Voluntary disclosure and information asymmetry in the Netherlands

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Master thesis department Accounting

University of Tilburg

W.H.J.M. (Wouter) van Brandenburg

ANR: 521227

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Supervisor: Prof.dr. J.P.M. Suijs

Second Reader: Dr. S. Hollander RA

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Preface

I have written this thesis to complete my master accountancy at the University of Tilburg. Under the supervision of Prof. dr. J.P.M. Suijs I received guidance and feedback to conduct this research. The relevance of this thesis is derived from previously published research papers from which I tried to add something new.

I want to thank my supervisor Prof. dr. J.P.M. Suijs for his helpful comments on my thesis and writing.

Abstract

This thesis investigates the relation between disclosed information and information asymmetry in the Netherlands. The evidence is only limited for this relation in Europe. Previous research has found significant results in the US. Peterson & Plenborg (2006) investigated this relation for Denmark. They found some small differences compared to the US studies. Therefore more insight is provided on this relation by investigating this effect in the Netherlands. Also the difference in effect between disclosing financial and non-financial information is investigated.

Using a sample of 104 Dutch publicly listed firms I find evidence that increased disclosure is associated with lower information asymmetry. The second regression model tried to show that there is a difference in impact between financial or non-financial information disclosures. The result was insignificant and no evidence is found on the difference in impact between financial and non-financial disclosed information. What is important is that the relevant information is provided to the interested parties. In short, the results are comparable with the results of Peterson & Plenborg (2006) and the US studies (Botosan 1997, Hail 2002, Leuz & Verrecchia 2000, Welker 1995).

Because the sample size was limited in size, not all variables were fully symmetric or homoscedastic as a consequence some assumptions for a regression analysis were close to violation. One independent variable violated the assumption of kurtosis. Robustness checks show that there was no major impact on the results.

Keywords: Information asymmetry, Disclosure, Bid-ask spread, Cost of equity capital, Netherlands.

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I. Introduction

1.1 Introduction

Shareholders are following the news and the course of firms they have invested in or willing to invest in. They gather information or attend shareholder meetings. In any case there is a point where they want to buy or sell shares of that specific firm. At this point a few important factors come to their attention such as: how quickly can a share be sold? And what is a good price? Is there something I do not know and other traders do know? Those information issues are related to information asymmetry concerning shares. Information asymmetry has influence on the cost of equity capital of firms (which is explained later in this thesis). Firms can provide traders with information via publications in different media. One important channel is their annual report. By disclosing information, a firm provides traders with information and, as a consequence, can lower the information asymmetry of their shares.

1.2 Research question

The research question in this thesis is whether voluntarily disclosed information will lower the information asymmetry in the Netherlands and if so, whether there is a difference in impact between financial and non-financial information.

1.3 Relevance

From an academic perspective this research provides additional insights in the relation between voluntarily disclosing information and information asymmetry. It does so by making a distinction in the 'type' of information that is disclosed and the research is done in the Netherlands.

The relation between voluntary disclosure and information asymmetry is mostly investigated in the US environment. (Botosan 1997, Hail and Leuz 2006, Leuz and Verrecchia 2000, Verrecchia 2001). In Europe, empirical evidence is limited. Peterson & Plenborg (2006) investigated the relation for Denmark. They found some small differences in the economic environment compared to the US. Particular categories of information such as marketing did have a bigger impact on information asymmetry whereas strategy was the most important category in the US. This provides us with a first indication that the European disclosure environment may differ from the US environment and therefore it may be that the relation

found in the US may be different in Europe. Besides Peterson & Plenborg (2006), no studies concerning this relation have been conducted in Europe. To provide academic literature with more insight on the relation between disclosing information and information asymmetry, this research will focus on the Netherlands. I also add a distinction in the type of information that is disclosed, namely: financial information and non-financial information. In previous research, this distinction has never been made.

1.4 This research

This research has a sample of 104 Dutch publicly listed firms. The regression analysis provides evidence of the relation between voluntary disclosed information and the information asymmetry. It shows that information asymmetry decreases when disclosed information increases. The second regression attempt to show a difference in impact between financial and non-financial disclosed information. These results are insignificant meaning that the difference in impact of financial and non-financial is still an unanswered question in this topic of research.

1.5 Structure

This thesis will continue with the second chapter in which the literature review is presented. Furthermore it provides the concept of information asymmetry and related theories. Chapter two will end with the hypothesis for the regression analysis. Chapter three presents the research design and chapter four will discuss the sample and the descriptive statistics. In chapter five the results of the two regression models are presented. Chapter six will end the thesis with a general discussion, limitations, recommendations for future research and conclusion.

II. Literature review and hypotheses development

2.1 Literature review

The relation between voluntary disclosure and information asymmetry has already been a subject of studies since the 1980's. Generally, in the accounting literature, it is supported that firms who are disclosing more information in their financial statements have a lower cost of capital because there is less information asymmetry between the investors. In this relation it is assumed that the information asymmetry creates costs through adverse selection (Daimond & Verrecchia, 1991 and Leuz & Verrecchia, 2000). Information gathering by investors is not costless. At least it takes time and, as a consequence, raises opportunity costs. Better informed investors have more information about a particular stock and thus can better estimate the future performance of the company. Therefore less informed investors protect themselves against the adverse selection problem. They do this by demanding a higher risk premium from firms compared to better informed investors (Wang, 1993). Mitigating this risk by diversifying the portfolio cannot overcome the problem because the less informed investors always have the disadvantage (Easley & O'Hara, 2004). In conclusion, a firm can reduce the risk premium required by investors by disclosing more information via their financial statements. Overall this will provide each investor with more information and may lead to a lower risk premium, thereby lowering the cost of capital for firms. I will refer to this theory onward as the disclosure theory.

2.1.1 Information asymmetry and the bid-ask spread

In order to easily sell a stock the shareholder requires an investor who is willing to buy the same stock. This goes easier when the market has a high liquidity; the degree to which one can quickly sell or buy an asset on a market, which is characterized by a high level of trading activity. A liquid asset can be quickly bought or sold without affecting the price of the asset. In order to maintain liquidity, many exchanges hire market makers who provide investors with a market when they want to trade. This is the point where the bid-ask spread arises. The bid price is the price at which a market maker buys a stock, the ask price at which a market maker sells a stock. This means that an investor sells its stock to the market maker for the bid price and buys the stock for the ask price. The market maker only earns money equal to the

difference of the bid- and ask price. When an order is received, the market maker can sell from its inventory or offsets the trade with another order. The bid-ask spread addresses the adverse selection problem that arises from trading in firm shares when trading parties are facing information asymmetry. When a firm decides to withhold information from the market, investors face an information disadvantage when they decide to trade in the firms shares and are not able to make the best estimation possible about the firms' future performance. During times with high information asymmetry (e.g. earnings announcement), the market makers set a large bid-ask spread and vice versa, when there is a period with low information asymmetry, market makers set a small bid-ask spread. The reason for this is that the market maker is protecting himself against trades where an investor has superior information over a particular stock (Kim & Verrecchia, 2004). This reflection of adverse selection in the bid-ask spread is the reason why researchers use the spread as a proxy for information asymmetry.

Copeland and Galai (1983) were the first to use the bid-ask spread as a purely information driven phenomenon. They found evidence in their model showing the bid-ask spread as a result of more and better informed traders on the market. Previous research argued that the bid-ask spread functions as a result of the inventory cost of the market makers on the bid-ask spread (O'Hara & Oldfield, 1986 and Ho & Stoll, 1981). In 1985, Glosten and Milgron used the bid-ask spread as a proxy for information asymmetry; they presented a model which shows how the spread arises from adverse selection. The model is built on the assumption that a market maker faces an adverse selection problem, because a customer who agrees to trade on the market maker's ask or bid price may do that because he knows something that the market maker does not know. Glosten and Milgron (1985) conclude that the adverse selection can explain the existence of a bid-ask spread. The magnitude however is dependent on a few parameters such as the quality of information held by insiders, elasticity of supply and demand among liquidity traders (who held public information), and the arrival patterns of insiders and liquidity traders.

Several studies have examined the relation between the level of disclosure and a firm's bid-ask spread. The results are consistent. Welker (1995) found a significant negative relation between the level of disclosure rated by analysts and the bid-ask spread. Consistent with Welker, Sengupta (1998) used analyst ratings of the firms' overall disclosure levels and found that firms with higher disclosure levels have lower bid-ask spreads and lower cost of debt. Healy, Hutton and Palepu (1999) show that firms who consequently improve their disclosure over time also improve their bid-ask spread. Leuz & Verrecchia (2000), point out that disclosure ratings represent analysts' perceptions of voluntary disclosure at that time. Firms

without commitment to increased disclosure may reverse or reduce their disclosure policy in the future and deviate from their sustained improvements over the years.

2.1.2 Disclosure and information asymmetry

Disclosure indexes are used in research to determine the level of disclosure a firm provides in their financial statements. Botosan (1997) found evidence for the relation between her disclosure index and a firm's cost of capital. Her findings are consistent with the cost of capital hypothesis which predicts that the more information is disclosed, the lower the information asymmetry is and the lower the risk premium required by investors will be. She finds that when firms with low analyst following increase their level of disclosure, it will lower their cost of equity capital. However, this relation is not significant for firms with a high analyst following. As an explanation she argues that the disclosure measure is limited to the annual reports and that this may not provide a strong proxy for overall disclosure level when a large group of analyst are following the firm.

The effect of increased disclosure on information asymmetry is supported by a strong theory. Empirical results are less obvious due to the fact that most research is done in the US market where disclosure environment is already rich (Petersen & Plenborg, 2006). Because of the difficulties measuring the cost of capital directly and due to self-selection bias[1], Leuz and Verrecchia (2000) conducted an event study to overcome the problem of self-selection bias in which they used multiple proxies to investigate the effect of increased disclosure on information asymmetry (the bid-ask spread, trading volume and share price volatility). They found a unique setting in Germany regarding the disclosure environment. Their sample consisted of German firms who committed themselves to report in International Accounting Standards (IAS) or US GAAP instead of German GAAP in the German market. In this ecample, IAS and US GAAP were considered to provide a higher amount of information when compared to German GAAP. Commitment of firms is an important part, as Bushee & Leuz (2005, p.5) explain: "Without commitment, firms may have incentives to withhold or manipulate information in certain situations, for example, when performance is poor". The results from the event study show that the proxies for information asymmetry decreased after the firms from the sample committed to an increased disclosure policy. Despite the powerful setting the sample size is very limited (21 firms), but the findings are in line with the

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[1] Self-selection bias: arises when an individual select himself into a group which causes a biased sample. In this case, when particular firms are selected because they disclose more than other firms.

disclosure theory which suggest that disclosing more information should lower the information asymmetry component of a firm's cost of capital.

Hail and Leuz (2006) conducted a research similar to Leuz and Verrecchia (2000) but with a larger sample size. They used a sample of thirty-five thousand firm years across 40 countries, studying the effect of international differences on cost of equity capital of firms. Hail and Leuz (2006) argue that information risk is not fully diversifiable and part of the information risk gets incorporated in the cost of equity capital. The results show that countries' legal institutions are significantly related to international differences in cost of equity capital, especially in countries with stricter disclosure requirements, stronger securities regulation and stricter enforcement mechanisms. These findings are in line with the disclosure theory.

2.1.3 Disclosure of non-financial information and information asymmetry

Previous paragraph described the relation between information asymmetry and the bid-ask spread and has discussed findings of the effect of disclosing financial information on the cost of equity capital. This will be followed up with a refinement in the type of information. In 1995 Meek et al. were the first to conduct a research where they made a refinement in the type of information that companies could disclose in their financial statements. They found that there are differences in factors influencing firms disclosing policy for a specific category of information (strategic, financial or non-financial). For example, mainly large European multinational companies disclosed non-financial information. No plausible reason other than social accountability for their peers was given by the authors for this phenomenon. This could mean that there can be different reasons for firms in Europe to disclose non-financial information in their financial statements. Therefore this paragraph will look at the effect of disclosed non-financial information on information asymmetry.

In the past years researchers started to study the relation between of non-financial information and information asymmetry. Dhaliwal et al. (2011) studied the effect of disclosure of corporate social responsibility (CSR) information on the cost of equity capital; they found that firms with a high cost of equity capital in the previous year are inclined to disclose their CSR activities in the current year to lower their information asymmetry. Especially those firms who outperformed their peers in CSR activities actually experienced a reduction in the cost of equity capital. These findings give a first insight in how non-financial

information could affect the cost of equity capital (via information asymmetry). The reasoning for this causality goes as follows: CSR information is value relevant for investors and thus can affect the information asymmetry of firm's shares. For example, social responsible behaviour can help prevent government regulation and reduce compliance costs and thus improves financial performance (Margolis & Walsh, 2001). Other examples are, protecting the environment and improvements in employee welfare. This can reduce potential litigation costs and boost employee morale (Rodriguez et al., 2006). These examples highlight the importance of CSR disclosure. Consequently it encourage firms to disclose CSR (non-financial) information in their financial statements and thereby reduce the information asymmetry, which in turn reduces the cost of equity capital. Frankel et al. (1995) supports the study of Dhaliwal et al.; they argue that firms benefit from increased voluntary disclosure by raising capital in the future at lower cost of equity capital.

In contrast to Dhaliwal et al., Richardson & Welker (2001) suggest that the cost of equity capital is positively associated with social reporting. For the relation between voluntarily disclosed social information and the cost of equity capital, they predicted a positive relation, and a negative relation between disclosed financial information and the cost of equity capital. For both relations they found significant results. They conducted their research in Canada and assessed the level of social disclosure of firm by manually analysing the annual reports using a checklist. The more information firms disclose from the checklist, the higher they score on the disclosure variable.

The findings of Richardson and Welker (2001), which state that social disclosure is positively associated with the cost of equity capital, taken together with the study of Dhaliwal et al. (2011) can lead to the conclusion that the results are mixed on the relation between voluntary disclosed non-financial information on the cost of equity capital.

2.2 Hypotheses development

The previous section shows how information asymmetry influences the cost of equity capital. It is now possible to construct a hypothesis for this thesis based on the theory already discussed.

As seen in the previous section, less informed investors require a higher risk premium than the better informed investors. The reason for this is because less informed investors

cannot fully protect themselves against information asymmetry when they diversify their portfolio because they will always have the information disadvantage (Kim & Verrecchia, 2004). Therefore they require a higher risk premium compared to the better informed investor. The information asymmetry between firms and its capital providers creates the adverse selection problem. Therefore in this paper it is argued that by increasing the level of disclosure firms lower their information asymmetry of their shares. As a consequence the cost of equity capital of the firm lowers as well. The corresponding hypothesis is as follows:

> *H1: The information asymmetry of firm's shares is lower when more information is disclosed in their financial statements.*

The second hypothesis is founded on the works of Dhaliwal et al. (2011), Meek et al. (1995) and Richardson & Welker (2001). Up to now it is not clear how the impact between disclosed non-financial information and financial information differs. Meek et al. (1995) show that there is a difference in effect for different kind of non-financial information. Therefore it is assumed that there probably is a difference in the effect of financial and non-financial disclosed information on the cost of equity capital. Secondly, the results are mixed on whether the relation between non-financial information and the cost of equity capital is positive or negative. Because most studies did find a negative relation it is assumed in this thesis, based on the paper of Dhaliwal et al. (2011), that as long as the non-financial information is value relevant (it affects firms' performance), it will contribute to the negative relation that exists between the level of disclosure and the cost of capital. Therefore hypothesis two is formulated as follows:

> *H2: The information asymmetry of firm's shares is more sensitive to voluntary disclosed non-financial information than it is to voluntary disclosed financial information.*

Now that both hypotheses are presented and supported by the corresponding theory, this thesis will continue with the next chapter in which the research design of the study is presented.

III. Research design

This section discusses the construction of the disclosure index which is based on previous research. Next it discusses the proxy for information asymmetry and finally the regression model.

3.1 Construction of the disclosure index

Financial analysts from the CFA Institute annually created a disclosure index for approximately 500 firms from 22 different industries. Since they no longer provide such an index, this research requires a different source to determine the level of disclosure of firms. Botosan (1997) states in her study that firms coordinate their disclosure of information evenly across different media. Petersen & Plenborg (2006), assume that those findings are applicable in their sample on Danish firms and use the annual reports of each firm for the overall disclosure of the reporting period. This research takes the same approach and uses the annual report as a proxy for the level of disclosure over the year.

The disclosure index is based on the designs of the disclosure indexes of Petersen & Plenborg, 2006 and Botosan, 1997. Both indexes have generally the same items. Omitted items from the disclosure index of Peterson & Plenborg (2006) compared to Botosan (1997) (and vice versa) are inserted in my disclosure index. The disclosure index has 61 items and for each item, a firm scores a '1' if the item is included in the annual report, and a '0' when it is not included. The full disclosure index can be found in appendix A. Ultimately the disclosure index consists out of six categories, namely: Strategy, Competition and outlook, Production, Marketing strategy, Human capital and Management discussion. Below I will discuss the relevance of each of the six categories.

Information about a firm's strategy, direction they are aiming at, competitive issues, information about segment growth and market share are among the most important value drivers (Schuster & O'Connel, 2006). Botosan (1997) and Jenkins (1994) claim that information about production is important for investors for the continuity of production firms, which is why this category is included in the disclosure index. Marketing strategy is of limited importance according to Schuster & O'Connel (2006). But as they point out marketeers consider this information as value drivers. In the marketing literature, marketing information is an indicator for future success of the company. Information about human capital has gained

considerably more attention from investors. Investors require information supplementary to the traditional financial report to help them to better identify the value driving activities (Schuster & O'Connel, 2006). The last category 'Management discussion' is about detailed explanation of changes that cannot be extracted from just looking at the financial statements or footnotes. It provides the investor with more insight in how changes, for example in revenues, have occurred (Botosan, 1997).

The third category (production) caused a problem in the overall score of disclosure. Because all industries were selected, non-manufacturing firms received a low score in this category. As a consequence, the third category 'production' is excluded from 68 firms because these did not manufacture any products. Most of the 68 firms that were excluded are service providers or holdings. The reason for this exclusion is that the disclosure index of Peterson & Plenborg (2006) was created for industrial firms. A firm who mainly provides services would score nothing in this category and, as a consequence, receive a low score on overall disclosure. To overcome this problem, the category is removed for this group of firms. The overall disclosure is still comparable because the disclosure score is a relative measure based on the total possible score.

3.2 Information asymmetry

A measure for information asymmetry is necessary to examine the relation between the level of disclosure of firms and their level of information asymmetry. In chapter 2, I discussed the relation between information asymmetry and the bid-ask spread. This research uses the bid-ask spread as a proxy for information asymmetry just like Petersen & Plenborg (2006) and Leuz & Verrecchia (2000). The dependent variable information asymmetry (INFA) equals the average bid-ask spread. It is calculated as the monthly absolute spread, divided by the average of the bid- and ask price. Then an average is taken over the twelve months during the reporting period to use it as one measure for the reporting period. The data are obtained from Datastream with end of month data intervals.

3.3 Regression model

A regression analysis is the only method to analyse the impact of voluntarily disclosed information in annual reports together with other control variables on the information

asymmetry of firms shares. The variable INFA is regressed on the disclosure score and other firm characteristics. The regression model is formulated as follows:

$$INFA_t = \alpha_0 + \alpha_1\ DS + \alpha_2\ MV + \alpha_3\ Solvency + \alpha_4\ ROIC +\ \varepsilon1 \tag{1}$$

DS is a firm's total score on the disclosure index. MV is calculated as the log of the market value of a firm's equity. Solvency is the book value of equity divided by total liabilities of the firm. ROIC is return on invested capital and is calculated as operating profit divided by total assets.

Market value is included in the analysis because Botosan (1997) finds a significant negative association between market value and her proxy for information asymmetry. Botosan (1997) claims that lightly followed firms were those firms with low market values and more information asymmetry. Highly followed firms with high market values had less information asymmetry. Therefore this variable could be a correlated variable and should not be omitted from the analysis.

Low solvency indicates that a firm might be in distress. The risks for investors are lower when a firm has a high solvency ratio. This implies that information asymmetry is negatively associated with solvency. On the other hand, a low solvency increases the incentive for debt holders and shareholders of the firm to closely monitor the performance of the firm (Botosan, 1997). Therefore the bid-ask spread is positively related with solvency and should be included in the regression model.

Firms with a high level of disclosure mostly show a high earnings number. This may be a result of self-selection bias (Lang & Lundholm, 1993). In other words, when firms perform well, they will likely disclose more information. This means that disclosure can be the result of firm performance. ROIC is included as a variable to check whether disclosure is a random event or if it is likely that it reacts with the firm's economic tendency (Healy & Palepu, 2001). Therefore the sign of the association between ROIC and information asymmetry cannot be determined.

The second regression model tests the difference in impact of disclosed financial information and non-financial information. The following model is used:

$$INFA_t = \alpha_0 + \alpha_1\ FIN + \alpha_2\ NFIN +\ \alpha_3\ MV + \alpha_4\ Solvency + \alpha_5\ ROIC +\ \varepsilon1 \tag{2}$$

In this regression model DS is divided in a financial (FIN) category and non-financial (NFIN) category. Appendix A shows how the disclosure items are divided. The FIN category consists out of 17 items compared to 44 items for the NFIN category. Both variables are the percentage score of their own items.

This distinction in the type of disclosed information has not been subject to analysis in previous research. It is suggested as future research by Peterson & Plenborg (2006). Botosan (1997) did make a distinction in her disclosure index but did not examine a difference in impact between disclosed financial and non-financial information. Therefore no indication of the sign of the relation can be estimated. But in this thesis it is assumed that non-financial information might have a bigger impact on the information asymmetry.

IV. Sample selection and data

4.1 Sample selection

This study includes 104 publicly listed firms on the NYSE Euronext Amsterdam stock exchange. For each firm, I analyse the 2012 annual report. This serves as a proxy for the firm's overall disclosure level during 2012 via press releases, quarterly reports, and other media. This is in accordance with the proxy that Petersen & Plenborg (2006) use for the level of disclosure. I hand collected the annual reports and analysed them manually. Most of the time, the language of the annual report was English. In some cases firms referred to their Dutch annual report as the leading report to avoid discrepancies due to translation errors; with these I used the Dutch annual reports to calculate the disclosure index. All information is publicly available.

To acquire a variety in disclosure level, the sample must be sufficiently large. In total there are 111 Dutch publicly listed firms. No industries were excluded. Datastream did not provide data for 5 firms, so it was impossible to determine the bid-ask spread for these firms. I therefore excluded these firms from the sample. One firm merged during the year 2012 with another publicly listed company, so I excluded this firm to avoid double counting. The final sample consists of 104 firms covering the financial year 2012. Table 1 shows an overview of the sample size determination process.

Table 1: Sample overview

Total Dutch listed firms	111	100%
Firms with no data from Datastream	(5)	4,5%
Merged firms	(1)	1%
Final sample	104	94,5%

4.2 Descriptive statistics

Table 2 shows the descriptive statistics for the 104 firms in the sample.

The average and median value of the disclosure score (DS) is slightly above 50%. With both the first and third quartile deviating 10% from the median, it implies a symmetric[2] distribution. The Financial (FIN) and Non-Financial (NFIN) variables are a distinction of the disclosure items. Both have a comparable mean and median value close to the ones from DS. The information asymmetry variable (INFA) consists of a lot of small observations. Although the mean is comparable to the one of Peterson & Plenborg (2006), the median is two times smaller. This indicates a smaller information asymmetry in the Netherlands compared to Denmark, but with higher outliers. Market value (MV), Solvency and return on invested capital (ROIC) are comparable to the data of Peterson & Plenborg (2006). This indicates no major differences between Dutch and Danish firms in terms of these variables.

Table 2: Descriptive Statistics

Variable[1]	n[2]	Mean	Min	25% percentile	Median	75% percentile	Max	Standard deviation
DS	104	0,5183	0,1472	0,4306	0,5364	0,6201	0,8058	0,1349
INFA (Bid-Ask)	104	0,0308	0,0005	0,00163	0,00747	0,03051	0,3181	0,0571
MV	104	5,3855	1,6902	4,6824	5,4213	6,1770	8,0642	1,2160
Solvency	104	0,8850	0,1943	0,5589	0,8826	1,0935	1,7833	0,3832
ROIC	104	0,0299	-0,7174	-0,0096	0,0483	0,1079	0,8640	0,1982
FIN	104	0,4886	0,0588	0,4	0,4706	0,6	0,7647	0,1625
NFIN	104	0,5536	0,1471	0,4445	0,5682	0,6471	0,9412	0,1552

[1]: DS is the firms individual score on the 61 indicators. INFA is the absolute bid-ask spread divided by the average of bid and ask. Then an average is taken for the twelve months to use it as one measure for the reporting period. MV is the log of the market value of the firms' equity. Solvency is the book value of equity divided by total liabilities. ROIC is the return on invested capital and is calculated by operating profit divided by total assets.

[2]: n is number of observations

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[2] Given the assumption from Hair et al. (2010): Skewness < | 2 | x SE skewness.

V. Results

5.1 Main regression

This section will discuss the results of the first regression model. Some precaution is needed before the results of the regression analysis are presented. The reason for this is that two variables are close, or are violating assumptions, needed to run a regression analysis. The dependent variable INFA does not violate any assumptions. The variable is symmetric[3] and homoscedastic (Table 2) . Only two independent variables have their limitations. The residual plot of the variable DS (Appendix B) shows that the variable is more heteroscedastic than homoscedastic. Although the regression line is linear, it causes the predictions of the independent variable to be better at some levels than others (Hair et al., 2010). The ROIC is leptokurtic (distribution is more peaked), which means that the variable has to be normalized. This is done by taking the root, square, inverse or taking the Log. Taking the Log of the ROIC decreases the impact of bigger observations compared to the smaller ones which lead to the best possible normalized value. Only then the variable still violated the assumption of too much kurtosis: "Kurtosis < | 2 | x SE[4] kurtosis" (Hair et al., 2010). Although the variable did improve the assumption was still violated. Hair et al. (2010) advises to use the variable in its original form. Therefore some caution needs to be taken in interpreting the results. All other variables are symmetric and violate no assumption[5] which are discussed above. Summarizing, not all variables are fully normal distributed but most important is that the linear specification is correct.

Table 3 shows the correlation between the variables. For the first regression model the table shows that the coefficient on the disclosure index is negative and significant at the 0.01 level. This is also the case for market value and ROIC. This is all in line with the expected sign, except for ROIC were no sign direction could be determined. This implies that one change in value of the independent variable has a linear cohesion on the dependent variable. Thus when DS increases with 1, direct or indirectly the data shows a negative effect of -0.421 on INFA. Although market value and disclosure have the highest correlation between the

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[3] Skewness < |2|xSE Skewness (Hair et al., 2010).
[4] Where SE: standard error
[5] After adjusting for skewness (MV, Solveny).

independent variables, their tolerance value is 0.667[6], this means that the multi-collinearity between the independent variables is not too high (Hair et al., 2010). The results from the correlation coefficients are showing a negative relation between the level of disclosure of firms on their information asymmetry (bid-ask spread). Table 3 shows for hypothesis 2 a similar cohesion. Both FIN and NFIN are negatively associated and significant at the 0,01 level. Which implies that an increase of 1 in FIN or NFIN decreases the information asymmetry with -0.342 and for NFIN -0.409.

Table 3: Pearson correlation coefficients

Variables[1]	INFA	DS	FIN	NFIN	MV	Solvency	ROIC
INFA	1	-0,421***	-0,342***	-0,409***	-0,539***	0,086	-0,300***
DS		1	0,804***	0,866***	0,468***	-0,133	0,140
FIN			1	0,625***	0,342***	-0,002	-0,090
NFIN				1	0,554***	-0,179	0,146
MV					1	-0.241**	0,346***
Solvency						1	-0,008
ROIC							1

[1]: Significance levels given are for a 2-tailed test of statistical significance

***: Significant at $\alpha \leq 0,01$

**: Significant at $0,01 < \alpha \leq 0,05$

*: Significant at $0,05 < \alpha \leq 0,10$

Table 4 shows the results of the regression analysis. The variable disclosure is significant at the 0.05 level with a negative coefficient of -0.211. Market value has a coefficient stronger than disclosure and is significant at the 0.01 level. Other variables, solvency and ROIC are not significant. These results are comparable to the study of Peterson & Plenborg (2006). They conducted a similar research in Denmark and found similar regression results except for ROIC. Their variable was positive and significant. One possible explanation is that their sample only consisted of positive ROIC ratio's and this sample consisted partially of negative ROIC ratio's. The R-square of the overall model is 0.317 which is not very high but comparable to the models used by Peterson & Plenborg (2006) in Denmark (0.2943) and Botosan (1997) in the United States (0.135 and 0.247). Botosan (1997) used less control variables in her model, which could explain the lower R-square.

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[6] Other tolerance values are: DS; 0.78, Solvency; 0.935, ROIC; 0.873

Table 4: Regression results

Model[1]	Disclosure (-)	MV (-)	Solvency (-)	ROIC (+/-)	F-Statistics	Adj. R^2
$INFA_t = \alpha_0 + \alpha_1 DS + \alpha_2 MV + \alpha_3 Solvency + \alpha_4 ROIC + \varepsilon 1$						
(1)	-0,221	-0,4	-0,041	-0,131	12,975	0,317
	(-2.394)**	(-4,013)***	(-0,490)	(0,31)		

[1]: Significance levels given are for a 2-tailed test of statistical significance

***: Significant at $\alpha \leq 0,01$

**: Significant at $0,01 < \alpha \leq 0,05$

*: Significant at $0,05 < \alpha \leq 0,10$

The results support the theoretical hypothesis that increased disclosure of voluntary information in firms annual reports do lower the information asymmetry of firms' shares. With more information available to traders, the market maker faces a less severe adverse selection problem. Therefore the bid-ask spread is smaller for those firms that increase their level of disclosure. This theory is supported with the negative association of DS on INFA (-0.221 with p<0.01). The same is true for market value. Botosan (1997) explains this relation as follows. The bigger the firm is in terms of size (market value of equity), the more analyst that are following the firm. This leads to less information asymmetry because a larger pool of traders have similar information about the firm. In her study she found significant results for this relation in her regression model. This study finds a similar result.

Practically, this means that because of the negative association between DS and INFA firms can lower their cost of capital by disclosing more information in their annual reports which lowers the information asymmetry of their shares. There is a trade-off for firms between the benefits of disclosing more information and the costs of disclosing more information. There is no evidence found that the decrease in information asymmetry is the result of only increased disclosure (R^2: 0.317) meaning that there are other variables than the level of disclosure (and market value of equity) associated with information asymmetry.

5.2 Difference in financial and non-financial information

This section will discuss the results of the second regression model. Table 5 shows the regression results of the second regression model. In this model, disclosed information is replaced with financial information and non-financial information. In Table 3, one can see

that FIN and NFIN correlate negatively with information asymmetry and are both highly significant. Although this seems a first indication for a negative association on information asymmetry, both are not significant in the regression model. All independent variables have tolerance values bigger than 0.62[7] except for NFIN which has a tolerance value of 0.532. This means that the multi-collinearity between the independent variables is not too high (Hair et al., 2010).

Table 5: Regression results

Model[1]	Fin(-)	NFIN (-)	MV (-)	Solvency (-)	ROIC (+/-)	F-Statistics	Adj. R^2
$INFA_t = \alpha_0 + \alpha_1\,FIN + \alpha_2\,NFIN + \alpha_3\,MV + \alpha_4\,Solvency + \alpha_5\,ROIC + \epsilon 1$							
(2)	-0,137	-0,136	-0,384***	-0,040	-1,431	10,522	0,316
	(-1,374)	(-1,217)	(-3,712)	(-0,470)	(-1,431)		

[1]: Significance levels given are for a 2-tailed test of statistical significance

***: Significant at $\alpha \leq 0,01$

**: Significant at $0,01 < \alpha \leq 0,05$

*: Significant at $0,05 < \alpha \leq 0,10$

Other variables all have the expected sign. Only MV with a coefficient of -0.384 is significant $(p < 0.01)$.

There is no evidence found that non-financial information has a bigger impact on the information asymmetry than financial information. Although it was suggested in this thesis that there could be a difference in impact of financial and non-financial information on the information asymmetry, both have almost the same negative coefficient (-0,137 and -0,136). As well FIN as NFIN are not significant in this model. One reason could be that firms do disclose information on certain subjects but not all subjects can be expressed in either financial information or non-financial information. E.g. it is hard to provide financial information on experience of management. So, this could limit a possible significance result of relevant financial and non-financial information on the same subject. Another reason could be that FIN and NFIN both form the variable DS, but one cannot live without the other. For the user of an annual report it is insufficient to have only non-financial information or only financial information. Both the variables reinforce each other in the variable DS and thus are significant in the first regression and not in the second regression. The correlation between NFIN and FIN is 0,625 (Table 3) which is quite high. The results of the second regression

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[7] Other tolerance values are: FIN; 0.670, NFIN; 0.532, MV; 0.621, Solvency; 0.91 and ROIC; 0.873.

were insignificant and thus no evidence is found on the difference in impact between financial and non-financial disclosed information. What is important is that the relevant information is provided to the interested parties.

Theoretically the results imply that disclosing information is related with information asymmetry. But there is no evidence found for the difference in impact between financial and non-financial information on the information asymmetry. Thus when a firm discloses information it is irrelevant if it is disclosed using a financial measure or a non-financial measure. What is important is that the relevant information is provided to the interested parties.

5.3 Comparison with US studies

This study tried to provide the academic literature with additional insights about the relationship between the level of disclosure and information asymmetry. Peterson & Plenborg (2006), found some indication that the relation found in US studies may differ from the relation found in Europe. They conducted their research in Denmark and found a weaker coefficient of their disclosure variable on information asymmetry. Their R-square was fairly strong.

Table 6 shows a comparison between European and US studies. The bid-ask spread is calculated the same way in each study except for Hail (2002). This study was added to show the small coefficient in an European environment. On average the coefficient on disclosure is stronger in US studies (Botosan 1997, Hail 2002, Leuz & Verrecchia 2000, Welker 1995). The R-square is different in every study. The reason for this is that for each study not the same control variables are used. In conclusion, the impact of disclosure on proxies for information asymmetry seems to have the same direction in both environments only in the US it seems to be stronger than in Denmark or in the Netherlands. One possible explanation might be that research in Europe is done after the implementation of mandatory reporting in IFRS. This reporting standard is already a richer reporting standard than the local GAAP that was in place before 2005. This might weaken the coefficient on disclosure of research done after 2005.

Table 6: Comparison US & European studies

Study	Dependent variable	Coefficient on disclosure	R^2
Panel A: European studies			
Hail (2002)	Expected cost of equity	-0.0188***	0.378
Peterson & Plenborg (2006)	Bid-ask spread	-0.0014***	0.294
This study (2013)	Bid-ask spread	-0.221**	0.317
Panel B: US studies			
Welker (1995)	Bid-ask spread	-2.024***	0.626
Botosan (1997)	Bid-ask spread	-0.812**	0.135
Leuz and Verrecchia (2000)	Bid-ask spread	-0.47**	0.816

***: Significant at $\alpha \leq 0,01$

**: Significant at $0,01 < \alpha \leq 0,05$

*: Significant at $0,05 < \alpha \leq 0,10$

VI. Conclusion

6.1 Conclusion

This research investigated whether voluntarily disclosed information will lower the information asymmetry of firms' shares in the Netherlands and if so, whether there is a difference in impact between financial and non-financial information. Using a sample of 104 Dutch publicly listed firms, two regression analyses are performed. The results are dependent on the extent to which the bid-ask spread is a good proxy for information asymmetry, theory and other empirical studies support this proxy.

The results of the first regression analysis show that increased disclosure is associated with lower information asymmetry. Practically, this means that because of the association firms can lower their cost of capital by disclosing more information in their annual reports which lowers the information asymmetry of their shares. There is a trade-off for firms between the benefits of disclosing more information and the costs of disclosing more information. There is no evidence found that the decrease in information asymmetry is the result of only increased disclosure (R^2: 0.317) meaning that there are other variables than the level of disclosure associated with information asymmetry. The second regression model shows that there is no difference in impact between financial or non-financial information on information asymmetry. Both variables (FIN and NFIN) are insignificant. One reason could be that FIN and NFIN both form the variable DS, but one cannot live without the other. For the user of an annual report it is insufficient to have only non-financial information or only financial information. Both the variables reinforce each other in the variable DS and thus are significant in the first regression and not in the second regression. The correlation between NFIN and FIN is 0,625 which is quite high. The results of the second regression were insignificant and thus no evidence is found on the difference in impact between financial and non-financial disclosed information. What is important is that the relevant information is provided to the interested parties.

6.2 Limitations

The sample size of the research is limited. This leads to variables that are not always completely homoscedastic what implicitly means that the estimates of standard deviations are disturbed, which has its effects on the p-values. A larger sample could overcome the problem

of heteroscedasticity, but the number of publicly listed Dutch firms is very small compared to the US. Another possible reason for the heteroscedasticity could be that the relation assumed in this research is in reality more complex.

A limitation for the results of this thesis is their comparability with results from previous studies. Since 2005, the new IFRS standard is in place for publicly listed firms. This standard is considered to include more information than, for example, Dutch GAAP. This new reporting standard might have weakened the relation between disclosing information and information asymmetry. Therefore when comparing the results with results from previous research in the US this needs to be taken in consideration.

6.3 Future research

The evidence for the relation between voluntarily disclosed information and information asymmetry is limited in Europe. The relation seems to exists but in a weaker form than in the US. For more insight in how the relation may differ in Europe compared to the US more research in other European countries is necessary. It might be necessary to search for evidence of this relation on pre-2005 data to avoid the richer standard of IFRS. One thing that may come up is that in European countries the annual reports are traditionally more rich in terms of information than the US annual reports.

Because of the insignificant results of the difference in impact between financial and non-financial information future research can focus on specific disclosed information. There may be self-selection in the sample in the sense that certain pieces of information are disclosed financially by almost all firms, while other pieces of information are disclosed non-financially by almost all firms. Significant results can be found when there is only focus on specific disclosed information that can be reported financially and non-financially. One example could be: workforce performance in terms of revenue per employee or in units of production.

VII. Literature

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VIII. Appendices

Appendix A: Disclosure index.

Strategy	Financial	Non-Financial
A statement of corporate goals or objectives is provided?		1
A general statement of corporate strategy is provided?		1
Actions taken to achieve the corporate goal are discussed?		1
A time frame for achieving corporate goals is provided?		1
Attitude towards ethical questions is provided		1
Strategy towards environmental issues is provided?		1
Detailed segment performance is provided?	1	
Changes in ROCE or EVA are provided?	1	
Commercial risk assessments are provided?		1
Financial risk assessments are provided?		1
Interest or exchange risks are discussed?		1
Other risk assessments are discussed?		1
Competition and outlook		
The principal markets are identified?		1
Specific characteristics of these markets are described?		1
Units sold	1	
The market sizes are estimated?		1
Market share is provided?		1
The competitive landscapes are discussed?		1
Barriers to entry are discussed?		1
The market/segment growths are estimated?	1	
Change in market shares is discussed?		1
Impact of barriers to entry on profits is discussed?		1
The impact of competition on profits is discussed?		1
A forecast of market share is estimated?		1
Production		
A general description of the business is provided?		1
The principal products/services are identified?		1
Specific characteristics of these products/services are described?		1
Speed to market is discussed?		1
R&D expenditures are discussed?	1	
Investments in production are discussed?	1	
Product development cycle is discussed?		1
Ratio of inputs to outputs is discussed?		1
New products are discussed?		1
Volume of materials consumed is discussed?		1
Changes in production methods are discussed?		1
Changes in product materials are discussed?		1
Marketing strategy		

Marketing strategy is provided?		1
Sales strategy is described?		1
Distribution channels are described?		1
Sales and marketing costs are provided	1	
Brand equity/visibility ratings are discussed?		1
Customer turnover rates are discussed?		1
Customer satisfaction level is discussed?		1
Customer mix is discussed?		1
Revenues from new products/services are discussed?	1	
Order backlog is provided?	1	
Change in inventory is discussed?	1	
Human capital		
Experience of management team is discussed?		1
Description of workforce is provided?		1
Average compensation per employee	1	
Amount spent on education is provided?	1	
Employee retention rates are provided?		1
Average revenue per employee is provided?	1	
Average age of key employees is provided?		1
Age of key employees is provided?		1
Other Measurement of intellectual capital is provided?		1
Strategy for for human capital is discussed?		1
Management Discussion		
Change in sales/revenue	1	
Change in gross profit/Operating costs	1	
Change in operating income	1	
Change in net income	1	

Appendix B: Residual plot

Scatterplot

Dependent Variable: Disclosure