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Market valuation and corporate investment in India

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Abstract

Purpose – This study aims to examine the impact of stock market valuation on corporate investment. Specifically, it attempts to understand the influence of both the fundamental and non-fundamental components of stock price on firms' investment decisions.

Design/methodology/approach – The study decomposes the market-to-book (MB) ratio into three components, namely, firm-level mispricing, industry mispricing and growth component to examine the effect of each of these components on corporate investment decisions. Based on the literature review, four testable hypotheses concerning the relationship between market valuation and corporate investment have been generated. These hypotheses have been tested on the panel data of 1,311 Indian Public Limited Manufacturing Firms using a pooled data regression model.

Findings – The study finds that both the fundamental and non-fundamental components of stock price influence the investment decisions along with the cash flow variable. The market valuation–investment nexus is more pronounced in the case of equity-dependent firms, which shows that stock valuation affects corporate investment predominantly through the equity transaction channel. Further, the positive relationship between industry mispricing and corporate investment demonstrates that the market sentiment also affects firms' investment decisions.

Originality/value – The relationship between the different components of market value and corporate investment decisions has not been explored in India. Hence, the present study is unique because it breaks the MB ratio down into growth and mispricing components and examines the impact of each of these components on corporate investment.

Keywords Market valuation, Corporate investment, Stock mispricing, India

Paper type Research paper

1. Introduction

Financial markets create and accumulate information through the trading process that converts information generated by traders into market prices (Chen *et al.*, 2007). The finance literature argues that the information contained in stock prices influences corporate investment decisions (Keynes, 1936; Barro, 1990; Dow and Gorton, 1997; Subrahmanyam and Titman, 1969; Bakke and Whited, 2010; Brainard and Tobin, 1968). The classical explanation for this relationship is that in an efficient market, stock prices reflect the marginal productivity of capital (Tobin, 1969; Von Furstenberg, 1977) and thus increases in stock price will signal a rise in the productivity of capital (Adjasi and Biekpe, 2009). However, Keynes (1936) maintains that the modern stock markets are not completely

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efficient since the information does not move freely from firms to investors and hence, market value is also affected by *animal spirits* or irrational psychology. Stock prices deviate from fundamental values when investor sentiment influences the demand of enough investors (Morck *et al.*, 1990). Therefore, stock prices do not always move with fundamentals (Shiller, 1981). Consequently, the stock prices also include an element of mispricing or sentiment (Shleifer and Summers, 1990; Shiller, 1984). Morck *et al.* (1990) claim that if stock prices affect investment decisions, then investor sentiments that influence the stock prices could also affect firms' investment decisions. Stein (1996) and Baker *et al.* (2003) observe that the non-fundamental element of stock prices also influence the investment decision of equity dependent firms. In contrary, another strand of literature argues that managers may already possess the information about future fundamentals and thus, variation in stock price would have no marginal impact on corporate investment (Braun and Johnson, 2005). Accordingly, the stock markets play a limited role, given fundamentals, in determining corporate investment (Blanchard *et al.*, 1993; Von Furstenberg, 1977; Clark, 1979; Summers, 1981) and firms should ignore the signals provided by the market (Bosworth, 1975). Yet another view contends that the stock market is neither a complete sideshow, nor is very vital in determining corporate investment (Morck *et al.*, 1990).

Given this background of diverse formal evidence, this article aims to examine the impact of stock price on corporate investment decisions. Specifically, the study responds to the research call of Bakke and Whited (2010) and attempts to disentangle market valuation into growth and mispricing components to address two important related questions: whether investment responds to mispricing or growth component of stock price.

The remainder of the paper is organized as follows. Section 2 presents the review of literature. Section 3 describes the variables, the data and the methodology. Section 4 contains the results and discussion. Section 5 concludes the study.

2. Related literature

2.1 Stock market valuation and corporate investment

Classical theories of investment argue that the marginal productivity of capital is the major determinant of corporate investment (Keynes, 1936; Marshall, 1980; Fisher, 1930; Modigliani and Miller, 1958). However, Keynes (1936) argues that the stock markets also exert a decisive influence on the rate of current investment. Taking cue from Keynes, Brainard and Tobin (1968) have formalized the link between the stock market and investment in the framework of Q theory of investment. Brainard and Tobin (1968) argue that the prices and the interest rates determined by financial market will influence the real economy. Tobin (1969) advocates that in an efficient market, stock prices reflect the marginal productivity of capital and a new investment is encouraged when the market value of capital is more than its replacement cost. Hence, a firm will expand its investment until its market value is equal to its replacement cost.

Braun and Johnson (2005) propose three channels through which stock prices can influence corporate investment. The first channel, known as the active informant hypothesis, argue that stock prices contain the information that is pooled from investors who do not directly communicate with firms, and this would improve the investment decisions of managers (Dow and Gorton, 1997; Subrahmanyam and Titman, 1999). An increase in stock prices communicates positive changes in the future investment fundamentals, which in turn increases investment activities (Adjasi and Biekpe, 2009).

In the second channel, stock price influences investment decisions through the equity financing channel. Stock prices reflect the cost and availability of equity finance (Baker and Wurgler, 2002). An increase in stock price signals the availability of equity finance at relatively less cost, which would increase investment spending (Adjasi and Biekpe, 2009).

However, the equity financing channel is relevant only for equity dependent firms (Stein, 1996; Baker *et al.*, 2003). Therefore, the influence of market valuation on investment decisions of equity dependent firms is more pronounced than the firms that are relatively less dependent on equity (Li, 2004; Morck *et al.*, 1990).

The third channel proposes that the stock market influences corporate investment through the market pressure channel. The channel assumes that managers are primarily driven by changes in stock prices. Low and declining stock prices put pressure on managers to increase firm's performance because investors would consider declining stock price as a signal of managerial underperformance. Therefore, under fear of being fired or taken over, managers are compelled to improve performance through an increase in investment (Braun and Johnson, 2005; Morck *et al.*, 1990).

2.2 Stock mispricing and corporate investment

Tobin *Q* theory assumes that the stock market is efficient and hence market valuation truly reflects firms' fundamentals or marginal productivity of capital. Hence, it rules out the impact of investor sentiments on stock price and the possibility of stock mispricing (Alzahrani, 2006). However, both the news about fundamentals and investor sentiments affect stock prices (Shiller, 1984; Galeotti and Schiantarell, 1994; Polk and Sapienza, 2002). This leads to the problem of stock mispricing (Shiller, 1984; Li, 2004) and therefore stock prices contain an element of mispricing along with the information about firms' fundamentals (Li, 2004; Bond and Cummins, 2000). If stock prices affect investment decisions, then investor sentiments that influence the stock prices could also affect firms' investment decisions (Morck *et al.*, 1990; Li, 2003).

Morck *et al.* (1990) propose three channels through which stock mispricing would affect a firm's investment. The first channel, known as the equity transaction channel, argues that when a firm experiences overvaluation, the cost of raising additional capital will decrease. This will induce the firm to invest in outstanding projects with positive net present values. On the other hand, repurchasing would be more profitable for undervalued firms than investing in undervalued projects (Baker and Wurgler, 2002). This is particularly true in the case of equity dependent firms (Stein, 1996). If stock prices influence the financing choice, there should be considerable scope for stock mispricing to affect investment (Morck *et al.*, 1990). Hence, the investment decisions of the equity dependent firms are more sensitive to stock mispricing.

The second channel, referred to as the investor catering channel, postulates that managers have to satisfy the interest or perceptions of the investors, and accordingly managers make the investment decisions that are consistent with investors' perceptions about the growth of the firm (Morck *et al.*, 1990). Investors with short-term investment horizons are more interested in the current share price than the fundamental value of firms. Overvalued firms increase investment to justify this positive sentiment of investors. Such investments are aimed at increasing short-term investors' wealth by maximizing stock price as these investors are expected to hold their stock for a short duration. Therefore, the stock price–investment nexus is more pronounced in the case of firms having investors with short-term horizons (Morck *et al.*, 1990).

The third channel that would transmit the impact of mispricing to investment is the noisy indicator of the stock market about the prospects of a firm, an industry and the economy in general. According to Morck *et al.* (1990), investors' assessment of the economy or industry is revealed in stock prices. However, there will be some errors in their assessment, if the market is not efficient and if investors are less rational. If managers cannot isolate the rational component of the stock price from the irrational, then investor sentiment will influence investment decisions, provided the managers listen to the market.

Based on the literature review, the following empirically testable hypotheses are generated:

- Both the growth and mispricing components positively affect firms' investment decisions after controlling for the cash flow variable.
- The investment decisions of the equity dependent firms (financially constrained firms) are more sensitive to stock prices.
- The effect of stock mispricing on corporate investment is stronger for the firms which have the investors with short-term shareholding horizon.
- Mispricing affects investment decisions through the noisy indicator about the prospects of the economy and the industry communicated by market participants.

3. Construction of variables, methodology and source of data

The study uses both fundamental and stock market variables to examine the link between the stock market and corporate investment. The investment variable is the net addition of fixed assets. Since the actual time series data on capital expenditure is not available, the study uses the ratio of net addition of fixed assets to total assets as the measure of investment growth. The net addition of fixed capital includes a firm's net investment on plant, building, infrastructure and other fixed assets in a given year. Following Kaplan and Zingales (1995), the market-to-book (MB) ratio is used as the measure of stock market valuation instead of the Tobin's q. The study decomposes MB ratio into the growth and the mispricing components.

Two fundamental variables are included in the model. First, return on assets is included as the cash flow variable. The cash flow variable measures the fundamentals of a firm in two ways. First, it reflects the firm's ability to generate profit from investment. Second, it also shows the availability of internal finance for investment (Morck *et al.*, 1990). The sales growth is included as another fundamental variable because it represents the future demand for a firm's product (Morck *et al.*, 1990). Following Barro (1990) and Alzahrani (2006), the paper includes lagged fundamentals and lagged stock market variables as the response to these variables takes place in lag due to time-to-build technology for the capital stock. Appendix describes the variables.

3.1 Measure of stock mispricing

The extant literature uses stock liquidity (Odean, 1998; Baker and Stein, 2002; Glaser and Weber, 2007; Statman *et al.*, 2006), future realized return (Baker *et al.*, 2003), previous period stock returns, discretionary accruals and equity issuance (Polk and Sapienza, 2002) as the measures of stock mispricing. However, it is hard to ascribe the role of the stock market to any hypothesis unless the stock price is separated into the fundamental and the non-fundamental component (Alzahrani, 2006). Therefore, this study uses the method invented by Rhodes-Kropf *et al.* (2005), Rhodes, Robinson and Viswanathan (RRV) henceforth.

According to RRV, a firm's MB ratio can be separated into two components as follows:

$$\frac{M}{B} = \frac{M}{V} X \frac{V}{B} \tag{3.1}$$

The first component on the right side of equation (3.1) is the ratio of market value (M) to fundamental value (V). This component represents the deviation of market value from its fundamental value. The second component is the ratio of fundamental value to the book value of the firm, which reflects its growth opportunities. In an efficient market, the first component of the equation would be equal to one, and the MB ratio would be equal to V/B, the growth component of the firm.

In a log form, equation (3.1) becomes:

$$\log\left(\frac{M}{B}\right) = log\left(\frac{M}{V}\right) + log\left(\frac{V}{B}\right) \tag{3.2}$$

Equation (3.2) can be presented as:

$$\log_{\text{Mispricing}} - \log B = \underset{\text{Mispricing}}{\overset{[\log M - \log V)]}{\longleftrightarrow}} + \underset{\text{Growth}}{\overset{[\log V - \log B)]}{\longleftrightarrow}} \tag{3.3}$$

In equation (3.3), [logM – logV] captures the potential mispricing in the stock price, which will be positive when there is overvaluation and negative in times of undervaluation. If the market is efficient, [logM – logV] will equal to zero and hence [logM – logB] will be equal to [logB – logV], which means that any deviation between market price and book value truly reflects the growth opportunities of the firm, which is not contaminated by investor sentiments.

In equation (3.3), V, the fundamental value of the firm, is unobservable. Assuming that V is determined by some firm-specific accounting variables at time t, (θ_{it}) and vector of multiples (α), thus:

$$\log(\mathrm{V})_{it} = \mathrm{V}(\theta_{it};\ \alpha) \tag{3.4}$$

Using equation (3.4), RRV elaborate equation (3.3) into three components. First, a firm-specific error, which is the difference between the observed market price and a firm's fundamental value based on time-t fundamentals,

$$[\log \mathrm{M}_{it} - \mathrm{V}(\theta_{it};\ \alpha_t)] \tag{3.5}$$

Second, an aggregate error (shared by all firms in an industry), which is the difference between the fundamental value based on time t fundamentals and the fundamental value based on long-term multiples (α),

$$[\mathrm{V}(\theta_{it};\ \alpha_t) - \mathrm{V}(\theta_{it};\ \alpha)] \tag{3.6}$$

Third, the growth component, which is the difference between the fundamental value based on long-term multiples (α) and the book value at time t,

$$[\mathrm{V}(\theta_{it};\ \alpha) - \log \mathrm{B}_{it}] \tag{3.7}$$

With this decomposition, equation (3.3) can be written as:

$$\log \mathrm{M} - \log \mathrm{B} = \underset{\text{Firm error}}{\overset{[\log \mathrm{M}_{it} - \mathrm{V}(\theta_{it};\ \alpha_t)]}{\longleftrightarrow}} + \underset{\text{Aggregate error}}{\overset{[\mathrm{V}(\theta_{it};\ \alpha_t) - \mathrm{V}(\theta_{it};\ \alpha)]}{\longleftrightarrow}} + \underset{\text{Growth}}{\overset{[\mathrm{V}(\theta_{it};\ \alpha) - \log \mathrm{B}_{it}]}{\longleftrightarrow}} \tag{3.8}$$

The first term on the right side of equation (3.8) is the measure of stock mispricing, the difference between firm's market value and the fundamental value. RRV consider this as a firm-specific error. If the market is bullish at time t, it will be reflected in the multiples, α_t and subsequently in the fundamental value of the stock, $V(\theta_{it}; \alpha_t)$. Therefore, the firm-specific mispricing, $[\log M_{it} - V(\theta_{it}; \alpha_t)]$, reflects only the firm-specific deviation, not the market-wide mispricing.

The second component is the difference between the firm's fundamental value at time t and the fundamental value based on long-term multiples, α. RRV designates this as a time series sector error because $V(\theta_{it}; \alpha)$ captures sector-specific valuation that does not vary over time. Further, RRV suggest that $V(\theta_{it}; \alpha)$ also represents the long-term value of the firm. The last component in equation (3.8) is the growth component, which is the difference between long-term fundamental value and the current book value.

3.2 Measure of fundamental value

Since V in equation (3.8) is unobservable, it has to be estimated before empirically decomposing the MB ratio. The residual income model of accounting defines the value of a firm as the book value of the assets plus the net income generated by those assets. The net income is known as the residual income since it is the excess of cash flows from the assets over their opportunity cost. The residual income model is expressed as:

$$V_t = B_t + E_t \sum_{\tau=t+1}^{\infty} \frac{[ROE_\tau - r_\tau]B_{\tau-1}}{(1+r_\tau)^\tau} \tag{3.9}$$

Where $\mathbf{V_t}$ is the fundamental value, $\mathbf{B_t}$ is the book value at time $\mathbf{t}$, ROE is the return on equity and $\mathbf{r}$ is the time-varying discount rate. The residual income model depicts the value of a firm as the sum of the current book value and the present value of the expected cash flow above the cost of capital (discount rate). Lee *et al.* (1999) find that the residual income model has a significant predictive ability and therefore, performs well as the measure of valuation.

RRV implement equation (3.9) as the linear function of the current book value and the net income:

$$\mathrm{V_t} = \alpha_0 + \alpha_1 \mathrm{B_t} + \alpha_2 \mathrm{NI_t} \tag{3.10}$$

Since the coefficients (α's) in equation (3.10) reflect the discount rate and the growth rate (Alzahrani, 2006), they are expected to vary over time. Hence, the equation will be estimated separately for each year as followed by RRV and Alzahrani (2006). Equation (3.10) will be estimated as:

$$\log(M) = \alpha_{0t} + \alpha_{1t}\log(B)_{it} + \alpha_{2t}\log(NI)_{it} + \varepsilon_{it} \tag{3.11}$$

As the net income is in the log form, the firms with negative net income cannot be included. Therefore, the net income in absolute form is included and a dummy variable is used to capture the negative net income. Thus, equation (3.11) becomes:

$$\log(M) = \alpha_{0t} + \alpha_{1t}\log(B)_{it} + \alpha_{2t}\log(|NI|)_{it} + \alpha_{3t}\left[\log\left(|NI| \times D_{(NI<0)}\right] + \varepsilon_{it}\right. \tag{3.12}$$

Where, log ($|NI|$) is the absolute value of net income and $D_{(NI<0)}$ is the dummy which takes the value 1, if the net income is negative and 0, otherwise.

RRV also suggest that a firm's leverage may also affect its value and thus, the model also includes leverage ratio as a control variable. Hence, equation (3.12) is written as:

$$\log(M) = \alpha_{0t} + \alpha_{1t}\log(B)_{it} + \alpha_{2t}\log(|NI|)_{it} + \alpha_{3t}\log(|NI|)_{it} * D_{(NI<0)} + \alpha_{4t}LEV_{it} + \varepsilon_{it} \tag{3.13}$$

Where, LEV is the leverage ratio.

To implement equation (3.8), we need to estimate V(θ_{it}; α_t) and V(θ_{it}; α). To obtain the former, equation (3.13) is estimated for all firms in each year to compute the annual estimates of the coefficients and the estimated equation is used to calculate V(θ_{it}; α_t) for each firm in each year as follows:

$$V(B_{it}, NI_{it}, LEV_{it};\ \hat{\alpha}_{0t},\ \hat{\alpha}_{1t}, \hat{\alpha}_{2t}, \hat{\alpha}_{3t},\ \hat{\alpha}_{4t}) = \hat{\alpha}_{0t} + \hat{\alpha}_{1t}logB_{it} + \hat{\alpha}_{2t}logNI_{it} + \hat{\alpha}_{3t}\left[\log\left(|NI| \times D_{(NI<0)}\right] + \hat{\alpha}_{4t}LEV_{it} + \varepsilon_{it} \tag{3.14}$$

To get the estimate of V(θ_{it}; α), the average of the coefficients is calculated as:

$$\overline{\alpha}_k = \frac{1}{T}\sum \alpha_{kt} \qquad k = 0,\ 1,\ 2,\ 3,\ 4 \tag{3.15}$$

Using equation (3.13), V(θ_{it};α) is estimated as:

$$V(B_{it}, NI_{it}, LEV_{it};\ \overline{\alpha}_1, \overline{\alpha}_2, \overline{\alpha}_3, \overline{\alpha}_4) = \overline{\alpha}_0 + \overline{\alpha}_1 logB_{it} + \overline{\alpha}_2 logNI_{it} + \overline{\alpha}_3\left[\log\left(|NI| \times D_{(NI<0)}\right] + \overline{\alpha}_4 LEV_{it} + \varepsilon_{it} \tag{3.16}$$

With the estimation of V(θ_{it}; α_t) and V(θ_{it};α), equation (3.8) can be empirically decomposed into: (a) [logM_{it} – V(θ_{it}; α_t)], the firm-specific error, (b) [V(θ_{it}; α_t) – V(θ_{it}; α)], the aggregate or time-series error and (c) [V(θ_{it}; α) – logB_{it}], the growth component. The component (a) is the direct measure of stock mispricing.

3.3 Measure of financial constraint

Stein (1996) and Baker *et al.* (2003) argue that the relationship between the stock market and investment is also influenced by financial constraints. The firms with less internal capital and high leverage are generally dependent on equity market for marginal investment. These firms are referred to as financially constrained firms or equity-dependent firms. Baker *et al.* (2003) argue that a practical measure of equity dependence should have an inverse relationship with cash flow and debt capacity of assets and a direct relationship with growth opportunities and leverage. They further argue that the equity-dependent firms are less likely to make marginal investment if their stock is undervalued, which suggests that the relationship between investment and stock price is stronger in the case of equity-dependent firms than the firms that are relatively less equity dependent.

To measure financial constraints, Kaplan and Zingales (1995) first advanced the KZ index. Using probit regression, KZ estimated the following equation for financial constraint.

$$KZ = -1.002\,\text{Cash flow} + 0.2826q + 3.14\text{Leverage} - 39.37\,\text{Dividends} - 1.315\,\text{Cash balance} \quad (3.17)$$

Where, cash flow, dividend and cash balance are scaled by the beginning of the year total assets. The profit after tax has been used as a proxy for cash flow. The debt to total capital is used as the measure of leverage.

The KZ measure is extensively used as a proxy for financial constraint (For instance, Alzahrani (2006), Baker *et al.* (2003), Polk and Sapienza (2002) among others). Later, Baker *et al.* (2003) modify equation (3.17) by omitting the q variable. According to them, including the *q* variable in the model is problematic, as it also contains the element of stock mispricing along with the growth component. Excluding the *q* variable overcomes the problem associated with the estimation of the replacement cost of capital as well. The modified KZ index is as follows:

$$KZ = -1.002\,\text{Cash flow} - 39.368\,\text{Dividends} - 1.315\,\text{Cash balance} + 3.139\,\text{Leverage} \quad (3.18)$$

Using the original data of Kaplan and Zingales (1995), Baker *et al.* (2003) re-estimated the coefficients of the four variable KZ index and found that the coefficients nearly remained identical.

In this study, the modified KZ index is used to classify the firms. The KZ index for each firm in each year is estimated. Based on the fourteen years' average KZ index, the firms are classified into four groups. The firms in the top quartile are considered to be equity-dependent, as they have a larger KZ index than the firms in the lower quartile.

3.4 Data and methodology

The sample for the study includes the panel data of the Indian public limited manufacturing firms. The study covers the period from FY2004 to FY2018. To be included in the sample, each firm is required to have at least two consecutive years of data. The firms that are in the 1st and 99th percentile of the total assets are excluded from the sample to reduce the effect of extreme values and the reporting errors, if any. The full sample includes firm-year observations of 1,311 firms.

The data have been collected from the CMIE Prowess Database. The pooled regression technique has been found to be appropriate for the analysis as the data does not have either fixed effect or random effect.

4. Results and discussion

The F test and the Lagrange multiplier tests presented in the Table 1 indicate that there is neither a fixed effect nor a random effect in the data. Therefore, the pooled regression model is appropriate for the analysis:

Tests	Test values
F Test for fixed effect	0.78 (1.00)
LM Test random effect	0.50 (0.48)

Note: *p*-values in bracket
Source: Author's Estimation

Table 1.
Results of F and LM test

H1. Market pricing/mispricing positively affects firms' investment decisions after controlling the cash flow variable.

To examine the impact of both fundamental and non-fundamental components of the stock price, this study decomposes market valuation into three components: firm mispricing (FDev), market mispricing (MDev) and growth component (G). To understand the impact of these three components, following investment equations are estimated [1]:

$$I_{it} = \alpha + \beta_1 CF_{it-1} + \beta_2 MB_{it-1} + \beta_2 GDP_{it-1} + \varepsilon_{it-1} \tag{4.1}$$

$$I_{it} = \alpha + \beta_1 CF_{it-1} + \beta_3 FDev_{it-1} + \beta_4 MDev_{it-1} + \beta_5 G_{it-1} + \varepsilon_{it-1} \tag{4.2}$$

$$I_{it} = \alpha + \beta_1 CF_{it-1} + \beta_2 MB_{it-1} + \beta_2 GDP_{it-1} + \beta_3 FDev_{it-1} + \beta_4 MDev_{it-1} + \beta_5 G_{it-1} + \varepsilon_{it\ -1} \tag{4.3}$$

The efficient market approach predicts that only the growth component (*G*) positively influences the corporate investment. The market mispricing view expects a significant positive relationship between stock mispricing (*FDev* and *MDev*) and corporate investment. However, if the stock price is not relevant for investment decisions, only the cash flow variable will be significant.

Table 2 shows the results of the investment equations. The regression 4.1 shows that there is a significant positive relationship between MB and the net investment even in the presence of the flow variables. The MB retains its explanatory power when the gross domestic product (GDP) growth rate is also included in the equation.

In equation (4.2), the three components of MB are included along with the cash flow (CF) variable. The results show that all the three components of stock price positively influence the net investment along with the cash flow variable. Further, both the growth and the mispricing component of MB significantly influence the investment decisions, even after controlling for the cash flow variable.

Including three components of the MB ratio allows us to understand the impact of the different components in explaining the investment decisions. If these components truly constitute the MB ratio, the explanatory power of the MB ratio will diminish when the components are included in the model. To ascertain this, the investment equation (4.3) has been estimated, including MB ratio as an additional explanatory variable. The results show that the explanatory power of MB ratio has come down significantly when the three components of it are also included in the investment equation, which suggests that the decomposed components truly belong to the MB ratio. Further, all the three components retained their explanatory power when the GDP growth rate is included as another explanatory variable. In succinct, the results suggest that a firm is expected to increase its investment activities in response to a high growth prospects and a positive market sentiment.

The positive relationship between the growth component and investment variable suggests that firms gather information from stock prices while they make investment

Table 2. Results of investment equations

	Dependent variable: Net investment							
Eq. No.	Sales Growth	Cash flow	MB	GDP	FDev	MDev	Growth	F Test
4.1	−0.0112 (−0.58)	0.0264* (1.64)	0.0067* (1.92)	0.27*** (5.97)	–	–	–	10.77 (0.00)
4.2	0.0009 (0.25)	0.023** (2.22)	–	–	0.160** (2.45)	0.340*** (4.34)	0.3495*** (3.45)	4.86 (0.00)
4.3	0.0010 (0.27)	0.023** (2.16)	0.0170 (1.43)	0.25*** (6.03)	0.135** (2.32)	0.330*** (4.30)	0.336*** (3.41)	7.59 (0.00)

Notes: *t*-values in parentheses. ***Significant at 1%, **significant at 5%, *significant at 10%. N = 1311
Source: Author's Estimation

decisions, which is consistent with the active informant hypothesis of Braun and Johnson (2005). Further, the positive relationship between market mispricing and investment suggests investor sentiment also affects corporate investment decisions:

> *H2.* Investment decisions of equity-dependent firms (financially constrained firms) are more sensitive to stock prices.

Stein (1996) and Baker *et al.* (2003) argue that the relationship between the stock market and investment is also influenced by financial constraints. The firms with less internal capital and high leverage are generally dependent on equity market for marginal investment. For firms that are solely dependent on equity, the market's assessment of the worth of the project turns out to be the major determinants of investment (Alzahrani, 2006). To empirically examine this proposition, the extent of financial constraints has been calculated using Baker *et al.* (2003) modified KZ index. Based on KZ score, firms are classified into four categories; the top quartile includes firms that are highly dependent on equity capital, and the firms in the bottom quartile are the least dependent on equity capital. Investment equation (3.2) has been estimated for each quartile.

Table 3 presents the results of the investment equation for all the quartiles. The results show that firms in the top quartile are more sensitive to all three components of MB ratio as compared to the firms in other three quartiles. The sensitiveness of the investment to the firm-level mispricing decreases as the dependence on equity comes down. This suggests that the stock overvaluation helps the firms to time the market, i.e. to raise capital when stock market valuation is high, thereby reducing the cost of capital. This positively affects firms' investment. Therefore, the results suggest that the firm-level stock mispricing influences corporate investment through the equity transaction channel. However, the investment of firms in all quartiles are found to be influenced by the market level mispricing, suggesting that firms' investment is sensitive to market-wide positive wave. Further, the growth component of the stock price retains its influence even in the case of firms that are less dependent on equity capital. This indicates that the fundamental component of the stock price truly reflects the growth prospects of the firms, which are not included in the cash flow variable:

> *H3.* The effect of stock mispricing on corporate investment is stronger for the firms which have the investors with short-term shareholding horizon.

The investor catering channel postulates the link between stock mispricing and investment is stronger when firms have investors with short-term horizons. Turnover ratio, the ratio of shares traded to shares outstanding during the fiscal year, is used to measure investor horizon. High share turnover ratio implies a short-term investment horizon and vice versa. The average share turnover ratio of each firm is calculated for the sample year, based on which the firms are classified into four quartiles. The top quartile includes the firms with higher turnover ratios, and the bottom quartile has the firms with lower turnover ratio. The investment equation (3.2) has been estimated for each quartile.

The results presented in Table 4 do not support the investor catering hypothesis. As shown in the Table, the relationship between the investment and the firm-level mispricing is not significant for the firms in the top quartile (firms with short-term investment horizon). This suggests that firms do not respond to the short-term expectation of the short-horizon investor. Therefore, stock price–investment link is primarily due to the equity transaction channel and active informant role of stock price than the investor catering channel:

Table 3. Market valuation–investment link in the presence of financial constraint

S. No.	Quartile	Dependent Variable: Net investment Sales growth	Cash flow	FDev	MDev	Growth	F Test
1	Top Quartile (N = 327)	−0.0702 (−0.95)	0.035* (1.77)	0.368*** (3.25)	0.296*** (3.15)	0.261** (2.81)	2.64 (0.02)
2	2nd Quartile (N = 327)	−0.0664 (−1.11)	0.073* (1.70)	0.197** (2.09)	0.250** (2.47)	0.3316* (1.76)	2.00 (0.07)
3	3rd Quartile (N = 327)	0.0037 (0.56)	0.015* (1.65)	0.2142 (1.19)	0.186** (2.39)	0.1836 (0.87)	1.85 (0.100)
4	Bottom Quartile (N = 327)	0.007*** (7.99)	0.0100 (1.45)	−0.2756 (−1.45)	0.280** (2.66)	0.483* (1.66)	15.24 (0.000)

Notes: *t-values* in parentheses. ***Significant at 1%, **significant at 5%, *significant at 10%
Source: Author’s estimation

Table 4.
Investor horizon and market valuation–investment link

		Dependent variable: Net investment					
S. No.	Quartiles	Sales growth	Cashflow	FDev	MDev	Growth	F Test
1	Top quartile (N = 327)	−0.0196 (−1.18)	0.042* (1.81)	0.2193 (1.20)	0.155** (2.62)	−0.1930 (−0.38)	1.92 (0.08)
2	2nd quartile (N = 327)	−0.0558 (−0.19)	0.025** (2.19)	0.1151 (1.11)	0.239*** (3.25)	0.264* (1.65)	2.62 (0.02)
3	3rd quartile (N = 327)	0.0033 (1.09)	0.0210 (0.82)	0.2511 (1.67)	0.416** (2.03)	0.7454 (1.29)	2.5 (0.02)
4	Bottom quartile (N = 327)	−0.0163 (−1.54)	0.045* (1.88)	0.2632 (1.75)	0.357** (2.81)	0.345** (2.63)	12.17 (0.03)

Notes: *t*-values in parentheses. ***Significant at 1%, **significant at 5%, *significant at 10%
Source: Author's estimation

H4. Stock mispricing affects the corporate investment by providing the signal about the prospects of the economy and the industry communicated by market participants.

The third channel that would transmit the impact of mispricing to investment is the noisy indicator of the stock market about the prospects of industry and the economy in general. Essentially, this channel argues that firms use information about the industry or market conditions reflected in the stock price in their investment decisions. A positive aggregate mispricing sends a signal about the market/economy-wide positive wave, and if the manager uses this information, he responds to this positive wave with an increase in investment.

This hypothesis is related to the coefficient of aggregate mispricing in the investment equation (MDev). Across all the analyses presented above (Table 2 through 4), market mispricing is found to be significantly influencing the investment decision of the firms. The coefficient retains its explanatory power even after controlling for cash flow variables and the other two components of stock price. Further, the market mispricing-investment linkage is stronger compared to the other two components of stock price. This suggests that stock price supplies useful information about the market and industry prospects to managers, which helps them in their investment decisions. Therefore, the significant and positive link between the market-level mispricing and investment suggests that managers use market valuation as a source of information in their investment decisions. In sum, the above results show that investment activities respond to both the fundamental and non-fundamental components of stock price. Overall, the results support the findings of Barro (1990) and Alzahrani (2006) that the stock market is not merely a sideshow; rather it significantly affects the real economy.

5. Conclusion

In this paper we ask whether investment responds to growth component or to mispricing. To address this, the study disentangles the MB ratio into firm-specific mispricing, industry mispricing and growth component to examine the impact of each of these components on corporate investment. We find that both the firm-specific mispricing and growth components significantly influence corporate investment, even after controlling the cash flow variable. The market valuation-investment linkage is more pronounced in the case of equity-dependent firms, which suggests that the stock price affects corporate investment predominantly through the equity transaction channel. The study contributes to the research conversation on the role of stock market in corporate investment decisions. The findings are also important from the point of view of the policy measures to target stock markets since the targeting is useful only if the stock markets influence real economic activities.

The scope of this paper is limited to understanding the stock mispricing-investment nexus. Future research may extend this study to examine the impact of stock valuation on other corporate decisions such as issuing new equity or engaging in other corporate restructuring activities.

Note

1. All the explanatory variables are lagged by one period nas response to these variables takes place in lag due to time-to-build technology for the capital stock (Barro, 1990). This also reduces the problem of endogeneity.

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Appendix

Variables	Symbol	Definition	Source
Investment	I	The ratio of net addition of fixed capital to total assets	Computed from CMIE Prowess Database
Market to Book Ratio	MB	The ratio of total assets minus book equity plus market capitalization all divided by total assets.	Computed from CMIE Prowess Database
Mispricing at the firm level	FDev	Difference between Observed market price at time *t* and fundamental value at time *t* [lnMit -v(θit;αt)]	Computed from CMIE Prowess Database
Aggregate (market) mispricing	MDev	Difference between fundamental value based on time-*t* fundamentals and fundamental value based on long-term multiples. [v(θit;αt) -v(θit;α)]	Computed from CMIE Prowess Database
Growth component	G	Difference between fundamental value based on long-term multiples and book value [v(θit;α) - lnBit]	Computed from CMIE Prowess Database
Investor Horizon	TO	Investor horizon is measured by the turnover ratio, which is the ratio of shares traded to shares outstanding during the fiscal year. High turnover ratio implies short-term investment horizon and vice versa.	CMIE Prowess Database
Financial constraint	KZ	Measures the degree to which the firm is financially constrained. A high value of KZ suggests the firm is financially constrained and more dependence on equity. KZ value is calculated from Baker *et al.* (2003) modified KZ equation	Computed from CMIE Prowess Database
Cash flow	CF	The ratio of profit after tax to total assets	CMIE Prowess Database
Sales growth	SG	Change in sales	Computed from CMIE Prowess Database

Table A1.
Market valuation and corporate investment – description of variables

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