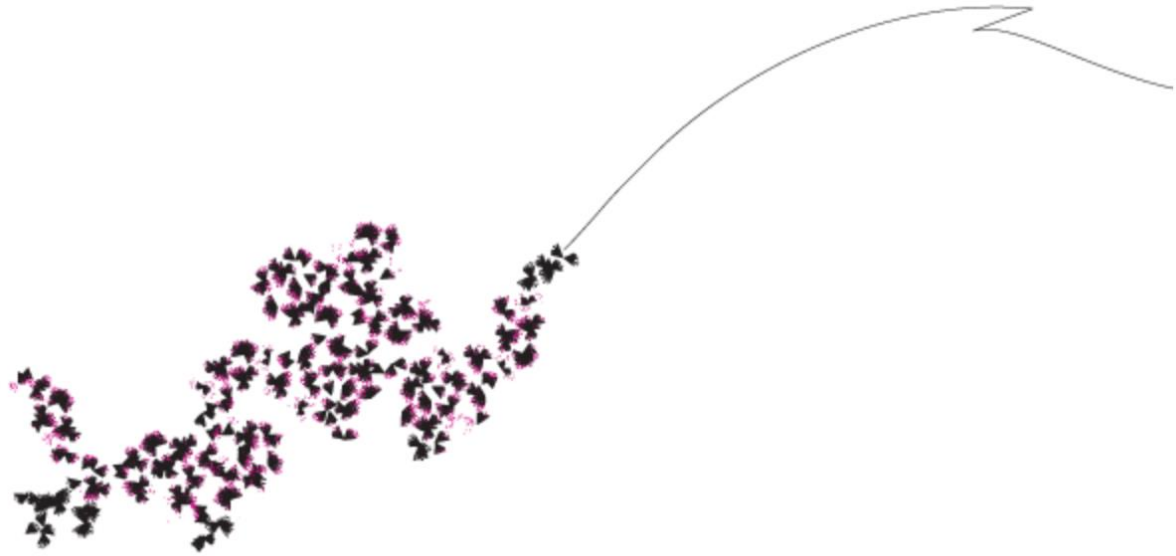
The impact of dividend payout ratio on future earnings growth

Evidence from Dutch non-financial listed companies



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Abstract

In this study, the relationship between dividend payout ratio and future earnings growth is examined in the Dutch stock market. Based on a sample of 50 Dutch listed firms, ordinary least squares (OLS) regression analysis is conducted. The results give an indication of a positive relationship between the dividend payout ratio and the future earnings growth. However, this outcome is not robust. When looking at the subsamples it gives an indication that the impact is greater for bigger firms, however, this impact is not significant. Future research should further develop and confirm these initial findings by performing the analysis on a larger sample by using more observation years and different variable combinations in the regression. This study mainly contributes to the knowledge about the impact of the dividend payout ratio on future earnings growth in the Dutch market.

Keywords: Dividends, Dividend payout ratio, future earnings growth

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1 Introduction

The issue of dividend payout and what role it plays on the subsequent earnings growth of a company has been subject of discussion for decades. More than 40 years ago, Black (1976), in his article about the dividend puzzle, already argued the following, ''The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that don't fit together''. The extensive research that is done into dividend payout not only shows that there is no general theory for it, but also shows that corporate dividend practice varies over time, among firms and across countries (Amidu, 2007).

The discussion about dividends, and what role they play started with the publication of the dividend irrelevance theorem from Modigliani and Miller (1961). Arguing that, under certain assumptions that all need to be fulfilled, dividend policy has no impact on the market value of a company or its capital structure. These assumptions are: 1. Information is costless and available to everyone equally. 2. No distorting taxes exist. 3. Flotation and transportation costs are non-existent. 4. None contracting, or agency cost exists.

However, Arnott and Asness (2003) found results challenging this theory. They used the S&P 500 companies to investigate the relationship between the dividend payout ratio and future earnings growth. And indeed, they found a positive association indicating that a higher dividend payout ratio will cause a higher future growth. Arnott and Asness (2003) argue that dividends are relevant, following theories such as the bird in the hand theory (Gordon, 1962), the free cash flow hypothesis (Zhou & Ruland, 2006) and the signalling theory (Bhattacharya, 1979; John & Williams, 1985; Miller & Rock, 1985).

When comparing the two viewpoints on the impact of dividend payout it is important to discuss the assumptions that Modigliani and Miller made for their theory. First, when looking in a theoretical way, no consensus can be found. The first group argues that dividends do have impact whereas the second group argues that, under certain conditions, it does not. However, when looking at it in a practical world, the assumptions from the theory from Modigliani and Miller

(1961) do not stand true. Making their dividend irrelevance theory a purely theoretical hypothesis which will not hold in the practical world.

When looking at the companies in the Netherlands, as far as the author knows, no study that investigates this effect at the company level has been performed for the Dutch market. Therefore, this paper answers the following research question: ''What is the impact of dividend payout on future earnings growth when looking at Dutch listed firms?''

Previous studies about the impact of dividend payout ratio on future earnings growth in the Netherlands is unsatisfactory, since the effect is only observed at the market-index level (comparing different markets in several different countries). Taking all the listed companies in the Netherlands as 1 observation. The issue with market level studies such as the ones from Arnott and Asness (2003), Gwilym, Seaton, Suddason and Thomas (2006) is that the market-index is weighted, and a few large markets dominate the overall outcome of the results. This study overcomes the market level problem by examining the effect at the company level. Which will give a more balanced insight into the relationship between the dividend payout ratio and future earnings growth in the Netherlands.

This paper uses several articles that where published in journals as a benchmark. The first article from Prasangi and Wijesinghe (2016) investigates the impact of dividend payout ratio on future earnings growth at the firm level. They investigated 40 companies at the Colombo Stock Exchange during the period 2006-2012. The second article from Huang, You and Lin (2009) about the dividend payout ratios and subsequent earnings growth investigates the same phenomenon but on the Taiwanese stock exchange. Their sample consists of 497 firms and the investigated time frame is 2000-2004. The third article that is used is from Flint, Tan and Tian (2010) who investigated the future earnings growth based on the current dividend payout ratio. Their sample consists of 682 firms listed on the Australian Stock Exchange over the period 1989-2008. The last article that is used is from Gwilym, Seaton, Suddason and Thomas (2006) about the international evidence on the payout ratio, earnings, dividends and returns. Investigating 11 different countries at the country level approach during the years 1965-2004.

This study investigates the impact from dividend payout on future earnings

growth for Dutch listed non-financial companies. For the analysis a sample of 50 companies is used with observations during the years 2012, 2014, 2015, 2016 and 2018. Within this study, the year 2015 is used as the base year. To perform the analysis, an OLS regression is performed. This study finds that the dividend payout ratio has a positive and significant impact on future earnings growth for the one and three year periods. However, these results are not robust.

Conventional wisdom suggests that a high dividend payout ratio reduces the future earnings growth of a company. This effect is assumed to be caused by the retained earnings that leave the company in the way of dividends, decreasing the amount of cash a company has available for investment opportunities and thus, decreasing the future profitability (Gordon, 1962). However, Arnott and Asness (2003) found evidence against this and argue that a high dividend payout ratio corresponds to higher future earnings growth. This contradiction creates confusion for investors on the Dutch stock markets in their decision-making process about future earnings after an announcement of dividends or dividend payout. Understanding the relationship in the Dutch stock market between the dividend payout ratio and the future earnings growth will have important impact on the company valuations that are made by investors. Therefore, this study will further investigate the impact of dividend payout on future earnings growth. And contribute to the academic knowledge that is available about this subject.

Besides investors, the results from this study are also important as guidance for financial managers. The outcome from this paper may guide them in their dividend payout decisions, because this paper indicates what effect the dividend payout decision has on the future earnings growth, which will ultimately impact the shareholders wealth.

The remainder of this paper is structured as follows. Section 2 covers the literature review. This is followed by the hypothesis development. Section 3 discusses the methodology. Followed by section 4, which covers the data. Section 5 presents the results and examines the robustness of the findings. Section 6 concludes.

2 Literature review

The first section of this chapter will describe several theories regarding dividend payout ratio and their possible effects on future earnings growth. The second part of this chapter will describe empirical studies that are done and their outcomes. The third part will handle the current situation in the Netherlands and Europe regarding the dividend payout ratio and what that might imply for the results from this study. The last part of this chapter will discuss the hypothesis that is used to test the research question.

2.1 Theories

There are many theories and thoughts in the scientific world about the effect of a dividend payout ratio on a company's future growth. These theories can be divided into two large opinion groups namely: the dividend relevance theory and the dividend irrelevance theory. The theories, the reasoning and empirical evidence will be discussed. Starting with the dividend irrelevance theories, followed by the dividend relevance theories.

2.1.1 Dividend irrelevance

The dividend irrelevance theory by Miller and Modigliani (1961) argues that the dividend policy of a firm is independent from the value of the share price. This theory is based upon certain assumptions that need to be fulfilled for their theory to be effective Miller and Modigliani (1961) argue that the dividend is a companies' residual. The dividend irrelevance theory argues that it is indifferent to shareholders and companies if they receive their expected return in the form of dividends or in the form of an increase in the share value. The theory is based on four assumptions; 1. Information is costless and available to everyone equally. 2. No distorting taxes exist. 3. Flotation and transportation costs are non-existent. 4. None contracting, or agency cost exists.

In consensus with Miller and Modigliani (1961) is the study from Black and Scholes (1974) about the relationship between the dividend policy and the stock returns on the New York Stock Exchange. Their goal was to identify the impact of

dividend policy on stock prices. The outcome from their study is that that the expected return, either on high or low dividend stocks is the same. Which supports the dividend irrelevance theory from Miller and Modigliani. Another important factor that plays a role in the payout policy from a company is the capital structure. Many studies found empirical evidence that companies prefer internal funds when a growth opportunity occurs. This is caused by the fact that external financing is more expensive than internally generated funds. Besides that, internally generated funds are easier to access and require less work in comparison to external financing. Rozeff (1982) argued that the investment policy from a company directly influences their dividend payout ratio. He argues that companies that are in a growth phase prefer to hold on to their cash instead of paying it out in dividends. This technique limits their amount of financing needed from external more expensive funds. This arguing leads to a negative relationship between the dividend payout and the expected future growth. Myers (1984) called this theory the pecking order theory, which implies that companies prefer internally generated funds to invest in new opportunities instead of external more expensive financing methods. The financing from internal funds reduces the amount of retained earnings that can be distributed to the shareholders. And thus, lower dividend payout will be associated with higher future earnings growth. Besides the cost-aspect internal financing needs less information that must be exposed to the outside world. When using public financing, a company needs to expose a lot of internal and probably sensitive information to convince the potential investors. This loss of information might harm the company because anyone can investigate your business figures and plans. Internal financing however can be done without this loss of information and can be done with the own retained earnings from the company.

The mentioned theories indicate that there is a lot of research done that supports the idea that a lower dividend payout will increase the internal funds, which should lead more investment opportunities, which ultimately results in higher future earnings growth.

2.1.2 Dividend relevance

There are many theories that argue that dividend has relevance. One of them is the signalling theory, which implies that firms signal future expected profitability by paying dividends (Miller & Modigliani 1961; Bhattacharya, 1979; Miller & Rock, 1985). The payment of dividends is a positive signal for investors and indicates that a company has trust in their future. They give the signal that they don't need all the retained earnings and are able to pay a part of it to their shareholders. These payments generate trust, because a company indicates that it does not need all the money they generate because their underlying business activities are so strong that they able to easily generate the money themselves or attract the money externally. This leads to higher stock prices that make it easier for a company to generate equity when they need it for investments. Bhattacharya (1979) argues that outside investors have imperfect information about the profitability from a firm and that cash dividends are taxed at the higher ordinary income tax rate, whereas capital gains are taxed at a lower rate. Under these conditions, dividends function as a signal of expected cash flows.

The signalling theory suggests a positive relationship between dividend policy and future earnings growth. Contrary to this positive relationship is the danger in the signalling theory. Managers might be afraid to cut dividends because of the signal it might send to the shareholders. This could become dangerous for companies because they could be paying more dividends than they officially can afford.

Besides the signalling theory the free cash flow hypothesis (Jensen, 1986) also supports the relevance of dividend payments. The free cash flow hypothesis states that a company that has large sums of free cash have the tendency to overinvest and are less disciplined with their spending's. These overinvestments are often less profitable and may even cause a company to get in financial trouble because these investments are not in their area of expertise or might be too risky. And thus, the retaining of cash in the company is not always a guarantee for future earnings growth.

2.1.3 Conclusion dividend relevance/irrelevance

Both the dividend relevance theory and the dividend irrelevance theory suggest that the dividend payout ratio has an impact on the future earnings growth. Whereas dividend irrelevance argues that a higher dividend payout will produce a lower future growth, which could be explained by the pecking order theory. However, the dividend relevance theory suggests that higher dividends will cause a higher future growth, supported by several theories such as the signalling theory, bird in the hand theory and free cash flow hypothesis.

Since both theories suggest a potential effect from the dividend payout ratio on the future earnings growth, it is interesting to investigate the dependency of the future earnings growth on the dividend payout ratio. Table 1 shows the discussed theories and their expected effects on future earnings growth.

2.2 Empirical evidence

The main variable that is investigated is the dividend payout ratio. However, there are other variables that are expected to influence a firm future earnings growth and need to be controlled for. The empirical evidence regarding the different variables are discussed in chapter 2.2.1 and 2.2.2.

2.2.1 Dividend payout ratio

For quite some time, supported by many empirical studies, there was the assumption that high dividend payout ratios would directly impact the retained earnings from companies, and thus their investment plans, which ultimately leads to lower future earnings growth. However, Arnott and Asness (2003) recently found evidence contrasting that assumption and found that there is a positive association between the dividend payout ratio and the future earnings growth.

The dividend puzzle is based upon the dividend irrelevance theorem from Miller and Modigliani (1961), who argue that the value of a firm is independent from the portion of retained earnings from that firm. De Angelo and Skinner (1996) found support for this theory. They tried to investigate the signalling effect from Bhattacharya (1979) to investigate if managers' dividend decisions help to identify firms with superior future earnings. De Angelo and Skinner (1996) found no support for the signalling theory and thus support for the dividend irrelevance

theorem. However, they only investigated 145 NYSE firms whose annual earnings declined after nine or more consecutive years of growth. Which seriously limited their sample and study outcomes, one year after that, Bernartzi, Michaely and Thaler (1997) conducted a similar kind of study, investigating the signalling content from dividends about future earnings growth. They found limited support for this theory in the years -1 and the year 0, which is the year that the firm increases the dividend. After those 2 years (-1 & 0) they found no unexpected future earnings growth. Besides that, they found evidence that the size of the dividend increase is also irrelevant to the future earnings growth of a company. Overall, they found little predictive evidence from a dividend increase to the future earnings growth of a company. Besides increases they also investigated dividend cuts. They found a positive relationship between dividend cuts and earning increases in the following years. The study from Gul (1999) on the Shanghai Stock Exchange from 1990 to 1995 examines the relationship between Government share ownership, investment opportunities and corporate policy choices. They found evidence that companies that have high growth opportunities have a low dividend payout ratio and vice versa. La Porta, Lopez-de-Silanes, Schleifer and Vishny (2000) investigated agency problems and dividend policies around the world. Their main goal was not to find a specific relationship between the dividend payout and future earnings. However, they found that shareholders were willing to wait for dividends when there are high investment opportunities. Which implies that lower dividends will cause higher investments, and thus, should cause the future earnings growth to rise.

The mentioned results above only investigated the effect when there was a change in dividends and not the overall payout ratio. The first study that tested the effect using the payout ratio was the one from Arnott and Asness (2003), who investigated the relationship between dividend payout and future earnings growth. Contrasting previous empirical results, they found a positive relationship between the payout ratio and future earnings growth. In line with these are the results from the study from Gwilym, Seaton, Suddason and Thomas (2006) who found out that the greater the proportion of earnings paid out as dividends, the greater the subsequent real earnings growth. They extended the work from Arnott and Asness (2003) and investigated this in 11 international markets (France,

Germany, Greece, Italy, Japan, Netherlands, Portugal, Spain, Switzerland, United Kingdom and the United States) during the years 1965-2004. Besides that, they also found that higher payout ratios do not result in a future higher real dividend growth.

Zhou and Ruland (2006) did a similar study. However, they investigated if the relationship also holds when it is investigated at the company level instead of looking at complete markets. They argue that the previous outcomes from the tests that used aggregate market data might differ from their outcome using company level data. Zhou and Ruland (2006) found that high dividend payout companies tend to experience strong future earnings growth. They also found robustness when using alternative measurement methods. Huang, You and Lin (2009) extended the work from Zhou and Ruland (2006) and included dual dividends and cash and stock dividends. With this they tried to determine the robustness from the results from Zhou and Ruland (2006). Huang, You and Lin (2009) found similar results and positive evidence that the payout ratio has a positive association with earnings growth. Flint, Tan and Tian (2010) investigated companies listed at the Australian Stock Exchange over the period 1989 to 2008. And found evidence that the dividend payout ratio has a positive relationship with future earnings growth. The investigation was done investigating a one, three and five year period and the results hold over all three periods. Furthermore, their results showed that this effect was not caused by a simple mean reversion in earnings and they found no evidence that the cash flow, signalling and free cash flow hypothesis are the explanation for the relationship they found. Prasangi and Wijesinghe (2016) continued this type of study and investigated more than one time period. They looked at the one and three year time horizons. The firm level approach was used, and they investigated 40 companies that were listed in the Colombo Stock Exchange during the years 2006 to 2012. Prasangi and Wijesinghe (2016) found that the payout ratio is positively linked to the future earnings growth and that this relationship is significant at the one year time period. However, they found no significant relationship when looking at the three-year period that they investigated. Which might be due to their relatively small sample size of only 40.

There are two points of view about the impact of dividends on the future earnings growth. Both views are supported by lots of empirically and respected studies. Whereas the first and oldest view argues that the dividend payout from a company reduces its financial funds available to finance future growth and investment opportunities. And eventually, the expected outcome is that the dividend payout will have a negative impact on the future growth. However, the second point of view contradicts the first one and argues that a dividend payment is a sign from a company that they are in good financial health and that they have more than enough cash to pay out to their shareholders. It is argued that those companies already have a solid income base to grow from and to not need all the cash they generate for their future growth opportunities. Table 1 shows all the empirical evidence and their sign.

2.2.2 Evidence for the control variables

Within this study, several control variables are used to control for possible impact from variables other than the independent variable. These control variables are: size, return on assets, leverage and past earnings growth. This section will discuss the empirical evidences that are found for these variables regarding their relationship with future earnings growth.

Following the theory from Schumpeter's (1934) it is expected that large companies grow less than smaller companies. His theory is based upon the argument that an innovation will cause imitation by other companies after a while, which leads to saturation of the market and eventually will decrease the earnings growth rate. However, Gibrat's Law (Gibrat, 1931) states that the size of a company and its growth rate are independent variables. Evans (1987) found evidence that firm size has a negative relationship with firm growth. Evans (1987) investigated 100 different industries and had a total sample of 42.339 firms in the US. More recent research from Johansson (2004) also found that firm growth decreases when firm size increases. These results reject Gibrat's Law and are in line with the theory from Schumpeter.

Table 1: Dividends on firm future earnings growth

Sign	*Major finding*	*Study from*	*Year of publication*
-	No support for the signalling theory	De Angelo & Skinner	1996
-	High growth opportunity companies have low payout ratios	Gul	1999
-	lower dividends causes higher investments	La Porta, Lopez-de-Silanes, Schleifer & Vishny	2000
/	positive earnings from t -1 to 0 but no evidence for future earnings growth	Bernartzi, Michaely & Thaler	1997
+	Dividend payout on future earnings growth	Arnott & Asness	2003
+	Dividend payout on subsequent earnings growth	Gwilym, Seaton, Suddason & Thomas	2006
+	Dividend payout on future earnings growth	Zhou & Ruland	2006
+	Dividend payout on future earnings growth	Huang, You & Lin	2009
+	Dividend payout on future earnings growth	Flint, Tan & Tian	2010
+	Dividend payout on future earnings growth	Prasangi & Wijesinghe	2016

Notes: this table presents the major findings when looking at previous researches that were done regarding the subject dividend payout and future earnings growth and the belonging theories. The (-) indicates a negative and significant relationship between the dividend payout and future earnings growth. The (+) indicates that a positive and significant relationship was found. The (/) indicates no evidence.

However, when looking at empirical evidence from the Dutch market, Audretsch, Klomp, Santarelli and Thurik (2004) found evidence for Gibrat's Law and thus accepted the fact that the size of a firm has no relationship with its growth rate. Worth mentioning is that the study from Audretsch, Klomp, Santarelli and Thurik (2004) only focused on the Dutch hospitality industries (restaurants, cafes, hotels and camping's). When focusing on the benchmark journals, they all expect and find a negative relationship between size and future growth (Huang, You & Lin, 2009; Flint, Tan & Tian, 2010; Prasangi & Wijesinghe, 2016).

When a company experiences high return on assets, it is difficult to maintain and continue those returns. Altunbas, Karagiannis, Liu and Tourani-Rad (2008) investigated the profitability of firms in the European Union with the aim of confirming a mean-reverting pattern. They found that the profitability indeed does follow a mean-reverting process and that profitability forecasting can be improved by using this. Fama and French (2000) also support that result in their study and argue that in a competitive market environment abnormal results cannot be maintained for a long time, because of the competitors and their imitating behaviour. This imitating behaviour eventually leads to a reduction in earnings growth. This negative relationship is also found in the studies from Flint Tan and Tian (2010) and Prasangi and Wijesinghe (2016).

Contrasting this expected outcome is the expected outcome from Huang, You and Lin (2009) who expect a positive relationship between ROA and the future earnings growth. They argue that this expected outcome is due to the signalling theory. Which is strange because u cannot modify the profitability of a firm to send a signal to the outside world.

High growth rate companies might need external financing to support their future growth. Besides that, following the pecking order theory, companies that attract external financing must deliver higher returns than the companies that pay their investments from internal financing. The empirical evidence regarding leverage and the effect on future earnings growth are mixed. Lang, Ofek and Stulz (1996), Barclay and Smith (2005) and Sheikh and Wang (2011) found a negative relationship between the future earnings growth and leverage, whereas Honjo and Harada (2006), Alkhatib (2012), Prasangi and Wijesinghe (2016) and Anton

(2016) show that there is a positive relationship between leverage and future earnings growth.

Using the lagged earnings growth, Arnott and Asness (2006) controlled for the potential effect of mean reversion in earnings. Flint, Tan and Tian (2010) expect a negative relationship between past earnings growth and future earnings growth. This expectation is based upon the theory from Fama and French (2000) that firms that have high earnings will attract new competitors into their market and eventually the market will saturate, and the profits will flow away due to competition. Flint Tan and Tian (2010) found a negative correlation between the past and future earnings growth. Which gives support for the mean reversion in earnings. Prasangi and Wijesinghe (2016) and Vermeulen and Smit (2011) also found negative correlations for this relationship.

2.3 Dividend payout in Europe and the Netherlands

When looking at the current dividend payout situation in the European Union, the fraction of dividend paying firms declines dramatically. Von Eije and Megginson (2006) studied the evolution of dividend policy from 1989 to 2003 in Europe and found that in this period the number of dividend paying firms declined from 91 to 62 per cent of all the listed companies. While the amounts of dividends paid as a fraction of corporate profits increased significantly during this period. Besides that, they found that company characteristics such as size, profitability and firm age increase the probability of paying dividend and the amount of dividend that is paid. When comparing the dividend policies in emerging markets to the developed markets it is found that developed markets have different norms. Whereas in emerging markets the emphasis is on dividend payout ratios, in developed markets it is more on the level of dividends paid. Which results in more volatile dividend payments in emerging markets than in developed countries (Glen, Karmokolias, Miller & Shah, 1995). Another difference is that emerging market companies do not consider dividend stability as important as developed market companies do (Jabbouri, 2016).

When looking at the Netherlands, it may be concluded that the rights of the shareholders can be significantly limited by the legal governance regime. The

Netherlands has a governance code, which listed companies are obliged to follow. This code tries to protect the interests of the shareholders, employees and other stakeholders. This shareholder protection is achieved by giving the working council a role in the supervisory boards. This substantially decreases the shareholders rights, which also refers to their influence on determining dividend policy. The corporate governance code includes rules about how the management should inform the rest of the company. It states how the board should be composed and what the position of the shareholders is in the company. At last it states what requirements apply to an internal audit function and an external auditor (Ministerie van Economische Zaken en Klimaat, 2017).

Renneboog and Szilagyi (2006) studied the dividend pay-outs of Dutch firms under the corporate governance code. They tried to investigate the impact of the shareholder power restrictions (due to the corporate governance code) on the dividend payout ratio. Their results showed a contradiction, it showed that there is a low payout ratio and that there is smoothed dividends in the Netherlands. Renneboog and Szilagyi (2006) argue that this is because the shareholders power is limited and that the shareholders are too weak to push higher dividend payouts.

2.4 Hypothesis development

This section will describe the hypothesis that is tested during this study. The hypothesis relates to the main variable investigated in this study namely the dividend payout ratio.

2.4.1 Dividend payout ratio

Following previous empirical evidence, of more or less comparable studies and the mentioned theories in the theories section above it is expected that the dividend payout ratio has a positive impact on the one and three year future firm performance (Arnott & Asness, 2003; Gwilym, Seaton, Suddason & Thomas, 2006; Zhou & Ruland, 2006; Huang, You & Lin, 2009; Flint, Tan & Tian, 2010; Prasangi & Wijesinghe, 2016). The Signalling theory and the free cash flow hypothesis also support this result. However, the pecking order theory contradicts this expected

outcome, assuming that companies prefer internally generated funds, which reduces the amount left over to distribute to shareholders as dividends.

The one and three year firm performance is chosen in line with Prasangi & Wijesinghe (2016) The other benchmark studies investigated the impact from dividend payout on future earnings growth the one, three and five year periods however, this is impossible due to a lack of available data. Following the theories and previous empirical outcomes, the following hypothesis is formulated:

Dividend payout ratio has a positive impact on the future earnings growth.

2.5 Conclusion

This chapter presented academic literature concerning dividend payout, future earnings growth, past earnings growth, size, leverage, price earnings ratios and return on assets. It can be concluded that these variables and their effects are complex and widely discussed. No consensus is found in the literature when looking at the hypothesis that is going to be tested. This might be because the markets where the empirical evidence are collected are different. Besides the markets, the investigated sectors are an important point to mention. Another factor that might play an important role is the sample size and the time frame that is used. These are all different and thus hard to compare.

The investigated variables and hypothesis is important and has a wide impact. This might be important for (potential) investors to further analyse and understand how the future revenue growth reacts on current or past activities or ratios. As well as for the managers of companies to understand better what impact their payout ratio has.

3 Methodology

This chapter will give a description of the research method that is used to answer the following research question: What is the impact of dividend payout on future earnings growth? To answer the research question, the formulated hypothesis is answered based upon the model. The first section of this chapter explains which research model is used to test the formulated hypothesis. The second section will give a description of the variables that were used to test the hypothesis and will further explain how these variables were measured. These variables are divided into 3 different sub-categories: independent variables, dependent variables and control variables. The third section will describe the method that is used to answer the hypothesis. The fourth section of this chapter will describe how the assumptions are met and what robustness tests are performed to assure that the results are robust. The last section will describe the sample and data selection.

3.1 Model

To test the hypothesis in this study, two regressions are conducted with different time horizons. The first regression will test the one year future earnings growth, whereas the second regression will test the three year future earnings growth. The base year for these regressions is 2015, which is t_0. Using 1 base year is in line with Prasangi and Wijesinghe (2016). The model used in this study as previously mentioned is the Ordinary Least Square model. This model is used to examine the impact of dividend payout ratio on the future earnings growth. The Ordinary Least Square model is commonly used in previous studies that were examining a similar research question. OLS is a straightforward regression technique, if all the regression conditions are accounted for. These conditions are: normality, multicollinearity and heteroscedasticity.

The variables used to test the hypotheses are based on previous studies. Prasangi and Wijesinghe (2016) used the same variables in their study. However, there are some differences when looking at the other benchmark studies. Flint Tan and Tian test the same variables as mentioned beneath and besides that also included the E/P Ratio. When looking at the model from Vermeulen and Smit

(2011) it can be observed that they also test for comparable variables. Besides those variables, they used the variable asset growth instead of earnings growth to test if companies that grow acquire more assets in the future. However, in line with Flint, Tan and Tian (2010) and Prasangi and Wijesinghe (2016), this variable is not included because it will not help to answer the research question. To test the previously formulated hypothesis, the following model is derived:

$$EG_{it1\ \&\ i,t3} = a_0 + \beta_1 Payout_{i,t} + \beta_2 Size_{i,t} + \beta_3 ROA_{i,t} + \beta_5 LEV_{i,t} + \beta_6 PEG_{i,t-1\ \&\ i,t-3} + \beta_7 Industry_{i,t} + e_{i,t}$$

Where:

$EG_{i,t1,3}$	Earnings growth of firm i in year t+1 and year t+3
$Payout_{i,t}$	Dividend payout ratio of firm i in year t
$Size_{i,t}$	Firm size of firm i in year t
$ROA_{i,t}$	Return on assets of firm i in year t
$LEV_{i,t}$	Leverage of firm i in year t
$PEG_{i,t1,3}$	Past earnings growth of firm i in year t-1 and year t-3
$Industry_{i,t}$	Industry of firm i in year t
$e_{i,t}$	Error term of firm i in year t

To prove the assumed outcome, the null hypothesis must be rejected, and the alternative hypothesis and the research hypothesis must be approved. Looking at the p-values will indicate if the null hypothesis can be rejected or must be approved. A p-value >0.10 indicates that it there is no significant relationship, a p-value <0.10-0.05 indicates that the relationship is marginally significant, a p-value <0.05-0.01 indicates a significant relationship and a p-value <0.01 indicates high significance. The alpha level is important because it is known as the probability of committing a type 1 error (incorrectly rejecting a true null hypothesis). Fisher (1925) proposed an alpha level of 0.05 as the limit for statistical significance, and until now this remains the most popular probability cut-off value. Following Fisher (1925) the alpha level in this study to reject the null hypothesis is p<0.05.

3.2 Measurement of variables

The models in this study consist of three different sets of variables: dependent, independent and control variables. An overview with the definitions and the variables are given in table 2.

3.2.1 Dependent variable

Earnings growth is the dependent variable in this study and is measured as the compounded annual earnings (net income) over one and three years following the study from (Huang, You & Lin, 2009; Prasangi & Wijesinghe, 2016). The compounded annual earnings is used because it gives an average annual growth rate for the three year period. The net income is equal to net earnings (profit) and is calculated as the sales less cost of goods sold, selling, general and administrative expenses, operating expenses, depreciation, interest, taxes and other expenses.

The calculation for the earnings growth is done by dividing the net income of $t_{1,3}$ by the net income of year t_0. This result needs to be raised to an exponent of one divided by the number of year's t. And eventually 1 needs to be subtracted from this outcome.

3.2.2 Independent variable

The independent variable in this study is the dividend payout ratio.

The dividend payout ratio is calculated as year t_0 annual reported cash dividends divided by the year t_0 annual reported earnings (net income). The percentage equals the amount paid out by the company as dividends, the higher the percentage the higher the dividend that is paid out relatively to the total assets.

3.2.3 Control variables

There are many variables that can possibly influence future earnings growth. The best control variables are those that highly correlate with the dependent variables (future earnings growth) and are unrelated to the independent variable (dividend payout ratio). Following previous empirical studies this study uses the control variables firm size, leverage, return on assets and past earnings growth (Huang, You, Lin, 2009; Flint, Tan & Tian, 2010; Prasangi & Wijesinghe, 2016).

3.2.3.1 Size

The firm size is calculated as the natural logarithm (ln) of the firm's market value of equity (MVE) at the end of the year t_0. To calculate the market value of equity, the total shares outstanding are multiplied with the end of the year share price. This is in line with the method from Fama and French (2002), Flint, Tan and Tian (2010), Huang, You and Lin (2009) and Prasangi and Wijesinghe (2016).

3.2.3.2 Leverage

Leverage is calculated following the studies from Zhou and Ruland (2006), Flint, Tan and Tian and Prasangi and Wijesinghe (2016). The calculation is performed using the book value of debt at t_0, divided by the total assets at the end of t_0.

3.2.3.3 Return on assets

Return on assets is calculated using the following formula: earnings before interest and tax at the end of year t_0 divided by the end of the year t_0 total assets. This is in line with the previous studies from Zhou and Ruland (2006), Flint, Tan and Tian and Prasangi and Wijesinghe (2016).

3.2.3.4 Past earnings growth

The past earnings growth is calculated the same way as the future earnings growth. However, using the lagged annual earnings from $t_{-1,3}$ to t_0. This is done by dividing the net income of t_0 by the net income of year $t_{-1,3}$. This result needs to be raised to an exponent of one divided by the number of year's t. And eventually, 1 needs to be subtracted from this outcome.

3.2.3.5 Industry dummy

This study uses industry as a dummy variable. Since the industry a company is in can influence their relative performance (Douma, George & Kabir, 2006). Following the NACE Rev. 2 Core code industry categories, four industry dummies are formed: manufacturing, construction, information communication and real estate and other industry dummies. These groups are formed following the NACE Rev. 2 codes and some groups are combined to create a total of 4 industry groups. These dummy variables are included in each regression analysis.

3.2.4 Variables overview

Table 2 gives a concise overview of all the abbreviations, variables and their measurement method.

Table 2. Variable definitions

Variables	Abbreviation	Measurement
Earnings growth	$EG_{i,t1}$	$(\text{net income}_{i,t1} / \text{net income}_{i,t0})^{1/1}-1$
	$EG_{i,t3}$	$(\text{net income}_{i,t3} / \text{net income}_{i,t0})^{1/3}-1$
Dividend payout ratio	$PAYOUT_{i,t0}$	$\text{cash dividends}_{i,t0} / \text{net income}_{i,t0}$
Size	$Size_{i,t0}$	natural logarithm of the market value of equity $_{t0}$
Return on assets	$ROA_{i,t0}$	$\text{earnings before interest and tax}_{i,t0}$ / end of book value of total $\text{assets}_{i,t0}$
Leverage	$LEV_{i,t0}$	$\text{book value of debt at the end}_{i,t0,}$ / book value of total assets at the $\text{end}_{i,t0}$
Past earnings growth	$PEG_{i,t-1}$	$(\text{net income}_{i,t0} / \text{net income}_{i,t-1})^{1/1}-1$
	$PEG_{i,t-3}$	$(\text{net income}_{i,t0} / \text{net income}_{i,t-3})^{1/3}-1$
Dummy	Dummy	Industry Dummy

Notes: this table presents the definitions and abbreviations used in this study. Besides that, it gives an overview of how the measurement of the variables is performed.

3.3 Research method

This section describes the research method that is used during this study. Furthermore, it will discuss and outline the variables and how they are measured. Lastly, it will discuss the sample and data selection.

3.3.1 Univariate analysis

The univariate analysis is descriptive in its nature. The main purpose of this type of analysis is to describe the individual variables and to provide descriptive statistics about the mean median and quartiles. In this analysis, outliers will be detected and transformed. This type of analysis does not look at any interrelationships between variables and focuses purely at one variable at the time.

3.3.2 Bivariate analysis

The bivariate analysis gives an insight in the relationship between two variables. It also shows whether there is an association and indicates the strength of this association. There are three ways to do a bivariate analysis: a scatterplot, a regression analysis and correlation coefficients. This study uses the correlation coefficients. These show a correlation between two variables ranging between -1 and 1. Where -1 is a strong negative relationship and 1 is a strong positive relationship. When there is a high correlation coefficient, it may indicate the risk of multicollinearity. The correlation analysis only measures direction + or – and strength ranging from -1 to 1 between variables. It does not give any causation information and direction of the association. The correlation coefficients are used to give a first impression between the relationships within the different variables that are used in this study, and to get a clear overview about the different associations.

3.3.3 Multivariate

This empirical study tests what the impact is of dividend payout ratio on future earnings growth. Furthermore, it also tests the impact of several control variables. To test this effect, regression analysis is used. Regression analysis is a statistical modelling process used for estimating relationships among variables. Regression analysis is useful when the focus is on a relationship between one dependent variable and one or more independent variables. These independent variables are also called predictors. This study has one dependent variable (future earnings growth) and one independent variable (dividend payout ratio) Therefore the regression analysis is chosen as the most appropriate regression technique in this study. A second argument to choose for the regression analysis is that the prior studies all used regression analysis when investigating a comparable impact of dividend payout ratio on future earnings growth (Gwilym, Seaton, Suddason & Thomas, 2006; Huang, You & Lin, 2006; Flint Tan & Tian, 2010; Prasangi & Wijesinghe, 2016). In order to be consistent and comparable with prior studies and in line with the arguments above, the regression analysis seems the most appropriate method for this empirical study.

3.3.4 Method applied

The main relationship to be tested in this study is the impact of payout ratio on future earnings growth. To investigate this impact this paper uses the OLS regression model. The OLS regression allows an estimation of the parameters of a linear model. The goal of this method is to determine a linear model that minimizes the sum of the squared errors between the observations in the dataset and those predicted by the model. Some benchmark studies used panel data analysis (Huang, You & Lin, 2009; Flint, Tan & Tian, 2010) however, when there is a small sample size and time frame the use of an OLS regression is more appropriate.

Another reason to choose for the OLS regression is the fact that it is a suitable method when there is a metric dependent variable, which is measured on an interval or ratio scale. In this study the dependent variable future earnings growth is ratio, which makes the OLS regression appropriate. Another argument for this regression type is the fact that is a commonly used technique in prior studies examining a mostly similar research question (Prasangi & Wijesinghe, 2016; Arnott & Asness, 2003; Gwilym, Seaton & Suddason, 2006).

The fact that previous studies also used this technique makes it easier to compare the outcomes. Thus, the OLS regression model is used in this study to examine the impact of dividend payout ratio on future earnings growth.

3.4 Assumptions and robustness

This section will describe the assumptions and robustness tests that are performed to test the hypothesis.

3.4.1 Normality

In order to make valid inferences from the regression, all the residuals from the regression should follow a normally distribution pattern. By examining a normal predicted probability (P-P) plot it can be determined if the residuals are normally distributed. If they are, they will align with the diagonal normality line in the plot. Second, the Shapiro-wilk test will be performed indicating if there is normality.

3.4.2 Homoscedasticity

Homoscedasticity is about the distribution of the residuals, it indicates if they are normally distributed or if they tend to bunch together or spread apart at some values. Plotting the predicted values and residuals on a scatterplot controls for Homoscedasticity. Ideally this scatterplot looks like a shot of a shotgun.

3.4.3 Linearity

Linearity is about the relationship between the predictor variables and the outcome variables. However, when the residuals are normally distributed and homoscedastic (which is the case) there is no need to worry about linearity.

3.4.4 Multicollinearity

Multicollinearity is about the correlation between the predictor variables. Multicollinearity can be checked in two ways: correlation coefficients or variance inflation factors. The correlation coefficients can be seen in the correlation matrix. If there are magnitudes higher than 0.8 there is a clear sign that multicollinearity may be present. The second way is to look at the VIF scores. According to Hair et al. (1999) the maximum acceptable level of VIF is 10. He argues that VIF levels above 10 are a clear signal of multicollinearity. However, many other studies argue that the maximum VIF score is 5. It can be concluded that there is no consensus to the VIF scores, and potential multicollinearity must critically be looked at. These VIF scores will be checked for every regression that is performed and can be found for the full-model 6 and 7 in appendix 1.

3.4.5 Robustness checks

To test for robustness, an analysis will be done on the subsample basis. Where small and large samples will be analysed. Second, the subsample manufacturing will be taken and analysed to control if the outcomes are robust. These regressions will be performed using an OLS regression.

3.5 Sample and data selection

The first part of this section discusses which firms are included and which firms are excluded in the sample. It also mentions the size of the final sample

3.5.1 Sample and data

For this study, the databases Web of Science, Google Scholar and Scopus have been used for the theory section of this paper. Besides the theory, this paper also uses data from Dutch listed non-financial firms. The data from the listed non-financial firms is retrieved from ORBIS. There are several companies excluded from the sample, in line with the previous studies. The companies must be non-financial, publicly listed on the AEX AMX or AScX, and must be listed on the Dutch stock exchange during the years 2012 – 2018 so that all the necessary data is available. Besides that, these firms must have paid dividend in the basis year $_{t0}$, which is 2015. Following Fama and French (2002), Flint, Tan and Tian (2010) and Ping and Ruland (2006), firms with negative earnings in the basis year are also excluded from the sample

The starting sample consists of 113 firms that were listed at the end of 2018. The listings AEX, AMX and AScX all most of the time consist of 25 firms each. Besides the AEX, AMX and AScX there is also the listing that is called lokaal. This listing consists of 38 applicable firms at the end of 2018. The firms on the AEX are the 25 largest Dutch securities traded on the Euronext Amsterdam, after that the AMX firms are ranging from number 26-50 in size, and finally, the AScX firms are ranked between 51-75.

When removing the companies with NACE codes 64, 65 and 66, which are financial activities, a sample of 96 companies remains. Financial companies are removed because of the high leverage and volatility that is normal for financial firms. These companies are: ABN AMRO Group, AEGON, ASR Nederland, ING Group, NN Group, Flow Traders, Intertrust, BInckBank, KAS Bank, NIBC Holding, HAL trust, Novisource n.v., Reinet investments, VEON Amsterdam, Dutch star companies, Yatra capital and NEPI rockcastle securities. After that, the sample from 96 companies is controlled for their ticker symbols (a unique series of letters

and / or numbers which every public traded company has) to secure that the right companies are selected.

All the companies in the final sample must have paid dividend in the year 2012, 2014, 2015, 2016 and 2018. So that only the dividend paying companies are included in the sample. The companies who didn't pay dividend in one or more of those years were also removed, these companies are: Adyen, ArcelorMittal, Galapagos, Air-France-KLM, Altice Europe, Aperam, Basic-Fit, Fugro, OCI, PostNL, Signify, Takeaway, TomTom, Accsys Technologies, Alfen, B&S Group, Fagron, ForFarmers, Heijmans, Kiadis Pharma, Lucas Bols, Ordina, Pharming Group, SIF Holding, Volkerwessels, AND, Altice, Core Laboratories, AFC Ajax, Bever, Tie Kinetix, Kardan, DGB Group, Roodmicrotec, Morfield group, Porceleyne fles, Avantium, IEX group, Vastned, Ease2pay, Curetis and Alumex. Which creates a sample of 54 companies. There were also companies that had a lack of available data available, these where: Value 8, MKB Nedsense, New sources energy and Beter bed. Creating a total final sample size of 50 companies.

Some company's change slightly from structure or holding during the years, one example is Ahold that changed their name and organization in 2015 from Koninklijke Ahold to Ahold Delhaize. For that reason, all the companies and their dividends are checked on dividendpro.nl and besides that, their annual reports are used to assure that the right data is used.

4 Results

This chapter discusses the outcomes of this study. The first chapter describes the univariate analysis and the descriptive statistics. The second chapter shows the bivariate analysis and the correlation matrix. The third chapter handles the multivariate analysis and the regression results. The final chapter shows the robustness tests that where done ensuring the robustness of this study.

4.1 Univariate analysis

4.1.1 Outliers

Outliers significantly affect the process of estimating statistics (e.g., the average and standard deviation of a sample), resulting in overestimated or underestimated values (Kwak & Kim, 2017). Outliers are data points that lie far from most of the other data points; this creates extreme or abnormal values impacting the overall outcomes. These outliers create bias into the statistical estimates which creates type I and type II errors (Tsai & Gu, 2007a). The method used to identify the outliers is the interquartile range (IQR). The IQR is the length of the box in the box-and-whisker plot. An outlier is defined as a value that lies more than one and a half time the length of the box away from the box. These outliers may appear on both sides of the box. Which means that if a value is below Q1-(1.5xIQR) or above Q3+(1.5xIQR) it may be defined as a potential outlier that has a value which is too far from the central values to be reasonable (Dovoedo & Chakraborti, 2015).

There are two methods to treat outliers. The first method is to remove outliers. The second method is to replace the values or reduce the influence of the outlier through weight adjustments. Adams, Hayunga, Mansi, Reeb and Verardi (2018) argue that in order to prevent bias on the OLS coefficient estimates most studies try to create normal data that is not skewed. They found that most studies create this ideal dataset by winsorizing or removing the outliers. Since removing outliers will cause the number of observations to decrease and thus, a loss of information winsorizing will be used in this study.

Chambers, Kokic, Smith and Cruddas (2000) describe winsorizing as altering the value of an extreme observation or altering its weight so that it has less effect on the estimated total. In this study, winsorizing is used and the variables are altered to the first non-outlier observation. percentile values and the results from the winsorized dataset can be seen in table 3.

4.1.2 Descriptive statistics

Table 3 reports the descriptive statistics of the analysed variables. These variables are the dependent variable, independent variables and control variables. The mean and median outcomes will be compared to the prior studies that where done.

Starting off with the dependent variable earnings growth. When looking at the one year earnings growth (the year 215 to 2016), the mean and median are 0.142 and 0.095. This is lower than the benchmark studies, which might be due to the market circumstances in Europe.

When looking at the three-year earnings growth (the year 2015 to 2018), with a mean and median from 0.122 and 0.093 annually, it reports a slightly lower mean and median than the one year earnings growth. Implying that the growth decreases when the time -frame increases from one to three years.

The independent variable payout ratio (the year 2015) has a mean from 0.56 and a median from 0.52. This is in line the mean payout ratio from Prasangi and Wijesinghe (2016) who report a mean payout ratio from 0.53. However, this is a bit higher than the payout ratio from Flint, Tan & Tian (2010) who report a mean and median payout ratio from 0.41 and 0.40. This might be again due to the market circumstances in the Australian Market. The payout ratio (the year 2015) found in this paper is close to the mean payout ratio of 0.47 that Gwilym, and Suddason (2006) found in the Netherlands during the years 1973-2002. There are also some extreme payout values such as the maximum value of 1.1. Which means that the payout is more than the earnings. This might be due to the previously called signalling effect.

The leverage ratio in the Netherlands (the year 2015) is slightly higher than in the benchmark studies (mean 0.47 & median 0.46). The benchmark studies

have mean value of leverage from 0.41 (Prasangi & Wijesinghe, 2016) and 0.19 (Flint, Tan & Tian, 2010).

The past earnings growth decreases when there is a longer time frame, it reports a mean past earnings growth of 0.12 at the one year (the year 2014 to 2015). When looking at the past earnings growth for the three year period (starting with the year 2012 until the year 2015) it reports a mean of -0.46. The ROA has a mean and median of 0.055 and 0.054 (the year 2015).

4.1.3 Separation by industry

Table 4 separates the sample by industry. As can be seen in the table, almost 50% of the sample is filled with manufacturing firms. The least represented industry construction, with an N of 5 from the total sample of 50. When investigating the sample for differences between the industries, it can be seen that information, communication and real estate has a negative future earnings growth for the 1 and three year future. All the other industries show a positive 1 and 3 year future earnings growth. Besides that, the information communication and real estate category also shows the lowest payout ratio with a mean of 0.514.

4.2 Bivariate analysis

Table 5 presents the Pearson correlation matrix for the variables that are used in this study. Starting with the dividend payout ratio, it has a positive (r=0.324) and significant (5% level) correlation with $EG_{i,t1}$. This indicates that dividend payout ratio, as a part of the current earnings, is positively correlated with the earnings growth in the upcoming year. This is in line with the expected outcome and other studies (Huang, You & Lin, 2009; Flint, Tan & Tian, 2010; Prasangi & Wijesinghe, 2016; Vermeulen & Smit, 2011). When looking at the impact of the dividend payout ratio on $EG_{i,t3}$, there is a positive (r=0.242) and 10% significant correlation. However, this correlation is less significant in comparison to $EG_{i,t1}$. This outcome is also in line with the previous empirical studies and expected outcome.

Table 3: Descriptive statistics

Panel A: Dependent variables

Dependent variables	Obs.	Mean	St. Dev.	Min	1st quartile	Median	3th quartile	Max	IQR
$EG_{i,t1}$	50	0.142	0.457	-0.730	-0.113	0.095	0.391	0.890	0.504
$EG_{i,t3}$	50	0.122	0.395	-0.65	-0.106	0.093	0.322	0.910	0.428

Panel B: Independent variables

Independent variables	Obs.	Mean	St. Dev.	Min	1st quartile	Median	3th quartile	Max	IQR
$Payout_{i,t0}$	50	0.560	0.284	0.080	0.345	0.525	0.68	1.10	0.335

Panel C: Control variables

Control variables	Obs.	Mean	St. Dev.	Min	1st quartile	Median	3th quartile	Max	IQR
Size (million €)$_{i,t0}$	50	7678	13899	25	479	1689	8634	68800	8155
$LEV_{i,t0}$	50	0.474	0.135	0.19	0.405	0.457	0.563	0.75	0.158
$PEG_{i,t-1}$	50	0.1173	0.726	-1.470	-0.289	0.118	0.533	1.2	0.822
$PEG_{i,t-3}$	50	-0.464	1.244	-3.640	-1.766	0.000	0.245	2.04	2.011
$ROA_{i,t0}$	50	0.055	0.027	0.000	0.036	0.054	0.075	0.110	0.039

Notes: this table presents summary statistics of the variables that are used in this study. Obs. Is the number of observations. 1st quartile, median and 3th quartile are the 25th, 50th, and 75th percentile of the variables. IQR is the Inter Quartile Range for each variable. The variable definitions can be found in table 2. $T0$ *is the year 2015.*

Table 4. Descriptive statistics by industry

industry		$EG_{i,t1}$	$EG_{i,t3}$	$Payout_{i,t0}$	$Size_{i,t0}$	$LEV_{i,t0}$	$PEG_{i,t-1}$	$PEG_{i,t-3}$	$ROA_{i,t0}$
Manufacturing	Mean	0.227	0.245	0.548	8884	0.448	0.109	-0.413	0.060
	N	24	24	24	24	24	24	24	24
	Std. Deviation	0.413	0.332	0.320	17436	0.141	0.627	1.357	0.030
In,com,real	Mean	-0.021	-0.060	0.514	5052	0.464	0.257	-0.694	0.051
	N	12	12	12	12	12	12	12	12
	Std. Deviation	0.392	0.295	0.227	7390	0.110	0.967	1.497	0.015
Other	Mean	0.206	0.058	0.643	9517	0.536	0.087	-0.431	0.046
	N	9	9	9	9	9	9	9	9
	Std. Deviation	0.580	0.562	0.330	13751	0.145	0.756	0.911	0.032
Construction	Mean	0.020	0.090	0.576	4879	0.510	-0.122	-0.216	0.058
	N	5	5	5	5	5	5	5	5
	Std. Deviation	0.578	0.454	0.120	6552	0.140	0.581	0.657	0.034

Notes: This table presents the descriptive statistics from the four different industries. The variable definitions that are used in this table, can be found in table 2. $T0$ *is the year 2015.*

Past earnings growth has a negative correlation with earnings growth this correlation becomes significant at the 5% level when looking at the correlation from $PEG_{i,t1}$ with $EG_{i,t3}$ (r=-0.251). This might indicate the mean reversion in earnings. ROA is negatively and significant correlated with $EG_{i,t1}$ (r=-0.463). ROA is also negative and significant correlated to the payout ratio (r=-0.309), which is in line with the expectations. It is useful, since ROA is highly correlated with earnings growth, to investigate potential multicollinearity between these variables. When looking at ROA and leverage, there is a negative and significant correlation (r=-0.36).

Table 5: Correlation matrix

Variable	$EG_{i,t1}$	$EG_{i,t3}$	$Payout_{i,t0}$	$Size_{i,t0}$	$LEV_{i,t0}$	$PEG_{i,t-1}$	$PEG_{i,t-3}$	$ROA_{i,t0}$
1. $EG_{i,t1}$	1,00							
2. $EG_{i,t3}$	**0.6**	1,00						
3. $Payout_{i,t0}$	**0.324**	**0.242**	1,00					
4. $Size_{i,t0}$	-0.013	0.127	0.03	1,00				
5.$LEV_{i,t0}$	-0.001	-0.075	-0.131	-0.013	1,00			
6.$PEG_{i,t-1}$	-0.189	**-0.251**	-0.104	-0.071	0.086	1,00		
7. $PEG_{i,t-3}$	-0.16	-0.01	-0.074	-0.015	0.038	0.1	1,00	
8. $ROA_{i,t0}$	**-0.463**	-0.2	**-0.309**	0.005	**-0.36**	0.138	**0.309**	1,00

Notes: this table presents the Pearson's correlations between all the variables used in this study. The bold numbers indicate significance (p<0.10). The variable definitions that are used in this correlation matrix can be found in table 2, the descriptive statistics from these variables can be found in table 3. $_{T0}$ *is the year 2015.*

4.3 Multivariate analysis

4.3.1 Assumptions

Before the regression analysis can be conducted, several assumptions need to be checked. These assumptions are: multicollinearity, homoscedasticity, normality and linearity. The results of these analyses are described and discussed, and their tables and figures can be found in appendices 2, 3 and 4.

First, normality is tested. As can be seen in appendix 2 all the variables and their P-P plots seem to roughly meet those requirements. In addition, the Shapiro-Wilk test is done, and showed that some variables do not meet the Shapiro-Wilk requirements of normality. These variables are FEG, PEG and Payout. However, since the Shapiro-Wilk test is designed for sample sizes between 3 and 49. This study has a sample size of 50, and because of that reason, the analysis is continued.

Second, homoscedasticity is tested. Looking at appendix 3 it can be concluded that the data is homoscedastic since the data points are spread apart around the scatterplots and thus, the assumption is met.

Finally, multicollinearity is tested. Looking at table 5 no variables have correlation values higher than 0.8. The highest correlation is EG1 with EG3, this high correlation is due to the fact that those variables proxy the same concept. In the regression analysis those variables will not be together in one analysis and will be split up into two different regression analyses. It can also be seen that ROE and earnings growth are highly correlated. The second method is looking at the VIF values. The VIF values should be below 10 and ideally below 5. Looking at the VIF scores in appendix 1 it can be seen that the VIF scores are below 5 for all the predictor variables in the two regression models.

4.3.2 Regression analysis

The following tables show the results of the regression analyses that were done. The tables show standardized coefficients. These standardized coefficients show the expected standard deviation change in the dependent variable given a one-standard deviation change in the independent variable. Standardized coefficients are commonly used by other articles, for example, Huang, You and Lin (2009), Flint, Tan and Tian (2010) and Prasangi and Wijesinghe (2016). Table 6 shows the

OLS regression models for the one year future earnings growth, while table 7 shows the regression models for the three year future earnings growth. The industry dummies are included in the regressions to investigate for industry-specific factors that could affect the future earnings growth. The control variables are also included into the regressions.

4.3.2.1 Effect dividend payout ratio on one year future earnings growth

The hypothesis states that the dividend payout ratio has a positive impact on the future earnings growth. Table 6 presents the results of the OLS regression models with the one year future earnings growth as the dependent variable.

The first model (model 1) shows the regression result from dividend payout ratio on the one year future earnings growth without any control variables. The result from this regression is positive and significant at the 5% level (β=0.315, t=2.276). When looking at the adjusted R-squared, it shows an explained variability of 8.1%. Besides that, the overall model is significant at the 10% level. The positive and significant results in model 1 are in line with the results from Huang, You and Lin (2009) who found a positive and 10% significant association. Besides that, Flint, Tan and Tian (2010) and Prasangi and Wijesinghe (2016) also found a positive association between the dividend payout and future earnings growth. This outcome is in line with the signalling theory and the free cash flow hypothesis.

The second model (model 2) shows a negative and significant impact from ROA on the future earnings growth. This impact is significant at the 1% level (β=-8.272, t=-3.928). As expected, ROA has a negative impact on the future earnings growth. Meaning that companies that show high return on assets will have lower future earnings growth. Model 2 has a R-squared of 0.299. Leverage and Size almost have no impact on the future earnings growth and, thus, have no impact on the future earnings growth. However, when looking at model 5, PEG1 has some impact on the future earnings growth. This impact is negative indicating that higher past earnings growth will create lower future earnings growth. This indication is in line with the mean reversion of earnings theory (Fama & French, 2000). This theory suggests that when a firm experiences high return on assets, it would be difficult to continue to demonstrate strong earnings growth. Model 6

shows the significant variables in one model. When the 2 variables are combined, the payout ratio becomes insignificant and the ROA remains highly significant. In the last model (model 7) it can be observed that the payout ratio has a positive however, insignificant impact on the future earnings growth. This might be since this is the full model and the influence of the highly significant and correlated variable ROA.

Overall, it can be concluded that table 6 shows that the dividend payout ratio is positively related to the future earnings growth. This impact is significant when it is the only variable included in the regression. However, when other variables are included in the regression, the impact from dividend payout on future earnings growth becomes insignificant. Indicating that the impact is not robust.

4.3.2.2 Effect dividend payout ratio on three year future earnings growth

The hypothesis predicts that dividend payout ratio is positively related to the three-year future earnings growth. Table 7 presents the results of the OLS regression models with the three-year future earnings growth as the dependent variable.

The first model shows the impact from the dividend payout ratio on the future earnings growth. In this regression no control variables are included. As can be seen in table 7 model 1 the dividend payout ratio has a positive and 10% significant impact (β=0.245, t=1.779). This outcome is in line with the expected outcome and it demonstrates that an increase in dividend payout ratio affects the future earnings growth positively when investigating the three-year time horizon. However, the impact from the three year period is less strong than the one year period. These results are in line with the results from Zhou and Ruland (2006), Flint, Tan and Tian (2010) and Prasangi and Wijesinghe (2016) who all found positive and significant impact. The adjusted R-squared is 0.090 and the overall model is significant at the 10% level with an F-value of 2.208.

When looking at the full-model (model 7) the impact from dividend payout on future earnings growth becomes insignificant. Indicating that the impact is only significant when there is no other control variable added. This is evidence that the impact is not robust.

ROA (model 2) is found to be a major future earnings growth predictor with a coefficient of -3.759 and significance of 10% (t=-1.901). This indicates that a higher ROA will result negatively impact the future earnings growth when looking at the three year time horizon. However, this impact is less strong and significant than the impact of ROA on the one year future earnings growth. This shows that, when looking at a three year period, the negative impact from ROA on future earnings growth is less strong and significant than at the one year period. The adjusted R-squared is slightly higher than model 1 (0.098). Besides that, the overall model is significant at the 10% level (t=2.333).

Model 3, model 4 and model 5 show almost no impact on the future earnings growth. This is the same for the one year time frame. The adjusted R-squared are 0.027, 0.049 and 0.027 respectively which indicates that there is almost no explained variability. The F-statistic from these models is also insignificant.

Overall, when looking at model 1, the positive results are in line with the results from Huang, You and Lin (2009) who found a positive and significant association between the dividend payout ratio and the future earnings growth. Besides that, Flint, Tan and Tian (2010) and Prasangi and Wijesinghe (2016) also found a positive association between the dividend payout and future earnings growth. This outcome is in line with the signalling theory and the free cash flow hypothesis. This outcome contradicts the pecking order theory. However, when looking at the full model (model 7), it shows that the significant impact disappears. Indicating that the result is not robust and that it is only significant in model 1.

4.3.3 Robustness test

Previous tables already give an indication if the outcome is robust. In addition, several robustness tests are performed to test the robustness of this study. The first robustness test divides the sample into a subsample of small firms and a subsample of large firms. The second robustness test includes only the manufacturing firms. Which is the biggest subsample.

Table 6: The impact of payout ratio on $EG_{i,t1}$

	$EG_{i,t1}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	-1.092	-0.639	-0.737	-0.629	0.876	-0.86	-0.377
	(-1.500)	(-0.988)	(-0.870)	(-0.579)	(1.023)	(-1.303)	(-0.351)
$Payout_{i,t0}$	0.315**					0.292	0.138
	(2.276)					(1.381)	(0.983)
$ROA_{i,t0}$		-8.272***				-7.353	-0.489***
		(-3.928)				(-3.359)***	(-3.232)
$LEV_{i,t0}$			0.018				-0.131
			(0.035)				(-0.885)
$Size_{i,t0}$				-0.004			-0.016
				(-0.12)			(-0.123)
$PEG1_{i,t-1}$					-0.115		-0.084
					(-1.272)		(-0.640)
Industry Dummy	Included	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.081	0.299	-0.025	-0.025	0.010	0.252	0.224
F-statistic	2.075*	4.796***	0.70	0.704	1.130	4296***	2.764**

*Notes: this table presents the results of OLS regressions of firm performance on dividend policy. The variable definitions are defined in table 2, the descriptive statistics from these variables can be found in table 3 and their correlations can be found in table 5. The industry dummies are included in each regression; however, their coefficients are not reported. The numbers in parenthesis represent the t-statistics. The asterisk ***, ** and * denote statistical significance at the 1%, 5% and 10% levels.* $_{T0}$ *is the year 2015.*

Table 7: The impact of payout ratio on $EG_{i,t3}$

	$EG_{i,t3}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	-1.298**	-0.639	-0.958	-1.738*	-1.058	-1.205*	-1.620
	(-2.076)	(-0.988)	(-1.343)	(-1.924)	(-1.676)	(-1.938)	(-1.602)
$Payout_{i,t0}$	0.245*					0.254	0.150
	(1.779)					(1.278)	(0.983)
$ROA_{i,t0}$		-3.759*				-2.957	-0.278
		(-1.901)				(-1.434)	(-1.622)
$LEV_{i,t0}$			-0.119				-0.102
			(-0.279)				(-0.634)
$Size_{i,t0}$				0.028			0.153
				(1.051)			(1.095)
$PEG3_{i,t-3}$					-0.011		-0.068
					(-0.247)		(0.467)
Industry Dummy	Included	Included	Included	Included	Included		Included
Adjusted R^2	0.090	0.098	0.027	0.049	0.027	0.111	0.085
F-statistic	2.208*	2.333*	1.346	1.632	1.341	2.220*	1.572

*Notes: this table presents the results of OLS regressions of firm performance on dividend policy. The variable definitions are defined in table 2, the descriptive statistics from these variables can be found in table 3 and their correlations can be found in table 5. The industry dummies are included in each regression; however, their coefficients are not reported. The numbers in parenthesis represent the t-statistics. The asterisk ***, ** and * denote statistical significance at the 1%, 5% and 10% levels.* $_{T0}$ *is the year 2015.*

4.3.3.1 Subsample analysis

In this section, the robustness will be tested when the sample is divided into small and large firms. The whole sample is divided into two groups, based on the median value of firm size. The large firms are the firms that have more or equal total assets as the median value and the small firms are the firms that have fewer total assets than the median value. The control variable Size, which is used in the original model, is removed from the sample because the subsamples are based on this variable. The results of this subsample analysis can be seen in table 8 and table 9.

When looking at the one-year future earnings growth the outcomes of the subsample analysis are comparable to the original model. The only exception is that, for the large firms, the results from payout (model 1) remains significant whereas for the small firms the results becomes insignificant. When looking at the full model, the impact of dividend payout is insignificant for both the large and small firms. This indicates that the impact from dividend payout on future earnings $growth_{i,t1}$ is not robust.

The results of table 9 are comparable to the results of the original model. However, when looking at the impact of the payout ratio on the three year future earnings growth for the small firms. In the full model (model 6) the impact is negative, whereas in the original model the impact is positive. This is probably due to the big impact of ROA in model 6. Besides that, for the small firm sample in table 9 the impact of dividend payout ratio on future earnings growth becomes insignificant when it is the only variable included. For the large firms, the impact of dividend payout on the three-year future earnings growth remains positive and significant when it is the only variable included. When looking at the full model, it can be observed that the impact becomes insignificant. Indicating that the impact is not robust..

Table 10 presents a subsample analysis with only manufacturing firms included. It is interesting to see if the results are robust when looking at only manufacturing firms because this subsample is the biggest of all industries and was excluded as dummy variable in all the other regressions. Table 10 only shows the payout, ROA variables and the full model. The reason for this is that the other variables almost had no impact on the dependent variable, which is in line with

the original model. When looking at the results, the impact from payout on future earnings growth remains positive for the 1 and 3 year periods when it is the only variable included. However, the impact is insignificant at the three year future earnings growth. When looking at the full model (model 3) payout is insignificant for both $t_{i,1}$ and $t_{i,3}$. Besides that, ROA also remains negative and significant for both time frames. These results are comparable to the results from the original model. And therefore, the impact from dividend payout on future earnings growth is not robust.

Table 8: The impact of payout ratio on $EG_{i,t1}$ - subsample analysis

	Small firms						Large firms					
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-1.596	-1.459	-1.703	1.005	-1.315	0.844	-1.372	-0.594	-0.253	-0.132	-0.965	-0.146
	(-1.446)	(-1.558)	(-1.397)	(0.502)	(-1.186)	(0.388)	(-1.684)	(-0.825)	(-0.249)	(-0.072)	(-1.034)	(-0.097)
$Payout_{i,t0}$	0.164					0.178	0.445***					0.125
	(0.804)					(0.815)	(2.741)					(0.500)
$ROA_{i,t0}$		-7.801**				-0.501*		-9.219***				-0.489*
		(-2.762)				(-2.108)		(-3.678)				(-1.829)
$LEV_{i,t0}$			0.346			-0.108			-0.831			-0.239
			(0.519)			(-0.385)			(-1.225)			(-1.455)
$Size_{i,t0}$				-0.103		-0.245				-0.032		0.008
				(-1.424)		(-1.179)				(-0.449		(0.045)
$PEG1_{i,t-1}$					-0.074	-0.204					-0.084	0.097
					(-0.551)	(-0.903)					(-0.696)	(0.530)
Industry Dummy	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.064	0.300	0.046	0.122	0.048	0.286	0.390	0.499	0.219	0.169	0.181	0.468
F-statistic	1.407	3.573**	1.290	1.835	1.300	2.204*	4.835***	6.984***	2.686**	2.221	2.323*	3.639**

*Notes: this table presents the results of OLS regressions of firm performance on dividend policy split up in large and small firm subsamples. The variable definitions are defined in table 2, the descriptive statistics from these variables can be found in table 3 and their correlations can be found in table 5. The industry dummies are included in each regression; however, their coefficients are not reported. The numbers in parenthesis represent the t-statistics. The asterisk ***, ** and * denote statistical significance at the 1%, 5% and 10% levels.* $_{T0}$ *is the year 2015.*

Table 9: The impact of payout ratio on $EG_{i,t3}$ - subsample analysis

	Small firms						Large firms					
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-1.197	-1.089	-0.693	-1.315	-0.936	-0.395	-2.256**	-1.641**	-1.960**	-3.702**	2.243**	-3.577**
	(-1.696)	(-1.593)	(-0.910)	(-0.977)	(-1.350)	(-1.508)	(-2.798)	(-2.086)	(-1.959)	(-2.198)	(2.241)	(-2.195)
$Payout_{i,t0}$	0.152					-0.058	0.369**					0.126
	(0.861)					(-0.275)	(2.321)					(0.461)
$ROA_{i,t0}$		-2.314				-0.517**		-6.373**				-0.350
		(-1.121)				(-2.342)		(-2.328)				(-1.312)
$LEV_{i,t0}$			-0.477			-0.513*			0.205			-0.007
			(-1.146)			(-2.077)			(0.307)			(-0.040)
$Size_{i,t0}$				0.010		0.069				0.084		0.204
				(0.206)		(0.371)				(1.297)		(1.113)
$PEG3_{i,t-3}$					-0.098	0.128					-0.026	0.117
					(-1.169)	(0.673)					(-0.441)	(0.590
Industry Dummy	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R^2	0.299	0.316	0.318	0.275	0.320	0.371	0.415	0.416	0.261	0.315	0.265	0.378
F-statistic	3.560**	3.773**	3.796**	3.272**	3818**	2.771**	5.258***	5.272***	3.120**	3.762**	3.160**	2.826**

*Notes: this table presents the results of OLS regressions of firm performance on dividend policy split up in large and small firm subsamples. The variable definitions are defined in table 2, the descriptive statistics from these variables can be found in table 3 and their correlations can be found in table 5. The industry dummies are included in each regression; however, their coefficients are not reported. The numbers in parenthesis represent the t-statistics. The asterisk ***, ** and * denote statistical significance at the 1%, 5% and 10% levels.* $_{T0}$ *is the year 2015.*

Table 10: The impact of payout ratio on $EG_{i,t1}$ & $EG_{i,t3}$ **(Manufacturing firms)**

	$EG_{i,t1}$			$EG_{i,t3}$		
Explanatory Variables	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	-0.092	0.727***	1.109	0.119	0.530	-0.057
	(-0.594)	(4.607)	(1.682)	(0.878)	(3.695)***	(-0.079)
$Payout_{i,t0}$	0.581**		0.241	0.230		0.079
	(2.372)		(1.192)	(1.069)		(0.355)
$ROA_{i,t0}$		-8.351***	-9.552***		-4.751**	-5.298*
		(-3.524)	(-4.070)		(-2.206)	(-1.964)
$LEV_{i,t0}$			-0.875*			-0.358
			(-1.789)			(-0.676)
$Size_{i,t0}$			-0.002			0.035
			(-0.057)			(1.160)
$PEG_{i,t-1\ \&\ i,t-3}$			-0.178			0.004
			(-1.722)			(0.073)
Adjusted R^2	0.167	0.332	0.514	0.006	0.144	0.061
F-statistic	5625**	12.421***	5.870***	1.142	4.867**	1.300

*Notes: this table presents the results of OLS regressions of firm performance on dividend policy using only manufacturing firms. The variable definitions are defined in table 2, the descriptive statistics from these variables can be found in table 3, the descriptive statistics from the industry specific subsample can be found in table 4 and their correlations can be found in table 5. The industry dummies are included in each regression; however, their coefficients are not reported. The numbers in parenthesis represent the t-statistics. The asterisk ***, ** and * denote statistical significance at the 1%, 5% and 10% levels.* $T0$ *is the year 2015.*

5 Conclusion

This chapter gives the conclusion of this study. First, the main findings are presented. Second, the limitations and the recommendations for future studies are given.

5.1 Main findings

This study tests the impact of the dividend payout ratio on the future earnings growth in a Dutch context. Both the one-year and three-year future earnings growth periods are tested. To test the hypotheses, an ordinary least square (OLS) regression is conducted. Within this regression, different industries are controlled for. Finally, several tests are performed to test the robustness. The total sample consists of 50 different companies. Within this study, the year 2015 is used as the base year.

In line with the expected outcomes, a positive and significant impact is found of the dividend payout ratio on the future earnings growth of companies for the one-year period when it is the only variable included in the regression. However, when looking at the full-model the result becomes insignificant. Therefore, it is not robust. Besides that, the robustness tests also show the same outcome. This is not in line with the prior findings of both market level and firm level studies such as Zhou and Ruland (2006), Huang, You and Lin (2009) and Flint, Tan and Tian (2010) who found positive and significant impact in their full model.

The impact of the dividend payout ratio on the three-years future earnings growth is positive and significant when it is the only variable included in the regression. Which is in line with the expected outcome. However, when looking at the full-model with all the control variables, the impact becomes insignificant. When looking at the robustness tests that are performed no difference in comparison to the original model came up. This indicates that the outcome is not robust.

Another objective of this study is to investigate other key predictors of future earnings growth. It is found that return on assets negatively and significantly impacts the future earnings growth. This result is significant for both the one and three year periods. This outcome is also in line with the expected outcome and with the previous studies from Zhou and Ruland (2006), Huang, You and Lin (2009) and Flint, Tan and Tian (2010). Furthermore, leverage shows a negative but insignificant impact on the one and three-year future earnings growth periods. Size only showed small impact on future earnings growth. When looking at past earnings growth, it can be concluded that it only has a small impact on the future earnings growth.

Concluding to the results of this study, the research question can be answered. The research question of this study is: ''what is the impact of dividend payout on future earnings growth when looking at Dutch listed firms?'' This study shows some evidence that the dividend payout ratio positively influences the one and three-year future earnings growth when it is the only variable in the regression. However, this influence is not robust when tested in the full model.

5.2 Limitations and recommendations

This section discusses the limitations and recommendations of this study that can be used for future research.

The first limitation of this study is the sample size. The sample size of this study is a limitation due to 2 factors. First, it only uses 2015 as the base year. When for example the impact is also tested for years 2014, 2013 and 2012 the total sample size would have been 200. Now only the year 2015 is observed as the base year, which creates a bias in the outcomes. The second limitation for the sample size is the fact that firms that did not pay dividend during the observation years are excluded from the sample. Which creates a bias. A larger sample size would have resulted in higher reliability, validity and more significant results.

The second limitation of this study is the multicollinearity between ROA and EG. This is due to the fact that both the variables are company profitability indicators and proxy the same concept. As can be seen in all the regressions, the impact from dividend payout on earnings growth becomes insignificant when

ROA is included into the same regression. ROA should have been excluded as a variable to investigate if this impacts the regression results.

For the future, several recommendations can be made based upon the results and limitations of this study. First, it would be interesting to conduct the research with a larger sample size. As previously mentioned, this can be done by investigating multiple base-years. Or by including also the companies that did not pay dividends. Second, it is interesting to investigate the regression with different control variables and in different combinations with the dependent variable. At last, it would be interesting to cover a larger time period of for example 5 or 10 years. To investigate what the impact of the dividend payout ratio is on the long term instead of only the one and three-year period.

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Appendices

Appendix 1: Multicollinearity

Appendix 2: P-P plots

Appendix 3: Scatterplots

Appendix 1: Multicollinearity

VIF statistics

Explanatory Variables	$Eg_{i,t1}$
$Payout_{i,t0}$	1.247
$ROA_{i,t0}$	2.445
$LEV_{i,t0}$	1.378
$Size_{i,t0}$	1.051
$PEG_{i,t0}$	1.079

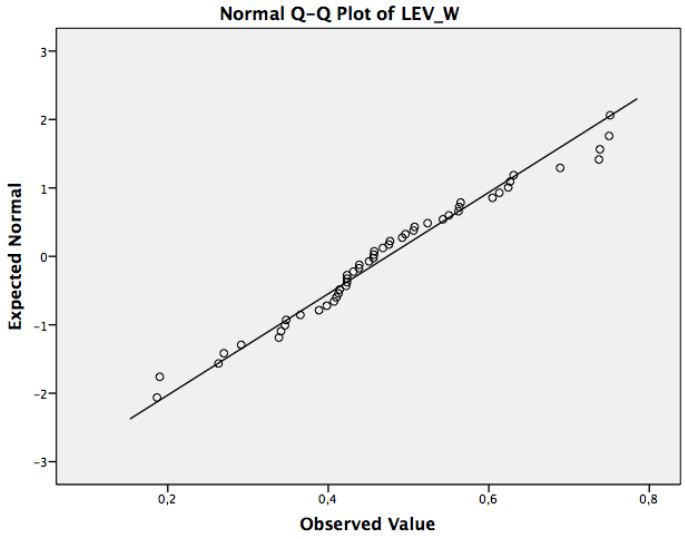
Notes: this table presents the VIF statistics for the regression in model 6.

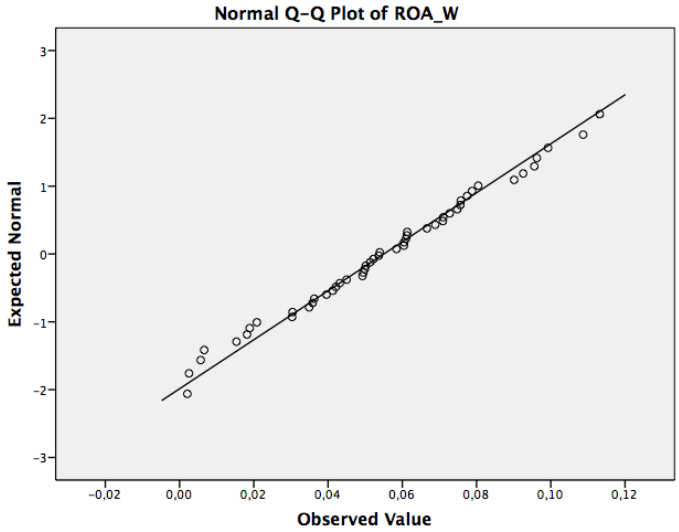
VIF statistics

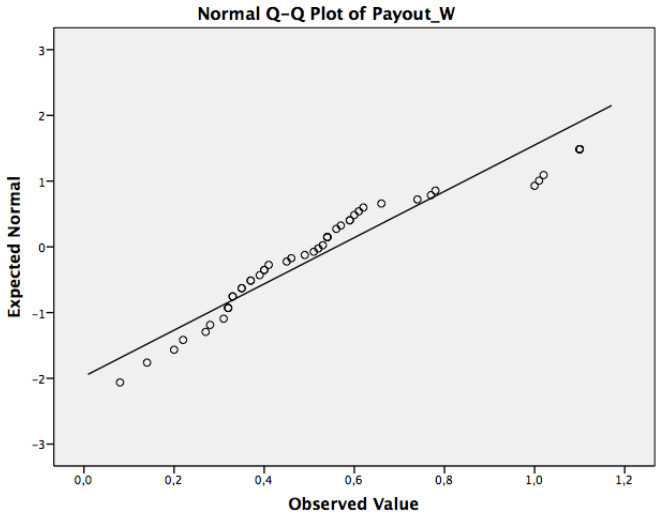
Explanatory Variables	$Eg_{i,t3}$
$Payout_{i,t0}$	1.251
$ROA_{i,t0}$	1.570
$LEV_{i,t0}$	1.379
$Size_{i,t0}$	1.049
$PEG_{i,t3}$	1.150

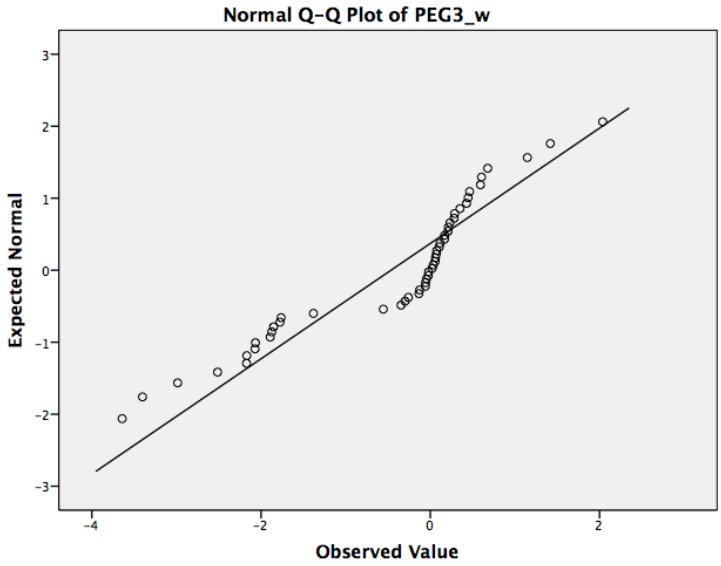
Notes: this table presents the VIF statistics for the regression in model 7.

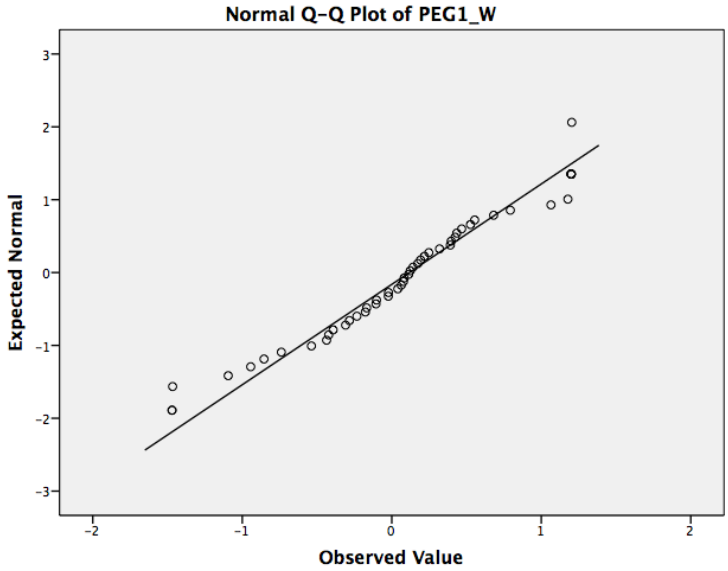
Appendix 2: P-P plots

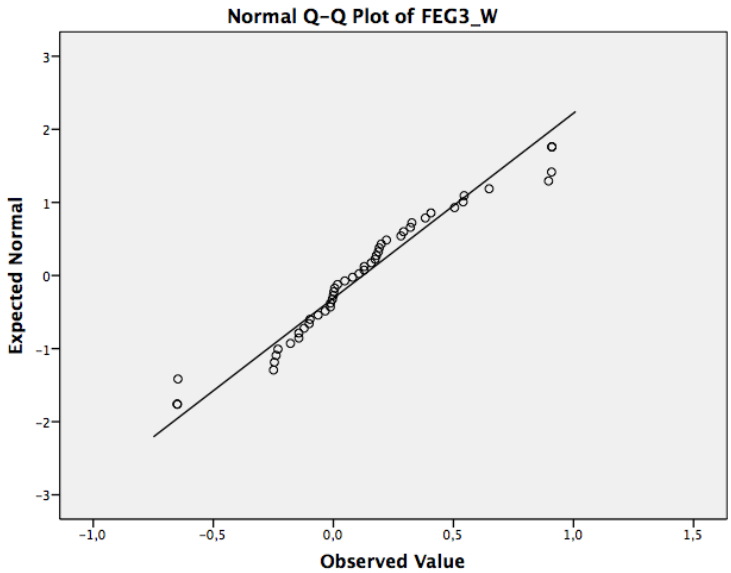


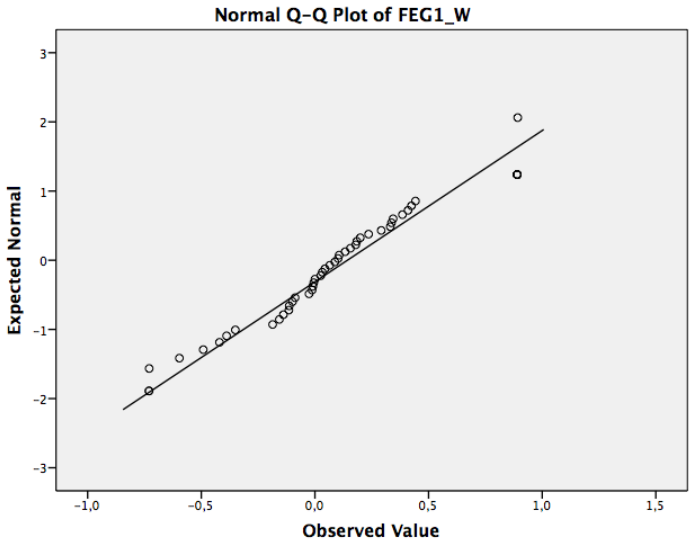


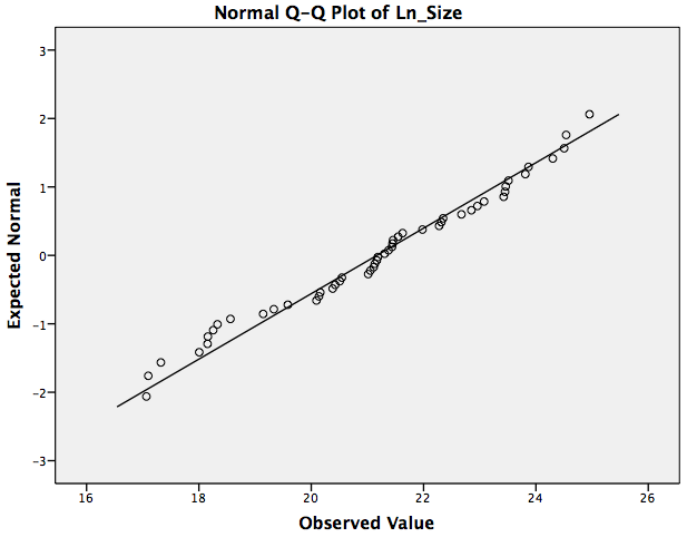



Normal Q-Q Plot of PEG3_w
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
-4
-2
0
2


Normal Q-Q Plot of PEG1_W
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
-2
-1
0
1
2


Normal Q-Q Plot of FEG3_W
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
-1,0
-0,5
0,0
0,5
1,0
1,5


Normal Q-Q Plot of FEG1_W
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
-1,0
-0,5
0,0
0,5
1,0
1,5


Normal Q-Q Plot of Ln_Size
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
16
18
20
22
24
26

Appendix 3: Scatterplots