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Incorporation of ESG Criteria in Private Equity Investments

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Abstract:

Over the past decade, sustainability and responsibility have become megatrends in the financial industry driven by concerns over climate change and social issues, and thus, sustainability and corporate responsibility have increased their importance for companies and individuals. This has led to the exponential growth of capital flows toward sustainable financial products, and the private equity industry is not an exception. Also, the whole capital spectrum for the private equity industry has broadened by funds operating with ESG screens, ESG opportunities, or even under the theme of impact investing. Impact investing aims to achieve financial returns by intentionally and measurably pursuing a positive non-financial impact either environmentally or socially.

Furthermore, the European Union's Commission aims to create a unified ESG framework and evaluation system for all European professional investors, and as a result, the ESG integration is expected to increase (European Commission 2019). In addition, the European asset managers and institutional investors are demanded to disclose the evaluation of ESG issues in the risk analysis process by the European Commission's Sustainable Finance Disclosure Regulations (SFDR) act since March 2021.

This thesis focuses on the effects of incorporation of ESG practices in private equity buyout investments, covering a sample of European and US lower and middle market buyout funds from 2007 to 2021. Using fund-level ESG data and portfolio company-level cashflow data, the purpose of this thesis is to investigate the relation between ESG practices and financial performance.

The impact of incorporating ESG practices in private equity is measured and analyzed by firstly investigating the relation between ESG practices and financial performance with multiple linear regression analysis and secondly by comparing two manually constructed portfolios. The findings indicate a relation between ESG practices and financial performance, but the relation is not unambiguous. The findings indicate that investors actively reporting ESG factors are also producing higher returns. However, other tested ESG practices were either negatively correlated with return or not statistically significant. The findings from the second part of the quantitative analysis indicate that the Low-ESG portfolio outperforms the High-ESG portfolio during the sample period of 31.12.2015-31.12.2021. As the previous research on ESG and private equity performance is thin, these findings lay the groundwork for future research.

Keywords: Private equity, ESG, responsible investing, sustainability, financial performance

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Tiivistelmä:

Kuluneen vuosikymmenen aikana kestävästä kehityksestä on tullut rahoitusalan megatrendi ilmastonmuutoksen ja sosiaalisten epäkohtien vauhdittamana ja siten kestävä kehityksen periaatteet ja yritys vastuun merkitys yrityksille ja yksityishenkilöille on kasvanut. Megatrendi on johtanut pääomavirtojen eksponentiaaliseen kasvuun kohti kestäviä rahoitustuotteita, eivätkä pääomasijoitusrahastot ole poikkeus. Myös koko pääomasijoitusala on laajentunut, kun rahastot ovat implementoineet ESG:n osaksi sijoitusprosessia sekä uuden vaikuttavuussijoittamisen strategian myötä. Vaikuttavuussijoittamisella pyritään saavuttamaan taloudellista tuottoa samanaikaisesti tarkoituksella ja mitattavissa olevan positiivisen ulkoisvaikutuksen luonnin kanssa.

Lisäksi Euroopan unionin komissio on laatinut asialistan yhtenäisen ESG-kehityksen ja arviointijärjestelmän rakentamiseksi kaikille ammattimaisille sijoittajille Euroopassa ja näin ollen pääomavirtojen nousun ennustetaan vain lisääntyvän. Lisäksi eurooppalaisia varainhoitajia ja institutionaalisia sijoittajia vaaditaan julkistamaan, miten ESG-asiat otetaan huomioon riskianalyysointiprosessissa Euroopan komission kestävä rahoituksen tiedonantösäätöjen (SFDR) lain mukaisesti maaliskuusta 2021 lähtien.

Tämä tutkimus keskittyy ESG-käytäntöjen sisällyttämisen vaikutuksiin pääomasijoituksissa, kattaen otoksen eurooppalaisista ja yhdysvaltalaisista pääomarahastoista vuosilta 2007–2021. Tämän tutkimuksen tarkoitus on käyttää rahastotason ESG-tietoja ja kohdeyritystason kassavirtatietoja tutkiakseen ESG-käytäntöjen ja taloudellisen tuloksen välistä suhdetta.

ESG-käytäntöjen sisällyttämistä pääomasijoitusrahaston toiminnassa mitataan ja analysoidaan ensiksi ESG-käytäntöjen ja taloudellisen tuloksen välistä suhdetta tutkimalla lineaarisella regressioanalyysillä ja toiseksi vertaamalla kahta manuaalisesti rakennettua salkkua. Tulokset osoittavat, että ESG-käytäntöjen ja taloudellisen tuloksen välillä on suhde, mutta suhde ei ole yksiselitteinen. Tulokset osoittavat, että sijoittajat, jotka aktiivisesti raportoivat ESG-faktoreita saavuttavat myös korkeamman tuoton. Muut testatut ESG-käytännöt kuitenkin joko korreloivat negatiivisesti tuoton kanssa tai eivät olleet tilastollisesti merkittäviä. Kvantitatiivisen analyysin toisen osan tulokset osoittavat, että matalan ESG:n salkun tuotto ylittää korkean ESG:n salkun tuoton otosjaksolla 31.12.2015–31.12.2021. Koska aiempi tutkimus ESG:stä ja pääomasijoitusten tuotoista on vähäisiä, nämä havainnot rakentavat pohjan tulevalle tutkimukselle.

Avainsanat: Pääomasijoittaminen, ESG, vastuullinen sijoittaminen, vastuullisuus, taloudellinen tuotto

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Abbreviations

AIFM	Alternative Investment Fund Manager
AUM	Assets under management
BO	Buyout
CAGR	Compound Annual Growth Rate
DPI	Distributions to Paid-In
ESG	Environmental, Social and Governance
FMP	Financial Market Participant
GIIN	Global Impact Investing Network
GP	General Partner
IRR	Internal Rate of Return
KPI	Key Performance Indicator
LP	Limited Partner
MSCI	Morgan Stanley Capital International
NAV	Net Asset Value
NPV	Net Present Value
PE	Private Equity
PME	Public Market Equivalent
PRI	Principles for Responsible Investment
RVPI	Residual Value to Paid-In
SDG	Sustainable Development Goal
SFDR	Sustainable Finance Disclosure Regulation
SRI	Socially Responsible Investing

TVPI	Total Value to Paid-In
UN	United Nations
UCITS	Undertakings for Collective Investment in Transferable Securities
VC	Venture Capital

1 Introduction

For a long time, academics have acknowledged that to a great extent, the broad gains in global economic development and the wealth of societies have been achieved through the cost of environmental degradation and thus, by jeopardizing the global financial systems sustainability (see e.g. Boulding 1966 pp. 3–4; Ehrlich 1968; Schmidheiny 1992). In addition to these localized problems of air pollution, toxic wastes in groundwater, and surface-water degradation, the scientists have revealed global scale effects such as climate change, the destruction of ocean fisheries, and ozone depletion (World Resources Institute 2004; United Nations 2004). When looking at the long-term economic impacts of these effects, the outcome might be quite substantial as a vast proportion of the world's economic output depends on the viability of natural systems (Constanza et al., 1997). The recent global issues such as global warming, wildfires, poverty, and hunger have steered the public conversation towards finding solutions to these issues. In the past two decades, responsibility and sustainability have been developing inside the investing and wealth management world as frameworks such as United Nations' Principles of Responsible Investing (PRI) and UNs Sustainable Development Goals have been widely adopted by institutions and investors. According to Argentum (2019, pp. 4–5.) – a Nordic Asset Management company – the year 2019 showed the most interest within the private equity (PE) companies to consider sustainability in their investment decision process. The research argues that during the past couple of years, the ESG agenda of PE companies have shifted from being compliance-driven to becoming a part of the investment strategy.

A common agreement is that all investments, regardless of the asset class, can produce a positive impact, but evidently, some are closer to the action than others. For example, investors in the public equity markets can generate impact through a shareholder advocacy campaign, and it is well established that investors have managed to have a meaningful impact on some corporate practices. Impact investing is a strategy across all asset classes. Still, the closest an investor can get to producing impact comes from placing

capital directly into companies and projects or making direct loans (Bugg-Levine & Emerson 2011, pp. 9–10.) Therefore, private equity and venture capital have unmatched power to generate impact. Hence, these are fruitful asset classes to investigate whether investors implementing ESG criteria can generate abnormal returns.

ESG investing or taking environmental, social, and governance concerns into account when assessing investment risk is a more complex type of responsible investing than simple screening procedures. It has also gained a lot of traction; between 2015 and 2017, the use of ESG integration techniques in Europe grew at a compound annual growth rate (CAGR) of 27% in terms of total assets under-managed (Eurosif, 2018). Furthermore, the European Union's Commission aims to create a unified ESG framework and evaluation system for all European professional investors, and as a result, the ESG integration is expected to increase (European Commission 2019). In addition, the European asset managers and institutional investors are demanded to disclose the evaluation of ESG issues in the risk analysis process by the European Commission's Sustainable Finance Disclosure Regulations (SFDR) act since March 2021. The SFDR aims to level the playing field for financial market participants (FMPs) and financial advisers in terms of transparency concerning sustainability risks, consideration of adverse sustainability impacts in investment processes, and provision of sustainability-related information with respect to financial products. The SFDR mandates that asset managers, such as alternative investment fund managers (AIFMs) and Undertakings for collective investment in transferable securities' (UCITS) managers, give prescriptive and standardized disclosures on how ESG factors are integrated at the entity and product levels. Whether or not they have an explicit ESG or sustainability focus, all asset managers are subject to a large amount of the SFDR.

Impact investing has grown from its predecessor, socially responsible investing (SRI), which refers to the use of both positive and negative portfolio screening in the investment process (Combs 2014, pp. 1–2). Typically, this means that an investor with positive screening includes companies in the investment portfolio committed to ethical business

practices and addressing social and environmental issues or negatively screening out companies that fall under categories as tobacco, oil, alcohol, and weapons.

A decade ago, Grabenwarter and Liechtenstein (2011, pp. 14–15.) argued that all the literature available on impact investing has differentiated investing between ideologies of investors as either impact first or financial first and also to either mission-based investing or market-based investing. Thus, the choice is limited to either financial return or social benefits of an investment in investment decisions. Unfortunately, financial return-seeking investors have associated social or environmental agendas in the investment decision process with a loss in financial return. As a result, it has made prominent barriers withstanding impact investing from scaling to a recognized asset class.

On the other hand, Beal, Goyen, and Phillips (2005, pp. 68–69.) argue that investors are interested in incorporating responsible investing as a part of investment strategy because it provides superior financial performance. Others have also argued that incorporating responsibility and sustainability in the investment strategy can lead to improvements in financial performance. Many have argued that active ownership combined with the consideration of ESG factors improves operational performance, reduces risk, and increases the stock prices of the target companies. (see e.g., Nagy et al. 2012, pp. 1–2.; Dimson et al. 2013.)

1.1 Objective and research questions

The purpose of this study is to examine whether incorporating ESG criteria in the lower and middle market private equity buyout fund investment value chain will lead to superior financial performance. The study aims to contribute to the existing literature on how the incorporation of ESG criteria in the investment value chain affects the financial performance of the private equity portfolio. As the current definition of impact investing is the aim for financial returns while intentionally pursuing responsibility and sustainability,

it is in great interest to examine a unique dataset of lower and middle market buyout funds, aiming for superior financial returns with different ESG scores.

Firstly, the academic literature on ESG incorporation's relation to portfolio performance is, to my understanding, non-existent in private equity and still majorly debated in public equities. Therefore, this thesis tries to answer this question about the relation between the two by employing a unique dataset of private equity fund level ESG scores and company level return data, and the first hypothesis is formed as shown below.

H_0^1 : There is no relation between ESG incorporation and financial performance in private equity buyout investments.

H_1^1 : There is a relation between ESG incorporation and financial performance private equity buyout investments.

The motivation for the second hypothesis arose from the previous literature on public equities as it is still debated along with academics. For example, while examining socially responsible and conventional mutual funds, Hamilton et al. (1993) state that there are no differences in the market price of the socially responsible funds compared to the conventional funds and that the social responsibility factors do not have an effect on a firm's cost of capital. On the other hand, Derwall et al. (2005) and Kempf and Osthoff (2007) state that by applying ESG criteria in the investment process, one can achieve abnormal returns, while Renneboog et al. (2008) showcase that the use of ESG criteria will run up costs and therefore, the investors are left with suboptimal performance. Thus, the second hypothesis seeks to test whether a low-ranked or a high-ranked ESG private equity portfolio performs better, and the second hypothesis is constructed as follows:

H_0^2 : There is no difference in performance between private equity buyout funds that include ESG criteria in the investment value chain compared to PE buyout funds that do not include ESG criteria.

H_1^2 : There is a difference in performance between private equity buyout funds that include ESG criteria in the investment value chain to PE buyout funds that do not include ESG criteria.

1.2 Structure

This thesis is divided into five main chapters, covering the previous academic literature and the theoretical and empirical parts to cover the topic as a whole. Firstly, this thesis will begin with a brief introduction to the primary motivation behind this thesis and the hypothesis development. In the second chapter, the topic is introduced more thoroughly by examining the previous literature research around private equity while focusing on buyout investments, and then the incorporation of ESG in financial markets is presented.

From the third chapter onwards, the empirical implementation is presented. The chapter describes the data used to answer the hypothesis and continues with the theoretical methodology behind the empirical analysis. The fourth chapter will focus on the empirical analysis by first explaining the descriptive statistics from the data sample and then the results for both the relation of ESG incorporation and return and the finding on abnormal return in two different ESG portfolios. Finally, this thesis concludes by critical interpretation of the results by examining the implications and the limitations of the results, and the ideas for future research will conclude the thesis.

1.3 Scope

Most of the research about ESG and performance made to date focus on the public equities or have no access to both data on ESG and private equity returns. Therefore, this thesis's scope is focused on the effect of taking into account ESG in the investment value

chain on private equity returns. Furthermore, as the asset manager offering mainly fund-of-funds providing the data focuses on both European and United States private equity lower and middle market buyout industry, this thesis will geographically investigate both markets. However, the differences between the two are recognized, and the empirical part of this thesis will critically evaluate its effect. Finally, as access to data on private equity investments is usually hard to access, this thesis will use all available data, including realized and unrealized investments. This is justified by recent academic research, and the potential effects are critically analyzed in the final chapter of the paper.

2 Literature review

This chapter will present the previous academic literature on the essential concepts of this thesis. Firstly, it will introduce the private equity and buyout fund characteristics; secondly, the elements of private equity performance measurement; thirdly, the academic development of ESG frameworks; and finally, recognize opportunities and issues regarding the integration of sustainability frameworks in private equity investments.

2.1 Private Equity characteristics

The private equity industry is an essential source of funding for start-ups, private middle-market companies, companies struggling in financial distress, public companies looking for a buyout investment, and companies looking to expand their business. (Fenn et al. 1996, p. 26.) In general, there are two types of PE investors: buyout (BO) investors whose investment strategy is to acquire majority positions mainly in mature companies where they find growth potential from active ownership, and venture capital (VC) investors whose strategy is to make minority investments in early-stage companies where they find scalability usually in industries driven from rapid technological development.

The inflow of capital to the private equity sector has been significant; the growth from \$5 billion in 1980 to \$100 billion in 1994 looks relatively small compared to the growth after. As per the Preqin database, the industries assets under management reach \$4,74 trillion per June 2020. (Preqin 2021.) The significant expansion of the industry is mainly enabled by the late 1970s adaptation of limited partnerships which are a vehicle used for institutional investors to act as Limited Partners (LPs) in PE funds managed by investment professionals who, on the other hand, are General Partners (GPs) (Fenn et al. 1996, p. 26). The LP-GP structure enables the inflow of LPs capital in the hands of professionals instead of having to invest themselves directly. The structure has grown into the PE sector and can be presented as in Figure 1 below:

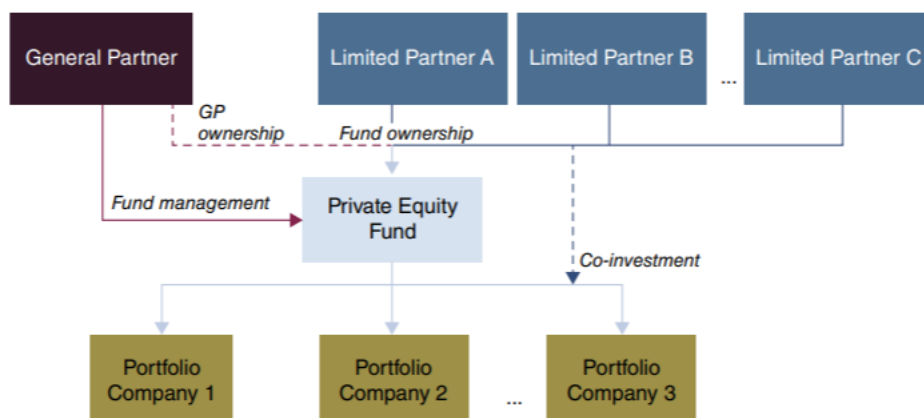


Figure 1. Private equity LP-GP structure (van Swaay et al. 2015, p. 28).

Before a private equity fund can start investing, the GP needs to attract LPs to invest in the fund. According to Kaplan and Schoar (2005), the LPs commit to providing the agreed amount of capital to the fund in a specific time period which, on the other hand, gives the GPs a timeframe when to complete the investments – usually within five years. After the first commitment, the GPs start screening investment opportunities to invest the LPs capital profitably. The GPs have an agreed time period to return the capital to LPs – usually in 10-12 years, giving the typical period for the investment of 3-7 years. This schedule makes private equity investments unique as the GPs have a relatively short period of time to increase the value of the acquired companies and then cash in the profits. Also, the LP-GP structure gives limitations to the cash-in opportunities of the LPs. As mentioned, the lifespan of a fund is typically 10-12 years, and the lifespan ends when the fund is liquidated, and the capital and return flow to LPs are only then.

The widely recognized agency theory from Eisenhardt (1989) suggests this kind of structure might involve conflicting interests between the GPs and LPs. As the LP's capital is locked in the fund, the lifespan is relatively long, and the LPs have limited resources and governance mechanisms to influence the use of their capital; a management contract governs the relationship between the LPs and GPs. (Robinson & Sensoy 2013, p. 2760.) To tackle the problems caused by the agency relationship, the contract is signed at the

inception of the fund. These contracts are essential, and they specify the GPs compensation, the required GPs own investment to the fund, and a variety of other parameters to be considered in the investments. For example, the typical management contract of a PE fund has a "2/20/1" rule, which states that GPs are entitled to a 2% management fee per year, carried interest (carry) of 20%, and that a GP is required to have ownership of 1% of total fund size. In addition, according to Metrick and Yasuda (2010), some management contracts add a so-called hurdle rate to the compensation scheme, which sets a level of return the GPs must achieve before earning the carried interest or carry.

Another unique characteristic of PE investments is the exceptional risk and return profile of both buyout and venture capital investments. As mentioned, venture capital investors make investments into early-stage companies that involve a great amount of risk and significant potential returns. Weidig and Mathonet (2004, pp. 10–14) find that direct VC investments in the US have an unsuccess rate of 30%, meaning that the investments fail to generate a return and a significant return rate of 10% of investments cashing in 10x returns. As investments into VCs are usually made into funds, the volatility of investments is lower as the diversification benefits increase. It is stated that the US VC funds have a 1% probability of total loss, and also, the probability of cashing in 10x returns drop to under 2%.

Weidig and Mathonet (2004, p. 5) find the same probability for a total loss as in VC funds, but generally, the risk profile is more evenly distributed for buyout funds. Harris et al. (2014) investigate private equity returns both in absolute terms and relative to the public market equivalents. Their results for buyout investments are far more positive than previously documented as they find that since 1984 average US buyout fund returns have exceeded public market equivalents in most vintages. They deploy the public market equivalent (PME) method of Kaplan and Schoar (2005), which compares the net of fees returns generated by PE funds to an equivalent investment made to the public market index. The results show an outperformance of 20% to 27% versus the S&P 500 over funds life which accounts for more than 3% per year. The findings from Harris et al. (2014) are

consistent with the likes of Kaplan (1989), Smith (1990), and Lichtenberg and Siegel (1990). Their ground-breaking studies on private equity have found significant improvement in companies' operational performance after being purchased into a private equity vehicle.

2.2 Buyout funds

In a leveraged buyout, a specialized investment firm acquires a company with a relatively small portion of equity and a rather large portion of debt. A typical leveraged buyout involves a private equity fund purchasing majority ownership of an existing or mature company. This arrangement differs from venture capital firms, which often invest in new or rising businesses and do not typically hold majority ownership. (Kaplan & Strömberg 2009, pp. 121–122.)

The 1980s saw the emergence of leveraged buyouts as a significant trend. Jensen (1989) projected that as leveraged buyout activity intensified over that decade, leveraged buyout organizations would eventually become the dominant corporate organizational type. He maintained that the private equity company itself had a lean, efficient organization with low overhead costs, concentrated ownership holdings in its portfolio firms, high-powered incentives for private equity firm experts, and a lean, efficient organization with low overhead expenses. The private equity company then used performance-based management compensation, highly leveraged financing (typically using junk bond financing), and active governance to invest in firms. These structures, according to Jensen, outperformed the average public business, which has dispersed owners, limited leverage, and poor corporate governance. This prognosis looked premature a few years later. By the early 1990s, the junk bond market had imploded, a substantial number of high-profile leveraged buyouts had failed, and leveraged buyouts of public firms (so-called public-to-private transactions) had all but vanished (Kaplan & Strömberg 2009, pp. 121–122).

On the other hand, the leveraged buyout market had not died; it had simply gone underground (Kaplan & Strömberg 2009, pp. 122–123). During the 1990s and early 2000s, when private equity firms continued to buy private companies and divisions when leveraged buyouts of public corporations were limited. When the United States (and the rest of the globe) underwent a second leveraged buyout boom in the mid-2000s, public-to-private transactions returned. In both nominal terms and as a percentage of the entire stock market, a record amount of capital was committed to private equity in 2006 and 2007. The activity of the first wave in the late 1980s, which peaked with the buyout of RJR Nabisco in 1988, was matched, if not surpassed, by private equity pledges and deals.

Three aspects are required for a successful leverage buyout: cash availability (interest, debt pay-down), operational improvements, and repeated expansions. A private equity firm must determine the best exit strategy. Private equity firms seek to profit from the acquired company's cash flow. Cash flow is utilized to pay down debt and interest; thus, debt will be converted to equity value over time. Following the takeover, a private equity group attempts to improve the company's operating performance and increase efficiency. Improved operating performance should boost cash flow and, as a result, the company's total value. A higher overall business value indicates that the company can be sold for a higher price. Investors, funds, and companies have experience in a variety of industries, making them better suited to develop specific aspects of the business. In general, the goal of a private equity firm is to increase the purchased company's overall worth.

The company's overall value will rise as a result of multiple expansions (Pignataro 2014, pp. 1–4). The target company's purchase and exit multiples are set. When a company is sold, the profits from buyouts are realized. Strategic sale, financial sponsor, initial public offering, and dividend recapitalization are all options for exiting a buyout. A strategic sale occurs when a firm is sold to a strategic buyer who sees value in owning the company. Another private equity firm with a different concentration is commonly referred to as a

financial sponsor. An initial public offering (IPO) is when a firm is sold to the public markets for the first time. A corporation acquires liquidity from business investments in a dividend recapitalization.

2.3 Buyout performance and returns

As mentioned above, a unique characteristic of private equity is a fixed holding period that causes investors to have to wait for returns for a certain period and gives PE investments an issue on reporting returns. Investors must deal with the difference between unrealized returns and realized returns. (Appelbaum & Batt 2014, p. 163). Realized returns are defined as returns paid to limited partners in actual cash after the liquidation of assets in PE funds, whereas unrealized returns are GPs estimates delivered to LPs during the funds holding period. The need for unrealized returns comes from the relatively long lifespan of the fixed investment. LPs that have invested in the PE funds are interested in the returns during the holding period, and therefore, the GPs calculations rely on estimates of unrealized returns of active investments in the portfolios. Because of this issue, scholars focusing on PE performance tend to use net asset values (NAV) in their calculations. NAV is the net value of a company inside the PE fund estimated by the GP, which after a change in accounting standards back in 2008, NAVs are reported at fair value.

2.3.1 Measurement

Return multiples are probably the most widely utilized method for evaluating private equity performance. Return multiples are simply the value of the cumulative distributions divided by the amount already drawn into the fund from the entire commitment known as paid-in capital. The sum of the distributed value to paid-in ratio (DVPI) and residual value to paid-in ratio (RVPI) is the total value to paid-in ratio (TVPI), which is the

best performance technique at the close of the fund's life cycle. (Talmor et al., 2011, p. 42)

$$TVPI = \frac{\sum_{t=1}^{t<T} CF_i^{PAST,RECEIVED} + NAV_r}{\sum_{t=1}^{t<T} CF^{PAST,PAID IN}} \quad (1)$$

where $CF_i^{PAST,RECEIVED}$ is the net cash flow distributed by the fund, $CF^{PAST,PAID IN}$ is the cash flows transferred to the fund, and NAV_r is the net asset value.

A simple demonstration of the multiple calculations can be found in Table 1 below. The table demonstrates a private equity fund with €100 million commitments, a fixed 10-year term, and an investment period of three to seven years. As the first row of the table indicates, most of the capital is called during the first five years as the fund is making investments. Typically, in a private equity structure, the GP starts to make distributions to the LPs when cash is returned from investments through exits, as can be seen from the third year onwards on the third row. The residual value or the NAV of a fund is the value of the fund at a certain time. The NAV will change over time as the fund calls capital from the LPs, the fund makes new investments, the valuations of investments change, or the investments are exited, and the commitments are returned to LPs. Finally, the total is the sum of distributions made to the LPs and the current NAV.

Table 1. Multiple calculations.

Years	1	2	3	4	5	6	7	8	9	10
Paid-in-Capital	15	20	22	15	12	10	5	1	0	0
Distributions	0	0	3	5	10	25	50	60	22	25
Residual Value	13	25	40	75	100	110	90	40	20	0
Total	13	25	43	83	118	153	183	193	195	200

Years	1	2	3	4	5	6	7	8	9	10
DPI	0,00	0,00	0,05	0,11	0,21	0,46	0,94	1,53	1,75	2,00
RPI	0,87	0,71	0,70	1,04	1,19	1,17	0,91	0,40	0,20	0,00
TVPI	0,87	0,71	0,75	1,15	1,40	1,63	1,85	1,93	1,95	2,00

From the second panel of the table above, we can examine the multiple calculations. The distributed value to paid-in -ratio is simply the ratio between the distributions made to and the capital called from the LPs. The residual value to paid-in -ratio is the ratio between the residual value and the capital called from the LPs. As can be seen from the final row of the table and as mentioned above, the TVPI is calculated as the sum of the DPI and RPI.

Multiple measurements are problematic in that they ignore the fund's investment capital's time horizon and duration (Talmor et al., 2011, p. 42). Return multiples also lack the risk information and reinvestment reallocation data that investors require. To appropriately inform return performances, multiples should always be given along with the term of the investment, the amount of leverage and the quantity of capital reinvested.

When applied to a series of cash flows, the internal rate of return (IRR) is defined as the discount rate, which produces a net present value (NPV) of zero. By capturing the cash-flows effect at certain times in the fund's portfolio, the IRR has the temporal effect that is missing from the return multiples. Because cashflow management must be described when the control is on the GPs, the private equity IRR departs from the time-weighted rate of return measure utilized in the public markets. The PE internal rate of return, unlike the time-weighted metric, recognizes intermediate cash flows based on amounts and timings.

The performance metrics presented by funds during fundraising have minimal predictive power, according to Jenkinson et al. (2013) findings. This is especially true when internal rates of return are used to assess performance (IRR). Using public market equivalent measures considerably improves predictability. Their findings suggest that investors should be exceedingly cautious about basing investment decisions on current fund returns, particularly when looking at quoted IRRs.

IRRs and investment multiples (also known as the ratio of the total value – cash realizations plus remaining NAV – to paid-in capital, or "TVPI") are the most common performance metrics discussed by GPs and LPs for private equity firms. Any increase in the NAV will have an immediate impact on the IRR and TVPI reported. The IRR will be greatly influenced by the timing of capital flows into and out of the fund, as well as the investment's holding period. The IRR will naturally diminish over time unless the NAV continues to climb. As a result, unless valuations continue to rise, the IRR relative to comparable funds will begin to fall after an upward revision to the NAV.

We begin by making the following simple observation to examine fund valuations. A fund's NAV may vary for one of three reasons: (1) cash is drawn from investors and used to pay management fees (which have no effect on the NAV) or invested in a portfolio company, (2) the valuation of an existing portfolio company is changed due to changes in the company's performance and/or changes in the market valuation of companies (for example, if price/earnings ratios change), or (3) cash is returned to investors when dividends are paid from existing portfolio companies, or the companies are sold. Using the (unbalanced) panel data of quarterly fund observations, we can examine the behavior of the net asset value (NAV) reported by the GP across the fund's lifetime.

In their study, Jenkinson et al. (2013) run regressions with TVPI and PME as performance indicators and try to establish if interim funds multiples are good predictors of the fund's ultimate multiples at the exit. Predictability begins sooner in both circumstances, and the coefficients converge on one. The findings reveal that the interim fund PME is a relatively strong predictor of the final PME of buyout funds. The interim PME coefficients are all statistically significant, and PMEs from the quarter the follow-on fund first closed and two quarters later are not substantially different from one another, making them good predictors of the fund's ultimate PME. The results are similar when using TVPI; however, predictability appears slightly later.

Kaplan and Schoar (2005) presented one of the most widely used PE performance methodologies as the public market equivalent or PME. It calculates the impact of investing in private equity versus a public index by compounding each cash flow (calls and distributions) based on the performance of the public index. The performance of the public index is measured between the cash flow date and the valuation date. The formula utilized in this research is as follows:

$$KS - PME = \frac{FV(Dist)}{FV(Call)}, \quad (2)$$

where $FV(Dist)$ is the sum of distributed capital,

$FV(Call)$ is the sum of called capital,

And $KS - PME > 1 (< 1)$ and thus the PE outperformance (underperformance)

PME can also be expressed as per Kaserer and Diller (2004):

$$PME = \frac{\sum_{t=1}^T cf_t \prod_{i=t+1}^T (1 + R_{Ii})}{\prod_{t=1}^T (1 + R_{Ii})}, \quad (3)$$

where R_{Ii} = public market benchmark on time t ,

and cf_t = distributions of the private equity fund on time t .

The PME can be thought of as a market-adjusted multiple of capital invested (net of fees). A PME of 1.25, for example, means that at the end of the fund's tenure, investors received 25% more than if they had invested in the public market.

2.4 ESG framework

Environmental, social, and governance (ESG) focus on three main elements connected to a company's environmental, social, and governance activities. The environmental perspective is concerned with how businesses deal with concerns such as climate change, resource shortages, pollution, etc. The social side of ESG is concerned with the employer-employee relationship, racism and child labor, workplace safety and health, etc. The third component, governance, is concerned with the firm's administrative techniques, such as bribery and corruption, the ratio of men and women on the board of directors, excessive CEO salary, etc. Considering ESG factors in investments is more salient than ever. The external pressure to incorporate ESG factors into business activities has increased for corporations' cross sectors. There are several reasons why the consideration of ESG has exploded in popularity over the last two decades. One of the motives is that the amount of information available to investors has grown, and the quality of information produced by social research organizations is significantly higher than it was previously, and the organizations are far more capable. Most importantly, as the amount of available knowledge grows, investors' activities become more responsible. Since the beginning of the 21st -century, scholars have investigated the relation between ESG performance and financial performance, but despite the growing interest in understanding ESG factors, the investigation of ESG factors in the investment process in the private equity industry has been relatively small.

2.4.1 Principles for Responsible Investment

Back in 2006, a relatively large step toward a global mutual understanding of the sustainable financial system and the actions required from companies to support the much needed sustainable development in the financial industry was taken as an initiative of the United Nations by the launch of the Principles of Responsible Investment (PRI). An invite from the United Nations for the world's largest institutional investors started the

development of the PRI in early 2005. Together, a group of these institutional investors developed the Principles for Responsible Investment and became signatories and committed to following the guidelines set in the PRI. The mission of PRI is to work to achieve a sustainable global financial system by encouraging investors to adopt the ESG criteria as a part of their investment and ownership decisions. The adaptation of ESG criteria benefits the environment and society and rewards long-term value creation. The founding signatories of the PRI developed the following six principles for responsible investment as a guideline for investors implementing ESG criteria in their investment and ownership decisions:

Principle 1. We will incorporate ESG issues into investment analysis and decision-making processes.

Principle 2. We will be active owners and incorporate ESG issues into our ownership policies and practices.

Principle 3. We will seek appropriate disclosure on ESG issues by the entities in which we invest.

Principle 4. We will promote acceptance and implementation of Principles within the investment industry.

Principle 5. We will work together to enhance our effectiveness in implementing the Principles.

Principle 6. We will each report on our activities and progress towards implementing the Principles.

The above six Principles were launched in April 2006 at the New York Stock Exchange. PRI signatories have grown consistently since the launch from 100 to over 4000 signatories. Figure 2 demonstrates the number of signatories and the assets under management (AUM) from 2006 to 2021; we can note that the AUM has grown from \$6,5 trillion to \$121,3 trillion over the past 16 years. (Principles for Responsible Investment 2021.)

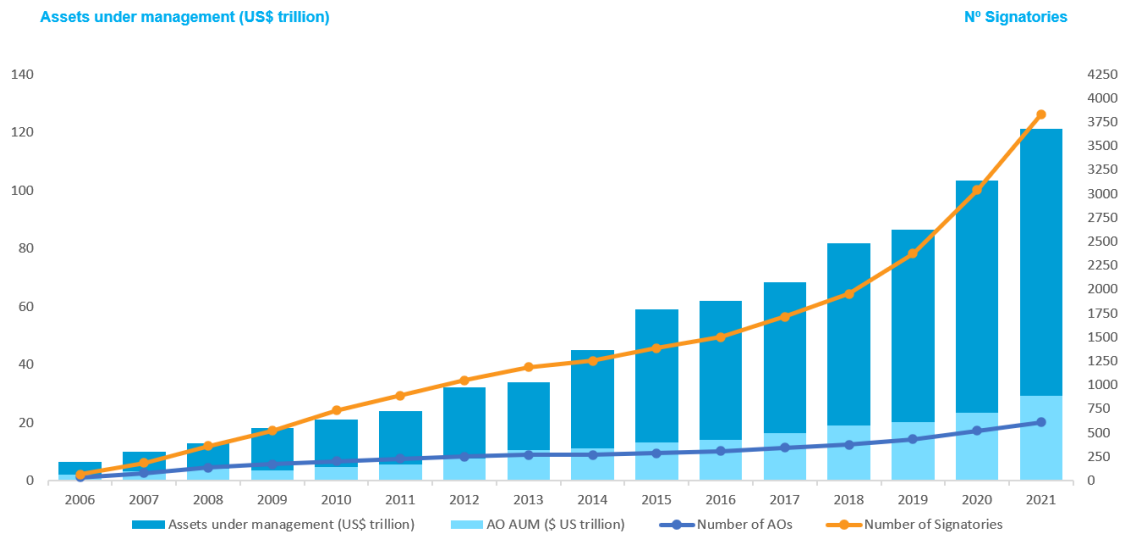


Figure 2. PRI growth 2006-2021 (Principles for Responsible Investment 2021).

2.4.2 Sustainable Development Goals

Also, a commonly used framework for sustainable investing is the Social Development Goals (SDGs) introduced by the United Nations in their ambitious 2030 Agenda for Sustainable Development (Agenda 2030) which consists of 17 individual goals as presented in Figure 3 (United Nations, 2015). According to the impact investor survey 2020, 60% of the respondents target both social and environmental impact in their investments, and accordingly, 73% of the respondents claim to be using the SDG framework for at least one measurement and management purpose.

SUSTAINABLE DEVELOPMENT GOALS



Figure 3. UN Sustainable Development Goals (United Nations, 2015).

Ruff and Olsen (2018) note that the process of impact measurement sometimes tends to fade into oblivion since impact investors are keen to seek a set of uniform metrics and the proposed metrics often end up competing with an ever-increasing number of similar standards. They claim that the impact achieved is the greatest when each impact investor uses the most meaningful and insightful measurement and processes for their aim and operations. Here the SDGs are a useful metric to provide investors with concreteness as they can choose the issues most relevant to them and start finding solutions to these issues of sustainability and inequality. Hehenberger and Harling (2018) suggest that impact investors should adapt to the SDGs metrics more strongly as it has been designed as the framework of the 17 most important set of objectives the impact investors should aim for.

2.4.3 Responsible and sustainable investing

Despite the growth and widespread interest in investing in an environmentally and socially sustainable way, the terminology remains ambiguous, and scholars are constantly debating the many terminologies associated with the concept. Terms like corporate social responsibility, ethical investing, responsible investing, ESG investing, sustainable investing, and impact investing will appear in the underlying literature. Many studies have debated whether these terms are all the same or should be treated differently.

The traditional spectrum of investing has broadened as the development of socially responsible investing has evolved. The spectrum of capital from Bridges Ventures (2013) gives a simplified look into the differences between the debated terminologies. As shown in Figure 4 below, the spectrum varies between traditional investing, which focuses purely on finance and returns, and philanthropy which focuses on one or a cluster of social or environmental issues and is willing to fully trade-off financial performance. The figure showcases the spectrum between traditional and philanthropic investors, as well as an overview of how investing strategies can be employed for ESG risk management, ESG opportunities, and high-impact solutions, all while maintaining competitive returns.

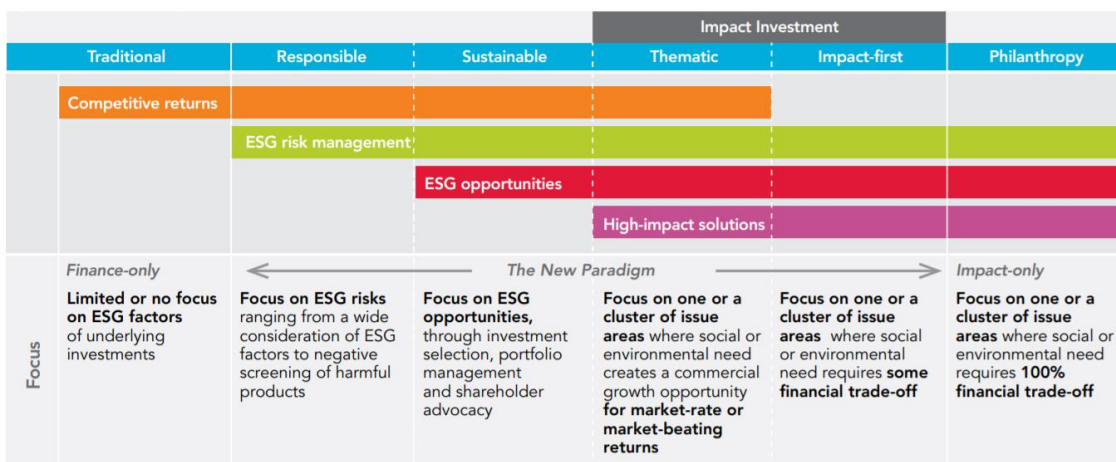


Figure 4. Spectrum of Capital (Bridges Ventures 2013).

As this thesis focuses on the private equity industry and the concept shown in Figure 4 is widely adapted in the industry, it is used to explain the aspects of responsible, sustainable and thematic or impact investing. According to Eurosif (2016), sustainable and responsible investing is a long-term-oriented investment approach that integrates ESG factors in securities research, analysis, and selection within an investment portfolio. It combines fundamental analysis and engagement with an evaluation of ESG factors to capture long-term returns for investors better and benefit society by influencing the behavior of companies. As shown from Figure 4, responsible investing focuses on managing ESG risks while sustainable investing focuses on ESG opportunities.

A recent article from Indahl and Jacobsen (2019) suggests a new era for the private equity industry. This movement expressed in the article as Private equity 4.0 involves a growing number of PE firms and funds, incorporating ESG issues into their strategies and hence the investment decision process. Several private-sector entities have been refining their understanding of investment impact and have already adjusted their strategies as a result. Recently, the adoption of environmental, social, and governance (ESG) factors in investment processes have progressed steadily. Promoting ESG adoption across the investment value chain will stimulate more private investments in sustainable development, which will produce a positive impact. ESG and sustainability information is rapidly being included in the reporting processes of many actors in the investment value chain, such as asset owners, asset managers, and corporations (Eurosif 2018). ESG integration refers to asset managers explicitly incorporating environmental, social, and governance (ESG) aspects in addition to the standard financial research. This investing approach has gained traction not only in Europe but around the world, becoming the most popular strategy among SRI investors, the vast majority of whom have a formal integration policy statement.

2.4.4 Impact Investing

Although ESG has been part of various academic research, its implementation in the private equity industry is much shorter. In the capital spectrum shown above, impact investing is considered a form of investing that focuses on one or a cluster of social or environmental issues where the issues create opportunities for commercial growth. Impact investments are separated into the ones aiming for market-rate or market beating returns and those that are willing to trade-off some financial performance.

For the past century or so, the term Impact investing has risen, and it has been more and more noticeable over a couple of years. As mentioned in the introduction, the private equity industry has an unmatched power of producing impact by direct capital allocation. The history of Impact Investing is yet somewhat short. According to Bugg-Levine and Emerson (2011), the term impact investing emerged in 2007 when a 20-person group kept gathering to meetings at the Rockefeller Foundation. Since the inception of the term, many academics have produced their understanding of the definition of the term. Fast forward to this day, the academic world has formed a somewhat mutual agreement of the definition, but still, there remains some disagreement.

Bugg-Levine and Emerson (2011) argued that when the term impact investing emerged, many academics were still locked in the past mindsets and viewed the term as a below-market-rate investment strategy that trade-offs financial return for social impact. Their article defines impact investing as the simultaneous pursuit of financial returns and a positive social or environmental impact. They also introduce a new term, blended value, which reintegrates the understanding of value as a nondivisible combination of economic, social, and environmental components. It is used to describe the double objective of impact investing. As mentioned in the introduction, it can be argued that all investments have some sort of impact, and thus, it is important to note that impact investing is the act of intentionally and measurably pursuing a positive impact. Hence, impact investors develop strategies to allocate capital towards where it can generate the most

integrated blended value. (Bugg-Levine & Emerson 2011, pp. 9–10.) This blended value or double objective is described by Roundy et al. (2017) as the combination of philanthropic objectives and mainstream financial decision making. Also implying the relation of pursuing financial returns with the intention of positive impact.

As the movement of impact investments is relatively new, not many academic papers investigate their ability to produce financial and non-financial returns. However, some academics argue that great impact and financial return are inextricably linked and that attempting to achieve both is unreasonable (see, e.g. Cheng 2011; Evans 2013; Mitchell et al. 2008). According to Brest and Born (2013), impact investors are not able to produce additional utility as if there is an investment opportunity that generates market-rate returns while also having a positive impact, traditional investors seeking only returns would be long on it, and therefore, there is not any additional impact value left for impact investor. However, as the whole focus of the impact investment movement is to go beyond sustainable investing and produce non-financial impact by focusing on the chosen clusters of social or environmental issues that create commercial growth opportunities, these points of view are, to some extent, outdated. In addition, in their paper, Grabenwarter and Liechtenstein (2011) find that considering environmental or social factors positively correlate with financial performance. They present a view that the goal for producing impact should be built into the business model so that when the investment performs well, it will generate both profit and impact.

2.4.5 Opportunities in incorporating sustainable frameworks

Many studies that investigated public entities and the relation between the incorporation of sustainable frameworks in investments and investment returns have showcased a positive correlation. For example, Kempf and Osthoff (2007) and Derwall et al. (2011) have found that building portfolios with attention to social responsibility characteristics have achieved superior financial returns in comparison to the market.

Also, studies have shown that with the use of ESG practices, firms have increased their ESG performance which, on the other hand, has improved the operational performance of firms and hence increased the firm valuation (Clark et al. 2015). Furthermore, the incorporation of ESG analysis in investment processes which leads to making investments into high ESG score companies, is argued to lead to an increase in the portfolio's overall financial performance. Thus, the use of the ESG framework in the investment decision process leads to better ESG and financial performance.

As mentioned earlier, the rise of ESG strategies started with the conversation of a values-versus-profits proposition that focused on screening out negative companies from an SRI perspective. The conversation has now evolved toward best-in-class investing that attempts to identify mispriced market risks and opportunities (Derwall et al. 2011). Many have found that fundamental risk measures can be formed from ESG factors that correlate with the cost of capital, and companies with high ESG scores have outperformed on operational and accounting-based metrics (see e.g. El Ghouli et al. 2011; Bauer & Hann 2010). Also, environmental economics believes that market failure causes environmental degradation, whereas entrepreneurship literature contends that market failure creates opportunity (Dean & McMullen 2005). Environmentally relevant market failures represent opportunities for obtaining profitability while lowering environmentally damaging economic practices. It also entails conceptualizations of sustainable and environmental entrepreneurship, which describe how entrepreneurs take advantage of environmentally important market failures. This reveals an important advantage for private equity investors seeking promising companies with new innovative solutions that seize the advantage.

2.4.6 Issues in incorporating sustainable frameworks

In opposition to the papers mentioned in the previous chapter, many academics have found evidence of rising costs for incorporating ESG factors in investing and reporting in the public equities. Among the skeptics are, for example, Renneboog et al. (2008) and Nofsinger and Varma (2014), whom both have found evidence of an increase in the company's cost of capital. Therefore, they note that the incorporation of ESG factors leads to suboptimal performance.

Also, the complexity of active investing such as implementing environmental and social investment criteria is often too big of a burden for small- and medium-sized businesses (Demaria 2011, p. 61). Hence, private equity investments are not an exception. Post-investment monitoring can be considered bureaucratic and administrative burdens. The extra costs that evolve from checklists and additional reporting required by the standard sustainable guidelines might not be wise to incorporate for small private equity teams as they have limited human and financial resources.

As mentioned, the SDGs have 17 main goals, and the main goals are divided into 169 subcategories. These subcategories contain many goals that are not measurable, and most of them are built around increasing knowledge. The integration of sustainable development goals into different aspects of sustainable development means not only the joint development of many areas but also the conflicts between the goals. Puttonen and Puttonen (2021, pp. 67–70) argue that it is impossible to build towards a world where every aspect of sustainable development would improve dramatically. Also, sustainable development goals do not consider side effects that are inevitably happening in different areas, and therefore, it can be thought of as a very impractical tool. Again, the situation is to be understood that not every sustainable development goal can be fully achieved, although it is described as theoretically possible. The sustainable development goals only directly guide the actions of states to promote sustainable development, but this results in investors and companies justifying their actions by referring to the goals of

Agenda 2030. Because of this, in the paper, they argue that Agenda 2030 does not provide investors with concrete tools to implement responsible investing.

3 Data and methodology

This chapter aims to showcase the data and methodology used in this thesis comprehensively. The first part of the chapter explains the collection of data and presents the variables used in the empirical part of the paper. As the empirical implementation is divided into two parts, the next subsection presents the methodology for the multiple linear regression used to test the first hypothesis. Secondly, the portfolio formation and performance measurement to test the second hypothesis is introduced.

3.1 Data description

The data used in this study consists of fund-level ESG data and portfolio company-level cash flow data. The data is collected from a Nordic asset manager investing in European and US lower and middle market private equity buyout funds. Therefore, this thesis focuses on European and US lower and middle market private equity transactions between 2007 and 2020. The full dataset consists of 83 funds established between 2007 and 2020 and 753 portfolio company data. The portfolio company data consists of cash flow data from the fund's transaction records. The fund-level ESG data and the portfolio company cash flow data are combined to answer the research questions by testing the hypotheses.

The dataset includes information on the fund characteristics, private equity companies' cash flows at entry and exit, the quarterly net asset values of the portfolio companies, and the proceeded cash flow from the investments. As the companies cashflows are reported in investee currency, the analysis is done in local currencies. This is done in order to have the TVPI calculations as original as possible and to avoid the effects of exchanging the currencies to one base currency. Because of the lifespan of a typical PE fund, some of the newest funds were excluded from the second part of the empirical analysis as they had made their first investments in 2021 and did not have portfolio companies at the last portfolio construction time at 31.12.2020

After the adjustments in the dataset to test the first hypotheses, the final sample of 76 Buyout funds and 692 lower and middle market private equity companies' pairs are formed. Finally, the ESG-score of the fund ranks the pairs, and the portfolio company level data is used to examine the relation of the ESG-score to the returns.

The ESG scores used in this study come from a yearly ESG Query sent to each of the funds that the funds used in this thesis have invested in. The ESG query has been annually sent to the GPs of the funds and sorted into a 0–7-point system. This thesis will work around six ESG Queries starting from 2015 and ending in 2020. This thesis will deploy the latest, i.e., the year 2020s ESG Query, and rank the funds to test the first hypotheses. The data used in the first part consists of the full history of each investment made between 2007 and 2021 either until the liquidation or the end of 2021. To test the second hypothesis, the formation of two portfolios is explained in the methodology part of this thesis, but the portfolio company data is used to examine the differences in possible abnormal returns of two different ESG strategies. The data is collected quarterly for the period of 31.12.2015 - 31.12.2021. Thus, the dataset used involves the ESG scores of six annual ESG Queries and 24 samples of portfolio company-level data.

3.2 Variables

In the literature, assumptions concerning NAVs have sparked debate and deserve to be discussed. In their examination of Venture Economics data, Kaplan and Schoar (2005) employ the reported NAVs in the same way that is done in this thesis. Phalippou and Gottschalg (2009) cast doubt on NAVs based on patterns in Venture Economics data, assuming that NAVs are zero for funds beyond their tenth year with no cash flow activity in their primary analysis. However, Stucke (2011) effectively reveals that many funds' cash flows and NAVs were not updated by Venture Economics. As a result, even when the reported NAVs are applied, calculations based on Venture Economics data understate returns for many funds. As a result, the assumption made by Phalippou and

Gottschalg (2009) that NAVs are zero is incorrect (in hindsight) and understates performance even more.

Although caution should be exercised when using residual values in return estimates, likewise to the paper from Harris et al. (2014), this thesis profits from two differences that the authors of the previous papers did not have. First, the dataset used for both distributions and NAVs are current because the data is from a fund of fund that is an LP in the funds it invests in, and therefore the data is sourced directly from GPs, is subject to intensive cross-checking, and is part of the fund of funds systems that monitor and record the GPs' activities. Second, the Financial Accounting Standards Board (FASB) has mandated that PE companies evaluate their assets at a fair value every quarter since the end of 2008, rather than allowing them to value them at cost until an explicit valuation adjustment. This has resulted in estimated unrealized values being closer to true market values than previously, especially for buyout funds. In addition, more recent research from Brown et al. (2013) and Jenkinson et al. (2013) shows that residual values have historically been conservative estimates of the ultimate cash delivered to investors. As a result, the projections in this study for funds that have not yet been fully realized may be conservative.

3.3 Regression variables

3.3.1 Dependent variable

As mentioned above, the latest academics have recognized the interim private equity returns as admissible for research with the caution of them being conservative. With this in mind, this thesis derives the total value paid in ratios for all the portfolio companies in the funds, and the TVPI is used as the dependent variable in this study. Furthermore,

as mentioned earlier, impact-focused private equity investors simultaneously pursue environmental or social impact and financial returns. So the dataset deployed gives an interesting look between the relation of the selected ESG practices and financial performance on private equity funds.

3.3.2 Independent variables

The ESG Query used in this thesis gives an interesting point of view into private equity funds' incorporation of ESG practices across the investment value chain. For this thesis, each company is appointed five measures of ESG incorporation based on the fund that has invested in the companies. Firstly, the fast-growing world's leading proponent of responsible investment, the PRI signatories' relation, is used in this study as an independent variable. The funds PRI signatory status is deployed with a binary variable of 1 = yes and 0 = no. Secondly, the active tracking of ESG key performance indicators (KPIs) in the GPs portfolio companies is an important question as it gives insight into the investor's commitment to ESG issues. Similarly, the ESG KPIs are deployed as an independent variable with a binary variable of 1 = yes and 0 = no. ESG and sustainability information is rapidly being included in the reporting processes of many investors, such as asset owners, asset managers, and corporations. The reporting on ESG and sustainability gives an interesting look into the effect of teams focusing on their sustainability performance. This thesis uses it as an independent variable to see if tracking and writing annual ESG reports adds value to the investments. The last binary independent variable used in this thesis is whether funds include ESG factors in their quarterly reporting. Before the quarterly reporting involved strictly the financial information like the previously covered NAVs, return multiples, and IRRs, but today more and more funds are committed to reporting the ESG factors and especially changes in them in the portfolio companies. One of the foundations of sustainable investing is to achieve financial returns while pursuing non-financial impact. It is interesting to see if the quarterly reporting of these ESG factors relates

to the TVPIs. Lastly, the ESG policy score given to each fund is deployed as an independent variable as a categorical variable measuring the level of each fund's ESG policy with scores of 0 = none, 1 = existent, 2 = good, 3 = excellent.

3.3.3 Control variables

As mentioned earlier, many academics have proposed that the interim results of private equity funds have been conservative. Therefore, the liquidation status of each company is suggested to have a significant impact on performance, and thus, a binary variable is deployed. Next, as per Braun et al. (2017), a longer holding term should result in a higher (lower) absolute return if buyouts outperform (underperform) the public market benchmark over time. To account for this, the holding period of each investment is included as a continuous variable indicating the holding period in years. Theoretically, investment regions should affect the investment return by a difference in the risk profile of each region. Even though this thesis focuses on investments from Europe and North America, a couple of investments from Asia are included in the funds. Thus, the three regions are included as control variables, and the n-1 dummy variable is used to avoid the dummy variable trap. Because different industries have varying growth expectations at other times, the industry in which the portfolio company works is likely to impact the investment's performance. Also, investments made during a particular year are inherently affected by the economic circumstances of that year; investments made during a recession perform statistically worse than those made during an improving economy. Therefore, because the portfolio company industry and the investment year are expected to affect investment performance, they are employed in a similar manner using the n-1 dummy variable than the investment region as a control variable.

Table 2. Regression variables.

Variable	Variable type	Metric	Value range
TVPI	Dependent variable	Continuous	0,00 - 270,19
Signatory in PRI	Independent variable	Binary	Yes=1, No=0
ESG KPIs	Independent variable	Binary	Yes=1, No=0
Annual ESG report	Independent variable	Binary	Yes=1, No=0
ESG Factors included in quarterly reporting	Independent variable	Binary	Yes=1, No=0
ESG Policy Score	Independent variable	Categorical	0=None, 1=Existent, 2=Good, 3=Excellent
Liquidated	Control Variable	Binary	Yes=1, No=0
Holding period	Control Variable	Continuous	0,30 - 11,75
Investment region	Control Variable	Categorical	3 Regions
Investment industry	Control Variable	Categorical	10 Industries
Investment year	Control Variable	Categorical	3 five-year periods 2017-2021

3.4 Methodology

This thesis has two empirical approaches to answer the hypotheses. Firstly, this section will introduce the multiple linear regression model from Myers (1990) to examine the relation of the GP ESG integration to financial performance. Secondly, to analyze the effects of ESG practices integration on PE performance, this thesis compares two portfolios. After introducing the multiple linear regression model, this section will detail the formation of the two portfolios based on the ESG integration level, and the framework for the performance measurement of these portfolios is explained.

3.4.1 Multiple linear regression

A multiple linear regression model from Myers (1990) is implemented to answer the first hypotheses. To analyze how the ESG Query's output on GP ESG integration affect the financial performance of the fund's investments the linear regression is a useful tool as it is a predictive analysis method that allows us to judge how the independent variables (ESG Query) affect the selected variable (financial performance). To analyze the ESG integration, this thesis will assume that the funds that have incorporated some sort of ESG

framework in the investment value chain now have also previously considered these variables, so the latest annual ESG Query is used as the independent variables. The method employed in this thesis is as follows:

$$Y_i' = \beta_0 + \beta_1 x_1 + \dots + \beta_n x_n + \varepsilon, \quad (4)$$

where Y_i' is the prediction of the dependent variable,

β_0 is the constant term,

$\beta_1 \dots \beta_n$ are the regression coefficients

$x_1 \dots x_n$ are the independent variables

and ε is the error term.

Also, by employing the ordinary least squares (OLS) method, we can estimate the independent variables parameters in the way of minimizing the sum of the squared deviations between the predicted values and the actual values as follows:

$$\sum_{i=1}^N (Y_i - Y_i')^2 \quad (5)$$

There are five major assumptions in the multiple linear regression analysis models: weak homogeneity, linearity, homoscedasticity, independence of errors, and lack of complete multicollinearity (Myers, 1990). Weak exogeneity implies that the independent variables can be assumed to be fixed rather than random. This assumes that the independent variables are error-free, which often is not fully realistic, but it does result in rather accurate estimates. On the other hand, the linearity condition means that the dependent variable's mean is a linear combination of the regression coefficients. The independent variables are not restricted — only their coefficients are. Homoscedasticity refers to the fact

that different values of the dependent variables have the same error variance. This assumption does not hold if the scale of the variables is very big because variance is usually determined by the projected values, like in this study. The errors of the dependent variables must not be correlated since they must be unrelated. It is important to emphasize that this assumption does not imply that the dependent variables are independent — simply that their errors are independent. Finally, the absence of complete multicollinearity implies that no independent variables are perfectly correlated. For example, having two independent variables that measure the same thing could lead to this situation.

Because each GP in the survey has several portfolio companies and the GP's answers linked to the companies are the same for all of their portfolio companies, the sample does not comply with all of the mentioned built-in assumptions of the ordinary least square's method because the data points of the sample are not independent of each other nor identically distributed. Therefore, this thesis will use the robust standard errors method to account for the heteroskedasticity in the sample when analyzing the effect of the variables on financial performance. Except for constructing the covariance matrix of the regression coefficient matrix, the robust standard errors approach follows the conventional OLS method. The coefficient matrix is employed as set out by Rousseeuw and Leroy (1987):

$$\text{cov}(B) = (X^T X)^{-1} X^T S X (X^T X)^{-1} \quad (6)$$

This prevents our standard errors from being both biased and inconsistent. Also, clustering is another method that is widely used for countering the arising side effects from using OLS on heteroscedastic data. Clustering can help to adjust for biases, as the port-

folio companies of various GPs form subgroups within the sample in this example. Clustering is employed in the regression model, in addition to robust standard errors, so that the data points of the sample are clustered by their respective GP.

Finally, as the TVPIs can contain both extremely high and low values, winsorization is used on it to account for these outlier values in the data sample. By applying this to the dataset, we can restrict the extreme values of a variable, such that the lowest 1% and highest 1% of the returns are scaled up or down at the level of the nearest value outside that 1 % range, respectively. Thus, to account for these outliers in the data, the TVPIs are subjected to a 1 % and 99 % winsorization.

3.4.2 Portfolio formation

To analyze the effect of integrating ESG criteria on portfolio performance, this thesis will firstly compare the ESG conscious manager's (5-7points) funds to the non-ESG conscious manager's (0-2points) funds. At the end of year $t - 1$, ESG Query ratings for the funds are given to each company in the funds. Based on this rating, two portfolios are formed at the beginning of year t , and the portfolios are held unchanged until the end of year t . At the end of year t , the new ESG Query ratings are taken, and two new portfolios are constructed with the same criteria for the year $t + 1$. As described earlier regarding the characteristics of increases and decreases in the NAV blended with the fact that this thesis implements company level cashflow data, new investments for the funds during the year t can be manually adjusted in the portfolios by offsetting the increase in NAV with the outbound cash flow arising from the new investment. Thus, new investments from the funds during the year t that fit either the outstanding or poor criteria will be added to the new portfolios. With offsetting the increase in NAV compared to the $t-1$ period, the new investments can be calculated in the holding period return since only the increase or decrease is left for the year. This implementation leads to a time series of quarterly returns for the period 31.12.2015 - 31.12.2021.

3.4.3 Performance measurement

As already mentioned in the paper, institutionalized private equity has, since its inception in the early 1980s, managed to grow to a multitrillion-dollar asset class. Despite three decades of operation and a significant economic impact, assessing the systematic risk and abnormal returns of private equity funds and their underlying portfolio company investments is challenging. To address the financial performance of these two above-mentioned portfolios, this thesis follows the novel econometric approach developed by Buchner (2016) to estimate abnormal returns and systematic risk in private equity investment cashflows. The unique feature of Buchner's method is that it can provide closed-form estimators and that it employs a generalized CAPM, which he shows can take into account the fact that private equity returns typically deviate from a normal distribution. The estimators used by Buchner (2016) are derived from the Rubinstein (1976) model and the associated generalized CAPM developed by Leland (1999) and thus, named the Rubinstein-Leland CAPM.

Estimates based on the conventional CAPM have been derived in previous research. The restrictive assumptions underpinning the typical CAPM, which only hold if (i) asset returns are normally (and thus symmetrically) distributed or (ii) investors only care about the mean and variance of returns (which implies that they view upside and downside risks with equal distaste), are a disadvantage of this approach. In the case of private equity, neither of these assumptions holds: private equity returns are not well represented by a normal distribution in general (see, e.g., Cochrane 2005). Furthermore, investors distinguish between risks on the upside and risks on the downside. Positively skewed returns, for example, are typically preferred by investors. The results of Leland (1999) show that the traditional CAPM mismeasures systemic risk and anomalous returns if these restrictive assumptions are not met. By capturing all factors of risk, including skewness, kurtosis, and any other elements that further explain the return distribution, the Rubinstein–Leland CAPM derived by Buchner (2016) provides for accurate measurement

of abnormal returns and systematic risk. Finally, the method provides estimates of abnormal returns and systematic risk that are consistent with Kaplan and Schoar's (2005) Public Market Equivalent (PME) measure, which, as mentioned earlier, is a widely used performance metric in the private equity literature and industry (see, e.g., Harris et al. 2014). While Kaplan and Schoar (2005) only provide a heuristic motivation for their measure, Sorensen and Jagannathan (2015) and Korteweg and Nagel (2016) demonstrate that from the Rubinstein (1976) model, one can derive the standard PME measure under the assumption that investors have logarithmic utility, i.e., a relative risk aversion coefficient of one. Buchner (2016) assumes a logarithmic utility in calculating the estimators for systematic risk and anomalous returns in order to achieve consistency with the conventional PME measure. However, because log-utility imposes some unrealistic constraints on the market risk premium and riskless rate, the estimation methodology is also extended to the general utility case, in which relative risk aversion accurately reflects the riskless rates and returns of public equity markets over the sample period.

$$E[r_p] = r_f + \beta_p(E[r_m] - r_f), \quad (7)$$

where

$$\beta_p = \frac{Cov[r_p, (1 + r_m)^{-b}]}{Cov[r_m, (1 + r_m)^{-b}]} \quad (8)$$

The rates r_p , r_f , and r_m measure, respectively, the single period returns of the portfolio, of the riskless asset, and the market portfolio. As we can see from above, the Rubinstein-Leland CAPM is structured in the same way as the standard CAPM but differs in the construction of the beta coefficient. As we know, in the standard CAPM, beta is defined by $\beta_p^{CAPM} = \frac{Cov[r_p, r_m]}{VAR[r_m]}$. Because the standard CAPM is based on the premise that either investor have quadratic utility or that security and market returns are jointly normally distributed, this divergence arises. The CAPM produced by equation 7 is based on the Rubinstein (1976) model, which assumes that investors have power utility and does not

impose any restrictions on the distribution of returns. As a result, the equation is a generalized CAPM version that holds for any distributed securities and market portfolio return, including nonsymmetrical return distributions. This said, as showcased by Buchner (2014), by assuming that the portfolio returns and market returns are bivariate normal, we can apply Stein's Lemma into equation 9 and show that the beta coefficient defined above equals the standard CAPM beta:

$$\begin{aligned}\beta_P &= \frac{COV[r_p, (1 + r_m)^{-b}]}{COV[r_m, (1 + r_m)^{-b}]} = \frac{E[(1 + r_m)^{-b-1}]COV[r_p, 1 + r_m]}{E[(1 + r_m)^{-b-1}]COV[r_m, 1 + r_m]} \\ &= \frac{COV[r_p, 1 + r_m]}{COV[r_m, 1 + r_m]} = \frac{COV[r_p, r_m]}{COV[r_m, r_m]} = \frac{COV[r_p, r_m]}{VAR[r_m]} = \beta_P^{CAPM}\end{aligned}\tag{9}$$

And thus, this thesis employs the CAPM in measuring the alpha of the two portfolios, ESG-High and ESG-Low, respectively. As the funds investigated in this thesis are from both Europe and USA, the MSCI World Index is used as the market portfolio in the performance calculations.

4 Empirical results

Firstly, this chapter empirically analyses the relation between the chosen ESG practices and financial performance by employing a regular multiple linear regression and secondly by examining if private equity investors can achieve superior returns by including only ESG-wise highly rated investments in their portfolio. The descriptive statistics of the data sample are presented first, and then this chapter will present the results for both empirical parts of the thesis.

4.1 Descriptive analysis

All of the descriptive statistics used in the multiple linear regression part of this thesis are presented below in Table 3. The TVPI is presented before the winsorization, and as we can notice, the maximum value of the return can be viewed as an outlier at 270,19x while the average return of the whole sample was a multiple of 2,5x with a standard deviation of 10,86. For both variables, almost roughly half of the sample were signatories in PRI and actively tracked ESG KPIs in the portfolio companies, while a third had an annual ESG report and had ESG factors included in quarterly reporting. The average ESG policy score of the sample was 1,95 out of 3 points with a standard deviation of 1,06.

The data sample is heavily tilted toward more recent years as the last five years have two-thirds of the companies in the study. This is explained by the current market conditions of private equity, where newer funds keep breaking records on the size, and therefore, there is a capacity for a larger number of companies in each fund. The sample is also a bit shifted towards European companies, and as the focus of the sample was on Europe and United States, the number of companies elsewhere is minimal. As discussed earlier, only a fourth of the companies in the sample have been liquidated, and the effects of this are critically evaluated in the next chapter. The average holding period for

the companies in the sample is three years and four months, and the longest is almost 12 years. The distribution between the industries is also shown in the table below.

Table 3. Descriptive statistics.

Variable	Mean	SD	Min	Max	N
TVPI	2,50	10,86	0,00	270,19	692
Signatory in PRI	0,45	0,50	0,00	1,00	692
ESG KPIs	0,50	0,50	0,00	1,00	692
Annual ESG report	0,29	0,46	0,00	1,00	692
ESG Factors included in quarterly reporting	0,33	0,47	0,00	1,00	692
ESG Policy Score	1,95	1,06	0,00	3,00	692
Years 2007-2011	0,09	0,28	0,00	1,00	692
Years 2012-2016	0,23	0,42	0,00	1,00	692
Years 2017-2021	0,68	0,47	0,00	1,00	692
Europe	0,60	0,49	0,00	1,00	692
North America	0,39	0,49	0,00	1,00	692
Other	0,01	0,08	0,00	1,00	692
Liquidated	0,24	0,43	0,00	1,00	692
Holding period	3,37	2,12	0,30	11,75	692
Health care	0,17	0,37	0,00	1,00	692
Consumer discretionary	0,18	0,39	0,00	1,00	692
Industrials	0,22	0,41	0,00	1,00	692
Telecommunication services	0,02	0,15	0,00	1,00	692
Consumer staples	0,04	0,20	0,00	1,00	692
Energy	0,02	0,14	0,00	1,00	692
Financials	0,07	0,25	0,00	1,00	692
Information technology	0,24	0,43	0,00	1,00	692
Materials	0,03	0,17	0,00	1,00	692
Utilities	0,00	0,05	0,00	1,00	692

In addition to the descriptive statistics above, the Pearson correlations are shown below in Table 4. As can be seen from the table, there are quite a lot of significantly correlated variables in the dataset. Firstly, the ESG Querys questions are all positively correlated with each other, which implies that by adapting one ESG-practice, one is skewed toward

also adapting others. It seems that there is a low threshold for being a PRI signatory as the correlations with others are lower. Once an investor has decided to start tracking the development of ESG KPIs in the portfolio companies, publish an annual ESG report, or has included ESG factors as a part in quarterly reporting, there is a significantly positive correlation of around one out of two will also adapt for the others. Interestingly, the difference between the two regions, Europe, and North America, is quite distinct as Europe is significantly positively correlated with all of the ESG practices and North America significantly negatively correlated with them. This said the reasoning behind this is most likely both the more active investor demand for sustainability in Europe and the European commission's active push on new regulations. However, even though the PE funds in Europe are ahead in ESG reporting, it cannot be strictly said that the US funds are less sustainable. As this thesis works with a certain ESG practice framework, the reasoning behind the differences is not clear.

Table 4. Pearson correlation table.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
1. TPI	1																						
2. Signatory in PR	-0.0113	1																					
3. ESG KPIs	0.0417	0.3295*	1																				
4. Annual ESG report	-0.0212	0.3107*	0.4800*	1																			
5. ESG factors included in quarterly reporting	0.0589	0.2259*	0.5351*	0.5950*	1																		
6. ESG policy score	0.0122	0.4178*	0.5191*	0.4716*	0.5359*	1																	
7. Years 2007-2011	-0.003	0.2036*	0.2573*	0.3930*	0.3243*	0.2699*	1																
8. Years 2012-2016	0.0192	0.2190*	0.2955*	0.2284*	0.0989*	0.2690*	-0.1719*	1															
9. Years 2017-2021	-0.0156	-0.3220*	-0.4238*	-0.4454*	-0.2863*	-0.4074*	-0.4509*	-0.8018*	1														
10. Liquidated	0.1012*	0.2253*	0.3793*	0.4347*	0.3130*	0.3680*	0.4659*	0.4511*	-0.6913*	1													
11. Holding period	0.0469	0.2404*	0.3016*	0.3388*	0.2650*	0.3686*	0.4259*	0.4387*	-0.6559*	0.3329*	1												
12. Europe	0.0356	0.2247*	0.6091*	0.5183*	0.5396*	0.6789*	0.2533*	0.2482*	-0.3785*	0.3511*	0.3163*	1											
13. North America	-0.0338	-0.2181*	-0.6021*	-0.5169*	-0.5309*	-0.6623*	-0.2495*	-0.2408*	0.3695*	-0.3438*	-0.3102*	0.9969*	1										
14. Health care	-0.032	0.0107	-0.0271	-0.0427	-0.1088*	-0.1150*	-0.0304	-0.0471	0.0611	-0.0736	-0.0634	-0.1480*	0.1393*	1									
15. Consumer discretionary	-0.0172	-0.1166*	-0.0526	0.0307	-0.0146	0.0034	0.0238	0.0465	-0.0565	0.0537	0.0443	0.0736	-0.0668	-0.2128*	1								
16. Industrials	-0.0127	0.1146*	0.2199*	0.1309*	0.2058*	0.1128*	0.0962*	0.0487	-0.1025*	0.1357*	0.0979*	0.1707*	-0.1706*	-0.2361*	-0.2494*	1							
17. Telecommunication services	0.0071	0.1208*	0.0826*	0.1233*	0.0476	0.0608	0.2470*	0.0004	-0.1502*	0.1714*	0.0685	0.053	-0.0508	-0.0712	-0.0752*	-0.0835*	1						
18. Consumer staples	-0.0163	-0.0907*	-0.0586	-0.0436	-0.0435	-0.1157*	-0.0161	-0.0339	0.0405	-0.0543	0.0434	-0.073	0.0763*	-0.0955*	-0.1009*	-0.1120*	-0.0338	1					
19. Energy	-0.0075	0.0778*	0.1014*	0.2005*	0.1832*	0.1135*	-0.0085	0.0902*	-0.0766*	0.0383	0.0679	0.1170*	-0.1153*	-0.0645	-0.0681	-0.0756*	-0.0228	-0.0306	1				
20. Financials	0.1208*	0.0703	-0.0655	-0.073	-0.0792*	0.0139	-0.0434	-0.0136	0.0387	-0.0457	-0.0138	-0.0968*	0.1011*	-0.1211*	-0.1280*	-0.1420*	-0.0428	-0.0575	-0.0388	1			
21. Information technology	-0.0008	-0.0827*	-0.1428*	-0.1299*	-0.0764*	-0.0086	-0.1174*	-0.0442	0.1113*	-0.1257*	-0.1142*	-0.0384	0.0332	-0.2551*	-0.2695*	-0.2990*	-0.0902*	-0.1210*	-0.0817*	-0.1534*	1		
22. Materials	-0.0155	0.0017	0.0158	-0.0922*	-0.0475	-0.0397	-0.0536	-0.0139	0.0451	-0.0172	-0.0454	-0.0709	0.0736	-0.0774*	-0.0818*	-0.0908*	-0.0274	-0.0367	-0.0248	-0.0466	-0.0881*	1	

* p < 0.05

4.1.1 Sample characteristics

The sample characteristics of this study are presented in Tables 5 and 6. It must be noted that the tables are constructed from the 2020 ESG Query, and for the second part of the empirical analysis, the portfolios are constructed each year with new ESG Query scores, and thus, the distribution is a bit different. However, it is notable that there are no significant differences between the ESG Queries as most investors that have adapted the ESG practices have done it for a longer period and vice versa. Although it must be noted that there are some funds that have adapted new ESG practices during the years and also because of the nature of the dataset, new funds are affecting the distribution each year.

Table 5 clearly shows some biasness of the whole distribution as the distribution of ESG scores from 0-7 are not evenly distributed for the investment years. Firstly, for the beginning years of the sample, the distribution is inclined towards higher ESG scores, and secondly, even though the sample distribution evens a bit from the middle towards the later years, the incline shifts toward lower ESG scores. This possible biasness can be explained by both Table 4 and Table 6. As the low ESG scores are stacked by the investments made in North America and as the funds in the sample in terms of investment year are stacked by Northern American funds in the later period.

Table 5. 2020 ESG Query ranking and investment year.

Year	0	1	2	3	4	5	6	7	Total
2007	0	0	0	0	0	0	0	1	1
2008	0	0	0	0	0	1	1	5	7
2009	0	0	0	0	0	1	1	2	4
2010	0	0	0	0	0	1	3	12	16
2011	0	0	0	1	0	3	13	16	33
2012	0	0	0	3	0	2	10	6	21
2013	0	0	0	1	0	4	12	8	25
2014	0	0	0	6	0	4	18	4	32
2015	0	0	5	11	0	7	8	2	33
2016	5	3	3	14	1	7	8	10	51
2017	9	7	8	29	4	8	6	7	78
2018	16	18	8	32	7	13	6	6	106
2019	17	17	9	22	11	10	3	8	97
2020	24	20	9	31	12	5	4	5	110
2021	21	10	3	23	10	7	2	2	78
Total	92	75	45	173	45	73	95	94	692

Table 6. 2020 ESG Query ranking and investment region.

Region	0	1	2	3	4	5	6	7	Total
Europe	5	5	14	98	32	73	95	94	416
North America	85	68	31	75	12	0	0	0	271
Other	2	2	0	0	1	0	0	0	5
Total	92	75	45	173	45	73	95	94	692

4.2 Regression results

4.2.1 Multiple linear regression

The main results for the multiple linear regression implemented in this thesis are presented in table 7 below. The main results are divided into the full sample and a sample from European investments only. This was done because of differences arising from ESG implementation between the two regions. During the past few years, Europe has been quicker to adapt regulatory on ESG reporting and tracking, which implies a higher implementation of the ESG practices investigated, as is shown in the tables above.

From the independent variables for the whole sample, the dependent variable of the thesis, the TVPI of portfolio companies, seems to only statistically significantly correlate with $p=0,05$ significance level with the independent variable Annual ESG report and with $p=0,1$ significance level with the inclusion of ESG factors in quarterly reporting. For the publishing of the annual ESG report, the TVPI correlates negatively, which implies that investments made by funds that have been publishing the annual ESG report would seem to perform worse than the ones that have not. On the other hand, investments made by funds that have included ESG factors in quarterly reporting seem to perform better than the ones that have not on the mentioned significance level. For the European sample, the results are similar. The differences arise from the independent variable signatory in PRI seen as statistically significant with $p=0.1$ significance level and by correlating negatively with the TVPI. Also, it must be noted that for both the annual ESG report and the inclusion of ESG factors in quarterly reporting, the significance worseness to $p=0.1$ significance level, but both show a similar correlation than in the whole sample.

As can be seen from the table, the TVPI also correlates with some of the control variables. From the investment years, it seems that on a significance level of $p=0.01$, the years 2012-2016 seem to outperform others. As mentioned earlier, the previous academic

findings have established that interim private equity returns are conservative, and the regression did here also show on a significance level of $p=0.02$ that the liquidated companies tend to outperform the ones still active. Also, the holding period correlates positively, implying that a longer holding term for investments outperforming the others will indicate a higher absolute return over time. However, as seen, the correlation coefficient for the holding period is dramatically lower than for liquidation, which implies that the liquidation premium exists for investments regardless of the holding period.

As the dependent variable of this study correlates to some extent with the ESG practices chosen in this thesis, we must reject the first hypothesis and note that there is a relation between the incorporation of ESG practices in the investment value chain and financial performance. Depending on the sample used, for the whole sample, the relation is negative with the Annual ESG report and positive with the inclusion of ESG factors in quarterly reporting. In addition to the mentioned two, for the European sample, there is evidence of a negative correlation between TVPI and the investors' decision of being a signatory in PRI.

Table 7. Regression results.

TVPI	Full Sample		Europe	
	Coef. / Rob. SE.	p.	Coef. / Rob. SE.	p.
Signatory in PRI	-0,080 0,174702	0,654	-0,334 0,199	0,098
ESG KPIs	-0,056 0,175	0,757	0,145 0,198	0,467
Annual ESG report	-0,582 0,262	0,024	-0,533 0,292	0,073
ESG factors included in quarterl	0,422 0,231	0,068	0,456 0,249	0,073
ESG policy score	-0,027 0,084	0,761	-0,086 0,093	0,358
Years 2012-2016	0,898 0,327	0,007	0,714 0,337	0,039
Years 2017-2021	0,612 0,576	0,294	0,523 0,704	0,461
Liquidated	1,091 0,421	0,011	1,028 0,547	0,066
Holding period	0,143 0,062	0,025	0,094 0,073	0,203
Europe	0,474 0,412	0,254	-	-
North America	0,474 0,385	0,223	-	-
Health care	-0,215 0,329	0,498	-0,476 0,298	0,116
Consumer discretionary	-0,126 0,375	0,725	-0,429 0,333	0,203
Industrials	-0,034 0,368	0,911	-0,248 0,353	0,486
Telecommunication services	0,737 0,594	0,217	0,943 0,618	0,133
Consumer staples	-0,404 0,445	0,359	-1,041 0,489	0,038
Energy	-0,323 0,714	0,646	-0,523 0,718	0,470
Financials	-0,179 0,351	0,608	-0,311 0,504	0,540
Information technology	0,034 0,330	0,936	-0,203 0,373	0,589
Materials	-0,568 0,470	0,230	-1,381 0,743	0,068
Constant	0,386 0,792	0,214	1,526 0,871	0,086
n	692		416	

4.2.2 CAPM

As explained in the methodology, the use of a regular CAPM is justified by the findings from Buchner (2016). The regular CAPM is run on both the High- and Low-rated ESG portfolios, and tables 8 and 9 showcase the results accordingly. As mentioned earlier, the results in earlier academic research from the public entities are divided into no evidence of abnormal returns, negative abnormal returns, and positive abnormal returns.

Table 8. CAPM High-ESG portfolio.

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0,6846							
R Square	0,4687							
Adjusted R Square	0,4445							
Standard Error	0,0404							
Observations	24							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	0,032	0,032	19,407	0,000			
Residual	22	0,036	0,002					
Total	23	0,068						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	0,036	0,009	4,195	0,000	0,018	0,054	0,018	0,054
Mkt - Rf	0,451	0,102	4,405	0,000	0,239	0,663	0,239	0,663

Table 9. CAPM Low-ESG portfolio.

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0,3698							
R Square	0,1367							
Adjusted R Square	0,0975							
Standard Error	0,0789							
Observations	24							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	0,022	0,022	3,484	0,075			
Residual	22	0,137	0,006					
Total	23	0,159						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	0,058	0,017	3,481	0,002	0,024	0,093	0,024	0,093
Mkt - Rf	0,373	0,200	1,867	0,075	-0,041	0,788	-0,041	0,788

As can be seen from Tables 8 and 9, both portfolios perform superbly, producing significant abnormal returns compared to the MSCI World Index during the sample period of 31.12.2015-31.12.2021. For the High-ESG portfolio, the gross of fees abnormal return of 3,6% is statistically significant on a significance level of $p=0.01$. For the Low-ESG portfolio, an abnormal return of 5,8% is also significant on a significance level of $p=0.02$, respectively. Both CAPM-regression has been run on quarterly return data, and thus, the abnormal returns for both portfolios per annum are significant – 14,4% and 23,2%. As the Low-ESG portfolio outperforms the high, we can reject the second hypothesis and note that there is a difference in performance between private equity buyout funds that include ESG criteria in the investment value chain compared to private equity buyout funds that do not include ESG criteria. Also, the difference is negative, meaning that the latter performs far better than the primary.

It is worth repeating that the unrealized fund's final performance will be determined by the future realization of investments over the funds' remaining lifespan. If the historical J-curve trend of PE funds, in which fund multiples increase with time, continues to hold, that performance will most likely improve.

5 Interpretation and conclusions

The purpose of this paper was to contribute to the existing literature on the effect of incorporation of ESG practices to the return and test whether private equity portfolios built with Low- and High-ESG fund level characteristics differ in performance. Thus, the two hypotheses concentrated on the relation between ESG practices and return and the differences in return of two different ESG-strategic portfolios. A fund-level ESG data was combined with a portfolio company-level cashflow data to examine the effects of ESG on financial performance.

The theoretical part of this thesis focused on explaining the previous literature research behind private equity while focusing on buyout investments, and then the theory of incorporation of ESG is presented. The focus on the ESG part was kept relevant to private equity, and thus, the different forms of SRI investing, such as different screening strategies, were not introduced. Also, the new phenomenon of impact investing was briefly explained, and the difference between impact investing and sustainable and ESG investing was discussed.

The empirical part of this thesis was built to solve the debate in previous literature by answering the two hypotheses. Although the first hypothesis is rejected, it seems that the effect is not unambiguous for the data sample used in this thesis to investigate the relationship between financial performance and ESG incorporation. Surprisingly, the effect of the annual ESG report is found significant, which in theory should not affect the returns. However, based on this finding, it could be argued that for the past couple of years, as the ESG policies have been in the focus of many investors and the policies themselves have broadened, this would affect the availability of time to focus on the factors that produce the returns. This would be in line with the finding from Demaria (2011, p. 61) of time consumption from the bureaucracy of ESG reporting, especially for teams consisting of fewer employees and the add-on fees the reporting is producing. As men-

tioned, previous academic research has found positive effects of the ESG factor implementation across the investment value chain. To investigate this, firstly, the independent variable of following the ESG KPIs in portfolio companies is found to not be statistically significant in both the whole sample and also in the European company level sample. However, the use of ESG factors in quarterly reporting is shown to have a statistically significant positive correlation with financial performance. It can be assumed that if an investor is actively reporting ESG factors such as energy use, waste, and pollution, most likely also try to achieve better results each quarter by either investing in more sustainably cautious firms or by actively interacting with the portfolio companies. Therefore, the positive correlation implies that the funds achieving higher returns are to some extent linked to actively improving the ESG performance of an investment. This is in line with the previously mentioned findings that the consideration of ESG factors improves operational performance, and thus, increases the company's valuation. (Nagy et al. 2012, pp. 1–2; Dimson et al. 2013.)

In addition, even though both portfolios in the second part of the empirical analysis performed well and were able to produce statistically significant abnormal returns, the Low-ESG portfolio outperformed the High-ESG portfolios. Therefore, the second hypothesis was also rejected, as the Low-ESG portfolio produced higher returns, and there was a difference in performance between the portfolios.

5.1 Implications

As to my knowledge, by being one of the first studies to implement private equity buyout company-level data with fund-level ESG data to address the relation and effectiveness of ESG practices in performance, this thesis has some practical implementations. Firstly, as the regulatory ESG reporting standards have been forming, the availability of information on private equity funds ESG incorporation has been increasing. For profit-seeking LPs with a sustainability edge, this thesis suggests focusing on the GPs that are focusing

on active tracking of ESG factors rather than the ones with the most visually satisfying ESG report.

Also, for academics, this thesis can work as a groundwork for future research on ESG on private equity. With a more comprehensive data set, the regression analysis findings can be further developed to understand the relations more clearly. As GP ESG reporting will evolve through either regulatory reasons or investor demand, or both, this analysis can be continued.

5.2 Limitations and ideas for future research

There are typically many problems to solve when researching private equity, and this thesis was no exception. Usually, the limitations of private equity research are in terms of the dataset as it is not publicly available for everyone. Firstly, it must be recognized that the data used in this thesis comes from one asset manager operating private equity fund of funds, and it is showcased by previous literature that private equity funds that have been operating successfully tend to keep being successful. Therefore, the sample used might be a bit skewed towards funds that can produce higher returns. Secondly, as it was chosen to include both the European and US funds, the results on ESG integration vary. As Europe has seen a quicker adaptation of regulation on ESG reporting while the US industry has not, the two are hard to compare ESG-wise, which can be seen from the descriptive statistics where the US is highly represented in the lower levels of ESG incorporation. Because of this, the thesis implemented the regression for the whole sample and for the sample of only European investments. Finally, a potential biasedness arises also from the inclusion of active investments. Even though it is shown that previous literature has proved the interim results as valid, it still leaves with an uncertainty of the returns of the active investments compared to the ones that were liquidated and, therefore, permanent.

The limitations of this thesis form potential for future researchers. Firstly, it would be interesting to have a larger sample of data from multiple private equity investors and examine the relations and differences in performance. According to my knowledge, the frequently used databases for private equity, such as Preqin and Burgiss, have started providing ESG scores for many private companies in addition to the return data, which would form a comprehensive dataset for research.

Secondly, as there are distinctly two separate dimensions of ESG or sustainability considerations in private equity, the regulatory or investor demand forced reporting of ESG factors and the new phenomenon of impact investing, the latter will also form an interesting topic for the future. Although, to my knowledge, the impact of investing in private equity is still frequently recent, and thus, it might be hard to get access to comprehensive return data.

As a final note, since the availability of research around private equity and ESG is limited, it must be stressed that the need for future research is large to understand the possibilities for investors to seek sustainable ways of producing wealth.

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