	1.716
Fund <i>q</i>	12,857	4.077	5.693	1.491	2.498	4.475
Cash flow	12,857	0.239	0.316	0.104	0.187	0.315
Panel B: GMM regression variables:						
$\Delta$ Inv	12,857	-0.007	0.089	-0.031	-0.002	0.021
$\Delta$ Total_Inv	12,857	-0.007	0.116	-0.035	-0.002	0.025
$\Delta$ MisV	12,857	0.019	2.205	-0.252	0.006	0.260
$\Delta$ Fund <i>q</i>	12,857	-0.032	3.003	-0.317	-0.010	0.321
$\Delta$ Cash flow	12,857	-0.012	0.237	-0.046	0.000	0.037
Panel C: Sorting variables:						
<u>Managerial ownership</u>						
OWN_CEO	5408	1.415	4.252	0.075	0.221	0.674
OWN_TEAM	5752	0.503	1.481	0.039	0.100	0.318
Delta_CEO	5542	2056.654	5730.549	363.312	768.061	1686.616
Delta_TEAM	5871	709.652	1545.946	161.489	309.873	641.192
<u>Earnings report quality</u>						
DACC	9475	0.114	0.148	0.027	0.063	0.145
Analyst Forecast Error	12,857	0.016	0.126	0.001	0.004	0.012
F-Score	9198	0.688	0.510	0.323	0.496	0.957

Note: The table shows the mean, standard deviation, 25th, 50th and 70th percentiles of the main regression variables based on OLS (Panel A) and GMM (Panel B), as well as the sorting variables (Panel C) for US firms from 1980 to 2015. *Inv* is capital expenditures normalized by gross property, plant and equipment. *Total\_Inv* is investment plus R&D expenditure normalized by gross property, plant and equipment. Misvaluation (*MisV*) is defined as the ratio of stock price over the next quarter to the firm's intrinsic value (the inverse of Value-to-Price ratio used in Dong et al. (2021)). The calculation of firm's intrinsic value is similar to that of Lee et al. (1999). Fundamental *q* (*Fund q*) is computed as the intrinsic value multiplied by number of shares outstanding plus total assets minus book value of equity minus deferred tax, normalized by gross property, plant and equipment. *Cash flow* is income before extraordinary items plus depreciation, normalized by gross property, plant and equipment.  $\Delta x$  denotes the variables after first-difference. *OWN\_CEO* is the ownership of CEO, which is defined as the number of shares (excluding options) owned by CEOs divided by number of common shares outstanding. *OWN\_TEAM* is the average ownership of top management team as defined in the ExecuComp. *Delta\_CEO* (*Delta\_TEAM*) is the change in the value of stock and option holdings (based on the Black and Scholes (1973) formula) for every dollar change of stock price from CEO (top management team). |DACC| is defined as the absolute value of residuals from a modified Jones (1991) model (Dechow et al., 1995). *Analyst Forecast Error* is defined as the absolute value of median earnings forecast minus actual earnings, scaled by the year-end stock price. *F-Score* is a scaled probability based on a misstatement prediction documented in Dechow et al. (2011).

75th percentiles of the first-difference variables in Panel B of Table 2. Most of the variables are centered around 0 after first-differencing.

Another goal is to compare the investment-misvaluation relation between firms with a higher degree of investment informativeness versus firms with a lower degree, and firms with high managerial stock ownership versus firms with low managerial stock ownership. However, the extent to which investors extract information from firms' investment policies is difficult to measure. We thus use ERQ to gauge the degree of investors resorting to investment strategies (due to the low information quality of earnings) to predict firms' future economic standings. We use three variables to capture ERQ: (1) |DACC| is defined as absolute value of residuals from a modified (Jones, 1991) model (Dechow

et al., 1995).<sup>5</sup> (2) *Analyst Forecast Error* is computed as the total quarterly absolute value of median earnings forecast minus actual earnings, in each year, scaled by the year-end stock price. (3) *F-Score* is a scaled probability based on a misstatement prediction documented in Dechow et al. (2011) as a signal of the likelihood of earnings management or misstatement.<sup>6</sup>

We rely on the information of stock holdings of both the CEO and the TMT as defined in the ExecuComp database to evaluate the moderating effect of managerial ownership. Stock ownership is defined as the number of stocks owned by the CEO or TMT divided by number of common shares outstanding.<sup>7</sup> We also look at total delta, which is the change in the value of stock and option holdings (based on the formula of Black and Scholes (1973)) for every dollar change of stock price. Specifically, it is defined as  $delta = \frac{\partial Black-Scholes\ value}{\partial Price}$ .

Panel C of Table 2 shows the summary statistics for our sorting variables. The mean stock ownership level of the CEO is 1.41% and the value is slightly smaller than that in Nikolov and Whited (2014) due to the more recent period the data sample covers, though it is very close to the mean value reported in Nyman and Golbe (2017). The average stock ownership of the TMT is smaller than that of the CEO stock ownership. The 75th percentile of *F-Score* is close to 1, indicating that around one quarter of our sample is identified as “above normal risk” for an *F-Score* cutoff of 1.00 (Dechow et al., 2011).

### 3.3 | Estimation results

In this section, we investigate the influence of managerial ownership and earnings quality on managers’ incentives to use investment to boost misvaluation; a lower earnings quality indicates a higher tendency of uninformed investors to rely on investment for information. We first present the regression outcomes for the full sample, using both OLS and GMM estimation methods. Then we split the samples according to managerial stock ownership and earnings quality and compare the estimation outputs across subsamples.

#### 3.3.1 | Baseline results

As a prequel to our cross-sectional evidence, we show the baseline results for the effects of investment (*Inv*) on stock market misvaluation (*MisV*) from OLS regression with firm and year fixed effects. As in Campello and Graham (2013), we include, as independent variables, cash flow, fundamental *q* and misvaluation for investment regression. Specifically, we estimate

$$MisV = b_0 + b_1 Inv + b_2 Cash\ flow + b_3 Fund\ q + v_i + v_t + u_{it}, \quad (14)$$

in which *MisV* is the ratio of stock price over the next quarter to a firm’s intrinsic value computed as stated in the Appendix (the inverse of value-to-price ratio used in Dong et al. (2021)). By using the stock price in the following quarter, the estimation also partly mitigates reverse causality concerns because it is hard to argue that managers make

<sup>5</sup> Specifically, it is the absolute value of the residuals from the following regression for each year and each two-digit SIC code industry:  $TA_{it} = \alpha_0 + \alpha_1 (\Delta Rev_{it} - \Delta Rec_{it}) + \alpha_2 PPE_{it} + \epsilon_{it}$ , where  $TA_{it}$  indicates the total accruals for firm *i* at year *t* (computed as income before extraordinary items minus net cash flow from operating activities) scaled by average total assets;  $\Delta Rev_{it}$  is the change in sales revenues divided by average total assets;  $\Delta Rec_{it}$  is the change in accounts receivables scaled by average total assets and  $PPE_{it}$  is the gross amount of property, plant and equipment scaled by average total assets.

<sup>6</sup> Specifically, we compute  $logit = 7.893 + 0.790 * RSST\_accr + 2.518 * \Delta AR + 1.191 * \Delta INVEN + 1.979 * \%SFT + 0.171 * \Delta CashSales - 0.932 * \Delta ROA + 1.029 * Issue$ , where  $RSST\_accr$  is the change in working capital accruals, plus the change in net noncurrent operating assets, plus change in net financial assets, scaled by average total assets;  $\Delta AR / \Delta INVEN / \Delta ROA$  is the change in accounts receivables/inventory/return on assets, scaled by average total assets;  $\%SFT$  is the percentage of soft assets (total assets – net PP&E – Cash).  $\Delta CashSales$  is the change in cash sales (sales minus accounts receivables), scaled by average total assets and  $Issue$  indicates the issuance of long-term debt or common stock. The probability that a company is fraudulently reporting is  $Prob = \frac{logit}{1+logit}$  and the *F-Score* is the probability of misstatement divided by the unconditional probability of misstatement, which is  $F-Score = Prob / 0.0037$ .

<sup>7</sup> It is computed as ExecuComp item *shrown\_excl\_opts* divided by the total number of shares outstanding (Nikolov & Whited, 2014).

investment decisions based on the stock price in the next quarter. *Fund q* is the fundamental *q* built based on the estimated intrinsic value, and *Cash flow* is the cash flows. In the OLS estimation, we include firm fixed effects (denoted as  $v_i$ ) to account for time-invariant firm-specific characteristics and the control of year fixed effects (denoted as  $v_t$ ) accounts for concomitant national trends. The results for the OLS estimation are presented in Column 1 of Table 3. We also present the results for the regression of investment on misvaluation as a reference for the following GMM regression results. Consistent with the theoretical prediction that managers use investment strategies to impact market inferences about firms' prospects, the estimated coefficient on investment of misvaluation is positive and statistically significant at the 1% probability level. We also investigate the effects of total investment, which is the combination of capital expenditure (CAPEX) and R&D expenses, on misvaluation. As shown in Column 3, the positive impact of investment on misvaluation remains even we account for R&D expenses.<sup>8</sup>

In addition, we employ simultaneous-equation two-step GMM regressions where misvaluation and investment both appear as dependent variables and regressors in the equations. By doing so, we permit the misvaluation to depend on investment decisions and vice versa. The joint estimation of all the parameters of the system of equations allows the correlation of the residuals to be reflected across these equations. We also include cash flow and fundamental *q* as independent variables for misvaluation and investment regression. We employ GMM estimation methodology with first-difference variables to control for firm fixed effects.<sup>9</sup> Using first differences of the variables also allows endogenous right-hand side variables to be instrumented with their twice-lagged values (MacKays & Phillips, 2005). Specifically, we estimate the following system of equations using GMM:

$$\Delta MisV = b_0 + b_1 \Delta Inv + b_2 \Delta Cash\ flow + b_3 \Delta Fund\ q + u, \quad (15)$$

$$\Delta Inv = a_0 + a_1 \Delta MisV + a_2 \Delta Cash\ flow + a_3 \Delta Fund\ q + e, \quad (16)$$

where  $\Delta$  is the first-difference operator. All other variables are as defined previously.  $u$  and  $e$  are random error terms that can be correlated in the second-step estimation.

Columns 2 and 4 of Table 3 provide a view on the relation between investment and misvaluation based on GMM estimation. The coefficients on *Inv* of misvaluation equation are all positive and statistically significant at the 1% level, verifying the model predictions that managers tend to affect stock prices with their investment choices. Also consistent with the equity-issuance interpretation, the estimated coefficients on misvaluation of the investment regression are positive and significant. However, the Hansen's *J*-statistics are too large to survive the overidentification tests. We thus need to interpret these results with caution.<sup>10</sup> We thereafter estimate the moderating effects of ERQ and managerial ownership using the OLS estimation of Equation (14) with firm and year fixed effects.

### 3.3.2 | Earnings quality and managerial ownership

We now investigate the influence of managerial ownership and earnings quality by dividing the sample according to ERQ and managerial stock ownership. Uninformed investors, due to information asymmetry, are more likely to extract

<sup>8</sup> Despite R&D being an important component of corporate investment, nonetheless, we prefer to keep capital expenditure as our primary measure of corporate investment in our following tests because R&D could depress earnings and is considered as a way to manipulate earnings (e.g., real earnings management). Therefore, whether R&D can improve stock price over the next quarter could be ambiguous. In addition, half of the firms do not report R&D expenditures in their statement, according to Koh and Reeb (2015), treating missing R&D as 0 can misclassify nonreporting R&D firms as firms with no R&D activities. Finally, the technical report of Luo (2016) argues that CAPEX is largely undertaken in-house, whereas R&D can be contracted, and CAPEX is "the most predominant investment form, consisting of about 67% of the sum of capex, R&D and M&A."

<sup>9</sup> The simultaneous equations estimation using GMM can be implemented using the STATA command *gmm* or *3sls*.

<sup>10</sup> GMM estimations with the third lag in the levels as the instruments and both the second and third lags in the levels as the instruments produce similar output.

**TABLE 3** OLS and GMM regressions of full sample

	(1)	(2)	(3)	(4)
	CAPEX		Total_Inv: CAPEX + R&D	
	OLS	GMM	OLS	GMM
Dependent variable: MisV				
Inv	1.839*** (0.48)	55.579*** (1.39)	1.839*** (0.48)	23.937*** (0.31)
Cash flow	-0.979** (0.39)	-26.873*** (6.44)	-0.979** (0.39)	-6.261** (3.08)
Fund q	-0.039** (0.02)	-0.325 (0.49)	-0.039** (0.02)	-0.138 (0.13)
Constant	1.662*** (0.08)	-0.002 (0.08)	1.662*** (0.08)	0.119*** (0.04)
$R^2_g$	0.299		0.305	
Dependent variable: Inv				
MisV	0.003*** (0.00)	0.012*** (0.00)	0.008*** (0.00)	0.040*** (0.00)
Cash flow	0.001*** (0.01)	0.475*** (0.11)	0.083** (0.03)	0.266** (0.12)
Fund q	0.001** (0.00)	0.006 (0.01)	0.003*** (0.00)	0.006 (0.01)
Constant	0.093*** (0.00)	0.000 (0.00)	0.153*** (0.01)	-0.005*** (0.00)
Observations	12,857	12,857	12,857	12,857
J-stats.	N/A	93.219	N/A	204.537
$R^2_g$	0.424	N/A	0.734	N/A

Note: The table presents OLS and GMM estimation output for the full US sample from 1980 to 2015. For OLS estimation, the model is specified as

$$MisV = b_0 + b_1 Inv + b_2 Cash\ flow + b_3 Fund\ q + v_i + v_t + u_{it},$$

in the upper panel and

$$Inv = b_0 + b_1 Mis + b_2 Cash\ flow + b_3 Fund\ q + v_i + v_t + u_{it},$$

in the lower panel, where  $v_i$  ( $v_t$ ) indicates firm (year) fixed effects. For the GMM estimation, all the regression variables are first-differenced to control for firm fixed effects and are instrumented with their second lags in levels

$$\Delta MisV = b_0 + b_1 \Delta Inv + b_2 \Delta Cash\ flow + b_3 \Delta Fund\ q + u,$$

$$\Delta Inv = a_0 + a_1 \Delta MisV + a_2 \Delta Cash\ flow + a_3 \Delta Fund\ q + e,$$

where  $\Delta$  is the first-difference operator.  $u$  and  $e$  are random error terms and they can be correlated in the second-step estimation. Investment ( $Inv$ ) is capital expenditures (CAPEX) normalized by gross property, plant and equipment in Columns 1 and 2, and is the sum of capital expenditures and R&D expenditure ( $Total\_Inv$ ) in Columns 3 and 4. Fundamental  $q$  ( $Fund\ q$ ) is computed as the intrinsic value multiplied by number of shares outstanding plus total assets minus book value of equity minus deferred tax, normalized by gross property, plant and equipment. Misvaluation ( $MisV$ ) is defined as the ratio of the stock price over the next quarter to the firm's intrinsic value.  $Cash\ flow$  is income before extraordinary items plus depreciation, normalized by gross property, plant and equipment. Robust standard errors adjusted for firm level clustering are given in brackets.  $J$ -statistics and adjusted R-squared ( $R^2_g$ ) are shown at the bottom. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% probability levels, respectively.



**TABLE 4** Cross-sectional analyses: Earnings report quality

	(1)		(2)		(3)		(4)		(5)		(6)	
	DACC		Analyst Forecast Error		F-Score		Low ERQ	High ERQ	Low ERQ	High ERQ	Low ERQ	High ERQ
Inv	2.753***	-0.342	2.176**	0.852**	1.626***	1.853	(0.82)	(0.90)	(1.04)	(0.42)	(0.57)	(1.76)
Cash flow	-0.985**	-0.056	-2.398***	0.708**	-0.018	-2.767*	(0.41)	(0.72)	(0.83)	(0.29)	(0.30)	(1.44)
Fund q	-0.052***	-0.089***	-0.033**	-0.088***	-0.062***	-0.030	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)
Constant	1.743***	1.821***	1.745***	1.559***	1.588***	1.870***	(0.11)	(0.19)	(0.08)	(0.09)	(0.12)	(0.13)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes						
Year FE	Yes	Yes	Yes	Yes	Yes	Yes						
p of sig. dif.	0.000		0.022		0.777							
Observations	3079	3211	3815	4956	3050	3070						
R <sub>a</sub> <sup>2</sup>	0.433	0.211	0.255	0.527	0.359	0.303						

Note: The table presents the OLS estimation output of studying the effects of investment on misvaluation by dividing the samples according to earnings report quality (ERQ). The dependent variable is misvaluation (*MisV*) and the model is specified as follows:

$$MisV = b_0 + b_1 Inv + b_2 Cash\ flow + b_3 Fund\ q + v_i + v_t + u_{it}.$$

In Columns 1 and 2, low (high) ERQ is defined as firms with absolute residuals from a modified (Jones, 1991) model (*|DACC|*) in the highest (lowest) tercile of the yearly sample distribution. In Columns 3 and 4, low (high) ERQ is defined as firms with analysts forecast error in the highest (lowest) tercile of the yearly sample distribution. In Columns 5 and 6, low (high) ERQ is defined as firms with *F-Score* in the highest (lowest) tercile of the yearly sample distribution. Investment (*Inv*) is capital expenditures normalized by gross property, plant and equipment. Fundamental *q* (*Fund q*) is computed as the intrinsic value multiplied by number of shares outstanding plus total assets minus book value of equity minus deferred tax, normalized by gross property, plant and equipment. Misvaluation (*MisV*) is defined as the ratio of the stock price over the next quarter to the firm's intrinsic value. *Cash flow* is income before extraordinary items plus depreciation, normalized by gross property, plant and equipment.  $v_i$  ( $v_t$ ) indicates firm (year) fixed effects. Robust standard errors adjusted for firm level clustering are given in brackets. *p* value of significant difference on *Inv* corresponding to Chow's test of differences between high and low earnings quality are presented. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels, respectively.

information based on investment policies when the degree of the informativeness for earnings is low, that is, the ERQ is poor. Moreover, the model shows that, when managers' compensation is largely linked to the stock market performance, they are more spurred to influence market participants' opinions about firm prospects through investment choices. According to such predictions, the association between investment and misvaluation should be stronger when insiders' stock ownership levels are higher and earnings quality is poorer.

We start by sorting our samples into high and low ERQ and reproduce our baseline results. As mentioned above, we use three measures to capture firms' earnings quality, and group firms accordingly. We assign firms in the highest yearly tercile of *|DACC|* to the group of "Low ERQ". We also look at *Analyst Forecast Error* and firms that are in the highest tercile of *Analyst Forecast Error* on an annual basis are assigned to the "Low ERQ". Finally, we rely on *F-Score* to predict earnings manipulations and assign firms in the highest yearly tercile of *F-Score* to the group of "Low ERQ".

The coefficient estimates presented in Table 4 show that "Low ERQ" firms demonstrate a stronger relationship between misvaluation and investment. When we measure ERQ with *|DACC|* and *F-Score*, as shown in Columns 1 and 2, Columns 5 and 6 of Table 4, the coefficients on *Inv* are only statistically significant for the subsample of firms identified

as having low earnings report quality. Although the coefficients on *Inv* for “Analyst Forecast Error” are significant for both subsamples, the *p*-value corresponding to Chow’s test of differences shows that the magnitude of the coefficient on *Inv* of *MisV* for “High ERQ” is significantly smaller than that for “Low ERQ”.

Our model suggests that managerial ownership is an important determinant of managers’ tendency to impact stock valuation through their investment policies. We therefore move on to evaluate this argument by separately examining the subsamples that differ in terms of managerial ownership. We present our cross-sectional analysis results on the basis of managerial ownership in Table 5. Low-(high-)stock ownership (*OWN\_CEO/OWN\_TEAM*) is defined as firms with CEO/TMT stock ownership in the lowest (highest) tercile of the yearly sample distribution, whereas low-(high-)delta (*Delta\_CEO/Delta\_TEAM*) is classified as firms with CEO/TMT total delta in the lowest (highest) tercile of the yearly sample distribution.

Based on Columns 1 and 3 of Panel A in Table 5, the coefficients on *Inv* of *MisV* are positive and statistically significant for the subsample of high-stock ownership; in contrast, Columns 2 and 4 of Panel A for the low-stock ownership subsample show that the coefficients are insignificant and nearly twice as small. Panel B of Table 5 shows the impact of managers’ total delta. Again, the coefficients on *Inv* of *MisV* are only statistically significant at the 5% level for the high-delta subsample, irrespective of the CEO’s or TMT’s delta. The economic size for the subsample of high-CEO delta (high-TMT delta) is double that for low-CEO delta (low-TMT delta). Consistent with our model predictions, higher levels of insider stock ownership or larger CEO pay sensitivity to the firm’s stock value motivates managers to boost market valuations via investment decisions.

Collectively, the replication of the OLS specification lends support for our model predictions that investors are more reliant on investment policies to form opinions about a firm’s future prospects when the firm’s earnings informativeness is low, or its managerial ownership is high.

## 4 | ADDITIONAL TESTS

### 4.1 | Evidence from insider sale

Managers should care more about stock price inflation following their insider sales. We therefore obtain insider trading information from the Thomson Financial Insider Filings Data (TFN), which contains insider trading for all executives reported on SEC Forms 3, 4, 5 and 144, over the period from 1990 to 2015. We aggregate the number of their open market purchases and sales in a given firm-year. To measure the direction of insider trading (i.e., whether buying or selling) in a given firm-year, we compute *NSR* analogously to that of Frankel and Li’s (2004) net purchase ratio. That is, the *NSR* is equal to  $(Sell - Buy)/(Buy + Sell)$ . *Buy* indicates the total number of purchase transactions in a given firm-year and *Sell* denotes the total number of insider sales transactions in a given firm-year. We re-examine the investment-misvaluation relation depending on insiders’ *NSR* in the following year. Regression results for the “positive *NSR*” and “negative *NSR*” subsamples are shown in Panel A of Table 6. The coefficient on *Inv* is only statistically significant for the subsample of firms in which there is a larger number of upcoming insider sale transactions relative to insider purchases. Also, the economic magnitude of *Inv* coefficient for “positive *NSR*” (Coef. = 3.559) is 18 times greater than that of “negative *NSR*” (Coef. = 0.243). The results are therefore consistent with the view of managers being more apt to influence stock prices with investment choices preceding a greater tendency of insider sales.

In addition, we evaluate the effects of investment on increasing future abnormal profits of insider sales. The abnormal trading profits are estimated using the following transaction-specific regression of daily returns on the Fama and French (1992) and Carhart (1997) four factors over the next 180, 120 and 90 days after each transaction:  $R_{it} - R_{ft} = \alpha + \beta(R_{mt} - R_{ft}) + hHML_t + sSML_t + mUMD_t + v_{it}$ . The abnormal trading profit is equal to  $\alpha$  ( $-\alpha$ ) for purchases (sales). We also create an indicator variable for insider sales (*InsiderSale*) and interact it with the firm’s *Inv* in the previous fiscal year. We control for firm-specific characteristics that may correlate with insider trading profits. All the control variables are measured in the previous year. For instance, following Lakonishok and Lee (2001), we control for size (*Size*)

**TABLE 5** Cross-sectional analyses: Ownership

Panel A: Stock ownership				
	High	Low	High	Low
	OWN_CEO	OWN_CEO	OWN_TEAM	OWN_TEAM
	(1)	(2)	(3)	(4)
Inv	2.211** (0.88)	1.093 (1.08)	2.429*** (0.73)	1.159 (1.22)
Cash flow	-0.483 (0.49)	-0.282 (0.82)	-0.588 (0.47)	-0.121 (0.87)
Fund q	-0.029** (0.01)	-0.112*** (0.04)	-0.023* (0.01)	-0.138*** (0.04)
Constant	1.726*** (0.17)	2.041*** (0.20)	1.617*** (0.16)	2.108*** (0.21)
Observations	1768	1836	1897	1951
R <sub>a</sub> <sup>2</sup>	0.360	0.094	0.396	0.111
Panel B: Delta				
	High	Low	High	Low
	Delta_CEO	Delta_CEO	Delta_TEAM	Delta_TEAM
	(5)	(6)	(7)	(8)
Inv	2.551** (1.04)	0.821 (0.56)	2.291** (0.94)	0.866* (0.50)
Cash flow	-0.605 (0.43)	-0.084 (0.29)	-0.186 (0.34)	0.004 (0.32)
Fund q	-0.027* (0.01)	-0.089** (0.04)	-0.026* (0.02)	-0.094** (0.04)
Constant	1.887*** (0.21)	1.746*** (0.13)	1.739*** (0.18)	1.712*** (0.13)
Observations	1767	1927	1888	2040
R <sub>a</sub> <sup>2</sup>	0.200	0.440	0.357	0.442

Note: The table presents the OLS estimation output of studying the effects of investment on misvaluation by dividing the samples according to executives' inside ownership. The dependent variable is misvaluation (*MisV*) and the model is specified as follows:

$$MisV = b_0 + b_1 Inv + b_2 Cash\ flow + b_3 Fund\ q + v_i + v_t + u_{it}$$

In Panel A, low-(high-)stock ownership is defined as firms with CEO's/top management team's stock ownership (*OWN\_CEO/OWN\_TEAM*) in the lowest (highest) tercile of the yearly sample distribution. In Panel B, low-(high-)delta (*Delta\_CEO/Delta\_TEAM*) is defined as firms with CEO's/top management team's total delta in the lowest (highest) tercile of the yearly sample distribution. *Inv* is capital expenditures normalized by gross property, plant and equipment. Fundamental *q* (*Fund q*) is computed as the intrinsic value multiplied by number of shares outstanding plus total assets minus book value of equity minus deferred tax, normalized by gross property, plant and equipment. Misvaluation (*MisV*) is defined as the ratio of the stock price over the next quarter to the firm's intrinsic value. *Cash flow* is income before extraordinary items plus depreciation, normalized by gross property, plant and equipment.  $v_i$  ( $v_t$ ) indicates firm (year) fixed effects. Robust standard errors adjusted for firm level clustering are given in brackets. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% probability levels, respectively.

**TABLE 6** Evidence based on insider sales

<b>Panel A: Sorting by Net Sale Ratio</b>			
	(1)	(2)	
	Positive NSR	Negative NSR	
Inv	3.559** (1.73)	0.243 (0.55)	
Cash flow	-2.846* (1.56)	-0.981* (0.57)	
Fund q	-0.002 (0.03)	-0.052** (0.02)	
Constant	1.636*** (0.12)	1.855*** (0.15)	
Observations	2333	1414	
$R_a^2$	0.464	0.614	
<b>Panel B: Trading profits for insider sale</b>			
	(1)	(2)	(3)
	180 days	120 days	90 days
InsiderSale x Inv	0.200*** (8.59)	0.192*** (6.93)	0.190*** (6.07)
Inv	-0.098*** (-7.95)	-0.097*** (-6.57)	-0.100*** (-5.94)
<i>Joint Sig. of (Inv + InsiderSale x Inv)</i>	0.000	0.000	0.000
InsiderSale	-0.162*** (-34.67)	-0.166*** (-30.32)	-0.177*** (-28.34)
Size	0.002 (1.55)	-0.000 (-0.10)	0.001 (0.29)
Sale_growth	0.001 (0.36)	0.002 (0.69)	0.003 (0.72)
AnalystC	-0.000 (-0.05)	0.000 (0.29)	0.001 (0.50)
ROA	-0.001 (-0.84)	-0.002 (-1.55)	-0.002 (-1.60)
VOL	0.004 (0.10)	-0.008 (-0.16)	0.001 (0.01)
RD_dummy	0.001 (0.47)	0.001 (0.38)	0.004 (0.78)
BTM	-0.000 (-0.63)	-0.000 (-0.08)	-0.000 (-0.08)

(Continues)

TABLE 6 (Continued)

Panel B: Trading profits for insider sale			
	(1)	(2)	(3)
	180 days	120 days	90 days
RET	-0.001 (-1.58)	-0.000 (-0.79)	-0.000 (-0.12)
Turnover	0.001 (1.59)	0.001 (1.63)	0.001 (1.16)
Observations	62,740	62,740	62,740

Note: Panel A of the table presents the OLS estimation output of investment on misvaluation (*MisV*) by sorting the sample based on insiders' Net Sales Ratio (*NSR*) in the following year. The model is specified as follows:

$$MisV = b_0 + b_1 Inv + b_2 Cash\ flow + b_3 Fund\ q + v_i + v_t + u_{it}.$$

*Inv* is capital expenditures normalized by gross property, plant and equipment. Fundamental *q* (*Fund q*) is computed as the intrinsic value multiplied by number of shares outstanding plus total assets minus book value of equity minus deferred tax, normalized by gross property, plant and equipment. Misvaluation (*MisV*) is defined as the ratio of the stock price over the next quarter to the firm's intrinsic value. *Cash flow* is income before extraordinary items plus depreciation, normalized by gross property, plant and equipment.  $v_i$  ( $v_t$ ) indicates firm (year) fixed effects. Panel B shows the transaction-level regressions examining the effect of investment decision on insider sales' trading profits (*Profits*) estimated over 180 days, 120 days and 90 days. The model is specified as follows:

$$Profits = b_0 + b_1 InsiderSale \times Inv + b_2 Inv + b_3 InsiderSale + Controls + v_i + v_t + u_{it}.$$

*InsiderSale* is an indicator variable for insider sales. *p*-value of joint significance of *Inv* and *InsiderSale*  $\times$  *Inv* is shown. Robust standard errors adjusted for firm level clustering are given in brackets. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% probability levels, respectively.

and the book-to-market ratio (*BTM*). In addition, following Brochet (2010), we include stock returns (*RET*, a measure of momentum to capture insiders' potential contrarian behavior), stock return idiosyncratic volatility (*VOL*), a dummy variable for R&D (*RD\_dummy*), and *Turnover* (defined as the aggregate trading volume 1 year before the trade, scaled by total number of shares outstanding). We also incorporate the return on assets (*ROA*) and sales growth (*Sale\_growth*) as controls for the impact of firm performance and the natural logarithm of analyst coverage (*AnalystC*) to account for the firm's information environment (e.g., Dai et al., 2015). All regressions include firm and year fixed effects.

We present the estimation results of the insider trading profits estimated over the next 180 days (Column 1), 120 days (Column 2) and 90 days (Column 3) in Panel B of Table 6. After the inclusion of full set of control variables, the joint significance of *Inv*  $\times$  *InsiderSale* and *Inv* (with all *p* values less than 0.000) indicates that, overall, managers can generate better abnormal insider trading profits with higher levels of corporate investment. The coefficients on *Inv*  $\times$  *InsiderSale* are positive and statistically significant at the 1% probability level for all windows, implying that the abnormal profits arising from corporate investment are largely dominated by insider sales transactions. Taken together, we provide evidence that managers' personal insider trading benefits from their open market sales can be an important driver of their propensity to influence stock prices through investment strategies.

## 4.2 | The issuance of CAPEX guidance

Nonearnings guidance such as CAPEX guidance has recently spurred investors' appetites and has been advocated by influential voices (Lu et al., 2012). Several studies examine the role of managers' voluntary CAPEX guidance in reducing information asymmetry between managers and investors (Luo, 2016) and enhancing investment efficiency (Bae et al.,

**TABLE 7** CAPEX guidance of S&P500 firms

	(1)	(2)
Dependent variable: MisV		
Inv × high_dev	2.538** (1.10)	2.156* (1.28)
Inv	−0.367 (0.68)	−1.763** (0.76)
high_dev	−0.278* (0.16)	−0.239 (0.15)
Cash flow	1.517*** (0.41)	0.488 (0.31)
Fund <i>q</i>	−0.134*** (0.02)	−0.125*** (0.02)
Constant	1.598*** (0.14)	1.973*** (0.15)
Fixed effects	Industry and Year FE	Firm and Year FE
Observations	481	451
$R^2_q$	0.352	0.628

Note: The table presents the OLS estimation output for S&P500 firms examining whether the impact of investment on misvaluation differs across firms with various managerial CAPEX guidance forecast errors (i.e., the differences between actual capital expenditures and CAPEX guidance). The model is specified as follows:

$$MisV = b_0 + b_1 Inv \times high\_dev + b_2 Inv + b_3 high\_dev + b_4 Cash\ flow + b_5 Fund\ q + u_{it}$$

Firms with above-median managerial CAPEX guidance forecast errors are coded as 1 for *high\_dev*, and 0 otherwise. *Inv* is capital expenditures normalized by gross property, plant and equipment. Fundamental *q* (*Fund q*) is computed as the intrinsic value multiplied by the number of shares outstanding plus total assets minus book value of equity minus deferred tax, normalized by gross property, plant and equipment. Misvaluation (*MisV*) is defined as the ratio of the stock price over the next quarter to the firm's intrinsic value. *Cash flow* is income before extraordinary items plus depreciation, normalized by gross property, plant and equipment. Industry (Firm) and year fixed effects are included in Column 1 (2). Robust standard errors are given in brackets. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% probability levels, respectively.

2021). Managers can often bundle capital expenditures with CAPEX guidance to convey information about the firm's growth opportunities to investors (Luo, 2016; Lu et al., 2012). If CAPEX guidance serves as a good substitute for actual capital expenditures that investors can use to make inferences about a firm's growth potential, investors will react mildly to the actual capital expenditures when the CAPEX guidance can provide a proper guideline. As in Bae et al. (2021), we compute managerial CAPEX guidance forecast errors, that is, the difference between the actual capital expenditures and CAPEX guidance. We then use managerial CAPEX guidance forecast errors to capture the quality of CAPEX guidance. We predict that the stock price response to the actual CAPEX is weaker when the level of managerial CAPEX guidance forecast errors is low (i.e., the information quality of CAPEX guidance is high), and vice versa.

We retrieve our data from FactSet for a sample of Standard & Poor's (S&P) 500 firms. CAPEX guidance typically includes an estimated dollar amount of the firm's overall capital spending (Lu et al., 2012). We use the absolute value of the deviation of midpoint estimates of CAPEX guidance from the actual CAPEX (all normalized by gross property, plant and equipment) to capture managerial CAPEX guidance forecast errors. We create a dummy variable that is equal to 1 for observations whose managerial CAPEX guidance forecast errors in the previous year (denoted as *high\_div*) are above the median (and 0 otherwise), and we interact it with *Inv*. The regression results examining the effects of CAPEX guidance forecast error are presented in Table 7. Aside from adding controls of year fixed effects, cash flow,

fundamental  $q$ , we include (two-digit SIC code) industry fixed effects in Column 1 and firm fixed effects in Column 2. In both specifications, the coefficients on *high\_dev* are negative, albeit insignificant with the inclusion of firm fixed effects. It suggests that the market responds negatively when management CAPEX guidance diverges from the actual CAPEX. The positive and significant coefficients on  $Inv \times high\_dev$  in both Columns 1 and 2 show that firms with high managerial CAPEX guidance forecast errors demonstrate a strong association between investment (i.e., the actual CAPEX) and stock market misvaluation. It is thereby consistent with the argument that the low information quality of CAPEX guidance toughens the role of actual investment in influencing stock price.

## 5 | CONCLUSION

We construct a dynamic structural model to provide insights into how managers' investment decisions can influence stock market valuation. We consider the effects of stock ownership and information asymmetry between the inside managers and outside investors. Managers in this framework are motivated to use investment decisions to cater to investors' opinions about firms' future prospects and influence market valuation, which creates a "catering" channel that allows the direction to run from investment choices to market valuation. The model can be employed to understand the contribution of equity-based managerial compensation to the association between firm policies and market valuation. Consistent with the model predictions, our empirical findings show that the incentives to manipulate the valuation process are stronger when managers are granted with greater stock ownership or the informativeness of earnings is lower.

The positive correlation between corporate investment and market valuation is consistent with the bulk of the literature (Baker et al., 2003; Campello & Graham, 2013); however, the interpretation behind the association differs. Although holding an equity stake aligns managers' incentives with investors' interests, we show that self-interest-maximizing managers may exploit the information asymmetry and invest beyond the optimal levels to influence investors' valuation process and increase managerial utility. Hence the study contributes to the literature that examines a "catering" channel (e.g., Polk & Sapienza, 2008) and managerial incentives to influence market valuation (Jensen, 2005). The dynamic model, however, falls short because it does not embed managers' turnover risk and shareholders' investment horizons. Managers who are less likely to be discharged for making suboptimal investment decisions are more prone to influencing market valuation with investment choices. Investors with short horizons might be more concerned about the market-based value than the fundamental value, which is the expected present value of dividend streams. Hence, our paper suggests a host of additional research avenues for the investigation of investment policies well beyond accounting quality and managerial compensation.

## ACKNOWLEDGMENTS

Open Access funding enabled and organized by Projekt DEAL.

## ORCID

Shushu Liao  <https://orcid.org/0000-0003-0663-0372>

## REFERENCES

- Ali, A., Hwang, L. S., & Trombley, M. A. (2003). Arbitrage risk and the book-to-market anomaly. *Journal of Financial Economics*, 69(2), 355–373.
- Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *The Journal of Finance*, 59(4), 1777–1804.
- Bae, J., Biddle, G. C., & Park, C. W. (2021). Managerial learning from analyst feedback to voluntary capex guidance, investment efficiency, and firm performance. *Management Science*, 68(1), 583–607.
- Baker, M., Greenwood, R., & Wurgler, J. (2009). Catering through nominal share prices. *The Journal of Finance*, 64(6), 2559–2590.

- Baker, M., Stein, J. C., & Wurgler, J. (2003). When does the market matter? stock prices and the investment of equity-dependent firms. *The Quarterly Journal of Economics*, 118(3), 969–1005.
- Barro, R. J. (1990). The stock market and investment. *The Review of Financial Studies*, 3(1), 115–131.
- Bizjak, J. M., Brickley, J. A., & Coles, J. L. (1993). Stock-based incentive compensation and investment behavior. *Journal of Accounting and Economics*, 16(1–3), 349–372.
- Black, F., & Scholes, M. (1973). The pricing of options and corporate liabilities. *The Journal of Political Economy*, 81(3), 637–654.
- Blanchard, O., Rhee, C., & Summers, L. (1993). The stock market, profit, and investment. *The Quarterly Journal of Economics*, 108(1), 115–136.
- Bolton, P., Scheinkman, J., & Xiong, W. (2006). Executive compensation and short-termist behaviour in speculative markets. *The Review of Economic Studies*, 73(3), 577–610.
- Brochet, F. (2010). Information content of insider trades before and after the Sarbanes–Oxley act. *The Accounting Review*, 85(2), 419–446.
- Brown, J. R., & Petersen, B. C. (2011). Cash holdings and R&D smoothing. *Journal of Corporate Finance*, 17(3), 694–709.
- Campello, M., & Graham, J. R. (2013). Do stock prices influence corporate decisions? Evidence from the technology bubble. *Journal of Financial Economics*, 107(1), 89–110.
- Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*, 52(1), 57–82.
- Chen, Q., Goldstein, I., & Jiang, W. (2007). Price informativeness and investment sensitivity to stock price. *The Review of Financial Studies*, 20(3), 619–650.
- Chirinko, R. S., & Schaller, H. (1996). Bubbles, fundamentals, and investment: A multiple equation testing strategy. *Journal of Monetary Economics*, 38(1), 47–76.
- Dai, L., Parwada, J. T., & Zhang, B. (2015). The governance effect of the media's news dissemination role: Evidence from insider trading. *Journal of Accounting Research*, 53(2), 331–366.
- Dechow, P. M., Ge, W., Larson, C. R., & Sloan, R. G. (2011). Predicting material accounting misstatements. *Contemporary Accounting Research*, 28(1), 17–82.
- Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *Accounting Review*, 70(2), 193–225.
- Dong, M., Hirshleifer, D., & Teoh, S. H. (2021). Misvaluation and corporate inventiveness. *Journal of Financial and Quantitative Analysis*, 56(8), 2605–2633.
- Dow, J., & Gorton, G. (1997). Stock market efficiency and economic efficiency: Is there a connection? *The Journal of Finance*, 52(3), 1087–1129.
- Erickson, T., & Whited, T. M. (2012). Treating measurement error in Tobin's q. *Review of Financial Studies*, 25(4), 1286–1329.
- Fama, E., & French, K. (1992). The cross-section of expected stock returns. *Journal of Finance*, 47(2), 427–465.
- Frankel, R., & Lee, C. M. (1998). Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics*, 25(3), 283–319.
- Frankel, R., & Li, X. (2004). Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics*, 37(2), 229–259.
- Gabaix, X., & Landier, A. (2008). Why has ceo pay increased so much? *The Quarterly Journal of Economics*, 123(1), 49–100.
- Galeotti, M., & Schiantarelli, F. (1994). Stock market volatility and investment: Do only fundamentals matter? *Economica*, 61(242), 147–165.
- Gilchrist, S., Himmelberg, C. P., & Huberman, G. (2005). Do stock price bubbles influence corporate investment? *Journal of Monetary Economics*, 52(4), 805–827.
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323–329.
- Jensen, M. C. (2005). Agency costs of overvalued equity. *Financial Management*, 34(1), 5–19.
- Jones, J. J. (1991). Earnings management during import relief investigations. *Journal of Accounting Research*, 29(2), 193–228.
- Koh, P. S., & Reeb, D. M. (2015). Missing R&D. *Journal of Accounting and Economics*, 60(1), 73–94.
- Lakonishok, J., & Lee, I. (2001). Are insider trades informative? *The Review of Financial Studies*, 14(1), 79–111.
- Lee, C. M., Myers, J., & Swaminathan, B. (1999). What is the intrinsic value of the dow? *The Journal of Finance*, 54(5), 1693–1741.
- Lu, R., Hung-Yuan, & Wu Tucker, J. (2012). Nonearnings corporate guidance. *Financial Management*, 41(4), 947–977.
- Luo, J. (2016). The stock price reaction to investment news: New evidence from modeling optimal capex and capex guidance. Technical report, Working paper, New York University.
- MacKay, P., & Phillips, G. M. (2005). How does industry affect firm financial structure? *The Review of Financial Studies*, 18(4), 1433–1466.
- Morck, R., Shleifer, A., Vishny, R. W., Shapiro, M., & Poterba, J. M. (1990). The stock market and investment: Is the market a sideshow? *Brookings Papers on Economic Activity*, 1990(2), 157–215.
- Morellec, E., Nikolov, B., & Schürhoff, N. (2012). Corporate governance and capital structure dynamics. *The Journal of Finance*, 67(3), 803–848.



- Mussa, M. (1977). External and internal adjustment costs and the theory of aggregate and firm investment. *Economica*, 44(174), 163–178.
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221.
- Nikolov, B., & Whited, T. M. (2014). Agency conflicts and cash: Estimates from a dynamic model. *The Journal of Finance*, 69(5), 1883–1921.
- Nyman, I., & Golbe, D. (2017). Share repurchases and ceo ownership. Technical report, Hunter College Department of Economics.
- Ohlson, J. A. (1995). Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research*, 11(2), 661–687.
- Ovtchinnikov, A. V., & McConnell, J. J. (2009). Capital market imperfections and the sensitivity of investment to stock prices. *Journal of Financial and Quantitative Analysis*, 44(3), 551–578.
- Peters, R. H., & Taylor, L. A. (2017). Intangible capital and the investment-q relation. *Journal of Financial Economics*, 123(2), 251–272.
- Polk, C., & Sapienza, P. (2008). The stock market and corporate investment: A test of catering theory. *The Review of Financial Studies*, 22(1), 187–217.
- Riddick, L. A., & Whited, T. M. (2009). The corporate propensity to save. *The Journal of Finance*, 64(4), 1729–1766.
- Strobl, G. (2014). Stock-based managerial compensation, price informativeness, and the incentive to overinvest. *Journal of Corporate Finance*, 29, 594–606.
- Subrahmanyam, A., & Titman, S. (1999). The going-public decision and the development of financial markets. *The Journal of Finance*, 54(3), 1045–1082.
- Warusawitharana, M., & Whited, T. M. (2016). Equity market misvaluation, financing, and investment. *The Review of Financial Studies*, 29(3), 603–654.
- Wu, Y. (2018). What's behind smooth dividends? Evidence from structural estimation. *The Review of Financial Studies*, 31(10), 3979–4016.

**How to cite this article:** Liao, S., & Errico, M. (2023). Corporate investment and stock market valuation. *Journal of Business Finance & Accounting*, 50, 795–819. <https://doi.org/10.1111/jbfa.12649>

## APPENDIX

We estimate intrinsic value based on the residual income valuation (RIV) model originated by Ohlson (1995). As a follow-up, Frankel and Lee (1998) construct a method for estimating fundamental equity value. With the assumption of “clean surplus relation,” the change in book value of equity is equal to earnings minus dividends. The current-year equity value  $V_0^{RIV}$  is expressed as a function of book values and discounted value of an infinite sum of expected abnormal earnings.

$$V_0^{RIV} = B_0 + \sum_{t=1}^T E_0 \left[ \frac{X_t^a}{(1+r_e)^t} \right], \quad (A1)$$

where  $X_t^a = X_t - r_e \times B_{t-1}$  is abnormal earnings with  $X_t$  referring to earnings in year  $t$ ,  $B_{t-1}$  referring to book value of equity in year  $t - 1$  and  $r_e$  is the cost of equity in year 0. I remove observations with negative book value of equity.  $X_t^a$  can also write  $X_t^a = (ROE_t - r_e) \times B_{t-1}$  and  $ROE_t$  is the return on equity in year  $t$ . Following Dong et al. (2021), we use a three-period forecast horizon

$$V_0^{RIV} = B_0 + \frac{(FROE_1 - r_e)B_0}{1+r_e} + \frac{(FROE_2 - r_e)B_1}{(1+r_e)^2} + \frac{(FROE_3 - r_e)B_2}{(1+r_e)^2 r_e}, \quad (A2)$$

where  $FROE_t$  is the forecasted return on equity in year  $t$  and is computed as  $\frac{FEPS_t}{B_{t-1}}$ , where  $FEPS_t$  is the Institutional Brokers' Estimate System (I/B/E/S) mean forecasted EPS in year  $t$  (e.g., FY1 of I/B/E/S consensus earnings estimates

for  $FEPS_t$ ) and  $B_{t-1}$  is the book value per share in year  $t - 1$ . Following Dong et al. (2021), if the EPS forecast for any horizon is not available, it is substituted by the EPS forecast for the previous horizon and compounded at the long-term growth rate as provided by I/B/E/S. If the long-term growth rate is not available from I/B/E/S, the EPS forecast for the first preceding available horizon is used as a substitute for  $FEPS_t$ . We cap the value of any of these  $FROE_t$  at 1 if  $FROE_t > 1$ . Finally, the last term of the equation discounts the residual income in year 3 as a perpetuity.

With the assumption of “clean surplus relation,” future book values of equity can be written as

$$B_t = B_{t-1} + FEPS_t(1 - k), \quad (A3)$$

where  $FEPS_t$  is the I/B/E/S mean forecasted EPS for year  $t$ .  $k$  is the dividend payout ratio and is determined by the ratio of dividends per share to earnings per share in year  $t$ . Following Lee et al. (1999) and Dong et al. (2021), if  $k$  is negative (owing to negative earnings per share), we divide dividends by  $(0.06 \times \text{total assets})$ , that is, assuming that earnings are 6% of total assets on average, to obtain an estimate of the payout ratio. We also set  $k$  equal to 1 when  $k > 1$ .

The RIV model requires the input of a discount rate that corresponds the riskiness of future cash flows to shareholders. The annualized cost of equity  $r_e$  is determined using the CAPM model, where beta is estimated using the monthly stock returns of the last 5 years. We require the sample to have at least 2 years of available data in stock returns. We obtain the information for risk-free rate and the market risk premium from Kenneth R. French-Data Library. Following Dong et al. (2021), any estimate of the CAPM cost of capital that is outside the range of 5%–20% is winsorized to lie at the border of the range. Misvaluation is then computed as the ratio of the stock price in the following quarter ( $prcc\_q$ ) to the firm's  $V_0^{RIV}$ .