AN ANALYSIS ON FIRM VALUATION, CSR PERFORMANCE AND INVESTMENT CASH FLOW SENSITIVITY: EVIDENCE FROM THE S&P500

Master thesis

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Abstract

This study investigates to what extent CSR performance and investment cash flow sensitivity are determinants for future investments made by undervalued and overvalued firms in the S&P500. Data is acquired from the Refinitif Eikon database. Firms from the financial industry are excluded from the final sample. Based on existing literature about CSR performance, investment cash flow sensitivity and firm size/valuation, several hypotheses are formed regarding the determinants for the investment-to-total asset ratio. The results show that investment cash flow sensitivity plays no significant role for firms in the S&P500. CSR performance is a more important denominator for investments made by undervalued firms than for overvalued firms. Undervalued firms that have high CSR performance are likely to invest more. This can be explained by the signal that undervalued firms send when investing in CSR and the benefits a firm can have by having high CSR performance. These findings are in line with the existing literature.

Keywords: investment cash flow sensitivity, firm valuation, S&P500, CSR, signalling theory, instrumental variables estimation procedure, firm size, investment-to-capital ratio.

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1. Introduction

1.1 Background

The financial situation is a decisive factor for a firm's investment decision in imperfect markets. Uncertainty in the capital market about the firm's future prospects can lead to the cost of external capital exceeding the cost of internal financing. If this is the case, an investment can show an excess of sensitivity to the internally generated funds of the firm. Fazzari et al. (1998) have shown that financially constrained firms have a higher sensitivity to the availability of internal funds (Samet & Jarboui, 2017). Adding to this, they conclude that investment cash flow sensitivity (ICFS) is a good indicator of financial constraints.

Previous studies have shown that the determinants for the investments a firm makes have changed over time. Some researchers state that investments made by firms became more sensitive to cash flows and risk spread has increased over the years (Triplett et al., 2022), while other researchers discuss that the ICFS has decreased over time (Wang & Zhang, 2021; Schauer et al., 2019). Wang & Zang (2021) state that in the old economy, there was a higher ratio of tangible capital to intangible capital in the productive capital structure. The cash flow generated from this productive capital was the indicator for future productivity of the existing tangible capital, which made the current cash flows the predictor for future cash flows which led to the existence of simple ICFS. Additional research recognizes the statement that the number of investments a firm makes cannot be explained solely by the current cash flows anymore, (Attig et al., 2014; Bhandari & Javakhadze, 2017; Samet & Jarboui, 2017) and that other factors like CSR play a role in determining the number of investments as well.

Some researcher argue that Corporate Social Responsibility (CSR) might influence the investment decisions of firms. Apart from the effect that CSR can have on future investments, Samet & Jarboui (2017) found that CSR performance has a negative effect on ICFS, (which means that firms that score high on CSR performance show less ICFS) and additional existing literature shows that CSR leads to various beneficial aspects for firms. Multiple studies have shown that CSR can have a positive effect on long-term financial performance (Shirasu & Kawakita, 2021), a decrease in ICFS (Attig et al., 2014), and a strong positive link to profitability deems CSR as value-enhancing overall (Gupta & Krishnamurti, 2021). While some researchers state that ICFS becomes a less important factor for the number of future investments, others say that the ICFS depends on firm size. For smaller firms, ICFS can still be seen as an important factor for future investments, but research shows that for large firms this is not the case (Carreira, 2015). This can partly be explained by the fact that large firms are often less financially constrained, and ICFS is significantly more present for financially constrained firms (Mizen & Vermeulen, 2005).

1.2 Relevance and research question

Because there are discussions in the literature about the determinants for future investments that firms make, it is interesting to look if there is a difference in the determinants for overvalued and undervalued firms. When looking at ICFS as a determinant for investments, existing literature states that high-ICFS firms have lower liquidity, lower profitability and lower stock market valuation (or undervaluation) compared to low-ICFS firms (Espallier et al., 2022). If high-ICFS leads to lower firm valuation, it will naturally lead to lower cash flows and fewer funds to invest. As described by the existing literature (Attig et al., 2014; Cheng et al., 2014; Espallier et al., 2022; Samet & Jarboui, 2017), CSR

activity/investment lead to lower ICFS. This makes it interesting to see if CSR performance is equally important for overvalued firms as for undervalued firms, as undervalued firms are more sensitive to ICFS according to the literature, and CSR has a moderating effect on ICFS.

To get a high CSR performance score, a firm has to invest in CSR activities. An overvalued firm has more money to invest (in CSR) than an undervalued firm, which makes it easier to invest. Where an overvalued firm might be able to use only internal financing to invest which will not (or slightly) raise their ICFS, an undervalued firm will have to raise external capital and create more debt which leads to higher ICFS. Because it is harder for undervalued firms to make investments, it might be that they send a more serious signal when investing in CSR than when financially unconstrained firms invest in CSR. This line of thought will be researched in this paper by looking at the determinants for investments for firms in the S&P500, and including the interaction effect between CSR and ICFS. This leads to the following research question:

"Are ICFS and CSR important factors for future investments and is there a difference for undervalued and overvalued firms?"

This research adds to the literature by taking the assumption into account that firm valuation can influence the amount that firms are willing- or are able to invest in CSR and that CSR performance might not be equally important for future investments for overvalued- and undervalued firms. One could argue that firm valuation might affect the signal that firms send when investing in CSR. To get a better understanding of the signal that firms send when investing in CSR, a literature review is included in this research.

According to the literature, high cost of raising external funds, or high ICFS, is an important reason for firms not to pay dividends (Kent Baker & Kilincarslan, 2019). On the other hand, research has shown that financially constrained firms that decide to increase their dividend

payment send a more serious signal about their future prospects and their stock price rises more than dividend-increasing unconstrained firms (Pathan et al., 2016). This research analyses if this phenomenon (signalling theory) also exists for firms investing in CSR. Using literature and financial data, this research analyses the effect on future investments for undervalued firms, or financially constrained firms, that invest in CSR, compared to overvalued firms. The main idea behind this is that if financially constrained firms invest their money in CSR (which is harder to do than for overvalued firms), it would send a more serious signal to investors than when financially unconstrained firms invest in CSR.

1.3 Structure

This report is structured as follows. Chapter two discusses relevant ICFS, CSR and firm valuation theories, followed by an analysis of signalling theory. Next, the hypotheses are developed. Chapter three describes the research methods used, followed by an empirical model and an explanation of the variables used. This chapter also describes how the hypotheses are tested and which data is used. Chapter four shows the results of the research and finally, chapter five gives the conclusion, limitations and availability to further research.

2. Literature review

This chapter considers the definitions and relevant literature for the key topics of this research. It is structured as follows. Section 2.1 introduces the ICFS theories. Next, section 2.2 discusses CSR performance and the benefits a firm can have from it. Section 2.3 focuses on the effects of firm size on the determinants for future investments. Thereafter, an

overview of the effects and determinants for firm valuation is given in section 2.4. This section also includes the hypotheses for this research by also taking the previous sections into account. Lastly, section 2.5 discusses the relevant theories and literature about the signal that firms send when they invest in CSR.

2.1 Investment cash flow sensitivity

The debate on ICFS dates back to 1988 when Fazzari et al. (1998) concluded that investments by financially constrained firms are more sensitive to the availability of internal funds used a sample of US manufacturing firms (Fazzari et al., 1988; Samet & Jarboui, 2017). Even though this paper was widely accepted, some researchers criticised this research, stating that there is no strong theoretical reason that can explain this conclusion (Kaplan & Zingales, 1997) which led to the FHP-KZ debate. Following this debate, other researchers, both in the past and more recently have supported the conclusion of Fazzari et al. (1998) and they add to the literature by showing that the ICFS puzzle can be seen as (at least) a relative measure for financial constraints (George et al., 2011; Kim, 2014).

In general, the main conclusion of previous research is that there is a positive relationship between cash flow and investment. As mentioned before, Samet & Jarboui (2017) later add to the literature by including the role of CSR performance in ICFS. They found using a database of European companies that are listed in the STOXX 600 that firms with higher CSR performance have significantly lowered ICFS. This research leads to the belief that there are other factors that can mediate ICFS as well. Previous research shows that financially constrained firms have higher ICFS than unconstrained firms (Fazzari et al., 1988; Moyen, 2004).

Over the years, research has shown that ICFS becomes less important, even when cash flows are negative (Brown & Petersen, 2009). Investors tend to look more at growth opportunities and good practices than before. Brown & Petersen (2009) have shown that in the period between 1980-2006, ICFS has fallen 60% for young firms and 41% for mature firms. They suggest that this is partly because public equity markets have improved their sustainability in the last decades, which contributes to the decline of ICFS. Research by Kaplan and Zingales (1997) diverge from existing literature by stating that ICFS increases, especially for financially unconstrained firms. Allayannis & Mozumdar (2004) state that these results can be explained by negative cash flow observations and they confirm that ICFS has declined over the years. They show that in particular, the most financially constrained firms have seen a decline in ICFS over the years (Allayannis & Mozumdar, 2004). Research has shown that cash flow persistence has fallen in developed economies and that especially in the US, ICFS has declined or even disappeared (Moshirian et al., 2017).

2.2 CSR performance, firm benefits and the relationship with investments

Throughout the years, CSR became an increasingly important subject for firms. Investing in CSR can lead to beneficial effects for a firm. Firms that invest in CSR and know how to adapt to it successfully, can expect more confident customers and exceptional positive financial performance (Kim, 2014). Firms that have been highly involved with CSR practices, may have seen an increased firm value (Ogachi & Zoltan, 2020). Another benefit is that CSR performance leads to a decrease in idiosyncratic capital constraints and naturally to an increase in accessibility of external funds (Cheng et al., 2014). Research has shown that CSR performance has a larger effect on investors' firm value estimates when it is reported into a separate report, rather than when it is integrated into a financial report (Haji et al., 2021). To

further capitalize on the benefits of CSR performance, firms actively use social media to show their CSR performance (Ali et al., 2015).

CSR performance has an effect on the investments of a firm as well. Existing literature shows that firms with high CSR performance have higher investment efficiency (Benlemlih & Bitar, 2018). Besides higher efficiency, there seems to be an positive relationship between CSR performance and the amount a firm invest (Erhemjamts et al., 2013). This can partly be explained by the fact that CSR performance leads to an increase in the accessibility to external funds. Because of these beneficial effects of CSR on investments, it has become an increasingly important factor for firms' investment policy.

Even though high CSR performance seems to have only positive effects, some researchers argue that the relationship between CSR and financial performance is not that significant. Waddock and Graves (1997) found a positive relationship between CSR performance and financial performance. McWilliams and Siegel (2000) suggested that Waddock and Graves should also add R&D intensity to their model. They found that with R&D included, the significant positive relationship between financial performance and CSR disappears (Awaysheh et al., 2020). There exist a relationship between economic policy and benefits from CSR performance. If economic policy uncertainty is relatively high, CSR enhances the firms' financial performance and offsets the negative role of economic uncertainty on the firms' financial performance (Rjiba et al., 2020).

Investing in risk management often comes at a price in excess of expected loss. Smith and Stultz (1985) and Stultz (2002) show that risk reduction adds value for shareholders because of violations of the perfect market assumptions (Godfrey et al., 2009). While some experts argue that investing in CSR can be seen as risk management and that there is a CSR risk premium for extra-financial ratings priced by the market (Lajili Jarjir et al., 2020), others

define CSR in the literature as voluntary and that this voluntary nature means that CSR activities can be seen as "gifts" for various stakeholder groups, which may raise the stock price (Mackey et al., 2007). Existing literature has shown that no matter if investing in CSR will be seen as risk reduction, or as a voluntary investment, it possibly will lead to financial benefits for the firm. Campbell (2007) argues that financially constrained firms are less likely to have high CSR performance, compared to financially unconstrained firms. Additional research supports Campbell's (2007) statement by confirming a significant negative relationship between financially constrained firms and CSR activities (C. Y. Chan et al., 2017).

2.3 Firm size and determinants for investments

The determinants for investments by firms cannot be simply explained. Where in the past ICFS was one of the most important determinants, researchers nowadays show that the importance of ICFS for future investments has lessened. In addition to this, the importance of ICFS for future investments seem not to be equal for different firm sizes (Carreira, 2015; Khurana et al., 2006; Mizen & Vermeulen, 2005). Khurana et al. (2006) have shown that the importance of ICFS decreases with firm size, as smaller firms are often more financially constrained than large firms. Even though this relationship is likely to exist, not every research has shown this same relationship. Some researchers claim that larger firms' investments are more dependent on ICFS and that the dependency of investments on cash flow cannot be interpreted as an accurate measure of its access to capital markets (Kadapakkam et al., 1998).

As stated before in chapter *2.2*, CSR performance is an increasingly important factor for future investments of a firm. Investors tend to pay more attention to the corporate governance of a firm, and less to their cash flows. There are some reasons why it is

interesting for investors to look at the CSR performance of a firm before investing. Not only does CSR performance lead to beneficial effects as mentioned in chapter 2.2,but it also leads to a higher tolerance for uncertainty, and long time-horizon investments of a firm (Yuan et al., 2020). The role of CSR as a determinant for future investments can also not simply be explained, as some previous research shows different results. Where Samet and Jarboui (2017) show that CSR has a negative effect on the ICFS of firms, other research states that CSR negatively affects the sensitivity of external finance (to *Q*) and aggravates ICFS (Bhandari & Javakhadze, 2017). This debate makes it interesting to see whether ICFS still plays a role in the S&P500 and if it does increase- or decrease the ICFS.

2.4 Firm valuation and price to book ratio

The price-to-book (P/B) ratio of a firm shows the difference in the book value and market value of a firm. This P/B ratio can be used as a determinant for deciding if a firm is overvalued or undervalued (L. K. C. Chan et al., 2002; H. L. Chen & De Bondt, 2004). Some managers try to emphasize improving their investor relationships to increase their P/B ratio and thus firm valuation (Bushee & Miller, 2012). In general, if a firm's P/B ratio is greater than 1, the firm has added value (Agrawal et al., 1996). This does not mean directly that a firm with a higher P/B ratio than 1 is automatically overvalued. The P/B ratio for firm valuation is different between sectors and firms in general. The mean P/B ratio of the S&P500 has been around 3.0 since the year 2000. This can partly be explained by the fact that the S&P500 contains only large companies that are, on average, not extremely financially constrained.

Firms with a high P/B ratio- or overvalued firms, in general, have more excess cash than firms that are financially constrained or have a low P/B ratio, which makes it easier for

overvalued firms to make investments (in CSR). Literature shows that financially unconstrained have less IFCS than financially constrained firms. This would decrease the need for financially unconstrained firms to get high CSR performance to increase their future investments (as CSR has a moderating effect on ICFS (Samet & Jarboui, 2017). This would put undervalued firms that invest in good practices (CSR) in favour of investments, as they have higher ICFS. Adding to this, it could send a more serious signal to investors when undervalued firms invest in CSR, compared to overvalued firms. Keeping in mind the discussions about the relevance of ICFS, the role of firm size, the role of firm valuation, and the signalling theory, the following hypotheses are developed to give more clarity about the role of these variables for firms in the S&P500:

H1: Overvalued firms' investments are not sensitive to cash flow.

H2: Undervalued firms' investments are sensitive to cash flow.

H3: Undervalued firms' investments are more sensitive to CSR performance than overvalued firms' investments.

H4: The interaction effect between ICFS and CSR will be higher for undervalued firms than for overvalued firms.

2.5 The signalling effects of firms investing in CSR

There can be many reasons why firms want to invest in CSR. Some people argue that managers over-invest in CSR to gain a personal reputation as a good person, while other people state that CEOs strategically invest in CSR performance to reduce the chance of a future CEO turnover through (in)direct support from activists. Also, others claim that firms invest in CSR to give a signal about their product quality (Harjoto & Jo, 2011). Literature suggests that consumers pay increasingly more attention to the CSR performance of firms

when they make their purchasing decisions and that CSR performance either increases the purchase intention or the price customers are willing to pay for the firms' products or services (Bhardwaj et al., 2018).

Because CSR performance has beneficial effects for firms, many firms use CSR as a marketing gimmick. When firms put emphasis on the observable aspects of CSR, but they pay no attention to the unobservable aspects, they can be accused of greenwashing (Wu et al., 2020). Previous research has shown that there is a negative relationship between firm reputation and greenwashing, and that even when a firm's CSR performance is high, over-advertising this is more unfavourable to their brand attitudes than not advertising (Delmas & Burbano, 2011; Nyilasy et al., 2014; Parguel et al., 2011). When firms communicate about their CSR performance correctly, CSR performance significantly affects the valuation of a firm. CSR expands overvaluation and reduces the deviation from the true value for undervalued firms (Bofinger et al., 2022). As the literature shows, firms send a positive effect to investors when they invest in CSR, but they have to watch out that they communicate about it correctly, as greenwashing send a negative signal to the market.

3 Research method and database

3.1 Data and sample selection

The sample of this study consists of 500 large-cap companies listed in the S&P500 index between 2020 and 2021, which includes 11 different sectors. Firms with missing data will be dropped from the sample. Also, firms from the financial sector will be excluded from the research, as their data is not relevant to use in the research. The data for the sample is collected by using the Refinitif Eikon (Thomson Reuters) database. Refinitif Eikon offers data

concerning the CSR performance of the firms in the S&P 500. It also includes their financial data and the P/B ratio, which will be used to make a distinction between overvalued and undervalued firms. If the firm has a P/B ratio greater than one, the firm has added value (Agrawal et al., 1996). Theoretically, any firm with a P/B ratio greater than one has added value and can be seen as "overvalued", but financial professionals discuss that this is not a good value to determine whether firms are overvalued and undervalued in the S&P500. In this research, the median of the P/B ratio in the S&P500 will be used as the determinant for the overvaluation- or undervaluation of firms in the sample. The data will be processed using R. After filtering the financial sector and the N/A missing values from the database, a total of 416 firms in the S&P 500 is included in this research.

ICB Industry name	***n***	***%***
Basic Materials	18	4.33
Consumer Discretionary	81	19.47
Consumer Staples	32	7.69
Energy	22	5.29
Health Care	58	13.94
Industrials	88	21.15
Real Estate	22	5.29
Technology	55	13.22
Telecommunications	10	2.40
Utilities	23	5.53
Total	***416***	***100***

Table 1: Sample distribution across industries

3.2 Model specification

To answer the hypotheses, the Euler equation (A. A. Chen et al., 2013) will be used. Samet & Jarboui (2017) discussed that CSR performance should be included in this equation, and they added to the literature by showing why CSR performance is relevant to add to the standard equation. The regression made by Samet & Jarboui is:

$$\left(\frac{I}{K}\right)_{i,t} = \alpha_1 \left(\frac{S}{K}\right)_{i,t-1} + \alpha_2 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_3 CSR_{i,t} + \alpha_4 CSR_{i,t} * \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_5 \left(\frac{I}{K}\right)_{i,t-1} +$$

$$\alpha_6 \left(\frac{I}{K}\right)^2_{i,t-1} + \alpha_7 \left(\frac{D}{K}\right)^2_{i,t-1} + \beta_i + \beta_t + \varepsilon_{i,t}$$

This equation will be used as the basis to test the hypotheses, which shows the significance of the variables that determine the investment made by firms in the S&P500. In this equation, *I* represents the investment in fixed assets and *K* the capital stock. The total sales of the firm are represented by S, the cash flow by *CF,* and the debt by *D*. β_i and β_t are not relevant for this study, as they represent the firm fixed effects and the period fixed effects. $\varepsilon_{i,t}$ is an error term. *CF/K* measures the cash flow to total assets ratio (ICFS) and *I/K* measures the investment-to-capital ratio. The median P/B of the firms will be used to make a database with "undervalued" and "overvalued" firms in the S&P500. Because this research uses panel data for firms across different industries, the industry fixed effects have to be included in the equation, to prevent any biases. The new equation is:

$$\left(\frac{I}{K}\right)_{i,t} = \alpha_1 \left(\frac{S}{K}\right)_{i,t-1} + \alpha_2 \left(\frac{CF}{K}\right)_{i,t-1} + \alpha_3 CSR_{i,t} + \alpha_4 CSR_{i,t} * \left(\frac{I}{K}\right)_{i,t-1} + \alpha_5 \left(\frac{I}{K}\right)_{i,t-1} +$$

$$\alpha_6 \left(\frac{I}{K}\right)^2_{i,t-1} + \alpha_7 \left(\frac{D}{K}\right)^2_{i,t-1} + \beta_i + \varepsilon_{i,t}$$

In this formula, β_i represents the industry fixed effects. To control for these industry fixed effects, 9 dummy variables will be created for the 10 different sectors. Using the ordinary least squares (OLS) method to estimate the model is problematic because there is an explanatory lagged dependent variable (LDV) and a fixed effect in the model. To avoid any estimation bias, the instrumental variables estimation procedure will be applied. The previous year's values will be used to control for endogeneity that results from the LDV.

3.3 Dependent variable

The dependent variable in the model is $\left(\frac{I}{K}\right)_{i,t}$ which measures the investment-to-capital ratio. This ratio gives an insight into the amount of investments a firm makes, compared to its capital. A panel study is useful to determine which variables are important for the investments. The equation uses the investment-to-capital ratio of this year, and it is equal to the investment-to-capital ratio of last year, with some additional explanatory one-period-lagged variables added. If these extra variables have no impact on the investment-to-capital ratio, then the investment-to-capital ratio of this year should be fully explained by the investment-to-capital ratio of last year plus the error term. If an explanatory variable shows a significant positive relationship with the investment-to-capital ratio of this year, it means that the explanatory variable leads to firms investing more.

3.4 Independent variables

There are 5 independent variables in the equation that are important for the investment-to-capital ratio of a firm. These independent variables explain the difference in the CF/K ratio of this year compared to the CF/K ratio of last year. To make a conclusion about which independent variables are important for future investments, the one-period-lagged ratio is used for the financial ratio's that explain the investment-to-capital ratio.

The variable $\left(\frac{S}{K}\right)_{i,t-1}$ represents the one-period-lagged sales to capital ratio. A high S/K ratio shows how efficient a firm can turn one dollar of capital into one dollar revenue. This factor is deemed to be important because if the efficiency of the sales to capital raises, the firm raises more cash, which can be used for investments. The variable $\left(\frac{CF}{K}\right)_{i,t-1}$ represents the cash flow-to-capital ratio. This is an efficiency ratio that shows the CF/K without being affected by income measurements or income recognition. This ratio is used by

firms because it estimates the availability of cash in future periods, which can, for example, be used for investments. If a firm shows higher sensitivity of CF to investment, and the cash flow-to-capital ratio of a firm is low, it will lead to a lower amount of future investments.

The CSR performance score is measured by $CSR_{i,t}$ and it shows how well a firm performs in CSR. A high CSR performance score means that the firm exercises good practices and a low CSR performance score shows that the firm shows not much corporate social responsibility. As explained in 3.3, $\left(\frac{I}{K}\right)_{i,t-1}$ is the investment-to-capital ratio one-period-lagged. This variable is used to analyse the difference in investments of last year with the investments of this year. The last independent variable is the squared value of the debt-to-capital ratio $\left(\frac{D}{K}\right)^2_{i,t-1}$ one-period-lagged. This ratio shows the leverage of a firm and how much debt the company has to creditors. A higher debt-to-capital ratio makes it more difficult for firms to raise external capital and make investments, which in it turn is expected to lead to a lower amount of investments.

3.5 Interpretations and expectations of the results

Hypotheses 1 & 2 focus on the question if ICFS is still important, and it distinguishes undervalued firms from overvalued firms. To get a global interpretation of the relevance of ICFS for firms in the S&P500, first, the regression will be used for the entire sample. The prediction is that ICFS will show no significance because the literature shows the decrease in significance for ICFS (especially in the US and for large firms). This can be concluded by looking at the cash flow-to-total asset ratio (*CF/K t-1*). Once the entire sample is split into overvalued firms and undervalued firms, the effect of ICFS for undervalued firms is expected

to be significant, as undervalued firms show more sensitivity to cash flows (Carreira, 2015; Khurana et al., 2006; Mizen & Vermeulen, 2005).

To answer *H3*, the variable α_3 ($CSR_{i,t}$) is of interest. It is expected that CSR performance shows a more significant positive relationship with investments in undervalued firms than for overvalued firms. This is because undervalued firms on average have more financial constraints, and CSR performance makes it easier for firms to raise external capital (Cheng et al., 2014).

To answer *H4,* the variable α_4 ($CSR_{i,t} * \left(\frac{I}{K}\right)_{i,t-1}$) is of interest. It is expected that this interaction variable shows a significant relationship for undervalued firms and no significance for overvalued firms. This is based on the theory that CSR performance decreases ICFS, and undervalued firms tend to have more ICFS than overvalued firms. If CSR or ICFS don't show any significance, it is expected that the interaction effect will show no significance as well.

4 Results

In this chapter, the results of the research are analysed, based on multiple analyses. Section 4.1 gives a discussion of the descriptive statistics. 4.2 shows the regression for the entire sample. 4.3 analyses the results of the regression for the undervalued firms only. Following, 4.4 analyses the results of the regression for the overvalued firms. Section 4.5 answers the hypotheses and lastly, section 4.6 gives a remark on ICFS, P/B ratio, firm size and existing literature.

4.1 Descriptive statistics

The descriptive statistics of this study can be seen in table 2. The median price-to-book ratio is 3.758. This is lower than the mean value of 5.97 and higher than the theoretical "overvalued – undervalued" border of 1.00. This shows that the firms in the S&P500 are generally "overvalued", which makes sense because the S&P500 contains only large, mostly financially unconstrained firms. The minimum (*D/K)*t-1 score shows that the sample has at least 1 firm that has no debt at all. The mean and the median score of CSR performance are almost identical, which shows that 58 is an average CSR performance score in the sample. The differences in the scores per variable for each industry shows that it is important to control for industry. The differences can be easily explained as, for example, the real estate industry has naturally a higher CAPEX and debt rate than the technology sector.

Panel A. Descriptive statistics of the sample

Variable	**Mean**	**Min**	Q_1	**Median**	Q_3	**Max**	**SD**
CSR	58.05	8.00	46.35	58.64	69.80	88.92	15.43
PB	5.97	-122	2.094	3.758	7.235	175.51	18.30
I/K	0.0368	0.0020	0.0138	0.0259	0.0480	0.3222	0.0351
I/K*(t-1)*	0.0352	0.0020	0.0140	0.0261	0.0475	0.1759	0.0290
S/K*(t-1)*	0.6509	0.0680	0.3125	0.5202	0.7849	4.2890	0.5493
CF/K*(t-1)*	0.0845	-0.3831	0.0489	0.0797	0.1286	0.4874	0.0887
D/K*(t-1)*	0.3345	0.0000	0.2202	0.3146	0.4250	2.6282	0.2241

Panel B. Mean of variables across industries

Industry	***CSR***	***PB***	***I/K***	***I/K****(t-1)*	***S/K****(t-1)*	***CF/K****(t-1)*	***D/K****(t-1)*
Basic Materials	67.83	3.9287	0.0428	0.0418	0.5788	0.1002	0.2888
Con. Discr.	50.59	2.6720	0.0308	0.0302	0.7931	0.0626	0.3656
Con. Staples	58.91	13.326	0.0245	0.0245	1.0432	0.0897	0.3792
Energy	61.45	5.1740	0.0477	0.0665	0.4775	-0.0351	0.3587
Health Care	58.73	5.7820	0.0268	0.0263	0.6817	0.1090	0.2767
Industrials	58.62	7.7641	0.0272	0.0251	0.7201	0.1011	0.3026
Real Estate	68.86	5.0653	0.0825	0.0561	0.2147	0.0435	0.4944
Technology	58.72	7.5218	0.0342	0.0324	0.6154	0.1347	0.2778
Telecom	48.22	3.3864	0.0524	0.0373	0.4022	0.0879	0.3421
Utilities	59.96	2.6150	0.0676	0.0697	0.2247	0.0569	0.4021

Table 2: Descriptive statistics and sample distribution across industries

4.2 Regression for the entire sample

In table 3, the results for the regression for the entire sample can be seen. In this regression, only (*I/K)*t-1 stands out as a significant determinant for future investments. This indicates that in the sample, ICFS is no significant determinant for future investments. This is in line with the literature as mentioned in chapter 2.3 and it can be explained by the size of the firms. Adding to this, according to the literature, US firms experience the least ICFS.

When looking at the interaction between ICFS and CSR, these results do not support the literature that states that CSR performance leads to a decrease in ICFS. The main reason for this can be that ICFS has no significance in the sample. The Adjusted R^2 of 0.7119 shows that the regression model fits the observed data well.

Variable	**Estimate**	**Std. error**	**t-value**
(Intercept)	-0.01022664	0.00914994	-1.118
(S/K)t-1	-0.00084668	0.00187976	-0.450
(CF/K)t-1	-0.02573494	0.03723717	-0.691
(I/K)t-1	0.77847659 ***	0.14575274	5.341
(I/K)^2 t-1	0.09485873	0.05984850	1.585
(D/K)^2 t-1	-0.00162482	0.00518381	-0.313
CSR	-0.00001012	0.00008628	-0.117
CSR*((CF/K) t-1)	0.00061627	0.00064307	0.958
Industry fixed effects		Yes	
Adjusted R^2		0.7119	

Notes: This regression uses the instrumental variables estimation. The dependent variable is (*I/K*), the investment-to-capital ratio of the firm. (*S/K*)t-1 is the one period lagged sales-to-capital ratio. (*I/K*)t-1 is the one period lagged investment-to-capital ratio. (*CF/K*)t-1 is the one period lagged cash flow-to-capital ratio, which is used for the ICFS. (*I/K*)^2 t-1 is the one period lagged square function of the investment-to-capital ratio. The squared value of the total debt to total asset ratio one period lagged is shown by (*D/K*)^2 t-1. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' .

Table 3: Regression for the entire sample

4.3 Regression for undervalued firms

The results of the regression for undervalued firms can be seen in table 4. The database for this regression only contains the firms with the PB score lower than the median value of the entire sample. This does not mean that every firm in this database is actually undervalued, but in the case of the entire sample, these firms do not belong to the top 50%

of overvalued firms. The original database was split on basis of the P/B ratio to check whether firms with a lower P/B ratio (undervalued) have other determinants for their future investments than firms with a higher P/B ratio (overvalued).

The results show that CSR performance now has a significant positive relationship with the investment-to-capital ratio, whereas in the original database CSR performance shows no significant relationship. It could be expected to see (*S/K*)t-1 (the ICFS) have a significant effect as well, because as explained in chapter 2.1, financially constrained firms or undervalued firms are more sensitive to ICFS than overvalued firms. The fact that ICFS shows no significant relationship in this regression, is mainly due to the large size of the undervalued firms. Also, it shows that, in line with the theory of (Attig et al., 2014; Bhandari & Javakhadze, 2017; Samet & Jarboui, 2017), ICFS becomes less of an important denominator and CSR becomes a more important denominator for the investment-to-capital ratio of firms. The Adjusted R^2 is relatively high (0.8189), which shows that the regression model fits the observed data well.

Variable	**Estimate**	**Std. error**	**t-value**
(Intercept)	-0.07202545 *	0.03269250	-2.203
(S/K)t-1	-0.00239795	0.00266497	-0.900
(CF/K)t-1	-0.01118884	0.04648855	-0.241
(I/K)t-1	1.07631906 ***	0.16973022	6.341
(I/K)^2 t-1	-0.00126043	0.07206892	-0.017
(D/K)^2 t-1	0.00413607	0.00633142	0.653
CSR	0.00020073 *	0.00008521	2.356
CSR*((CF/K) t-1)	0.00041429	0.00078966	0.525
Control for size logK		Yes	
Industry fixed effects		Yes	
Adjusted R^2		0.8189	

Notes: This regression uses the instrumental variables estimation. The dependent variable is (*I/K*), the investment-to-capital ratio of the firm. (*S/K*)t-1 is the one period lagged sales-to-capital ratio. (*I/K*)t-1 is the one period lagged investment-to-capital ratio. (*CF/K*)t-1 is the one period lagged cash flow-to-capital ratio, which is used for the ICFS. (*I/K*)^2 t-1 is the one period lagged square function of the investment-to-capital ratio. The squared value of the total debt to total asset ratio one period lagged is shown by (*D/K*)^2 t-1. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' .

Table 4: Regression for undervalued firms

4.4 Regression for overvalued firms

The regression for overvalued firms can be seen in table 5. Where CSR performance shows a significant positive relationship with the investment-to-capital ratio for undervalued firms, it shows no such relationship for overvalued firms. This confirms the hypothesis that undervalued firms' investments are more sensitive to CSR performance than overvalued firms' investments. In line with the literature, this regression also shows that for overvalued firms with a large size, there is no significant relationship between investments and ICFS. The regression also shows a 5% significant positive relationship between CSR and (*CF/K*)t-1, which indicates that the overvalued firms' cash flow-to-capital rate rises when their CSR performance increases. For the entire sample, the interaction effect between CSR and ICFS is not significant in the first place. When the sample is split for overvalued and undervalued firms, the regression shows only a slightly significance between CSR and ICFS for overvalued firms. This is contradictory to the hypothesis that the interaction effect between ICFS and CSR will be higher for undervalued firms, *H4* is namely tested by looking at the difference in the interaction effect between CSR and ICFS. The Adjusted R^2 is lower than it was for the entire sample and the undervalued database, but 0.6262 is still acceptable.

Variable	**Estimate**	**Std. error**	**t-value**
(Intercept)	-0.0208189	0.0365948	-0.569
(S/K)t-1	-0.0010783	0.0027644	-0.390
(CF/K)t-1	-0.01118884	0.04648855	-1.464
(I/K)t-1	0.5812108 *	0.2440331	2.382
(I/K)^2 t-1	0.1490693	0.0977332	1.525
(D/K)^2 t-1	-0.0093579	0.0089589	-1.045
CSR	-0.0003024	0.0001966	-1.538
CSR*((CF/K) t-1)	0.0021665 .	0.0012530	1.729
Control for size logK		Yes	
Industry fixed effects		Yes	
Adjusted R^2		0.6262	

Notes: This regression uses the instrumental variables estimation. The dependent variable is (*I/K*), the investment-to-capital ratio of the firm. (*S/K*)t-1 is the one period lagged sales-to-capital ratio. (*I/K*)t-1 is the one period lagged investment-to-capital ratio. (*CF/K*)t-1 is the one period lagged cash flow-to-capital ratio, which is used for the ICFS. (*I/K*)^2 t-1 is the one period lagged square function of the investment-to-capital ratio. The squared value of the total debt to total asset ratio one period lagged is shown by (*D/K*)^2 t-1. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' .

Table 5: Regression for overvalued firms

4.5 Hypotheses table

Table 6 shows the answers to the hypotheses of this research. The two most noticeable things are that 1) firms in the S&P500 show no significant ICFS and 2) CSR performance is more important for the investment-to-capital ratio for undervalued firms. This means that undervalued firms that have high CSR performance are more likely to invest more in the future than undervalued firms with low CSR performance. This can be explained by the theory of Yuan et al. (2020)

Hypotheses	**Status**
H1: Overvalued firms' investments are not sensitive to cash flow	Accepted
H2: Undervalued firms' investments are sensitive to cash flow	Rejected
H3: Undervalued firms' investments are more sensitive to CSR performance than overvalued firms' investments	Accepted
H4: The interaction effect between ICFS and CSR will be higher for undervalued firms than for overvalued firms	Rejected

Table 6: Hypotheses results

4.6 Remark on ICFS, P/B ratio, firm size and existing literature

The CF to total assets ratio measures the amount of CF a firm makes compared to the total assets. While it is not related to the profit or loss that the firm makes, it is related to the cash inflow of the firm. The CF to total asset ratio shows the ability of a firm to generate

CF with their own assets, this is why the CF/K is used as an indicator for the ICFS. A high CF/K rate increases the likelihood of the ability of firms to use their own money to make investments, rather than raising external capital. Firms with a low CF/K rate face a higher risk of having to raise external capital to make investments, as their CF might not be enough to cover the expenses.

Running an $\alpha = 0.05$ two-sample t-test for mean CF/K(t-1) for overvalued and undervalued firms gives *t = 6.7509, df = 408.93, p-value = 0.0000*, which shows that there is a significant difference in the mean CF/K(t-1) value of overvalued and undervalued firms. The mean for overvalued firms is 0.1124, and the mean for undervalued firms is 0.0566. Even though CF/K shows no significance for future investments for overvalued- and undervalued firms in the S&P500, the significant difference in the mean CF/K(t-1) value for overvalued- and undervalued firms is in line with existing literature that says that financially constrained firms have higher ICFS (Fazzari et al., 1988; George et al., 2011; Kim, 2014; Samet & Jarboui, 2017). The fact that CF/K(t-1) does not show any significance in both regressions can be explained by the literature that states that ICFS becomes less of an important factor for investments for large firms (Carreira, 2015; Mizen & Vermeulen, 2005).

5. Conclusion

This study investigates the sensitivity of investments to cash flow-to-capital and CSR performance. The main goal of the study is to investigate whether ICFS and CSR performance are important factors for future investments by firms and if there is a difference in this importance for undervalued and overvalued firms. The study uses the S&P500 as the sample with the exclusion of firms in the financial industry, in the period 2020-2021. The results show that CSR performance is a more important factor for the investment-to-capital ratio of

undervalued firms, meaning that undervalued firms that have high CSR performance are more likely to invest more. This can mainly be explained by the benefits that CSR performance can bring to a firm, as described in chapter 2 (more loyal customers for example). Furthermore, the empirical results show that both undervalued firms and overvalued firms show no significant relationship between cash flow-to-total assets and investment-to-total assets, meaning that the firms' investments in the sample are not sensitive to cash flow. This can be explained in three ways; 1)it confirms the literature that in general, the cash flow-to-total assets ratio is becoming less important for investments, 2) ICFS is less present in large firms and 3) the sample uses US-listed firms, and literature states that ICFS is becoming less relevant (or even non-existing) in the US, compared to other countries. The sample consists only of large firms, otherwise, they would not be listed in the S&P500. The results of this study can not confirm the findings by Samet & Jarboui (2017) that CSR performance should weaken the ICFS. The answer to the research question: "Are ICFS and CSR important factors for future investments and is there a difference for undervalued and overvalued firms?" can be answered with; 1) ICFS is not an important factor for future investments for the firms in the entire sample and, 2) CSR is an important factor for future investments and there is a significant difference in the importance of CSR performance for overvalued and undervalued firms. Undervalued firms' investments are more dependent on CSR performance than overvalued firms' investments. That is why it is a good thing to make a distinction between overvalued and undervalued firms.

5.1 Discussion

The results of this research are in line with existing literature and it shows that investments cannot be solely explained by the cash flows anymore. The sample of this

research consists of large companies only, which might not entirely represent the importance of ICFS for undervalued firms and small firms well. Future research could include a database with small and medium enterprises as well to get a more in-depth explanation of the importance of ICFS and CSR.

The most questionable variable in this research is the CSR performance score. CSR performance is not easily measurable and the score can differ for different online databases, whereas the financial data is the same in different online databases. It could also be a good thing to split the CSR performance score up into environmental, social and governance scores, to see if any of these scores play a more significant role than others. Furthermore, it could be interesting to repeat this research, but for firms with higher debts and more financial constraints as well, to control whether the findings are the same.

As stated by Moshirian et al. (2017), ICFS has declined or even disapeared especially in the US. This can explain the difference between the results of this research and the findings by Samet and Jarboui (2017), as they used European listed firms only, and this research used US-listed firms. This opens the door to future research to control if there is a significant difference in ICFS between European and US-listed firms (in the same recent period).

5.2 Limitations

This research did not include the R&D intensity in the regression as independent variable. To get an even better understanding of the determinants for investments, it could be a good thing to add this variable to the regression and control if this has any significance as well. Also, this research was limited to large cap firms only because the S&P500 was used as database. To get a better understanding of the determinants for firms' investments in general, a sample could be taken that includes small-and medium cap sized firms as well. A

last limitation is that a few firms in the sample had some missing data, because it was not published yet. Firms with missing values were excluded from the dataset.

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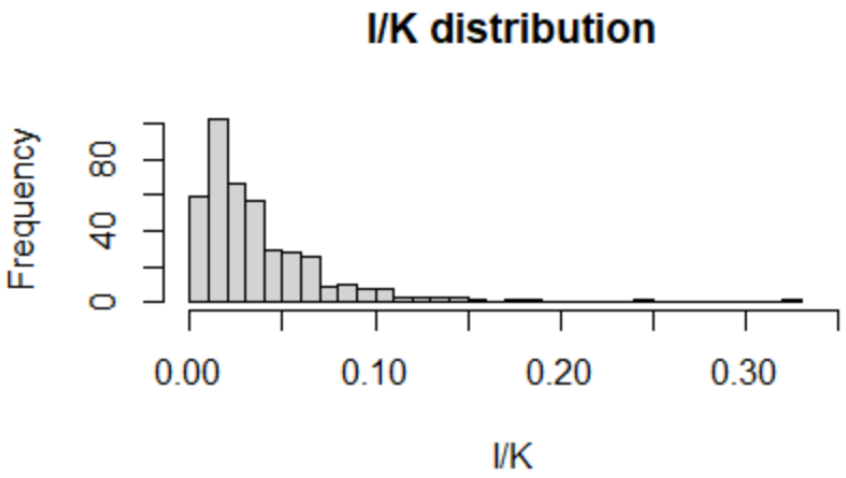
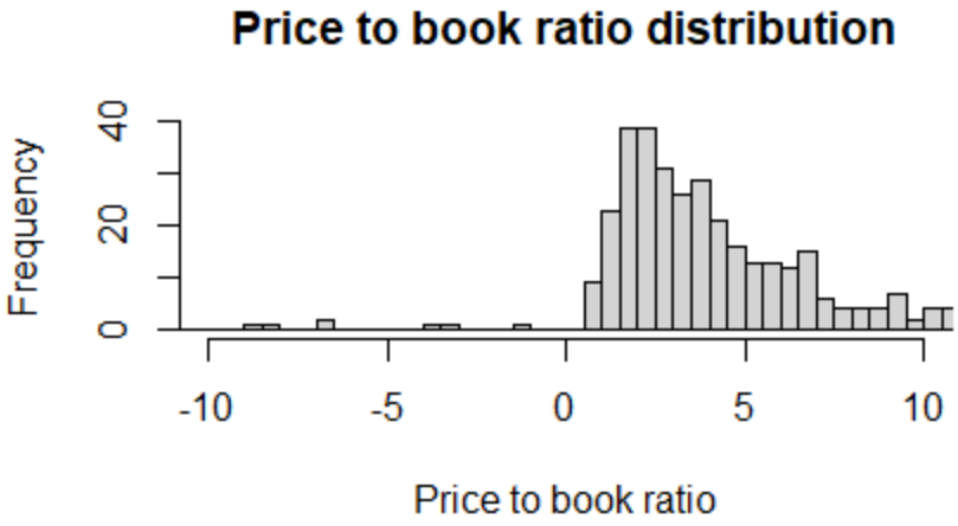
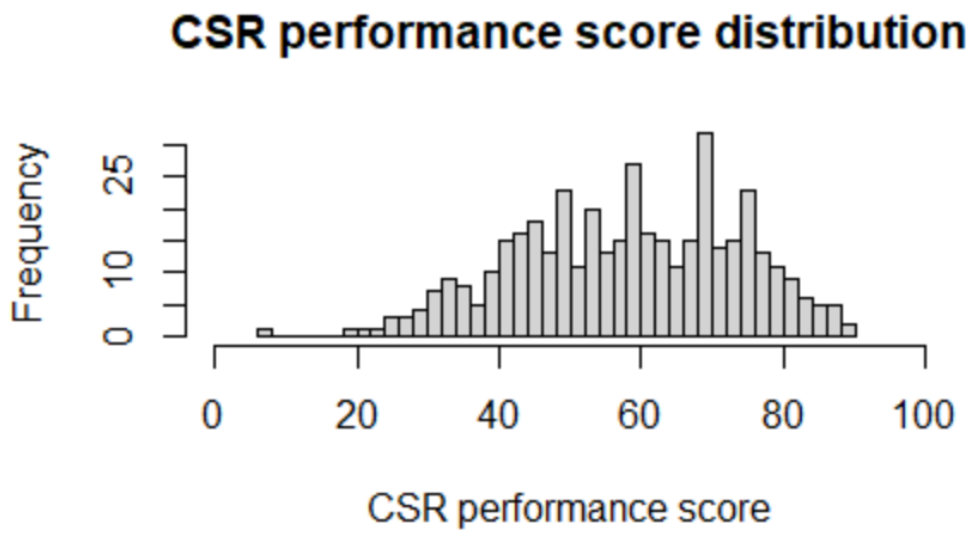
7. Appendix

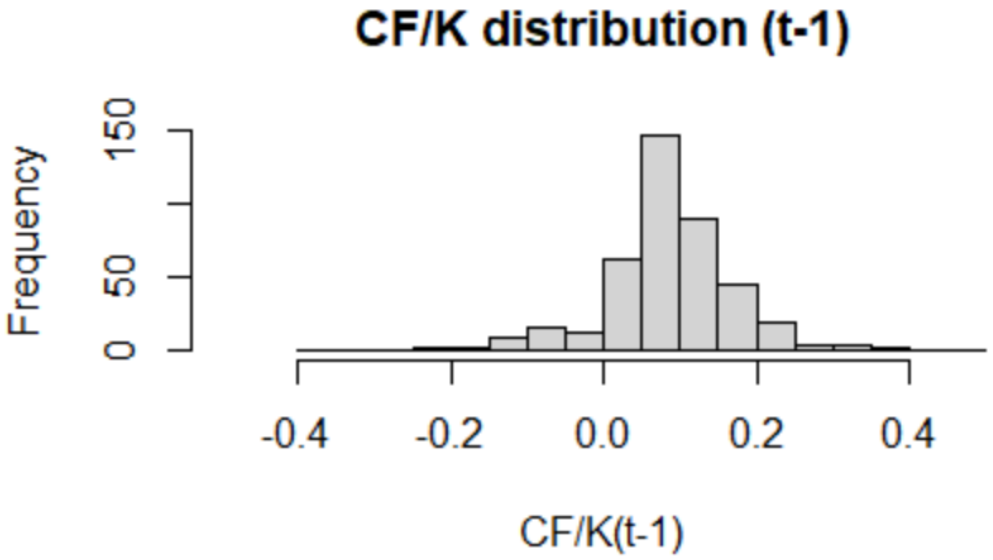
7.1 Histogram frequency distribution dependent variable

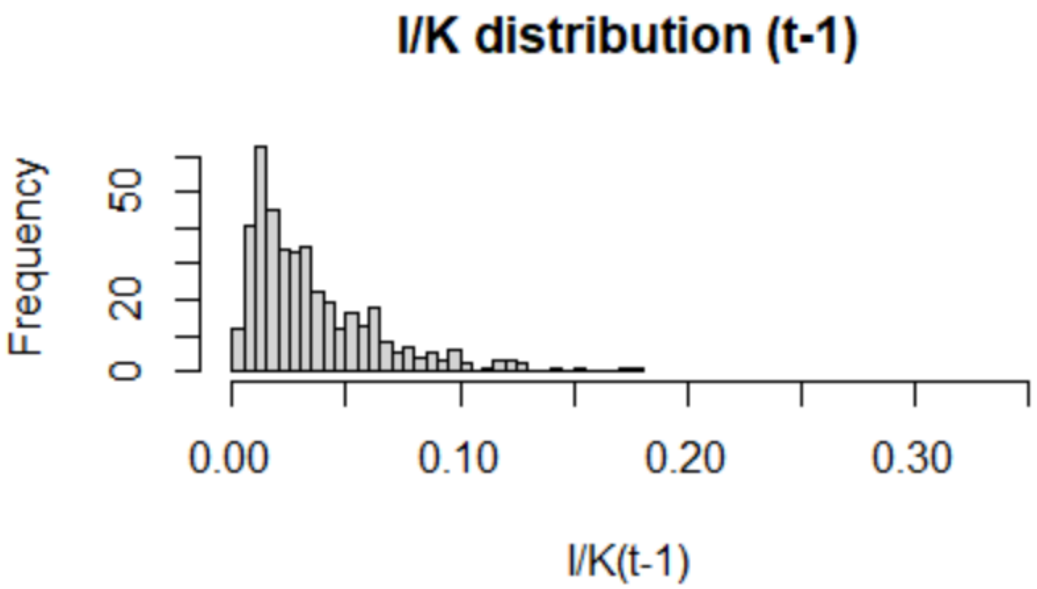


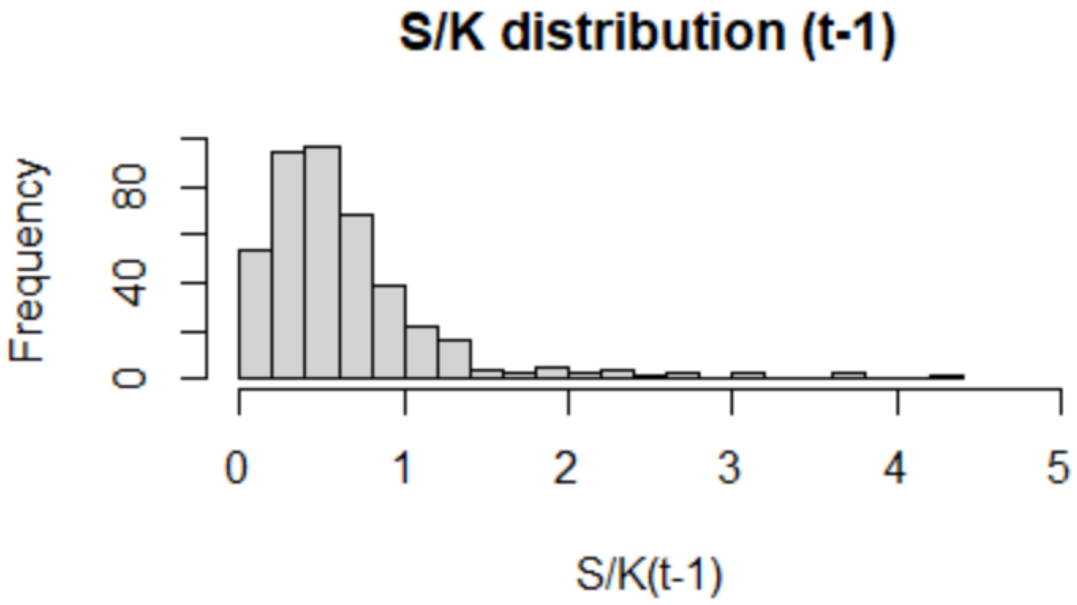
7.2 Histogram frequency distribution independent variables

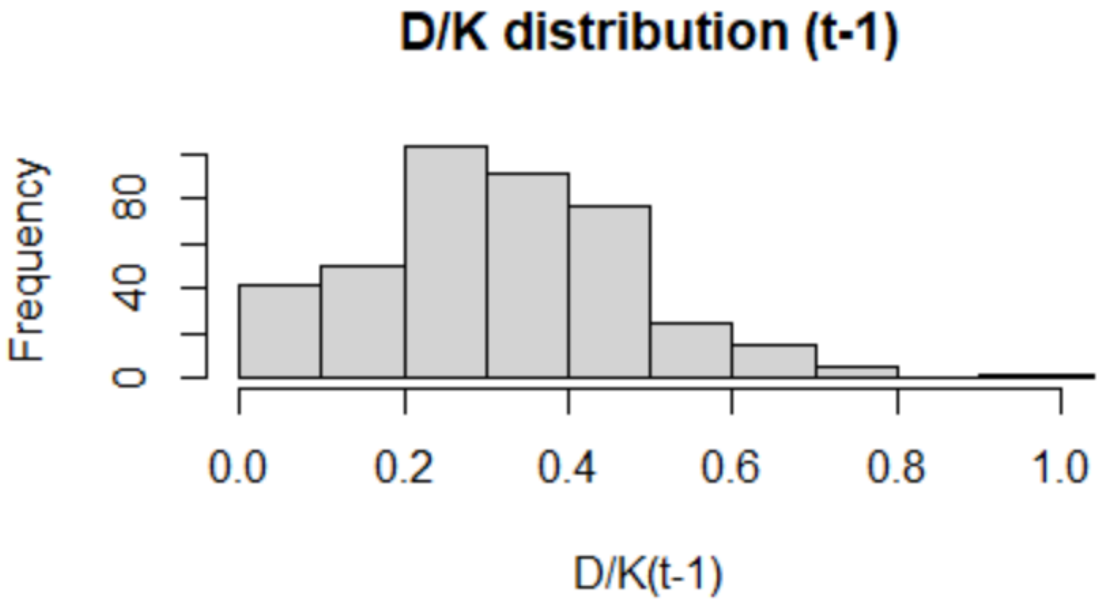



CSR performance score distribution
Frequency
0
10
25
0
20
40
60
80
100
CSR performance score


CF/K distribution (t-1)
Frequency
0
50
150
-0.4
-0.2
0.0
0.2
0.4
CF/K(t-1)


I/K distribution (t-1)
Frequency
0
20
50
0.00
0.10
0.20
0.30
I/K(t-1)


S/K distribution (t-1)
Frequency
0
40
80
0
1
2
3
4
5
S/K(t-1)



7.3 Definition of variables

Variable	Definition
P/B	Price-to-book ratio
CSR	Combined average of the environmental-, social- and governance score of the firm
I	Capital expenditures
S	Total sales
D	Book value of total debt
CF	Cash flow
K	Book value of total assets

Table 7: Definition of variables used