OPACITY AND DIVIDEND SIGNALING OF FUTURE PROFITABILITY

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science Program in Finance
Department of Banking and Finance
Faculty of Commerce and Accountancy
Chulalongkorn University
Academic Year 2014

ความคลุมเครือและการส่งสัญญาณของเงินปันผลต่อความสามารถในการทำกำไรในอนาคต

นางสาววีรยา รัตนวรทิพย์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต
สาขาวิชาการเงิน ภาควิชาการธนาคารและการเงิน
คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2557

Thesis Title	OPACITY AND DIVIDEND SIGNALING OF FUTURE PROFITABILITY
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Field of Study	Finance
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วีรยา รัตนวรทิพย์ : ความคลุมเครือและการส่งสัญญาณของเงินปันผลต่อความสามารถในการทำกำไรในอนาคต (OPACITY AND DIVIDEND SIGNALING OF FUTURE PROFITABILITY) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร. มนพล เอกโยคยะ, 78 หน้า.

วิทยานิพนธ์ฉบับนี้ศึกษาความสัมพันธ์ระหว่างการเปลี่ยนแปลงของเงินปันผลกับความสามารถในการทำกำไรในอนาคตในแง่ของระดับของความไม่สมมาตรของข้อมูลสำหรับบริษัทในประเทศสหรัฐอเมริกาตั้งแต่ปี พ.ศ. 2533 ถึงปี พ.ศ. 2556 เนื่องจากความไม่สมมาตรของข้อมูลของบริษัทเป็นแรงจูงใจเชิงทฤษฎีในการส่งสัญญาณผ่านทางเงินปันผล ดังนั้นบริษัทที่มีความไม่สมมาตรของข้อมูลในระดับสูงควรจะเป็นบริษัทที่มีแรงจูงใจสูงที่สุดในการส่งสัญญาณ ตรงกันข้ามกับความคาดหมายนี้ ไม่มีหลักฐานที่แน่ชัดที่จะมาสนับสนุนข้อสมมติฐานดังกล่าว โดยเฉพาะอย่างยิ่งผลการวิจัยมีแนวโน้มไปในทางที่แสดงให้เห็นว่าไม่มีหลักฐานของการส่งสัญญาณของเงินปันผล นอกจากนี้ การขาดนัยสำคัญทางสถิติในการทดสอบความแตกต่างระหว่างบริษัทที่มีความไม่สมมาตรของข้อมูลในระดับสูงกับบริษัทที่มีความไม่สมมาตรของข้อมูลในระดับต่ำแสดงให้เห็นว่า ความแตกต่างของระดับความไม่สมมาตรของข้อมูลสำหรับบริษัทไม่ได้มีผลกระทบต่อการตัดสินใจในการใช้การส่งสัญญาณของเงินปันผล ดังนั้น ผลการวิจัยของวิทยานิพนธ์ฉบับนี้เมื่อนำมารวมกันแล้วชี้ให้เห็นว่าเงินปันผลไม่ได้มีข้อมูลของความสามารถในการทำกำไรในอนาคตและเป็นไปได้ว่าเงินปันผลไม่ได้เป็นวิธีการทั่วไปในการส่งสัญญาณ

ภาควิชา	การธนาคารและการเงิน	ลายมือชื่อนิสิต	....
สาขาวิชา	การเงิน	ลายมือชื่อ อ.ที่ปรึกษาหลัก	....
ปีการศึกษา	2557		

5683009326 : MAJOR FINANCE
KEYWORDS: INFORMATION ASYMMETRY / DIVIDEND POLICY / SIGNALING THEORY

VEERAYA RATTANAWORATIP: OPACITY AND DIVIDEND SIGNALING OF FUTURE PROFITABILITY. ADVISOR: ASST. PROF. MANAPOL EKKAYOKKAYA, Ph.D., 78 pp.

This thesis examines the relation between dividend changes and future profitability in respect of the degree of information asymmetry faced by U.S. firms during 1990 to 2013. As the information asymmetry is the theoretical incentive for firms to signal via dividends, firms with a high level of information asymmetry should be those that have the most incentives in taking such action. Contrary to this prediction, no conclusive evidence is found to support such hypothesis. Specifically, the results tend towards suggesting no evidence of dividend signaling. Additionally, the lack of the significance when testing the difference between high and low asymmetry firms greatly indicates that the difference in the level of asymmetry faced by firms has no impact on their decision to use dividend signaling. Hence, the findings of this thesis taken together suggest that dividends contain no information of future profitability, and plausibly that dividends are not the common means of signaling.

Department:	Banking and Finance	Student's Signature	....
Field of Study:	Finance	Advisor's Signature	....
Academic Year:	2014		

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my advisor, Asst. Prof. Dr. Manapol Ekkayokkaya for his full support, advice, and encouragement throughout my research. This thesis would not have been possible without his exceptional guidance. To me, he is more than a thesis advisor. Not only does he consistently give the advice regarding to the thesis but also that regarding to life and career. Oftentimes, there are some difficult situations distracting me and he would not hesitate to give his guidance. I must say I am fully indebted to him.

In addition, I would like to express my appreciation to the committees, Dr. Ruttachai Seelajaroen and Dr. Sira Suchintabandid and as well as the external examiner, Dr. Charnwut Roongsangmanoon. Without their thoughtful questions and comments, I would not be able to make more improvements to my thesis.

I would also like to appreciate the help from Ms. Wassachon, Ms. Thanatcha, Ms. Boonyanan, and Mr. Teerawat. I am extremely grateful for their assistance, suggestion, and endless support. I also thank my fellow classmates and other friends for their friendship and encouragement.

Lastly, special thanks go to my parents. I cannot thank them enough for their neverending love and support. I can completely say that I would not be where I am today without them, and I am so blessed to have them as my parents.

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CHAPTER I

INTRODUCTION

1.1 Background and Problem Review

It is inarguable that dividend payout policy is considered to be one of important corporate decisions as it can portray several aspects of a firm. Large dividend may indicate that the firm is entering into the mature stage as larger portion of distribution means lesser portion for the firm to facilitate its further investments (Grullon, Michaely, & Swaminathan, 2002). Additionally, an announcement of dividend increase or decrease may also reflect how the firm views its future prospect (Miller & Rock, 1985). Thus, improper decision on dividend policy may adversely affect the firm's valuation. However, the Dividend Irrelevance Theory proposed by Miller and Modigliani (1961) argues that a firm's dividend policy has no effect on its value, but this largely depends on several essential assumptions, which are perfect capital markets, rational behavior, and perfect certainty. Such market environment implies that all investors have equal access to information, therefore, there will be no information asymmetry between insiders and outsiders. Consequently, there will be no need for the firm to use dividends for signaling its true value.

As opposed to Dividend Irrelevance Theory, the world is, however, not as idealistic as it sounds, or in other words, it is full of frictions. Firm's managers are assumed to know more about the firm's true value and prospect than the outside investors (Miller & Rock, 1985), and this leads to the information asymmetry between the two parties. In the presence of information asymmetry, outside investors will always question on the firm's actions and decisions, including dividend decision. According to dividend signaling theory, a firm's dividend decision can convey valuable information about the firm itself, especially its future earnings (Bhattacharya, 1979; John & Williams, 1985; Miller & Modigliani, 1961; Miller & Rock, 1985). Thus, firms whose level of information asymmetry is more severe will have more incentives in using dividends for signaling about their true value since such firms are likely to be more discounted by outside investors. According to Myers and Majluf (1984), the existence of information asymmetry can cause mispricing of the firm's equity as outside investors believe that managers know more about the firm's true condition, i.e. managers know when to exploit the overvaluation. When the gap of information asymmetry between the two parties gets wider, the amount of discount will be larger because such discount will be used to compensate these investors for being in the position of less informed party. From this, it can be implied that the effect of information asymmetry can influence the firm's dividend decision.

Many empirical studies have been exploring and investigating an idea of dividend signaling theory, in which dividend changes convey information about the firm's future prospect, that is to say there should be a positive relation between dividend changes and future profitability. Some studies find little or no evidence to support this idea. For example, Watts (1973) finds that there is positive, yet very small relationship between current dividends and future earnings, in which it suggests that the dividend signaling theory is a minor matter. Benartzi et al. (1997) also find the results contradict the theory, in which dividend increases do not predict any increase in future earnings, however, dividend decreases do show a strong relationship with the increases in future earnings. Grullon et al. (2005) find that after controlling for the nonlinearities in the earnings behavior, current changes in dividends are not a reliable signal for the firm's future earnings. On the other hand, there are limited studies that find strong evidence to support the theory. For example, Healy and Palepu (1988) find that for dividend-initiating cases, firms experience earnings increases in the past and as well as for the subsequent two years. Aharony and Dotan (1994) find that dividend changes are positively associated with subsequent earnings for at least four quarters. Nissim and Ziv (2001) also find significant results that dividend changes are positively correlated with future earnings changes as well as level of future profitability.

Overall, there is not very much evidence to support the dividend signaling hypothesis. This brings doubt in the theory itself whether it actually holds in reality. The fact that there is not much evidence to support the theory cannot be totally concluded that the theory does not work. As aforementioned, information asymmetry can influence the firms to use dividends for signaling, especially those that face severe level of asymmetry between insiders and outsiders. This can be implied that not every firm will need signaling. However, previous studies only investigate all types of firms in general, in which they do not take into account the variations in the degree of information asymmetry facing different firms. Firms operating in an environment characterized by a high level of asymmetry are likely to have strong incentives to signal via dividends whereas those faced with a low level of asymmetry are likely to have weak or no signaling incentives. Therefore, this thesis seeks to re-examine the question of whether dividends signal future profitability by taking into account the differences in information asymmetry across different firms.

1.2 Statement of Problem/Research Question

There have been many empirical studies that attempted to prove the idea that dividend changes have information content of future profitability. Most of the prior evidence lean towards indicating no relation between these two. In other words, dividends do not have any information content of future profitability. However, prior studies do not take into account the differences in the degree of information asymmetry among firms, in which they perform the test on all types of firms without sorting firms based on their level of asymmetry. Thus, this study aims to answer the question “By considering the differences in the level of information asymmetry confronted by different firms, do dividend changes signal future profitability?”

1.3 Objective of the Study

This study attempts to fill the gap in the existing literatures that they have not been addressing the importance of level of asymmetry facing different firms when investigating the dividend signaling hypothesis. The different levels of information asymmetry imply that different firms will not have the same level of incentive to signal through dividends. This thesis re-examines this issue whether dividends signal future profitability by considering the differences in the level of information asymmetry confronted by different firms. The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges.

1.4 Scope of the Study

This thesis examines the relation between dividend changes and future profitability in respect of the degree of information asymmetry faced by U.S. firms during 1990 to 2013. Firms are partitioned in relative to their level of asymmetry based on various measures of information asymmetry. Both of linear and nonlinear models are applied to investigate the relation between dividends and future profitability. Then, the dummy variable approach is used to test the difference between high and low asymmetry firms.

1.5 Contribution

This study provides new empirical evidence on the reexamination of the dividend signaling theory. It extends the existing literatures in a way that it takes into account the variations in the level of information asymmetry facing different firms when examining the information content of dividends. As the theory indicates that the information asymmetry is the incentive for firms to signal, an investigation of the effect from asymmetry faced by firms should be essential to understand the information content of dividends. Since the results of this study tend to be inconclusive, which are not supportive to the dividend signaling theory, they can be concluded that dividend changes do not contain information about future profitability. This provides the implication that firms may not practically use dividend signaling, or dividends are not the common means of signaling.

1.6 Organization of the Study

The remainder of this study is organized as follows. Chapter II provides the literature review and hypothesis development. Chapter III describes data and methodology. Chapter IV reports the results and discussion, and lastly, Chapter V concludes the results of this study and suggests an area for future research.

CHAPTER II

LITERATURE REVIEW

The concept of dividend signaling hypothesis has long been proposed and discussed by several researchers. Lintner (1956) was one of the first who stated that a firm's dividend decision did not only rely on current and past earnings, but also future earnings, in which such decision would be made upon two factors: the net present value of earnings and the sustainability of future earnings. Additionally, Miller and Modigliani (1961) suggest that under the assumptions of perfect markets, rational behavior, and perfect certainty, a firm's dividend policy has no effect on its value, which means no matter how much firm pays dividends to its shareholders, its value is not affected by any dividend decision. To ensure this irrelevance of dividend policy, the homemade dividend is used, in which it suggests that investors can create their own dividends even when their holding stocks do not declare any dividend. In this case, investors will feel indifferent between dividends and capital gain since the total return consists of these two. Moreover, Miller and Modigliani also further point that in reality i.e. when there is uncertainty, dividend changes actually lead to the changes in stock prices, in which this phenomenon is an indication of the information content of dividends.

2.1 Dividend Policy under Asymmetric Information

In reality, the world is actually full of things people know nothing about, or in other words, there exists the information asymmetry. Managers are assumed to know more about the firm's true value than the outside investors (Miller & Rock, 1985). This assumption is reasonable as managers are better equipped with more access to information than the outside investors. In addition, they are the one who gets in touch with the real operation so they will have more ideas what is currently going on within the firm.

To take steps closer to the real world situation, Bhattacharya (1979) develops the dividend-signaling model with an imperfect-information setting. An increase in dividends will function as a costly signal of a firm's future prospect because this action will reduce the amount of cash on hand. Higher dividend means higher probability for the firm to costly finance its investments from external sources. As a result, he concludes that firms that increase dividends are more likely to have better future earnings. John and Williams (1985) also develop a dividend-signaling model under an adverse environment. In this setting, only dividends are taxed. By signaling through dividends, the stock price will increase accordingly as the signaling reveals better expectation of the future prospect. In equilibrium, firms with more favorable information pay higher dividends and their stocks will be priced higher as well, thus, these benefits will be more than offset the signaling cost, which is the personal tax on dividends. On the other hand, firms with less favorable information, the benefits would not be able to offset the cost. Furthermore, Miller and Rock (1985) state that even though the dividend announcement provides informational content of the firm's future earnings, it can only indirectly do so because the dividend announcement only serves as the missing piece of information for estimating the firm's current earnings, which will eventually be used to estimate the future earnings. To be specific, it is not the announced dividends but rather the expected current earnings, which are partly formed by the announced dividends, are used to predict future earnings. Also, they further suggest that dividends are costly because by paying dividends, firms are moved away from the optimal level of investments. Higher amount of dividends means lesser amount of cash on hand that can else be used for investments. As a result, only high profitable firms will be able to pay higher dividends while it will be hard for less profitable firms to cut their investments and mimic such action.

The above models heavily rely on the presence of signaling cost that enables firms facing high level of information asymmetry to send the credible signal to the market in order to separate themselves from the low-quality one. In this case, the dissipative cost of signaling is used to guarantee the investors that dividend increases indicate greater future cash flows.

Hence, under asymmetric information, the action of dividend changes has an informative content about the firms.

Apart from the dividend signaling, dividends can be used as a tool to reduce the degree of moral hazard, or in other words, they are used to align the managers' interests with the outside investors'. As managers do not have the residual claims from the firm's income stream, there might be the situation where managers do not sufficiently put their effort and instead seek for their own interests. According to Easterbrook (1984), distributing cash dividends will help firms draining cash out, which might possibly be used up by managers for their own preferences, and keeping firms in the capital markets for financing their reinvestments. Then, the capital markets will perform the monitoring to firms before giving them out the money. As a result, paying cash dividends should lead to the reduction in the moral hazard.

However, it cannot be completely determined whether dividends are more from a result of the firm's attempt to reduce the degree of moral hazard or rather an action to signal its strong future prospect. Specifically, the amount of dividends cannot be decomposed into whether it results from past earnings or it is an indicator of the firm's future earnings. In this study's context, an action of dividend changes by firms facing with a high degree of asymmetry will function as a signal of their future profitability, so the moral hazard or the problem of misalignment between managers' interests and those of shareholders is assumed away. Hence, if the results of this study are not supportive to the dividend signaling hypothesis, then dividends can be viewed as the possibility of the relevance to moral hazard and other agency theoretical explanations are needed to be explored.

2.2 Empirical Evidence of Dividend Signaling Hypothesis

Many researchers have been attempting to conduct the empirical tests of dividend signaling hypothesis. The primary prediction of this theory proposes that dividends convey information about future earnings, therefore, dividend changes should be followed by subsequent earnings changes in the same direction.

2.2.1 Evidence in Support of Dividend Signaling Hypothesis

Brickley (1983) comes across with the results in support of the prediction. His study mainly focuses on the common stock returns, dividends, and earnings around the announcements of specially designated dividends (SDDs) and regular dividends and these two kinds of dividends are compared accordingly. After running a time-series regression of daily common stock returns over 121-day period around SDDs announcement, he finds that management does use the labeling of dividend increases to convey information about the firm's future prospect. Both of SDDs and regular dividends increases convey positive information to the market with the latter gives more positive information than the former one. Furthermore, he performs the analysis of variance for the change in earnings per share of SDDs and regular dividends increases between Year 0 and 1. He finds that firms with regular dividend increases experience larger subsequent earnings increases than those with specially designated dividend increases, in which this result is consistent with the dividend signaling theory.

Likewise, Healy and Palepu (1988), who examine whether dividend initiations and omissions convey information about future earnings, also find the results corresponding with the theory. The results show that for dividend-initiating cases, firms experience earnings increases at least a year before and in the year of the announcement, and as well as for the subsequent two years. These results are consistent with Lintner (1956) and the hypothesis that a firm's dividend initiation decision does not only rely on current and past earnings, but also future earnings. On the other hand, firms that omit dividends experience earnings decreases for up to two years before and in the year of the dividend date, but accordingly experience a significant improvement in earnings for the subsequent two years. The results found by Aharony and Dotan (1994) are also consistent with the theory. They investigate whether quarterly cash dividend announcements can convey information about the firm's future profitability by examining the association between unexpected dividend changes and subsequent unexpected earnings.[1] Their results show that there is a positive relationship between dividend changes and subsequent unexpected earnings, in which dividend increases are followed by subsequent earnings increases for at least four quarters.

Further, Nissim and Ziv (2001) also come up with the supportive results as they find strong and significant evidence correspondent with the prediction. Their study directly investigates the relation between dividend changes and future profitability. They claim that the reason previous empirical studies cannot find any evidence to support the dividend signaling hypothesis is because those studies fail to identify the true relation between dividends and future earnings due to adopting the incorrect model to control for the expected changes in earnings. Therefore, in their study, they modify the model by making an important assumption that mean reversion in earnings is linear. With such assumption, the regression results show that there is a positive relation between dividend changes and future earnings changes in each of the following two years. In addition, when examining dividend changes and level of future profits, dividend increases are positively correlated with future earnings in each of the following four years while dividend decreases do not show any correlation with future earnings. Although the missing correlation between dividend decreases and future earnings after controlling for current earnings is not in line with the implication of dividend signaling hypothesis, Nissim and Ziv claim that such result is understandable as it can be explained by conservatism principle, in which losses are

[1] Unexpected dividends and earnings are defined as the difference between actual and expected values.

immediately recognized when incurred while profits are deferred and recognized only when earned. From my point of view, this explanation is reasonable as the recognition criteria required by conservatism principle directly influence the way firms recognize their income. Under conservatism principle, firms are allowed to recognize revenues only when they are certain. This means that when firms are very confident that their future revenues will rise, they still cannot recognize these revenues at the moment. For this reason, what firms can make this good news pronounced in the market is to increase their dividends, so there should be a finding of positive relation between dividend increases and future earnings. Hence, the implication of this dividend increase should rather be reflected by future earnings than by current earnings. On the other hand, when firms discover that there will be losses in the future, they cannot postpone the recognition of these losses, but rather record the losses immediately. Thus, there should be a relation between dividend decreases and current earnings, instead of future earnings. The implication of this dividend decrease will instead be reflected by current earnings.

2.2.2 Evidence against Dividend Signaling Hypothesis

Watts (1973) was actually one of the first who attempted to prove the hypothesis that the information of current and past dividends can enhance the prediction of future earnings. He conducts the test on a sample of 310 firms during 1946 to 1967. He starts his analysis by regressing future earnings on current and past earnings and dividends. However, the results are not very strong though they are found to be positive. Then, to affirm that dividends give information beyond that given by earnings, he regresses future earnings changes on unexpected changes in dividends. The regression results also show positive relationship, yet not so strong, leading to the conclusion that the information content of dividends is unimportant.

Contrary to the theory, DeAngelo, DeAngelo, and Skinner (1996) state that dividends are not reliable signals of future earnings. They study the dividend decisions made by 145 NYSE firms whose annual earnings decline after nine or more consecutive years of growth. They focus on dividend decisions in Year 0 as these decisions best illustrate how managers view the current earnings problems whether these problems are transitory or persistent. Their results show that for dividend-increasing firms, dividend changes are not positively associated with future earnings changes. They also further examine whether managers use dividend increases to separate themselves from the low-quality firms as suggested by the separating equilibrium. The results are not in line with the separating equilibrium argument as they indicate that dividend decisions cannot convey any information about future prospect. The reasons why dividends are not reliable signals of future earnings lie in the fact that managers are being too optimistic in their view of future growth. Also, when managers increase dividends, they only make small cash commitments, which weaken the credibility of dividend signaling.

Similarly, Benartzi, Michaely, and Thaler (1997) also cannot find evidence to support the dividend signaling hypothesis. They directly examine whether dividend changes contain informative content of future earnings by using a large sample of 1,025 NYSE and AMEX-traded firms and 7,186 firm-year observations. They find that, unlike what stated in dividend signaling hypothesis, there is rather a strong correlation between dividend changes and lagged and current earnings. Besides, for dividend-increasing cases, there is no relationship between dividend changes and future earnings changes for the subsequent two years. On the other hand, for dividend-decreasing cases, their results are corresponding with Healy and Palepu's (1988), which dividend decreases surprisingly lead to earnings increases for the subsequent two years. Benartzi et al. give the explanation of these conflicting results that firms that undergo the losses and also decrease dividends tend to experience a higher rate of recovery in their earnings.

Grullon, Michaely, Benartzi, and Thaler (2005) are unable to find evidence supporting the hypothesis as well. They re-examine whether dividend changes signal changes in future profitability by using different model from Nissim and Ziv (2001), namely the modified partial adjustment model proposed by Fama and French (2000). This model assumes that both mean reversion rate and coefficient of autocorrelation are rather nonlinear. This assumption is reasonable as it is empirically documented that negative changes in profitability revert to the mean faster than positive changes and also, large changes in profitability revert faster than small changes (e.g. Brooks and Buckmaster (1976), Elgers and Lo (1994), and Fama and French (2000)). By referring to these well-documented nonlinear patterns, Grullon et al. argue that Nissim and Ziv's assumption of linear mean reversion in earnings is inappropriate. This raises doubt in Nissim and Ziv's evidence as such inappropriate assumption has the same effects as omitting relevant independent variables. With the nonlinear model of earnings expectations that can better illustrate earnings patterns, the results show that dividend changes do not convey any information about future earnings changes. In addition, when examining dividend changes and future earnings levels i.e. ROE, the results reveal that after controlling for the nonlinearity in earnings, dividend changes do not contain informational content of future level of ROE.

2.2.3 Other Evidence in Relation to Dividend Signaling Hypothesis

There are also numbers of studies finding evidence that can also be interpreted, though indirectly, in relation to the dividend signaling hypothesis. For instance, DeAngelo, DeAngelo, and Skinner (2004) initially examine whether dividends are disappearing by analyzing from dividend concentration and earnings of industrial firms over the period of 1978-2000. They find that although the reported number of dividend payers decreases, aggregate real dividends increase over this period, which they later conclude that the industrial firms show a two-tier structure: 1) a small group of firms with substantial earnings, who is accounted for the majority of earnings, dominates dividend supply and 2) a big group of firms, who generates modest earnings, has only minor impact on aggregate dividend supply. The finding that dividends are highly concentrated on a small group of firms with substantial earnings may have the implication to dividend signaling hypothesis as the hypothesis predicts that the signaling should be useful for small and quite unknown firms who have limited access to the public and want to signal about their true valuation. However, their results contradict such hypothesis as most of dividends are distributed from well-known firms, which are the group that probably has the least incentive to use dividends for signaling as they should already have good media coverage.

Besides, Denis and Osobov (2008) examine the propensity to pay dividends through firms' characteristics in six developed financial markets, which are the United States, Canada, the United Kingdom, France, Germany, and Japan during 1989 to 2002. In these six countries, they find that the determinants of the propensity to pay dividends are similar, in which firms with greater size, more profitable, and greater earned/contributed equity have more likelihood to pay dividends. Furthermore, in aspect of the dividend signaling hypothesis, dividends tend to be highly concentrated in largest and most profitable firms in all six countries, which is consistent with DeAngelo et al. (2004)'s findings. To be specific, these firms are the group of firms that has the least incentive to use dividends for signaling.

2.2.4 Summary of the Review

Most of the evidence tend towards opposing to the dividend signaling theory. Even other studies indirectly related to the theory, namely DeAngelo et al. (2004) and Denis and Osobov (2008) cannot also seek the findings in favor of the theory as they find that dividends are more concentrated among largest and most profitable firms, which are those that have the least incentive in signaling. This leads to the question whether what stated in the theory is merely a myth. Then, what could have gone wrong here? Initially, information asymmetry is the theoretical incentive for firms to do dividend signaling. According to Bhattacharya (1979), John and Williams (1985), and Miller and Rock (1985), there is a positive relation between level of information asymmetry and dividend policy because managers are assumed to know more about their firm's valuation than the outside investors, thus, any dividend decision made by them can convey information to the market. In reality, different firms confront to different levels of information asymmetry. If information asymmetry is theoretically believed to be the motive of a firm decision to signal, then using dividends for signaling is not necessary to all firms. For example, firms that have more access to media coverage will be less in need of signaling than the otherwise firms. However, previous studies fail to address the issue of information asymmetry when analyzing the relation between dividend changes and future profitability, in which they only conduct the tests on all types of firms in general without considering the differences in the degree of asymmetry confronting different firms. Although it is true that a good theory must hold in general, there are still many firms out there that do not need to use dividends for signaling. This gap in the literatures implies that those empirical results not corresponding with the signaling theory might be the outcome of the fact that researchers do not partition firms based on their level of asymmetry relative to their need to do dividend signaling. Thus, this thesis aims to fill this gap in the literatures by re-examining whether dividends signal future profitability by taking into account the differences in information asymmetry across different firms.

2.3 Hypothesis Development

Theoretically, dividend signaling hypothesis proposes that due to the existence of asymmetric information, managers use dividends to convey the information about a firm's future profitability to the outside investors (Bhattacharya, 1979; John & Williams, 1985; Miller & Rock, 1985). In reality, there is always an information gap between managers and investors as managers are assumed to be better informed than the investors. Therefore, in the world of imperfect information, any dividend decision made by the well-informed party can signal new information to the poor-informed party and specifically, this action of changes in a firm's dividend policy is essentially used to reduce the information asymmetry.

Although there is still no consensus settled whether there is a systematic relation between dividend changes and future profitability, the recent evidence, both direct and indirect tests of dividend signaling, leans towards suggesting no relation between these two. The evidence includes the latest study by Grullon et al. (2005), which offers the more appropriate model of earnings expectations by assuming nonlinearity in the earnings behavior, also finds no relation between dividend changes and future earnings changes. Prior empirical studies tend to perform the empirical tests on all types of firms in general without addressing the degree of information asymmetry faced by different firms. This inclusion of all types of firms without categorizing them based on the level of asymmetry might weaken the power of their dividend signaling test causing the results contradict the dividend signaling hypothesis. Generally, firms that operate in the environment of low asymmetry will have less incentives in using dividends for signaling. On the other hand, firms in high asymmetry environment will have stronger incentives in taking such action because they are more likely to be underpriced by outside investors (Myers & Majluf, 1984) whom need greater compensation for being in the position of poor-informed party. In this sense, for firms with high level of asymmetry, when managers anticipate that future earnings will rise (fall), dividends can be used to communicate this strong (weak) future prospect to investors in order to reduce the degree of asymmetry. On this basis, the level of asymmetry faced by firms does matter in the dividend signaling hypothesis. Thus, classifying firms into either high or low level of asymmetry relative to their incentive to signal should strengthen the power of dividend signaling test. To that extent, it is expected that amidst the high level of information asymmetry, dividends have information content of future profitability whereas in the low level of information asymmetry, dividends are not informative, leading to the following hypothesis:

H1: *For firms operating in an environment characterized by a high level of asymmetry, there is a significant and positive relation between dividend changes and future profitability while firms characterized by a low level of asymmetry do not exhibit such relation.*

CHAPTER III

DATA AND METHODOLOGY

3.1 Data and Sample

Using the Datastream and Worldscope, all dividend announcements made during the period 1990-2012 by U.S. firms are identified. Other accounting data are obtained from 1989 to 2013. Worldscope identifies dividends per share (WC05101) as the total dividends per share declared during a firm's year. To remain in the final sample, a dividend announcement must meet the following criteria:

1. The firm must pay cash dividends in U.S. dollars in the current and in each of the previous two years.
2. The firm is not a financial institution (SIC codes 6000-6999).
3. There are no other distribution events, such as stock dividends and stock splits announced at the same time as current dividend announcement.
4. To avoid any potential distortions from the deflation, the book value must be positive and must not be less than 10 percent of total assets.

In this study, the sample does not include the extreme cases of dividend initiations and omissions since they are considered to be special circumstances. One of the reasons these events are excluded is that dividend initiations and dividend increases convey different messages to the investors. When firms initiate dividends, the initiation can be implied that firms are entering into the mature phase and their growth rate starts to level off. Their rapid increase in earnings will reflect the firms' past investments. On the other hand, in the case of dividend increases, firms increase dividends in order to signal that their future earnings will be improving. These firms are likely to have already been in the maturity phase, but they may still have some investment opportunities in the future. Therefore, the signaling earnings by these firms will rather reflect the future investments. Another reason the extreme cases of dividends are left out is that firms omitting dividends might be those that are financially distressed, in which this opposes to the dividend signaling equilibrium.

In accordance with Benartzi et al. (1997) and Grullon et al. (2005), the dividend events that are declared during fiscal year *t* will be matched to the earnings in the fiscal year *t*. The annual percentage change of cash dividends per share is defined as follows:

$$R\Delta DIV_{i,0} = \frac{D_{i,0} - D_{i,-1}}{D_{i,-1}}$$

where $D_{i,0}$ is the total dividends per share in the event year.

The reason I use dividends per share rather than dividend yield or payout ratio is that as I aim to measure the change in firms' dividend policy, the good measurement must be those that best represent how firms change their dividend target and have low noise. Since the dividend yield is calculated as the dividend per share divided by the current share price, its denominator tends to incorporate the noise as the share price is likely to fluctuate over time. Similarly, for the payout ratio, it is calculated as dividends per share divided by earnings per share. Such earnings in its denominator tend to fluctuate over time as they reflect how much profit firms can produce during a particular period, which will be conditional on different circumstances. Such noise in those dividend measurements can obscure the effect of the information on the dividends. On the other hand, for the dividends per share, this measure directly indicates the firms' expected ability to produce the value for their shareholders. Generally, firms will increase their target dividends per share only if they are certain that they can maintain such higher level of dividends in the future. Therefore, when there is any change in dividends per share, this change can be interpreted as a signal of the new management's perspective on the future. Thus, in this case, the dividends per share would be the best representative for testing dividend signaling hypothesis.

Other accounting data are also obtained from Datastream and Worldscope. These include earnings before extraordinary items (WC01551-WC01701), book value of equity

(WC03501), market value of equity (WC08001), and total assets (WC02999). Other analyst forecast data that will be used for proxies for information asymmetry are acquired from I/B/E/S.

3.2 Methodology

3.2.1 Baseline Regression Models

In this section, I will investigate the relation between dividend changes and future profitability in each group of firms, which is partitioned based on their level of information asymmetry proxied by different measures (will be discussed later). The logic of using dividends as a signaling of future earnings is that dividends are the direct cash distributions of a portion of the firms' earnings. Most previous researches examine the dividend signaling theory by using earnings as a measure of firm profitability. As discussed by Allen and Michaely (2003), the concept that dividend changes will be followed by earnings changes is probably the most common one. Although the estimates of the dummy variables for dividend changes are also included in the equations, the variables of interest will rather be the interaction terms between the dummy variable and the percentage change of dividends as the dummy variables for dividend changes only explain the effect of the direction but not its size. The size of dividend changes is particularly emphasized because if dividend signaling is costly, then the greater the cost, the larger the signal should be. In other words, it must cost more to firms for increasing dividends by a dollar than by a penny (Benartzi et al., 1997). Thus, this thesis mainly examines the relation between dividend changes and future earnings changes.

To establish the baseline, two models with different aspects of earnings expectations are adopted which are linear model and nonlinear model. All of the variables in the equations are winsorized at the 1% and the 99% of the empirical distribution. Then, I will run some basic regression specifications again in order to check how the unstandardized residuals behave and to avoid potential biases.

Linear Model of Earnings Expectations

The linear model is proposed by Nissim and Ziv (2001). It basically assumes that the relation between future earnings changes and past earnings levels and changes is linear. In other words, it assumes the single rate in mean reversion and the level of autocorrelation in earnings. The model is defined as follows:

$$(E_{i,\tau} - E_{i,\tau-1}) / B_{i,-1} = \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_4 (DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 ROE_{i,\tau-1} + \beta_6 (E_{i,0} - E_{i,-1}) / B_{i,-1} + \varepsilon_{i,\tau} \qquad (1)$$

for τ = 1 and 2, where:

- $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year).
- $B_{i,-1}$ is the book value of equity at the end of year -1.
- $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise.
- $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0.
- $ROE_{i,\tau-1}$ is equal to earnings before extraordinary items in year τ - 1 scaled by the book value of equity at the end of year τ - 1.

The estimate of the annual percentage change of cash dividends per share itself ($R\Delta DIV_{i,0}$) is omitted because the inclusion of such estimate would result in the perfect collinearity since the interaction terms of positive and negative dividend changes have already been included. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following this approach, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year.

Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients.

Nonlinear Model of Earnings Expectations

As opposed to the linear model, Grullon et al. (2005) argue that the empirical evidence leans towards suggesting that the rate of the mean reversion and the level of autocorrelation are rather nonlinear (e.g. Brooks and Buckmaster (1976), Elgers and Lo (1994), and Fama and French (2000)). Evidenced by Fama and French (2000), large changes in earnings tend to revert to the mean faster than small changes, and negative changes in earnings revert faster than positive changes. To underline such nonlinearity pattern in earnings, the modified partial adjustment model by Fama and French (2000) will be adopted. The model is estimated as follows:

$$\begin{aligned}(E_{i,\tau} - E_{i,\tau-1}) / B_{i,-1} = {} & \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_4 (DNC_{i,0} \times R\Delta DIV_{i,0}) \\ & + (\gamma_1 + \gamma_2 NDFED_{i,0} + \gamma_3 NDFED_{i,0} \times DFE_{i,0} + \gamma_4 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \\ & + (\lambda_1 + \lambda_2 NCED_{i,0} + \lambda_3 NCED_{i,0} \times CE_{i,0} + \lambda_4 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} + \varepsilon_{i,\tau}\end{aligned} \tag{2}$$

for τ = 1 and 2, where:

- $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year).
- $B_{i,-1}$ is the book value of equity at the end of year -1.
- $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise.
- $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0.
- $ROE_{i,0}$ is equal to earnings before extraordinary items in year 0 scaled by the book value of equity at the end of year 0.
- $DFE_{i,0}$ is equal to $ROE_{i,0}$ - E[$ROE_{i,0}$], where E[$ROE_{i,0}$] is the fitted value from the cross-sectional regression of $ROE_{i,0}$ on the logarithm of total assets in year -1, the logarithm of the market-to-book ratio of equity in year -1, and $ROE_{i,-1}$.

- $NDFED_{i,0}$ ($PDFED_{i,0}$) is a dummy variable which is set to 1 when $DFE_{i,0}$ is negative (positive) and 0 otherwise.
- $CE_{i,0}$ is equal to ($E_{i,0} – E_{i,-1}$) / $B_{i,-1}$.
- $NCED_{i,0}$ ($PCED_{i,0}$) is a dummy variable which is set to 1 when $CE_{i,0}$ is negative (positive) and 0 otherwise.

The estimate of the annual percentage change of cash dividends per share ($R\Delta DIV_{i,0}$) is also omitted as previously mentioned. The squared terms and dummy variables are expected to capture the nonlinearities in the earnings process, in which large changes in earnings revert to the mean faster than small changes, and negative changes in earnings revert faster than positive changes. Then, the regression is set up following the Fama-MacBeth (1973) procedure.

3.2.2 Proxies for Information Asymmetry

Prior literatures have introduced a number of measures that can be used as the proxy for information asymmetry. However, it is still inconclusive whether which measure would represent the best proxy for asymmetry. Thus, this study adopts various measures to gauge the level of information asymmetry. I will run equation (1) and (2) separately for firms with high level of asymmetry and for those with low level of asymmetry. Additionally, the sample is run independently for each proxy. Though there might be the case that one firm might fall into different categories in different proxies, the proxies of information asymmetry used in this thesis are reasonably correlated to one another. For instance, small-sized firms tend to have low coverage by analysts and as well as are not covered by I/B/E/S. In addition, small firms are more likely to be listed in smaller stock exchanges, rather than in the NYSE or AMEX. In this sense, the problem of firm categories in different asymmetry proxies should be minimized.

Proxies for information asymmetry are introduced as follows:

1) Firm size

The size of firm can be an indication of a firm's information environment. According to Zhang (2006), small firms tend to be less diversified and have less information available to the public than large firms as they have less ability in accepting high disclosure preparation costs. Thus, it is plausible that the information from small-sized firms is less credible than that from large firms. In this sense, small firms are more likely to face a high degree of asymmetry between firms and outside investors. Hence, the firm size should be one of the measures of the level of information asymmetry. Firms will be sorted into three groups based on their market capitalization of year -1: lowest market value group (below 30^{th} percentile), medium market value group (between 30^{th} and 70^{th} percentiles), and highest market value group (above 70^{th} percentile). The group of lowest market value represents firms facing a high level of information asymmetry whereas the group of highest market value represents firms facing a low level of information asymmetry.

2) Number of analysts following

The analyst coverage reflects the supply of firm information. There are empirical studies that use the number of analysts following as a proxy of information asymmetry. For instance, Brennan and Subrahmanyam (1995) find that a greater number in analysts following tends to be related to a reduction in adverse selection costs. Furthermore, Chang et al. (2006) mention that the information asymmetry has a negative relation to the number of analysts following, which means the greater number of analysts following, the lower level of information asymmetry will be, and vice versa. This is because analysts have an important role in reducing the asymmetry by providing the information that is not widely known to the public and also aggregating all complicated information and make it into the form that is easier to understand. Thus, I choose the number of analysts following as another measure of the asymmetry. The information of analyst coverage is obtained from I/B/E/S. Since the coverage by I/B/E/S is not extensive, firms not covered by I/B/E/S are excluded in this proxy in order to avoid the situation where the sample median results in zero. Then, firms are categorized into two groups based on the number of analysts following at year -1 where the sample median is the cutting point. A lower number of analysts following indicates a lower supply of a particular firm information. Therefore, firms that are below the median of analysts following number represent those with a high level of asymmetry while firms that are above the sample median represent those with a low level of asymmetry.

3) Analyst coverage and noncoverage by I/B/E/S

In addition to the number of analysts following, firms are sorted into two groups at year -1: 1) Firms covered by I/B/E/S and 2) Firms not covered by I/B/E/S. The first group represents those with a low degree of information asymmetry as market participants can readily acquire the firms' information through I/B/E/S, and the latter group represents those with a high degree of information asymmetry as the information of these firms will be harder to be acquired. I/B/E/S tends to cover large firms that receive more attention from investors. In fact, there is an abundance of firms in the market, including small or less well-known firms and it is impossible that I/B/E/S will be able to cover all of them. So, this type of firms will be harder to follow by outside investors. Thus, categorizing firms into a group that is covered and not covered by I/B/E/S should be another effective proxy for information asymmetry.

4) Forecast error

Previous literatures determine that forecast error can be used as one of the proxies for information asymmetry (e.g. Elton et al. (1984) and Thomas (2002)). They argue that firms with higher degree of information asymmetry between managers and outside investors tend to have higher forecast errors. This is because when there is a high level of information asymmetry between the two parties, it will be more difficult for outsiders to obtain any firm information used for forecasting a firm's value including the information regarding to earnings and profitability, leading to larger forecast errors. The forecast error is computed as the absolute difference between actual profits and profits forecast, where the profits are defined as earnings scaled by total assets. All of the variables are determined at the end of year -1 or before the event year. Following Fama and French (2000), the proxy for expected profitability or profits forecast will be the fitted value from the following cross-sectional regression:

$$E_{i,t}/A_{i,t} = d_0 + d_1(MV_{i,t}/A_{i,t}) + d_2DD_{i,t} + d_3(D_{i,t}/B_{i,t}) + \varepsilon_{i,t}$$

where:

- $E_{i,t}$ is the earnings before extraordinary items in year t.
- $A_{i,t}$ is the total assets.
- $MV_{i,t}$ is the market value of equity.
- $DD_{i,t}$ is a dummy variable which is set to 1 for non-dividend payers and 0 otherwise.
- $D_{i,t}$ is the dividend payment.
- $B_{i,t}$ is the book value of equity.

Then, firms are sorted into three groups based on the forecast error of year -1 (before the event year): lowest forecast error group (below 30th percentile), medium forecast error group (between 30th and 70th percentiles), and highest forecast error group (above 70th percentile). A smaller number of errors shows a higher accuracy in profits forecasts. Thus, the group of lowest forecast error represents firms faced with a low level of information asymmetry whereas the group of highest forecast error represents firms faced with a high level of information asymmetry.

5) Firms listed on the NYSE and AMEX and on other stock exchanges

The New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX) are one of the largest stock exchanges in the U.S. Specifically, the NYSE is considered to be the largest stock exchange in the world as measured by the market capitalization. Firms listed on these exchanges are mostly large- and medium-sized firms. As the NYSE and AMEX have been considerably reputable in the market, firms in these stock exchanges should gain very much attention from the market participants such as media, analysts, and investors. Thus, it is less likely that these firms will be in the situation where there is a high level of asymmetry between firms and outsiders. However, there are not only the NYSE and AMEX in the U.S. There are other U.S. stock exchanges as well such as BATS Exchange, Chicago Stock Exchange, NASDAQ, and etc., which the market participants might put less attention on since these exchanges might not be as large and reputable as the NYSE and AMEX. So, it is more likely that firms in other stock exchanges would fall in the market environment where there is a high level of asymmetry. Thus, I will separate firms into two groups at year -1: 1) Firms listed on the NYSE and AMEX and 2) Firms listed on other stock exchanges. The first group illustrates firms faced with a low level of information asymmetry and the second group illustrates firms faced with a high level of information asymmetry.

3.2.3 Testing the Difference between High and Low Asymmetry Firms

To test the difference between high and low asymmetry firms, the dummy variable approach is applied. The test aims to examine whether firms purposely use dividends for signaling by ensuring that two sets of data are statistically and significantly different from each other. If the test indicates no difference between high and low asymmetry firms, it may imply that firms do not take dividend signaling into account when making decision on the dividend policy in the first place.

Thus, in this section, both equation (1) and (2) are modified by adding the dummy variable for high asymmetry firms. The base group is the firms that have a low level of information asymmetry and make no change in dividend policy. In addition, the regressions are also run following the Fama-MacBeth (1973) procedure.

Linear Model of Earnings Expectations

$$
\begin{aligned}
(E_{i,\tau} - E_{i,\tau-1})/B_{i,-1} = \beta_0 &+ \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 DHASYM_{i,-1} \\
&+ \beta_4 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 (DPC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
&+ \beta_6 (DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_7 (DNC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
&+ \beta_8 ROE_{i,\tau-1} + \beta_9 (ROE_{i,\tau-1} \times DHASYM_{i,-1}) \\
&+ \beta_{10} (E_{i,0} - E_{i,-1})/B_{i,-1} + \beta_{11} [((E_{i,0} - E_{i,-1})/B_{i,-1}) \times DHASYM_{i,-1}] + \varepsilon_{i,\tau}
\end{aligned}
\quad (3)
$$

for τ = 1 and 2, where:

- $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year).
- $B_{i,-1}$ is the book value of equity at the end of year -1.
- $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise.
- $DHASYM_{i,-1}$ is a dummy variable which is set to 1 if a firm is in high asymmetry group and 0 otherwise.
- $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0.
- $ROE_{i,\tau-1}$ is equal to earnings before extraordinary items in year τ - 1 scaled by the book value of equity at the end of year τ - 1.

Nonlinear Model of Earnings Expectations

$$
\begin{aligned}
(E_{i,\tau} - E_{i,\tau-1})/B_{i,-1} = \beta_0 &+ \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 DHASYM_{i,-1} \\
&+ \beta_4 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 (DPC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
&+ \beta_6 (DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_7 (DNC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
&+ (\gamma_1 + \gamma_2 NDFED_{i,0} + \gamma_3 NDFED_{i,0} \times DFE_{i,0} + \gamma_4 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \\
&+ [(\gamma_5 + \gamma_6 NDFED_{i,0} + \gamma_7 NDFED_{i,0} \times DFE_{i,0} + \gamma_8 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \times DHASYM_{i,-1}] \\
&+ (\lambda_1 + \lambda_2 NCED_{i,0} + \lambda_3 NCED_{i,0} \times CE_{i,0} + \lambda_4 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} \\
&+ [(\lambda_5 + \lambda_6 NCED_{i,0} + \lambda_7 NCED_{i,0} \times CE_{i,0} + \lambda_8 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} \times DHASYM_{i,-1}] + \varepsilon_{i,\tau}
\end{aligned}
\tag{4}
$$

for $\tau = 1$ and 2, where:

- $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year).
- $B_{i,-1}$ is the book value of equity at the end of year -1.
- $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise.
- $DHASYM_{i,-1}$ is a dummy variable which is set to 1 if a firm is in high asymmetry group and 0 otherwise.
- $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0.
- $ROE_{i,0}$ is equal to earnings before extraordinary items in year 0 scaled by the book value of equity at the end of year 0.
- $DFE_{i,0}$ is equal to $ROE_{i,0}$ - $E[ROE_{i,0}]$, where $E[ROE_{i,0}]$ is the fitted value from the cross-sectional regression of $ROE_{i,0}$ on the logarithm of total assets in year -1, the logarithm of the market-to-book ratio of equity in year -1, and $ROE_{i,-1}$.
- $NDFED_{i,0}$ ($PDFED_{i,0}$) is a dummy variable which is set to 1 when $DFE_{i,0}$ is negative (positive) and 0 otherwise.
- $CE_{i,0}$ is equal to $(E_{i,0} – E_{i,-1}) / B_{i,-1}$.
- $NCED_{i,0}$ ($PCED_{i,0}$) is a dummy variable which is set to 1 when $CE_{i,0}$ is negative (positive) and 0 otherwise.

3.2.4 Testing Dividend Signaling by Using Fixed Effects Approach

In this section, firm fixed effects are taken into account. Practically, firms are likely to have their individual characteristics such as managerial styles, business practices, and etc., in which these characteristics should impact differently on their dividend policy. An argument of using firm fixed effects can also lie on the structure of dividend signaling and life cycle theory. According to dividend signaling hypothesis, firms increase dividends in order to signal that their future profitability will be improving. This hypothesis contrasts with the life cycle theory of dividends as the theory states that firms pay dividends when they expect that their growth and future profitability will decline, or in other words, they are entering into the maturity phase. This can be implied that the structure of these two theories tends to be mutually exclusive. However, as each firm is likely to have its own specific characteristics which might be different from one another, an effect from paying dividends on earnings should differ across firms. Thus, in practice, life cycle theory and dividend signaling hypothesis may not be strictly mutually exclusive. For instance, firms that increase dividends may have already been in the maturity phase but possibly still have some investment opportunities in the future. For these reasons, fixed effects approach will be applied in this section in order to control such differences in firm specific nature.

The analysis in prior sections simply examines the relation between dividend changes and future profitability using the basic ordinary least squares (OLS) estimated as follows:

$$Y_{it} = \beta X_{it} + \varepsilon_{it}$$

The above equation, however, does not take firm fixed effects into account. As previously mentioned, firms are likely to have their own specific characteristics which may influence their dividend policy and the signaling. Using standard OLS to study dividend signaling can cause biases as there might be some unobserved variables and lead to the correlation between the firm's error term and the predictor variables. Initially, the error term can be decomposed into two components as follows:

$$\varepsilon_{it} = u_i + v_{it}$$

In this case, u_i can be thought as an error of each firm, which is constant over time and specific to each of the firms. u_i will take an effect of the individual characteristics of the firms that may cause biases to the examination of dividend signaling. Therefore, the error term u_i represents firm fixed effects and what left over in v_{it} is purely random. The equation of the fixed effects regression is hence derived to:

$$Y_{it} = \beta X_{it} + u_i + v_{it}$$

where:

- Y_{it} is the dependent variable for firm i at time t, which represents changes in future earnings in this case.
- X_{it} is a vector of independent variables, as described in equation (1), (2), (3), and (4).
- u_i is firm fixed effects.
- v_{it} is within-firm error.

The above fixed effects model will treat u_i as a time-invariant individual level. Generally, the fixed effects model can be estimated using dummy variables for the firms. However, as the sample used in this study contains large number of firms, it will not be feasible to estimate those excessive dummy variable parameters. Thus, this study will run the fixed effects regressions by using demeaned variables.

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Summary Statistics

Table 1 reports summary statistics for the overall sample firms on the annual percentage change of cash dividends per share, market value of equity, market-to-book ratio, and return on equity. There are 2,769 firms in total. The sample selection criteria result in a total observation of 1,475 dividend decreasing cases, 8,734 dividend increasing cases, and 6,697 no-change cases. Consistent with Nissim and Ziv (2001) and Grullon et al. (2005), the results indicate that even though dividend increases happen more often than dividend decreases, they are smaller in magnitude as the average (median) of the percentage change of dividends per share for dividend increasing cases is 16.25% (8.73%) while that for dividend decreasing cases is -39.64% (-37.50%). In addition, other results suggest that dividend increasing firms have greater averages of market value of equity, market-to-book ratio, and return on equity than the other two types of firms. This means that in overall, firms that increase dividends are larger in size and more profitable than firms that decrease or remain no change in dividends.

Table 1

Summary Statistics

This table presents the firm characteristics for the sample firms. R∆DIV is the annual percentage change in the cash dividends per share. MV is the market value of equity. M/B is the market value of equity relative to the book value of equity. ROE is equal to earnings before extraordinary items scaled by the book value of equity. All of these variables are determined at the beginning of the year of the announcement. In order to reduce the effects from outliers, all variables are winsorized at the 1% and the 99% of the empirical distribution.

	Mean	SD	5%	50%	95%	N
			A. Dividend Decreases			
R∆DIV	-39.64%	23.70%	-80.00%	-37.50%	-6.37%	1,475
MV (thousands of $)	1,679,913.43	4,720,181.17	16,957.60	317,221.00	7,498,135.60	1,453
M/B	2.01	3.70	0.48	1.30	4.90	1,392
ROE	6.54%	40.14%	-28.60%	6.37%	38.15%	1,405

			B. Dividend Increases			
RΔDIV	16.25%	25.76%	1.56%	8.73%	53.33%	8,734
MV (thousands of $)	5,636,811.05	10,698,206.96	53,402.40	1,353,094.00	34,109,098.40	8,689
M/B	2.78	2.60	0.98	2.10	6.65	8,541
ROE	15.83%	17.33%	2.79%	13.28%	35.32%	8,553
			C. No Changes			
RΔDIV	0	0	0	0	0	6,697
MV (thousands of $)	2,456,279.20	6,012,838.68	31,001.45	566,531.00	10,621,755.80	6,680
M/B	2.02	1.82	0.69	1.59	4.52	6,461
ROE	8.48%	16.54%	-9.95%	8.93%	26.22%	6,462

4.2 Evidence before Sorting Based on the Level of Asymmetry

Linear Model of Earnings Expectations

Table 2 provides the results for the overall sample firms before sorting them relative to their degree of information asymmetry by using linear model of earnings expectations (equation (1)). Before starting the analysis, I basically run the regression to check how the unstandardized residuals would behave and the results indicate that there are still some outliers left although I have already winsorized the variables at the 1% and the 99% of the empirical distribution. To prevent potential biases, six observations that have unusually large unstandardized residuals are eliminated: three observations in year 1 and another three observations in year 2 (τ = 1 and 2, respectively).[2]

The results in panel A of table 2 show that dividend increases and dividend decreases (β_3 and β_4) are not significantly related to future earnings changes in year 1 and 2 (τ = 1 and τ = 2). The insignificance of dividend decreases is consistent with both evidence in Nissim and Ziv (2001) and Grullon et al. (2005), however, the insignificance of dividend increases is inconsistent with those evidence as they find that dividend increases are significantly and

[2] The eliminated three observations in year 1 have an unstandardized residual of -10.90, -10.13, and 8.54 and those in year 2 have an unstandardized residual of -18.84, -9.93, and 7.92. These observations show unusually large unstandardized residuals whereas the rest of the observations tend to have unstandardized residuals in descending order.

positively correlated with future earnings changes both in year 1 and 2. Nonetheless, their equations seem to skip the sole estimates for the dummy variables of positive and negative dividend changes (DPC and DNC), in which my results show that the dummy variable for positive dividend changes itself is significantly and positively related to future earnings changes in both year 1 and 2 (β_1 are equal to 0.016 and 0.011, respectively). This can be implied that those supportive results found by Nissim and Ziv (2001) and Grullon et al. (2005) might be due to their specification as they exclude the estimates of the dummy variables for dividend changes.

Panel B of table 2 reports the annual cross-sectional regression coefficients of dividend changes to see whether there is a systematic relation between dividend changes and future earnings. In this panel, positive and significant coefficients (at least at the 10% level) are indicated in bold. According to the results, the coefficient for positive dividend changes is significant in only a year when $\tau = 1$ and not significant in any year when $\tau = 2$. The coefficient for negative dividend changes is significant in about 17 percent of the years (i.e., in only 4 out of 23 years) when $\tau = 1$ and in about 36 percent of the years when $\tau = 2$.

Regarding to the control variables, the linear model generally assumes a single rate in mean reversion and autocorrelation in earnings. The estimate of the control variable ROE shows a significant and negative relation to future changes in earnings in both year 1 and 2 (β_5 are equal to -0.147 and -0.143, respectively). This is consistent with Nissim and Ziv (2001) as they suggest that since ROE is mean reverting, high ROE will indicate an expected decrease in future earnings, and vice versa. However, the estimate of the control variable for current earnings changes is significant in only year 1, which Nissim and Ziv (2001) also indicate that the inclusion of this variable only has a minor effect to the results.

Overall, by assuming linearity in the earnings behavior, my results show that there is no relation between dividend changes and future earnings changes in each of the following two years. Such finding is not in line with the previous evidence by Nissim and Ziv (2001) and Grullon et al. (2005) as they can find the positive relation between dividend increases and future earnings. This conflicting evidence is possibly due to the difference in the equation specifications, in which in my regression, I also include the base dummy variables for dividend changes while previous studies seem to skip these variables.

Table 2

Linear Model of Earnings Expectations – before sorting based on the level of asymmetry (Fama-MacBeth (1973) Approach)

$E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year). $B_{i,-1}$ is the book value of equity at the end of year -1. $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise. $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0. $ROE_{i,\tau-1}$ is equal to earnings before extraordinary items in year τ - 1 scaled by the book value of equity at the end of year τ - 1. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following the Fama-MacBeth (1973) procedure, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year. Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients. In order to reduce the effects from outliers, all variables are winsorized at the 1% and the 99% of the empirical distribution. The average adj. R^2 is the average (adjusted) R^2 of the cross-sectional regressions. a, b, and c indicate statistical significance at the 1%, 5%, and 10% level, respectively. In panel B, positive and significant coefficients (at least at the 10% level) are indicated in bold.

$$(E_{i,\tau} - E_{i,\tau-1})/B_{i,-1} = \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3(DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_4(DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 ROE_{i,\tau-1} + \beta_6(E_{i,0} - E_{i,-1})/B_{i,-1} + \varepsilon_{i,\tau}$$

A. Time-Series Means of the Cross-Sectional Regression Coefficients

Year		β_0	β_1	β_2	β_3	β_4	β_5	β_6	Average Adj. R^2	N
$\tau = 1$	Coeff.	0.011	0.016[a]	-0.007	-0.012	0.019	-0.147[b]	-0.106[c]	18.17%	15,629
	t-stat	1.44	3.05	-0.39	-1.33	0.38	-2.70	-1.96		
$\tau = 2$	Coeff.	0.017[b]	0.011[c]	0.023	-0.009	0.086	-0.143[a]	-0.060	17.44%	14,173
	t-stat	2.30	1.96	1.12	-1.15	1.65	-2.84	-1.13		

B. Annual Cross-Sectional Regression Coefficients of Dividend Changes

	$\tau = 1$				$\tau = 2$			
Year	β_3	$t(\beta_3)$	β_4	$t(\beta_4)$	β_3	$t(\beta_3)$	β_4	$t(\beta_4)$
1990	-0.024	-0.65	0.038	0.35	-0.033	-1.25	0.027	0.36
1991	-0.067	-1.53	0.049	0.78	0.000	0.01	-0.046	-0.78
1992	0.021	0.54	0.019	0.30	0.027	0.53	**0.195**	**2.37**
1993	0.029	0.72	-0.269	-3.05	-0.034	-0.86	-0.231	-2.55
1994	-0.004	-0.12	-0.132	-1.28	0.005	0.15	**0.251**	**2.20**
1995	-0.054	-1.46	-0.051	-0.57	0.043	0.79	**0.250**	**1.74**
1996	0.048	0.57	-0.003	-0.02	-0.065	-0.90	**0.560**	**3.99**
1997	-0.066	-1.33	0.200	1.35	0.028	0.35	0.167	0.76
1998	-0.041	-0.98	-0.284	-3.11	-0.001	-0.03	**0.528**	**4.09**
1999	-0.019	-0.22	**0.752**	**5.31**	-0.005	-0.08	-0.089	-0.81
2000	**0.069**	**2.12**	**0.221**	**2.44**	0.024	0.38	**0.423**	**2.37**
2001	0.009	0.16	-0.024	-0.27	-0.006	-0.14	**0.175**	**2.61**
2002	-0.006	-0.17	0.031	0.57	0.063	1.41	0.032	0.39
2003	0.001	0.03	-0.064	-0.53	-0.092	-1.99	0.102	0.64

2004	-0.062	-1.96	**0.360**	**2.22**	-0.006	-0.17	-0.061	-0.33
2005	0.019	0.70	-0.025	-0.18	-0.045	-1.43	-0.371	-2.30
2006	0.052	1.54	-0.057	-0.38	-0.038	-0.78	0.115	0.55
2007	-0.091	-1.92	-0.261	-1.48	-0.015	-0.32	0.073	0.45
2008	-0.064	-1.50	**0.268**	**3.33**	-0.007	-0.19	-0.288	-3.54
2009	-0.010	-0.18	-0.285	-3.41	-0.024	-0.40	0.091	1.16
2010	-0.003	-0.11	0.104	0.92	-0.013	-0.39	-0.238	-1.59
2011	0.011	0.56	-0.184	-1.87	0.007	0.38	**0.229**	**2.34**
2012	-0.017	-0.75	0.031	0.31				

Nonlinear Model of Earnings Expectations

Grullon et al. (2005) argue that the behavior of earnings is rather nonlinear since past researchers have documented that large changes in earnings revert to the mean faster than small changes, and negative changes in earnings revert faster than positive changes (e.g. Brooks and Buckmaster (1976), Elgers and Lo (1994), and Fama and French (2000)). Table 3 reports the results for the overall sample firms by assuming this nonlinearity in the earnings process (equation (2)). Similar to what I have done in the linear model, I also run the regression to check the behavior of the unstandardized residuals before beginning the analysis. The regression results show that there are still some outliers left, thus, I eliminate the observations that have unusually large unstandardized residuals. There are seven observations in total that are excluded: four observations in year 1 and another three observations in year 2 (τ = 1 and 2, respectively).[3]

Grullon et al. (2005) claim that the relation between dividend changes and future earnings disappears when controlling for the nonlinearity in the behavior of earnings. Contrary to their finding, I find that there is rather a negative relation between positive dividend changes and future earnings changes in year 1 (β_3 is equal to -0.018), as shown in panel A of table 3. This particular result contradicts what stated in the dividend signaling hypothesis as dividend changes should be positively related to future earnings. Furthermore,

[3] There are seven observations that show unusually large unstandardized residuals while the rest of the observations tend to have unstandardized residuals in descending order. The eliminated four observations in year 1 have an unstandardized residual of -10.67, -9.14, -6.93, and 6.68, and another three observations in year 2 have an unstandardized residual of -18.97, -10.65, and 10.07.

similar to the results in table 2, I find that there is no significant relation between negative dividend changes and future earnings changes.

In panel B of table 3, neither year 1 nor year 2 shows the significance in the coefficient for positive dividend changes. On the other hand, the coefficient for negative dividend changes reveal more significant results, however, such coefficient is significant only about 13 percent of the years in year 1 (i.e., in only 3 out of 23 years) and about 23 percent of the years in year 2 (i.e., in 5 out of 22 years).

In addition, consistent with Fama and French (2000), the results in table 3 suggest that the behavior of earnings is seemingly nonlinear. Specifically, the mean reversion in earnings is stronger when earnings are negative as the estimate of negative reversion in earnings or NDFE (γ_2) is negative and significant at 1 percent level (γ_2 is equal to -0.563). The results also further show that there is the nonlinearity in the autocorrelation of earnings changes as the estimate of squared negative earnings changes (λ_3) is positive and significant (λ_3 is equal to 0.606), in which this particular result suggests that the reversal is stronger when there are large changes in earnings. Moreover, the results in nonlinear model tend to better explain the earnings behavior than those in linear model since the average adjusted R^2 increases from 18.17 percent to 25.97 percent in year 1 and from 17.44 percent to 20.50 percent in year 2.

Overall, using nonlinear model for the overall sample, my results show that dividend increases are negatively correlated with future earnings changes in year 1. This finding is inconsistent with the evidence in Grullon et al. (2005) as they find no significant relation between dividend changes and future earnings. However, the annual cross-sectional results in panel B of table 3 do not show a systematic pattern in the relation between dividend changes and future earnings changes, which can lead us to the similar conclusion as Grullon et al. (2005) that dividend changes are not a reliable signal of future profitability.

Table 3

Nonlinear Model of Earnings Expectations – before sorting based on the level of asymmetry

(Fama-MacBeth (1973) Approach)

$E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year). $B_{i,-1}$ is the book value of equity at the end of year -1. $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise. $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0. $ROE_{i,0}$ is equal to earnings before extraordinary items in year 0 scaled by the book value of equity at the end of year 0. $DFE_{i,0}$ is equal to $ROE_{i,0}$ - $E[ROE_{i,0}]$, where $E[ROE_{i,0}]$ is the fitted value from the cross-sectional regression of $ROE_{i,0}$ on the logarithm of total assets in year -1, the logarithm of the market-to-book ratio of equity in year -1, and $ROE_{i,-1}$. $NDFED_{i,0}$ ($PDFED_{i,0}$) is a dummy variable which is set to 1 when $DFE_{i,0}$ is negative (positive) and 0 otherwise. $CE_{i,0}$ is equal to $(E_{i,0} - E_{i,-1}) / B_{i,-1}$. $NCED_{i,0}$ ($PCED_{i,0}$) is a dummy variable which is set to 1 when $CE_{i,0}$ is negative (positive) and 0 otherwise. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following the Fama-MacBeth (1973) procedure, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year. Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients. In order to reduce the effects from outliers, all variables are winsorized at the 1% and the 99% of the empirical distribution. The average adj. R^2 is the average (adjusted) R^2 of the cross-sectional regressions. a, b, and c indicate statistical significance at the 1%, 5%, and 10% level, respectively. In panel B, positive and significant coefficients (at least at the 10% level) are indicated in bold.

$$(E_{i,\tau} - E_{i,\tau-1}) / B_{i,-1} = \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_4 (DNC_{i,0} \times R\Delta DIV_{i,0})$$
$$+ (\gamma_1 + \gamma_2 NDFED_{i,0} + \gamma_3 NDFED_{i,0} \times DFE_{i,0} + \gamma_4 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0}$$
$$+ (\lambda_1 + \lambda_2 NCED_{i,0} + \lambda_3 NCED_{i,0} \times CE_{i,0} + \lambda_4 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} + \varepsilon_{i,\tau}$$

A. Time-Series Means of the Cross-Sectional Regression Coefficients

Year		β_0	β_1	β_2	β_3	β_4	γ_1	γ_2	γ_3	γ_4	λ_1	λ_2	λ_3	λ_4	Average Adj. R^2	N
τ = 1	Coeff.	-0.011[c]	0.012[a]	-0.008	-0.018[b]	0.039	-0.120	-0.563[a]	-0.197[c]	0.122	-0.060	0.357[b]	0.606[b]	0.112	25.97%	15,560
	t-stat	-1.96	3.44	-0.76	-2.20	1.16	-1.52	-5.78	-1.89	0.67	-0.87	2.54	2.45	0.79		
τ = 2	Coeff.	0.010	-0.001	0.011	-0.007	0.024	-0.043	0.018	0.076	-0.064	0.085	-0.125	-0.074	-0.141	20.50%	14,230
	t-stat	1.40	-0.22	0.49	-0.74	0.43	-0.52	0.11	0.39	-0.32	0.94	-0.89	-0.31	-1.06		

B. Annual Cross-Sectional Regression Coefficients of Dividend Changes

	τ = 1				τ = 2			
Year	β_3	t(β_3)	β_4	t(β_4)	β_3	t(β_3)	β_4	t(β_4)
1990	-0.039	-1.06	0.005	0.05	-0.054	-1.56	-0.138	-1.37
1991	-0.071	-1.95	0.040	0.78	-0.004	-0.10	-0.015	-0.23
1992	-0.013	-0.33	0.016	0.26	0.020	0.37	0.126	1.40
1993	0.010	0.28	-0.230	-2.90	-0.032	-0.78	-0.167	-1.78

1994	-0.032	-1.01	-0.042	-0.39	0.005	0.15	0.120	0.98
1995	-0.080	-2.17	-0.048	-0.55	0.082	1.55	-0.061	-0.45
1996	0.073	0.84	0.137	0.89	-0.085	-1.03	**0.455**	**3.02**
1997	-0.055	-1.08	0.126	0.83	0.016	0.21	-0.141	-0.61
1998	-0.022	-0.45	-0.239	-2.70	0.071	0.89	**0.580**	**3.78**
1999	-0.013	-0.22	0.150	1.60	-0.004	-0.06	-0.046	-0.42
2000	0.022	0.65	**0.222**	**2.46**	0.029	0.43	**0.373**	**2.05**
2001	0.010	0.18	-0.108	-1.22	-0.027	-0.52	0.087	1.05
2002	-0.016	-0.44	0.066	1.25	0.030	0.60	0.050	0.63
2003	-0.003	-0.14	-0.005	-0.07	-0.100	-3.06	-0.113	-0.93
2004	-0.053	-2.30	**0.433**	**3.70**	0.001	0.06	-0.333	-2.72
2005	0.009	0.38	0.059	0.45	-0.043	-1.29	-0.496	-2.78
2006	0.037	1.17	0.210	1.30	-0.050	-1.11	0.295	1.31
2007	-0.061	-1.34	-0.179	-1.04	0.002	0.04	0.007	0.03
2008	-0.087	-1.94	**0.242**	**2.93**	0.019	0.41	-0.311	-3.47
2009	-0.004	-0.09	-0.023	-0.39	-0.002	-0.03	**0.136**	**1.89**
2010	0.001	0.03	0.160	1.44	-0.017	-0.49	-0.217	-1.35
2011	0.002	0.10	-0.145	-1.43	-0.010	-0.47	**0.349**	**3.11**
2012	-0.025	-1.50	0.053	0.73				

4.3 Evidence after Sorting Based on the Level of Asymmetry

Similar to previous studies, my results from the previous section do not support the dividend signaling theory, in which there is no systematic relation between dividend changes and future earnings changes. Those results suggest that dividends are not informative about a firm's future earnings. However, the previous analysis does not take into account the degree of information asymmetry faced by different firms. As the information asymmetry is the theoretical incentive for firms to do dividend signaling, an investigation of the impact of asymmetry facing firms should be fundamental to an understanding of the information content of dividend changes. Hence, in this section, I will re-examine the dividend signaling hypothesis by taking into account such information asymmetry using both models of earnings expectations.

Table 4 presents the results from equation (1) or linear model using five different proxies for information asymmetry, which are previously described. The regressions are run separately for firms with a high level of asymmetry and for those with a low level of asymmetry. In this case, as discussed in chapter 3, the variables of interest are positive dividend changes and negative dividend changes, which are β_3 and β_4, respectively. The difference in the coefficient on positive and negative dividend changes between two groups of asymmetry is presented as well. According to the dividend signaling hypothesis, it predicts that there should be a significant and positive relation between dividend changes and future profitability in high asymmetry firms while there should not be such relation in the otherwise firms since the group of high asymmetry firms should be the one that has most incentives in signaling via dividends. Notably, the results in table 4 do not support this hypothesis. Most of the coefficients for dividend increases and dividend decreases (β_3 and β_4) in high asymmetry firms are not significantly different from zero at any standard confidence levels. Some of the results even yield opposite to what is predicted in the signaling hypothesis. Specifically, in panel D using forecast error as a proxy, the results show that for firms faced with high asymmetry, positive dividend changes in year 0 are significantly and negatively correlated with future earnings changes in year 2 (β_3 is equal to -0.074) and there is also a significant difference between high and low asymmetry firms at 5% level. Furthermore, in panel E (stock exchanges), there is a significant negative relation between dividend increases and future earnings changes in year 1 for high asymmetry firms (β_3 is equal to -0.033) whereas there is a significant positive relation between dividend increases and future earnings changes in year 2 for low asymmetry firms (β_3 is equal to 0.035). Both in year 1 and 2 also show the significant difference in the coefficient on positive dividend changes between high and low asymmetry firms at 5% and 10% level, respectively. The only result that is in line with the hypothesis is that of panel A when using firm size as a proxy, in which it shows that for firms with high level of information asymmetry, negative dividend changes in year 0 are significantly and positively correlated with future earnings changes in year 1 (β_4 is equal to 0.075). The difference in the coefficient on negative dividend changes between the two asymmetry groups in year 1 is also significant at the 5% level.

Table 5 presents the results from equation (2) or nonlinear model after categorizing firms based on the level of asymmetry by using five proxies of information asymmetry. Similar to those reported in table 4, most of the coefficients for positive and negative dividend changes (β_3 and β_4) for high asymmetry firms are not significantly different from zero at any standard confidence levels and some results contradict the signaling hypothesis. According to panel C and D (analyst coverage by I/B/E/S and forecast error), for firms faced with low information asymmetry, there is a significant negative relation between positive dividend changes and future earnings changes in year 1 (β_3 are equal to -0.025 and -0.035, respectively). On the other hand, in panel E, there is rather a significant negative relation between positive dividend changes and future earnings changes in year 1 among firms faced with high level of information asymmetry (β_3 is equal to -0.020). These results are completely opposite to what predicted in the signaling hypothesis as low asymmetry firms should not exhibit any relation between dividend changes and future earnings changes while high asymmetry firms should show the positive relation. The only result that corresponds with the hypothesis is that under panel B when using number of analysts following as a proxy, dividend decreases are significantly and positively related to future changes in earnings in year 1 in high asymmetry group (β_4 is equal to 0.105) and there is also a difference in the coefficient on dividend decreases between the two asymmetry groups at the 10% level. However, the result goes opposite for dividend-increasing cases as dividend increases are rather significantly and negatively related to future earnings in the same year for high asymmetry group (β_3 is equal to -0.030).

The discussion in previous paragraphs mainly focuses on the size of dividend changes. Notice that, the directions of dividend changes (β_1 and β_2) somehow show a significant and positive relation to future earnings changes in both table 4 and 5. While the relation between the dummy variable of negative dividend changes and future earnings changes is relatively flat, the relation between the dummy variable of positive dividend changes and future earnings changes is more statistically significant at standard confidence levels. In table 4, using firm size and stock exchanges as a proxy, the results show that there is a significant and positive relation between the dummy variable of positive dividend changes and future earnings changes in both year 1 and 2 for high asymmetry firms, in which these particular results are in line with the signaling hypothesis. Otherwise, the rest of the results in both table 4 and 5 are rather mixed between high and low asymmetry firms. For example, in table 5, using firm size as a proxy, the results show a significant positive relation between the dummy variable of positive dividend changes and future earnings in year 1 in both high and low asymmetry firms, which β_1 are equal to 0.010 and 0.013, respectively. Thus, the positive relation between the directions of dividend changes and future earnings suggests that the directions of dividend changes matter, however, the pattern is at best very weak.

In summary, the results in table 4 and 5 are on balance inconclusive. Nevertheless, most findings are more consistent with no dividend signaling since both models show that the coefficients for positive and negative dividend changes in high asymmetry firms are mostly statistically insignificant and when they happen to be statistically significant, they rather contrast with the signaling hypothesis. The aforementioned results suggest that the degree of information asymmetry facing different firms does not systematically have an impact on firms' incentives to use dividend signaling. This means that even under the high asymmetry setting, dividends convey no information about future profitability.

Table 4

Linear Model of Earnings Expectations – after sorting based on the level of asymmetry

(Fama-MacBeth (1973) Approach)

This table reports estimates of regressions of the relation between dividend changes and future earnings changes by categorizing firms based on their level of asymmetry in year -1 (before event year). The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. HIGH (LOW) represents the group of firms faced with a high (low) level of information asymmetry. DIFF is the difference in the coefficients between high and low asymmetry group. $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year). $B_{i,-1}$ is the book value of equity at the end of year -1. $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise. $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0. $ROE_{i,\tau-1}$ is equal to earnings before extraordinary items in year τ - 1 scaled by the book value of equity at the end of year τ - 1. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following the Fama-MacBeth (1973) procedure, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year. Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients. In order to reduce the effects from outliers, all variables are winsorized at the 1% and the 99% of the empirical distribution. The average adj. R^2 is the average (adjusted) R^2 of the cross-sectional regressions. a, b, and c indicate statistical significance at the 1%, 5%, and 10% level, respectively.

$$(E_{i,\tau} - E_{i,\tau-1}) / B_{i,-1} = \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_4 (DNC_{i,0} \times R\Delta DIV_{i,0})$$
$$+ \beta_5 ROE_{i,\tau-1} + \beta_6 (E_{i,0} - E_{i,-1}) / B_{i,-1} + \varepsilon_{i,\tau}$$

A. Firm Size

Year	Asymmetry Group			β_0	β_1	β_2	β_3	β_4	β_5	β_6	Average Adj. R^2	N
τ = 1	HIGH	Coeff.		0.008	0.015[c]	0.012	0.004	0.075[b]	-0.175[a]	-0.105	18.61%	3,120
		t-stat		1.17	1.90	0.82	0.32	2.58	-3.24	-1.54		
	LOW	Coeff.		0.019[c]	0.011	-0.048[c]	0.019	-0.103	-0.150[a]	-0.218[a]	18.11%	5,737
		t-stat		1.74	1.41	-1.85	1.21	-1.60	-4.25	-3.79		
			DIFF (t-stat)				-0.785	2.517[b]				
τ = 2	HIGH	Coeff.		0.007	0.026[a]	0.000	-0.015	-0.003	-0.225[a]	0.035	15.32%	2,778
		t-stat		0.96	3.25	0.02	-0.87	-0.05	-7.01	0.87		
	LOW	Coeff.		0.034[a]	0.008	-0.472	0.000	-0.851	-0.235[a]	0.026	15.70%	5,246
		t-stat		4.14	1.26	-0.89	-0.01	-0.79	-7.68	0.67		
			DIFF (t-stat)				-0.542	0.789				

B. Number of Analysts Following											
τ = 1	HIGH	Coeff.		0.012	0.019[b]	-0.001	-0.001	0.040	-0.230[a]	-0.107	21.28%	5,499
		t-stat		1.20	2.34	-0.04	-0.09	0.69	-3.21	-1.12		
	LOW	Coeff.		0.022[c]	0.018[b]	-0.053[c]	-0.012	-0.012	-0.198[a]	-0.141[a]	16.06%	7,300
		t-stat		2.00	2.47	-1.77	-0.60	-0.17	-5.58	-2.88		
			DIFF (t-stat)				0.412	0.575				
τ = 2	HIGH	Coeff.		0.014	0.017[b]	0.047	-0.007	0.170	-0.197[a]	-0.072	23.26%	4,940
		t-stat		1.48	2.50	1.26	-0.50	1.53	-5.34	-1.07		
	LOW	Coeff.		0.030[a]	0.011	-0.505	0.007	-0.935	-0.231[a]	0.046	15.22%	6,654
		t-stat		3.05	1.56	-0.95	0.39	-0.87	-6.49	1.18		
			DIFF (t-stat)				-0.617	1.028				
C. Analyst Coverage and Noncoverage by I/B/E/S												
τ = 1	HIGH	Coeff.		0.005	0.025[b]	0.033	-0.026	0.077	-0.142[c]	-0.051	30.57%	2,085
		t-stat		0.68	2.26	1.28	-0.94	0.71	-1.74	-0.73		
	LOW	Coeff.		0.018[c]	0.020[a]	-0.020	-0.011	0.023	-0.216[a]	-0.121[b]	16.92%	13,544
		t-stat		2.01	3.08	-1.04	-1.05	0.47	-5.03	-2.48		
			DIFF (t-stat)				-0.483	0.451				
τ = 2	HIGH	Coeff.		-0.002	0.002	0.068	-0.005	0.143	-0.076	-0.038	19.43%	1,893
		t-stat		-0.15	0.14	1.44	-0.13	1.10	-1.05	-0.46		
	LOW	Coeff.		0.024[a]	0.014[b]	0.017	-0.001	0.113[c]	-0.219[a]	-0.034	18.48%	12,280
		t-stat		2.95	2.44	0.71	-0.06	1.86	-7.12	-0.61		
			DIFF (t-stat)				-0.108	0.212				
D. Forecast Error												
τ = 1	HIGH	Coeff.		0.003	0.019	-0.007	-0.026	-0.027	-0.080	-0.048	21.87%	2,882
		t-stat		0.21	1.56	-0.25	-1.09	-0.36	-1.16	-1.06		
	LOW	Coeff.		0.006	0.014[a]	-0.022	-0.031	0.032	-0.103[b]	-0.350[a]	18.96%	5,905
		t-stat		0.73	3.15	-1.41	-1.05	0.73	-2.25	-4.21		
			DIFF (t-stat)				0.110	-0.680				
τ = 2	HIGH	Coeff.		0.026[c]	-0.006	0.022	-0.074[b]	0.141	-0.059	-0.082	23.92%	2,583
		t-stat		2.01	-0.38	0.38	-2.25	1.20	-0.92	-1.70		
	LOW	Coeff.		0.023[b]	0.017[a]	0.011	0.011	0.031	-0.270[a]	0.099	15.34%	5,372
		t-stat		2.51	2.90	0.32	0.62	0.38	-5.04	1.51		
			DIFF (t-stat)				-2.288[b]	0.775				

E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges												
$\tau = 1$	HIGH	Coeff.		0.011	0.034^{a}	0.004	-0.033^{b}	0.052	-0.266^{a}	-0.091	19.81%	3,369
		t-stat		1.19	4.82	0.13	-2.65	0.51	-3.27	-1.12		
	LOW	Coeff.		0.016^{c}	0.009	-0.014	0.006	-0.060	-0.112^{c}	-0.115^{b}	20.50%	9,195
		t-stat		1.92	1.27	-0.73	0.41	-1.60	-2.06	-2.08		
			DIFF (t-stat)				-2.063^{b}	1.037				
$\tau = 2$	HIGH	Coeff.		0.020^{b}	0.022^{a}	0.056	-0.009	0.176	-0.297^{a}	0.016	15.78%	3,035
		t-stat		2.36	3.04	1.07	-0.53	1.28	-8.44	0.24		
	LOW	Coeff.		0.026^{a}	0.004	0.010	0.035^{b}	0.065	-0.153^{a}	-0.002	20.46%	8,510
		t-stat		3.16	0.57	0.27	2.15	0.76	-2.85	-0.04		
			DIFF (t-stat)				-1.872^{c}	0.681				

Table 5

Nonlinear Model of Earnings Expectations – after sorting based on the level of asymmetry

(Fama-MacBeth (1973) Approach)

This table reports estimates of regressions of the relation between dividend changes and future earnings changes by categorizing firms based on their level of asymmetry in year -1 (before event year). The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. HIGH (LOW) represents the group of firms faced with a high (low) level of information asymmetry. DIFF is the difference in the coefficients between high and low asymmetry group. $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year). $B_{i,-1}$ is the book value of equity at the end of year -1. $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise. $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0. $ROE_{i,0}$ is equal to earnings before extraordinary items in year 0 scaled by the book value of equity at the end of year 0. $DFE_{i,0}$ is equal to $ROE_{i,0}$ - $E[ROE_{i,0}]$, where $E[ROE_{i,0}]$ is the fitted value from the cross-sectional regression of $ROE_{i,0}$ on the logarithm of total assets in year -1, the logarithm of the market-to-book ratio of equity in year -1, and $ROE_{i,-1}$. $NDFED_{i,0}$ ($PDFED_{i,0}$) is a dummy variable which is set to 1 when $DFE_{i,0}$ is negative (positive) and 0 otherwise. $CE_{i,0}$ is equal to $(E_{i,0} - E_{i,-1}) / B_{i,-1}$. $NCED_{i,0}$ ($PCED_{i,0}$) is a dummy variable which is set to 1 when $CE_{i,0}$ is negative (positive) and 0 otherwise. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following the Fama-MacBeth (1973) procedure, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year. Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients. In order to reduce the effects from outliers, all variables are winsorized at the 1% and the 99% of the empirical distribution. The avg. adj. R^2 is the average (adjusted) R^2 of the cross-sectional regressions. a, b, and c indicate statistical significance at the 1%, 5%, and 10% level, respectively.

$$
\begin{aligned}
(E_{i,\tau} - E_{i,\tau-1}) / B_{i,-1} = \beta_0 &+ \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_4 (DNC_{i,0} \times R\Delta DIV_{i,0}) \\
&+ (\gamma_1 + \gamma_2 NDFED_{i,0} + \gamma_3 NDFED_{i,0} \times DFE_{i,0} + \gamma_4 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \\
&+ (\lambda_1 + \lambda_2 NCED_{i,0} + \lambda_3 NCED_{i,0} \times CE_{i,0} + \lambda_4 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} + \varepsilon_{i,\tau}
\end{aligned}
$$

A. Firm Size

Year	Asym Group		β₀	β₁	β₂	β₃	β₄	γ₁	γ₂	γ₃	γ₄	λ₁	λ₂	λ₃	λ₄	Avg. Adj. R^2	N
τ = 1	HIGH	Coeff.	-0.014	0.010[c]	-0.004	-0.008	0.043	0.231	-0.781[a]	-0.511	-0.819	-0.295[c]	0.547[c]	1.242[c]	0.452	25.86%	3,120
		t-stat	-1.43	1.82	-0.35	-0.61	1.51	1.48	-3.17	-0.84	-1.32	-1.81	1.85	2.04	0.86		
	LOW	Coeff.	-0.022[b]	0.013[b]	-0.064	0.001	-0.138	-0.051	-0.264	0.097	-0.241	0.033	-0.261	-0.068	-0.060	30.78%	5,737
		t-stat	-2.74	2.17	-1.62	0.07	-1.53	-0.35	-1.23	0.55	-0.41	0.30	-1.57	-0.14	-0.17		
	DIFF (t-stat)					-0.437	1.912[c]										
τ = 2	HIGH	Coeff.	0.005	0.011	-0.009	-0.018	-0.058	-0.152	0.744[b]	1.887	0.047	0.093	-0.207	0.678	-0.171	12.34%	2,798
		t-stat	0.49	1.39	-0.31	-1.10	-0.79	-0.69	2.78	1.09	0.05	0.49	-0.55	0.59	-0.20		
	LOW	Coeff.	0.020[b]	-0.008	-0.471	-0.016	-0.922	-0.056	-0.482[b]	-0.545	0.071	0.028	0.410[b]	0.592	-0.028	12.40%	5,294
		t-stat	2.08	-1.26	-0.89	-0.75	-0.87	-0.50	-2.40	-1.55	0.17	0.26	2.16	1.13	-0.11		
	DIFF (t-stat)					-0.051	0.810										

B. Number of Analysts Following																	
τ = 1	HIGH	Coeff.	-0.017[c]	0.017[a]	0.011	-0.030[a]	0.105[b]	0.216	-1.157[a]	-0.119	-1.049	-0.395[c]	0.719[b]	0.385	0.991	31.03%	5,493
		t-stat	-1.81	3.07	0.63	-3.00	2.10	1.32	-3.98	-0.16	-0.80	-1.99	2.20	0.60	1.28		
	LOW	Coeff.	-0.022[b]	0.016[b]	-0.078[b]	-0.021	-0.080	0.048	-0.500[b]	0.076	-1.138	0.113	-0.112	0.117	-0.179	26.88%	7,282
		t-stat	-2.61	2.73	-2.12	-1.13	-0.89	0.29	-2.12	0.29	-1.36	1.07	-0.55	0.26	-0.48		
	DIFF (t-stat)					-0.422	1.803[c]										
τ = 2	HIGH	Coeff.	-0.001	0.003	0.012	0.015	0.033	-0.142	0.818[b]	1.293[c]	1.104	0.110	-0.618[c]	-0.668	-0.452	24.53%	4,972
		t-stat	-0.11	0.43	0.36	0.90	0.30	-0.81	2.35	2.03	1.01	0.76	-1.96	-0.73	-1.13		
	LOW	Coeff.	0.022[c]	-0.009	-0.512	0.018	-1.090	-0.101	-0.269	-0.263	0.436	0.050	0.298	0.799	0.000	10.53%	6,698
		t-stat	2.07	-1.23	-0.98	0.82	-1.04	-0.78	-1.00	-0.57	0.84	0.46	1.58	1.64	0.00		
	DIFF (t-stat)					-0.113	1.065										
C. Analyst Coverage and Noncoverage by I/B/E/S																	
τ = 1	HIGH	Coeff.	-0.005	0.007	-0.021	-0.005	-0.061	-0.155	0.073	1.122	0.637	-0.024	-0.143	-1.249	-0.468	43.83%	2,040
		t-stat	-0.54	1.05	-0.97	-0.23	-0.70	-0.76	0.19	1.62	0.69	-0.14	-0.43	-1.00	-0.66		
	LOW	Coeff.	-0.015[b]	0.015[a]	-0.014	-0.025[b]	0.047	-0.068	-0.655[a]	-0.177	-0.367	-0.051	0.335[c]	0.527[c]	0.172	22.60%	13,520
		t-stat	-2.47	3.51	-0.86	-2.52	1.07	-0.63	-5.45	-1.32	-0.97	-0.52	1.96	1.99	0.77		
	DIFF (t-stat)					0.908	-1.104										
τ = 2	HIGH	Coeff.	-0.019	-0.001	0.022	-0.031	-0.071	0.612	0.179	-0.075	-2.340[c]	-0.114	-0.067	-1.101	-0.463	31.59%	1,864
		t-stat	-1.04	-0.08	0.66	-1.15	-0.57	1.62	0.26	-0.05	-1.96	-0.42	-0.19	-0.27	-0.46		
	LOW	Coeff.	0.010	-0.002	0.006	0.009	0.014	-0.031	-0.030	0.077	-0.218	0.096	-0.130	-0.169	-0.064	15.34%	12,366
		t-stat	1.34	-0.32	0.28	0.75	0.27	-0.36	-0.16	0.33	-1.00	0.99	-0.75	-0.50	-0.58		
	DIFF (t-stat)					-1.356	-0.635										
D. Forecast Error																	
τ = 1	HIGH	Coeff.	-0.004	0.024[b]	0.020	-0.015	0.057	-0.349[c]	0.119	0.475	0.699	-0.114	0.524[b]	0.761[c]	0.338[c]	32.25%	2,882
		t-stat	-0.50	2.60	0.62	-0.67	0.77	-1.92	0.36	1.20	1.20	-1.14	2.57	1.81	1.96		
	LOW	Coeff.	-0.020[b]	0.011[b]	-0.004	-0.035[c]	0.068	-0.027	-0.491	0.179	0.568	0.205	-0.401	-0.157	-0.861	26.23%	5,905
		t-stat	-2.81	2.74	-0.29	-1.75	1.48	-0.16	-1.71	0.18	0.48	1.15	-1.54	-0.13	-0.63		
	DIFF (t-stat)					0.691	-0.125										
τ = 2	HIGH	Coeff.	0.018	-0.028[b]	-0.015	-0.025	0.044	0.088	-0.707[c]	-0.409	-0.196	0.193	0.229	0.408	-0.300	29.36%	2,616
		t-stat	1.34	-2.13	-0.34	-0.72	0.60	0.48	-1.96	-1.38	-0.52	1.37	0.61	0.77	-1.48		
	LOW	Coeff.	0.006	0.004	-0.007	0.036	-0.072	-0.185	0.436	0.228	0.079	0.143	-0.292	0.008	0.248	8.48%	5,402
		t-stat	0.70	0.79	-0.25	1.33	-0.96	-1.16	1.12	0.24	0.06	1.02	-0.65	0.00	0.34		
	DIFF (t-stat)					-1.381	1.102										

E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges																	
τ = 1	HIGH	Coeff.	-0.026[a]	0.015[a]	-0.012	-0.020[c]	-0.002	0.195	-0.798[a]	-0.591	-1.517	0.117	-0.007	0.398	-0.603	29.32%	3,351
		t-stat	-3.05	2.90	-0.60	-1.74	-0.03	1.03	-2.98	-1.16	-1.14	0.76	-0.03	0.82	-0.90		
	LOW	Coeff.	-0.013[c]	0.011[b]	-0.012	-0.009	-0.034	0.048	-0.619[a]	-0.064	-0.448	-0.013	0.036	0.122	-0.027	28.80%	9,148
		t-stat	-1.96	2.23	-0.71	-0.75	-0.87	0.50	-4.33	-0.66	-0.87	-0.18	0.27	0.42	-0.18		
	DIFF (t-stat)					-0.603	0.459										
τ = 2	HIGH	Coeff.	0.007	0.003	0.018	-0.011	0.048	-0.035	0.398	0.742	-0.440	-0.052	-0.120	-0.418	0.074	11.53%	3,048
		t-stat	0.58	0.47	0.46	-0.76	0.42	-0.11	0.83	1.08	-0.23	-0.23	-0.42	-0.45	0.08		
	LOW	Coeff.	0.015[b]	-0.007	-0.014	0.018	-0.011	-0.046	-0.034	-0.221	0.239	0.133	-0.117	0.407	-0.302[c]	22.51%	8,528
		t-stat	2.32	-1.08	-0.39	1.05	-0.13	-0.39	-0.16	-0.98	0.77	1.43	-0.64	0.97	-1.85		
	DIFF (t-stat)					-1.293	0.410										

4.4 Evidence on Testing the Difference by Using Asymmetry Dummy Variable

In this section, the dummy variable approach is used to confirm the results from table 4 and 5 whether there is a difference between high and low information asymmetry group. Equation (1) and (2) are modified by adding the dummy variable for high asymmetry firms, i.e. DHASYM. In this case, the variables of interest are dividend increases and dividend decreases in high asymmetry group, which are β_5 and β_7, respectively.

Table 6 exhibits the results using linear model. Similar to what reported in table 4, the results in panel A of table 6 show that when using firm size as a proxy, there is a significant difference between high and low asymmetry firms in the coefficient of dividend decreases when $\tau = 1$, which β_7 is equal to 0.070. The positive sign of the coefficient indicates a positive relation that dividend decreases in year 0 convey information about a decline of future earnings in year 1 in high asymmetry firms. To be precise, this is the only result from linear model that is in support of the dividend signaling hypothesis. Further, panel B of table 6 shows that the coefficient of dividend decreases when $\tau = 1$ is significant, yet negative (β_7 is equal to -0.058). This implies that there is a significant difference between high and low asymmetry firms, but the negative sign is opposed to what predicted in the hypothesis as there should rather be a positive relation between dividend changes and future earnings changes. The results in panel D of table 6 also affirm those reported in table 4 that when using forecast error as a proxy, there is a statistically significant difference between high and low asymmetry firms in the coefficient of dividend increases when $\tau = 2$, which β_5 is equal to -0.111. The negative sign of the coefficient indicates a negative relation between dividend increases in year 0 and future earnings changes in year 2 in high asymmetry group. Otherwise, the rest of the table show that there is no statistically significant difference between the two asymmetry groups.

Table 7 provides the results using nonlinear model. The results in this table confirm those reported in table 5 in a way that most coefficients of dividend increases and decreases in high asymmetry group are not statistically significant, which means that there is no difference in those coefficients between high and low asymmetry firms. Nevertheless, there are a few results that show the statistical difference between the two asymmetry groups. In panel C of table 7, when sorting firms based on their coverage by I/B/E/S, there is a significant difference between high and low asymmetry firms in the coefficient of dividend decreases when $\tau = 1$, which β_7 is equal to -0.119, and as well as in the coefficient of dividend increases when $\tau = 2$, which β_5 is equal to -0.056. Moreover, in panel D of table 7 using forecast error as a proxy, there is also a significant difference in the coefficient of dividend increases between the two groups when $\tau = 2$, which β_5 is equal to -0.010. However, these significant coefficients are entirely in negative sign, which suggests that amidst the high level of information asymmetry, there is rather a negative relation between dividend changes and future earnings changes.

In summary, the results in table 6 and 7 show that by adding the asymmetry dummy variable, most coefficients of dividend increases and decreases in high asymmetry group are statistically insignificant. The insignificance of these coefficients indicates no difference between high and low asymmetry firms. These findings confirm those presented in table 4 and 5 that the difference in the level of information asymmetry confronted by firms does not significantly influence a firm's decision to employ dividend signaling. This can be implied that firms may not consider dividend signaling when making decision on their dividend policy in the first place.

Table 6

Linear Model of Earnings Expectations with the Asymmetry Dummy Variable

(Fama-MacBeth (1973) Approach)

This table reports results from testing the difference between high and low asymmetry firms, in which equation (1) is modified by adding the dummy variable for high asymmetry firms. The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. $DHASYM_{i,-1}$ is a dummy variable which is set to 1 if a firm is in high asymmetry group in year -1 (before event year) and 0 otherwise. $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year). $B_{i,-1}$ is the book value of equity at the end of year -1. $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise. $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0. $ROE_{i,\tau-1}$ is equal to earnings before extraordinary items in year τ - 1 scaled by the book value of equity at the end of year τ - 1. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following the Fama-MacBeth (1973) procedure, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year. Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients. In order to reduce the effects from outliers, all variables are winsorized at the 1% and the 99% of the empirical distribution. The average adj. R^2 is the average (adjusted) R^2 of the cross-sectional regressions. a, b, and c indicate statistical significance at the 1%, 5%, and 10% level, respectively.

$$
\begin{aligned}
(E_{i,\tau} - E_{i,\tau-1})/B_{i,-1} = {} & \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 DHASYM_{i,-1} \\
& + \beta_4 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 (DPC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
& + \beta_6 (DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_7 (DNC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
& + \beta_8 ROE_{i,\tau-1} + \beta_9 (ROE_{i,\tau-1} \times DHASYM_{i,-1}) \\
& + \beta_{10} (E_{i,0} - E_{i,-1})/B_{i,-1} + \beta_{11} [((E_{i,0} - E_{i,-1})/B_{i,-1}) \times DHASYM_{i,-1}] + \varepsilon_{i,\tau}
\end{aligned}
$$

Year		β0	β1	β2	β3	β4	β5	β6	β7	β8	β9	β10	β11	Average Adj. R^2	N
A. Firm Size															
τ = 1	Coeff.	0.018^c	0.012^b	-0.012	-0.009	0.016	-0.009	-0.035	0.070^c	-0.152^a	-0.013	-0.217^a	0.100	18.44%	8,857
	t-stat	1.74	2.11	-0.86	-1.06	0.99	-0.46	-0.81	1.79	-4.33	-0.22	-3.80	1.15		
τ = 2	Coeff.	0.033^a	0.014^a	0.020	-0.022^a	-0.023	0.019	0.231^b	-0.187	-0.238^a	0.015	0.026	0.015	14.83%	8,024
	t-stat	3.84	2.87	0.60	-2.87	-0.81	0.57	2.29	-1.59	-7.78	0.36	0.65	0.27		
B. Number of Analysts Following															
τ = 1	Coeff.	0.021^c	0.019^a	-0.015	-0.009	-0.011	0.009	0.074	-0.058^c	-0.200^a	-0.028	-0.139^a	0.028	20.82%	12,799
	t-stat	1.96	2.88	-0.73	-0.95	-0.64	0.41	1.37	-1.89	-5.65	-0.38	-2.84	0.24		
τ = 2	Coeff.	0.028^a	0.014^b	0.019	-0.013	-0.006	-0.002	0.206^c	-0.084	-0.230^a	0.034	0.044	-0.117^c	21.77%	11,594
	t-stat	2.94	2.49	0.80	-1.65	-0.24	-0.08	1.93	-0.74	-6.41	0.72	1.17	-1.77		

C. Analyst Coverage and Noncoverage by I/B/E/S															
$\tau = 1$	Coeff.	0.017[b]	0.020[a]	-0.009	-0.011	-0.012	-0.016	0.046	-0.060	-0.216[a]	0.092	-0.120[b]	0.056	21.49%	15,629
	t-stat	2.09	3.74	-0.47	-1.24	-1.23	-0.76	1.04	-0.72	-5.06	1.13	-2.44	0.77		
$\tau = 2$	Coeff.	0.025[a]	0.013[b]	0.027	-0.027[a]	0.002	-0.026	0.133[b]	-0.089	-0.217[a]	0.132[c]	-0.036	-0.005	20.47%	14,173
	t-stat	3.17	2.36	1.33	-2.86	0.19	-0.93	2.65	-1.17	-7.08	2.08	-0.65	-0.04		
D. Forecast Error															
$\tau = 1$	Coeff.	0.006	0.015[b]	-0.018	-0.001	-0.033	0.017	0.035	-0.080	-0.103[b]	0.027	-0.344[a]	0.294[a]	22.70%	8,787
	t-stat	0.65	2.55	-1.14	-0.10	-1.12	0.41	0.71	-1.57	-2.23	0.33	-4.18	3.35		
$\tau = 2$	Coeff.	0.024[b]	0.013[b]	0.013	-0.005	0.013	-0.111[b]	0.047	0.063	-0.268[a]	0.206[a]	0.095	-0.176[b]	22.41%	7,955
	t-stat	2.70	2.48	0.40	-0.53	0.73	-2.25	0.60	1.05	-5.07	3.02	1.43	-2.22		
E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges															
$\tau = 1$	Coeff.	0.013	0.015[b]	-0.008	0.005	-0.001	-0.013	-0.057	0.112	-0.116[b]	-0.132	-0.113[c]	0.012	20.47%	12,564
	t-stat	1.65	2.62	-0.45	0.54	-0.09	-0.77	-1.57	1.54	-2.14	-1.49	-2.05	0.12		
$\tau = 2$	Coeff.	0.024[a]	0.009	0.017	0.000	0.027[c]	-0.033	0.072	0.040	-0.151[b]	-0.131[a]	-0.005	0.021	19.66%	11,545
	t-stat	2.98	1.61	0.74	0.06	1.82	-1.54	1.10	0.46	-2.81	-2.85	-0.09	0.21		

Table 7

Nonlinear Model of Earnings Expectations with the Asymmetry Dummy Variable

(Fama-MacBeth (1973) Approach)

This table reports results from testing the difference between high and low asymmetry firms, in which equation (2) is modified by adding the dummy variable for high asymmetry firms. The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. $DHASYM_{i,-1}$ is a dummy variable which is set to 1 if a firm is in high asymmetry group in year -1 (before event year) and 0 otherwise. $E_{i,\tau}$ is earnings before extraordinary items in year τ (year 0 is the event year). $B_{i,-1}$ is the book value of equity at the end of year -1. $DPC_{i,0}$ ($DNC_{i,0}$) is a dummy variable which is set to 1 for positive (negative) dividend changes and 0 otherwise. $R\Delta DIV_{i,0}$ is the annual percentage change of cash dividends per share in year 0. $ROE_{i,0}$ is equal to earnings before extraordinary items in year 0 scaled by the book value of equity at the end of year 0. $DFE_{i,0}$ is equal to $ROE_{i,0} - E[ROE_{i,0}]$, where $E[ROE_{i,0}]$ is the fitted value from the cross-sectional regression of $ROE_{i,0}$ on the logarithm of total assets in year -1, the logarithm of the market-to-book ratio of equity in year -1, and $ROE_{i,-1}$. $NDFED_{i,0}$ ($PDFED_{i,0}$) is a dummy variable which is set to 1 when $DFE_{i,0}$ is negative (positive) and 0 otherwise. $CE_{i,0}$ is equal to $(E_{i,0} - E_{i,-1}) / B_{i,-1}$. $NCED_{i,0}$ ($PCED_{i,0}$) is a dummy variable which is set to 1 when $CE_{i,0}$ is negative (positive) and 0 otherwise. To estimate the coefficients of the regression model, the Fama-MacBeth (1973) approach is applied. Following the Fama-MacBeth (1973) procedure, the first stage is to estimate cross-sectional regression coefficients each year by using all observations in that particular year. Then, in the second stage, I compute the time-series means of the previously estimated cross-sectional regression coefficients. In order to reduce the effects from outliers, all the variables are winsorized at the 1% and the 99% of the empirical distribution. The average adj. R^2 is the average (adjusted) R^2 of the cross-sectional regressions. a, b, and c indicate statistical significance at the 1%, 5%, and 10% level, respectively. To conserve space, this table omits the estimates of the control variables, which are presented later in the appendix A.

$$
\begin{aligned}
(E_{i,\tau} - E_{i,\tau-1}) / B_{i,-1} = {} & \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 DHASYM_{i,-1} \\
& + \beta_4 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 (DPC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
& + \beta_6 (DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_7 (DNC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
& + (\gamma_1 + \gamma_2 NDFED_{i,0} + \gamma_3 NDFED_{i,0} \times DFE_{i,0} + \gamma_4 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \\
& + [(\gamma_5 + \gamma_6 NDFED_{i,0} + \gamma_7 NDFED_{i,0} \times DFE_{i,0} + \gamma_8 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \times DHASYM_{i,-1}] \\
& + (\lambda_1 + \lambda_2 NCED_{i,0} + \lambda_3 NCED_{i,0} \times CE_{i,0} + \lambda_4 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} \\
& + [(\lambda_5 + \lambda_6 NCED_{i,0} + \lambda_7 NCED_{i,0} \times CE_{i,0} + \lambda_8 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} \times DHASYM_{i,-1}] + \varepsilon_{i,\tau}
\end{aligned}
$$

A. Firm Size

Year		β0	β1	β2	β3	β4	β5	β6	β7	Average Adj. R^2	N
τ = 1	Coeff.	-0.020^b	0.012^b	-0.021^c	0.006	0.001	-0.013	-0.052	0.060	29.39%	8,857
	t-stat	-2.72	2.48	-1.75	0.48	0.09	-0.68	-1.14	1.38		
τ = 2	Coeff.	0.017^c	-0.002	0.017	-0.008	-0.038	0.036	0.146	-0.144	12.22%	8,092
	t-stat	1.75	-0.31	0.52	-0.59	-1.32	1.08	1.37	-1.12		

B. Number of Analysts Following											
τ = 1	Coeff.	-0.023[a]	0.016[a]	-0.012	0.006	-0.023	-0.008	0.063	-0.001	31.48%	12,775
	t-stat	-2.84	3.29	-0.83	0.81	-1.35	-0.42	1.27	-0.02		
τ = 2	Coeff.	0.019[c]	-0.004	-0.003	-0.017[c]	0.007	0.021	0.002	0.011	20.89%	11,670
	t-stat	2.00	-0.63	-0.19	-1.96	0.32	0.63	0.03	0.08		
C. Analyst Coverage and Noncoverage by I/B/E/S											
τ = 1	Coeff.	-0.014[b]	0.014[a]	-0.015	0.003	-0.024[b]	0.018	0.046	-0.119[b]	28.25%	15,560
	t-stat	-2.46	3.76	-1.22	0.31	-2.57	1.04	1.23	-2.19		
τ = 2	Coeff.	0.010	-0.002	0.010	-0.025	0.011	-0.056[b]	0.023	-0.073	22.19%	14,230
	t-stat	1.35	-0.36	0.51	-1.43	0.85	-2.37	0.47	-0.94		
D. Forecast Error											
τ = 1	Coeff.	-0.022[a]	0.014[a]	0.003	0.022[b]	-0.038[c]	0.039	0.073	-0.039	32.28%	8,787
	t-stat	-3.00	3.16	0.16	2.42	-1.98	1.21	1.41	-0.85		
τ = 2	Coeff.	0.011	-0.003	-0.014	-0.005	0.043	-0.010[b]	-0.076	0.103	25.72%	8,018
	t-stat	1.18	-0.59	-0.51	-0.44	1.58	-2.22	-1.03	1.62		
E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges											
τ = 1	Coeff.	-0.013[b]	0.011[b]	-0.009	-0.011	-0.010	-0.005	-0.026	0.042	29.10%	12,499
	t-stat	-2.14	2.81	-0.59	-1.35	-0.80	-0.31	-0.70	1.06		
τ = 2	Coeff.	0.014[b]	-0.004	-0.004	-0.003	0.013	-0.024	0.000	-0.004	21.68%	11,576
	t-stat	2.09	-0.70	-0.15	-0.33	0.82	-1.09	0.01	-0.06		

4.5 Evidence on Using Fixed Effects Approach

As stated in section 3.2.4, in addition to Fama-MacBeth (1973) approach, I rerun equation (1), (2), (3), and (4) by using fixed effects approach in order to control for firm effects. Since each firm is likely to have its own specific natures which may behave differently to its dividend policy, firm fixed effects should be used to control for these unobservable characteristics.

Similar to the results using Fama-MacBeth (1973) procedure, I cannot find the results to support the signaling hypothesis even after accounting for the firm fixed effects. Table 8 reports the results after grouping firms based on their degree of asymmetry by using linear model. While there should be a positive relation between dividend changes and future earnings changes in high asymmetry group as predicted in the hypothesis, the results show that there is somewhat a negative relation between dividend decreases and future earnings changes in year 1 in high asymmetry group when using number of analysts following and forecast error as a proxy, which β_4 are equal to -0.203 and -0.390, respectively. However, the results go opposite in the proxy of firm size and analyst coverage by I/B/E/S as they show the similar relation but rather in low asymmetry group, which β_4 are equal to -0.117 and -0.122, respectively. Similarly, in table 9 using nonlinear model, there is a negative relation between dividend decreases and future earnings changes in year 1 in high asymmetry group when using forecast error as a proxy, that is β_4 is equal to -0.173. But again, there is also a negative relation between those two variables but in low asymmetry group in the proxy of firm size, analyst coverage by I/B/E/S, and stock exchanges, which β_4 are equal to -0.105, -0.072, and -0.084, respectively. Otherwise, the rest of the results in table 8 and 9 show no significant correlation between dividend changes and future earnings changes in high information asymmetry group, which does not support the stated hypothesis.

Table 10 and 11 provide the results from testing the difference between high and low asymmetry group. The results seem to follow those under Fama-MacBeth (1973) approach as most coefficients of dividend increases and decreases in high asymmetry firms are not statistically significant at any standard confidence levels, which indicates that there is no difference between the two groups of asymmetry. There are only a few results showing the statistical difference between these two groups. As reported in panel D of both table 10 and 11, using forecast error as a proxy, there is a significant difference between high and low asymmetry group in the coefficient of negative dividend changes when $\tau = 1$, which β_7 are equal to -0.242 and -0.158, respectively. The negative sign of the coefficient, however, suggests a negative relation between dividend decreases in year 0 and future changes in earnings in year 1 in high asymmetry firms. Additionally, in panel E of table 10, there is a significant difference between high and low asymmetry group in the coefficient of negative dividend changes when $\tau = 1$, which β_7 is equal to 0.203. The positive sign of the coefficient indicates that dividend decreases in year 0 can help in forecasting future earnings changes in year 1. To be specific, this is the only result that is in line with the dividend signaling hypothesis when using fixed effects approach. In addition, under the same panel, there is also a significant difference between high and low asymmetry group in the coefficient of positive dividend changes when $\tau = 1$, which β_5 is equal to -0.065. Unfortunately, the negative sign rather suggests dividend increases signal a decline in future earnings in year 1.

Overall, the results in this section are similar to those using Fama-MacBeth (1973) approach as they lean towards suggesting no evidence of signaling, in which they show no systematically positive relation between dividend changes and future earnings changes among firms faced with high degree of asymmetry. Specifically, when a specific nature of each firm is taken into account in the analysis, dividend changes are still not useful in forecasting firms' future profitability.

Table 8

Linear Model of Earnings Expectations – after sorting based on the level of asymmetry

(Fixed Effects Approach)

This table reports estimates of fixed effects regressions of the relation between dividend changes and future earnings changes by categorizing firms based on their level of asymmetry in year -1 (before event year). The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. HIGH (LOW) represents the group of firms faced with a high (low) level of information asymmetry. P-Values are given in brackets. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Due to limited space, the table is separated into two parts: the first part exhibits results for proxy of firm size, number of analysts following, and analyst coverage and noncoverage by I/B/E/S, and the second part exhibits results for proxy of forecast error and firms listed on the NYSE and AMEX and on other stock exchanges.

		Future Earnings Changes											
		A. Firm Size				B. Number of Analysts Following				C. Analyst Coverage and Noncoverage by I/B/E/S			
		τ = 1		τ = 2		τ = 1		τ = 2		τ = 1		τ = 2	
		HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
DPC	β_1	0.008	0.002	0.013	-0.004	0.003	0.003	0.019**	-0.001	0.027**	0.001	-0.018	0.004
		[0.328]	[0.812]	[0.129]	[0.570]	[0.717]	[0.643]	[0.027]	[0.818]	[0.039]	[0.811]	[0.132]	[0.462]
DNC	β_2	-0.001	-0.046**	-0.007	0.005	-0.077	-0.040*	-0.016	-0.013	-0.004	-0.052*	0.048	-0.012
		[0.943]	[0.049]	[0.719]	[0.873]	[0.149]	[0.069]	[0.821]	[0.564]	[0.939]	[0.068]	[0.332]	[0.745]
DPC*RΔDIV	β_3	0.011	-0.003	-0.018	-0.025	0.008	-0.011	-0.022	-0.021	-0.043	0.000	0.020	-0.009
		[0.420]	[0.863]	[0.234]	[0.193]	[0.783]	[0.455]	[0.404]	[0.161]	[0.207]	[0.991]	[0.637]	[0.484]
DNC*RΔDIV	β_4	0.006	-0.117**	-0.038	0.071	-0.203*	-0.059	0.049	0.010	0.021	-0.122*	0.113	0.017
		[0.869]	[0.036]	[0.392]	[0.256]	[0.099]	[0.275]	[0.764]	[0.829]	[0.881]	[0.090]	[0.301]	[0.839]
ROE	β_5	-0.380***	-0.242***	-0.478***	-0.353***	-0.335***	-0.332***	-0.248*	-0.387***	-0.301**	-0.308***	-0.226	-0.317***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.086]	[0.000]	[0.022]	[0.000]	[0.262]	[0.000]
$(E_0-E_{-1})/B_{-1}$	β_6	-0.180**	-0.267***	-0.019	-0.012	-0.235***	-0.129**	-0.284**	-0.017	0.044	-0.197***	-0.202	-0.191**
		[0.028]	[0.000]	[0.600]	[0.699]	[0.002]	[0.021]	[0.011]	[0.346]	[0.741]	[0.002]	[0.130]	[0.023]
Constant	β_0	0.002	0.015*	0.028*	0.069***	0.003	0.023***	0.027	0.068***	0.036	0.014*	0.036	0.057***
		[0.921]	[0.100]	[0.055]	[0.000]	[0.839]	[0.005]	[0.152]	[0.000]	[0.129]	[0.078]	[0.205]	[0.000]
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		3,120	5,737	2,778	5,246	5,499	7,300	4,940	6,654	2,085	13,544	1,893	12,280
Number of firms		716	769	644	719	1,112	1,084	1,023	1,013	484	1,815	447	1,683
Adjusted R^2		40.71%	20.96%	34.37%	12.91%	17.99%	18.65%	14.45%	18.14%	20.29%	19.67%	15.61%	14.61%

		Future Earnings Changes							
		D. Forecast Error				E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges			
		$\tau = 1$		$\tau = 2$		$\tau = 1$		$\tau = 2$	
		HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
DPC	β_1	-0.025	-0.002	-0.039*	0.004	0.033***	-0.004	0.008	-0.005
		[0.311]	[0.779]	[0.051]	[0.470]	[0.005]	[0.552]	[0.372]	[0.377]
DNC	β_2	-0.126*	-0.013	-0.070	0.002	0.043	-0.091	0.004	-0.057
		[0.090]	[0.469]	[0.240]	[0.912]	[0.215]	[0.161]	[0.924]	[0.290]
DPC*RΔDIV	β_3	-0.010	-0.006	0.005	-0.015	-0.061***	0.024	-0.047*	0.005
		[0.745]	[0.749]	[0.905]	[0.524]	[0.009]	[0.310]	[0.096]	[0.760]
DNC*RΔDIV	β_4	-0.390***	0.066	-0.031	-0.033	0.152	-0.253	0.035	-0.074
		[0.009]	[0.228]	[0.803]	[0.619]	[0.147]	[0.109]	[0.639]	[0.519]
ROE	β_5	0.046	-0.326***	-0.057	-0.394***	-0.462***	-0.181*	-0.475***	-0.208
		[0.826]	[0.000]	[0.754]	[0.000]	[0.000]	[0.055]	[0.000]	[0.101]
$(E_0\text{-}E_{-1})/B_{-1}$	β_6	-0.218***	-0.310**	-0.321**	0.045	-0.118	-0.144***	-0.063	-0.132**
		[0.000]	[0.012]	[0.013]	[0.243]	[0.144]	[0.001]	[0.528]	[0.020]
Constant	β_0	-0.025	0.029**	0.072**	0.056***	0.045***	0.010	0.087***	0.046***
		[0.538]	[0.015]	[0.029]	[0.000]	[0.008]	[0.406]	[0.000]	[0.001]
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		2,882	5,905	2,583	5,372	3,369	9,195	3,035	8,510
Number of firms		1,220	1,536	1,116	1,452	490	881	441	848
Adjusted R^2		-10.15%	36.52%	-6.68%	43.56%	29.94%	10.12%	15.83%	10.51%

Table 9

Nonlinear Model of Earnings Expectations – after sorting based on the level of asymmetry

(Fixed Effects Approach)

This table reports estimates of fixed effects regressions of the relation between dividend changes and future earnings changes by categorizing firms based on their level of asymmetry in year -1 (before event year). The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. HIGH (LOW) represents the group of firms faced with a high (low) level of information asymmetry. P-Values are given in brackets. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Due to limited space, the table is separated into two parts: the first part exhibits results for proxy of firm size, number of analysts following, and analyst coverage and noncoverage by I/B/E/S, and the second part exhibits results for proxy of forecast error and firms listed on the NYSE and AMEX and on other stock exchanges.

		Future Earnings Changes											
		A. Firm Size				B. Number of Analysts Following				C. Analyst Coverage and Noncoverage by I/B/E/S			
		$\tau = 1$		$\tau = 2$		$\tau = 1$		$\tau = 2$		$\tau = 1$		$\tau = 2$	
		HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
DPC	β_1	-0.006	0.001	0.003	-0.015**	-0.005	-0.003	0.014	-0.013**	0.009	-0.004	-0.001	-0.005
		[0.437]	[0.865]	[0.767]	[0.023]	[0.474]	[0.565]	[0.167]	[0.025]	[0.400]	[0.264]	[0.959]	[0.353]
DNC	β_2	-0.006	-0.051**	-0.009	0.028	-0.041	-0.040*	-0.002	-0.001	0.004	-0.037**	0.032	-0.001
		[0.735]	[0.027]	[0.708]	[0.440]	[0.263]	[0.063]	[0.976]	[0.958]	[0.857]	[0.048]	[0.352]	[0.988]
DPC*RΔDIV	β_3	0.019	-0.002	-0.021	-0.024	-0.007	-0.010	-0.045	-0.017	-0.025	-0.008	-0.031	-0.019
		[0.177]	[0.887]	[0.248]	[0.130]	[0.712]	[0.525]	[0.116]	[0.210]	[0.494]	[0.492]	[0.442]	[0.111]
DNC*RΔDIV	β_4	-0.016	-0.105*	-0.063	0.097	-0.096	-0.065	0.049	-0.019	-0.035	-0.072**	0.069	0.008
		[0.677]	[0.052]	[0.300]	[0.187]	[0.109]	[0.229]	[0.762]	[0.722]	[0.603]	[0.045]	[0.494]	[0.918]
DFE	γ_1	-0.174	-0.270*	0.044	0.029	-0.547**	-0.150	0.367	-0.032	-0.739***	-0.236**	-0.842**	0.125
		[0.228]	[0.069]	[0.780]	[0.702]	[0.022]	[0.233]	[0.234]	[0.684]	[0.006]	[0.025]	[0.024]	[0.258]
NDFED*DFE	γ_2	-0.323**	-0.290**	0.188	-0.111	-0.347**	-0.504***	-0.241	0.041	0.789	-0.440***	0.655**	-0.086
		[0.036]	[0.015]	[0.320]	[0.521]	[0.046]	[0.000]	[0.608]	[0.785]	[0.150]	[0.000]	[0.026]	[0.628]
NDFED*DFE²	γ_3	-0.099*	-0.085***	0.101	-0.026	-0.222**	-0.098***	0.039	-0.015	0.387	-0.116***	-0.058	-0.004
		[0.061]	[0.000]	[0.161]	[0.476]	[0.028]	[0.000]	[0.627]	[0.611]	[0.192]	[0.000]	[0.831]	[0.872]
PDFED*DFE²	γ_4	-0.117	0.244***	-0.197	0.092	0.141***	0.105*	-0.156*	0.047	0.598***	0.077***	0.481***	-0.089
		[0.709]	[0.001]	[0.207]	[0.198]	[0.008]	[0.095]	[0.096]	[0.625]	[0.000]	[0.000]	[0.000]	[0.221]
CE	λ_1	-0.060	0.292***	-0.192	-0.076	0.239	-0.059	-0.148	-0.065	-0.150	0.061	0.817*	-0.016
		[0.692]	[0.007]	[0.185]	[0.303]	[0.141]	[0.598]	[0.420]	[0.186]	[0.593]	[0.474]	[0.090]	[0.839]

NCED*CE	λ_2	0.072	-0.587***	-0.178	0.233	-0.268	0.014	-0.105	0.146	-0.175	-0.163	-0.980*	-0.113
		[0.755]	[0.000]	[0.472]	[0.178]	[0.250]	[0.934]	[0.760]	[0.328]	[0.584]	[0.182]	[0.085]	[0.440]
NCED*CE^2	λ_3	0.732***	0.017	-0.553***	0.240*	0.071**	0.122	0.016	0.219*	0.191	0.060***	-0.117	0.033**
		[0.000]	[0.888]	[0.000]	[0.052]	[0.033]	[0.233]	[0.591]	[0.077]	[0.627]	[0.000]	[0.479]	[0.030]
PCED*CE^2	λ_4	-0.004	-0.374***	0.063	0.029	-0.050***	0.006	-0.028	0.007	0.051	-0.029***	-0.231***	-0.037
		[0.964]	[0.000]	[0.144]	[0.502]	[0.001]	[0.666]	[0.393]	[0.373]	[0.262]	[0.009]	[0.004]	[0.213]
Constant	β_0	-0.019	-0.037***	-0.012	0.040***	-0.026*	-0.027***	-0.008	0.039***	0.002	-0.029***	-0.002	0.024***
		[0.164]	[0.000]	[0.475]	[0.000]	[0.076]	[0.001]	[0.654]	[0.000]	[0.922]	[0.000]	[0.912]	[0.001]
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		3,120	5,737	2,798	5,294	5,493	7,282	4,972	6,698	2,040	13,520	1,864	12,366
Number of firms		716	769	649	729	1,112	1,083	1,033	1,023	465	1,814	429	1,702
Adjusted R^2		40.67%	25.70%	12.21%	1.10%	36.06%	19.72%	11.04%	0.21%	34.73%	28.36%	33.87%	6.46%

		Future Earnings Changes							
		D. Forecast Error				E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges			
		$\tau = 1$		$\tau = 2$		$\tau = 1$		$\tau = 2$	
		HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW
DPC	β_1	0.005	-0.008	0.014	-0.002	0.003	-0.001	-0.006	-0.002
		[0.806]	[0.112]	[0.713]	[0.720]	[0.675]	[0.789]	[0.568]	[0.875]
DNC	β_2	-0.048	-0.018	-0.019	0.002	-0.006	-0.030*	-0.024	-0.041
		[0.455]	[0.278]	[0.742]	[0.948]	[0.769]	[0.100]	[0.454]	[0.397]
DPC*RΔDIV	β_3	-0.036	-0.011	-0.123	-0.001	-0.027	-0.007	-0.013	-0.047
		[0.252]	[0.487]	[0.235]	[0.975]	[0.105]	[0.666]	[0.465]	[0.127]
DNC*RΔDIV	β_4	-0.173*	0.078	0.038	-0.096	-0.032	-0.084*	-0.060	-0.050
		[0.065]	[0.121]	[0.762]	[0.162]	[0.438]	[0.055]	[0.440]	[0.588]
DFE	γ_1	-0.610**	-0.165	-0.088	0.057	-0.161	-0.446***	0.167	-0.096
		[0.014]	[0.146]	[0.666]	[0.595]	[0.141]	[0.002]	[0.277]	[0.258]
NDFED*DFE	γ_2	-0.016	-0.297**	-0.173	0.059	-0.389***	-0.112	0.034	0.247**
		[0.960]	[0.030]	[0.619]	[0.714]	[0.008]	[0.560]	[0.856]	[0.033]
NDFED*DFE^2	γ_3	-0.095	-0.102***	-0.181**	0.012	-0.069	-0.088***	0.066	0.021
		[0.355]	[0.003]	[0.045]	[0.777]	[0.150]	[0.000]	[0.181]	[0.240]
PDFED*DFE^2	γ_4	0.345***	-0.358***	0.247***	0.054	-0.051	0.310***	-0.130	0.230***
		[0.000]	[0.009]	[0.000]	[0.554]	[0.673]	[0.000]	[0.212]	[0.000]

CE	λ_1	0.313**	0.376***	0.311*	0.035	-0.125	0.203**	-0.169*	0.071
		[0.021]	[0.002]	[0.099]	[0.781]	[0.341]	[0.012]	[0.092]	[0.511]
NCED*CE	λ_2	-0.484**	-0.798***	-0.579	-0.288	0.132	-0.368**	-0.132	-0.393*
		[0.020]	[0.000]	[0.107]	[0.199]	[0.627]	[0.013]	[0.595]	[0.062]
NCED*CE^2	λ_3	0.026	0.076*	-0.015	0.001	0.168	0.026**	-0.063	-0.018
		[0.258]	[0.088]	[0.553]	[0.987]	[0.208]	[0.021]	[0.483]	[0.238]
PCED*CE^2	λ_4	-0.052**	-0.427***	-0.117***	-0.009	0.002	-0.046***	0.085***	-0.032**
		[0.016]	[0.000]	[0.000]	[0.848]	[0.956]	[0.001]	[0.000]	[0.018]
Constant	β_0	-0.035	-0.012	0.004	0.007	-0.003	-0.020***	0.018	0.016
		[0.109]	[0.164]	[0.911]	[0.438]	[0.855]	[0.005]	[0.293]	[0.129]
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		2,882	5,905	2,616	5,402	3,351	9,148	3,048	8,528
Number of firms		1,220	1,536	1,130	1,460	487	878	443	849
Adjusted R^2		13.12%	40.67%	1.40%	29.69%	30.14%	31.14%	5.27%	6.41%

Table 10

Linear Model of Earnings Expectations with the Asymmetry Dummy Variable

(Fixed Effects Approach)

Equation (3) is estimated as fixed effects regression and is modified from equation (1) by adding the dummy variable for high asymmetry firms. The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. P-Values are given in brackets. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		Future Earnings Changes									
		A. Firm Size		B. Number of Analysts Following		C. Analyst Coverage and Noncoverage by I/B/E/S		D. Forecast Error		E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges	
		$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$
DPC	β_1	0.003	0.002	0.002	0.004	0.006	-0.001	-0.006	-0.007	0.006	-0.001
		[0.514]	[0.728]	[0.625]	[0.422]	[0.257]	[0.884]	[0.444]	[0.280]	[0.265]	[0.825]
DNC	β_2	-0.020	-0.005	-0.056**	-0.012	-0.038	-0.002	-0.058**	0.009	-0.045	-0.035
		[0.166]	[0.775]	[0.048]	[0.733]	[0.201]	[0.938]	[0.050]	[0.769]	[0.306]	[0.343]
DHASYM	β_3	0.181*	-0.108	0.006	-0.007	-0.012	-0.029**	-0.013	-0.006	0.000	0.000
		[0.074]	[0.258]	[0.580]	[0.643]	[0.365]	[0.039]	[0.517]	[0.747]	(omitted)	(omitted)
DPC*RΔDIV	β_4	-0.002	-0.031	-0.010	-0.025*	-0.011	-0.003	0.007	0.007	0.019	0.003
		[0.900]	[0.105]	[0.493]	[0.094]	[0.492]	[0.807]	[0.703]	[0.758]	[0.418]	[0.855]
DPC*RΔDIV*DHASYM	β_5	0.012	0.025	0.026	0.027	-0.006	-0.033	-0.021	-0.038	-0.065**	-0.046
		[0.566]	[0.266]	[0.363]	[0.314]	[0.848]	[0.321]	[0.458]	[0.300]	[0.031]	[0.145]
DNC*RΔDIV	β_6	-0.072*	0.046	-0.084	0.010	-0.084	0.040	-0.031	-0.010	-0.179	-0.038
		[0.082]	[0.308]	[0.160]	[0.883]	[0.260]	[0.591]	[0.613]	[0.884]	[0.143]	[0.663]
DNC*RΔDIV*DHASYM	β_7	0.050	-0.068	-0.084	0.047	-0.004	-0.033	-0.242***	0.060	0.203**	0.017
		[0.208]	[0.136]	[0.170]	[0.469]	[0.961]	[0.608]	[0.006]	[0.379]	[0.011]	[0.748]
ROE	β_8	-0.243***	-0.360***	-0.318***	-0.365***	-0.320***	-0.324***	-0.278***	-0.365***	-0.182*	-0.209*
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.002]	[0.000]	[0.054]	[0.100]
ROE*DHASYM	β_9	-0.140*	-0.119	-0.006	0.119	0.311***	0.378**	0.237	0.267	-0.267**	-0.253**
		[0.066]	[0.106]	[0.941]	[0.353]	[0.005]	[0.012]	[0.179]	[0.115]	[0.014]	[0.048]
$(E_0-E_{-1})/B_{-1}$	β_{10}	-0.261***	-0.012	-0.129**	-0.018	-0.192***	-0.195**	-0.341**	0.014	-0.142***	-0.131**
		[0.000]	[0.689]	[0.019]	[0.335]	[0.002]	[0.019]	[0.011]	[0.752]	[0.002]	[0.021]

$((E_0-E_{-1})/B_{-1})$*DHASYM	β_{11}	0.083	-0.008	-0.102	-0.265**	0.230*	-0.015	0.173	-0.288**	0.017	0.068
		[0.412]	[0.866]	[0.258]	[0.019]	[0.079]	[0.924]	[0.193]	[0.041]	[0.851]	[0.556]
Constant	β_0	-0.055	0.090***	0.012	0.060***	0.012	0.054***	0.009	0.060***	0.016	0.052***
		[0.139]	[0.008]	[0.101]	[0.000]	[0.154]	[0.000]	[0.562]	[0.000]	[0.114]	[0.000]
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		8,857	8,024	12,799	11,594	15,629	14,173	8,787	7,955	12,564	11,545
Number of firms		1,473	1,354	1,806	1,670	2,021	1,876	1,844	1,735	1,371	1,289
Adjusted R^2		28.95%	19.71%	19.73%	16.95%	18.10%	14.83%	14.16%	15.92%	15.34%	11.72%

Table 11

Nonlinear Model of Earnings Expectations with the Asymmetry Dummy Variable

(Fixed Effects Approach)

Equation (4) is estimated as fixed effects regression and is modified from equation (2) by adding the dummy variable for high asymmetry firms. The level of information asymmetry is measured through five proxies, which are firm size, number of analysts following, analyst coverage and noncoverage by I/B/E/S, forecast error, and firms listed on the NYSE and AMEX and on other stock exchanges. P-Values are given in brackets. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		Future Earnings Changes									
		A. Firm Size		B. Number of Analysts Following		C. Analyst Coverage and Noncoverage by I/B/E/S		D. Forecast Error		E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges	
		$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$	$\tau = 1$	$\tau = 2$
DPC	β_1	-0.002	-0.009*	-0.003	-0.005	-0.002	-0.006	-0.003	0.002	0.000	-0.002
		[0.739]	[0.092]	[0.401]	[0.357]	[0.477]	[0.256]	[0.574]	[0.832]	[0.938]	[0.769]
DNC	β_2	-0.025*	0.003	-0.038*	0.000	-0.030**	0.005	-0.033	0.012	-0.021	-0.035
		[0.089]	[0.884]	[0.058]	[0.996]	[0.041]	[0.851]	[0.182]	[0.672]	[0.116]	[0.288]
DHASYM	β_3	0.232**	-0.166	0.009	-0.023	0.043**	0.007	0.015	-0.007	0.000	0.000
		[0.024]	[0.395]	[0.285]	[0.104]	[0.028]	[0.683]	[0.171]	[0.717]	(omitted)	(omitted)
DPC*RΔDIV	β_4	0.002	-0.031**	-0.007	-0.026*	-0.011	-0.014	-0.011	-0.004	-0.006	-0.046*
		[0.906]	[0.045]	[0.624]	[0.063]	[0.328]	[0.246]	[0.502]	[0.880]	[0.687]	[0.094]
DPC*RΔDIV*DHASYM	β_5	0.006	0.027	0.002	0.012	0.005	-0.056	-0.013	-0.099	-0.020	0.029
		[0.758]	[0.221]	[0.911]	[0.692]	[0.876]	[0.175]	[0.634]	[0.109]	[0.356]	[0.292]
DNC*RΔDIV	β_6	-0.055	0.042	-0.055	-0.019	-0.058*	0.017	0.026	-0.051	-0.071*	-0.038
		[0.165]	[0.444]	[0.262]	[0.797]	[0.056]	[0.788]	[0.604]	[0.444]	[0.054]	[0.577]
DNC*RΔDIV*DHASYM	β_7	0.001	-0.073	-0.039	0.075	-0.015	-0.012	-0.158***	0.123	0.016	-0.038
		[0.979]	[0.190]	[0.386]	[0.246]	[0.716]	[0.857]	[0.002]	[0.110]	[0.652]	[0.535]
DFE	γ_1	-0.294**	0.032	-0.187*	-0.033	-0.244**	0.116	-0.100	0.096	-0.437***	-0.082
		[0.031]	[0.667]	[0.087]	[0.661]	[0.015]	[0.255]	[0.348]	[0.397]	[0.002]	[0.316]
NDFED*DFE	γ_2	-0.285**	-0.078	-0.475***	-0.008	-0.436***	-0.077	-0.551***	0.367*	-0.123	0.237**
		[0.014]	[0.656]	[0.000]	[0.955]	[0.000]	[0.652]	[0.000]	[0.075]	[0.512]	[0.035]
NDFED*DFE^2	γ_3	-0.089***	-0.018	-0.103***	-0.026	-0.116***	-0.005	-0.155***	0.118	-0.089***	0.023
		[0.000]	[0.619]	[0.000]	[0.345]	[0.000]	[0.842]	[0.000]	[0.127]	[0.000]	[0.209]

PDFED*DFE^2	γ_4	0.261***	0.089	0.126*	0.045	0.092***	-0.116*	-0.279***	0.005	0.308***	0.226***
		[0.000]	[0.198]	[0.052]	[0.622]	[0.000]	[0.090]	[0.001]	[0.938]	[0.000]	[0.000]
DFE*DHASYM	γ_5	0.212	-0.107	-0.237	0.384	-0.482	-0.639***	-0.516***	-0.217	0.255*	0.195
		[0.191]	[0.496]	[0.198]	[0.152]	[0.118]	[0.004]	[0.007]	[0.248]	[0.081]	[0.177]
NDFED*DFE*DHASYM	γ_6	-0.099	0.337	0.068	-0.275	0.974**	0.937**	0.523*	-0.501	-0.244	-0.165
		[0.605]	[0.202]	[0.739]	[0.542]	[0.040]	[0.016]	[0.087]	[0.141]	[0.279]	[0.417]
NDFED*DFE^2*DHASYM	γ_7	0.003	0.096	-0.096	0.043	0.266	0.275*	0.072	-0.294***	0.021	0.036
		[0.957]	[0.202]	[0.288]	[0.593]	[0.145]	[0.087]	[0.442]	[0.007]	[0.652]	[0.482]
PDFED*DFE^2*DHASYM	γ_8	-0.453	-0.197	-0.021	-0.198	0.408***	0.762***	0.627***	0.256***	-0.346***	-0.326***
		[0.172]	[0.270]	[0.765]	[0.128]	[0.000]	[0.000]	[0.000]	[0.002]	[0.002]	[0.001]
CE	λ_1	0.304***	-0.083	-0.039	-0.049	0.057	-0.004	0.324**	0.060	0.199**	0.066
		[0.003]	[0.249]	[0.712]	[0.303]	[0.502]	[0.964]	[0.037]	[0.644]	[0.012]	[0.535]
NCED*CE	λ_2	-0.569***	0.196	0.024	0.150	-0.138	-0.133	-0.583***	-0.686**	-0.366**	-0.392*
		[0.000]	[0.254]	[0.880]	[0.290]	[0.250]	[0.354]	[0.009]	[0.030]	[0.013]	[0.059]
NCED*CE^2	λ_3	0.028	0.223*	0.134	0.225*	0.062***	0.032**	0.108*	-0.113	0.026**	-0.018
		[0.816]	[0.065]	[0.187]	[0.071]	[0.000]	[0.034]	[0.054]	[0.259]	[0.021]	[0.217]
PCED*CE^2	λ_4	-0.377***	0.033	0.003	0.004	-0.027***	-0.040	-0.392***	-0.050	-0.046***	-0.032**
		[0.000]	[0.447]	[0.815]	[0.566]	[0.009]	[0.168]	[0.000]	[0.147]	[0.001]	[0.018]
CE*DHASYM	λ_5	-0.394**	-0.039	0.226	-0.096	-0.076	0.433	-0.051	0.205	-0.313**	-0.219
		[0.019]	[0.799]	[0.179]	[0.572]	[0.717]	[0.240]	[0.766]	[0.254]	[0.039]	[0.115]
NCED*CE*DHASYM	λ_6	0.612**	-0.385	-0.277	-0.218	-0.053	-0.736	0.260	0.238	0.499*	0.264
		[0.017]	[0.185]	[0.290]	[0.528]	[0.892]	[0.279]	[0.389]	[0.563]	[0.095]	[0.404]
NCED*CE^2*DHASYM	λ_7	0.671***	-0.730***	-0.067	-0.204	0.096	-0.055	-0.068	0.108	0.150	-0.040
		[0.000]	[0.000]	[0.514]	[0.105]	[0.767]	[0.723]	[0.247]	[0.285]	[0.246]	[0.631]
PCED*CE^2*DHASYM	λ_8	0.389***	0.010	-0.048***	-0.032	0.049	-0.110	0.350***	-0.057	0.045	0.116***
		[0.001]	[0.871]	[0.010]	[0.348]	[0.128]	[0.166]	[0.000]	[0.199]	[0.311]	[0.000]
Constant	β_0	-0.114***	0.082	-0.030***	0.034***	-0.029***	0.017**	-0.030***	0.011	-0.018***	0.014*
		[0.002]	[0.233]	[0.000]	[0.000]	[0.000]	[0.024]	[0.001]	[0.321]	[0.007]	[0.098]
Firm fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		8,857	8,092	12,775	11,670	15,560	14,230	8,787	8,018	12,499	11,576
Number of firms		1,473	1,369	1,805	1,690	2,014	1,888	1,844	1,749	1,365	1,292
Adjusted R^2		31.86%	3.80%	28.99%	8.04%	29.27%	29.27%	29.06%	14.57%	30.76%	5.93%

CHAPTER V

CONCLUSIONS AND AREA FOR FUTURE RESEARCH

Many researchers have been attempting without success to find evidence to support an idea of dividend signaling hypothesis, for example, Benartzi et al. (1997) and Grullon et al. (2005). However, there has been no systematic attempt to investigate the true incentive of dividend signaling hypothesis, in which previous studies fail to address the issue of information asymmetry when analyzing the hypothesis as they only perform the tests on all firms in general without grouping them based on the degree of asymmetry. An important thing to note is that different firms actually face with different levels of information asymmetry, so dividend signaling will not be necessary to all kinds of firms. As the information asymmetry is theoretically believed to be incentive for firms to do dividend signaling, an examination of the impact of asymmetry facing firms should be fundamental to an understanding of the information content of dividend changes. Thus, this study aims to re-examine the dividend signaling hypothesis by taking into account such information asymmetry.

Regarding to the recent literatures, there are two models with different assumptions of earnings expectations that have extensively been used to investigate the relation between dividend changes and future profitability, namely linear model and nonlinear model. As my objective is not to debate which model is more superior, both models are adopted in my analysis. I begin the analysis from testing the full sample before sorting them based on the level of asymmetry. Using linear model of earnings expectations, the results show that there is no relation between dividend changes and future earnings changes, which is inconsistent with Nissim and Ziv (2001) and Grullon et al. (2005) as they can find the positive relation between dividend increases and future earnings. These conflicting results are likely due to the difference in the equation specifications. On the other hand, using nonlinear model, although the time-series results show a negative relation between dividend increases and future earnings changes in year 1, the cross-sectional results indicate no systematic pattern between dividend changes and future earnings. These preliminary results seem to suggest that dividends are not informative about future earnings changes.

Then, the theoretical incentive of dividend signaling which is information asymmetry is taken into analysis. The results from both linear and nonlinear model tend to be similar as they show that the coefficients for positive and negative dividend changes in high asymmetry firms are mostly statistically insignificant, which is somewhat consistent with no evidence of dividend signaling. To confirm whether firms actually use dividends to signal their future prospects, equation (1) and (2) are modified by including the asymmetry dummy variable to test the difference between high and low asymmetry group. The results show what might be expected. Again, consistent with previous findings, most coefficients of dividend increases and decreases with the asymmetry dummy variable are not statistically significant. The insignificance of the coefficients indicates no difference between the two groups of asymmetry, which means that the difference in the degree of asymmetry faced by firms has no impact on firms' incentive to signal via dividends.

After that, I repeat the previous analysis by including firms fixed effects since there might be some firm characteristics that drive future earnings changes but for which I cannot control. Consistent with previous findings, even after accounting for specific characteristics of each firm, no systematically positive relation is found between dividend changes and future earnings changes among firms characterized by a high level of information asymmetry.

According to the dividend signaling hypothesis, it predicts that there is a significant and positive relation between dividend changes and future earnings changes in firms faced with a high degree of asymmetry whereas there is no such relation in the otherwise firms. As opposed to this prediction, the overall results are on balance inconclusive, in which they cannot be used to completely determine that dividend changes signal future profitability. Nevertheless, most findings are more consistent with no evidence of dividend signaling. To be specific, the results show that the coefficients for positive and negative dividend changes in high asymmetry firms are mostly statistically insignificant, in which these particular results do not support what predicted in such hypothesis. Moreover, the lack of the significance when testing the difference between high and low asymmetry firms greatly indicates that the difference in the level of asymmetry faced by firms does not influence their decision to use dividend signaling. All these results do not provide support that information asymmetry is the driving force behind dividend signaling. Rather, my results are consistent with the recent studies of dividend signaling. For instance, DeAngelo et al. (2004), Denis and Osobov (2008), and Leary and Michaely (2011) suggest that firms suffering high asymmetry (i.e., those that have the most incentive in signaling) pay out the least. Taken those together, it might be reasonable to conclude that dividends have no informational content of future profitability, which implies that dividends are not the common means of signaling.

Finally, apart from dividend signaling, dividends can also be used to reduce the degree of moral hazard. The assumption behind this is that paying cash dividends help draining cash out of the firms, thus this action will keep managers coming back to the capital markets for money to finance reinvestments (Easterbrook, 1984). Then, the capital markets will aggregate monitoring before giving money to the managers. In this sense, the degree of moral hazard should be reduced. Since the framework of this thesis is a signaling theory and the findings cannot provide the support to the hypothesis that dividend changes signal changes in future profitability, it is interesting to investigate whether such changes in dividends would rather reflect changes in the degree of moral hazard. This is left for future research.

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APPENDICES

APPENDIX A

Nonlinear Model of Earnings Expectations with the Asymmetry Dummy Variable

(cont'd on the estimates of control variables from table 7)

$$
\begin{aligned}
(E_{i,\tau} - E_{i,\tau-1})/B_{i,-1} = {} & \beta_0 + \beta_1 DPC_{i,0} + \beta_2 DNC_{i,0} + \beta_3 DHASYM_{i,-1} \\
& + \beta_4 (DPC_{i,0} \times R\Delta DIV_{i,0}) + \beta_5 (DPC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
& + \beta_6 (DNC_{i,0} \times R\Delta DIV_{i,0}) + \beta_7 (DNC_{i,0} \times R\Delta DIV_{i,0} \times DHASYM_{i,-1}) \\
& + (\gamma_1 + \gamma_2 NDFED_{i,0} + \gamma_3 NDFED_{i,0} \times DFE_{i,0} + \gamma_4 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \\
& + [(\gamma_5 + \gamma_6 NDFED_{i,0} + \gamma_7 NDFED_{i,0} \times DFE_{i,0} + \gamma_8 PDFED_{i,0} \times DFE_{i,0}) \times DFE_{i,0} \times DHASYM_{i,-1}] \\
& + (\lambda_1 + \lambda_2 NCED_{i,0} + \lambda_3 NCED_{i,0} \times CE_{i,0} + \lambda_4 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} \\
& + [(\lambda_5 + \lambda_6 NCED_{i,0} + \lambda_7 NCED_{i,0} \times CE_{i,0} + \lambda_8 PCED_{i,0} \times CE_{i,0}) \times CE_{i,0} \times DHASYM_{i,-1}] + \varepsilon_{i,\tau}
\end{aligned}
$$

Year		γ_1	γ_2	γ_3	γ_4	γ_5	γ_6	γ_7	γ_8	λ_1	λ_2	λ_3	λ_4	λ_5	λ_6	λ_7	λ_8
A. Firm Size																	
$\tau = 1$	Coeff.	-0.056	-0.261	0.100	-0.233	0.303	-0.562[c]	-0.616	-0.575	0.028	-0.243	-0.030	-0.041	-0.354	0.824[b]	1.186[c]	0.584
	t-stat	-0.39	-1.22	0.59	-0.39	1.28	-1.94	-1.12	-0.63	0.25	-1.50	-0.06	-0.12	-1.62	2.56	1.75	0.86
$\tau = 2$	Coeff.	0.003	-0.546[b]	-0.560	-0.034	-0.177	1.303[a]	2.436	0.122	0.005	0.422[b]	0.572	-0.025	0.146	-0.632	0.278	-0.419
	t-stat	0.03	-2.80	-1.61	-0.08	-0.83	4.49	1.40	0.13	0.05	2.27	1.14	-0.10	0.64	-1.49	0.23	-0.47
B. Number of Analysts Following																	
$\tau = 1$	Coeff.	0.053	-0.506[b]	0.075	-1.187	0.172	-0.682[c]	-0.286	0.155	0.111	-0.100	0.150	-0.164	-0.521[b]	0.836[c]	0.263	1.170
	t-stat	0.32	-2.11	0.29	-1.42	0.88	-1.87	-0.37	0.11	1.05	-0.49	0.34	-0.45	-2.11	2.01	0.32	1.24
$\tau = 2$	Coeff.	-0.073	-0.294	-0.274	0.433	-0.067	1.154[b]	1.696[c]	0.712	0.033	0.324	0.869	-0.014	0.073	-0.961[b]	-1.593	-0.443
	t-stat	-0.55	-1.10	-0.59	0.86	-0.28	2.78	2.01	0.59	0.30	1.59	1.59	-0.05	0.39	-2.35	-1.42	-0.91
C. Analyst Coverage and Noncoverage by I/B/E/S																	
$\tau = 1$	Coeff.	-0.070	-0.651[a]	-0.172	-0.369	-0.078	0.753[c]	1.584[b]	0.984	-0.048	0.332[c]	0.525[c]	0.167	0.064	-0.608	-2.405[c]	-0.834
	t-stat	-0.64	-5.45	-1.26	-0.98	-0.32	1.89	2.35	0.99	-0.50	1.94	1.98	0.75	0.29	-1.67	-2.00	-1.12
$\tau = 2$	Coeff.	-0.032	-0.032	0.077	-0.213	0.588	0.279	-0.157	-1.984[c]	0.095	-0.129	-0.175	-0.064	-0.214	0.043	-1.273	-0.176
	t-stat	-0.36	-0.17	0.32	-0.96	1.61	0.40	-0.09	-1.73	0.98	-0.74	-0.52	-0.57	-0.86	0.10	-0.29	-0.22

D. Forecast Error																	
τ = 1	Coeff.	-0.013	-0.518[c]	0.208	0.468	-0.295	0.585	0.235	0.082	0.208	-0.401	-0.224	-0.878	-0.342	0.949[b]	1.022	1.236
	t-stat	-0.07	-1.80	0.21	0.39	-1.20	1.37	0.23	0.06	1.17	-1.51	-0.18	-0.65	-1.70	2.47	0.73	0.92
τ = 2	Coeff.	-0.202	0.431	0.151	0.097	0.293	-1.127[b]	-0.495	-0.371	0.148	-0.258	0.150	0.275	0.051	0.419	0.109	-0.564
	t-stat	-1.25	1.10	0.16	0.08	1.14	-2.41	-0.59	-0.27	1.03	-0.58	0.08	0.37	0.27	0.71	0.06	-0.69
E. Firms Listed on the NYSE and AMEX and on Other Stock Exchanges																	
τ = 1	Coeff.	0.046	-0.620[a]	-0.068	-0.434	0.162	-0.173	-0.407	-1.093	-0.013	0.037	0.132	-0.033	0.128	-0.038	0.233	-0.572
	t-stat	0.47	-4.35	-0.70	-0.84	0.74	-0.63	-0.79	-0.73	-0.18	0.29	0.46	-0.23	0.67	-0.14	0.46	-0.82
τ = 2	Coeff.	-0.044	-0.033	-0.209	0.211	0.021	0.446	0.794	-0.732	0.133	-0.127	0.360	-0.298[c]	-0.202	0.053	-0.465	0.382
	t-stat	-0.37	-0.16	-0.91	0.69	0.07	0.83	1.14	-0.42	1.42	-0.69	0.84	-1.82	-0.71	0.15	-0.46	0.36

APPENDIX B

Table B1

Linear Model of Earnings Expectations – before sorting based on the level of asymmetry (Fixed Effects Approach)

Equation (1) is estimated as fixed effects regression. P-Values are given in brackets. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		Future Earnings Changes	
		$\tau = 1$	$\tau = 2$
DPC	β_1	0.005	-0.001
		[0.401]	[0.862]
DNC	β_2	-0.041	-0.003
		[0.247]	[0.923]
DPC*R∆DIV	β_3	-0.006	-0.007
		[0.702]	[0.657]
DNC*R∆DIV	β_4	-0.086	0.030
		[0.340]	[0.685]
ROE	β_5	-0.260***	-0.267**
		[0.004]	[0.012]
$(E_0\text{-}E_{-1})/B_{-1}$	β_6	-0.154***	-0.190**
		[0.000]	[0.015]
Constant	β_0	0.010	0.051***
		[0.422]	[0.000]
Firm fixed effects		Yes	Yes
Year dummies		Yes	Yes
Observations		15,629	14,173
Number of firms		2,021	1,876
Adjusted R^2		14.51%	12.67%

Table B2

Nonlinear Model of Earnings Expectations – before sorting based on the level of asymmetry

(Fixed Effects Approach)

Equation (2) is estimated as fixed effects regression. P-Values are given in brackets. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

		Future Earnings Changes	
		$\tau = 1$	$\tau = 2$
DPC	β_1	-0.001	-0.003
		[0.682]	[0.675]
DNC	β_2	-0.031**	0.002
		[0.041]	[0.952]
DPC*RΔDIV	β_3	-0.013	-0.033*
		[0.247]	[0.064]
DNC*RΔDIV	β_4	-0.057**	0.013
		[0.049]	[0.832]
DFE	γ_1	-0.428***	-0.085
		[0.001]	[0.318]
NDFED*DFE	γ_2	-0.192	0.151
		[0.189]	[0.265]
NDFED*DFE^2	γ_3	-0.102***	0.002
		[0.000]	[0.930]
PDFED*DFE^2	γ_4	0.300***	0.222***
		[0.000]	[0.000]
CE	λ_1	0.109	0.090
		[0.218]	[0.146]
NCED*CE	λ_2	-0.254*	-0.293**
		[0.057]	[0.018]
NCED*CE^2	λ_3	0.029**	-0.007
		[0.026]	[0.510]
PCED*CE^2	λ_4	-0.033***	-0.056***
		[0.008]	[0.006]
Constant	β_0	-0.023***	0.018**
		[0.000]	[0.018]
Firm fixed effects		Yes	Yes
Year dummies		Yes	Yes
Observations		15,560	14,230
Number of firms		2,014	1,888
Adjusted R^2		27.16%	8.39%

VITA

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