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BACHELOR THESIS

The Influence of Socially Responsible Investment Policies on the Financial Performance of Dutch Pension Funds

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Abstract

This thesis examined the relationship between socially responsible investment (SRI) practices and financial performance of Dutch pension funds. Using a two-way fixed-effect OLS model with clustered standard errors, panel data from 45 Dutch pension funds over the period of 2016 to 2021 was analyzed. The SRI score, measured by the VBDO "implementation" score, served as the independent variable, and abnormal returns were used as a proxy for financial performance. Three regressions were conducted, revealing a consistent positive and statistically significant impact of SRI implementation on abnormal returns. Additionally, this study employed various techniques to address potential econometric issues and highlighted the need for alternative benchmarks and enhanced methodologies in future research.

Keywords: Socially Responsible Investment, Financial performance, Dutch pension funds.

Contents

1 Introduction

1.1 Socially responsible investing and financial performance

In recent years, there has been a notable surge in socially responsible investments (SRI) among mutual funds and pension funds. As of the beginning of 2020, the global sustainable investment market in five key markets attained a value of 35.3 trillion USD, representing a notable increase over a two-year period of 2018 to 2020. In addition, the proportion of assets under management that constitute sustainable investment stands at 35.9 percent, illustrating an increase from 33.4 percent observed in 2018 (GSIR, 2020). The investment approach of SRI funds distinguishes from conventional investment funds. SRI funds screen their investment portfolio based on social, environmental, corporate governance or ethical criteria (Renneboog, Ter Horst & Zhang, 2008). Furthermore, Gregory and Whittaker (2007) and Bauer, Koedijk and Otten (2005) show that the investment styles of SRI funds and conventional funds differ in risk exposure.

1.2 Background literature

Various perspectives have been put forth in academic literature regarding the financial performance of SRI funds as compared to their conventional investment fund counterparts. The findings of the research exhibit variation. To begin with, SRI funds exhibit superior performance compared to their conventional counterparts. Van de Velde, Vermeir, and Corten (2005) conducted a study spanning from 1972 to 2013, evaluating the link between corporate social responsibility (CSR) and financial performance. Based on their analysis of four portfolios constructed by the researchers, they discovered a positive correlation between CSR and financial performance. Their research demonstrates that CSR initiatives, lead to enhanced financial outcomes. However, some studies found that SRI funds demonstrate lower performance in relation to conventional funds. According to Renneboog et al. (2008), SRI funds tend to exhibit lower performance than conventional funds due to the limitations on diversification potential imposed by SRI screening. Moreover, the screening process of SRI funds is characterized as labor-intensive and may incur additional costs for the investors, as noted by Gil-Bazo, Ruiz-Verdu, and Santos (2010). Additionally, there is no discernible disparity between the performance of SRI funds and conventional funds. Diltz (1995) and Sauer (1997) both found that there were no statistically significant differences in performance be-

tween socially responsible investments and traditional investments. Diltz came to this conclusion by examining the alpha and abnormal returns of 28 socially screened equity portfolios. Sauer examined the Domini Social Index performance and found no significant differences in risk-adjusted performance.

1.3 Research Question

As mentioned in the previous subsection, numerous studies have examined the relationship of the financial performance of individual firms and SRI. However, there are distinct differences in the characteristics of portfolios held by individual firms as compared to pension funds. One of the notable distinctions is the diversification of asset allocation. For instance, when comparing the average global asset allocation of the seven largest pension fund markets in 2022 (Australia, Canada, Japan, Netherlands, Switzerland, United Kingdom, and the United States), it can be observed that 45 percent of their portfolios are allocated to equity, 34 percent to bonds, 19 percent to alternative investments, and 2 percent to cash (Thinking Ahead Institute, 2022). In contrast, individual firms tend to allocate their assets primarily in their core business. The dissimilarities between portfolios maintained by individual companies in contrast to those of pension funds may lead to variations in financial returns. Additionally, limited research has been dedicated to investigating the financial performance of pension funds and SRI. Various studies have investigated the financial performance of pension funds in Switzerland, Norway, Sweden, and the United Kingdom, and their relationship with SRI. However, pension funds in the Netherlands differ from those in these countries. This discrepancy can be observed in the amount of assets in funded and private pension plans as a percentage of GDP. In the Netherlands, this amount is significantly larger compared to Switzerland, Norway, Sweden, and the United Kingdom, with respective percentages of 213 percent, 170 percent, 11 percent, 117 percent, and 120 percent (OECD, 2021). Consequently, these differences in pension fund assets may lead to variations in financial performance between Dutch pension funds and those of the previously mentioned countries. As a result, this thesis aims to examine the relationship between socially responsible investment practices of Dutch pension funds and their financial performance. In this thesis, the research question I aim to answer is:

How does socially responsible investment (SRI) affect the financial performance of Dutch pension funds?

1.4 Data and methodology

To provide the most comprehensive response to, a two-way fixed fixed-effect OLS model with clustering in *Fund type* using panel data from 2016 to 2021 will be estimated. In the following subsections the choice of this specific model will be elaborated. The financial performance of each pension fund will be measured by its yearly return, as reported in their respective annual reports. SRI scores will be proxied by the Corporate Social Responsibility (CSR) scores provided by the "Vereniging van Beleggers voor Duurzame Ontwikkeling" (VBDO), an independent agency that evaluates pension funds based on their sustainable investment practices. VBDO's scores cover four distinct dimensions of CSR, namely governance, policy, implementation, and accountability, and range from 0 to 5, with higher scores indicating higher levels of sustainability (VBDO, 2022). Due to substantial modifications in its evaluation metrics since 2017, VBDO has undergone significant changes. Consequently, this study will concentrate on the scores obtained during the period spanning from 2017 to 2021.To control for the effects of fund financial performance, yearly volatility will be used as an independent variable. Fund characteristics will also be taken into account, with the natural logarithm of yearly total assets under management used as a proxy for fund size, and the logarithm of the age of each pension fund used as a proxy for age. The yearly ratio of active participants to pensioners, and the yearly ratio of expenses to total assets under management will be employed as further control variables. The fixed-effect model will capture the individual differences in pension fund performance across types, providing a comprehensive analysis of the impact of SRI scores on the financial performance of Dutch pension funds. The data of the above-mentioned independent variables are provided by the annual reports of the respective pension funds. This thesis uses a comparable model to that of Ammann and Ehmann (2017), which is represented by the following equation:

$$FundPerformance_{i,t} = \alpha + \beta_1 \text{ImplementationScore}_{i,t} + \beta_2 \text{Size}_{i,t} + \beta_3 \text{Age}_{i,t} + \beta_4 \ln(AP)_{i,t} + \beta_5 \ln(\text{Expenses})_{i,t} + \beta_6 \text{Year}_{i,t} + \varepsilon_{i,t} \quad (1)$$

1.5 Research expectation

My hypothesis is that the financial performance of the 50 biggest pension funds is partly determined by SRI, which should be visible in significant effects of the four SRI scores on the return of Dutch pension funds. I expect there will be a negative correlation between SRI and the financial performance of Dutch pension funds: $H_0 : \beta_1 < 0$. This is in line with the findings of Renneboog et al. (2008). Despite utilizing the VBDO ESG benchmark in this analysis, I anticipate that the correlation between financial performance and SRI data may not capture all the variance due to the limited sample size and over-reliance on this benchmark. It is worth noting that this study focuses on the 50 largest pension funds out of the 250 in the Netherlands. Additionally, the SRI scores used in this study are based solely on the VBDO benchmark, which may not fully account for the variation in SRI practices among Dutch pension funds. Additionally, I expect: $H_0 : \beta_2 > 0$, $H_0 : \beta_3 > 0$, $H_0 : \beta_4 \neq 0$, $H_0 : \beta_5 < 0$. The rationale behind these expectations is provided in section 3.2.4.

2 Literature Review

2.1 Concept development and definitions

Socially Responsible Investing (SRI) is a relatively new investment field with an increase interest of the scientific world. However, the term SRI has not got a clear definition due to a high interchangeability of terms. To illustrate: broadly similar or related terms of SRI, which appear in the literature, such as green investments and impact investing (Schueth, 2003). The terms all pertain to investments made in companies that prioritize considerations of corporate social responsibility (CSR) or the impact generated by their business activities. In the following subsections there will be made clarification about the numerous concepts and their definitions. With the help of these sections, distinctions will be made between SRI and the abovementioned terms.

2.1.1 CSR and ESG

CSR is defined in the academic literature as a description of company's ethical and responsible behaviour. Companies integrate social and ecological topics into their governance (Pinner, 2003). By integrating CSR, companies put in place a foundation for potential Socially Responsible (SR) investors. Contra wise, the company's shareholders leverage their voting rights to shift the management of the company into a SR pathway (Sparkes and Cowton, 2004). A related concept of CSR is Corporate Social Performance (CSP). CSP can be seen as an expansion of the CSR concept. Unlike CSR, which primarily concerns businesses' societal accountability or responsibility, CSP emphasize on the tangible outcomes and achievements of CSR. Consequently, CSP can be regarded as a logical progression or continuation of CSR (Kolb, 2018). ESG is generally defined as a of three factors that enable investors to evaluate the impact of a of a company's sustainability practices on its financial performance. The first pillar is the environmental perspective. Within the environmental pillar fall climate change, energy use, pollution, animal welfare, water scarcity and natural resource preservation. At this moment of time, climate change gets the most attention. Within the second pillar, the social pillar (S), fall human rights, child labour, working conditions, non-discrimination, local community engagement, consumer protection, etc. Recently, this pillar became frequently in the limelight because of the Black Lives Matter movement. Investors became more aware that they also have a role in halting racism and promoting general social equality. The

governance pillar (G) encompasses various aspects such as executive remuneration, board composition, and the presence of illicit activities like bribery or corruption (Daniels, Stevens & Pratt, 2021).

2.1.2 SRI

Sandberg, Juravle, Hedesström, and Hamilton (2009) define SRI as the integration of certain non-financial concerns, such as ethical, social, or environmental, into the investment process. Furthermore, Daniels et al. (2021) define SRI as follows: it entails investing with ethical considerations in mind to avoid social harm, rather than investing on financial grounds to maximize the returns. Stated another way, SRI requires that investors act in an ethical manner to attain specific non-financial goals, thereby enabling them to tolerate lower projected returns in the pursuit of associated advantages. The Social investment Forum describes SRI as "an investment process that considers the social and environmental consequences of investments, positive and negative, within the context of financial analysis". Furthermore, the forum states that SRI is a process of identifying and investing in companies that meet a standard CSR. (Social Investment Forum, 2001). SRI is commonly regarded as an equity-focused endeavor, given that one of its primary objectives is to utilize the authority and impact of shareholders to effectively influence corporate conduct. Typically, investors can adopt three strategies to integrate SRI in their investment practices. The first strategy is 'negative screening'. Negative screening was the initial strategy employed within the realm of SRI. Which encompasses to exclude investments in industries or companies that that engage in controversial practices such as alcohol, gambling, fossil fuel etc. (Richardson, 2007). Following negative screening the second method that became increasingly popular is 'positive screening'. Investment funds select enterprises or industries that are engaged in desirable practices. For example, renewable energy supply. 'Shareholder activism' is the third strategy of SRI. This involves investing in a company that engages in unethical practices at the time of investment, with the intention of influencing and transforming its behavior in the future (Sandberg, 2011).

The main differences between SRI and impact investing are that impact investing takes a more active approach to address social and/or environmental issues, instead of solely focusing on improving corporate practices based on ESG criteria. Moreover, SRI funds historically focus more on large corporations and SRI investments are affiliated with publicly traded investments. On

the other hand, Impact Investing funds target relatively more small firms, and the investments are generally direct using private equity or debt (Höchstädter and Scheck, 2015). Furthermore, Höchstädter and Scheck state that SRI differs from impact investing within the aspect of maximization of return. SRI investors would anticipate close to commercial returns while impact investors would target for a low financial return, only to counterbalance inflation effects. Furthermore, there are many forms of SRI: green investing is one of these forms. Green investments have a narrow scope that solely emphasizes environmental considerations, while the broader concept of SRI includes a wider range of ethical issues such as: labor, health, and various other aspects.

2.1.3 Conceptual relationship CSR, ESG, and SRI

It is widely accepted within the academic community that SRI surpasses ESG by placing greater emphasis on moral or ethical factors that may not directly impact an investment's financial performance. Contrarily, ESG only serves as a framework to improve financial outcomes with the help of moral and ethical factors (Daniels et al., 2021). Nonetheless, ESG is widely employed as a proxy for assessing sustainability for SRI funds. Furthermore, the conceptual link between ESG and CSR is as follows: ESG ratings are being used to pertain the relation between CSP and CSR.

2.1.4 Evaluation SRI funds: ESG metrics

To operationalize sustainability performance is difficult due to expansive and situational nature of the definition of sustainability. Generally, in quantitative empirical studies, ESG metrics are used as a proxy for funds their sustainability performance. According to the existing literature, it is evident that ESG factors and SRI are distinct concepts and should not be considered interchangeable. Nevertheless, there exists a degree of overlap between these two concepts. As stated previously, throughout the course of time there has been a noticeable shift in the way investors have approached SRI. The academic literature has shown that the evolution ESG metrics were in line with the best practices of SRI screening of that time. Early in the 1990s investors generally used negative screening. ESG metrics were used to exclude nonethical companies. Correspondingly, the first ESG metrics were binary codes to show if companies complied or didn't comply with the selected ESG criteria. An example of this type of ESG metric is the KLD rating (Widyawati, 2020). In the 2000s the next evolution of SRI best practices took place. Investors were increas-

ingly interested in positive screening. They thought that negative screening was a method that insufficiently represented their sustainability values. Binary based metrics were not able to reflect the sustainability performance of companies accordingly. Consequently, the subsequent iteration of ESG metrics involved the aggregation of scores derived from various ESG dimensions. In this scoring model, each dimension of ESG was comprehensively evaluated, and the weights assigned to individual dimensions were set, resulting in a comprehensive assessment that showcases the performance range of each company. In the literature, researchers use different ESG metric providers such as the Domini400 index, the FTSE4Good index, the Dow Jones Sustainability index, ASSET4, Bloomberg, Sustainalytics, EIRIS, SAM, Vigeo and, Innovest. In studies focusing on the performance of socially responsible investing (SRI) within a particular country, researchers commonly utilize alternative domestic indices. For example, of SRI scores of Dutch Pension funds will be assessed using the Corporate Social Responsibility (CSR) scores offered by the "Vereniging van Beleggers voor Duurzame Ontwikkeling" (VBDO), an autonomous organization dedicated to evaluating pension funds' sustainable investment approaches (VBDO, 2022). On the other hand, qualitative empirical and conceptual studies imply that ESG metrics emulate a role as a facilitating role of the SRI market. The studies state that ESG metrics contribute to the credibility, expedite expansion, and foster recognition within the SRI market (Widyawati, 2020).

2.2 Pension Funds

Pension assets amounted to USD 58.9 trillion in the OECD at the end of 2021 and USD 60.6 trillion when considering non-OECD reporting jurisdictions. This is an increase of more than seven percent compared to the end of 2020. In the end of 2020, pension assets totaled to USD 54.3 trillion in the OECD. Assets were primarily accrued in pension funds, representing USD 37.7 trillion or 64 percent of assets in the OECD. The distribution of total global assets is not very diversified: United States (67.3 percent), United Kingdom (6.3 percent), Canada (5.4 percent), Australia (3.9 percent), Netherlands (3.5 percent), Japan (2.5 percent), and Switzerland (2.3 percent) (OECD, 2021).

2.2.1 Financial performance and asset allocation pension funds

Pension funds' vison is that the long-term financial performance of their portfolios is significantly more important in comparison to short-term losses or gains. In this section the focus will be on 30 OECD countries from the OECD Global Pension Statistics. In the past decade, the pension funds of the countries mentioned experienced overall gains in real terms through their investments. Among the 30 OECD countries, only two showed minor net investment losses over the last two decades. Notably, the Dominican Republic (7.6 percent), Costa Rica (7.3 percent), and Israel (6.4 percent) demonstrated the strongest average annual real investment returns over the past 10 years, while Colombia (6.2 percent), Denmark (4.6 percent), and Peru (4.6 percent) exhibited remarkable performance over the last 20 years. Conversely, the countries with the lowest annual returns over the last 10 years were Turkey (-0.3 percent), the Czech Republic (-1.0 percent), and Nigeria (-1.1 percent). Similarly, Latvia (-0.1 percent) and the Czech Republic (-0.2 percent) recorded the lowest returns over the past 20 years. Comparatively, Dutch pension funds achieved an average annual real investment return of 5.7 percent over the last 10 years, while over the last 20 years, the average annual real investment return was 4.2 percent (OECD, 2021).

Asset allocation and returns are intrinsically linked, alongside risk levels. A greater allocation of a portfolio to risky assets corresponds to both increased potential returns and heightened return volatility. Pension funds allocate their investments across various asset classes and investment vehicles, comprising five main categories: equities, bills and bonds, cash and deposits, and other investment options. As of 2021, bonds and equities account for more than half of investments in 27 out of 30 OECD countries. Consequently, developments in the markets for equities and bonds have a significant role in the financial performance of the respective pension funds. As of 2021, the average allocation percentages of equities, bills and bonds, cash and deposits, and other investment options, in terms of their contribution to total assets, are 25.9 percent, 20.6 percent, 4.6 percent, and 16.5 percent, respectively (OECD, 2021). In the Netherlands the average allocation, in 2021, was: equities (30.9 percent), bills and bond (42.9 percent), cash and deposits (2.0 percent), other investment options (24.2 percent). The other investment options were investments in mainly real estate, private equity, hedge funds and commodities (DNB, 2021).

2.2.2 Pension system in the Netherlands

The Dutch pension system is organized as a three-pillar system. This is in line with how developed countries structure their pension system. The first pillar includes a component known as the public pension plan. This plan offers a fixed rate pension to all retired workers based on numbers of years they have resided in the Netherlands. The financing is structured in on prepaid basis. Furthermore, the benefits provided by the plan are indexed to align with the legal minimum wage. The second pillar provides retired workers with additional income from supplementary plans. Most second-pillar funds are compulsory funded defined benefit plans. The second pillar offers an extra layer of retirement benefits. These schemes primarily operate on a 'defined benefit' basis, meaning that the accrued benefits are directly tied to the employee's salary. The second pillar is built upon principles of collectivity and solidarity, fostering a sense of shared responsibility among participants and across generations. By distributing risks among the scheme's members and different cohorts, the second pillar promotes a fair and equitable system of pension provision. These plans are offered by approximately 500 pension funds in the Netherlands. Subsequently, over 90 percent of the labor force in the Netherlands is financed by these types of funds. In the Netherlands, the second pillar consists of three types of pension funds. The first type is an industry pension fund, this fund is organized for a particular sector of industry such as health care, construction, or transport. It is obligatory to participate in a sector pension fund for all firms that operate in that sector. The second type is a corporate pension fund of an individual company. The company can only choose for this structure if it offers an improved pension plan to its employees in comparison to the industry pension fund. In cases where a supplementary pension plan is in place, whether in the form of a corporate pension fund or an industry pension fund, worker participation is obligatory. The third type of pension fund is a pension fund structured for a certain profession. For example: physicians, architects, dentists, notaries etc. According to the latest data from Pensioenfederatie (2023), the distribution of the three pension fund types in the Netherlands is as follows: the industry pension fund constitutes 60, the corporate pension fund comprises 130, and the profession pension fund encompasses 11. The third pillar consists of voluntary personal savings (Kemna, Ponds & Steenbeek, 2011).

2.3 Empirical evidence of performance of socially (ir)responsible mutual funds

An overview of the empirical evidence supporting three hypotheses will be presented. The papers under consideration predominantly focus on mutual funds, as this thesis undertakes an empirical analysis to explore the plausible association between SRI and a particular subset of mutual funds, namely pension funds in the Netherlands. Additionally, we will discuss papers that investigate this specific potential relationship.

2.3.1 There is no significant difference in performance between SRI funds and conventional funds

The following papers support this hypothesis. In their study, Bauer et al. (2005) conducted an analysis of the performance of 103 socially responsible investment (SRI) mutual funds and 4384 conventional mutual funds across Germany, the United States, and the United Kingdom. The study employed multifactor models to account for size, book-to-market ratio, and momentum bias in equity portfolios. The findings revealed no statistically significant evidence to support a difference in returns between ethical and conventional mutual funds. Two years later, Bauer, Derwall and Otten (2007) found comparable results. The researchers compared risk-adjusted performance of 8 Canadian SRI mutual funds and 267 of their conventional peers. The study shows that, using a single-factor model, there is no significant difference in performance between the SRI funds and their conventional counterparts. Additionally, a multifactor model analysis that controls for returns linked with fund characteristics (i.e., size, book-to-market etc.), shows that is not a significance difference between SRI funds and conventional funds. Empirical evidence from pension funds is given by Hoepner and Schopohl (2016) and Mooijaart (2022). Hoepner and Schopohl performed a time-series analysis of the performance effects of divestment decisions of two leading Nordic pension funds: Norway's Government Pension Fund-Global (GPFG) and Sweden's AP-funds. The researchers compared the portfolio's with and without the excluded companies. The average time that a company has been on a fund's exclusion list was in the range of five to eight years, the screening started in 2001 and ended in 2015. The number of excluded companies was in the range of 20 to 152 companies. The researchers show that there is not significant difference between

the ‘SRI portfolio’ in comparison with the ‘conventional portfolio’. Furthermore, according to the findings of Mooijaart (2022), there exists no statistically significant correlation between the performances of the 48 largest pension funds in the Netherlands during the period from 2013 to 2016 and their respective SRI scores. The SRI score is composed of four distinct categories, namely governance, policy, implementation, and accountability.

2.3.2 SRI funds exhibit superior performance compared to conventional funds

Over the last two decades, numerous papers showed empirical evidence for this hypothesis. According to Edmans (2011), there is evidence suggesting that a portfolio consisting of the ’100 best companies to work for’ in the United States yielded a statically significant annual four-factor alpha (which represents an abnormal risk-adjusted return) of 3.5 percent from 1984 to 2009. This finding implies that employing a positive screen based on employee satisfaction can potentially result in superior investment returns. Barnett and Solomon (2006) conducted a study examining the performance of 61 socially responsible investment (SRI) funds between 1972 and 2000. Their findings indicate the presence of superior performance in these funds. Notably, they discovered a statistically significant curvilinear association between social screening and SRI fund performance. Specifically, they observed a decline in financial performance during the initial period, but a subsequent rebound occurred when the number of social screens reached its maximum level. Statman (2000) studied 31 global SRI mutual funds during the 1990-1998 period. Statman focused on mutual SRI funds that had a minimum of 70 percent invested in equity. The SRI mutual funds financial performed better in comparison to conventional funds controlled with assets size. Although, the difference was not statistically significant. In the study conducted by Martí-Ballester (2019), the financial performance of pension funds that allocate investments towards sectors aligned with sustainable investment goals was examined. The investigation employed both Carhartt and Bollen and Busse models to assess the relationship between such investments and financial performance. The sample comprised 1546 global pension funds observed over the period from 2007 to 2018. The findings indicated that certain pension funds investing in a single sustainable development sector demonstrated superior performance compared to conventional pension funds and the S&P Global 1200 Index, which served as a proxy for market returns. However, it should be noted that the difference in returns was not statistically significant.

2.3.3 SRI funds demonstrate inferior performance compared to conventional funds

Empirical analysis show results that are in line with this hypothesis. According to Renneboog et al. (2008), the performance of socially responsible investment (SRI) funds tends to be lower compared to conventional funds. The sample size consisted of SRI mutual funds from Canada, France, Ireland, Malaysia, Japan, the Netherlands, Belgium, Singapore, Sweden, the UK, and the US. Only the performance of mutual funds in France, Japan, Sweden, and Ireland are in line with the underperformance hypothesis of SRI funds. The SRI alphas of these mutual funds are 7 percent to 4 percent lower in comparison to their conventional counterparts' alphas. For the rest of the sample there is no significant evidence that SRI mutual funds underperform in comparison to their matched conventional funds. This can be attributed to the limitations imposed by SRI screening on the potential for diversification. Furthermore, Gil-Bazo, Ruiz-Verdu, and Santos (2010) highlight that the screening process employed by SRI funds is labor-intensive, resulting in additional costs for investors.

2.4 Hypothesis development

The subsequent section will elucidate the established academic hypothesis regarding SRI fund returns. These subsections will concentrate on the potential rationale behind the hypothesis. The following hypothesis will be studied in this thesis.

The first existing hypothesis in the academic literature is that the return of SRI portfolios is not statistically different from returns of conventional portfolios. Hamilton and Statman (1993) states that this hypothesis is in line with the theory that SR is not (yet) priced in the market. Correspondingly, this means that SR funds do not obtain any gain from SRI. The main reason is because the cost of capital is not lower compared to their conventional counterparts. Another possible reason that is given in the literature is that the CSR activities of SRI funds augment the costs and benefits by a comparable level (Ullman, 1985). Another explanation is that SRI portfolios, specifically, mutual funds, are typically managed in similar manner as conventional funds (Benson, Brailsford & Humphrey, 2006). The second existing hypothesis is as follows: SRI funds exhibit superior performance compared to their conventional counterparts. Based on Hamilton and Statman (1993) findings, one plausible reason is that conventional funds may undervalue the

impact of negative news stemming from irresponsible behavior. Consequently, the likelihood of portfolio underperformance increases for conventional funds, and vice versa. Supporting this notion, Mokowitz (1972) highlights the significance of adequate environmental screening, which can effectively mitigate the risk of substantial costs associated with events such as environmental disasters. Such disasters could otherwise lead to diminished returns for conventional funds. The rationale can also be applied to the governance aspect of ESG. A robust governance framework effectively mitigates the potential risks associated with corporate scandals and lawsuits, thereby reducing the occurrence of negative externalities. Consequently, this contributes to a higher anticipated future return for SRI funds. The last existing hypothesis is that SRI funds underperform compared to conventional funds. Rudd's (1981) argumentation is consistent with the principles of classical portfolio theory. Rudd posits that the implementation of social responsibility (SR) criteria limits the allocation options available to fund managers because of both negative and positive screening. This constraint gives rise to additional costs and investment risk. Furthermore, Luther, Matatko and Corner (1992) augment this perspective by asserting that SRI entails supplementary monitoring costs, which in turn lead to diminished returns. Michelson, Wailes, Van Der Laan and Frost (2004) and Tippet (2001) categorize the comparatively lower returns observed in SRI funds when compared to conventional funds as an 'ethical penalty'.

3 Research Design

3.1 Data

This thesis utilizes the data sample derived from the VBDO benchmark of SRI by Dutch pension funds. Since 2006, VBDO has been evaluating the prevailing status and progress of SRI investment practices among the 50 largest pension funds in the Netherlands. In this thesis the data will be based on the sample of this group of pension funds that are included in the SRI benchmark of VBDO. This evaluation is yearly and assess the previous year. The SRI VBDO score encompasses four key categories: governance, policy, implementation, and accountability. In the report for SRI performance of 2016, VBDO underwent a significant methodology revision for its benchmark, incorporating best practices pertaining to SRI themes and advancements in SRI scores. For the purpose of this thesis, the data from the VBDO benchmark spanning the years 2016 to 2021 will

be utilized. During this time period 51 pension funds were evaluated in the different reports. Two of them merged and four of them didn't a score for every year in the respective period. With that reason, the sample will be 45 pension funds. Collectively, these 45 pension funds manage a total of approximately 1,540 billion euros in assets under management, accounting for approximately 89 percent of the assets within the pension fund sector of the Netherlands.

For each pension fund that is included in the VBDO benchmark in the relevant time period, the following characteristics will be obtained: the yearly return and benchmark return, which serves as a proxy for financial performance; the natural logarithm of the yearly total assets under management, which serves as a proxy for fund size; the logarithm of the age of each pension fund, which serves as a proxy for age; the yearly ratio of active participants to pensioners; the yearly ratio of turnover to total assets under management; and the yearly ratio of management costs to total assets under management. Additionally, information regarding the type of pension fund is also gathered. The data of the above-mentioned independent variables are provided by the annual reports of the respective pension funds. In the subsequent methodology subsection, the rationale behind utilizing these variables will be justified in relation to the existing academic literature.

3.2 Methodology

The following subsection will outline the methodology employed to determine and compute the various variables necessary for calculating the benchmark and the abnormal return of each pension fund. Subsequently, in the next subsections, the operationalization of all the other variables will be described.

3.2.1 Dependent variable: Financial performance

Assessing the financial performance of Dutch pension funds poses a challenging task. In this thesis, abnormal returns are employed as a measure of financial performance, calculated as the difference between actual returns and expected returns. Commonly used methods to estimate expected returns of mutual funds are the Fama French three-factor model, CAPM model or Carhart four-factor model (von Walis & Klein, 2015). Aforementioned models are not suitable for evaluating (Dutch) pension funds, they are primarily based on equity market returns, whereas the literature review reveals that the average relative allocation to equity in pension funds in 2021 is approximately 30

percent (DNB, 2021).

Alternative approaches involve using the benchmark return generated by the pension funds themselves. However, the methodology employed by these funds to calculate the benchmark return lacks clarity and transparency. Hence, due to the potential bias introduced by portfolio managers in computing these benchmarks, they are deemed inadequate for measuring the expected returns of the pension funds in the sample. In my opinion, the most appropriate approach to determine expected returns is to annually calculate the relative weight of each asset class and multiply it by an index that serves as a proxy for the performance of that specific asset class. The sample comprises various types of pension funds. On average, different types of pension funds display distinctive asset allocation patterns (DNB, 2023). For each type of pension fund, the average relative asset allocation will be calculated annually spanning the years 2016 to 2021.

3.2.2 Computing the benchmark and the abnormal returns

The annual return of a pension fund refers to the investment return achieved throughout a specific calendar year. Expressed as a percentage of the pension fund's total investments, the return encompasses the gains from interest hedging as well. It signifies the average return generated by the collective investments across various asset classes. This thesis will include three distinct asset classes: equities, bonds, and bills, along with a range of other investment options. The additional investment options encompass diverse categories such as real estate investment, alternative investments like private equity and infrastructure, hedge funds, and liquid assets. Proxying the expected returns poses a considerable challenge due to the substantial allocation of Dutch pension funds' assets in foreign markets. This is evident from the allocation percentages in various years, such as 82 percent in 2014, 81 percent in 2015, 88 percent in 2016, 87 percent in both 2017 and 2018 (PWC, 2019). Consequently, to accurately represent the asset classes of equities, bonds, bills, and other investment options, global indexes must be employed as proxies. The market index that will be used to proxy global equity market returns will be the MSCI World Index. Numerous prominent studies have used this index to proxy the global equity market returns such as Fama and French (1997), Bogle and Merton (1996), and Doidge, Karolyi, and Stulz (2009). In order to approximate the overall return of the global bond market, we will employ the Bloomberg Barclays Global Aggregate Bond Index as a benchmark. This index is widely recognized as one of the most

reputable global bond indices (Investopedia, 2023). Assessing the anticipated return of alternative investment options within this asset class presents a challenge due to the multitude of sub asset classes involved. For the sake of simplicity, this thesis will utilize the Bloomberg Barclays Global Aggregate Bond Index as a substitute for estimating the return of this asset class. Consequently, this choice will serve as a conservative estimate of the lower bound return. The expected returns of each pension fund type will be calculated by multiplying the relative weight of each asset class in the portfolio by yearly the market index return corresponding to that particular asset class. To compute the financial performance of each pension fund in the sample, the computed expected annual return will be subtracted from the actual annual return. The financial performance, as abnormal returns, will be expressed as the variable *Abnormal returns.*

3.2.3 Independent variables: VBDO-scores

The SRI VBDO score is based on four categories: governance, policy, implementation, and accountability. The scores are ranged from zero to five, scores of a higher magnitude indicate a correspondingly higher degree of sustainability. The weight assigned to each category varies. Policy, governance, and accountability carry a weight of 16.7 percent each, while implementation holds a weight of 50 percent. VBDO assigns a substantially higher weight to implementation due to its crucial role in determining the ultimate outcome and quality of SRI practices within a pension fund (VBDO, 2022). The category governance relates to boardroom awareness and expertise of RI, supervision, and the consultation process with the relevant participants and stakeholders. Policy pertains to the investment policy that was in place that specific year. Assessment occurs to determine the applicability of the investment policy in relation to the depth and quality of the portfolio. Accountability bears upon the transparency of RI policies, results, strategies, and reports. Implementation is intricately linked to the investment policies governing six distinct asset classes, namely public equity, sovereign bonds, private equity, real estate, and alternative investments. Each asset class is assigned a score, which is then multiplied by the corresponding percentage allocation of that asset class within the portfolio.

During the analysis of the scores and their corresponding descriptions, it is conceivable that a significant correlation exists among the scores themselves. This logical inference is supported by the observation that when a pension fund receives a high score in a particular SRI dimension, there

is a strong likelihood that the scores for other SRI dimensions will also be high, owing to the fund's overall high score. Additionally, the sub-score implementation serves as a practical manifestation of the interrelation between the three scores. Consequently, it is reasonable to surmise that if the three scores are elevated, the implementation score will also be high. Subsection 1.3.1.1 validates this rationale. In assessing the SRI practices of a pension fund, it is imperative to go beyond examining the stated intentions and written commitments, and instead focus on the actual actions taken by the fund. This is essential because the true measure of SRI practices lies in the tangible steps implemented by the pension fund, rather than the mere articulation of desired actions. Hence, the implementation score is utilized as a proxy to gauge the extent of SRI practices employed by the pension fund.

3.2.4 Control variables

For the dependent variable, abnormal returns as proxy for financial performance, there must be variables to control for factors that systemically affect the abnormal returns. Consequently, there will be control variables identified that likely influence the financial performance of the respective pension funds. Furthermore, there will also be variables included that control for unobservable implementing a combination of fixed and random effects. By incorporating these control variables, we can effectively isolate and account for the influence of the independent variables of interest in the analysis. In the next subsection the econometric specification will be examined.

Larger funds possibly outperform smaller funds because of expertise in determining the suitable asset managers, a higher quality of monitoring of portfolio performance, and the presence of economies of scale in investment costs (Broeders, van Oord & Rijsbergen, 2019). Conversely, the challenges faced by larger funds in identifying bargains and undervalued stocks can be attributed to their size. Furthermore, the significant volume of their trades has the potential to impact the market, thus posing difficulties in acquiring stocks at favorable prices (Barnett & Salomon, 2006). The variable *Size* will control for potential size effects. The variable is operationalized through the utilization of a dummy variable. This dummy variable signifies pension funds that possess a maximum yearly total asset under management of approximately 8.6 billion Euros and pension funds that manage yearly assets that exceeds 8.6 billion Euros. The specific value of 8.6 billion Euros was chosen as it represents the median of the yearly total assets under management within

the sample data. The decision to employ the median as the cutoff point instead of the mean, stems from the highly negatively skewed distribution of the assets under management.

The age of a pension fund can potentially influence its financial performance, as older funds may exhibit distinct cost structures compared to younger or newly established funds. Moreover, the accumulation of experience over time and the associated learning process can serve as a valuable asset when it comes to the selection and management of the fund's portfolio (Argote, 2012). The variable *Age* will control for potential age affects with the variable fund age, the number of years since the creation of the respective pension fund.

The presence of an active pensioner-to-active participants ratio may potentially impact financial performance due to varying risk attitudes that can influence asset allocation decisions. Consequently, this factor can indirectly affect the financial performance of pension funds (Ammann & Ehmann, 2017). The variable *ln(AP)* is quantified by the natural logarithm of the ratio of pensioners to active participants.

Cost of asset management paid by the pension funds may influence pension fund performance. To manage SRI pension funds, managers increase the screening for selecting investment opportunities. This could result into higher information costs and returns (Aslaksen & Synnestwedt, 2003). The variable *ln(Expenses)* will control for potential cost of asset management effects. The variable is quantified as the natural logarithm of the yearly cost of asset management as a percentage of the yearly total assets under management.

A dummy variable for every year will be included to control for possible residual macroeconomic factors that have impact on all pension funds equally and to control for the potential residual serial correlation of the error and simultaneity bias (Greene, 2000). The variable will be expressed as *Year*.

The classification of a pension fund into a specific type can also have an impact on its performance. On average, different types of pension funds display distinctive asset allocation patterns (DNB, 2023). Each asset class possesses unique risk characteristics and potential rewards. As a result, pension funds with a relatively higher allocation to equity may experience performance variations compared to funds with a lower relative allocation to equity. Conversely, a similar relationship can be observed for relative asset allocations in bonds. The variable will be expressed as *Fund type*.

3.2.5 Descriptive statistics of the variables

In Table 1 the descriptive statistics of the dependent, independent and control variables are stated. In Table 2 displays the frequency of each type of pension fund.

Table 1: Descriptive statistics of the dependent, independent, and control variables

Variable	Observations	Mean	Std. Dev.	Min	Max
(1) Abnormal return (in %)	270	1.072	4.068	-9.019	11.933
(2) Policy score	270	2.597	1.041	0	5
(3) Accountability score	270	2.855	1.097	0.1	5
(4) Governance score	270	2.972	1.034	0.4	5
(5) Implementation score	270	2.4	0.972	0.2	4.8
(6) Size (in billion EUR)	270	16.269	1.117	14.762	20.128
(7) Age (in years)	270	55.974	25.758	0	114
(8) $\ln(AP)$	270	-0.144	0.851	-1.942	2.187
(9) $\ln(\text{Expenses})$	270	-1	0.471	-2.408	0.476

Table 2: Frequency table for each Type of Pension Fund

Fund Type	Frequency
Industry Pension Fund	21
Profession Pension Fund	3
Corporate Pension Fund	21

4 Statistical method

To provide the most comprehensive response to, a two-way fixed fixed-effect OLS model with clustering in *Fund type* using panel data from 2016 to 2021 will be estimated. In the following subsections the choice of this specific model will be elaborated. The two fixed-effect OLS model is represented by the following equation:

$$\begin{aligned} FundPerformance_{i,t} = \alpha + \beta_1 \text{ImplementationScore}_{i,t} + \beta_2 \text{Size}_{i,t} \\ + \beta_3 \text{Age}_{i,t} + \beta_4 \ln(AP)_{i,t} + \beta_5 \ln(\text{Expenses})_{i,t} + \beta_6 \text{Year}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

4.1 Robustness tests

Robustness checks are a crucial component of panel data analysis, serving as a vital means to ensure the trustworthiness and soundness of research outcomes. These checks allow to test the established associations remain intact when confronted with diverse model specifications, underlying assumptions, and data variations.

4.1.1 Correlation between the regression variables

The correlation matrix among the potential regression variables reveals a notable presence of high correlation between several variables. In order to address the issue of potential multicollinearity, a threshold was set at a correlation value of 0.60. Variables exceeding this threshold were identified and treated accordingly. The choice to utilize the implementation score as a proxy for SRI practices is supported by economic reasoning outlined in subsection 1.2.2. To verify the effectiveness of the chosen cutoff in mitigating multicollinearity, Variance Inflation Factor (VIF) test was conducted. The VIF results of the regression with and without lagged control variables (see subsection 3.3.1.6 for further clarification) are showed in table 3. The results demonstrate that the VIF values are relatively low, with a mean of 2.59 and 2.72. And a maximum of 4.80 and 4.93. Based on this analysis, it can be concluded that the steps taken to address multicollinearity were successful.

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Table 3: Correlation matrix of independent, dependent, and control variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Abnormal return	1.000									
(2) Policy score	-0.078	1.000								
(3) Accountability score	-0.076	0.661*	1.000							
(4) Governance score	-0.070	0.654*	0.615*	1.000						
(5) Implementation score	-0.026	0.732*	0.744*	0.669*	1.000					
(6) Size	0.041	0.185*	0.289*	0.193*	0.237*	1.000				
(7) Age	0.035	-0.014	0.030	0.087	-0.058	0.111	1.000			
(8) ln(AP)	-0.049	0.012	-0.080	-0.029	0.056	-0.054	0.031	1.000		
(9) ln(Expenses)	0.004	0.075	0.144	0.137	0.165*	-0.121	0.027	0.087	1.000	
(10) Year	-0.109	-0.318*	-0.081	-0.173*	-0.073	0.124	0.069	0.047	0.063	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: Variance Inflation Factor (VIF) test results with regression without lags (1) and with lags (2)

Variables	Control variables (1)	Control variables with one-year lag (2)
Abnormal return	-	-
Implementation score	4.80	4.93
Size	2.27	2.23
Age	4.62	4.57
ln (AP)	1.04	1.04
ln (Expenses)	4.17	4.65
Year	1.75	1.76
Mean VIF	2.59	2.72

4.1.2 Test for two-way fixed effects model

The decision to employ a two-way fixed effect model in this thesis is based on a clear rationale. It is expected that unobservable time-invariant characteristics exist within each pension fund, which simultaneously influence both the dependent and independent variables. These characteristics include risk appetite, investment expertise, managerial style, market timing ability, network and relationship capital, reputation and brand value, and decision-making processes. Additionally, there are anticipated individual-invariant characteristics, such as macroeconomic factors specific to certain years, which affect both the outcome variable and the independent variable. To assess the validity of this rationale, the Breusch and Pagan Lagrangian multiplier test was conducted to determine whether a random or fixed effect model was more appropriate for the data. The test results were highly insignificant (P > chibar2 = 1.0000), leading to the conclusion that a fixed effect model was suitable. Furthermore, to examine the suitability of time fixed effects for the data, the command "testparm" was employed. This involved conducting a joint F-test to assess whether all years collectively equaled zero. The test results were significant at the one percent level (Prob > F = 0.0003), indicating that a time-fixed effect should be applied. Based on these tests and rationale, it is determined that this thesis will utilize a two-way fixed effects model.

4.1.3 Serial correlation

I expect that the errors will be clustered within pension fund with the fund types. This arises from the fact that the abnormal return of each pension fund belonging to a specific type is calculated based on an identical expected return. To address this issue of serial correlation, appropriate

measures were taken. First, the standard errors were clustered by fund type, accounting for the correlation within each type. Additionally, control variables as described in the initial subsections of the methodology were introduced to control for potential confounding factors. By clustering the standard errors by fund type and incorporating the relevant control variables, efforts were made to mitigate the impact of serial correlation in the analysis.

4.1.4 Heteroskedasticity

To examine the presence of heteroskedasticity, the fixed effects model was employed, specifically using the modified Wald statistic designed to detect groupwise heteroskedasticity in the residuals of a fixed effect regression model. The null hypothesis tested is the assumption of homoskedasticity, implying constant variance of the residuals. The obtained result is as follows: Prob>chi2 = 0.0000. Consequently, at the one percent level, the null hypothesis is rejected, indicating the presence of heteroskedasticity. To address the issue of heteroskedasticity in this regression analysis, robust standard errors will be utilized.

4.1.5 Normal distribution of the residuals

To assess the normality of the residuals, a histogram was constructed based on the regression residuals. The histogram plot indicates that the distribution of the errors closely approximates a normal distribution.

4.1.6 Endogeneity

There is a possibility that there is presence of endogeneity in this regression. There are three forms of endogeneity that are possible in this regression: omitted relevant variable bias, attenuation bias and reverse causality. Endogeneity presence is difficult to test; endogeneity is a matter of economic story. This is particular the case for omitted variable bias and for reverse causality.

Omitted variable bias is a well-known phenomenon that arises when a relevant variable is excluded from a statistical model, resulting in biased and misleading estimates of the relationship between the dependent and independent variables. To mitigate this issue, this thesis addresses omitted variable bias by incorporating relevant control variables and employing fixed effects. Reverse causality arises from the possibility that control variables in the previous year (t-1) may

influence the abnormal return in the current year (t). This occurs because the impact of these variables may not be immediate within the same year, meaning that a control variable at time t does not immediately affect the abnormal return of t. For instance, the size of a pension fund in 2016 may influence the abnormal return in 2017. To investigate this possibility, two regressions are conducted: one with control variables without lags and another with lagged variables. If the coefficients and/or significance significantly differ between the two regressions, caution must be exercised when interpreting the results of the regression without lags. In such cases, the regression incorporating one-year lagged control variables is employed. This approach recognizes that while it is plausible that control variables in the prior year (t-1) can influence current year abnormal returns (t), it is not feasible for control variables in the current year (t) to impact abnormal returns in the prior year (t-1) since the abnormal return has already occurred in the past. Although not a definitive solution, this methodology represents an effort to address the issue if it occurs.

5 Results

This section delves into the comprehensive analysis of the regression outcomes. The initial subsection scrutinizes the results of the regression model incorporating non-lagged control variables. Subsequently, the discussion proceeds to the regression results integrating one year lagged control variables. In the third subsection, a comparative analysis is conducted to evaluate any disparities between these two regressions. If dissimilarities arise, special attention will be given to highlighting the disparities and their potential implications for reverse causality between the control variables and the abnormal returns. Lastly, the concluding subsection addresses additional potential limitations of this research.

5.1 Regression results with non-lagged control variables

The robust random two-way effects panel regression results are presented in Table 4, in columns (1) and (2). The first column exhibits a robust two-way effects panel regression outcome with the independent variable "implementation." The second column displays the robust two-way effects panel regression result incorporating all control variables. Notably, the model yields a robust R-squared value of 0.521 when excluding the control variables, and 0.568 when including the control

variables.

In both regression models, both with and without the inclusion of control variables, the independent variable "implementation" (serving as a proxy for SRI of Dutch pension funds) exhibits a positive and statistically significant coefficient on abnormal returns, which serves as a proxy for financial performance. These results indicate a significant disparity in abnormal returns among the Dutch pension funds in the sample. In the first column regression, the coefficient for the "implementation" variable is estimated to be 0.506, and it is statistically significant at the five percent level. When control variables are included in the regression model, the effect of "implementation" is estimated to be 0.39, which is also statistically significant at the five percent level. These findings align with prior research conducted by Edmans (2011) and Barnett and Solomon (2006), which also explored the relationship between SRI implementation and financial performance of funds in the United States. Edmans' study demonstrated that a portfolio constructed through positive employee screening exhibited statistically significant superior investment returns. Similarly, Barnett and Solomon's research indicated that 61 SRI funds achieved superior financial performance over a 28-year investment horizon. It is worth noting that this thesis focuses on global financial performance rather than solely on the United States, and the research period differs. However, if the findings of Barnett and Solomon complement the findings of this thesis, it suggests that Dutch pension funds with high SRI scores may experience further increases in abnormal returns in the coming years. There are several potential factors that contribute to the improved financial performance observed in Dutch pension funds that prioritize socially responsible investing (SRI). These factors are discussed in subsection 2.4. Hamilton and Statman (1993) emphasizes the substantial impact of both negative and positive news regarding irresponsible behavior on the performance of mutual funds. This argument holds weight in the present era, as the world has become increasingly interconnected due to the rapid growth of the internet. Additionally, Mokowitz (1972) underscores the importance of thorough environmental screening, which effectively mitigates the risk of incurring significant costs associated with events such as environmental disasters. This line of reasoning is applicable to Dutch pension funds as well, given the growing significance of climate crises, among other environmental concerns.

Upon incorporating the control variables, the coefficient of the variable "implementation" becomes smaller in magnitude, yet it remains statistically significant. This observation suggests

that the inclusion of the control variables effectively accounts for the "true" effect of the variable "implementation" on abnormal returns, as anticipated in the methodology section.

Size has a positive effect on abnormal returns but statistically insignificant. The coefficient is 0.853, wat means that if a pension fund has 8.6 of billion Euros under yearly management, the abnormal return will increase on average with 0.853 percent, holding all other variables constant. The findings are consistent with the prior research conducted by Broeders et al. (2019), supporting the notion that larger funds may possess greater expertise in manager selection, benefit from economies of scale, and engage in higher-quality monitoring compared to smaller funds. The findings contradict the findings of Barnett and Salomon (2006) that larger funds face difficulties in identifying bargains and undervalued stocks.

The age of a pension fund demonstrates a significant negative impact on abnormal returns at the one percent level. The estimated coefficient of -0.17 indicates that for each additional year in the age of a pension fund, the average abnormal return is expected to decrease by 0.17 percent, holding all other variables constant. These findings align with the notion that older funds may adopt unique cost structures in comparison to newly established funds, consequently leading to a decline in financial performance (Argote, 1999).

The ratio of active pensioners to total active pensioners (AP) in a pension fund exhibits a negative effect on abnormal returns, although the coefficient is found to be statistically insignificant. The estimated coefficient of -0.183 suggests that for every one percent increase in the AP ratio, the average abnormal return is expected to decrease by 0.00183 percent, while holding all other variables constant. The difference in financial performance can relate to different risk attitudes (Ammann & Ehmann, 2017).

The ratio of management expenses to total invested capital has a positive effect on abnormal returns and is insignificant. The coefficient is 1.663, wat means that if a pension fund' expenses ratio increases with one percent, the abnormal return will increase on average with 0.0166 percent, holding all other variables constant. This finding contradicts the previous research conducted by Aslaksen and Synnestwedt (2003), which suggested a negative influence of the management expenses ratio on financial performance. However, an alternative interpretation could propose that by employing superior managers and implementing effective screening mechanisms, the long-term financial performance of pension funds can improve, thus enhancing sustainability in financial per-

formance.

In both regressions, the constant coefficients exhibit positive values. Specifically, in the first regression, the constant coefficient is estimated to be 4.096, while in the second regression, it is estimated to be 14.818. The constant coefficient of 14.818 indicates that when all right-hand sided variables are zero, the expected abnormal return is positive and equal to 14.818 percent. Both constant coefficients are statistically significant at the one percent level. These findings indicate that the average value of abnormal returns is significantly different from zero if all the right-hand sided variables take the value zero. This finding suggests the presence of additional factors or influences that extend beyond the independent and control variables, contributing to the variation in abnormal returns of pension funds during the specific period of research.

5.2 Results with one year lagged control variables

Table 4 presents the results of the robust random two-way effects panel regression analysis in columns (1) and (3). The first column presents the outcome of a robust two-way effects panel regression with the independent variable "implementation." On the other hand, the third column showcases the robust two-way effects panel regression results that incorporate all one-year lagged control variables. It is noteworthy that the model exhibits a robust R-squared value of 0.521 when excluding the control variables and 0.398 when including them. The results of the first column were discussed in the previous subsection, and this subsection will now present the findings of the regression model with one-year lagged variables.

In the subsequent regression model (column 3), the independent variable "implementation" demonstrates a positive and statistically significant coefficient on abnormal returns, which serves as a proxy for financial performance. This significant result indicates the presence of significant disparities in abnormal returns among the Dutch pension funds included in the sample. The estimated effect of "implementation" is 0.39, with statistical significance at the ten percent level. These results align with previous studies conducted by Edmans (2011) and Barnett and Solomon (2006), as well as support the rationale provided by Hamilton and Statman (1993) and Mokowitz (1972). Regarding the impact of assets on abnormal returns, the coefficient is positive but statistically insignificant at the given level of analysis. With a coefficient of 0.223, it can be interpreted that for each additional 8.6 billion Euros of assets under yearly management, the average

abnormal return is expected to increase by 0.223 percent, while holding all other variables constant. These findings are consistent with the prior research conducted by Broeder et al. (2019) but contradict the findings of Barnett and Salomon (2006).

The age of a pension fund demonstrates an insignificant negative impact on abnormal returns. With an estimated coefficient of 0.11, it can be inferred that for each additional year in the age of a pension fund, the average abnormal return is expected to decrease by 0.11 percent, while controlling for other variables. These findings differ from the findings of Argote (1999).

The ratio of active pensioners to total active participants (AP) in a pension fund shows a positive effect on abnormal returns, albeit statistically insignificant. The estimated coefficient of -2.116 suggests that for every one percent increase in the AP ratio, the average abnormal return is expected to increase by 0.02116 percent, while holding all other variables constant. This difference in financial performance can be attributed to varying risk attitudes, as indicated by Ammann and Ehmann (2017).

The ratio of management expenses to total invested capital displays a positive effect on abnormal returns but lacks statistical significance. With a coefficient of 2.132, it can be inferred that if a pension fund's expense ratio increases by one percent, the average abnormal return is expected to increase by 0.02132 percent, while holding all other variables constant. This finding contradicts prior research conducted by Aslaksen and Synnestwedt (2003). The constant coefficient in the regression model exhibits a positive value. Specifically, it is estimated to be 8.425. The statistically significant constant coefficient implies that even when all the right-hand-sided variables take a value of zero, the expected abnormal return is still positive and equal to 8.425 percent. The statistically significant constant coefficient at the one percent level suggests that the average value of abnormal returns significantly differs from zero when all the right-hand-sided variables are set to zero. These findings indicate the presence of additional factors or influences beyond the independent and control variables, contributing to the variation in abnormal returns among the pension funds during the specific research period.

5.3 Comparing regression results with and without lagged control variables

To assess the potential occurrence of reverse causality, a comparison will be made between the findings of subsections 4.1 and 4.2. When examining the variable "implementation," it is observed

that the coefficient and significance levels demonstrate no substantial variation between the regression models employing non-lagged control variables and those incorporating one-year lagged control variables. The sole distinction lies in the slightly lower significance level observed in the regression model with lagged control variables, transitioning from a five percent level to a ten percent level. Nonetheless, notable differences exist in the coefficients among the control variables. In the regression model with one-year lagged control variables, only the variable "Age" displays a change in significance level, with its coefficient not being statistically significant in the regression model utilizing lagged control variables, in contrast to its highly significant counterpart in the regression model employing non-lagged control variables.

5.4 Limitations

The findings in previous subsection show that there are significant differences in the coefficients and significance levels between the regressions with and without lagged control variables. Because of these differences there is a chance that reverse causality is present in the regression without lagged control variables. Due to this form of endogeneity, the results should be interpreted with caution. To cure this possible problem, lagged control variables are utilized. However, that this may not fully resolve the problem of reverse causality. Consequently, the findings of the regression with one year lagged control variables should also be interpreted with caution. But with less caution in comparison to the first regression. Furthermore, the model aims to address omitted variable bias by including relevant control variables and employing individual and time fixed effects. Additionally, robust standard errors are utilized to correct for heteroskedasticity, and serial correlation is corrected by clustering the standard errors based on pension fund type. These corrections may not eliminate the econometric imperfections mentioned above, but they represent the best possible attempts to address them.

It is anticipated that the correlation between financial performance and SRI data may not capture all the variance due to the previous mentioned reasons, as well as the limited sample size and reliance on the VBDO benchmark. This study specifically focuses on the 50 largest pension funds out of the 250 in the Netherlands. Additionally, the SRI scores utilized in this study are based solely on the VBDO benchmark, which may not fully capture the diversity in SRI practices among Dutch pension funds.

Table 5: Regression results, without control variables (1), with control variables (2), and with one-year lagged control variables (3)

	(1)	(2)	(3)
Implementation score	.506**	.39**	.367*
	(.052)	(.084)	(.106)
Assets	.853		
	(1.232)		
Age	-.17***		
	(.017)		
ln (AP ratio)	-.183		
	(.789)		
ln (Expenses ratio)	1.663		
	(.693)		
Assets, one year lagged		.223	
		(1.155)	
Age, one year lagged		.11	
		(.057)	
ln (AP ratio), one year lagged		2.116	
		(.941)	
ln (Expenses ratio), one year lagged		2.132	
		(2.084)	
Constant	4.096***	14.818***	8.425***
	(.12)	(1.112)	(.295)
Observations	270	270	225
R-squared	.521	.527	.398
Individual Fixed Effect	YES	YES	YES
Time Fixed Effect	YES	YES	YES
Robust Standard Errors	YES	YES	YES

Robust standard errors are in parentheses

*** p<.01, ** p<.05, * p<.1

6 Conclusion and discussion

This thesis aimed to examine the relationship between socially responsible investment practices of Dutch pension funds and their financial performance. Numerous studies have examined the relationship of the financial performance of mutual firms and SRI. However, there are distinct differences in the characteristics of portfolios held by mutual firms as compared to pension funds. One of the notable distinctions is the diversification of asset allocation. Additionally, limited re-

search has been dedicated to investigating the financial performance of Dutch pension funds and SRI. multiple studies have investigated the financial performance of pension funds in European countries, and their relationship with SRI. However, it is important to note that pension funds in the Netherlands differ from those in these countries in the amount of assets in funded and private pension plans as a percentage of GDP. Consequently, these differences may lead to variations in financial performance between Dutch pension funds and their European counterparts.In this thesis, the research question I aimed to answer is:

How does socially responsible investment (SRI) affect the financial performance of Dutch pension funds?

To study this possible relationship, I have used and estimated a two-way fixed fixed-effect OLS model with clustered standard errors in fund type. The data I used is panel data from 2016 to 2021. The data sample consist of 45 Dutch pension funds. Collectively, these 45 pension funds manage a total of approximately 1,540 billion euros in assets under management, accounting for approximately 89 percent of the assets within the pension fund sector of the Netherlands. To proxy the financial performance of each pension fund, The financial performance will be expressed as abnormal returns. To compute the abnormal return, the expected annual return will be subtracted from the actual annual return. The independent variable, that serves as a proxy for SRI practices, is the VBDO "implementation" score. This score is linked to the investment policies governing six distinct asset classes. Each asset class is assigned a score, which is then multiplied by the corresponding percentage allocation of that asset class within the portfolio. The control variables control for: fund size, age, active pensioners ratio and management expenses.

The empirical analysis encompassed three distinct regressions: one with only the independent variable, another with non-lagged control variables, and a third with one-year lagged control variables. In the initial regression, both the inclusion and exclusion of control variables yielded statistically significant and positive coefficients for the independent variable "implementation," representing the SRI score of Dutch pension funds. These results highlight notable variations in abnormal returns among the pension funds in the sample. Although the inclusion of control variables diminished the magnitude of the coefficient, it retained its statistical significance. These findings align with previous research conducted by Edmans (2011) and Barnett and Solomon (2006),

which also found the positive statistically significant relationship between SRI implementation and financial performance.

Within the regression involving non-lagged control variables, the coefficient for the variable "assets" displayed a positive trend but lacked statistical significance. The variable "age" exhibited a negative impact on abnormal returns, while the effects of "active pensioners ratio" and "management expenses ratio" yielded inconclusive findings. The constant coefficient retained a positive and statistically significant value, indicating a substantial deviation from zero when all other variables were held constant. Regarding the regression with one-year lagged control variables, the coefficient for the independent variable "implementation" remained positive and statistically significant, aligning with the prior findings. The variable "assets" sustained its lack of statistical significance, while "age" and "active pensioners ratio" displayed insignificant effects. Although the variable "management expenses ratio" exhibited a positive impact, it did not attain statistical significance. The constant coefficient remained positive and statistically significant. In summary, the results consistently indicate that the independent variable "implementation" (representing SRI scores) exerts a positive influence on abnormal returns across all three regressions. The inclusion of control variables contributes supplementary insights but attenuates the magnitude of the effect. Other variables, such as assets, age, active pensioners ratio, and management expenses ratio, manifested mixed or statistically insignificant effects.

In every empirical analysis, the chosen model must assure that the model is as robust as possible. The biggest challenge in this analysis was to cure the possible reverse causality. To cure this possible problem, lagged control variables are utilized. Furthermore, the model aimed to address omitted variable bias by including relevant control variables and employing individual and time fixed effects. Additionally, robust standard errors are utilized to correct for heteroskedasticity, and serial correlation is corrected by clustering the standard errors based on pension fund type. These corrections may not eliminate the econometric imperfections mentioned above, but they represent the best possible attempts to address them. It is anticipated that the correlation between financial performance and SRI data may not capture all the variance due to the reasons above, as well the limited sample size and reliance on the VBDO benchmark. Consequently, the findings of the regression with and without one year lagged control variables should be interpreted with caution. In this study, the VBDO benchmark was employed to assess the SRI score. However, the bench-

mark is not a universal benchmark for SRI. Exploring the utilization of alternative benchmarks and considering additional factors related to SRI would be a valuable avenue for future research. Furthermore, the methodology employed in this thesis for calculating abnormal returns for each pension fund could be enhanced in terms of comprehensiveness and detail. Unfortunately, due to data limitations, it was not feasible to compute internal benchmark returns for every individual pension fund. However, conducting such calculations in future research would greatly contribute to evaluating the financial performance of pension funds. I suspect, due to the rise of transparency of the pension funds financials and interest in SRI that these possibilities can arise in the nearby future.

To conclude, this thesis explored the relationship between socially responsible investment (SRI) practices of Dutch pension funds and their financial performance. Three regressions were conducted: one with the SRI score as the independent variable, one with non-lagged control variables, and one with one-year lagged control variables. The results consistently showed a positive and statistically significant impact of the SRI score implementation on abnormal returns. The inclusion of control variables provided additional insights, but the effects of other variables were mixed or insignificant. Further research should investigate alternative benchmarks and incorporate additional factors to enhance the assessment of SRI scores. The methodology for calculating abnormal returns could be improved for greater comprehensiveness. Conducting such calculations in the future would enhance financial performance evaluation. Increased transparency and interest in SRI suggest these possibilities may arise soon.

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