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Effect of Mispricing and Growth Opportunity on Dividend Policy: Evidence from Market-to-Book Ratio Decomposition

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Abstract

This paper investigates the effect of mispricing and growth opportunity on dividend policy by decomposing the market-to-book ratio into mispricing and growth components. Our results could be summarized as follow. First, the higher the market-to-book ratio would decrease the probability of the decision to pay cash dividends. Also, this paper figures out that the relationship between the mispricing and the probability of paying cash dividends is negative; plus, the growth opportunity has a positive effect when a company decide to pay a cash dividend. Second, both the mispricing and growth opportunity have positive effect when manager decide the amount of dividend. The manager would cater to the investor's demand and signify the growth opportunity when deciding how much money they will payout.Third, the mispricing performs a positive effect on the probability of the company pay stock dividends and transfer of reserve to common shares, and the growth opportunity is not significant, implying that the manager is prone to market timing when paying the stock dividend. Finally, this paper finds that both the overvaluation and undervaluation would decrease the probability of paying cash dividend, offering a new topic for future research by decomposing market-to-book ratio.

Keywords Dividend Policy; Mispricing; Growth Opportunity; Signaling; Market Timing
JEL: G35；M21

1. Introduction

Baker and Wurgler (2004) proposed the catering theory proposed, asserting that executives determine their firm's dividend policies to cater to investors. Academic studies have investigated whether other factors affect dividend policies in addition to the catering incentive (Li and Lie, 2006; Li and Zhao, 2008). These studies have employed the dividend premium or market-to-book ratio (MB) to verify whether executives implement dividend policies to pursue higher market valuations.

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The question of whether a firm's dividend policies are determined solely to cater to investors remains unanswered. The classical financial theory asserts that a firm's goal is to maximize its market capitalization, and a firm reduces its cash dividend payment to increase its market capitalization if a growth opportunity arises (Jensen, 2001). DeAngelo, DeAngelo, and Stulz (2006) proposed that a firm's growth opportunity determines its dividend payment, and cash dividends are paid to investors when the growth opportunity is unfavorable. This finding departs from the catering theory and the clientele effect, denoting a negative correlation between growth opportunity and cash dividend payment. Fama and French (2001) applied the MB as a proxy variable of a firm's growth potential and report that a high MB yields a low amount and low likelihood of dividend payment. This phenomenon has been supported by similar research outcomes in subsequent studies (Denis and Osobov, 2008; Li and Zhao, 2008). A company's executives are concerned with the actual operating status and growth of the company. When the company is more likely to grow, executives elect to

reserve capital to pay its capital expenditures (Xing, 2008). Other studies have revealed that firms with substantial growth opportunities tend to pay low cash dividends or no dividends at all (Guttman, Kadan, and Kandel, 2010; Mitton, 2004).

Nevertheless, signaling theory asserts that a firm pays high cash dividends to its shareholders to signal favorable future growth opportunities (John and Williams, 1985; Miller and Rock, 1985). Liang, Lin, and Huang (2011) asserted that in contrast to paying cash dividends to signal a favorable forecast, a low dividend payment reveals the low investment opportunity. These signaling-based studies have demonstrated a positive correlation between growth opportunity and cash dividend payment. Bartosz Gebka(2019) argued that in the absence of information about the company's real quality, investors utilize dividend announcements as signals about the firm's value, with the strength of this signal being dependent on dividend payout costs. Charles G.Ham et al.（2018）claimed that dividend changes contain information about highly persistent future economic income changes.

Theoretically, a firm pays dividends to cater to its investors. An underpriced firm with favorable investment opportunities foregoes investment projects with positive net present value to facilitate its growth (Polk and Sapienza, 2009). If a firm cites its favorable growth opportunity as the reason for preceding its cash dividend payments, the reserved cash can be allocated for favorable investments that reduce future risks or increase the future production capacity (Xing, 2008). If the MB is regarded as the proxy variable of mispricing, the positive correlation between the MB and dividend payment is attributed to executives' catering to incentives rather than the signaling theory. Conversely, a negative correlation between the MB and dividend payment is attributed to market timing rather than reserving cash for future growth opportunities.

Although growth opportunity and mispricing are capable of interpreting a firm's decision to pay dividends accurately, executives' decision-making regarding dividend policies alters the firm's long-run valuation. Cash dividend payments driven by growth opportunity exert a positive effect on a firm's long-run valuation, regardless of whether the reason is capital reservation or signaling. However, if dividend payments are attributed to mispricing, the practice negatively affects a firm's long-run valuation. Hence, this study examines whether market capitalization or catering incentive drives a firm's dividend policies. This study conducts an in-depth analysis of the Chinese stock market, which has witnessed staggering growth since the 1990s. Because individual investors dominate the Chinese stock market, stock prices therein are prone to unreasonable noise trader risks, resulting in mispricing (De Long, Shleifer, Summers, and Waldmann, 1990). Influenced by the characteristics of high growth and noise trader risk, the Chinese stock market apperas to be a perfect sample for investigating the effects of mispricing and growth opportunities on dividend policies, and thus the findings of this study may serve as a reference for research on other emerging stock markets.

It is also noteworthy that this study adopts the method proposed by Rhodes-Kropf, Robinson, and Viswanathan (RKRV model; 2005) to decompose the MB into mispricing and growth opportunity and examine the effects of these aspects on dividend policies with three control variables, namely financial status, dividend payment continuity, and shareholding structure. The three vital findings of this study are detailed as follows. First, when only the MB and cash dividend payments are considered, a high MB denotes that a firm is unlikely to pay its cash dividends. However, mispricing lowers the probability of cash dividend payments being made, whereas growth opportunity increases this probability. This phenomenon demonstrates that a decreased incidence of cash dividend payments is mostly attributed to mispricing rather than a growth opportunity. Second, fSecond, the company pays an additional cash dividend to cater to investors and signal investors its future growth opportunities. Third, overpriced company's issues result in dividend shares, while underpriced companies issue reduced dividend shares. Yet, growth opportunities failed to influence a company's decision to issue dividend shares. This practice demonstrates that executives devise dividend strategies according to market timing.

The remainder of this article is organized as follows. Section 2 summarizes the literature review, Section 3 introduces the data source and describes the theoretical and empirical models of this study, Section 4 further explains the empirical results, and Section 5 concludes the article and proposes suggestions for future studies.

The catering theory proposed by Baker and Wurgler (2004) asserts that executives determine their firm's dividend policies to cater to investors. Academic studies have investigated whether other factors affect dividend policies Besides to the catering incentive (Li and Lie, 2006; Li and Zhao, 2008). These studies have employed the dividend premium or market-to-book ratio (MB) to verify whether executives implement dividend policies to pursue higher market valuations.

2. Literature Review and MB Decomposition

2.1. Corporate Cash Dividend Theory

Previous studies on corporate cash dividend theory have investigated firms' dividend payment behaviors based on catering theory and investment opportunity theory. Baker and Wurgler (2004) pioneered the incorporation of catering theory to examine whether firms pay dividends to cater to investor sentiment. Li and Lie (2006) further revealed that firms determine the number of cash dividends to be paid catering to investor sentiment. If the cash dividend payment amount is subject to mispricing, executives may increase the stock price to cater to current investor sentiment. Consequently, executives are more likely to cater to their investors when firm valuation is difficult to measure. Polk and Sapienza (2009) and Lam and Wei (2011) have further explained that the higher the firm-specific error, the more likely are executives to cater to their investors. Ali, Hwang, and Trombley (2003) stated that a firm's MB is a crucial mispricing indicator. From the perspective of catering theory, a high MB leads to prevalence for catering to investors if a firm is easily affected by investor sentiment.

Growth opportunity theory asserts that a firm's dividend payments are subject to whether favorable investment opportunities exist. Smith and Watt (1992) selected the MB as the proxy variable of a firm's growth opportunity. Traditionally, the investment cost would be taken into consideration while analyzing a firm's future growth opportunity. Suppose a considerable capital cost is required for promising growth opportunities, a firm maneuvers its efforts to retain funds and avoid financing expensive external funds for future investments. Consequently, a high capital cost decreases the likelihood of dividend payments (Cochrane, 1991; Liu, Whited, and Zhang, 2009). Besides, noise traders and high arbitrage risks increase equity costs (Bakke and Whited, 2010; Berk, Green, and Naik, 1999). According to growth opportunity theory, a high MB implies that a firm has high growth opportunities and low cash dividend payments. Consequently, the firm is less likely to pay cash dividends because of high capital costs for future investment.

Because the MB may denote mispricing and growth opportunity, the positive explanatory power of the MB regarding cash dividend payments may not necessarily indicate executives' practice of catering to investors. Alternatively, to alleviate potential proxy problems, firms may pay additional cash dividends with their surplus of free cash flow after the required investment expenses have been paid off (DeAngelo and DeAngelo, 2006; DeAngelo, DeAngelo, and Skinner, 2008). Thus, the MB is expected to be decomposed into growth opportunity and mispricing to interpret the MB's effect on firms' decision-making.

2.2. MB Decomposition

This study refers the RKRV model to decompose the MB into the firm-specific error (FSE) and long-run value-to-book (LRVTB), which represent mispricing and growth opportunity, respectively. The decomposition method can be expressed as follows:

$$m_{i,t} = \alpha_{0j,t} + \alpha_{1j,t} b_{i,t} + \alpha_{2j,t}\, ln(NI)^{+}_{i,t} + \alpha_{3j,t} I_{(<0)}\, ln(NI)^{+}_{i,t} + \alpha_{4j,t} LEV_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where mi,t is the natural log of the market value for firm I at time t (calculated by the sum of the market value of equity and book assets minus book equity and deferred income tax), bi,t is the natural log of the book assets for firm i at time t, ln(NI)+i,tis the natural log of the absolute value of net profit for firm i at time t, I(<0) is a dummy variable (I(<0) = 1 if the net profit for firm i at time t is <0,otherwiseI(<0) = 0), and LEVi,t is the leverage ratio for firm i at time t (calculated by dividing book debt by book equity). The subscript j in Eq. (1) denotes the industry type, and the MB decomposition method is detailed as follows.

First, all industries at time t are estimated by using Eq. (1) to obtain the valuation regressions of all industries at time t. After plugging sector-specific variables to Eq. (1), the expected sector-average market value at various time points can be obtained and denoted as V(θ_(i,t):α_jt). Second, the mean long-run regression coefficient of each industry is calculated using the Fama–MacBeth regression. Subsequently, the expected long-run value of firm i, which is denoted as V(θ_(i,t):¯α_j), can be estimated by plugging firm-specific variables to the aforementioned coefficient. This industry-specific value is not subject to time. Finally, the MB of firm i can be decomposed into three parts as follows:

$$m_{i,t} - b_{i,t} = m_{i,t} - v(\theta_{i,t}; \alpha_{j,t}) + v(\theta_{i,t}; \alpha_{j,t}) - v(\theta_{i,t}; \alpha_j) + v(\theta_{i,t}; \alpha_j) - b_{i,t} \quad (2)$$

The component $m_{i,t} - v(\theta_{i,t}; \alpha_{j,t})$ on the right side of Eq. (2) denotes the FSE of firm *i*(i.e., the difference between the estimated market and book values) and is obtained through the firm-specific accounting values$\theta_{i,t}$ (i.e., the accounting values used in Eq. [1] such as book value, debt ratio, and net profit) and accounting value$\alpha_{j,t}$at time *t*. Besides, $m_{i,t} - v(\theta_{i,t}; \alpha_{j,t})$ can be used to define the range of error between the price of firm *I* and

the industry average. The second component,$v(\theta_{i,t};\alpha_{j,t}) - v(\theta_{i,t};\alpha_j)$, denotes the time-series sector error and measures the error between the estimated value and book value when accounting value$\alpha_{j,t}$ at time *t* does not equal the long-run valueα_j. This notation can also determine the degree of mispricing of a specific industry and even the entire market at time *t*. The third component,$v(\theta_{i,t};\alpha_j) - b_{i,t}$, denotes the LRVTB of firm *i* and measures the difference between the long-run and current book values.

According to catering theory, a firm with a high MB should increase its dividend payments. When the financial costs are accounted for, growth opportunity should be negatively correlated to the MB. However, signaling theory suggests that dividend payments are a representation of a firm's favorable growth opportunity. From the perspective of behavioral finance, this study hypothesizes a positive correlation between mispricing and dividend payments, and thus matches the catering theory. Besides, this study hypothesizes a positive correlation between growth opportunity and dividend payment when a firm's financial status is accounted for, thereby matching the signaling theory.

3. Research Methodology

This section is divided into two subsections. Section 3.1 describes the data source and processing method, and Section 3.2 explains the empirical model in this study.

3.1. Data Source and Processing

The primary data source in this study is employed from the database provided by Shenzhen GTA Education Technology Co., Ltd. Data of company information used in the MB decomposition process such as stock codes, accounting periods, net profit of the parent company, deferred tax assets, total assets, and total debts are retrieved from the Corporate Data directory of the China Stock Market and Accounting Research Database (CSMAR), whereas the trading years and annual stock market value are retrieved from the Stock Market Data directory of the CSMAR. Besides, this study obtains the Global Industry Classification Standard (GICS) codes of all sample firms from the database provided by SinoFin. This study utilizes the first two digits of each GICS code to classify the sample data sectors.

This study also selects annual data as the interval of the regression analysis. Because of the constraint of sample data availability, the study period of the sector regression analysis is 2003–2015, whereas that of the dividend analysis is 2004–2016. This study removes the data with an MB of ≤5th or ≥95th percentile to avoid extreme values' potential influences. The final sample data consists of 18,997 firms, 12,498 of which pay dividends to their shareholders.

3.2. Regression Models of Mispricing and Growth Opportunity on Dividend Payment

First, this study verifies whether a firm considers the influence of mispricing and growth opportunity on dividend payments when issuing cash dividends. The logistic regression model is expressed as Eqs. (3) and (4):

$$Pay_{i,t} = \alpha + \beta_1 \mathrm{MB}_{\mathrm{i,t\text{-}1}} + \beta_2 size_{i,t-1} + \beta_3 lev_{i,t-1} + \beta_4 EPS_{i,t-1} + \beta_5 D_{i,t-1} + \beta_6 balance_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

$$Pay_{i,t} = \alpha + \beta_1 \mathrm{FSE}_{\mathrm{i,t\text{-}1}} + \beta_2 \mathrm{LRVTB}_{\mathrm{i,t\text{-}1}} + \beta_3 size_{i,t-1} + \beta_4 lev_{i,t-1} + \beta_5 EPS_{i,t-1} + \beta_6 D_{i,t-1} + \beta_7 balance_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

Eq. (3) verifies whether the MB for firm *i* affects the firm's cash dividend policies, whereas Eq. (4) verifies the effect of mispricing and growth opportunity on cash dividend policies. The dummy variable $Pay_{i.t}$ denotes that firm *I* pays cash dividends at time *t* (1 = yes, 0 = no).$\mathrm{MB}_{\mathrm{i,t\text{-}1}}$ is the natural log of the year-end MB for firm *i* at time *t*-1,$\mathrm{FSE}_{\mathrm{i,t\text{-}1}}$ denotes the year-end mispricing error for firm *i* at time *t*-1,$\mathrm{LRVTB}_{\mathrm{i,t\text{-}1}}$ denotes the year-end growth opportunity for firm *i* at time *t*-1,$lev_{i,t\text{-}1}$denotes the year-end ratio of total debt and total asset for firm *i* at time *t*-1,$EPS_{i,t\text{-}1}$ denotes the year-end earnings per share for firm *i* at time *t*-1,$D_{i,t\text{-}1}$ denotes the cash dividend per share paid by firm *i* at time *t*-1,and $balance_{i,t\text{-}1}$ denotes the equity distribution for firm *i* at time *t*-1and measures the checks and balances of firm *i*(the shareholding ratio of the 2nd–5th shareholders and the top shareholder).

Subsequently, this study verifies the effect of mispricing and growth opportunity on the amount of cash dividend payment. The regression models are expressed as Eqs. (5) and (6):

$$D_{i,t} = \alpha + \beta_1 \mathrm{MB}_{\mathrm{i,t\text{-}1}} + \beta_2 size_{i,t-1} + \beta_3 lev_{i,t-1} + \beta_4 EPS_{i,t-1} + \beta_5 D_{i,t-1} + \beta_6 balance_{i,t-1} + \varepsilon_{i,t} \quad (5)$$

$$D_{i,t} = \alpha + \beta_1 \mathrm{FSE}_{\mathrm{i,t\text{-}1}} + \beta_2 \mathrm{LRVTB}_{\mathrm{i,t\text{-}1}} + \beta_3 size_{i,t-1} + \beta_4 lev_{i,t-1} + \beta_5 EPS_{i,t-1} + \beta_6 D_{i,t-1} + \beta_7 balance_{i,t-1} + \varepsilon_{i,t} \quad (6)$$

Eq. (5) verifies whether the MB for firm *i* affects the amount of cash dividend payment, whereas Eq. (6) verifies the effect of mispricing and growth opportunity on the amount of cash dividend

payment. $D_{i,t}$ denotes the cash dividend per share paid by firm *i* at time *t*. Because the amounts of cash dividends paid by firms can only be observed when the value is zero, this study uses two methods to analyze Eqs. (9) and (10). The first method is to estimate all sample data using the Tobit model, which can analyze the specific unobservable variables in this study (i.e., restricted dependent variables where the willingness to pay dividends is <0). The second method is a simple regression analysis of ordinary least squares (OLS) based on only the dividend-paying firms' sample data. Table 1 explicates the name and specific definition of each variable.

4. Empirical Results

4.1. Regression Models of MB Decomposition

Table 2 exhibits the regression results of Eq. (4) for all sample years. TThe 10 sectors are classified by the first two digits of each GICS code. With Telecom Services' exception, all departments perform a positive interception (i.e. negative and non-significant interception). MB owns a positive effect on the market value and net profit of the company. The financial loss only slightly affects a firm's market value, except the materials sector, which sees a positive effect of its loss coefficient on its market value. Generally, a high debt ratio reflects an enormous market value of a firm, except the telecommunication services sector (i.e., negative and insignificant).When the telecommunication services sector is discarded, R^2 ranges between 62% and 90%, intimatingthe explanatory power of the logistic regression model on market value.

In contrast to other sectors, the telecommunication services sector has different characteristics over fewer sample years, negative intercepts, and a book value coefficient of >1, indicating a negative market value for this sector. Consequently, the telecommunication services sector is disregarded for the remainder of this study. Ultimately, the revised data sample consists of 18,955 firms, 12,467 of which pay dividends to their shareholders.

4.2. Regression Test of the Effects of Mispricing and Growth Opportunity on Dividend Payment

Table 3 manifests the descriptive statistics of the revised sample data. During the sampling period, 63.3% of firms pay cash dividends to their shareholders with an average of 0.089 RMB per share. The mean MB of the revised sample data is 1.032 with maximum and minimum MB's of 7.943 and -1.48, respectively. The maximum and minimum FSE's are 3.396 and -1.95, respectively. Table 3 demonstrates that the sampling period contained overpriced and underpriced firms, with a mean LRVTB of 0.693, indicating growth opportunities among publicly traded firms in China. Notwithstanding, the minimum LRVTB of -1.189 indicates that some Chinese stock market firms face unfavorable growth opportunities. These results reveal that the sample data are suitable for investigating the effect of mispricing and growth opportunity on dividend policies.

Table 4 exposes the Pearson's chi-square test variables' correlation coefficients, which tests the correlation coefficients in a time series to avoid skewed results caused by collinearity and individual data.It also shows a significantly negative correlation between the FSE and LRVTB. The results reveal that the moderate correlations between the variables are not significantly affected by collinearity.

4.3. Effects of Mispricing and Growth Opportunity on Dividend Payment

Table 5 displays whether mispricing and growth opportunities affect executives' decision-making in terms of dividend payments. The results reveal that when the MB is fixed, cash dividends are more likely issued in large firms, firms with low debt ratios, and firms with excellent profitability. Besides, firms that paid cash dividends in previous years are likely to pay dividends again in ensuing years, indicating the continuity of cash dividend policies among publicly traded firms in China.

Column (2) in Table 5 demonstrates that a high MB leads to a low likelihood of cash dividend payment. If the MB is regarded as the growth opportunity, this finding can be interpreted as a negative correlation between growth opportunity and dividend policies. Columns (3)-(5) demonstrate that the sample firms are less likely to pay dividends when large mispricing errors occur, indicating that mispriced firms decayed to implement dividend policies to cater to investors. By contrast, it seems that the sample firms pay dividends, with promising growth opportunities, implying that executives implement dividend policies to signal their firms' prospects.

Table 6 proves the effect of mispricing and growth opportunity on the dividend payment amount. Panels A and B represent the Tobit and OLS models, respectively. Panel A reveals that the MB is positively correlated to the amount of cash dividend payment when the sample firms implement dividend policies. The amount of cash dividend payment is unaffected by mispricing but is

positively correlated to growth possibilities.

Panel B, which consists exclusively of dividend-paying sample firms, demonstrates that mispricing and growth opportunities positively affect the dividend payment amount. The results imply that the executives issue a more considerable dividend payment amount to signal prospects and cater to investors.

4.4. Propensity Score Matching

The results mentioned previously indicated that mispricing and growth opportunities increase the likelihood of dividend payment. The results seem to reveal that the executives implement dividend policies to cater to investors and signal prospects. However, executives also account for whether bonus shares should be issued in dividend policies. Therefore, this study conducts a propensity score matching (PSM) analysis to prevent skewed results caused by bonus share policies.

Panel A in Table 7 illustrates the regression results before and after PSM and demonstrates that mispricing increases the likelihood of bonus share policies. The results parallel the catering theory and market-timing strategy. However, growth opportunity does not affect whether bonus shares are issued. All regression coefficients are insignificant after PSM, indicating a firm similarity between the paired sample data variables. Panel B in Table 7 shows the results of the analysis of variance (ANOVA) of the PSM data paired based on whether bonus shares are issued. All variables in both datasets are insignificant, with an identical propensity score between the two datasets, indicating that similar data are properly paired. Panel C in Table 7 shows the comparisons of the logit, Tobit, and OLS regression models. The results reveal that mispricing does not affect a firm's cash dividend policies when the propensity score of bonus share issuance is considered. Still, the Tobit and OLS regression results demonstrate that executives implement dividend policies to cater to investors and signal prospects.

4.5. Effects of Overpricing and Underpricing on Dividend Payments

Mispriced firms are reluctant to implement dividend policies, as shown in Table 5. This study further decomposes the variable of mispricing (i.e., FSE) into overpricing and underpricing variables (denoted as *P_err* and *N_err*, respectively) to verify the effect of overpricing and underpricing on dividend payments. The definitions of P_err and N_err are expressed in Eqs. (7) and (8), respectively:

$$\begin{cases} P\_err = FSE & if \quad FSE > 0 \\ P\_err = 0 \end{cases} \tag{7}$$

$$\begin{cases} N\_err = abs(FSE) & if \quad FSE < 0 \\ N\_err = 0 \end{cases} \tag{8}$$

Table 8 depicts the effects of overpricing and underpricing on cash dividend policies. The logit regression reveals that the overpriced and underpriced firms are reluctant to pay cash dividends. The overpriced firms may consider issuing bonus shares or offer new shares rather than paying cash dividends, whereas the underpriced firms may replace cash dividend payments with stock repurchases. By contrast, the Tobit and OLS models confirm that executives implement cash dividend policies to cater to investors and signal prospects.

Table 9 unveils the effects of overpricing and underpricing on bonus share policies after the sample firms have been paired through PSM. The results prove that the overpriced firms are more likely to issue bonus shares, whereas the underpriced firms failed to issue bonus shares at all. Similarly, all regression coefficients are crucial after PSM. Panel B in Table 9 reaffirms the factual similarity between the variables in the paired sample data.

The logit model reveals that the underpriced firms are reluctant to pay cash dividends, as shown in Panel C in Table 9.By contrast, the firms with favorable growth opportunities are likely to pay cash dividends. The Tobit and OLS models yield regression results consistent with the logit model, indicating that executives determine the cash dividend payment amount to cater to investors and signal prospects.

5. Conclusion

The MB has long served as a proxy variable for a firm’s mispricing and growth opportunity, resulting in mixed interpretations of research outcomes. Furthermore, this study successfully decomposes the MB into pricing error and growth opportunity and verifies their effects on dividend policies. The results clarify a negative correlation between the MB and dividend policies for firms contemplating whether to pay dividends. More, importantly, these outcomes are consistent with those of previous studies. After MB decomposition, mispricing is negatively correlated to dividend policies, whereas growth opportunity is positively correlated to dividend policies. However, for firms that have already determined to pay dividends, mispricing and growth opportunity are positively correlated to the dividend payment amount.

This study further conducts PSM to investigate

the influence of bonus share policies and decompose mispricing errors into overpricing and underpricing errors for analysis. The results reveal that a large mispricing error leads to executives' deciding to issue bonus shares rather than cash dividends for market timing purposes. Firms deciding whether to pay cash dividends for the purpose of signal favorable growth opportunities. However, firms that have already decided to pay cash dividends will pay an additional dividend amount to satisfy investors.

6.Discussion

The findings of this study contribute to research on dividend policies as follows. First, previous studies have conducted analyses without decomposing the MB. Consequently, mispriced firm dividend payments may be interpreted as catering to investors or not catering at all, whereas firms with promising growth opportunities may be interpreted as paying dividends to signal prospects or not paying dividends to reserve capital. The decomposition method employed in this study can simultaneously demonstrate the influences of mispricing and growth opportunity. Except for dividend policies, this study presents a new research direction on other firm financial policies.

7.Implication

This study unveils that executives devise dividend policies in the decision-making sequence as follows. Executives first decide whether bonus shares are issued according to firm-specific pricing errors before deciding whether to implement cash dividend policies to signal prospects according to growth opportunities. Subsequently, executives determine whether to increase the cash dividend payment amount to cater to investors, thereby delivering more robust signal prospects. This pattern is substantially meaningful in terms of shareholders' investment decisions. When a firm implements bonus share policies rather than paying cash dividends, seemingly the firm is highly mispriced and subject to poor future performance. Eventually, Dittmar and Field(2015) suggested that stock repurchases' profitability affects a firm's repurchasing behavior Although new share offerings and repurchases are not discussed in the analysis of overpricing and underpricing conducted above, further research may focus on exploring these two aspects.

References

[1] Ali, Ashiq, Lee-Seok Hwang and Mark Trombley. (2003).Arbitrage Risk and the Book-to-Market Anomaly. Journal of Financial Economics, 69(2),355-373.

[2] Baker, Malcolm and Jefferey Wurgler. (2004). A Catering Theory of Dividends. Journal of Finance, 59(3),1126-1165.

[3] Bakke, Tor-Eric, Toni Whited. (2010). Which firms Follow the Market? An Analysis of Corporate Investment Decisions, Review of Financial Studies, 23(5): 1941-1980.

[4] Berk, Jonathan, Richard Green and Vasant Nail. (1999). Optimal Investment, Growth Options and Security Returns. Journal of Finance, 54(5),1153-1607.

[5] Cochrane, John. (1991). Production-Based Asset Pricing and the Link between Stock Return and Economic Fluctuations. Journal of Finance, 46(1),209-237.

[6] DeAngelo, Harry, Linda DeAngelo and Rene Stulz. (2006). Dividend Policy and Earned/Contributed Capital Mix: A test of Life-Cycle Theory. Journal of Financial Economics, 81,227-254.

[7] DeAngelo, Harry, Linda DeAngelo. (2006). The Irrelevance of MM Dividend Irrelevance Theorem. Journal of Financial Economics, 79,293-316.

[8] DeAngelo, Harry, Linda DeAngelo and Douglas Skinner. (2008). Corporate Payout Policy. Foundations and Trend in Finance, 3,95-287.

[9] DeLong, J., Shleifer A, Summers L H, and Waldmann, R. J.. 1990. Noise Trade Risk in Financial Markets. Journal of Political Economy, 98(4),703-738.

[10] Denis, David and Igor Osobov. (2008). Why do Firms Pay Dividends? International Evidence on the Determinants of Dividend Policy. Journal of Financial Economics, 89, 62-82.

[11] Dittmar, A., and Field, L. C.. (2015). Can Managers Time the Market? Evidence Using Repurchase Price Data. Journal of Financial Economics, 115,261-282.

[12] Fama, Eugene and Kenneth French. (2001). Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay? Journal of Financial Economics, 60, 3-43.

[13] Guttman, I., Kadan, O., and Kandel, E.. (2010). Dividend Stickiness and Strategic Pooling, The Review of Financial Studies. 23(12), 4455-4495.

[14] Gebka, B. . (2019). Asymmetric price reactions to dividend announcements: always irrational?. Economics letters, 185(Dec.), 108713.1-108713.4.

[15] Ham, C. C. , Kaplan, Z. , & Leary, M. T. . (2018). Do dividends convey information about future earnings?. Social Science Electronic Publishing.

[16] Jensen, M.C. (2001). Value Maximization, Stakeholder Theory, and the Corporate Objective Function. Journal of Applied Corporate Finance, 14(2), 8-21.
[17] John, K., and Williams, J.. (1985). Dividends, Dilution, and Taxes: A Signaling Equilibrium. Journal of Finance, 40(4), 1053-1070.
[18] Lam, Eric, John Wei. (2011). Limit-to-Arbitrage, Investment Frictions, and the Asset Growth Anonmaly. Journal of Financial Economics, 102(1), 127-149.
[19] Li, Wei and Erik Lie. (2006). Dividend Changes and Catering Incentives. Journal of Financial Economics, 80, 293-308.
[20] Li, Kai and Xinlei Zhao. (2008). Asymmetric Information and Dividend Policy. Financial Management, 37, 673-694.
[21] Liang, H., Moreau, L., and Park, J. C.,(2011). Investment Opportunities and Dividend Omissions. Journal of Business Research, 64(10), 1108-1115.
[22] Liu, Laura, Toni Whited, and Lu Zhang. (2009). Investment-Based Expected Return. Journal of Political Economy, 117(6), 1105-1139.
[23] Miller, M. H., and Rock, K.. (1985). Dividend Policy Under Asymmetric Information. Journal of Finance, 40(4), 1031-1051.
[24] Mitton, T.. (2004). Corporate Governance and Dividend Policy in Emerging Markets. Emerging Markets Review, 5(4), 409-426.
[25] Polk, Christopher and Paola Sapienza. (2009). The Stock Market and Corporate Investment: A Test of Catering Theory. The Review of Financial Studies, 22(1), 187-217.
[26] Rhodes-Kropf, M., Robinson, D., Viswanathan, S.. (2005). Valuation Waves and Merger Activity : The Empirical Evidence. Journal of Financial Economics, 77(3）,561-603.
[27] Smith, Clifford and Ross Watt. (1993). The Investment Opportunity Set and Corporate Financing, Dividend and Compensation Policies. Journal of Financial Economics, 32(3), 263-292.
[28] Xing, Yuhang, (2008). Interpreting the Value Effect Through the Q-Theory: An Empirical Investigation. The Review of Financial Studies, 21(4), 1767-1795.

Table 1. **Variable definitions**

Variable	Definition
MB	Market-to-book ratio
FSE	Firm-specific error (obtained from the RKRV model)
LRVTB	Long-run value-to-book (obtained from the RKRV model)
SIZE	Firm size (logarithm of year-end book assets)
LEV	Financial leverage (total debts–total assets ratio)
EPS	Profitability (earnings per share)
D	Annual dividend payment per share
BALANCE	Checks and balances (shareholding ratio between the 2nd–5th shareholders and the top shareholder)

Table 2. **Regression coefficients classified by industry**

	α_0	b	NI	INI	LEV	R^2	number of year
Energy	4.860***	0.720***	0.105***	0.006	0.286	90.03%	12
	(9.76)	(18.67)	(4.52)	(1.50)	(1.34)	.	.
Materials	7.620***	0.554***	0.136***	0.009**	0.917***	73.45%	12
	(12.95)	(23.04)	(6.62)	(2.52)	(5.74)	.	.
Industrials	6.442***	0.601***	0.146***	0.012***	0.940***	75.35%	12
	(22.27)	(26.64)	(7.90)	(3.35)	(9.60)	.	.
Consumer discretionary	7.687***	0.559***	0.129***	0.013***	0.730***	68.10%	12
	(13.62)	(25.48)	(9.06)	(4.40)	(4.53)	.	.
Consumer staples	5.732***	0.616***	0.184***	0.009**	0.249	67.71%	12
	(9.39)	(21.99)	(12.09)	(2.16)	(1.27)	.	.
Health care	9.602***	0.370***	0.254***	0.000	0.422***	62.61%	12
	(17.18)	(18.70)	(12.91)	(0.07)	(2.91)	.	.
Financials	2.216***	0.765***	0.203***	0.022***	0.873***	89.69%	12
	(3.87)	(16.40)	(8.07)	(3.58)	(3.69)	.	.
Information technology	7.844***	0.542***	0.150***	0.009**	0.084	57.97%	12
	(16.37)	(26.27)	(7.10)	(2.30)	(0.45)	.	.
Telecommunication services	**-25.785**	**1.065**	**1.471***	**0.039**	**-11.354**	**96.36%**	**4**
	(-0.92)	**(1.39)**	**(1.76)**	**(1.00)**	**(-1.09)**	**.**	**.**
Utilities	5.390***	0.700***	0.089***	0.009**	1.038***	88.21%	12
	(13.54)	(26.93)	(3.44)	(2.42)	(7.03)	.	.

Table 3. **Descriptive statistics**

	mean	std	min	q1	median	q3	max
pay	0.658	0.474	0.000	0.000	1.000	1.000	1.000
d	0.098	0.172	0.000	0.000	0.050	0.120	6.419
MB	1.048	0.658	-0.859	0.603	1.050	1.476	4.248
FSE	-0.020	0.524	-1.968	-0.342	-0.009	0.318	2.438
LRVTB	0.672	0.428	-1.133	0.401	0.672	0.945	3.466
Size	21.890	1.275	19.016	20.987	21.701	22.564	28.638
LEV	0.474	0.196	0.028	0.328	0.483	0.623	0.965
EPS	0.744	1.234	-6.262	0.125	0.413	1.010	18.304
balance	0.581	0.545	0.004	0.147	0.410	0.865	2.944

Table 4. **Correlation coefficients**

	pay	D	MB	FSE	LRVTB	size	lev	eps	balance
pay	1.000								
D	0.288***	1.000							
MB	-0.174***	-0.066***	1.000						
FSE	-0.143***	-0.027***	0.690***	1.000					
LRVTB	-0.252***	-0.163***	0.134***	-0.166***	1.000				
size	0.229***	0.204***	0.135***	0.247***	-0.497***	1.000			
lev	-0.190***	-0.128***	0.531***	0.421***	0.338***	0.423***	1.000		
eps	0.356***	0.442***	-0.238***	-0.250***	-0.116***	0.180***	-0.163***	1.000	
balance	0.007	0.013*	-0.018**	-0.086***	0.064***	-0.073***	-0.065***	0.051***	1.000

Table 5. **Effects of mispricing and growth opportunity on dividend policies**

	(1)	(2)	(3)	(4)	(5)
Intercept	-8.472***	-7.874***	-8.642***	-9.576***	-8.955***
	(-18.99)	(-16.14)	(-19.22)	(-13.15)	(-11.66)
Ln(MB)		-0.146***			
		(-2.99)			
FSE			-0.139***		-0.127**
			(-3.11)		(-2.49)
LRVTB				0.189*	0.056
				(1.93)	(0.50)
SIZE	0.424***	0.397***	0.430***	0.475***	0.445***
	(19.37)	(16.74)	(19.55)	(13.79)	(12.17)
LEV	-2.560***	-2.240***	-2.437***	-2.830***	-2.528***
	(-20.77)	(-13.75)	(-18.85)	(-15.14)	(-11.39)
EPS	1.241***	1.228***	1.216***	1.223***	1.213***
	(33.00)	(32.38)	(31.73)	(31.71)	(31.27)
D_{-1}	8.293***	8.329***	8.283***	8.239***	8.268***
	(26.64)	(26.75)	(26.64)	(26.39)	(26.46)
balance	-0.079**	-0.081**	-0.082**	-0.082**	-0.083**
	(-2.24)	(-2.28)	(-2.32)	(-2.30)	(-2.33)
Year	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
Pseudo R^2	31.41%	31.45%	31.45%	31.43%	31.45%
N	18955	18955	18955	18955	18955

Note: *10% significance level; **5% significance level; and ***1% significance level

Table 6. **Effects of mispricing and growth opportunity on dividend amount**

Panel A: Tobit model					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Intercept	-0.598***	-0.676***	-0.555***	-0.718***	-0.797***
	(-20.54)	(-22.17)	(-18.52)	(-15.26)	(-16.63)
Ln(MB)		0.026***			
		(8.33)			
FSE			0.016***		0.025***
			(5.60)		(7.94)
LRVTB				0.022***	0.049***
				(3.26)	(6.50)
SIZE	0.027***	0.030***	0.026***	0.033***	0.038***
	(20.97)	(22.52)	(19.47)	(15.07)	(16.66)
LEV	-0.123***	-0.180***	-0.139***	-0.153***	-0.214***
	(-15.06)	(-16.91)	(-16.08)	(-12.43)	(-14.77)
EPS	0.025***	0.027***	0.027***	0.024***	0.026***
	(20.00)	(21.36)	(20.76)	(18.63)	(19.88)
D_{-1}	0.710***	0.699***	0.706***	0.708***	0.697***
	(79.04)	(77.32)	(78.32)	(78.52)	(76.81)
balance	-0.007***	-0.007***	-0.007***	-0.008***	-0.008***
	(-3.09)	(-2.95)	(-2.82)	(-3.36)	(-3.29)
Year	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
N	18955	18955	18955	18955	18955
Panel B: OLS model					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Intercept	-0.345***	-0.420***	-0.252***	-0.313***	-0.391***
	(-9.05)	(-11.13)	(-6.29)	(-3.56)	(-4.39)
Ln(MB)		0.032***			
		(8.36)			
FSE			0.027***		0.031***
			(8.20)		(9.45)
LRVTB				-0.006	0.027**
				(-0.47)	(2.14)
SIZE	0.017***	0.019***	0.013***	0.015***	0.020***
	(8.43)	(10.12)	(6.37)	(3.36)	(4.37)
LEV	-0.046***	-0.115***	-0.073***	-0.038	-0.113***
	(-3.81)	(-9.12)	(-6.40)	(-1.58)	(-4.42)
EPS	0.007***	0.010***	0.011***	0.007***	0.010***
	(2.86)	(4.20)	(4.57)	(3.29)	(4.42)
D_{-1}	0.689***	0.674***	0.678***	0.689***	0.675***
	(13.26)	(13.17)	(13.22)	(13.15)	(12.88)
balance	-0.004*	-0.004*	-0.003	-0.004*	-0.004*
	(-1.85)	(-1.73)	(-1.39)	(-1.84)	(-1.79)
Year	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
ADJ R^2	49.46%	49.91%	49.82%	49.45%	49.86%
N	12467	12467	12467	12467	12467

Note: *10% significance level; **5% significance level; and ***1% significance level

Table 7. **Effects of mispricing and growth opportunity on bonus share payments**

Panel A: Regression model of PSM on bonus share issuance

	Before PSM	After PSM
Intercept	-6.017***	0.017
	(-8.90)	(0.02)
FSE	0.699***	-0.012
	(15.00)	(-0.20)
LRVTB	0.640***	0.056
	(6.26)	(0.42)
SIZE	0.230***	-0.005
	(7.21)	(-0.12)
LEV	-2.299***	0.063
	(-11.17)	(0.24)
EPS	-0.053**	0.001
	(-2.52)	(0.05)
D_{-1}	-0.327**	0.217
	(-2.12)	(1.02)
balance	0.183***	-0.003
	(5.25)	(-0.06)
Pseudo R^2	3.54%	0.21%
N	18955	6850

Panel B: ANOVA by firm characteristics

	Bonus-issuing firms	Non-bonus-issuing firms	Variance	Student's *t*
FSE	0.073	0.078	0.005	0.37
LRVTB	0.642	0.632	-0.010	-0.98
size	21.895	21.913	0.018	0.60
lev	0.460	0.460	0.000	0.07
eps	0.680	0.666	-0.014	-0.57
D_{-1}	0.101	0.097	-0.003	-0.99
balance	0.619	0.616	-0.003	-0.20
Propensity Score	0.212	0.211	0.000	-0.13

Panel C: Regression analysis of the effects of mispricing and growth opportunity on dividend policies

	Logit	Tobit	OLS
Intercept	-10.693***	-0.834***	-0.394***
	(-7.84)	(-10.85)	(-3.66)
FSE	0.127	0.030***	0.035***
	(1.50)	(6.53)	(6.10)
LRVTB	0.465**	0.070***	0.036**
	(2.39)	(6.05)	(2.29)
SIZE	0.523***	0.041***	0.021***
	(8.10)	(11.33)	(4.04)
LEV	-2.802***	-0.237***	-0.148***
	(-7.35)	(-10.96)	(-4.81)
EPS	1.217***	0.056***	0.046***
	(16.82)	(26.68)	(7.84)
D_{-1}	7.523***	0.454***	0.421***
	(14.29)	(34.47)	(8.78)
balance	-0.073	-0.003	-0.002
	(-1.21)	(-0.95)	(-0.61)
Year	YES	YES	YES
Industry	YES	YES	YES
Pseudo R^2/ R^2	28.00%	n.a.	43.47%
N	6850	6850	4661

Table 8. **Effects of overpricing and underpricing on cash dividend payment**

	Logit	Tobit	OLS
Intercept	-8.973***	-0.946***	-0.422***
	(-11.62)	(-18.05)	(-4.82)
P_err	-0.460***	0.027***	0.058***
	(-6.00)	(4.88)	(7.23)
N_err	-0.309***	-0.033***	-0.024***
	(-3.45)	(-5.82)	(-4.14)
LRVTB	0.074	0.077***	0.049***
	(0.66)	(9.36)	(3.89)
SIZE	0.453***	0.046***	0.023***
	(12.31)	(18.53)	(5.19)
LEV	-2.637***	-0.290***	-0.163***
	(-11.77)	(-18.39)	(-7.45)
EPS	1.255***	0.055***	0.040***
	(31.63)	(42.22)	(13.81)
D_{-1}	8.176***	0.522***	0.476***
	(26.23)	(57.52)	(13.36)
balance	-0.073**	-0.008***	-0.004*
	(-2.05)	(-3.17)	(-1.67)
Year	YES	YES	YES
Industry	YES	YES	YES
Pseudo R^2/ R^2	31.57%	n.a.	38.76%
N	18955	18955	12467

Table 9. **Effects of overpricing and underpricing on bonus share payment (with PSM)**

Panel A: Regression model of PSM on bonus share issuance

	Before PSM	After PSM
Intercept	-5.131***	0.496
	(-7.63)	(0.56)
P_err	0.581***	-0.045
	(8.11)	(-0.51)
N_err	-0.760***	-0.030
	(-9.01)	(-0.28)
LRVTB	0.556***	-0.047
	(5.47)	(-0.36)
SIZE	0.185***	-0.024
	(5.84)	(-0.58)
LEV	-2.028***	0.103
	(-9.92)	(0.40)
EPS	-0.096***	0.023
	(-4.69)	(0.82)
D_{-1}	0.547***	0.024
	(4.40)	(0.15)
balance	0.184***	0.015
	(5.28)	(0.34)
Pseudo R^2	3.62%	0.08%
N	18955	6856

Panel B: ANOVA by firm characteristics

	Bonus-issuing firms	Non-bonus-issuing firms	Variance	Student's *t*
P_err	0.243	0.246	0.003	0.40
N_err	0.169	0.170	0.000	0.02
LRVTB	0.641	0.642	0.001	0.08
size	21.898	21.906	0.008	0.26
lev	0.460	0.461	0.001	0.11
eps	0.683	0.662	-0.021	-0.82
D_{-1}	0.111	0.110	-0.001	-0.29
balance	0.619	0.614	-0.004	-0.33
Propensity Score	0.212	0.212	0.000	-0.07

Panel C: Regression analysis of the effects of overpricing and underpricing on dividend policies

	Logit	Tobit	OLS
Intercept	-11.142***	-0.881***	-0.336***
	(-8.10)	(-10.65)	(-2.78)
P_err	-0.092	0.027***	0.043***
	(-0.73)	(3.36)	(4.51)
N_err	-0.517***	-0.045***	-0.033***
	(-3.49)	(-5.27)	(-3.68)
LRVTB	0.488**	0.071***	0.024
	(2.49)	(5.69)	(1.38)
SIZE	0.553***	0.043***	0.018***
	(8.48)	(11.02)	(3.07)
LEV	-3.040***	-0.251***	-0.129***
	(-7.87)	(-10.67)	(-4.26)
EPS	1.245***	0.055***	0.045***
	(17.22)	(24.59)	(6.73)
D_{-1}	7.148***	0.503***	0.491***
	(13.65)	(34.94)	(9.48)
balance	-0.049	-0.005	-0.006
	(-0.80)	(-1.26)	(-1.40)
Year	YES	YES	YES
Industry	YES	YES	YES
Pseudo R^2/R^2	28.20%	95	43.58%
N	6856	6856	4657