Aalto University
School of Business

Dividend Changes as Predictors of Future Earnings

Abstract

This paper analyses the relationship between changes in dividends and unexpected earnings of public companies exchanged in Northern Europe using dividend change data from 2008 to 2017. This study finds that dividend changes in year 0 are positively correlated with earnings changes in year 0, but for the following two years the correlation with earnings is either insignificant or negative under different methods. The findings are inconsistent with dividend signalling theories but stay robust under different specifications, suggesting that dividend changes cannot reliably be used to predict changes in companies' future earnings.

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Antti Huotari
Aalto University School of Business
Department of Finance
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Contents

1. Introduction

In this study I examine if future earnings of firms can be predicted from changes in dividend payments, as prior research has not comprehensively resolved the issue. There is a lot of evidence on market treating dividend changes as newsworthy, as stock prices generally go up when dividend increases are announced and vice versa, but whether the announcement has a significant effect on companies' earnings is still under controversy.

Miller and Modigliani (1961) suggest that when markets are incomplete, investors interpret changes in dividends as a managements' signal about future prospects of the firm. Proceeding on Miller and Modigliani's view on asymmetric information, among others Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985) suggest dividends being signals about future earnings, sent on purpose by the management at a cost to its stockholders.

To support the dividend signalling theory, companies cannot easily try to signal better future growth prospects than they are actually expecting. If a company tries to pay higher dividends than they are sustainably capable of, they are likely to experience high costs in the future, as they could face illiquidity and leverage problems among others, that will be discovered by the investors, driving the stock prices down.

Opposingly, Benartzi, Michaely and Thaler (1997) only observe weak correlation between dividend changes and future earnings growth, thereby challenging the signalling function of dividends. Grullon, Michaely and Benartzi (2003) also examine whether change in dividend could be used as a factor on forecasting earnings changes but find that the model does not perform better than others.

This thesis investigates if changes in dividend payments have explanatory power in predicting firms' earnings growth in the following two years. Most of the research on this topic is several decades old and is based on companies in the US market, which is why I employ a more recent data set that examines public companies traded in Northern Europe.

In this study, no positive relationship is identified between dividend changes and future earnings changes, as dividend changes do not manage to significantly explain positive future earnings in any of the regressions conducted. The findings object dividend signalling theory and are consistent with studies by DeAngelo and Skinner (1996), Benartzi, Michaely and Thaler (1997) and Grullon, Michaely and Benartzi (2003).

The remainder of the paper is structured as follows: In Section 2, I introduce the existing literature on dividend signalling theory and generally the relationship between dividends and earnings, also stating the main hypotheses. In Section 3, I describe the chosen data set and distribution of the main variables. In Section 4, I will be discussing the methodology and results of the empirical part of the study. In Section 5, the thesis is concluded.

2. Literature review

> "The nearly universal policy of paying substantial dividends is the primary puzzle in the economics of corporate finance." -Feldstein and Green (1979)

Dividends pay-out has always been an important topic in corporate finance. Generally, dividend payments are used to distribute profits from a corporation to its shareholders for exposing their capital to the risks of the firms and to convey information about the company's current performance. Asquith and Mullins (1986) propose that investors demand regular signals from the managements, or they become disappointed, leading to negative impact on stock prices. However, residual dividend theory suggests that high dividend payments indicate that the companies do not have profitable investment opportunities left, leading to lower expected future earnings (Keown, Scott, Martin and Petty, 2000).

2.1 Dividends as signals

The dividend signalling theory was first introduced by Lintner (1956), arguing that managers aim to keep dividend streams constant, only increasing them if there is believed to be a permanent increase in earnings and if it would be possible to maintain distributing the increased level of dividends. Ogden, Jen and O'Connor (2003) find evidence to support the dividend smoothing theory, as empirical tests indicate that firms tend to maintain dividends stable even over periods where earnings are volatile. The study also finds that the market reacts more sensitively to decreases in dividends compared to increases, which supports Lintner's proposition on managers preferring to stabilize dividend payments.

As dividends are usually paid from companies' retained earnings and because managements aim to sustain stable dividend payments, it can be concluded that changes in dividends can signal the markets about management's perceived development of earnings. Watts (1973) however, reports that while there is a positive relationship between dividends and earnings, the size of the earnings change is minor, and the information sent to the market is trivial.

Asquith and Mullins (1986) suggest that distributing a greater portion of company's profits as dividends informs the investors that the operations are generating cash, instead of them having to rely on accounting numbers, which can be manipulated by managers. Increasing trend in dividends also encourages management to enhance operations and perform well to avoid negative market reactions caused by decreased dividends.

In addition, as Jensen (1986) and Zhou and Ruland (2006) suggest, companies that have plenty of excess cash, are prone to managers' "empire building" and overinvesting in unprofitable "pet projects", possibly leading to poor earnings growth in the future. High dividend payments reduce these agency problems, as the managers have less cash to spend, meaning that the investment decisions are likely to be more efficient for the company.

2.2 Evidence favouring the dividend signalling theory

Asquith and Mullins (1983) investigate the effects of dividend initiations and omissions on stock prices. Their findings are consistent with views that suggest dividends to convey valuable information to the market, as they concluded that dividend payments are strongly correlated with managements' views on the future prospects of the firms. They also find that the size of the dividend signal correlates with the size of excess returns.

Healy and Palepu (1988) investigate the correlation of dividend initiations and omissions on earnings and stock returns. They find that dividend initiating firms have positive earnings changes in the years before and after the change, while for dividend omitting firms the changes are negative. However, they also find that the dividend omitting firms recover from the earnings decreases soon after the omission in the years following, noting also that part of the recovery might be explained by survival bias. The article concluded that the market treats dividend changes as managers' signals about future earnings.

Nissim and Ziv (2001) conducted regression analyses on dividend changes and earnings changes to investigate the explanatory power of dividend changes. Controlling the results with accounting data, they find dividend changes to convey information to the market, as they are positively correlated with subsequent earnings changes of the following two years. Manakyan and Carroll (1990), also find dividend changes to signal about future earnings, however only recognizing the effect on two following quarters.

Arnott and Asness (2003) inspect if dividend pay-out ratios can help at forecasting future aggregate earnings growth on market portfolio level. Their empirical research suggests high dividend pay-out ratios to correlate with fast earnings growth, contradicting with views on

substantial reinvestment of retained earnings leading to high earnings growth. Zhou and Ruland (2006) contributed to the research of Arnott and Asness (2003) by conducting similar analysis on company level pay-out ratios and earnings growth, as they believe that aggregate results may differ from company level results. Nevertheless, their findings support the aggregate level results, completing the analysis and thus, providing strong evidence on dividend pay-out ratios having a positive relationship between future earnings growth, even suggesting that low pay-out ratios may result in inefficient empire building by managers.

2.3 Evidence opposing the dividend signalling theory

Watts (1973) reckons among the first ones to empirically inspect the relationship of changes in dividends and changes in earnings. The tests are about whether dividends have explanatory power on predicting earnings by regressing year 1 earnings on year 0 dividends. The finding is that while there is a positive correlation, the change in unexpected earnings is very small. Further examination accounting for changes in stock prices concludes that the information conveyed to the market is trivial, as the information does not exceed transaction costs. Gonedes (1978) performed a similar study, finding complementary results. Benartzi, Michaely and Thaler (1997), however criticize Watts (1973) for relying on a small number of observations.

Using similar methods as Nissim and Ziv (2001), Benartzi, Michaely and Thaler (1997) find entirely opposite results, proposing that the relationship between dividend changes and future earnings changes is non-existent. Their results suggest that dividends are strongly correlated with current and previous year's earnings, but even when dividing dividend increasing companies to quantiles, significant positive relationship with future earnings is not found in any of the groups. Moreover, the results show that dividend decreasing firms that face negative changes in earnings in year 0, experience positive earnings change in the next year.

DeAngelo, DeAngelo and Skinner (1996) study firms whose annual earnings had declined after nine or more years of consecutive growth, and find no evidence favouring the dividend signalling theory. Rather, they find dividends to be unreliable signals because managers occasionally tend to overestimate future earnings and only make modest cash commitments when they increase dividends, weakening the reliability of the signal.

Brav, Graham, Harvey and Michaely (2005) survey and interview hundreds of financial executives and find that managers do not use dividends to signal about future earnings, rather determining the dividend level to reflect investment opportunities. Many managers also prefer to use excess cash on share repurchases compared to dividend increases, as they are thought to be more flexible, while also increasing the earnings per share.

2.4 Hypotheses

The dividend signalling theory has been under controversy for decades as there is empirical evidence both for and against its functionality. The key questions in this paper are whether dividend changes convey informational content about future earnings and if the magnitude of the dividend change affects the magnitude of changes in future earnings. Following the preceding discussion, this study outlines two main hypotheses:

Hypothesis 1: Companies that increase their dividends will have a positive change in future unexpected earnings in comparison to companies with no changes in dividends.

The dividend signalling theory suggests that managements change dividends to signal the market about changes in expected future earnings. The stock market also tends to react positively to dividend increases and negatively to decreases, implying that the market trets dividends as having informational value on future profitability.

Hypothesis 2: A greater change in dividends will lead to a greater change in future unexpected earnings.

On the notion of asymmetric information, several signalling costs are identified regarding paying dividends. Bhattacharya (1979) states the cost to be ascending risk of having to issue new shares, Miller and Rock (1985) present the cost to be missed investment opportunities and Bernheim (1991) expresses the cost to be the higher tax rate on dividends compared to capital gains. If signalling about earnings is costly, and the cost of the signal is based on the amount of dividends paid, then a larger signal should imply a greater change in future earnings.

3. Sample and data

The researched main sample consists of yearly dividend change and earnings change data of public companies exchanged in Northern Europe (as per United Nations geoscheme) from 2008-2019. I also use smaller secondary samples of firms that, in addition, have sufficient accounting data to control regressions. The main sample includes 6845 observations on dividend changes. The data sample excludes all dividend omissions. To avoid outlier observations affecting the outcome of the study, 0.5% of the highest and lowest values of dividend changes and earnings changes were winsorized to the values of 0.5^{th} and 99.5^{th} percentiles. All data is collected from Refinitiv Eikon database.

3.1 Distribution of variables

Distributions for dividend and earnings variables are reported in Table 1. This study defines earnings as the firms' net income before extraordinary items, and dividends as the firms' annual dividend per share. For the year of the dividend change, the firms which increased their dividends the most, have slightly higher median earnings than the no-change and dividend decreasing groups. The magnitude of the change in dividend also correlates with the median earnings. Both of these findings are in line with the article from Benartzi, Michaely and Thaler (1997).

For the companies in the sample, the median earnings deflated by market value of equity is 6.12%, indicating an average P/E-ratio of 16.3. Nonetheless, the only notable difference in comparison to data samples by Benartzi, Michaely and Thaler (1997) and Nissim and Ziv (2001), is that the sample in this paper has relatively less no-change observations for dividends.

3.2 Control variables

As a support on inspecting the relationship between dividend changes and earnings in the regression analyses, this study exploits five additional control variables. All the control variables are supported by research of Ou and Penman (1989), and the variable selection is made regarding the availability of data. All the control variables in the regressions are from the year prior to the earnings change observation, to reflect information that is already known by the market, before the earnings announcement.

The first control variable used is return on equity, as Nissim and Ziv (2001) suggest it to be the most important factor to control for when investigating the relationship between dividend changes and earnings. Ou and Penman (1989) report that return on equity is likely to be negatively correlated with earnings.

The second control variable is return on assets, which Zhou and Ruland (2006) have demonstrated to be negatively correlated to earnings, as companies that are already highly profitable, find it harder to keep increasing earnings. The third control variable is gross profit margin, representing the percentage that the company retains from the revenue after the production's direct costs. Ou and Penman (1989) report the gross margin to likely be positively correlated with earnings.

The fourth control variable is percentage change in revenue. Benartzi, Michaely and Thaler (1997) express that relative changes in revenue is likely to be positively correlated with earnings. As the fifth control variable is debt to equity ratio, which Ou and Penman (1989) expect to be negatively correlated with earnings.

Table 1: Descriptive Statistics

The main sample contains 6845 dividend change observations from public companies exchanged in Northern Europe between 2008-2017. Panel A presents the cross-sectional distribution of the dividend and earnings variables; and Panel B shows the distribution of the number of dividend change observations throughout the years. In Panel A, for each variable, P1 represents the 1st percentile of the distribution (i.e. 1% of the observations are of a lower value), P10 is the tenth percentile, Q1 is the first quartile, Q3 is the third quartile, P90 is the 90th percentile and P99 is the 99th percentile. Δ in earnings is the annual change in earnings before extraordinary items, deflated by the market capitalization of the firm in the beginning of the year, as a percentage. Earnings are defined as net income before extraordinary items, deflated by the market capitalization of the firm, as a percentage. For earnings, observations are divided to seven groups by the magnitude of change in dividends. Dividends are measured as the dividend per share divided by the company's share price as a percentage. Δ in dividend is the change in dividend per share deflated by share price at the beginning of year 0, as a percentage. Δ in dividend deflated by div. rather than share price is the percentage change in annual dividend per share.

Panel A: Distribution of Variables

Variable	P1	P10	Q1	Median	Q3	P90	P99
Δ in earnings	-30.52	-6.96	-1.63	0.50	2.57	7.66	41.37
Earnings: All	-57.08	0.56	3.91	6.12	9.18	14.33	38.10
Decreases	-99.88	-5.52	2.85	5.71	9.73	16.90	46.60
No-change	-76.97	-0.90	3.03	5.42	7.55	10.66	25.22
Increases: quintile 1	-21.63	0.99	3.94	5.93	8.87	13.31	28.89
Increases: quintile 2	-40.50	2.03	4.09	6.22	9.08	13.50	32.40
Increases: quintile 3	-17.89	2.14	4.14	6.18	8.95	13.47	35.52
Increases: quintile 4	-16.98	2.69	4.40	6.31	8.93	12.85	30.54
Increases: quintile 5	-19.03	1.83	4.55	6.81	10.38	15.89	43.60
Dividends	0.48	1.41	2.32	3.59	5.23	7.50	24.50
Δ in dividend: decreases only	-14.27	-3.63	-1.55	-0.44	-0.15	-0.06	-0.01
Δ in dividend: increases only	0.02	0.10	0.21	0.46	0.94	2.02	10.62
Δ in div. per share deflated by div. rather than price: decreases only	-80.71	-60.00	-35.21	-11.50	-4.74	-2.09	-0.63
Δ in div. per share deflated by div. rather than price: increases only	0.82	3.41	7.53	15.58	32.38	69.56	278.12

Panel B: Frequency of Dividend Changes by Year

Year	Number of decreases	Number of no-changes	Number of increases	Total for year
2008	393	27	153	573
2009	132	32	370	534
2010	88	24	446	558
2011	105	50	469	624
2012	156	40	481	677
2013	151	37	516	704
2014	128	26	574	728
2015	274	48	447	769
2016	296	43	469	808
2017	217	47	606	870
Total for category	1723	374	4531	6845

4. Analyses and results

The empirical study is divided into two parts. The first part focuses on categorical analyses and the second part covers regression analyses. Together the analyses will be able to provide insights on both main hypotheses.

4.1 Categorical analyses

In the first step, each dividend change observation is divided into either dividend decreasing group, no-change in dividend group or into a quintile corresponding the magnitude of increase in dividends. Quintile 1 represents the lowest dividend increases and quintile 5 represents the highest dividend increases. The dividend changes are defined as:

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

where $D_{i,0}$ is the dividend per share in year 0, and $D_{i,-1}$ is the dividend per share in year -1, i.e. the percentage change in annual dividend per share.

The second step is to calculate the unexpected earnings for all the dividend change observation from year 0 to year 2. Unexpected earnings are estimated in two ways in this study. In Panel A, the approach is to assume a random walk to the earnings:

$$UE_{i,t} = \frac{(E_{i,t} - E_{i,t})}{MV_{i,-1}},$$

where $UE_{i,t}$ is the unexpected earnings in year t, $E_{i,t}$ denotes earnings in year t, and $MV_{i,-1}$ is the closing market value of equity for the previous year from the dividend change. This paper decides to deflate the change in earnings by the market value of equity, as recommended by Benartzi, Michaely and Thaler (1997) instead of book value of equity, which is used by Nissim and Ziv (2001).

In the second approach, the random walk of earnings growth is corrected with the average five-year earnings drift of the company, to control firms' average long-term growth rates. Relationship of the earnings drift has been documented in the accounting literature by Foster (1977). As such, in Panel B, the unexpected earnings are defined as:

$$UE_{i,t} = \frac{(E_{i,t} - E_{i,t-1}) - (E_{i,t-1} - E_{i,t-5})/4}{MV_{i,-1}},$$

where $UE_{i,t}$ is the unexpected earnings in year t, $E_{i,t}$ denotes earnings in year t, and $MV_{i,-1}$ is the closing market value of equity for the previous year from the dividend change.

Table 2 reports the median and mean unexpected earnings along with respective significance levels for all the dividend change categories. The main focus in the analyses is on whether the earnings changes of dividend changing groups are statistically different from the no-change group and on which direction. In Panel A, significance levels are calculated in comparison to the no-change group, and in Panel B, significance levels measure if the adjusted earnings changes are significantly different from zero, measuring the firms' ability to maintain the same growth rate as in the previous years, as the earnings are already corrected with the drift.

In Panel A, the relationship between dividend changes and unexpected earnings is strong in year 0, as higher dividend changes imply significantly higher earnings changes for each of the groups on both means and medians. In year 0, the no-change group experience a decline of 1.10% in earnings, and for the dividend decreasing group the earnings decline 2.28% on average, while all dividend increasing groups experience positive changes in earnings, showing strong relationship between the magnitude of change in dividends and earnings.

However, the same correlation does not apply for the following years, as all of the observations on year 1 are statistically insignificant. In year 2, there is only a small number of significant earnings changes, but the observations oppose the dividend signalling theory. Dividend increasing quintiles 3 and 5 show significantly lower average earnings growth than the no-change group, while the median of the dividend decreasing group is significantly higher than the reference group. Even while a few of the observations suggest a negative relationship, due to the low number of significant values in years 1 and 2, in Panel A, the relationship can be concluded to be insignificant.

The results in Panel B are also unfavourable to the dividend signalling theory. Similarly to Panel A, the year 0 dividend changes are strongly correlated with earnings growth, but most of the observations in the following years are insignificant or show negative relationship with dividend changes with a wrong sign. Regarding both panels, the results do not suggest that the magnitude of dividend change is positively correlated with future unexpected earnings and even implies that the relationship might be slightly negative.

Table 2: Earnings Growth After Dividend Changes

This table reports earnings changes in year 0 and the two following years from the dividend change. Each observation is divided to a quintile by the magnitude of increasement in dividend, the no-change group or the dividend decreasing group. Dividend changes are defined as the percentage change in annual dividend per share. In Panel A, Raw earnings changes are the annual change in net income before extraordinary items, deflated by the market capitalization at the beginning of the year, as a percentage. In Panel B, earnings changes are defined as the annual change in earnings minus the average earnings drift from the last five years, deflated by the market capitalization of the beginning of the year, as a percentage.

Dividend Change	(Median Dividend Change)	Year 0		Year 1		Year 2	
		Mean	Median	Mean	Median	Mean	Median
Panel A: Raw Earnings Changes (n = 6845)							
Decreases	(-11.28)	-2.28*	-0.98**	1.40	0.51	1.71	0.78*
No-change	(0.00)	-1.10	-0.31	0.60	0.48	1.03	0.47
Increases: quintile 1	(3.39)	0.72**	0.31**	1.24	0.51	0.40	0.32
Increases: quintile 2	(8.85)	1.41**	0.63**	0.34	0.48	0.89	0.46
Increases: quintile 3	(15.52)	1.66**	0.88**	0.92	0.47	0.13**	0.32
Increases: quintile 4	(26.00)	2.00**	1.34**	0.44	0.67	0.69	0.43
Increases: quintile 5	(69.19)	4.00**	2.54**	0.15	0.53	0.16*	0.39
Panel B: Earnings Changes Minus 5-Year Drift (n = 6652)							
Decreases	(-11.26)	-2.53**	-1.44**	1.52**	0.26**	1.56**	0.70**
No-change	(0.00)	-0.89	-0.60**	0.92	0.55*	1.07*	0.44*
Increases: quintile 1	(3.38)	0.37	-0.27*	0.95**	0.20*	0.02	-0.11
Increases: quintile 2	(8.78)	1.03**	0.09*	0.13	-0.06	-0.12	-0.01
Increases: quintile 3	(15.33)	0.73*	0.27**	0.29	-0.09	-0.86**	-0.20*
Increases: quintile 4	(25.20)	1.52**	0.74**	-0.13	-0.13	-0.25	-0.27*
Increases: quintile 5	(66.67)	3.43**	1.58**	-0.88*	-0.35**	-0.66	-0.46**

In Panel A: *, ** Significantly different from the no-change group at the 0.10 and 0.01 significance levels using two-tailed Student's t-test for the means and a two-tailed Wilcoxon test for the medians.
In Panel B: *, ** Significantly different from 0 at the 0.10 and 0.01 significance levels using two-tailed Student's t-test for the means and a two-tailed Wilcoxon test for the medians.

4.2 Regression analyses

The regression analyses are conducted using additional accounting data as control variables, making the sample sizes smaller due to data availability. The approach is to regress earnings changes from years 0, 1 and 2 to year 0 dividend changes and control variables from year t-1. With this method, it is possible to see if dividend changes add explanatory power to the development of future earnings. All the control variables are applied to the regression from a year prior to the earnings change, as only information that is known before the earnings announcements could have been used to predict the changes in earnings. The results of the regression analyses are reported in Table 3.

In the regressions, earnings are assumed to follow a random walk, and dividend changes are defined as the percentage change in the annual dividend per share. In Panel A, earnings changes are regressed on the dividend changes only, and in Panel B, return on equity from year t-1 is added to the formula as an independent variable due to Nissim and Ziv (2001) suggesting it to be the most important variable to control for. In Panel C, all five chosen control variables are applied to the regression model to see if other variables can help explain earnings changes better than dividend changes.

In Panels A and B, the relationship between dividend changes and unexpected earnings is significantly positive on year 0 with t-statistics over 17.0, but contrary to dividend signalling theory, turns significantly negative on the following years with t-statistics of lower than -2.9. However, it is worth noticing that the adjusted R^2-values remain low throughout the regressions, with highest values being 0.05 for year 0, and 0.01 for the following years.

In Panel C, the year 0 relationship is also significantly positive, but the explanatory power vanishes on the following years, as the effects are minor and insignificant. With the complete multivariate regression, the R^2 increases in comparison to the previous regressions but remains low, with a value of 0.07 for year 0, and 0.01 for the following years. Altogether, the regression analyses fail to support the dividend signalling theory under each specification, with the simplest forms of regression even suggesting the relationship of dividend changes to negative with earnings changes.

Table 3: Explanatory Power of Dividend Changes on Future Earnings

In the regression models the dependent variable $(E_{i,t} - E_{i,t-1})/MV_{i,-1}$ is the annual change in net income before extraordinary items, deflated by the market capitalization at the end of year -1. $\Delta DIV_{i,0}$ is the percentage change in annual dividend per share in year 0. $ROE_{i,t-1}$ is the return on equity of year t-1, $ROA_{i,t-1}$ is the return on assets in year t-1, $GMA_{i,t-1}$ is the gross profit margin in year t-1, $REV_{i,t-1}$ is the annual change in revenue in year t-1 as a percentage, and $DE_{i,t-1}$ is the debt to equity ratio of year t-1.

	Year 0		Year 1		Year 2	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
Panel A: Coefficient Estimates for the Univariate Regression Model $\frac{(E_{i,t} - E_{i,t-1})}{MV_{i,-1}} = \alpha + \beta \Delta DIV_{i,0} + \varepsilon_{i,t}$						
Intercept	-0.0009	(-0.856)	0.0093	(7.902)	0.0082	(8.064)
ΔDiv	0.0441	(17.357)	-0.0117	(-4.169)	-0.0111	(-4.540)
Adj. R^2	0.0436		0.0025		0.0030	
N	6845		6808		6789	
Panel B: Coefficient Estimates for the Multivariate Regression Model, Controlling for ROE $\frac{(E_{i,t} - E_{i,t-1})}{MV_{i,-1}} = \alpha + \beta_1 \Delta DIV_{i,0} + \beta_2 ROE_{i,t-1} + \varepsilon_{i,t}$						
Intercept	0.0035	(1.898)	0.0181	(9.002)	0.0118	(7.247)
ΔDiv	0.0482	(17.096)	-0.0092	(-2.972)	-0.0076	(-2.944)
ROE	-0.0341	(-4.56)	-0.0521	(-6.153)	-0.0296	(-4.188)
Adj. R^2	0.0547		0.0088		0.0051	
N	5465		5398		5366	
Panel C: Coefficient Estimates for the Complete Multivariate Regression Model $\frac{(E_{i,t} - E_{i,t-1})}{MV_{i,-1}} = \alpha + \beta_1 \Delta DIV_{i,0} + \beta_2 ROE_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 GMA_{i,t-1} + \beta_5 REV_{i,t-1} + \beta_6 DE_{i,t-1} + \varepsilon_{i,t}$						
Intercept	-0.0049	(-1.178)	0.0036	(0.729)	0.0000	(-0.013)
ΔDiv	0.0411	(13.101)	-0.0054	(-1.247)	-0.0036	(-1.102)
ROE	-0.0102	(-0.519)	-0.0289	(-1.578)	-0.0520	(-2.487)
ROA	-0.5580	(-1.132)	-0.0102	(-0.180)	0.0493	(0.962)
GMA	0.0079	(1.034)	0.0009	(0.096)	0.0124	(1.677)
REV	0.0036	(0.372)	-0.0173	(-1.351)	-0.0105	(-1.025)
DE	0.0021	(0.609)	0.0122	(3.095)	0.0107	(3.051)
Adj. R^2	0.0718		0.0085		0.0079	
N	2333		2310		2188	

4.3 Robustness checks

This study tests the reliability of the results by running the complete multivariate regression with alterations to the data samples. The first test examines if there are regional differences inside the main data set, and the second test inspects whether the results are affected by a change in the collection time period of the data.

The main data set is based on the United Nations geoscheme, which unlike some other definitions, includes the United Kingdom as a part of Northern Europe. As the companies from United Kingdom account for approximately half of the total dividend change observations, for the first robustness test, this study further divides the main data to two samples: companies from the United Kingdom and companies from Northern Europe (by the definition of EuroVoc). The results of the first test are reported in Panels A and B of Table 4.

The second robustness test examines if changing the time period from which the data was collected affects the results. Particularly, as the time period of the original data set begins from 2008, the results may be impacted by the financial crisis of 2008 and the following Great Recession. The characteristics of the firms in the following data sample are corresponding to the original but take place ten years prior. The results of the second robustness test are reported in Panel C of Table 4.

In Panels A and B, the results stay robust with the previous regression, and both United Kingdom and Northern Europe samples suggest significant positive relationship between dividend changes and unexpected earnings in year 0 with t-statistics of over 8.8. In the following years, the coefficients of dividend changes are statistically insignificant, implying no major differences between the geographical areas.

In Panel C, the results follow a similar pattern that was seen in the previous regressions. In year 0, the relationship between dividend changes and unexpected earnings is positive and significant with a t-statistic of 12.3, but for the following years, dividend changes fail to employ any statistically significant explanatory power. As a conclusion, both occasions of robustness tests executed, support the results presented in this thesis, showing no evidence backing the dividend signalling theory.

Table 4: Robustness Tests

In the regression model the dependent variable $(E_{i,t} - E_{i,t-1})/MV_{i,-1}$ is the annual change in net income before extraordinary items, deflated by the market capitalization at the end of year -1. $\Delta DIV_{i,0}$ is the percentage change in annual dividend per share in year 0. $ROE_{i,t-1}$ is the return on equity of year t-1, $ROA_{i,t-1}$ is the return on assets in year t-1, $GMA_{i,t-1}$ is the gross profit margin in year t-1, $REV_{i,t-1}$ is the annual change in revenue in year t-1 as a percentage, and $DE_{i,t-1}$ is the debt to equity ratio of year t-1.

$$\frac{(E_{i,t} - E_{i,t-1})}{MV_{i,-1}} = \alpha + \beta_1 \Delta DIV_{i,0} + \beta_2 ROE_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 GMA_{i,t-1} + \beta_5 REV_{i,t-1} + \beta_6 DE_{i,t-1} + \varepsilon_{i,t}$$

	Year 0		Year 1		Year 2	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
Panel A: Coefficient Estimates for the Multivariate Regression Model of Firms from Northern Europe						
Intercept	-0.0043	(-0.770)	-0.0019	(-0.307)	-0.0005	(-0.096)
ΔDiv	0.0399	(11.357)	0.0072	(1.629)	-0.0039	(-0.996)
ROE	-0.0666	(-1.740)	-0.1166	(-2.572)	-0.0906	(-2.263)
ROA	0.0495	(0.626)	0.1559	(1.641)	0.1244	(1.457)
GMA	0.0002	(0.021)	0.0007	(0.060)	0.0173	(1.672)
REV	-0.0082	(-0.815)	-0.0317	(-2.174)	-0.0232	(-1.741)
DE	0.0138	(2.719)	0.0202	(3.359)	0.0137	(2.432)
Adj. R^2	0.1135		0.0174		0.0138	
N	1188		1174		1136	
Panel B: Coefficient Estimates for the Multivariate Regression Model of firms from the United Kingdom						
Intercept	-0.0086	(-1.367)	0.0081	(1.139)	-0.0024	(-0.390)
ΔDiv	0.0506	(8.821)	-0.0120	(-1.583)	-0.0004	(-0.074)
ROE	0.0019	(0.102)	-0.0449	(-2.685)	-0.0291	(-1.506)
ROA	-0.0430	(-0.678)	0.0433	(1.597)	0.0315	(0.479)
GMA	-0.0009	(-0.081)	-0.0114	(-0.831)	0.0035	(0.320)
REV	0.0216	(1.691)	-0.0184	(-1.057)	-0.0103	(-0.694)
DE	0.0028	(0.647)	0.0151	(3.423)	0.0128	(3.089)
Adj. R^2	0.0626		0.0143		0.0067	
N	1145		1136		1052	
Panel C: Coefficient Estimates for the Multivariate Regression Model from 1998-2007						
Intercept	0.0208	(4.949)	0.0064	(1.540)	0.0094	(1.904)
ΔDiv	0.0414	(12.272)	0.0012	(0.326)	-0.0051	(-1.254)
ROE	-0.0596	(-3.633)	-0.0224	(-1.223)	-0.0799	(-4.279)
ROA	-0.0744	(-2.065)	-0.0465	(-1.094)	0.0188	(0.420)
GMA	0.0013	(0.192)	-0.0074	(-1.097)	-0.0142	(-1.643)
REV	-0.200	(-3.507)	0.0001	(0.025)	-0.0090	(-0.951)
DE	0.0052	(1.753)	0.0031	(1.191)	0.0100	(3.500)
Adj. R^2	0.0729		0.0026		0.0141	
N	2826		3185		3287	

5. Conclusion

In this study I examine if changes in dividends can help explain changes in companies' future earnings, testing the debated dividend signalling theory. As paying dividends is costly to firms, it is not surprising that the market treats the changes as newsworthy. I capture the effects of dividend changes by using annual percentage change as an independent variable in regressions to see if the explanatory power on future unexpected earnings is statistically significant. I also examine if the magnitude of dividend changes correlates with the level of earnings changes with categorical analyses. The data set consists of public companies that are exchanged in Northern Europe, containing 6845 observations on dividend changes from 2008-2017.

I find no evidence to back up the dividend signalling theory, as significant positive relationship between dividend changes and future earnings changes is not found in the regression analyses, even though the correlation is significant on the year of the dividend change. Also, to an extent, the categorical analyses imply that the firms' that do not change dividends perform better than dividend increasing groups, while also showing worse results than the dividend decreasing group. As a conclusion, the findings of thesis suggest that dividend changes cannot reliably be used to predict changes in companies' future earnings.

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