Tax-based signalling, evidence from the Dutch stock market

Bachelor Thesis

Bachelor Economie & Bedrijfds Economie

Financial Econmisc

Erasmus School of Economics | Erasmus Universiteit Rotterdam

July 2019

Abstract

Dividends are taxed at a higher rate in the U.S. than income, which lead to several theories as to way companies pay dividends to their shareholders. Tax-based signalling models assume that it is the higher taxation of dividends that make them informative about the company. Amihud and Murgia (1997) find in their paper that although German dividends are taxed at a lower rate than income tax, the dividend announcements are still informative about the company. Suggesting there might be other reasons than taxation that make dividend announcements informative about the company. This thesis researches whether the tax-based dividend model holds in the Dutch market, where dividend tax is lower than the box 3 income tax. But because dividend tax serves as a withholding tax for the box 1 income tax, it is not clear cut whether Dutch investors would follow the tax-based signaling model. This thesis finds that Dutch shareholders do not behave in accordance with tax-based signalling models and substantiates the findings of Amihud and Murgia; there might be other reasons beyond tax that explain why corporations pay dividends.

Naam	D.J.A. Olmer
Student number	427302
Supervisor	Ruben de Bliek, Ph.D.
Co-reader	Dr. Joris Kil

I. Introduction

Over the past fifty years, there has been an overwhelming amount of research done trying to explain why companies pay dividends and whether announcements of changes in dividends result in abnormal share price performance (Frankfurter & Wood Jr, 2002). Frankfurter and Wood Jr describe multiple models that try to answer this question. Signalling models are a subgroup of these models. Signalling models are based on the paper of Black (1976), which describes why corporations pay dividends. Central to the (U.S. centric) view on dividends is the "dividend puzzle" Black (1976); if dividends are taxed higher than capital gains on stocks, why do companies pay dividends? These signalling models suggest that because there are information asymmetries between managers and owners, unexpected changes in dividend are informative about the future performance of the company. They find that announcements of increased dividend pay-outs result in positive abnormal returns and decreased dividend pay-outs result in negative abnormal returns while the announcements of no-changes in dividends result in normal returns. This phenomenon is known as the dividend announcement effect. There are several groups within the signalling models, one of which are the tax-based signalling models. The tax-based signalling models suggest that it is the higher tax on dividends that make them informative about the future value of a company. These models propose that dividend news would contain no new information if not for the higher tax they lay down on investors (Bernheim, 1990a; Bernheim & Wantz, 1992; Bhattacharya, 1979a; John & Williams, 1985a). All of these models are tested on the U.S. market. The theoretical framework will further elaborate on the signalling models, with the emphasis on tax-based signalling models.

Amihud and Murgia (1997) tested a tax-based signalling model on the German market. In contrast to the U.S., dividends are not tax-disadvantaged in Germany. They found that stock price reaction to dividend announcements is similar in Germany to reactions found in the United States. Thus, violating the main assumption of U.S.-centric tax-based signalling models that suggests that a higher tax on dividends is a crucial condition to make them informative about companies' values. Amihud and Murgia suggest there might be other reasons than taxation that make dividends informative. Similar to the German tax system, Dutch dividends are taxed at a lower rate than retained earnings. But in the Dutch tax system, the dividend tax is a withholding tax which can be settled with the tax amount of the box 1 tax on income. Which is taxed at a higher rate than retained earnings. Therefore, one could argue that dividends are tax-disadvantaged instead. If the Dutch market behaves in line with the U.S.-centric tax-based signalling models, one would expect that Dutch share prices show similar responses to dividend announcements as to dividend announcements in the U.S. market. On the other hand, Dutch investors might not be concerned with the tax on

dividends at all because dividend tax is settled with the total income tax. Thus, it could be that Dutch investors do not react similarly to dividend announcements as U.S. investors.[1]

On 10 October 2017, the newly formed Rutte III cabinet announced its Coalition Agreement.[2] In this agreement, the cabinet revealed that they planned to abolish the dividend tax law from 1 Jan 2019. Which would make dividend pay outs more attractive compared to capital gains. During the following year, there has been a lot of uncertainty whether the Dutch government would go through with the planned reform of its dividend tax law. The Cabinet has been under severe pressure from the opposition and the society to revoke this plan, and on the 15th October 2018, the word was out; the Cabinet would not follow through with the planned abolishment of the dividend tax law. [3] With this decision came an end to a year of uncertainty about the dividend tax. In response to the news about the abolition of the dividend tax, I became curious about the effect of the uncertainty on the reaction of Dutch investors to dividend announcements.

If the change in legislation would have followed through, dividend pay-outs would become more attractive than capital gains to Dutch investors. And because individual investors pay a capital gains tax one year later after the actual capital gain, it might be that in 2018, in anticipation of the abolishment, they took an advance on this change and adjusted their behaviour towards dividend announcements.[4] I also wondered whether non-dividend stocks show any abnormal returns on the dividend announcements day of other companies and the day before the announcement. If the non-dividend-paying stocks do show any abnormal returns, the abnormal returns might not be caused by the dividend announcement of the company. Thus, abnormal returns could be caused by other market factors. This would mean that tax-based signalling models might not explain why companies pay dividends. Following these thoughts, I came to the next research question:

Does the dividend announcement effect theorem hold in the Dutch stock market?

If so, this would mean a substantiation of tax-based signalling models in favour of other theories that are trying to solve the dividend puzzle.[5] With this extra information on the

[1] The theoretical framework and appendix A further elaborate on the Dutch tax system.
[2] Coalition Agreement 'Confidence in the Future', Rutte III, Oct. 10, 2017, p. 36.
[3] Dividendbelasting blijft: 'Zuur voor Rutte, maar hij is flexibel'. (Oct. 15, 2018). Retrieved from https://nos.nl/artikel/2254964-dividendtaks-blijft-zuur-voor-rutte-maar-hij-is-flexibel.html
[4] See footnote 1.
[5] Black (1976) showed in his paper that multiple theories are trying to solve why companies pay dividends. However, these theories contradict each other. He famously stated; "the harder we look at the dividend picture, the more it seems like a puzzle, with pieces that just don't fit together".

dividend announcement effect, shareholders can sharpen their investment strategies and benefit in the future if a similar violation of the assumptions occurs.

This study is done through an event study, researching whether there are any abnormal returns following the period surrounding the announcement. In my research, I will use the daily returns of the Dutch stock exchange Euronext Amsterdam. The data used consists of 50 traded companies. In this set of companies, there are also companies that do not pay dividends. If the Dutch stock behaves in line with the signalling theory, their stocks should not react to dividend announcements in both the period of certainty and the period of uncertainty. Due to the similarities between the U.S. and the Dutch stock markets and tax systems, I expect to find evidence that supports the findings of Frankfurther and Wood Jr. for the 'certainty' sample from 1 January 2016 till 10 October 2017. The period of 'uncertainty' is from 10 October 2017 till 15 October 2018, when it was unclear whether the change in legislation would follow through. If Dutch investors happen to behave in accordance with the tax-based signalling models, I expect that, in the emphasis of the change, shareholders respond differently on dividend announcements. If the Dutch stock market under uncertainty reacts similar to the period of certainty, dividend changes contain information that can be explained by other factors than taxation. Black (1976) suggests that they might contain information because managers have an aversion to cut dividends and therefore raise dividends only when they can be sustained. And Kalay (1982) imposes that dividends display information about a company's ability to meet constraints set by debt contracts. If, on the other hand, the Dutch stock market behaves as the U.S. centric models expect, there should be no reaction to the dividend announcements during this period of uncertainty, because the assumption of tax-disadvantaged dividends is not met.

The remainder of this article is structured as follows; following the introduction, the background to the dividend announcement effect and the Dutch tax regime will first be discussed. Based on this, four hypotheses are drawn up. Then the data and methodology are explained, after which the results are shown and explained. Finally, the conclusion and limitations of the research are presented

II. Theoretical framework

The theoretical framework will discuss the background of tax-based signalling models and the dividend announcement effect.

II.i. Signalling models

Dividends are the distributed reward of a company's earnings, paid to a certain group of shareholders. The amount and type of dividend paid need to be approved by the General

Meeting of Shareholders. The most common form of dividend is cash dividend, companies can also pay a dividend by issuing new shares or other property and by buying back old shares. On the announcement date, the board of directors announces the amount and kind of dividends that will be paid to the shareholders. In the literature, there is no consensus on the motives of companies to pay dividends. Several conflicting theoretical models attempt to define corporate dividend behaviour, however, all of these models lack strong empirical support.

With the first attempts to make theoretical models of corporate dividend policy three schools of thought appeared. “One faction sees dividends as an attractive and positive influence on the stock price. A second bloc believes that stock prices are negatively correlated with dividend pay-out levels. The third group of theories maintains that firm dividend policy is irrelevant in stock price valuation.” (Frankfurter & Wood Jr, 2002). Later attempts to theorize corporate dividend policy made the older theories less relevant. Also, these theories are better separable by the underlying rationale of investors/ the nature of the market structure. They are divided into models with full information, models with information asymmetries and models based on behavioural principles.[6] Frankfurter and Wood Jr (2002) describe the later models in the following way. The full information models conclude that shareholders desire and ensure a higher expected return on dividend-paying stocks. The inflicted tax liability on the dividends paid causes the payment to be grossed up to heighten the shareholders their pre-tax returns. In line with the capital asset pricing theory, shareholders pay a lower price for shares due to the future tax liability of the payment.

The models of information asymmetries consist of three separate groups of models, the signalling models, the agency cost models, and the free cash flow (FCF) hypothesis. Signalling models are based on the assumption that managers try to limit information asymmetries between them and owners through dividend announcements concerning unexpected changes in dividend policy. Agency cost theories try to align the interests of shareholders and managers through dividend policy. The FCF hypothesis is a specific combination of the signalling and agency costs examples; the distribution of dividends limits the number of funds available for perquisite consumption by managers. The behavioural models seek to explain the corporate dividend policy by applying principles found in behavioural economics and psychology.

[6] For a more elaborate explanation on full information, information asymmetries and behavioural models, please read Frankfurter and Wood Jr. (2002).

II.ii. The dividend announcement effect

After a dividend announcement of a certain company, its found that the stock price of that company shows an abnormal (excess) return in comparison with the return of the total market (Pettit, 1972). Excess returns on share prices are the unexpected share price increases by a certain stock, the performance differs from the expected rate of return on the investment. The expected rate of return is an estimate based on an asset pricing model, applying multiple valuations or a long-term historical average. Gunasekarage and Power (2006) describe three main theoretical arguments that have been proposed to explain why investors respond to dividend announcements. In other words; why excess returns on share price appear after dividend announcements.

First, in an imperfect world of information asymmetry, where managers have insider information about the profitability of the firm, changes in dividend policy transfer managerial estimation of future cash flows of the firm to the outside world. This argument was also recognized by Modigliani and Miller, although they proposed there was no relationship between the market value of the firm and dividend policy, they acknowledged that; “where a firm has adopted a policy of dividend stabilization with a long-established and generally appreciated target pay-out ratio, investors are likely to (and hence have good reason to) interpret a change in the dividend rate as change in the management’s view of the future profit prospects of the firm” (Miller & Modigliani, 1961, p. 293). Within this context, increases (decreases) in pay-out ratios convey positive (negative) information about a company’s future profitability to the outside world.

Second, it is possible that managers disclose information concerning their policy for financing investments to the market through dividend policy; in line with this theory, high dividend pay-outs policy is associated with new equity/debt financing while a low dividend pay-out policy is associated with the financing of capital expenditure through retained earnings (Fazzari, Hubbard, & Petersen, 1987; Gaver & Gaver, 1993). Jensen (1986, 1988) advocates that companies should have a high dividend policy to withhold managers from too much liquidity and therefore reducing their capacity to make independent investment decisions. If they want to invest, they are subjected to the scrutiny of the capital markets. Managers with significant free cash flows have a habit to over-investing in projects with negative net present values, an increase in dividend will, ceteris paribus, lower the extent of over-investment and increase the market value of the firm. Thus, “…except for firms with profitable unfunded investment projects, prices will rise with unexpected increases in pay-outs to shareholders or promises to do so, and prices will fall with reductions in payments or reductions in promises to make future payments” (Jensen, 1988, p. 25). In consonance with this assumption, Lang and Litzenberger (1989), pose that the average return on the announcement day of substantial changes in dividends is significantly higher in over-

investing firms than their optimally investing counterparts, which indicates that shareholders in the over-investing company appreciate receiving free cash flows in the form of a dividend rather than receiving it in the form of retained earnings and investments in marginal projects.

Lastly, part of the impact caused by the dividend announcement is attributed to the nature of dividend clientele of the firm. “The dividend clientele hypothesis suggests that, ceteris paribus, the stock price response to an unexpected dividend change announcement will be related to the dividend preferences of the marginal investor in that firm”. Gunasekarage and Power (2006) summarize this aptly; “It follows that if high-yield firms attract investors in low marginal personal tax brackets and low-yield firms attract investors in high marginal tax brackets, a positive market response (excess return on share prices) to a dividend increase should be more pronounced in high-yield firms than for their low-yield counterparts. Similarly, the negative response to the news of a reduction in dividends should be less severe for low-yield firms than for their high-yield counterparts”.

II.iii. Tax-based signalling models

Taking both the several signalling theories and theoretical arguments as for why excess returns appear, it remains unclear which of the signalling models built is the best model with the highest empirical substantiation. Researchers have examined the impact of dividend announcements on share prices from a wide range of angles and under several different conditions. For instance, they have investigated the market response to announcements of large changes in dividend policy like dividend omissions and/or initiations(Asquith & Mullins Jr, 1983; Benesh, Keown, & Pinkerton, 1984; Born, 1988; Eades, Hess, & Kim, 1985; Ghosh & Woolridge, 1988, 1991; Healy & Palepu, 1988; John & Lang, 1991; Kalay & Loewenstein, 1985; Pettit, 1972; Wansley & Lane, 1987). Others have researched the market response to announcements of changes in regular dividends paid to equities. (Pettit, 1972; Charest, 1978; Woolridge, 1982; Divecha & Morse, 1983; Benesh, Keown, & Pinkerton, 1984; Dielman & Oppenheimer, 1984; Kalay & Loewenstein, 1985; Eades e.a., 1985; Aharony, Falk, & Swary, 1988; Aharony e.a., 1988; Ghosh & Woolridge, 1988). Researchers also have looked into share price volatility (Venkatesh, 1989) and the velocity of any linked price adjustment (Patell & Wolfson, 1984).

This research will focus on one version of the signalling models; the tax-based signalling models. Amihud and Murgia (1997) describe tax-based signalling models as follows; “…it is the higher tax on dividends that make them informative about companies’ future values (Bernheim, 1990; Bernheim & Wantz, 1992; Bhattacharya, 1979; John & Williams, 1985). According to these models, dividend news would not be informative if not for the higher tax that they impose on shareholders.”. These models suggest that dividend announcements are informative about the performance of the company and the future cash

flow expected by the corporation's managers due to the tax structure of a country. Amihud and Murgia's paper is a substantiation of the first theoretical argument proposed by Gunasekarage and Power (2006); changes in dividend policy transfer managerial estimation of future cash flows of the firm to the outside world. Amihud and Murgia examine whether dividends contain information about a company in Germany where, in contrast to the U.S., dividends are not tax-disadvantaged. Corporate earnings allocated to dividends instead of retained earnings do not lead to a higher tax burden for shareholders, and for many of them leads to lower taxation. This allowed them to test the hypothesis (based on the U.S. tax system) that dividends are informative because they are subject to higher taxes. Besides, they also test whether the dividend puzzle first noted by Black (1976), where high dividend payments appear to be inconsistent with a tax regime that puts a higher burden on dividends, does not exist under the German tax regime. Contrary to tax-based signalling models that predict that in Germany dividends should not be informative, Amihud and Murgia find that; "…dividend changes in Germany generate a stock-price reaction in the same way that they do in the United States. This suggests that dividend changes have information content that can be explained by other factors." (Amihud & Murgia, 1997, p. 406), and, therefore, found evidence contradicting the theorem that stock prices are influenced by dividend announcements. They also find that the average pay-out in Germany is lower than in the U.S., although one would expect the opposite if only the tax situation is taken into account. They explain this phenomenon by agency costs unique to Germany. "Banks often control the majority of voting rights in shareholder's meetings of many companies to which they lend, and therefore, the banks might favour low dividend pay-outs to provide greater security for debt. Also, the cost of issuing equity to replace the money paid out in dividends may lower the propensity of companies to pay dividends" (Amihud & Murgia, 1997, p. 407).

II.iv. The Dutch tax system

The Dutch income tax is a system which distinguishes four different investors; individual investor, corporate investors, pension funds and foreign investors.

The tax on dividend pay-outs is a withholding tax on income tax. All investors are allowed to offset the dividend tax paid against the income tax payable. The height of the income (or corporate) tax varies per investor group. Tax on income for individual investors is spread over three different 'boxes'; box 1, tax on income out of employment, pension or profits; box 2, tax on substantial interest gains; box 3, tax on income from savings and investments. Due to the difference in the tax rates between the different boxes, it is, in terms of minimizing the tax burden, most favourable for Dutch individual investors to have companies allocate their

profits to retained earnings and not to dividend pay-outs. Corporate investors are allowed to offset the tax on dividend with their corporate income tax. Capital gains on shares due to the allocation of corporate profits to retained earnings are not taxed directly. Therefore, corporate investors have no preference for either dividend pay-outs or allocating profits to retained earnings. Pension funds are exempted from corporate and dividend tax. Thus, they have no preferences between the allocation of corporate profits to dividends or retained earnings. If foreign investors meet several requirements, they are exempted from Dutch dividend tax and are allowed to ask for a refund on the withheld tax on dividend pay-outs. If they are exempted, their preference for dividend pay-out or allocation to retained earnings depends on the tax laws of the country of residence and the tax treaty between the Netherlands and that country. Therefore, it is not clear cut whether foreign investors prefer dividends or retained earnings.[7]

In line with standard U.S.-centric tax-based signalling models, the Dutch individual investors prefer dividend retained earnings over dividend pay-outs. If Dutch investors behave the way these models predict, they should respond in a similar way to dividend announcement as to how the U.S. investors respond to these announcements. As stated in the introduction, the Rutte III cabinet planned to abolish the dividend tax on 1 January 2019, which would make dividend pay-outs taxed at a lower rate than retained earnings. Due to legislation concerning box 3 income (retained earnings), capital gains made in 2018 are taxed in 2019. Investors possibly could take advantage of the abolishment of the dividend one year before the abolishment. It could be the case that Dutch investors adjusted their behaviour in anticipation of the change. Thus, making it more attractive for Dutch investors to have the capital gains allocated to dividend pay-outs instead of capital gains. However, because the dividend tax is a withholding tax, bottom line the Dutch investor still has to pay the same amount of income tax. Therefore, it could be the case that, if Dutch investors behave as tax-based signalling models predict during the period of certainty, they do not show any change in behaviour during the period of uncertainty. But, because the abolishment was revoked, we can only speculate on whether the Dutch investor has taken this into account or not.

III. Hypotheses

In my thesis I will follow the paper of Amihud and Murgia (1997) and add several hypotheses: As earlier stated, the main research question of this thesis is:

[7] See Appendix A for a more elaborate explanation of the Dutch tax system.

Does the dividend announcement effect theorem of a tax-based signalling model hold in the Dutch stock market?

To answer the research question, several hypotheses need to be tested. To test whether the Dutch stock market behaves as predicted by the U.S. centric tax-based signalling models, the model must be tested in a period where all the assumptions of this theory are met. If the Dutch market behaves as tax-based signalling models predict, the shares should show an excess return. Through this reasoning hypothesis 1 came about.

Hypothesis 1: A positive (negative) dividend announcement will affect shareholder wealth positively (negatively) in the Dutch stock market during periods of certainty about the tax legislation.

In anticipation of the Rutte III plans to abolish the dividend tax, Dutch investor might have changed their behaviour towards dividend announcements. However, because the dividend tax is a withholding tax, bottom line the Dutch investor still has to pay the same amount of income tax. Therefore, it could be that, when Dutch shareholders behave as the theorem predicts in periods of certainty, they do not show a change in behaviour during periods of uncertainty.

Hypothesis 2: In the absence of certainty, concerning tax laws, Dutch shareholders do not react differently to dividend announcements compared to announcements during periods of certainty.

To assure there is no omitted variable bias, this research will test whether non-dividend-paying companies have any abnormal returns during dividend announcement days. The non-dividend shares serve as a robustness test to assure that Dutch investors follow the tax-based signalling theory. One would expect no price reaction of the non-dividend-paying companies. If these companies do show an abnormal return, it might be the case that the abnormal returns on dividend-paying stocks are caused by something else, other than the dividend announcement.

Hypothesis 3: Non-dividend shares do not show any abnormal returns during dividend announcements of other (dividend-paying) companies.

Several companies listed on the Euronext Amsterdam are also traded on one of the other exchanges connected to Euronext. Because they are traded on another exchange these companies are not subject to the uncertainty companies listed on one exchange have to deal

with. Their stock price should not be impacted by the uncertainty and react the same to dividend announcements during the periods of certainty and uncertainty.

Hypothesis 4a: Shares traded on multiple stock exchanges do not show a comparable reaction to dividend announcements as the shares traded on a single exchange.

Hypothesis 4b: In comparison with dividend announcements during certainty, shares traded on multiple stock exchanges do not respond differently to dividend announcements during uncertainty.

IV. Empirical analysis

The analysis of the Dutch tax and dividend regime shows that in the Netherlands when companies allocate income to dividends instead of retaining it, this imposes a higher tax burden on many investors. For most investor classes, the tax burden of dividends is higher. This thesis now examines whether dividends are informative in the Netherlands given that the necessary conditions for a tax-based dividend signalling model apply. This thesis conducts an event study, researching the reaction of stock prices to announcements of dividend changes. In the Netherlands, the *Raad van Bestuur*, proposes a dividend at the Annual General Meeting of Shareholders. The shareholders normally approve of this proposal. Depending on the company, dividends are declared quarterly, half-yearly or yearly.

IV.i. Data

This thesis examines dividend announcements made during the period 1 January 2016 till 15 October 2018 by the 55 most actively traded on Euronext Amsterdam during that period. Companies that were not traded during the full period where omitted. Of the 55 companies, 41 paid dividends, 14 did not. And 9 companies of the 'dividend-paying' sample were listed on multiple stock exchanges. Stock return data were found on the online database Bloomberg. From this database, the daily returns for each stock in the sample and the daily returns on the stock indexes AEX and AMX were obtained. Dividend announcements by the dividend-paying sample companies were also gathered from Bloomberg (Bloomberg, 2019). The sample consists of 97 events of dividend increase, 38 events of dividend decrease and 28 events of unchanged dividends announcements. For the 'non-dividend-paying' sample, data of non-dividend-paying companies surrounding the announcement days of dividend-paying companies were obtained. This results in 1358 events of dividend increase by one of the 41 dividend-paying companies, 532 events of dividend decrease and 364 events of unchanged dividends. Within the sample of dividend-paying companies, there is the dual-

listed sample, consisting of 7 companies that are dual-listed on the Dutch Euronext and another (foreign) exchange.

IV.ii. Methodology

For every event i in year y, data are collected on the announced cash dividends per share in euro, DIV_{iy}, and the stock price ten days before the announcement day, P_{iy}. The dividend yield, and the change in dividend relative to price;

$$\Delta DIV/P_{iy} = (DIV_{iy} - DIV_{i,y-1})/P_{iy}$$

For the dividend increase sample, the average dividend yield is 2,31%, and the increases in the dividend paid show an average of 0,76%. For the dividend reduction and unchanged dividend samples, the numbers are respective 1,64% and 1,94% average dividend yield and -1,19% and 0,00% change in dividend $\Delta DIV/P_{iy}$. The detailed output is presented in table I. Here the data are divided into two periods. The certainty period runs from 1 January till 10 October 2017 and the uncertainty period runs from 10 October 2017 till 15 October 2018. This split is made to test whether the first two hypothesis hold.

To study the reaction of shares on dividend announcements, the cumulative excess returns on days -1 and 0, and the excess returns on days 0 and 1, day 0 being the announcement day are examined. The market model is estimated over 120 days centred on the announcement day, excluding a five-day window. For event i, the excess return on day t, is calculated as;

$$ER_{it} = R_{it} - \alpha_i - \beta_i * RM_t$$

here is the return on event i on day t, and are the market model parameters first estimated by the Scholes-Williams method (Scholes & Williams, 1977), and RM_t is the rate of return on the AEX or AMX market index on day t. Next the two-day cumulative excess return for each stock for each event i, respectively;

$$ER2_i = ER_{i-1} + ER_i \text{ and } ER2_{i+1} = ER_i + ER_{i+1}.$$

The average two-day excess return across events;

$$AER_i = \Sigma ER2_i/N$$

N being the number of events. Also, the weighted average of the two-day excess returns, WAER, is calculated;

$$WAER_i = AER_i * \hat{\delta}_i$$
$$\hat{\delta}_i = \delta_{i,j} / \sum \delta_j$$

The weights being the relative standard deviation of the residual returns over the estimation period for each event, for each event i. The relative standard deviation is calculated by dividing the standard deviation of event i by the sum of the standard deviations from group j. The data is split into three different groups; dividend increase, dividend decrease, unchanged dividend. Amihud and Murgia perform an event study based on a market model which uses 120 days of market data centred on the event day with a 5-day exclusion window. This thesis follows their method strictly, but because the use of 120 days centred on the event day with a 5-day exclusion window for an event study is very uncommon, this thesis has also performed an event study with 120 days before the event day with a 5-day exclusion window.[8] The non-dividend sample and the dual-listed sample are calculated with 120 days centred on the event day with an exclusion zone of 5 days. All other steps remain the same for the non-dividend and the dual-listed sample. Amihud and Murgia (1997, p. 404)*"…estimate the stock price reaction to dividend changes and to earnings changes for the same year. Companies in Germany usually do not announce their annual earnings and dividends on the same day, and earnings announcements precede dividend announcements. Thus, the information in dividends could corroborate the information in earnings (Kane, Lee, & Marcus, 1984)."* They estimate a model where $\mathrm{ER2_i}$ is a function of both earnings and dividend changes relative to price. Their results show *"…that dividend changes induce a significant positive reaction in stock prices, beyond the effect of the information contained in earnings changes."* (Amihud & Murgia, 1997, p. 404). For the Dutch stock market, this is not applicable because for almost all (156 out of 163) dividend announcements the earnings announcement is on the same day, and therefore it is not possible to test whether the dividend announcement corroborates with the earnings announcement.

Due to the small sample size of several of the split dividend-paying, non-dividend and dual-listed samples, the statistical power of a 'normal' t-test is low. Therefore, it is not a suitable test to test whether the excess returns have zero mean. This research will also use the one-sample bootstrap test (Efron, Bradley & Tibsirani, Robert J., 1993, pp. 225–227). Bootstrapping relies on random sampling with replacement, it allows estimation of the

[8] Appendix B

sample distribution for almost any statistic. The test estimates properties of an estimator (e.g. variance) by measuring those properties when taking a sample from an approximate distribution. A one-sided bootstrap test assumes;

$$H_0: \mu = 0$$
$$H_1: \mu > 0 \ \vee H_1: \mu < 0.$$

Assume we have n excess returns $e_1, \dots, e_n$ with the sample mean $\bar{e}$ and a sample standard deviation $\bar{\sigma}$. Under $H_0: \mu = 0$ we have;

$$t_0 = \frac{\bar{e} - 0}{\frac{\bar{\sigma}}{\sqrt{n}}}$$

Hereafter a new series $\tilde{e}$ is created;

$$\tilde{e} = e_i - \bar{e}$$

for $i = 1, \dots, n$. $\tilde{e}_1^*, \dots, \tilde{e}_n^*$ are sampled with replacement from $\tilde{e}_1, \dots, \tilde{e}_n$ for a total of $B = 10^5$ times. The statistic is calculated t^* for every bootstrap and counted how many times $t^* > t_0$, say b.

$$t^* = \frac{\tilde{e} - O}{\frac{\bar{\tilde{\sigma}}}{\sqrt{n}}}$$

The p-value of the test will be b/B. Note that this assumes that $\bar{e} > 0$ such that $t_0 > 0$, $H_1: \mu > 0$. In case $\bar{e} < 0$ the times $t^* < t_0$ and $H_1: \mu < 0$.

V. Results

This chapter will discuss the results found and its implications. Hypotheses 1 and 2 will be discussed first. These hypotheses test whether Dutch investors behave according to the standard tax-based signalling models.

Hypothesis 1: *A positive (negative) dividend announcement will affect shareholder wealth positively (negatively) in the Dutch stock market during periods of certainty about the tax legislation*.

Table I shows the results for hypotheses 1 and 2. The results for the certainty period (Panel B) show that there are excess returns for the dividend increase, dividend decrease and dividend unchanged sample, however, only the WAER of the dividend increase sample is significant. Panel B shows an ambiguous picture of whether the Dutch investor responds in line with tax-based signalling models. On the one hand, the fact that for the increase subsample the excess returns are positive, and the bootstrapped excess returns are significant, indicate that Dutch investors behave in line with the theorem. If this would be the case, this would mean that during certainty individual shares increase by 0,58 per cent in the days surrounding the announcement. Which is in line with results found by Amihud and Murgia on the German market. But on the other hand, the other subsamples during the certainty period show results that are not in line with the theorem.

Dividend decrease should lead to negative excess returns and an unchanged dividend should have no excess returns. However, the excess returns for dividend decreases are partly positive, but very small. Implying that Dutch investors may not attain much value to these announcements. The dividend unchanged subsample also shows positive excess returns. But, because these returns are again very small, there is not much to get out of. The bootstrapped excess returns show no sign of significance for either the dividend decrease nor the dividend unchanged subsample. Besides this, the binomial test does not reject the null hypothesis of equal likelihood of $ER2_i$ being positive or negative when dividends for any of the subsamples, indicating that there might not be a positive (negative) response to dividend increases (decreases) from investors. Therefore, hypothesis 1 is rejected, Dutch investors do not behave in line with the tax-based signalling models.

Hypothesis 2: *In the absence of certainty, concerning tax laws, Dutch shareholders do not react differently to dividend announcements compared to announcements during periods of certainty.*

During the uncertainty period (Panel C), the dividend increase subsample shows, in terms of size, comparable excess returns with the dividend increase sub-sample during the certainty period. However, unlike during the certainty period, the bootstrapped excess returns show no significant effect. The dividend decrease subsample shows negative excess returns and thus behaves in line with standard tax-based signalling models during certainty. But taking into account that, during certainty, Dutch investors do not respond to dividend decreases in line with the theorem, this is not a substantiation of hypothesis 2. Dutch investors do react differently to dividend decrease announcements during uncertainty compared to dividend decrease announcements during certainty. Compared to dividend unchanged

announcements during certainty, Dutch investors show relatively big negative responses to announcements of unchanged dividend. It could be the case that, in line with expectations laid down earlier, Dutch investors changed their behaviour towards unchanged dividend announcements. None of the excess returns discussed has statistical substantiation and neither the bootstrapped excess returns nor the binomial tests implicate that this is due to the small sample size. Therefore, the above is somewhat speculative and more an indication of whether or not the behaviour of Dutch investors is impacted by the uncertainty. In light of the foregoing, hypothesis 2 is rejected. Dutch investors appear to respond differently to dividend announcements during the period of uncertainty.

In appendix B the results of the 120 days before the event date (with a 5-day window) SW model is shown (table IV). Which shows results similar to the results shown in table I. Therefore, this SW model does not alter the conclusion that hypothesis 1 is rejected and hypothesis 2 is assumed.

Table I

Cumulative Excess Return for Dividend Announcements in the Netherlands

The table lists mean cumulative excess returns, *AER,* for the dividend announcement day and the previous day. The excess returns are the errors from a market model which contains parameters estimated based on the Scholes-Williams (1977) method over 120 days centred on the announcement day (excluding a 5-day window). The market indexes are AEX and AMX. *WAER* is the weighted average AER, the weights being the standard errors from the SW market model. DIV/P is the dividend yield, where *DIV* is the dividend paid per share and *P* is the share price 10 days before the dividend announcement date. $\Delta DIV/P$ is the change in dividend pay-out compared to one year earlier, divided by *P*. B-AER and B-WAER are the bootstrapped AER and WAER. AER and WAER are bootstrapped 100.000 times. The table shows the p-values for AER and WAER. If $p<0,05$, the excess returns differ significantly from 0. *Probability* is the binomial change of having at most the indicated number of negative or positive *AER*s for dividend increases or decreases (respectively) under the null of binomial probability is 0,5. Panel A shows the results for 97 announcements of dividend increases. Panel B shows the results for 38 announcements of dividend decreases. Panel C shows the results for 26 announcements of no change in dividend policy.

	No. cases	DIV/P (%)	$\Delta DIV/P$ (%)	AER (%)	WAER (%)	B AER	B WAER	Pos:Neg	*Probability*
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: All results									
Dividend increase	97	2,31	0,76	0,532	0,016			55:42	0,923
				(1.77)	(1.79)	(0,032)*	(0,021)*		
Dividend decrease	38	1,64	-1,19	-0,063	-0,019			19:19	0,564
				(-0.16)	(-0.70)	(0,434)	(0,228)		
Dividend unchanged	26	1,94	0,00	-0,301	-0,023			14:12	0,721
				(-0.47)	(-0.37)	(0,321)	(0,350)		
Panel B: Certainty period									
Dividend increase	57	2,16	0,64	0,584	0.0159*			35:22	0,969
				(1.86)	(2.12)	(0,028)*	(0,008)**		
Dividend decrease	25	1,81	-1,28	0,042	-0,012			14:11	0,788
				(0.08)	(-0.37)	(0,483)	(0,331)		
Dividend unchanged	14	2,03	0,00	0,086	-0,001			9:5	0,91
				(0.11)	(-0.01)	(0,488)	(0,455)		
Panel C: Uncertainty period									
Dividend increase	40	2,52	0,93	0,458	0,016			20:20	0,563
				(0,78)	(0,86)	(0,203)	(0,174)		
Dividend decrease	13	1,32	-1,01	-0,27	-0,03			5:8	0,291
				(-0,46)	(-0,63)	(0,345)	(0,277)		
Dividend unchanged	12	1,84	0,00	-0,753	-0,047			5:7	0,387
				(-0,69)	(-0,45)	(0,274)	(0,343)		

t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001

Next, hypothesis 3 will be tested. This hypothesis tests if non-dividend shares are impacted by dividend announcements of other companies

Hypothesis 3: Non-dividend shares do not show any abnormal returns during dividend announcements of other (dividend-paying) companies.

Table II shows the excess returns of the non-dividend sample during dividend announcements of dividend-paying companies. Because the companies in this sample do not pay dividends, the dividend yield and the change in dividend are left out in this table. In line with expectations, almost all of the subsamples show no response to dividend announcements of other companies. Only the dividend increase subsamples and the dividend unchanged during certainty subsample show a (small) excess return. However, these reactions are so small that there is not much to get out of and only the dividend

increase subsamples have statistical substantiation. Therefore, hypothesis 3 is assumed, non-dividend shares do not show any excess returns during dividend announcements of other companies.

Table II

Cumulative Excess Return for Non-Dividend Shares in the Netherlands during dividend announcements of other stocks

The table lists mean cumulative excess returns, *AER*, for the share price of non-dividend on the dividend announcement day of a dividend-paying company and the previous day. The excess returns are the errors from a market model which contains parameters estimated based on the Scholes-Williams (1977) method over 120 days centred on the announcement day (excluding a 5-day window). The market indexes are AEX and AMX. *WAER* is the weighted average AER, the weights being the standard errors from the SW market model. DIV/P is the dividend yield of the shares from which the dividends are announced, where *DIV* is the dividend paid per share and *P* is the share price 10 days before the dividend announcement date. $\Delta DIV/P$ is the change in dividend pay-out compared to one year earlier, divided by *P*. *Probability* is the binomial change of having at most the indicated number of negative or positive *AER*s for dividend increases or decreases (respectively) under the null of binomial probability is 0,5. Panel A shows the results for 1358 announcements of dividend increases. Panel B shows the results for 798 announcements of dividend decreases. Panel C shows the results for 364 announcements of no change in dividend policy.

	No. cases	AER *(%)*	WAER *(%)*	Pos:Neg	*Probability*
		1	2	3	4
Panel A: All results					
Dividend increase	1358	0	0	705:653	0,925
		(0,82)	(1,11)		
Dividend decrease	532	0	0	278:254	0,861
		(0,03)	(1,09)		
Dividend unchanged	364	-0,001	0	178:186	0,357
		(-1,18)	(-1,5)		
Panel B: Certainty period					
Dividend increase	798	0.002*	0,000***	431:367	0,989
		(2,17)	(4,27)		
Dividend decrease	350	0	0	174:176	0,479
		(-0,07)	(0,98)		
Dividend unchanged	196	-0,002	0	93:103	0,26
		(-1,35)	(0,31)		
Panel C: Uncertainty period					
Dividend increase	560	0,001	-0,000**	274:286	0,321
		(-1,64)	(-3,01)		
Dividend decrease	182	0	0	104:78	0,977
		(0,16)	(0,6)		
Dividend unchanged	168	0	0	85:83	0,591
		(-0,18)	(-1,90)		

t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001

Hereafter, hypotheses 4a and 4b are tested. They test whether dual-listed companies are affected by the same way as single listed companies by dividend announcements during certainty and uncertainty.

Hypothesis 4a: Shares traded on multiple stock exchanges do not show a comparable reaction to dividend announcements as the shares traded on a single exchange.

Hypothesis 4b: In comparison with dividend announcements during certainty, shares traded on multiple stock exchanges do not respond differently to dividend announcements during uncertainty.

Table III shows the results of the *dual-listed* sample. All samples show small responses to dividend announcements, but only the dividend increases during the certainty period show a significant result. The other subsamples do show excess returns but lack statistical substantiation. The excess returns are relatively small in comparison to the results at table I. The *dual-listed* companies only show significant bootstrapped excess returns for AER of the full dividend increase group and the WAER of the full dividend unchanged group. This shows that the earlier significance of the dividend increase complete sample and certainty subsample AERs may have come due to the small sample size. One could, therefore, argue that the dual-listed companies show a different response to dividend announcements compared to single listed companies. Hypothesis 4a is assumed.
During the period of uncertainty, the dual-listed shares do show a response to dividend announcements. But again, a relatively small response. The results show relatively big differences between the certain and the uncertain period. But, because neither the certain nor the uncertain bootstrapped results show a significant result, it cannot be conclusively said that the shares show different responses during certainty and uncertainty. Therefore, hypothesis 4b is also rejected.

Table III
Cumulative Excess Return for Dual-listed Shares in the Netherlands during dividend announcements of other stocks

The table lists mean cumulative excess returns, *AER,* for the share price of non-dividend on the dividend announcement day and the previous day. The excess returns are the errors from a market model which contains parameters estimated based on the Scholes-Williams (1977) method over 120 days centred on the announcement day (excluding a 5-day window). The market indexes are AEX and AMX. *WAER* is the weighted average AER, the weights being the standard errors from the SW market model. DIV/P is the dividend yield of the shares from which the dividends are announced, where *DIV* is the dividend paid per share and *P* is the share price 10 days before the dividend announcement date. $\Delta DIV/P$ is the change in dividend pay-out compared to one year earlier, divided by *P*. B-AER

and B-WAER are the bootstrapped AER and WAER. AER and WAER are bootstrapped 100.000 times. The table shows the p-values for AER and WAER, if the p<0,05, the excess returns differ significantly from 0. *Probability* is the binomial change of having at most the indicated number of negative or positive *AER*s for dividend increases or decreases (respectively) under the null of binomial probability is 0,5. Panel A shows the results for 20 announcements of dividend increases. Panel B shows the results for 9 announcements of dividend decreases. Panel C shows the results for 12 announcements of no change in dividend policy.

	No. cases	DIV/P *(%)*	$\Delta DIV/P$ *(%)*	AER *(%)*	WAER *(%)*	B AER	B WAER	Pos:Neg	*Probability*
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: All results									
Dividend increase	20	0,021	0,01	0,010*	-0,018			16:4	0,998
				(2,46)	(-0,49)	(0,012)	(0,287)		
Dividend decrease	9	0 ,022	-0,007	-0,002	-0,031			6:3	0,999
				(-0,22)	(-1,14)	(0,374)	(0,068)		
Dividend unchanged	12	0 ,012	0	-0,007	0,047			5:7	0,773
				(-1,04)	-1,39	(0,128)	(0,030)*		
Panel B: Certainty period									
Dividend increase	13	0,018	0,006	0,0129*	-0,0478			12:1	0,91
				(2,44)	(-0,94)	(0,128)	(0,375)		
Dividend decrease	6	0 ,027	-0,01	0	-0,049			5:1	0,984
				(-0,01)	(-1,22)	(0,444)	(0,063)		
Dividend unchanged	6	0 ,01	0	-0,001	0,072			3:3	0,5
				(-0,08)	(1,1)	(0,473)	(0,062)		
Panel C: Uncertainty period									
Dividend increase	7	0,026	0,017	0,005	0,039			4:3	0,387
				(0,78)	(1,18)	(0,25)	(0,252)		
Dividend decrease	3	0 ,011	-0,002	-0,004	0,004			1:2	0,665
				(-0,57)	(0,58)	(0,26)	(0,261)		
Dividend unchanged	6	0 ,013	0	-0,014	0,024			2:4	0,344
				(-1,16)	(0,9)	(0,097)	(0,09)		

t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001

In contrast to the results shown in papers concerning the German and U.S. markets, respectively (Amihud & Murgia, 1997) and (Bernheim, 1990b; Bernheim & Wantz, 1992; Bhattacharya, 1979b; John & Williams, 1985b) the results discussed in the above paragraphs show that the Dutch market show far smaller responses to dividend announcements, in either the certainty period and the uncertainty period. Besides, the results

shown in these papers are significant, whereas the results from this thesis lack statistical substance. Also, the findings of this thesis go against the first theoretical argument of Gunasekarage and Power (2006), whereas Amihud and Murgia's paper substantiates this theoretical argument. The difference in results may be caused by the fact that this thesis has not used a daily stock exchange that is adjusted for dividends and rights issues, whereas Amihud and Murgia do use a dividend and rights adjusted stock. The difference with the papers researching the U.S. market could be caused by differences in the way the tax systems work. The dividend tax in the Netherlands is a withholding tax, whereas in the U.S. this differs per State.

VI. Conclusion and Discussion

This thesis researches dividend informativeness in the Netherlands where, like in the United States, dividends are tax-disfavoured. Dividend pay-outs subject individual investors to a higher tax burden, whereas corporate earnings allocated to retained earnings result in a relatively lower tax burden. Because dividends are tax-disfavoured, tax-based dividend signalling models predict that in the Netherlands, like in the U.S., dividends should be informative. However, this thesis finds that dividend announcements in the Netherlands do not result in share price reactions similar to the way share prices react to dividend announcements on the U.S. market. Dutch stocks do show excess returns on the days surrounding the announcement date but lack statistical significance. When the samples are bootstrapped, the results show that there is only significant response to dividend increases during certainty. Shares do respond differently in the period of uncertainty. From this, it can be derived that hypothesis 1 only applies to dividend increase announcements during certainty. There are no significant responses during the uncertainty periods. Therefore, hypothesis 1 is rejected. Although there is no statistical substantiation, Dutch investors appear to be impacted by the uncertainty concerning tax laws. Therefore, hypothesis 2 is rejected. In line with hypothesis 3, non-dividend-paying shares do not show any excess returns to dividend announcements of other companies. Hypothesis 3 is accepted. Dual-listed companies show relatively small excess returns to dividend announcement, but overall lack statistical significance. Dutch dual-listed shares do show a significant excess return on dividend increases during the certainty period. However, the bootstrapped dual-listed sample shows that this could have come due to the small sample size. Besides this, only the complete dividend increase and dividend unchanged bootstrapped dual-listed samples show significant results. Shares listed on multiple stock exchanges, therefore, appear to behave differently compared to shares listed on just one stock exchange during dividend increases. Comparing the responses of the dual-listed shares during certainty and uncertainty, the shares show unsimilar, and insignificant, responses to dividend announcements. Therefore,

it cannot be said conclusively that the dual-listed shares respond the same during certainty and uncertainty. Hypothesis 4a is accepted, and hypothesis 4b is rejected. Considering all the above, the results direct towards rejecting the central research question; *Does the dividend announcement effect theorem hold in the Dutch stock market?* Dutch investors only appear to follow the signalling model when dividend increases are announced. Whereas, for the other dividend announcements, Dutch investors do not follow tax-based signalling models. This suggests that there might be other reasons beyond information signalling for paying dividends.

The literature has come up with several other explanations as to why companies pay dividends. Black (1976) suggests that managers might have an aversion against cutting dividends and therefore only raising dividends when they believe that the dividends can be sustained. Which makes dividend changes informative about the future cash flows of the company. Bhattacharya (1979) proposed that because companies that pay dividends will have to resort to costly outside financing for its investments, the dividends must be accompanied by better prospects of future cash flows. Kalay's (1982) model suggests that dividends contain information about the capacity of a company to live up to constraints imposed by debt contractors. Miller & Rock (1985) show that the cost of underinvestment forms the basis for a dividend signalling equilibrium. Gunasekarage & Power (2006) find that the choice of managers to alter the current degree of dividend pay-outs is associated with past and present financial performance of a company rather than expected future performance.

There are several things to note about this research. This thesis has not taken into account the possibility that Dutch investors might already suspect in the weeks before a dividend announcement whether the company will alter its dividend policy or not. If investors already expect a decrease in the dividend pay-out due to, for instance, a profit warning, the market will have already priced this accordingly. Therefore, it could be that on the days surrounding the announcement day and the announcement day itself there will be a muted effect. Or even show an opposite reaction, because the decrease in dividend is less than expected and investors respond to this rather than responding to the decrease in the dividend pay-out. [9]

Further, this thesis has used the daily returns without adjusting for dividends and rights offerings and the market return of the 'standard' *AEX* and *AMX* indices for the SW market model, whereas Amihud and Murgia used the daily returns of stocks adjusted for dividends and rights offerings and the *DAFOX* for their market model. Opposed to the *AEX* and *AMX* this index is adjusted for cash dividends and capital changes. As a result, this

[9] Gunasekarage and Power (2006) find evidence substantiating this possibility.

thesis may not provide the correct picture of the stock price reaction to dividend announcements. Further research should correct for whether or not changes in dividends were expected, adjust the daily returns for dividends and rights offerings and alter the *AEX* and *AMX* for cash dividends and capital changes. For future research, it might be interesting to look at the price trend of shares within the dividend announcement day and the day before the announcement. It could be that the shares show excess returns within the trading day but return to normal returns within the same day.

This thesis has assumed that the Dutch and U.S. tax system concerning dividends and capital gains are similar and that earnings allocated to dividends are tax-disadvantaged. But there are several special features in Dutch law that make it uncertain that Dutch investors will behave the same way as U.S. investors although the systems look the same. Although both the Dutch and the U.S. tax system make dividends tax-disadvantaged, the Dutch system has several aspects that make it uncertain whether Dutch investors respond in the same way as U.S. investors to dividend announcements.

Because the Dutch dividend tax is a withholding tax for the income tax, Dutch investors might not be concerned with the amount of dividend tax. Instead, they focus on the amount they have to pay in income tax. In future research, it will be difficult to distinguish dividends from the rest of the income of an investor because the total amount of income determines the height of the income tax. If an investor has at most a bracket 1 box 1 income, the tax on the income is almost equal to the tax on capital gains of box 3. If an investor has at a bracket 4 box 1 income, the tax on income is almost double compared to the tax on capital gains. Therefore, whether an investor is a low- or high-income investor impacts the way he behaves to dividend announcements. And so, researchers will need to have all the information on the income of a Dutch investor to determine what effect an increase or decrease of dividends will have on the tax income of an investor. Besides this, the box 3 tax on capital gains is a flat-rate tax over a fixed percentage capital gain. Thus, the tax on capital gains does not tax the real capital gains of a year but it taxes a fictitious gain. This may cause Dutch investors to value company profits allocated to retained earnings different than U.S. investors.

Because the proposed change in dividend tax was revoked, we can only speculate whether the Dutch investor would have changed its behaviour towards dividend announcements if the dividend tax would have been abolished. It could be that the Dutch investor would not change its behaviour because he still has to pay the same amount of income tax over the dividends, or that he would not take this into account and become more prone to receiving dividends.

Appendix A

The tax and dividend regime in The Netherlands

The following section describes the tax system in The Netherlands during the research period and the changes proposed by Cabinet Rutte III. The subject of dividend tax is the shareholder, but the tax is withheld by the dividend-distributing company. The company transfers the tax to the tax authorities. The shareholder may then deduct the withheld tax from the income tax or corporation tax due on the dividend. Suppose a company has one euro of profits to allocate. Companies pay a corporate tax of $T_{re} = 0.2510$ on their profit and have an after-tax profit of $(1 - T_{re}) = 0.75$EUR. This can be allocated to dividends or retained earnings. If the after-tax profit is allocated to dividends, the company must withhold $T_d = 0.15$. 0,6375EUR which is left to distribute to their shareholders. The tax treatment of dividends at the investor-level differs across investor types. Below is the treatment for the four main types of investors discussed.

A. Individual Investors

For individual investors, there is a system of three boxes. The tax on income out of employment, pension or profits (Box 1), denoted by T_{b1}, ranges between 0,3655≤ T_{b1} ≤ 0,5195. The brackets of box 1 are shown in table 1. Also, there is also a personal allowance in Box 1, which depends on factors like specific healthcare expenses, study costs, and donations. The company pays out 0,75EUR as a dividend. The dividend tax earlier withheld by the company may be offset against income tax due, which results in an effective after-tax income of 0,360≤ EUR ≤0,475.

Bracket	Taxable income	Percentage
1	€0 – €20.142	36,55%
2	€20.142 – €33.995	40,85%
3	€33.995 – €68.507	40,85%
4	> €68.507	51,95%

Table 1 Box 1 tax rates in the Netherlands

In Box 2 the substantial interest (‘aanmerkelijk belang’) is taxed. This consists of two sorts of benefits; regular benefits like dividend and alienation benefits such as sales profits on shares. A substantial interest arises when a shareholder (possibly in combination with a

[10] Companies pay $T_{re} = 0.20$ over the first €200,000 of revenue, and $T_{re} = 0.25$ over any amount higher than €200,000. Because all most all listed companies on the Euronext have a revenue much higher than €200,000, this research assumes that there is only one corporate tax bracket; $T_{re} = 0.25$.

fiscal partner) owns at least 5% of the shares, profit certificates, the enjoyment rights, or the right to vote of a company. Denoted by T_{b2}, the tax on income on a substantial interest is $T_{b2} = 0{,}25$. Resulting in a net gain of 0,75EUR * (1-T_{b2}) = 0,563EUR

In Box 3 the income from savings, investments and second homes are taxed at a flat rate. A fixed percentage ('forfaitair rendement') of the base savings and investments is denoted as the capital gains in box 3. Till 2016 a fictional return on assets of 4% was taxed. Over this 4%, an individual investor had to pay 30% income tax. Which comes down to 4%*30%= 1,2% tax on assets. On the first of January of year Y_t, the assets of an individual are calculated. Based on this amount, the tax amount of Box 3 is determined for year Y_t. Since the first of January 2017, the calculation of the fictional return changed to a system with tax brackets. The 30 % tax rate and the measuring moment stayed the same. The tax rate on equity and savings in Box 3, denoted by T_{b3}, ranges between 0,8613% (=2,871%*30%) and 1,617% (=5,39%*30%). Within Box 3, there is a fixed amount exempt from taxation. This is the tax-free allowance, amounting to €30.000 in 2018 for an individual investor (without a fiscal partner). So, if an investor has €40.000 invested in shares, he only pays a tax of 30% of a fictional average return of 2,871% over €10.000 (30%*2,871%*10.000= €86,13), the rest is exempted from taxation. If an investor has a fiscal partner, their shared tax-free allowance amounts a total of €60.000.

Bracket	Base saving and investing	Percentage 1,63%	Percentage 5,39%	Percentage average return
1	€0 - € 75.000	67%	33%	2,871%
2	€ 75.001 - € 975.000	21%	79%	4,60%
3	> € 975.000	0%	100%	5,39%

Table 2 Box 3 tax rates in the Netherlands

This research assumes that there are only individual investors without a fiscal partner. Suppose the company allocates one EURO to retained earnings and the stock price appreciates by an equal amount. (1- T_{re}) = 0,75EUR remains as an increase in value. Over this 0,75EUR retained in Y_t the individual investor pays nothing in Y_t and in Y_{t+1} the Box 3 tax the fictional average return ranging between 2.871 and 5,39 per cent. The individual investor's net gain in Y_t = 0,75EUR and for Y_{t+1} 0,738EUR ≤ (1- T_{re}) * (1-$T_{b3} * AR_f$)EUR_t≤ 0,743EUR (0,741EUR before 2017) [11]. In contrast to Box 1, the Box 3 tax burden works through in the following years. In Y_{t+2} there will be 0,726EUR ≤ (EUR_t) * (1-$T_{b3} * AR_f$) ≤ 0,732EUR left of the original gain. Because Box 3 also incorporates savings, it becomes

[11] Without accounting for inflation

increasingly hard to distinguish between savings from income and capital gains from investments for Y_t, because an individual only has to specify the total amounts of savings, investments, and secondary housing. The net gain for any period beyond Y_{t+1} is indistinguishable, therefore this research assumes an investor only has a tax horizon of Y_{t+1}.

For the individual investor, it is in terms of minimizing the whole tax burden, most favourable to have the company's profits directed to retained earnings. However, this assumes that profits allocated to retained earnings will result in an equal rise in stock price. Due to market influences, this will not always be the case. In contrast to Germany, dividends are tax-disadvantaged and taxed far higher than retained earnings. Therefore, the Dutch investor is more like the American investor, who's dividends are also tax-disadvantaged.

B. Corporate Investors

Companies paying a dividend to another company, are obligated to withhold the dividend tax on these dividends. Like dividend pay-outs to individual investors, this withholding tax can be settled with the corporate income tax (vennootschapsbelasting) the owning company has to pay. Similar to the German system explained by Amihud and Murgia (1997), "the dividends paid by one company to another company does not incur additional tax, and the receiving company merely serves as a conduit.". For the owning company, the dividend is added to the revenue from core businesses. As stated earlier the corporate tax rate is $T_{re} = 0.25$. When a company has a substantial interest (5% of total shares) in the dividend distributing company, the receiving company can obtain an exemption on the dividend tax. So, the dividend distributing company is not obligated to withhold the dividend tax. Considering all the above, corporate investors have no preference for either dividend pay-outs or allocating corporate profits to retained earnings.

C. Pension funds, foundations, and associations

Pension funds are exempted from corporation tax and are allowed to reclaim dividend tax withheld by the dividend distributing company. This also applies to foundations and associations if they do not drive business[12]. Therefore, they have no preference between capital gains from retained earnings and dividend pay-outs.

D. Foreign Investors

Foreign investors that receive dividends are exempted of Dutch dividend tax and can ask for a refund if they meet several requirements such as; the investor is a private person,

[12] The funds, foundations and associations are exempted if they comply with the requirements of art. 5 Wet Vpb 1969

who does not live in the Netherlands and requests dividend tax based on a tax treaty between his country of residence and the Netherlands. The taxation of the received dividends by the foreign tax authorities depends on the tax laws of the country of residence from the investors. Denote by T_g the foreign capital gain tax and T_o the foreign ordinary tax rate paid on the after corporate dividend income. If investors are allowed to claim the withheld tax on dividend as credit, they would prefer the distribution of corporate income to dividend instead of retained earnings. Nonetheless, most foreign investors are not able to claim much or all withheld dividend tax, because of the tax treaties between the country of residence and the Dutch government.

U.S. individual portfolio investors in Dutch companies are subject to the tax treaty between the United States and the Netherlands, effective 1 January 1994. On dividend received after Dutch corporate tax T_{re}, a maximum of 15 per cent is withheld. This can be claimed as credit by the U.S. investor, provided that the limitations on foreign tax credit are satisfied. Thus, one euro allocated to dividend results in an after-corporate-tax dividend of 0,75 EUR, of which 0,1125EUR is withheld. The cash distributed is 0,6375EUR. The investor has a tax liability of 0,6375*T_{b1} and claims 0,1125EUR as credit. Summarizing, a (non-substantial interest) U.S. investor entitled to the full foreign tax credit, has a net after-tax income of (1-T_{re}) * (1-T_o) from one EUR allocated to dividends. For an investor in the highest federal income tax bracket (39.6%), this implies a net receipt of 0,453EUR. If one euro is allocated to retained earnings that results in a value increase of 0,75EUR, a U.S. investor in the highest bracket pays capital gains tax $T_g = 0{,}2$ over this amount. This follows a net capital gain of 0,6EUR. The lower the tax bracket of an investor, the bigger the tax advantage of dividend gets.

U.S. tax-exempt investors, such as pension funds that are exempted from tax by the U.S. government are allowed to apply for a tax-exemption on Dutch dividend tax. Therefore, they are indifferent between dividend pay-outs and capital gains from retained earnings.

Appendix B

Table IV

Cumulative Excess Return for Dividend Announcements in the Netherlands

The table lists mean cumulative excess returns, *AER*, for the dividend announcement day and the previous day. The excess returns are the errors from a market model which contains parameters estimated based on the Scholes-Williams (1977) method over 120 days preceding the announcement day (excluding a 5-day window). The market indexes are AEX and AMX. *WAER* is the weighted average AER, the weights being the standard errors from the SW market model. DIV/P is the dividend yield, where *DIV* is the dividend paid per share and *P* is the share price 10 days before the dividend announcement date. $\Delta DIV/P$ is the change in dividend pay-out compared to one year earlier, divided by *P*. B-AER and B-WAER are the bootstrapped AER and WAER. AER and WAER are bootstrapped 100.000 times. The table shows the p-values for AER and WAER, if the p<0,05, the excess returns differ significantly from 0. *Probability* is the binomial change of having at most the indicated number of negative or positive *AER*s for dividend increases or decreases (respectively) under the null of binomial probability is 0,5. Panel A shows the results for 97 announcements of dividend increases. Panel B shows the results for 38 announcements of dividend decreases. Panel C shows the results for 26 announcements of no change in dividend policy.

	No. cases	DIV/P (%)	$\Delta DIV/P$ (%)	AER (%)	WAER (%)	B AER	B WAER	Pos:Neg	*Probabilaty*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Panel A: All results									
Dividend increase	97	2,31	0,76	0,483 (1.61)	0,440 (1.52)	(0,045)*	(0,114)	55:42	0.923
Dividend decrease	38	1,64	-1,19	-0,059 (-0.15)	-0,068 (-0.17)	(0,433)	(0,258)	19:19	0.564
Dividend unchanged	28	1,94	0,00	-0,301 (-0.46)	-0,230 (-0.36)	(0,319)	(0,499)	16:12	0.828
Panel B: Certainty period									
Dividend increase	57	2,16	0,64	0,525 (1.69)	0,478 (1.52)	(0,043)*	(0,028)*	35:22	0.969
Dividend decrease	25	1,81	-1,28	0,054 (0.10)	0,041 (0.08)	(0,473)	(0,326)	14:11	0.788
Dividend unchanged	28	1,94	0,00	-0,301 (-0.46)	-0,230 (-0.36)	(0,319)	(0,499)	16:12	0.828
Panel C: Uncertainty period									
Dividend increase	40	2,52	0,93	0,423 (0.72)	0,386 (0.71)	(0,223)	(0,345)	20:20	0.563
Dividend	13	1,32	-1,01	-0,277	-0,278			5:8	0.291

decrease									
				(-0.49)	(-0.48)	(0,327)	(0,324)		
Dividend unchanged	12	1,84	0,00	-0,753	-0,047			5:7	0.387
				(-0.69)	(-0.45)	(0,274)	(0,343)		

t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001

Bibliography

Aharony, J., Falk, H., & Swary, I. (1988). Information content of dividend increases: The case of regulated utilities. *Journal of Business Finance & Accounting*, *15*(3), 401–414.

Amihud, Y., & Murgia, M. (1997). Dividends, Taxes, and Signalling: Evidence from Germany. *The Journal of Finance*, *52*(1), 397–408. https://doi.org/10.1111/j.1540-6261.1997.tb03822.x

Asquith, P., & Mullins Jr, D. W. (1983). The impact of initiating dividend payments on shareholders' wealth. *Journal of business*, 77–96.

Benesh, G. A., Keown, A. J., & Pinkerton, J. M. (1984). An examination of market reaction to substantial shifts in dividend policy. *Journal of Financial Research*, *7*(2), 131–142.

Bernheim, B. D. (1990a). *Tax policy and the dividend puzzle*. National Bureau of Economic Research.

Bernheim, B. D. (1990b). *Tax Policy and the Dividend Puzzle* (Working Paper Nr. 3434). https://doi.org/10.3386/w3434

Bernheim, B. D., & Wantz, A. (1992). *A tax-based test of the dividend signalling hypothesis*. National Bureau of Economic Research.

Bhattacharya, S. (1979a). Imperfect Information, Dividend Policy, and "The Bird in the Hand" Fallacy. *The Bell Journal of Economics*, *10*(1), 259–270.

Bhattacharya, S. (1979b). Imperfect Information, Dividend Policy, and "The Bird in the Hand" Fallacy. *The Bell Journal of Economics*, *10*(1), 259–270. https://doi.org/10.2307/3003330

Black, F. (1976). The dividend puzzle. *Journal of portfolio management*, *2*(2), 5–8.

Bloomberg L.P. (2019) *Dividend announcements by companies listed on the AEX and AMX. 1/1/16 to 15/10/18.* Retrieved 5 January, 2019 from Bloomberg terminal.

Born, J. A. (1988). Insider ownership and signals: Evidence from dividend initiation announcement effects. *Financial Management*, 38–45.

Charest, G. (1978). Dividend information, stock returns and market efficiency-II. *Journal of Financial Economics*, *6*(2–3), 297–330.

Dielman, T. E., & Oppenheimer, H. R. (1984). An examination of investor behaviour during periods of large dividend changes. *Journal of Financial and Quantitative Analysis*, *19*(2), 197–216.

Divecha, A., & Morse, D. (1983). Market responses to dividend increases and changes in pay-out ratios. *Journal of Financial and Quantitative Analysis*, *18*(2), 163–173.

Eades, K. M., Hess, P. J., & Kim, E. H. (1985). *Market rationality and dividend*

announcements.

Fazzari, S., Hubbard, R. G., & Petersen, B. C. (1987). *Financing constraints and corporate investment*. National Bureau of Economic Research Cambridge, Mass., USA.

Frankfurter, G. M., & Wood Jr, B. G. (2002). Dividend policy theories and their empirical tests. *International Review of Financial Analysis*, *11*(2), 111–138.

Gaver, J. J., & Gaver, K. M. (1993). Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Accounting and Economics*, *16*(1), 125–160. https://doi.org/10.1016/0165-4101(93)90007-3

Ghosh, C., & Woolridge, J. R. (1988). An analysis of shareholder reaction to dividend cuts and omissions. *Journal of Financial Research*, *11*(4), 281–294.

Ghosh, C., & Woolridge, J. R. (1991). Dividend omissions and stock market rationality. *Journal of Business Finance & Accounting*, *18*(3), 315–330.

Gunasekarage, A., & Power, D. M. (2006). Anomalous evidence in dividend announcement effect. *Managerial Finance*, *32*(3), 209–226. https://doi.org/10.1108/03074350610646726

Healy, P. M., & Palepu, K. G. (1988). Earnings information conveyed by dividend initiations and omissions. *Journal of Financial Economics*, *21*(2), 149–175.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review*, *76*(2), 323–329.

Jensen, M. C. (1988). Takeovers: Their causes and consequences. *journal of Economic Perspectives*, *2*(1), 21–48.

John, K., & Lang, L. H. (1991). Insider trading around dividend announcements: Theory and evidence. *The Journal of Finance*, *46*(4), 1361–1389.

John, K., & Williams, J. (1985a). Dividends, dilution, and taxes: A signalling equilibrium. *the Journal of Finance*, *40*(4), 1053–1070.

John, K., & Williams, J. (1985b). Dividends, Dilution, and Taxes: A Signalling Equilibrium. *The Journal of Finance*, *40*(4), 1053–1070. https://doi.org/10.1111/j.1540-6261.1985.tb02363.x

Kalay, A. (1982). Stockholder-bondholder conflict and dividend constraints. *Journal of Financial Economics*, *10*(2), 211–233. https://doi.org/10.1016/0304-405X(82)90014-9

Kalay, A., & Loewenstein, U. (1985). Predictable events and excess returns: The case of dividend announcements. *Journal of Financial Economics*, *14*(3), 423–449.

Kane, A., Lee, Y. K., & Marcus, A. (1984). Earnings and dividend announcements: Is there a corroboration effect? *The Journal of Finance*, *39*(4), 1091–1099.

Lang, L. H., & Litzenberger, R. H. (1989). Dividend announcements: Cash flow signalling vs. free cash flow hypothesis? *journal of Financial Economics*, *24*(1), 181–191.
Miller, M. H., & Modigliani, F. (1961). Dividend Policy, Growth, and the Valuation of Shares. *The Journal of Business*, *34*(4), 411–433.
Miller, M. H., & Rock, K. (1985). Dividend policy under asymmetric information. *The Journal of finance*, *40*(4), 1031–1051.
Patell, J. M., & Wolfson, M. A. (1984). The intraday speed of adjustment of stock prices to earnings and dividend announcements. *Journal of Financial Economics*, *13*(2), 223–252.
Pettit, R. R. (1972). Dividend announcements, security performance, and capital market efficiency. *The Journal of Finance*, *27*(5), 993–1007.
Venkatesh, P. C. (1989). The impact of dividend initiation on the information content of earnings announcements and returns volatility. *Journal of Business*, 175–197.
Wansley, J. W., & Lane, W. R. (1987). A financial profile of the dividend initiating firm. *Journal of Business Finance & Accounting*, *14*(3), 425–436.
Woolridge, J. R. (1982). The information content of dividend changes. *Journal of Financial Research*, *5*(3), 237–247.