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Doing Well by Doing Good

Investigating the potential of impact investing in public equities

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Abstract

Impact investing is one of the latest innovations in the realm of responsible investment strategies. The industry has seen exponential growth since the term was coined in 2007 but is now held back by unclear boundaries to related strategies and varying definitions. This makes it hard to create a global and unified understanding of what the industry includes, which makes it difficult for investors to adopt the approach. This thesis seeks to clarify the scope of impact investing by exploring existing literature to find a definition of the term. We find two core concepts of impact investing, a financial and a non-financial objective. Formally it refers to investments made with the intention of generating a financial return while creating a positive societal and environmental impact, and the impact has to be measured or at least be measurable. This places it at the intersection between conventional investing for financial returns and philanthropic investments for non-financial impact. We further seek to expand existing literature by investigating the profitability of the investment strategy applied in public equities, where knowledge is scarce. We are held back by a lack of data on public equity impact investments but bypass this problem by creating an index tracking the historical performance of potential impact investments. By analysing the returns of the index, we find indications of outperformance over the measured time-period, both in excess of its systematic risk exposure and relative to a conventional index. However, the limitations of our approach mean that we cannot conclude that impact investing outperforms on average. On the other hand, we find no signs of underperformance after addressing the limitations, indicating that non-concessionary returns are possible. As the industry matures more data will become available enabling more precise analyses and information on the profitability of the strategy. For now, our analysis can serve as first step to uncovering the performance of public equity impact investments.

Preface

This master's thesis is a result of independent work and is a part of the Finance master's program (FIE) at the Norwegian School of Economics (NHH).

This thesis seeks to investigate the profitability of impact investments in public equities. We chose this topic because of our increased interest in aligning non-financial concerns with financial performance during our time at NHH.

We would like to acknowledge our supervisor, Professor Trond M. Døskeland who helped us identify the topic and has provided helpful consultation and feedback in the process of writing this thesis. We also want to recognize Professor Øystein Gjerde for his valuable contribution to the structure of this thesis.

Writing this thesis has been an educational and time-consuming process with upturns and downturns but we hope to provide a valuable contribution to literature on sustainable investment strategies.

Contents

1. Introduction

1.1 Background

The world is facing several societal and environmental challenges. Earth overshoot day is moving closer, emissions of greenhouse gases exceed the threshold of what the earth can handle, in 2013 10,7 percent of the world's population lived on less than $1,9 per day, and the list of challenges goes on (Earth Overshoot Day, 2018; Steffen et al., 2015; World Bank Group, 2016). Solving these issues have primarily been left to governments and charitable organizations. However, recent years have seen a growing concern in the public towards sustainability. In a survey of high-net-worth and ultra-high-net-worth Americans in 2017, 45 percent of the respondents either owned or were interested in making impact investments, a 13-percentage point increase from 2015 (U.S. Trust, 2017). 34 percent of the respondents had reviewed their portfolio based on social, societal, environmental or governance criteria. As the demand for responsible investments has grown, fund managers have also started to include non-financial concerns into their selection processes. By 2016 22 percent of total assets under professional management were invested according to sustainable investment strategies in the U.S. (Global Sustainable Investment Alliance, 2016, pp. 3-4).

The concept of including non-financial concerns in investment decisions is not a new one. In fact, the first investors to take such considerations into their investment strategy can be dated all the way back to the eighteenth century (Richardson, 2009, p. 555). These were religious investors excluding companies that did not comply with their ethical standards. This is one of the first examples of negative screening in the investment process and is considered the roots of Socially Responsible Investment (SRI). SRI is an investment strategy that includes the non-financial impact of companies into their screening process. The socially responsible investment industry started gaining traction during the 1970s and by 2016 global sustainable investments reached $22.89 trillion worldwide (Global Sustainable Investment Alliance, 2016, pp. 3-4). Recent years have seen new and innovative ways of including non-financial considerations into the investment process. These innovations have raised awareness around responsible investing but have also made the boundaries between the distinctive strategies unclear. Impact investing is one of these innovations.

The term impact investing was coined for the first time in 2007 as “using profit-seeking investment to generate social and environmental good” (Harji & Jackson, 2012, p. 7). Although the term was new, the concept was not. Microfinance is a popular investment vehicle that has existed since the 1970s and is one of the largest asset classes in the impact investing industry (Rodin & Brandenburg, 2014, p. 3). After coining the term the industry has seen substantial growth (Clark, Emerson, & Thornley, 2012, pp. 8-9). At the same time, overlaps with related terms and loosely defined boundaries caused a debate on what constitutes an impact investment. While this has brought attention to the field, the lack of a uniform understanding of the term has held back the development of the industry. Researchers and practitioners use varying terminology and definitions, making it hard for the public to get a grasp of what the industry consists of. Differentiating between impact investing and related strategies and identifying eligible investments has been left to a subjective understanding of the term. To address this issue the Global Impact Investing Network (GIIN) led an effort to refine the definition in 2010. They defined impact investments as “investments intended to create positive impact beyond financial return” (O'Donohoe, Leijonhufvud, Saltuk, Bugg-Levine, & Brandenburg, 2010, p. 7). There have been several attempts clarify the definition afterwards, but research from 2015 found that there was still variation at the definitional, terminological and strategic levels (Höchstädter & Scheck, 2015).

There is also an ongoing debate about the financial returns achievable from impact investing. There are arguments both supporting and opposing the idea that impact investing could yield competitive financial returns, but little empirical evidence is found. The lack of consensus on what constitutes impact investing has made it difficult to identify eligible investments, thus making it hard to find data on financial performance. However, as the attention toward impact investing has increased the industry has converged towards a clearer and more unison definition. This makes it easier to identify impact investors and find data to analyse. Thus, recent years have seen research being released on the financial performance of impact investing, but it is still scarce and mainly focuses on private investments. Little is known about impact investing in public equities but finding indications of the profitability in this segment could be an important step to opening the door for capital markets and catalyse further growth.

1.2 Purpose and motivation of the thesis

The goal of this thesis is to raise the understanding of impact investing and investigate the financial performance of the strategy applied in public equities. By exploring existing literature on impact investing we aim to bring the industry closer to a unison definition of the term. Reaching a global agreement on the concept would make it easier for investors to adopt the investment approach and determine the scope of the industry. By investigating the financial performance of this investment strategy in public equities we seek to extend existing literature and clarify the financial consequences of such an approach. We aim to give indications of whether impact investing in public equities means concessionary financial returns, so investors know what to expect.

1.3 Structure of the thesis

We will start by reviewing current literature on impact investing to create a picture of the current state of impact investing globally in section 2. This means finding a definition of impact investing, placing it in relation to other responsible investment strategies, and setting boundaries for the strategic options available for an impact investor. In section 3 we move on to look at previous research on the financial performance of impact investments in different asset classes and what theory says about the potential profitability of this strategy. In section 4 we use the definition found in section 2 to create inclusion criteria and use these to find eligible impact investments. We proceed to collect historical data for these companies and create an index tracking their performance. In section 5 we go through the methodology we will use to analyse the financial performance of this index. Finally, in section 6 we present the results from our analysis and draw conclusions based on these results in section 7 and 8.

2. Exploring impact investing

2.1 What is impact investing?

So, what is impact investing? Barber, Morse and Yasuda (2017, pp. 1-2) define impact funds as “venture capital and growth equity funds with dual objectives of generating a financial return and generating a positive externality”. Freireich and Fulton (2009, p. 5) refer to impact investing as “using profit-seeking investment to generate social and environmental good”. As we can see there is some variation between the two definitions but on a general level they seem to agree on the characteristics of impact investing. This is in line with what Höchstädter and Scheck (2015) find by examining available literature and shedding light on how impact investing is understood by industry professionals and researchers. OECD (2015, pp. 42-57) clarifies the term further by specifying 7 characteristics that have to be met to be considered an impact investment. These relate to social target areas, end beneficiaries, goods and services delivered, delivery organisation intent, measurability of social impact, investor intent and return expectations. Although these criteria are a step toward a uniform definition of impact investing, research finds that it does not match the current state of the industry. Chiappini (2017, pp. 105-138) examines 156 funds identified as impact investing funds and none of them meet all 7 criteria. This could be because the industry is still developing, and the characteristics set by OECD (2015, pp. 42-57) are meant as guidelines for this development. Since impact investing is still at an early stage it is important for industry leaders to direct the development. On the other hand, for the industry to grow it is important not to set too strict criteria.

We will review the findings of Höchstädter and Scheck (2015) to create a generic definition of impact investing, and supplement with the characteristics set by OECD (2015, pp. 42-57). As we will see, the definition of impact investing is fairly wide and could easily be mixed with similar investment strategies. Knowing what separates impact investing from other responsible investment approaches is thus key to grasping the concept. Therefore, we will explore the outer boundaries of impact investing to determine how it distinguishes itself from closely related topics. Finally, to identify potential impact investments it is necessary for investors and researchers to know the constraints on strategic options. We will review the restrictions found by Höchstädter and Scheck (2015), and the characteristics set by OECD (2015, pp. 42-57) to clarify the scope of impact investments.

2.1.1 Core concepts of impact investing

The industry seems to agree on the formal definition of impact investing. Although the choice of words might differ, two core concepts appear in all definitions: a financial and a non-financial objective (Global Impact Investing Network, 2018b; Höchstädter & Scheck, 2015; OECD, 2015). In other words, impact investing refers to investments that seek to create a positive societal and environmental impact while generating a financial return. Emphasis is put on the impact being intentional. This means that the impact for society or environment cannot be an unintended side effect. The non-financial impact is pursued by investing in companies that create positive benefits for the society or environment through their products, services or operations (Reeder & Colantonio, 2013, p. 13). Impact investors are also required to measure and report on their non-financial performance. OECD (2015, pp. 42-57) claims that a stated intent of creating a positive impact is not enough to be considered impact investing. Impact investors are required to formally evaluate their impact and report on it. This is "a hallmark of impact investing" according to GIIN (2018b). This means that impact investing requires managing and monitoring each investment.

This is a wide definition that captures many different types of investors. The definition only states that the investment should generate a financial return but does not specify the magnitude. Höchstädter and Scheck (2015) conclude that a minimum requirement for an impact investment is that it returns the invested principal but find no upper boundary for the expected level of return. OECD (2015, pp. 42-57) agrees with Höchstädter and Scheck (2015) on a floor for financial returns at capital preservation, but argues that investors targeting above-market-rate returns are no different from the conventional for-profit investors, so impact investments should at most target market-rate returns. The official definition used by GIIN (2018b) agrees with setting an upper boundary for targeted returns at market-rate. Most of the impact funds studied by Chiappini (2017, pp. 105-138) report their expected levels of return without comparing it with the market-rate. Only 7 percent of the funds reported returns expectations in the range between capital preservation and market-rate, while 12,2 percent targeted above market-rate returns. So, it seems that the industry is not in total agreement about an upper boundary for targeted levels of return, but emphasis seems to be on a balance between the objectives.

Only a minority of the texts reviewed by Höchstädter and Scheck (2015) state that impact investments should prioritize the non-financial impact over financial returns. Most of the literature either leaves this question open or categorize impact investors as financial first or impact first investors. Financial first investors put more weight on creating financial returns, while impact first investors focus on the impact objective. However, all impact investors need to pursue dual objectives meaning that objective cannot be sacrificed to reach the other.

The definition does not explicitly state what challenges impact investing should target. Impact investors have to specify the objective they are targeting but are according to Höchstädter and Scheck (2015) not restricted to specific challenges. OECD (2015, pp. 42-57) on the other hand specifies some target areas that are automatically eligible for impact investment. Other target areas must be considered in relation to the circumstances of the investment. We will go into further detail on this aspect in section 2.1.3.

In other words, impact investing is defined as investments that intentionally seek to create financial returns and a non-financial impact. The impact must be measured and reported, simply stating an intention is not enough. The investment should at least target capital preservation but there is still disagreement about an upper boundary for targeted levels of return. However, emphasis seems to be on a balanced pursuit of the objectives where one does not cannibalize the other. This definition might be skewed toward the one used by GIIN (2018b) because a large part of the reports Höchstädter and Scheck (2015) examine are collected from the GIIN research database (2018a). OECD (2015) also bases its report on GIIN’s (2018b) definition. However, the impact investing industry is developing and GIIN was established to direct this development. Therefore, a definition converging toward the one used by GIIN (2018b) might paint the most accurate picture of the industry.

2.1.2 Outer boundaries to related concepts

This definition of impact investing is very wide and has unclear boundaries to related topics. On the one hand, this can help the industry grow and it is important not to make itself too exclusive at an early stage of its development. On the other hand, clear boundaries to similar investment strategies are needed to gain credibility and a uniform understanding of the term. To get a clear picture of what impact investing is, it is thus important to know what it is not. This means reviewing the differences between impact investing and closely related topics. By seeking both financial returns and non-financial impact, impact investing places itself at the intersection between conventional investing and philanthropy. Höchstädter and Scheck (2015) identify SRI and social investment as two existing strategies that are often confused with impact investing. However, at the other end of the scale, venture philanthropy is another investment approach that shares similarities with impact investing (Rodin & Brandenburg, 2014, pp. 5-8).

Social investment

Social investment is a concept that is often mistaken for impact investment by academics and practitioners. It was established in the UK in year 2000 and is more widely used in Europe and the UK as synonym for impact investment (Höchstädter & Scheck, 2015; OECD, 2015, pp. 42-43). However, Höchstädter and Scheck (2015) also find literature referring to social investment as a broader term used to capture responsible investment strategies while others use it as a sub-category of impact investing. Since the terms essentially refer to the same concept they were merged to social impact investment in 2013 (OECD, 2015, pp. 42-43). Social impact investing and impact investing are still used interchangeably in literature but refer to the same thing. In other words, social investment is not a distinct investment strategy but generally refers to the same concept as impact investing.

SRI

“SRI (…) is often defined as the integration of certain non-financial concerns, such as ethical, social or environmental, into the investment process” (Sandberg, Juravle, Hedesström, & Hamilton, 2009, p. 521). Despite its similar definition, most literature refers to SRI as a distinct investment strategy (Höchstädter & Scheck, 2015). Traditional SRI is based on negative screening meaning that companies are excluded based on environmental, social or governance concerns. This form of SRI is clearly different from impact investing which aims to have a positive impact. However, positive screening and shareholder activism are also common SRI strategies. Positive screening means investing in companies that make a positive contribution to the society or environment (Rodin & Brandenburg, 2014, pp. 5-6). Shareholder activism is a developing strategy in SRI where the investor puts pressure on the companies in his portfolio to improve their non-financial impact (Sparkes & Cowton, 2004). These new dimensions make SRI less distinct from impact investing, but differences still exist.

Höchstädter and Scheck (2015) find that most literature treats impact investing as a strategy that goes beyond SRI in solving societal and environmental challenges. They find that impact investing is generally considered to be more proactive than SRI in generating a non-financial impact. SRI is mainly focused on minimizing negative externalities while impact investing seeks to proactively create a positive impact. Rodin and Brandenburg (2014) give a good example of this difference:

> *An SRI investor with a mission to reduce gun violence might create a portfolio of investments that excludes "bad" companies such as arms dealers and gun makers, or might use his or her power as a shareholder to influence those companies' business strategies. By contrast, impact investors might put money in Liberty United (or similar business) [a company that makes jewellery from bullets and gunmetal] in order to make a positive investment in a company that is proactively working to address the problem of gun violence. (p. 6)*

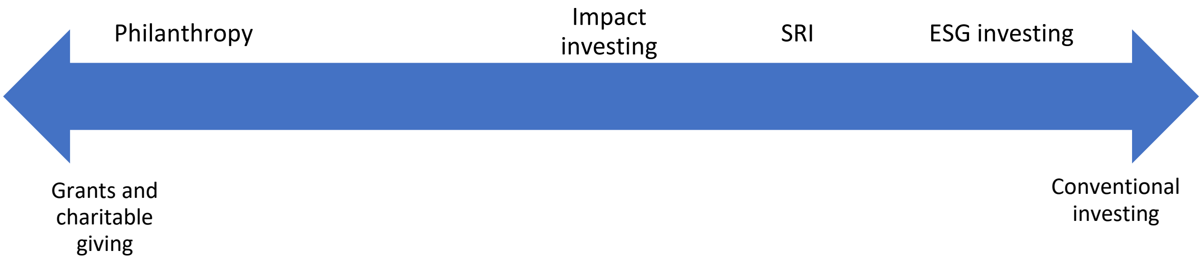
Another cited difference is the size and nature of the investments. Höchstädter and Scheck (2015) find that SRI is usually associated with investments in large corporations through publicly traded stocks, bonds or funds. By contrast, impact investments are usually associated with direct private investments in small corporations at an early stage of their life cycle. 75 percent of the assets under management reported in the Annual Impact Investor Survey of 2017 used private investments supporting this view (Global Impact Investing Network, 2017). On the other hand, 21 percent of the total assets under management reported in the same survey were invested in mature publicly traded companies so, it could be argued that these characteristics are just a consequence of the maturity of the industry. In fact, O'Donohoe et al. (2010, p. 7) expect more public opportunities for impact investing as the industry matures. A final difference cited by existing literature relates to the expected financial performance (Höchstädter & Scheck, 2015). SRI funds should expect near market-rate returns, while impact investors would expect lower levels of return. In contrast, 66 percent of the respondents to the 2017 Annual Impact Investor Survey targeted risk adjusted market-rate returns (Global Impact Investing Network, 2017). Thus, differences in expected levels of return do not necessarily seem to be a distinction between SRI and impact investing but as we saw in the definition impact investing does allow for below market-rate returns.

Venture philanthropy

Impact investing also has related topics in the direction of mission-driven investing and grants. It is thus necessary to clarify the boundaries to these types of investments as well. Rodin and Brandenburg (2014) argue that impact investing "sits on a continuum, with SRI investing on one side and venture philanthropy on the other" (p. 5). The European Venture Philanthropy Association (EVPA, 2018) defines venture philanthropy as "a high engagement and long-term approach to generating societal impact through (…) tailored financing (…) organisational support (…) and impact measurement and management (…)" (pp. 15-16). We can clearly see that there are similarities with impact investing. However, whereas impact investments can address both societal and environmental challenges, venture philanthropy focuses on having a societal impact. More significantly, impact investments explicitly target financial returns while venture philanthropy does not (Rodin & Brandenburg, 2014, p. 7). Venture philanthropists plan to exit the investment when they can no longer add value but positive financial returns are not a requirement (EVPA, 2018, pp. 51-52). This means that distinguishing between impact investing and venture philanthropy is fairly easy despite their similar characteristics.

We can see that impact investing shares similarities with related terms and that this can create confusion around scope of the industry. Placing itself at the intersection between conventional investing and mission-driven investing as illustrated in figure 2.1, impact investing shares characteristics in both directions. However, by examining the properties of these different concepts we can draw some distinctions between them. It distinguishes itself from venture philanthropy by explicitly targeting financial returns, thus having a greater potential to attract capital. The distinctions to SRI are less clear. Most literature agrees that they are distinct strategies but remain silent on the delimitations of impact investing. The most cited difference is that impact investing is more proactive in its approach to create a positive impact. Other cited differences relate to the nature, size, and expected levels of return from the investments, but it is less clear whether these are just a consequence of the relative immaturity of impact investing. Based on their findings, Höchstädter and Scheck (2015) conclude that more research is needed on the delimitations of impact investing.

Figure 2.1: Responsible investment strategies in relation to impact investing



Range of responsible investment strategies including philanthropy, impact investing, socially responsible investment (SRI) and Environmental, Social and Governance (ESG) investing

2.1.3 Strategic options of an impact investor

Having clarified where impact investing distinguishes itself from related investment strategies we will now explore the strategic options an impact investment is subject to. In order to define the impact investing market, clear criteria are needed to determine which types of investments are eligible. Höchstädter and Scheck (2015) identify five dimensions relevant for clarifying the scope of an impact investment. These five dimensions are geography and demography, organizational processes, sector and impact objective, financial or organizational structure, and asset classes and financial instruments. We will go through each of these dimensions and supplement with the restrictions set by OECD (2015, pp. 42-57).

Geography and demography

This dimension relates to the geographical and demographical restrictions of impact investments. That is, the geographical location and the characteristics of the end beneficiaries. Höchstädter and Scheck (2015) find few such restrictions. Some texts argue that impact investments have to target people at the "bottom of the pyramid", but the authors find no indication that this is the case. In contrast, OECD (2015, pp. 42-57) restricts the end beneficiaries of an impact investment to populations at risk. In its definition, populations at risk should not just depend on wealth and income but also on social demographics. Only 17,3 percent of the impact funds investigated by Chiappini (2017, pp. 105-138) targeted populations at risk, 37,8 percent targeted populations not at risk, while the rest did not report the end beneficiaries of their investments. So, it seems that there is a disconnect between the restrictions set by OECD (2015, pp. 42-57) and the current state of the industry. The end beneficiary is clearly a relevant criterion for some impact objectives. For example, financial inclusion must target people or organizations that would otherwise not obtain financing. However, impact investments can also create a positive environmental impact which will benefit populations not at risk. This means that demography must be considered in context with the targeted impact objective.

Höchstädter and Scheck (2015) do not find any restrictions on the geographical location of an impact investment. A common belief is that the end beneficiaries have to be located in developing or emerging markets, but the authors reject this view. They find some texts stating that impact investments can span geographies and others explicitly stating that impact investments can also occur in developed markets. Societal and environmental challenges exist around the world so constraining impact investments to developing and emerging markets would be too strict. Finally, there is an ongoing debate on whether any investment made in a poor area classifies as an impact investment (Addis, McLeod, & Raine, 2013, p. 3). Höchstädter and Scheck (2015) conclude that it might be easier for an investment made in a poor area to pass the criteria of an impact investment but it does not automatically qualify. OECD (2015, pp. 42-57) does not set geographical restrictions for an impact investment but focuses on the end beneficiaries. The geographical location is an aspect they consider when determining whether a population is at risk but is not decisive.

As we can see, impact investments are not restricted to certain geographical locations or demographics. However, targeting underserved populations or investing in developing markets can make it easier to qualify as an impact investment, and some impact objectives imply targeting certain populations.

Organizational processes

The impact of an impact investment is created by the investee. This dimension describes how the impact should be delivered. The texts identified by Höchstädter and Scheck (2015) that mention this aspect put no restrictions on this mechanism. The impact can come through the operations, products, or services of the investee. OECD (2015, pp. 42-57) takes this a step further in its report by classifying goods or services by their degree of publicness. At the one end of the scale goods and services can be defined as private if they are excludable, meaning that only the targeted population benefit from them. At the other end, goods and services can be defined as public when avoiding benefits to non-targeted populations is difficult. OECD (2015, pp. 42-57) states that these can be handled more efficiently in a fully private or fully public model respectively so impact investments can only occur in products or services that lie between public and private by their degree of publicness. This means that the goods or services cannot avoid benefits accruing to non-target beneficiaries but have barriers that limit the opportunities of non-target beneficiaries to access them. 37,2 percent of the impact funds investigated by Chiappini (2017, pp. 105-138) report goods or services in line with the characteristics set by OECD (2015, pp. 42-57), 15,4 percent report that they invest in public goods or services, while the rest did not report on the matter.

In other words, impact investments can be made in companies that create impact either through their offerings or the process. However, impact investments do seem to focus on products or services that are between public and private by their degree of publicness.

Sector and impact objective

This dimension deals with what sector and impact objective investors may target. We started this discussion in section 2.1.1 by stating that impact investing can target both societal and environmental challenges. In this section we will discuss whether an impact investor is restricted to specific sectors or objectives. Höchstädter and Scheck (2015) find that there are currently some sectors more common than others but conclude that impact investing is not restricted to these. None of the texts they analyse mention restrictions on target sector. The same results are found for impact objective. Impact investors might target a wide range of different impact objectives and can target several themes. However, the authors do propose a classification of impact objectives as additive or corrective. This is based on a framework suggested by Rubin (2009) for developmental venture capital. A corrective objective means providing access to capital to traditionally underserved populations while an additive objective means contributing to solving specific impact challenges (Höchstädter & Scheck, 2015, p. 458). OECD (2015, pp. 42-57) goes a step further by mentioning specific target areas that could be relevant for an impact investment. It argues that some of these issues are at the core of impact investing, while the rest need to be considered in context with other characteristics of the investment. The core areas are: ageing, disability, health, children and families, public order and safety, affordable housing, unemployment, education, and training. The other areas that can be considered impact objectives in some contexts are: community, culture, arts, agriculture, environment and energy, water and sanitation, financial services, ICT. This supports a wide view of possible impact objectives while taking a step toward clarifying the scope of impact investments. However, only 51,3 percent of the impact funds investigated by Chiappini (2017, pp. 105-138) targeted areas in line with the core suggested by OECD (2015, pp. 42-57).

In other words, impact investments are not limited to specific sectors and can target a wide range of impact objectives. However, some objectives are closer to the core of impact investing while others need to be considered in context with their circumstances (e.g. the target beneficiary).

Asset Classes and Financial Instruments

This dimension relates to the asset classes and financial instruments available for impact investing. Höchstädter and Scheck (2015) find a few texts that explicitly link impact investing to private investments but most literature claims that impact investments can span asset classes. O'Donohoe et al. (2010, p. 7) expect more publicly traded impact investment opportunities as the industry matures, implying that the concentration to private investments is just a consequence of the maturity. On the other hand, the Annual Impact Investor Survey in 2017 showed that the industry is still largely dominated by private investments. 75 percent of the reported assets under management were invested through private investment vehicles, indicating that making public impact investments could be problematic (Global Impact

Investing Network, 2017). Two strong arguments against impact investing in public equities relate to the impact of the investment.

Usually, investors in public equities take small positions in each company and do not aim to influence its strategy. There is an argument that impact has to be adjusted for what would have happened without the investment (Reeder & Colantonio, 2013, pp. 7-18). Given this argument it could be difficult to claim impact from a small and passive position in a company. There is an ongoing debate on whether impact investments need to create an additional impact in excess of what would have occurred otherwise. The majority of respondents to the Annual Impact Investor Survey of 2017 that were either currently making impact investments in public equities or planned to do so in the future, reported that they achieve impact by directing capital to companies that have a positive impact through their products, services or operations (Global Impact Investing Network, 2017, p. 16). A large share also tried to improve the impact of the companies through shareholder engagement, so there is no clear answer to this question. There could be an argument that impact investments do not have to create an additional impact, but this needs to be clarified by the industry. The answer will have large implications for the feasibility of impact investing in public equities.

A second argument against impact investments in public equities relates to the measuring and reporting of impact. We have seen that a prominent feature of impact investing is measuring and reporting in their non-financial impact. This means that each investment must be managed and monitored. This can be complex in public equities as the usual approach is to hold large portfolios of companies. Investors are usually distanced from the underlying companies in their portfolio further complicating the measurement of impact. This reduces the potential for impact investments as a diversified portfolio strategy or will at least make it difficult to implement. The results could be that impact investing is not an alternative strategy for public equity investors but rather a strategy that can be implemented aside conventional investing.

As we can see, more clarity is needed on how to make impact investments in public equities. However, impact investments do not seem to be restricted to a certain asset class or financial instrument. The industry is dominated by private investments, but public investments also comprise a large share of the total assets under management.

Financial or Organizational Structure

In the above dimensions, few restrictions on impact investments have been identified. An open and inclusive definition is positive for the growth of the industry, but restrictions are required to identify impact investments. Höchstädter and Scheck (2015) identify three broad groups of texts regarding the characteristics of impact investees. The first group defines impact investing without mentioning the recipients of the funds. These texts focus on the motivation of the investor to create an impact while generating financial returns. The second group mentions the impact investee in their definition of impact investing, but do not set requirements for the organizational or financial structure of the company. The last group goes more into detail on the financial and organizational structure of the impact investee. The texts in this group either require recipients to prioritize the non-financial impact, or primarily associate impact investing with private investments. For the first two groups the capacity or motivation of the organizations seems enough to be eligible investments. The last group has stricter requirements but sets more explicit and clearer characteristics. Höchstädter and Scheck (2015) conclude that more research is needed on the organizational characteristics of impact investees. Most of the texts they analyse are in the first two groups failing to mention what organizational or financial characteristics to look for. Although this puts less restrictions on the impact investing universe, it makes it difficult to identify investment opportunities and leaves too much room for subjective interpretation.

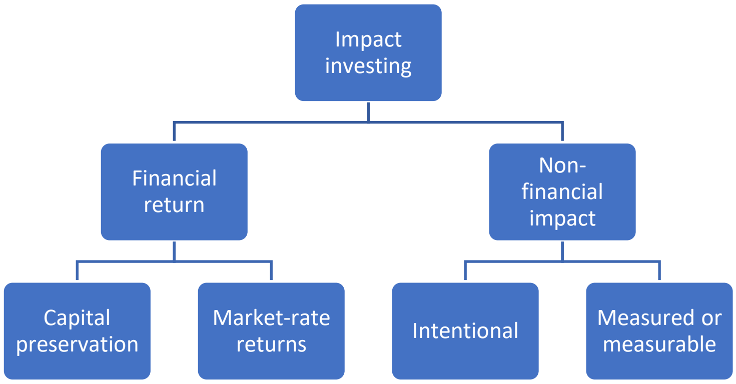
OECD (2015, pp. 42-57) takes this a step further in its report and argues that a stated intent by the recipient of funds is not enough to be considered an impact investment. OECD (2015, pp. 42-57) puts emphasis on the commitment, thus requiring companies to report on their impact to be eligible impact investments. It also recognizes initiatives trying to label the companies which can make it easier to identify impact investments and do recognize legally binding constraints as the strongest form of commitment. However, OECD (2015, pp. 42-57) does not put restrictions on the organizational structure of the impact investee. Finally, OECD (2015, pp. 42-57) distinguishes between intent and efforts to reduce their own negative impact. The latter is considered Corporate Social Responsibility (CSR) and does not qualify for impact investment.

As we can see, the impact investing industry has a long way to go in establishing clear criteria for impact investments. The emphasis seems to be on the commitment to the non-financial objective, so impact investees do not necessarily seem to be restricted to certain organizational or financial structures. Nonetheless, clear, and objective organizational characteristics are needed for the industry to grow and gain a global and uniform understanding of what constitutes an impact investment.

2.1.4 Defining impact investing

Impact investing is a dual-purpose investment strategy. This means investing with the objective of creating a positive societal and environmental impact while generating financial returns. Impact investors also have to measure and report their non-financial impact. An impact investment can target returns ranging from capital preservation to market-rate. The upper boundary of market-rate returns is debated but emphasis is on commitment to the non-financial objective. Impact investors are not required to prioritize the non-financial impact over financial return but are classified as financial first or impact first investors referring to what objective they put most weight on. These core concepts are summarized in figure 2.2.

Figure 2.2: The core concepts of impact investing



These characteristics place impact investing at the intersection between conventional investing and philanthropy as illustrated in figure 2.1. Its closest neighbours are venture philanthropy and SRI. It distinguishes itself from venture philanthropy by explicitly targeting financial returns which makes them easy to separate. The distinctions towards SRI are less clear. Most literature agrees that they are distinct investment strategies but remain silent on what distinguishes them. A commonly cited difference is that impact investing goes beyond SRI in trying to have a positive impact with a more proactive approach. Other cited differences relate to the nature and size of the investments. Impact investments usually target small non-listed companies at the growth stage, while SRI target large and publicly traded corporations. However, this could be a result of the relative immaturity of impact investing, so these differences might not be robust over time.

Impact investments are largely unrestricted by their strategic options. There are no restrictions on the geographical location of the end beneficiaries, but certain impact objectives imply demographical constraints. The impact is created by the investee and there are no restrictions on what mechanism this can come through. The positive impact can come from the product or service offered, or the operations of the investee (e.g. hiring people from an underrepresented group). Impact investments can target any sector and a wide range of impact objectives, but some objectives must be considered in context with their circumstances. Impact investments seem unrestricted by asset class and financial instrument. This means that impact investments can use any investment vehicle. However, the characteristics of impact investing seem to favour private investment approaches. Finally, impact investments do not seem restricted by the organizational or financial structure of the recipients of funds. Most literature seems to uphold that the intent or capacity to create a positive impact is enough to qualify as an impact investment. The focus seems to be on the commitment to non-financial impact.

2.2 Solving societal and environmental issues at scale with impact investing

As illustrated by figure 2.2 impact investing consists of two core concepts, a financial and a non-financial objective. This thesis focuses on the financial side but first we will briefly discuss how impact investing can contribute to solve societal and environmental challenges. As we saw in figure 2.1, impact investing is placed at the intersection between conventional investing and philanthropy. This means that it shares characteristics with both sides. By targeting financial returns, impact investing has the potential to attract larger pools of capital than traditional philanthropy. Compared to SRI, impact investing puts greater focus on the non-financial side of investment opportunities. Companies are required to demonstrate some level of commitment to creating a non-financial impact to be eligible for investment. Traditional CSR efforts to reduce their negative externalities does not make a company eligible for impact investing (OECD, 2015, p. 52). In addition, impact investors are required to measure and report their societal and environmental impact. This means that capital can be allocated more precisely to companies that *de facto* try to solve impact objectives.

In other words, impact investing has the potential to increase the scale at which societal and environmental challenges are solved. However, this potential is limited by the profitability of the investment strategy. If there is no financial trade-off compared to conventional investing, there is no limitation to the scale it can reach. The traditional view has been that financial and non-financial objectives are in conflict, meaning that more of one means less of the other. This belief has been debated for decades and has gained increased attention since the financial crisis. Research has been performed on responsible investment strategies and no clear answer has been found. Grabenwarter and Liechtenstein (2011) argue that there is no trade-off between financial and non-financial returns and state that a positive correlation between the two objectives is a requirement for impact investments. This means that the financial implications for impact investing are not clear cut, but the potential scale of impact investing is enormous if competitive levels of return are possible. Either way, the financial consequences need to be clarified for the industry to gain credibility.

3. What does existing research say about the financial performance of impact investing

Existing research on the financial performance of impact investments is limited. There is an ongoing debate between industry professionals on whether non-financial objectives can be aligned with financial returns, but little empirical evidence is found. This is likely because of the limited amount of data for impact investments. The industry is dominated by private investments which means that access to data depends on the willingness of investors to report on their performance. Private investments also make it difficult to evaluate performance since there is no transaction-based valuation of the assets. There is an increasing willingness by impact investors to release data on their investments, so recent years have seen research on the financial performance of private impact investments. This increases the transparency of the industry by making the financial consequences of the investment approach known. However, due to different structures and dynamics this information is of little value for public equity impact investors. Evidence from this segment is far scarcer. Our goal is to extend this line of research by giving a first indication of the potential profitability of impact investing in public equities. First, we will go through relevant research, so we know what to expect.

3.1 Private impact investments

Attention towards the financial performance of impact investments has grown in recent years with a few studies being released on data from private investment strategies. Since this segment dominates the impact investing industry these findings can give an indication of the overall performance of impact investments. Mudaliar and Bass (2017) summarise the key findings from performance studies on impact investing through private equity, private debt, real assets and portfolio approaches. They conclude that market-rate returns are achievable for impact investors in different asset classes and strategies. However, they also find that performance can vary significantly between funds, not all impact investors seek market-rate returns and the risk-return profile varies between asset classes.

It should be noted that most of the research Mudaliar and Bass (2017) review suffers from common drawbacks. The research is generally based on small samples of data which reduces the ability to conclude on the performance of the average impact investment within the asset class. The data is in one way or another based on self-reported numbers. Some analyses are based on entirely self-reported return data, while others calculate the returns based on financial information provided by the funds. The nature of private investments means that there is no transaction-based valuation of the unrealized investments and the performance is thus sensitive to the valuation approach. A final drawback for most of the research is that they do not provide relative measures of how well the funds are performing. Some of the research provide self-reported expected rates of return and target returns, but only a few provide a benchmark to compare with.

3.2 Public impact investments

We have seen evidence of how impact investing performs financially in private asset classes, and these seem to suggest that market rates of return are achievable. However, the literature on the performance of impact investing in public equities is scarce. At the same time, it was reported as the fourth largest asset class by assets under management in the 2017 Annual Impact Investor Survey and 25 percent of the respondents were either currently making impact investments through this asset class or planned to do so in the future (Global Impact Investing Network, 2017). This means that it is very important to investigate the performance in this segment. There is lack of existing knowledge on the topic but economic theory, research from similar investment strategies and sustainable businesses can give an indication of what to expect.

Modern portfolio theory teaches us that the risk-return ratio of a portfolio can be improved through diversification (Markowitz, 1952). The lesson is that risk must be considered in relation to other companies. This means that as long as two companies do not vary similarly in performance, a better risk-return ratio can be achieved by holding a share of each company compared to holding one of them. The risk-return ratio can be improved further by adding additional companies to the portfolio albeit with decreasing marginal benefits. The implication is that an investor can do no worse by adding a company to his portfolio and it might improve his risk-adjusted performance. It also means that at best, a portfolio facing constraints can only do as well as an unconstrained portfolio but will usually lead to lower risk-adjusted returns because of more company-specific risk. A profit-maximizing investor will thus want to hold the most diversified portfolio.

An impact investing portfolio will have smaller investment universe to choose from than a conventional portfolio without constraints. At the extreme case, a conventional portfolio could include all eligible impact investments in addition to the remaining companies in the market. Following the lesson of modern portfolio theory this should mean that the impact investing portfolio underperforms on a risk-adjusted basis. From the perspective of a fully diversified investor the implication is that increasing his weights toward impact investees would decrease the risk-adjusted performance of his portfolio. By deviating from the fully diversified position he is assuming more idiosyncratic risk, increasing the total risk of his portfolio, and depressing his risk-return ratio. In other words, impact investing in public equities should lead to concessionary risk-adjusted returns when compared with conventional investing. However, evidence from investment strategies subject to similar restrictions on the investment universe suggests that this is not necessarily the case. Evidence from SRI and ESG investing has shown that these strategies do not necessarily underperform.

Investigating the performance of SRI, Johnsen and Gjølberg conclude that SRI-restrictions do not lead to concessionary returns under normal times and upturns (NOU 2003:22, 2003, pp. 171-221). However, they also find that these restrictions led to underperformance during recessions depending on how strong the restrictions are. In other words, portfolios subject to these restrictions should expect risk-adjusted underperformance over longer periods of time. Nofsinger and Varma (2014) find contradicting evidence. They conclude that SRI funds outperform conventional funds during periods of crisis and underperform during non-crisis periods. Overall, they find no significant difference in performance. Bauer, Koedijk and Otten (2005) do not find any significant difference in risk adjusted returns between ethical funds and conventional peers after adjusting for common risk factors. Renneboog, Ter Horst and Zhang (2008) find that SRI funds seem to underperform their benchmarks but find no signs of statistical underperformance compared to conventional funds on a risk-adjusted basis. As we can see, research suggests that ethical restrictions do not necessarily imply concessionary risk-adjusted returns. Johnsen and Gjølberg also find a lot of variation in the findings of existing literature (NOU 2003:22, 2003, pp. 171-221). They conclude that the results will depend on the measured time-period and the sample of funds, portfolios, or companies. This indicates that impact investing can achieve non-concessionary risk-adjusted return despite restricting the investment universe.

From the perspective of the fully diversified investor we concluded that deviating from his original position would only lead to higher risk, thus depressing the risk-return ratio. This is true under the assumption that capital markets are efficient. If the efficient market hypothesis holds, capital will be allocated to companies representing good business opportunities until the valuation reflects this opportunity. Under these circumstances the market portfolio allocates the efficient amount of capital to each company. However, some research at the company-level suggests that sustainable businesses outperform their conventional peers. Eccles, Ioannou and Serafeim (2014) investigate the financial performance of 90 high-sustainability companies matched with 90 low-sustainability companies and find relative outperformance by the former group. Giese, Lee, Melas, Nagy and Nishikawa (2017) find that companies with high ESG ratings tend to be more profitable, have lower idiosyncratic tail risks with respect to their stock prices and have lower systematic risk leading to lower costs of capital and higher valuations. Finally, Fulton, Kahn and Sharples (2012) conclude that companies with a focus on their corporate sustainable performance offer superior risk-adjusted returns. In other words, some research suggests that sustainable businesses can offer opportunities that make them attractive from a financial point of view. On the other hand, this can be flipped around and state that companies that represent good business opportunities are the ones that can afford to engage in sustainability initiatives. This implies that selecting companies committed to sustainability is a proxy for selecting profitable and solid firms. Either way, there is an argument that investing in sustainable businesses can offer attractive returns which means that impact investing can be rational from a financial point of view.

3.3 The potential performance of impact investing in public equities

Summing up, existing literature on the financial performance suggests that competitive levels of return are possible through impact investing. However, this research is on private investments and cannot be transferred to public equities due to different dynamics. The transaction-based valuation in capital markets makes it difficult to find positive Net Present Value projects. Theory states that impact investing in public equities should lead to concessionary risk-adjusted returns because it restricts the investment universe compared to conventional investing. A portfolio of impact investments can at best achieve similar risk-return ratios as an unconstrained portfolio but will normally underperform. On the other hand, some research on investment strategies with similar restrictions find no significant underperformance compared to conventional investing. This implies that the same could be possible for impact investing.

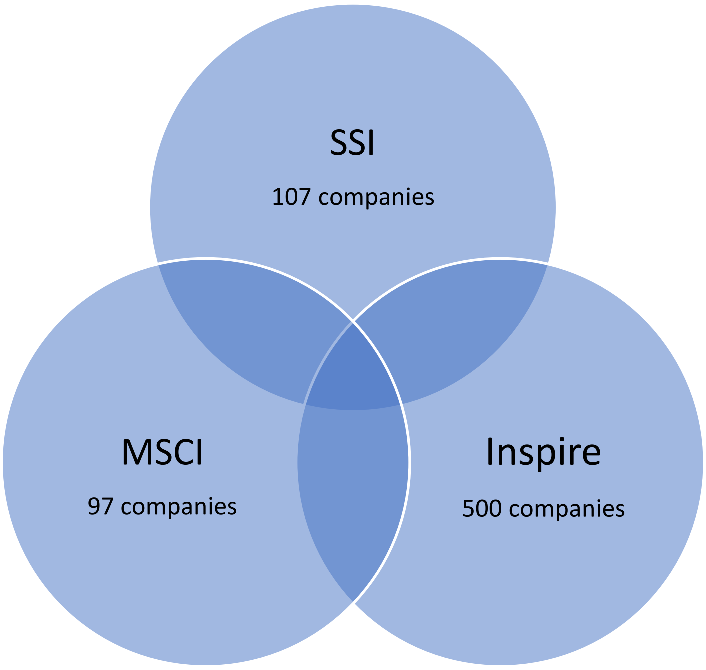
If capital markets are efficient, theory also implies that a fully diversified investor should not be targeting impact investments specifically. This would imply increasing his weights in impact investments which will depress his risk-ratio by increasing his idiosyncratic risk. However, some research at the company-level suggests that there could be financial benefits from investing in sustainable businesses. This means that impact investments might offer financial incentives that compensate for the idiosyncratic risk, making them an attractive opportunity from a financial point of view.

Existing research does not provide clear indications of the level of performance that should be expected from impact investing in public equities. The industry lacks empirical evidence, and this is where we aim to contribute. In order to do so, we first need to bypass the problem of lacking data on public equity impact investments. The industry is still in its infancy with few available investment opportunities and has yet to become a widespread approach among public equity investors. On the one hand this means that little precise data is available. On the other hand, it means that finding indications of the financial performance is even more important.

4. Data

As mentioned, the impact investing industry is dominated by private investments. This sets implications for the availability of data since private investors do not have the same ability or requirements to report on their performance. As the industry has grown and research has moved forward, more impact investment opportunities have become available in public equities and was reported as the fourth largest asset class in the survey of impact investors from 2017 (Global Impact Investing Network, 2017). Three indexes have been released in the last two years that track the performance of publicly traded impact investments with a varying degree of precision. These are the MSCI ACWI Sustainable Impact Index, the SSI Impact Index, and the Inspire Small/Mid Cap Impact Equal Weight Index (Inspire, 2018b; MSCI, 2018b; SSI Indexes, 2018). Figure 4.1 displays the number of companies included in each index by the end of February 2018 and it also shows us that there are some companies that are include in more than one of the indexes.

Figure 4.1: Companies included in the SSI, MSCI and Inspire index



Holdings of the SSI Impact Index (SSI), MSCI ACWI Sustainable Impact Index (MSCI) and Inspire Small/Mid Cap Impact Equal Weight Index (Inspire) by the end of February 2018 (Source: Morningstar Direct database (Morningstar, 2018))

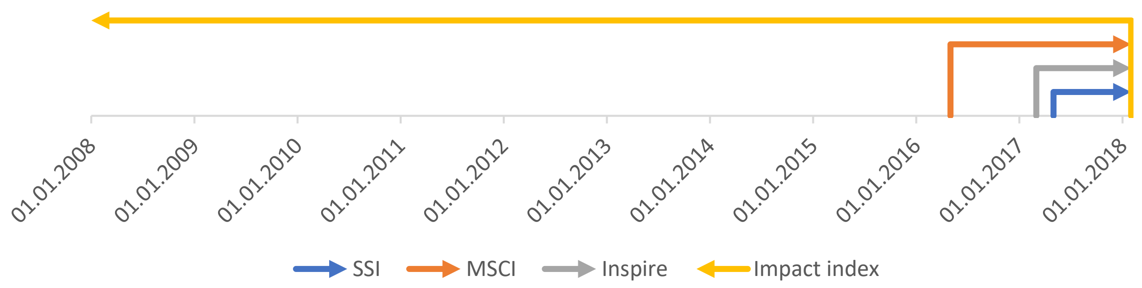
The MSCI ACWI Sustainable Impact Index was launched in 2016 and tracks the performance of companies whose core business is to contribute to solving at least one of the Sustainable Development Goals (SDGs) defined by the United Nations (2018). Companies from the MSCI ACWI index are evaluated in terms of their output and operations. Those that derive more than 50 percent of their revenue from dealing with at least one of the SDGs, while operating in compliance with minimum environmental, social and governance (ESG) standards are added to the index. The companies are reviewed on a quarterly basis to evaluate their eligibility and are also reviewed on a monthly basis for involvement in ESG controversies (MSCI, 2017).

The SSI Impact Index was released in 2017 and tracks the performance of public equity impact investments by the definition of SSI Indexes. The first step of the procedure is to define 20 impact themes that products or services might address. Next, all companies listed on the New York Stock Exchange (NYSE) and NASDAQ are reviewed and excluded based on minimum criteria. To obtain necessary liquidity, minimum requirements are set for market capitalization, share price and average daily volume. All companies involved in negative impact industries such as tobacco, fossil fuels and weapons are excluded and the remaining firms are reviewed individually against the predefined impact themes. This index is reviewed annually and rebalanced quarterly (SerenityShares, 2017).

The Inspire Small/Mid Cap Impact Equal Weighted Index was released in 2017 and tracks the performance of 500 U.S. companies that have a positive impact on the world. Inspire employs a standardized scorecard with positive and negative initiatives a company might be involved in. Small and mid-cap companies listed on NASDAQ and NYSE are scored on a range from 100 to negative 100, and the 500 companies scoring highest are included in the index. Any company involved in one or more of the negative impact initiatives on the scorecard are excluded. The index is equally weighted and reviewed twice a year to evaluate eligibility (Inspire, 2018a).

These indexes track the performance of possible impact investments with a varying degree of precision. Unfortunately, they have insufficient performance records to provide meaningful information. The MSCI index has the longest performance record with nearly two years of data, while the SSI and the Inspire index barely have one year. However, many of the companies included in these indexes have longer time-series than the indexes themselves. The indexes thus help us identify potential impact investments that we can retrieve the historical performance for. Therefore, we will review the companies included in these indexes by the end of February 2018 against criteria we set. We will retrieve historical data for all companies complying with all the criteria to create a value-weighted "impact index" as illustrated in figure 4.2.

Figure 4.2: Performance record of our Impact index together with the SSI, MSCI and Inspire index



Data length for the SSI Impact Index (SSI), MSCI ACWI Sustainable Impact Index (MSCI) and Inspire Small/Mid Cap Impact Equal Weight Index (Inspire), and our Impact index

4.1 Inclusion criteria

As we found in section 2, existing literature has not come a long way in defining clear organizational characteristics of an impact investee. However, there are some characteristics that can be derived from the definition of impact investing. In this section we establish four criteria that we argue are necessary to justify impact investment. These criteria will be used to select companies for our index and only the ones that fulfil all four are included.

4.1.1 For-profit organization

The company must be organized as a for-profit organization. This might be a trivial criterion for publicly traded companies, but it reminds us that impact investors seek financial return as well as positive impact. This means that an impact investee also needs emphasize financial performance. It also sets implications for the types of impact initiatives that are eligible. Many companies have established foundations or grant money to charitable organizations, but these types of initiatives do not make a company eligible for investment. An impact investee should find a profitable way of dealing with societal and environmental challenges.

4.1.2 Significant part of the company

The impact must be a significant part of what the company does. Impact investments aim for financial returns while creating a positive impact. Since the impact is delivered by the investee this objective must also be of paramount importance to the company. Companies that do good on the side cannot be considered eligible since the positive impact will not be a primary effect of the investment. For example, most banks in America have signed the community reinvestment act encouraging banks to make investments in their local communities (The Federal Reserve, 2018). Although these initiatives have a positive impact, investing in these banks cannot be considered impact investing. Even if positive impact constitutes a large share of the business model it must be considered in relation to the other activities the company engages in. For example, if an energy company is generating power through both renewable and fossil sources it is only included if most of the energy is produced from renewable sources. In other words, the negative impact of the company is also considered.

In some cases, the end beneficiaries also need to be considered in relation to the impact of the company. In section 2 we argued that some initiatives can only be considered impact if they target certain populations. For example, access to credit can only be considered financial inclusion if the targeted population would struggle to obtain financing otherwise. This means that banks are only included if they target underserved populations or organizations.

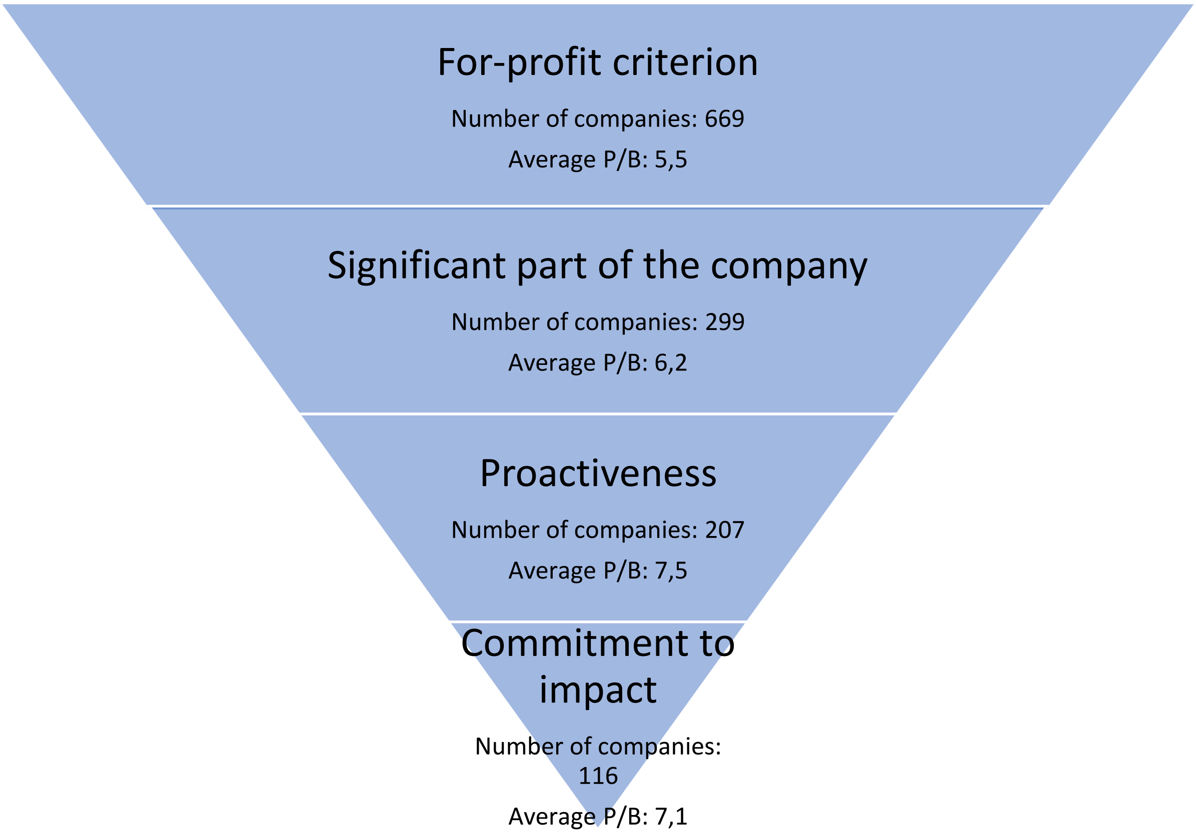
4.1.3 Proactiveness

The company must proactively address the societal and environmental challenges. The most commonly cited difference between impact investing and SRI is that the former goes beyond the latter in creating an impact by proactively addressing issues. Since the impact is delivered by the investee, this sets implications for how the company deals with these challenges. The impact investee is thus required to work proactively in solving societal and environmental challenges. This is referred to as shedding light by Jørgensen and Pedersen (2013, pp. 57-60) in their book on sustainable business models. Shedding light means that the company tries to solve impact challenges that it is not the root cause of itself. Companies may address try to reduce their own negative externalities. This is referred to as reducing their own shadow by Jørgensen and Pedersen (2013, pp. 57-60). This is typically companies that reduce their own greenhouse gas emissions, energy consumption and water usage. Although it is positive that companies are increasingly taking responsibility for their negative externalities, the company itself caused the problem so it cannot be considered working proactively to solve it. Thus, only companies addressing societal and environmental challenges of others, companies that are shedding light, are included in our index.

4.1.4 Commitment to impact

The company must be committed to its mission. To be included in our index the company must show some level of commitment to solving societal and environmental challenges. At minimum OECD (2015, pp. 42-57) requires companies to report on their impact. This restriction is set to avoid mission drift and greenwashing, but the emphasis of OECD (2015, pp. 42-57) seems to be on commitment to the cause. We relax this criterion slightly and include companies that show commitment through their business model even if they do not report on their impact. In other cases where the impact is less clear or where it is uncertain how long the company has been trying to create an impact, formal reporting is required. An extension of this requirement is that the impact must be a direct effect of the activities of the company. For example, a company producing Internet of Things (IoT) technology might have an impact by improving the efficiency of their customers and thereby reducing their energy consumption. This impact is too indirect and is not an eligible impact investment by our definition.

Figure 4.3: Inclusion criterion, number of companies and the average P/B multiple



Number of companies eligible for our impact index after adding the inclusion criterion and the average Price/Book (P/B) multiple for companies with available data (Source: Morningstar Direct database (Morningstar, 2018))

4.2 Sample period

After removing duplicates, we are left with 669 potential companies for our index. These companies are evaluated against the four criteria in section 4.1 and the result is shown in figure 4.3. Each criterion removes additional companies until 116 are found eligible for our index. Data is unavailable for 5 of these companies which leaves us with 111 companies. Another interesting pattern we can see in the figure 4.3 is a steadily rising P/B multiple as companies are excluded. This implies that the criteria move us in the direction of growth companies. Considering the state and nature of impact investing, this is in line with expectations. We collect data for the 111 companies from the start of 2008 until the end of January 2018 from the Morningstar Direct database (Morningstar, 2018). An important question is how far we should track the performance of these companies. On the one hand, we want to collect as much data as possible to strengthen our analysis. On the other hand, it depends on how long we can be confident that these companies are eligible for the index and how many companies have data for the relevant year. Not all the companies have performance records from 2008 and not all of them are eligible for the whole period.

4.2.1 Persistence of impact

The available performance record for each company depends on how long we can be confident that they are eligible for impact investing. The assessment of eligibility is primarily based on how the company is currently operating. However, since we will collect historical data for these companies we have to determine how long they have been operating in the same way. This relates to the commitment to impact criterion in section 4.1. If positive impact is embedded in the business model and no changes are found, the company is deemed eligible for the whole sample period. Companies that have an unclear impact are only included if they report on their non-financial performance, or if an external organization has verified the impact.

4.2.2 Constructing the index

We construct a value-weighted index over the period 2008 to 2018 by using monthly market returns and monthly market capitalizations in USD for each company. The companies that do not have performance records from 2008 or that are only eligible for parts of the period are added as they become available. This means that the index consists of a cumulatively increasing amount of companies. The returns for the index are calculated as:

$$r_t = \sum_{i=1}^{n} r_{i,t} * w_{i,t-1}$$

Where:

r_t is the one-month market return of the index at time *t*, for example the return of the index in January 2012.

$r_{i,t}$ is the one-month market return of company *i* at time *t*, for example the return of company *i* in January 2012, calculated as:

$$r_{i,t} = \frac{(P_{i,t} + D_{i,t}) - P_{i,t-1}}{P_{i,t-1}}$$

Where:

$P_{i,t}$ is the share price of company *i* at the end of time *t*.

$P_{i,t-1}$ is the share price of company *i* at the beginning of time *t*.

$D_{i,t}$ are the dividends paid in time *t*.

$w_{i,t-1}$ is the weight of company *i* at the beginning of time *t*, for example the weight of company *i* in the index at the start of January 2012. It is calculated as:

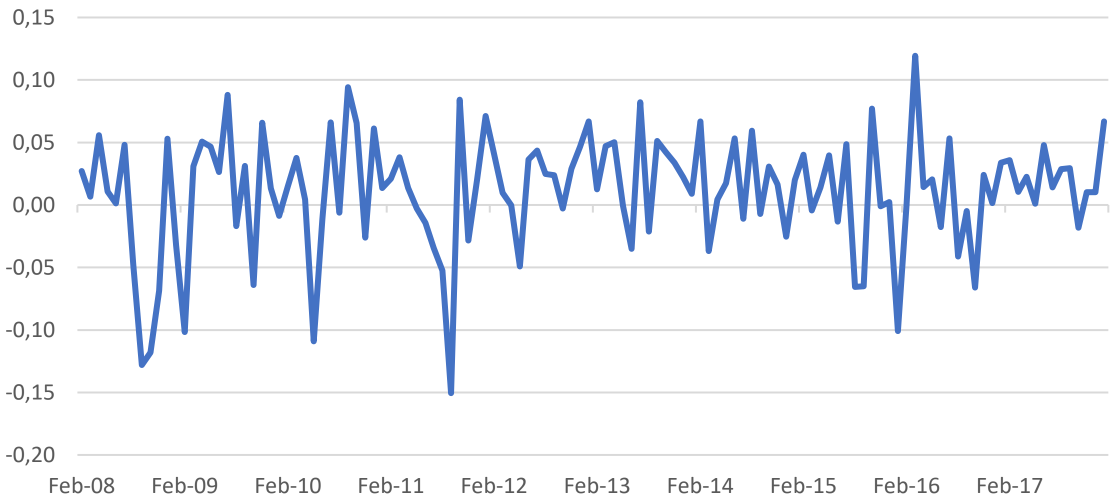
$$w_{i,t} = \frac{M_{i,t}}{\sum_{i=1}^{n} M_{i,t}}$$

Where:

$M_{i,t}$ is the market capitalization of company *i* at time *t*, meaning for example the market capitalization of company *i* at the start of January 2012.

4.2.3 Time-series of returns

Figure 4.4: 10-year monthly market returns (2008 – 2018)



Monthly market returns for our impact index from January 31st, 2008 to January 31st, 2018

Figure 4.4 plots the monthly market returns of our index from 2008 to 2018. We can see a lot of variation in the early years which is probably related to the aftermath of the financial crisis and the subsequent European debt crisis. An increasing amount of companies in the index also contributes to less volatility since relative importance of each decreases. Table 4.1 shows us that the index does not reach the full sample of 111 companies until 2018. After 2012 the variation seems to decrease, although we can see a spike in 2016. The length of the index also needs to be considered in relation to the persistence of impact. The longer we choose to track the performance of these companies, the less confident we can be that they are eligible for impact investing. At the same time, we need a large enough sample to provide meaningful information. Thus, we restrict our sample to only include data from January 1st, 2012 to January 31st, 2018.

Table 4.1: Number of companies included in our impact index by the start of each year

Year	**Number of companies 01.01.**
2008	50
2009	52
2010	66
2011	72
2012	76
2013	78
2014	89
2015	99
2016	103
2017	110
2018	111

4.3 Descriptive statistics

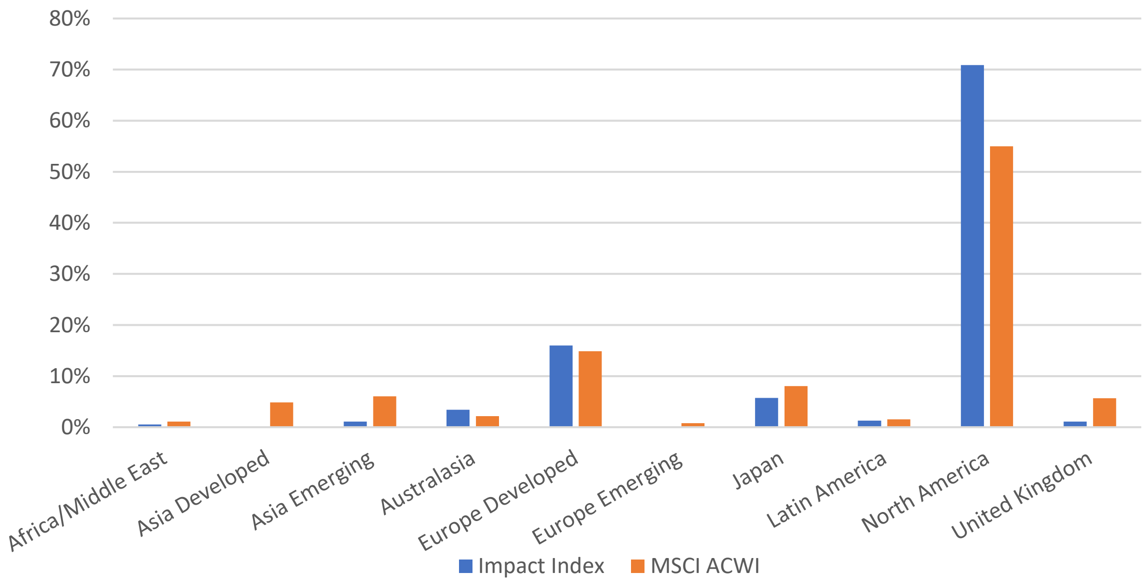
4.3.1 Index characteristics

To get familiar with the index we will consider some generic characteristics of the underlying companies and compare with a conventional index. We implicitly assume a global perspective in our analysis with a goal of providing indications that are valid for the global impact investing industry. Thus, we will compare with an index that captures the characteristics of the global market. We choose to compare with the MSCI ACWI index which tracks the performance of all listed companies on the world (MSCI, 2018a). The characteristics of the

MSCI ACWI index are obtained by considering the portfolio characteristics of the iShares MSCI ACWI ETF (iShares, 2018b). We limit this comparison to the status of the indexes by 2018, although our performance analysis will use historical data.

Figure 4.5 plots the index weights by world region in 2018. No significant differences appear in terms of regional affiliation. Most of the companies in both indexes are based in North America but our impact index seems slightly more concentrated around this region. This is hardly surprising given the maturity of the impact investing industry. The industry has developed furthest in the United States, so this is naturally where most opportunities for impact investing in public equities will currently be located. The majority of assets under management reported in the Annual Impact Investor Survey from 2017 were reported to be invested in the United States and Canada (Global Impact Investing Network, 2017). No other region had anywhere near the same share of assets. By considering the target geography instead we would argue that our impact index does represents the global market as most of the underlying companies have a global perspective.

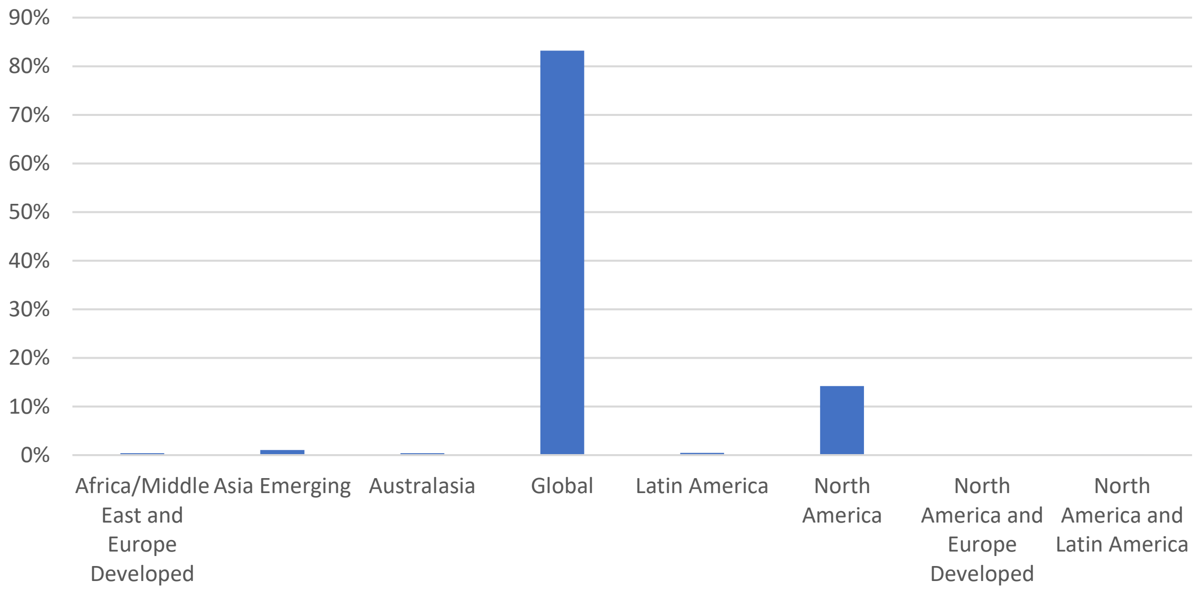
Figure 4.5: Geographic spread of our impact index by nationality



Portfolio weights for our impact index (impact index) and the iShares MSCI ACWI ETF (MSCI ACWI) by world region by the end of January 2018. Portfolio weights for the iShares MSCI ACWI ETF retrieved from the Morningstar Direct database (Morningstar, 2018)

Figure 4.6 plots the target geography of the underlying companies in our impact index by 2018. We reviewed each company and classified them as global if they had operations in or delivered products to at least three continents. As we can see, the index is dominantly weighted towards companies targeting the global market. Over 80 percent of the companies were classified as global, indicating that this represents a global impact investing index.

Figure 4.6: Geographic spread of our impact index by target geography



Portfolio weights for our impact index by target geography by the end of January 2018

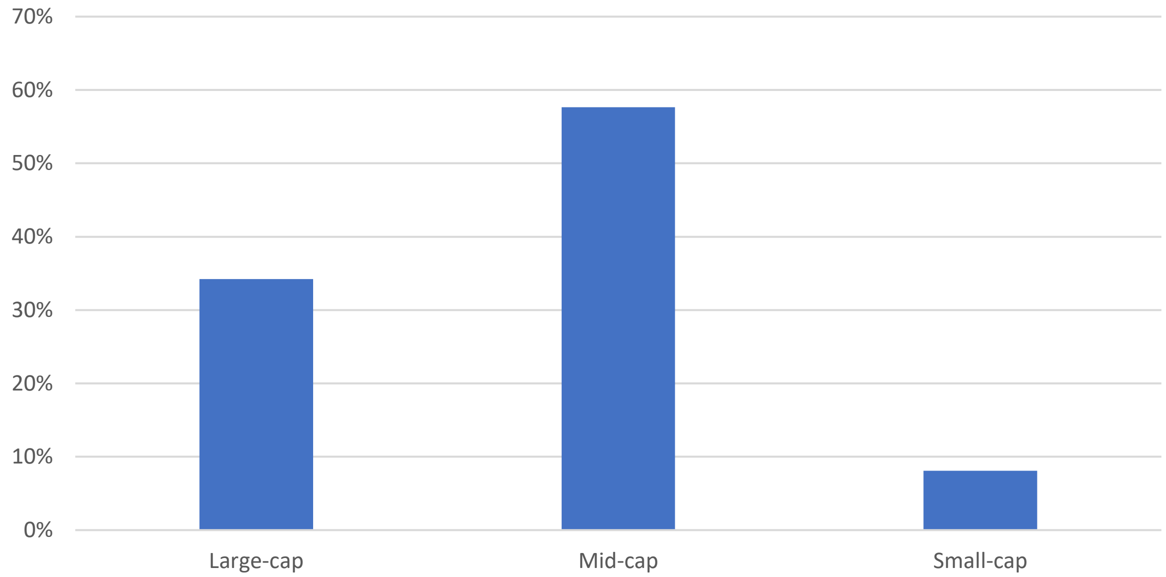
Table 4.2 illustrates the size of our impact index compared to the MSCI ACWI index. Size characteristics for the MSCI ACWI index obtained through considering portfolio characteristics of the iShares MSCI ACWI ETF in the Morningstar Direct database (Morningstar, 2018). First of all the MSCI index is much larger than our impact index, which is unsurprising due to the maturity of the impact investing industry. Impact investments in public equities only represent a fraction of the global market but are expected to grow in the future (O'Donohoe et al., 2010, p. 7). We expect our impact index to be weighted toward smaller firms compared to the MSCI ACWI. However, the average and median capitalization of the indexes only show slight differences. To investigate this further we classify each company in our impact index as either small-, mid- or large-cap to see if any group dominates. The thresholds for being included in these groups is unclear however. A common definition is that small-cap firms have market capitalizations below $2 billion, mid-cap between $2 billion and $10 billion, while large-cap stocks have market capitalizations greater than $10 billion. These boundaries seem supported by the average capitalizations in MSCI indexes tracking the returns of these groups (MSCI, 2018c, 2018d, 2018e). The results by this definition are illustrated in figure 4.7. Over 30 percent of the companies in the index are classified as large cap, in contrast to one of the commonly cited differences between impact investing and SRI (Höchstädter & Scheck, 2015). However, it is also argued that this is not a defining characteristic of impact investing but a consequence of its relative immaturity to SRI. Therefore, we will make a distinction that analyses the small- and mid-cap companies separately in the appendix. Appendix A illustrates the index characteristics after removing large-cap firms.

Table 4.2: Size characteristics for the indexes

	Impact Index	**MSCI ACWI**
Index	1 760 110	45 182 998
Largest	178 669	861 435
Smallest	887	423
Average	15 857	18 109
Median	5 877	7 296

Size characteristics for our impact index and iShares MSCI ACWI ETF by market capitalization in millions of USD by the end of January 2018. Data for the iShares MSCI ACWI ETF retrieved from the Morningstar Direct database (Morningstar, 2018)

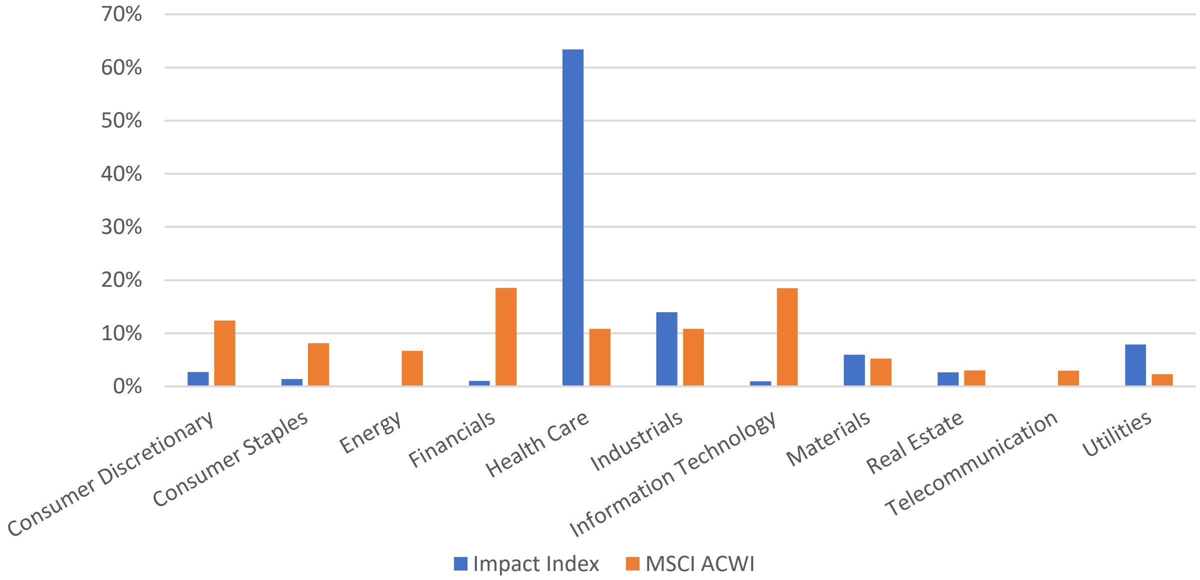
Figure 4.7: Share of companies classified as small-, mid- and large-cap



Portfolio weights for our impact index by size characteristics by the end of January 2018, grouped as small-, mid- or large-cap. Small-cap includes all companies with market capitalization below $2 billion, mid-cap includes all companies with market capitalization between $2 and $10 billion, large-cap includes all companies with market capitalization above $10 billion

Finally, figure 4.8 plots the index weights by Global Industry Classification Standard (GICS) sectors for our impact index and the MSCI ACWI index. This shows us how diversified our impact index is across sectors compared to the global market. While the MSCI ACWI index is spread across sectors, our impact index is concentrated to a few of these. The healthcare sector constitutes 63 percent of our impact index by 2018. This means that the healthcare sector will have a large effect on our results. To address this issue, we will make a distinction between healthcare and non-healthcare companies to give an indication of how this affects our results. The results for these distinctions will be reported in the appendix.

Figure 4.8: Sector spread by GICS classification



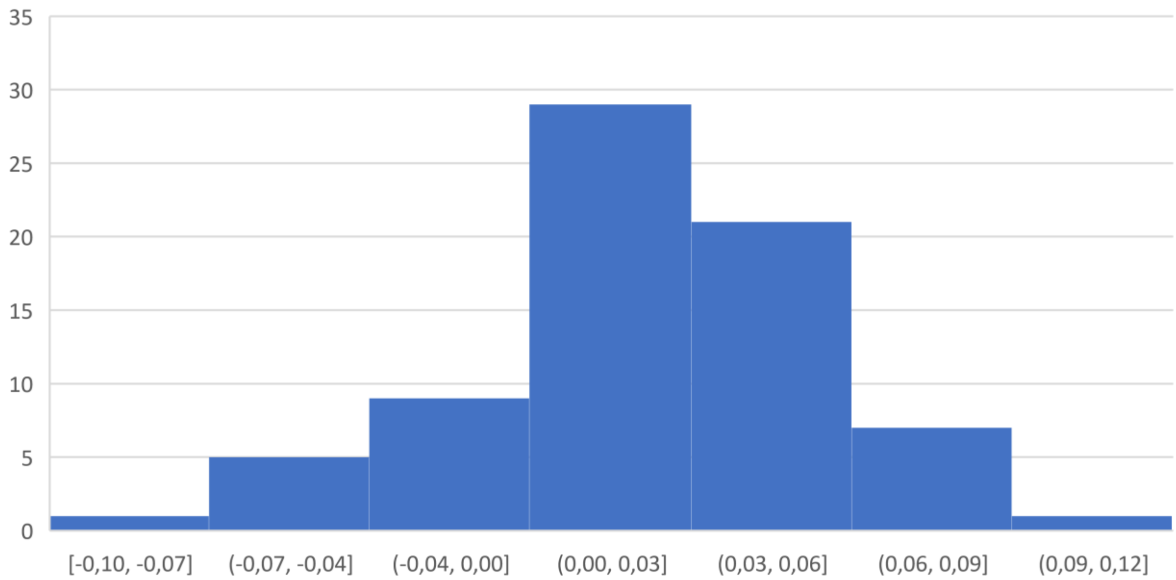
Portfolio weights for our impact index and the iShares MSCI ACWI ETF (MSCI ACWI) by Global Industry Classification Standard (GICS) sector by the end of January 2018. Data for the iShares MSCI ACWI ETF retrieved from the Morningstar Direct database (Morningstar, 2018)

Our impact index and the MSCI ACWI index do not differ significantly when it comes to geographical spread. Our impact index is a bit more concentrated to companies based in North America, but these differences are small. The industry has developed furthest in the United States, so naturally most impact investing opportunities in public equities will be located there. On the other hand, most of the companies in our impact index target the global market so we assume that the index represents the global impact investing industry. In contrast with previous research we only find slight differences in the size of the underlying companies between the MSCI ACWI index and our impact index. The clearest difference between our impact index and the MSCI ACWI index relates their spread across sectors, where our impact index is far more concentrated.

4.3.2 Return distribution

To make statistical inference from the results we find we need to make an assumption about the sample distribution. In theory, stock market returns are assumed to follow a normal distribution. Figure 4.9 displays a histogram of the index returns between 2012 and 2018. The shape of the plot suggests that the assumption of standard normal distribution holds for our index. Table 4.3 provides further evidence that the returns are normally distributed by displaying summary statistics. A standard normal distribution has kurtosis of 3 and no skewness. Our impact index displays a kurtosis of 1,01 and a slight skewness of negative 0,44. This means that our index exhibits fewer and less extreme observations and has a slightly longer left tail than a normal bell curve. Overall, the index seems to satisfy the assumption of standard normal distribution. We have mentioned earlier that we will make some distinctions to the index, so an assessment of their distributions is included in Appendix B.

Figure 4.9: Histogram of returns over the sample period (2012-2018)



Distribution of monthly returns for our impact index over the period January 1st, 2012 to January 31st, 2018

Table 4.3: Summary statistics over the sample period (2012-2018)

	Impact index
Average	0,016
Median	0,018
Standard deviation	0,038
Sample variance	0,001
Kurtosis	1,01
Skewness	-0,44
n	73

Summary statistics for the returns of our impact index, arithmetic average return, median return, standard deviation, sample variance, kurtosis, skewness, and number of observations (n) over the sample period

4.4 Weaknesses and limitations

The method we use for analysing impact investing is not unproblematic. The dataset includes weaknesses that set implications for our conclusion and overlooks aspects of impact investing that could have affected our results. As the industry evolves and uncertain aspects are clarified, more precise data will become available and more precise conclusions can be drawn for the profitability of impact investing in public equities. For now, it is important to be aware of the weaknesses our approach implies.

4.4.1 Subjective selection of companies

As we saw in section 2, the impact investing industry is still in disagreement on the characteristics of impact investments. Most literature sets no explicit requirements for recognizable characteristics, the capacity to or intention of creating an impact is enough for a company to be eligible for impact investment. This creates a wide and including definition that does not restrict the potential scope of the industry. However, without clear and recognizable characteristics that are agreed upon globally it is difficult to create a uniform understanding of what the industry includes. A definition that is completely detached from organizational characteristics leaves too much room for a subjective interpretation of impact investments.

This lack of clear organizational characteristics means that the selected companies are based on our interpretation of an impact investment. The inclusion criteria are derived from the definition of impact investing but are nonetheless criteria we deem necessary. The evaluation of whether these criteria are fulfilled is also based on our understanding of how the company operates. The implication is that if someone else had performed this process, they might set different criteria and evaluate the companies differently. In the extreme case, they could end up with a different sample of companies that yields different results. We address this issue in Appendix D by creating new indexes, using companies deemed eligible as impact investments by others and see whether these results differ significantly from our conclusions.

4.4.2 Survivorship bias

Another weakness of our index that is linked to the selection process, is survivorship bias. By only considering companies that are listed by 2018, we are overlooking the ones that have been delisted during the sample period but should have been included based on organizational characteristics. The companies that have been delisted during the sample period have likely underperformed the companies that survived. This means that our sample does not represent the average impact investee but the average surviving impact investee. Since it is impossible to know what companies will survive *ex ante*, this reduces the informational value of our results. Although we cannot adjust for this problem, we will try to give an estimate of how large this bias is. We do so in Appendix D by analysing the performance of the companies that have data throughout the sample period and comparing it with the full index.

4.4.3 Overlooking fees and expenses related to impact investing

One aspect of impact investing that could have a large effect on the return to the investor, is the expenses related to finding and managing impact investments. Impact investing requires the investor to measure and report on his non-financial performance. This implies managing and monitoring each investment which can be very complex, especially in large portfolios of companies. This complexity might incur significant costs on the investor, but this aspect is overlooked by our index. By tracking the financial performance of companies, the index represents gross returns to the investor. Without data from actual impact investments in public equities we cannot be sure how expensive this approach is but there is a strong argument that making impact investments is more expensive than conventional investments.

4.4.4 Sample size

A final problem with the dataset that might cause problems for the inference is the size of the sample. The index only includes 111 companies by 2018 and these are largely concentrated around the healthcare sector. Only 76 companies are eligible included in 2012, although a smaller share are healthcare companies. This means that certain companies and sectors still have a large influence on the returns of the index. This might imply that a large share of the variation in the returns of the index will remain unexplained. The index is also restricted to a relatively short period of time and only captures one market condition, a recovery period after a time of financial crisis. As we saw in section 3, the conclusion for the performance of SRI seems to vary between crisis periods and non-crisis periods. Johnsen and Gjølberg also explicitly conclude that the measured time-period can affect the results (NOU 2003:22, 2003, pp. 171-221). This implies that if we had data for a longer period of time the results might have been different.

5. Methodology

In the previous sections we have explored the boundaries of impact investing. We did so with a goal of raising the understanding of the concept, but it was also crucial for gathering data on impact investments. However, the main contribution of this thesis is to extend existing literature on the financial performance of impact investments. We will do so in two ways. First, we will perform a comparative analysis where we plot the cumulative return of our impact index against conventional indexes. Then we will move on to risk-adjusted measures to see how the impact performs on its own and relative to a peer. Throughout the analysis we take a global perspective of impact investing so we will focus on the relative performance against the MSCI ACWI index (MSCI, 2018a).

5.1 Comparative analysis

To get an indication of how well our impact index performed over the sample period we will compare its cumulative return against the returns of conventional indexes. To obtain higher risk-adjusted returns than its peers the index either has to offer higher financial returns or lower risk. However, the cumulative plot only considers one of these aspects, so we will also display the average return, standard deviation, and Sharpe-ratio of the indexes. This can give us an idea of how well our impact index performed. We will focus on the relative performance against the MSCI ACWI index but also include data for the S&P 500, Dow Jones Industrial Average (DJIA) and Russell 2000 indexes. We collect the monthly market returns for ETFs on these indexes from the Morningstar Direct database (Morningstar, 2018). Specifically, we collect monthly market returns for the iShares MSCI ACWI ETF, iShares Russell 2000 ETF, iShares Core S&P 500 ETF and SPDR Dow Jones Industrial Average ETF (iShares, 2018a, 2018b, 2018c; SPDR, 2018). In the appendix we will perform the same analysis for the distinctions we mentioned in section 4.

5.2 Investor perspective

The comparative analysis describes the performance of our impact index over the sample period and gives indications of what to expect. However, statistical evidence is needed to make conclusions about the financial performance. There are several measures that account for both the risk and return of an investment, but the relevant choice depends on investor perspective. An investor facing a choice between two mutually exclusive investment opportunities will care about their Sharpe-ratios. He will choose the alternative that provides most return per unit of risk. Thus, if the relevant perspective is to consider impact investments as an alternative to the conventional peers we should be investigating the Sharpe-ratios.

On the other hand, if the investor holds a fully diversified portfolio as his optimal mean-variance portfolio and is considering whether to take an investment opportunity he will care about alphas. As we saw in section 3, modern portfolio theory implies that an investor can do no better than holding the market portfolio. Deviating from this position means higher idiosyncratic risk and lower risk-adjusted performance. However, this implication depends on the efficient market hypothesis. An investment might be attractive from a fully diversified perspective if it can compensate for the added idiosyncratic risk through abnormal returns. The alpha measures the average mispricing of an asset and will make it financially attractive for a fully diversified investor. The optimal mean-variance portfolio of a fully diversified investor already includes a share of impact investees. The decision of whether to make an impact investment is thus a decision of whether to increase his portfolio weights in these companies. The investor will only do so if the impact investment offers a positive alpha.

To choose the most suitable measure we thus have to clarify what investor perspective is most relevant. We choose to analyse the performance of our impact index from the perspective of a fully diversified investor. As we found in section 2, impact investing sets requirements for the investor that makes it problematic as an alternative portfolio approach. The measurement and reporting of the impact can become very complex in large portfolio. Thus, we see impact investing in public equities as more of a strategy that can be pursued alongside holding a diversified portfolio but not as an alternative approach. Therefore, we will analyse the alpha of our impact index.

5.3 Risk factors and alpha

Modern economic theory states that exposure to systematic risk determines the level of performance that should be expected from an asset. This means that if capital markets work efficiently the financial performance of an asset can be predicted by determining its exposure to systematic risk. However, Grossmann and Stiglitz (1980) showed that capital markets cannot be perfectly efficient since the valuation of stocks is transaction-based. If capital markets were perfectly efficient there would be no incentive to deviate from the market portfolio and there would be no transactions. Thus, mispricing can occur and the alpha of an asset measures this. By adjusting the returns of an asset for systematic risk factors, the level of performance that cannot be explained can be identified. By now several risk factors have been identified but this way of thinking started with the Capital Asset Pricing Model (CAPM) during the 1960s.

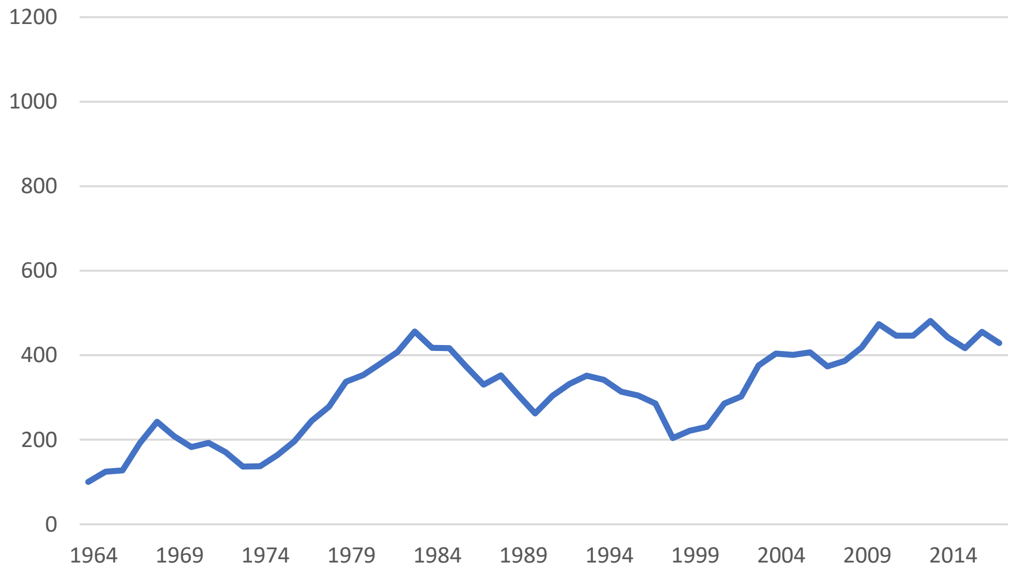
CAPM

CAPM was built on the theory of diversification proposed by Markowitz (1952). The theory states that the risk-reward ratio of a portfolio can be improved through diversification. The lesson is to consider the risk of a company as how it covaries with the rest of the portfolio. This was developed further by Treynor (1961), Sharpe (1964), Lintner (1965) and Mossin (1966) during the 1960s into CAPM. Under several assumptions, the theory of diversification implies that all investors will add companies to their optimal mean-variance portfolio until they hold the market portfolio. Since the market removes all idiosyncratic risk, the relevant risk of an asset is how it covaries with the rest of the market, its market beta. Investors are rewarded for taking market risk since this cannot be removed. In other words, there is a risk-premium for exposure to market risk. The risk-premium is based on the assumption that investors are risk averse. This means that they put more weight on losses than on a symmetrical gain. The implication is that investors like assets that perform well when the rest of the market is performing badly, and dislike assets that perform badly during downturns. An investor must thus be compensated for holding an asset that will perform worse than market during bad times through higher expected returns during normal times. Similarly, investors are willing to pay for an asset that performs better than the market during downturns through lower expected returns during normal times. Thus, the market beta of an asset will determine its expected level of performance (Ang, 2014, pp. 196-202).

Fama-French three factor model

The revolution of the CAPM was the intuition that risk premiums arise from exposure towards underlying risk factors. However, the CAPM states that the only relevant risk factor is the market which is rejected by subsequent research. The release of the CAPM catalysed research on these types of risk factors and has led to the identification of several types of risk factors since. Fama and French (1993) proposed a model for explaining the expected return of assets through three risk factors. The model includes the market factor in addition to a size and value factor. The size factor was discovered by Banz (1981) who finds that small stocks tend to outperform large stocks after adjusting for the market factor. The rationale is that small stocks will be hit harder by turbulent times than large stocks which is the opposite of what a risk averse investor prefers, so he must be compensated to hold these stocks. However, as we can see from figure 5.1, the size factor has disappeared since the year it was discovered so the existence of a size risk premium is debated (Ang, 2014, pp. 228-230).

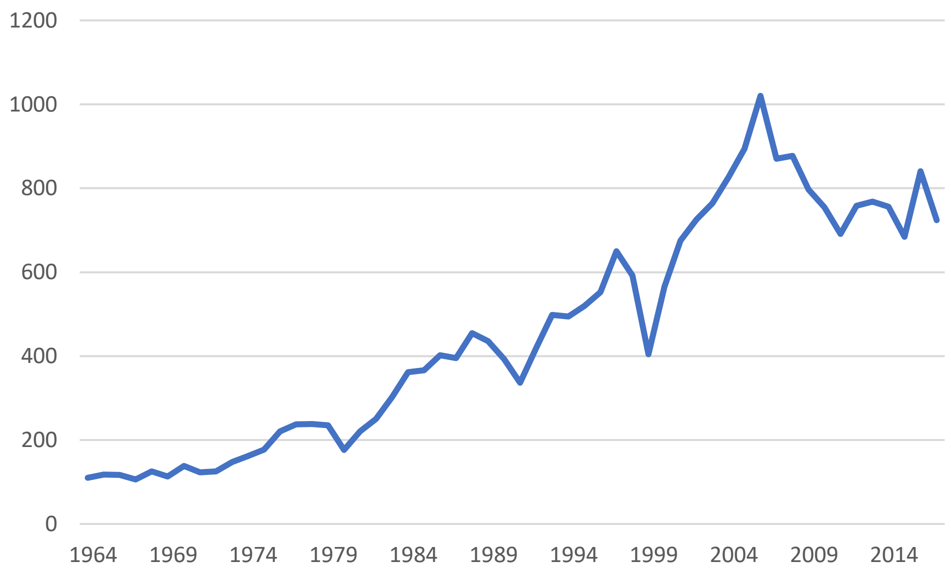
Figure 5.1: Cumulative returns from the size factor (1963-2018)



(Source: Kenneth French online data library (French, 2018))

The value premium is more robust as illustrated in figure 5.2. It was formally discovered by Basu (1977) and refers to the outperformance of value stocks over growth stocks. Value stocks are defined as companies with a low market capitalization relative to their fundamental value. Value stocks tend to move together and this risk can only partly be removed through diversification so it must be priced through a premium (Ang, 2014, pp. 230-235). There are several explanations of the existence of a value premium, both rational and behavioural. Rational theories proposed by Cochrane (1991, 1996) and Zhang (2005) explain it through the flexibility of the company during bad times. Value stocks have more committed capital than growth stocks that makes them rigid and slow to adjust during bad times. This risk is what the value investors are paid for during normal times. Behavioural theories focus on the overreaction or overextrapolation by investors of recent news. Lakonishok, Shleifer and Vishny (1994) find that investors tend to extrapolate past growth of stocks into the future. For growth this means too high expectations for the future and prices are bid up. When the growth does not materialize, the prices of these stocks fall, and they achieve lower returns on average than value stocks where the potential for growth is underestimated. Barberis and Huang (2001) explain value premium through the risk aversion of investors. Since investors dislike losses more than they like an equal gain, two losses following each other is more painful than a single loss. A high book-to-market is explained as a stock that has experienced negative returns and a risk averse investor will view this stock as riskier and demand a higher return to hold it. As we can see, there are many different theories on why a value premium exists but there is no debating its existence.

Figure 5.2: Cumulative returns from the value factor (1963-2018)

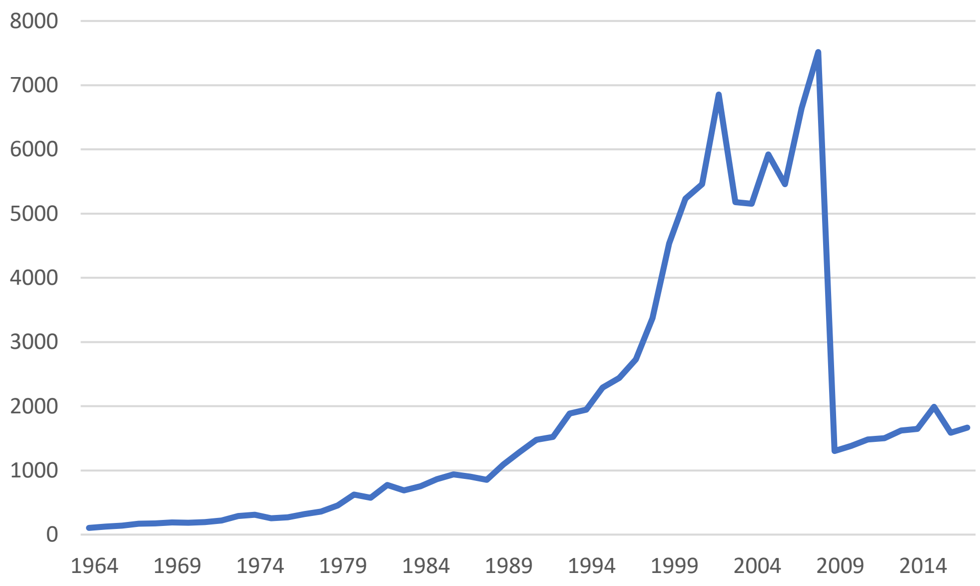


(Source: Kenneth French online data library (French, 2018))

Carhart four factor model

Carhart (1997) extended the Fama-French three factor model by adding a fourth risk factor, namely momentum. Momentum refers to buying the winners and selling the losers over the past year with the argument that momentum seems to persist. Momentum was fully recognized as a risk factor after research by Jegadeesh and Titman (1993). The momentum risk premium is most commonly explained through behavioural theories. It is either explained through overreaction or underreaction to new information (Barberis, Shleifer, & Vishny, 1998; Daniel, Hirshleifer, & Subrahmanyam, 1998; Hong, Lim, & Stein, 2000). The theory of overreaction explains momentum through a delayed overreaction to good news causing prices to drift upwards. The theory of underreaction explains momentum by stating that the price reacts upon good news, but not as much as it should. Investors learn the magnitude of the news and the prices are adjusted in the subsequent period (Ang, 2014, pp. 235-239). The momentum factor has given significant returns since 1963 as can be seen in figure 5.3 but there is also considerable risk by following this approach which is also clearly illustrated.

Figure 5.3: Cumulative returns from the momentum factor (1963-2018)

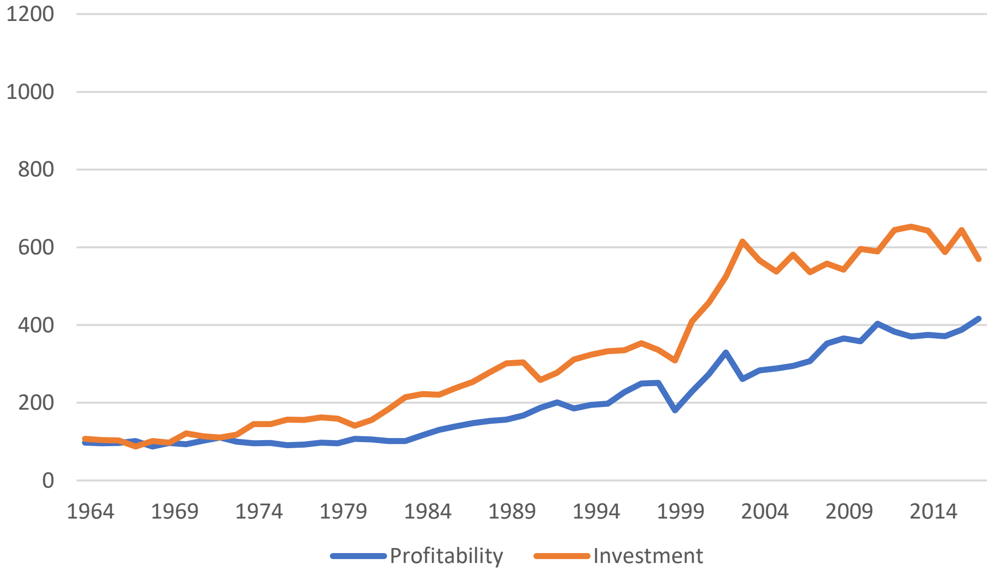


(Source: Kenneth French online data library (French, 2018))

Fama-French five factor model

Fama and French (2015) extended their original three-factor model by adding two additional factors. This is motivated by research suggesting that the three-factor model is inadequate to explain all variation in average returns. Specifically, Titman, Wei and Xie (2004) find that capital investments seem to have a negative effect on the subsequent financial returns of a company and Novy-Marx (2013) finds that profitable firms outperform unprofitable firms. Titman et al. (2004) suggest that the underperformance of companies increasing their capital expenditure comes from investors underestimating the importance of the unfavourable information this sends, while Novy-Marx (2013) does not provide a rational explanation of the outperformance of profitable firms. Fama and French (2015) extend their model with a profitability factor and an investment factor which improves its explanatory power. The profitability factor buys profitable firms and sells unprofitable firms, while the investment factor buys companies with a conservative investment policy and sells companies with an aggressive investment policy. The cumulative returns on these two factors are plotted in figure 5.4.

Figure 5.4: Cumulative returns from the profitability and investment factor (1963-2018)



(Source: Kenneth French online data library (French, 2018))

5.4 Factor models

To determine whether our impact index represents an attractive investment opportunity we have to control for systematic risk and see if it can offer excess returns. A fully diversified investor will only add our impact index to his optimal portfolio if it can offer positive alphas.

By controlling for differences in systematic risk we can also compare the returns of the impact investing index with the returns of conventional global indexes. Returns cannot be compared directly because differences in return can be explained by different exposure to systematic risk factors. After controlling for these differences, we can determine whether our impact index under- or outperforms the conventional indexes. We will do so by subtracting the returns of a conventional index from the returns of our impact index and regress this difference on the factor models. We start with the CAPM and move towards the Fama-French five factor model. Regression results will include all models for our impact index in the main section and for each of the distinctions to the index in Appendix D. We estimate the following models:

CAPM

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,1}(r_{m,t} - r_{f,t}) + \varepsilon_{i,t} \qquad (1)$$

Where:

$r_{i,t}$ is the one-month return of index *i* at time *t*, e.g. the return in January 2012.

$r_{f,t}$ is the one-month risk-free rate at time *t*, e.g. the risk-free rate in January 2012.

$\beta_{i,1}$ is the market beta of index *i*, meaning how the index covaries with the stock market.

$r_{m,t}$ is the one-month stock market return at time *t*, e.g. the one-month return on the stock market in January 2012.

α_i is the monthly average excess return that is unexplained by exposure to risk factors.

$\varepsilon_{i,t}$ is an error term.

Fama-French three factor model

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,1}(r_{m,t} - r_{f,t}) + \beta_{i,2}SMB_t + \beta_{i,3}HML_t + \varepsilon_{i,t} \qquad (2)$$

Where:

$\beta_{i,2}$ is the exposure of index *i* to the size factor, meaning how the index covaries with the excess returns of small companies over large companies.

SMB_t is the one-month return of the size factor at time *t*, e.g. the one-month excess return of small companies over large companies in January 2012.

$\beta_{i,3}$ is the exposure of index *i* to the value factor, meaning how the index covaries with the excess returns of value companies over growth companies.

HML_t is the one-month return of the value factor at time *t*, e.g. the one-month excess return of value companies over growth companies in January 2012.

Carhart four factor model

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,1}(r_{m,t} - r_{f,t}) + \beta_{i,2}SMB_t + \beta_{i,3}HML_t + \beta_{i,4}UMD_t + \varepsilon_{i,t} \tag{3}$$

Where:

$\beta_{i,4}$ is the exposure of index *i* to the momentum factor, meaning how the index covaries with the excess returns of past winners over past losers.

UMD_t is the one-month return of the momentum factor at time *t*, e.g. the one-month excess return of past winners over past losers in January 2012.

Fama-French five factor model

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,1}(r_{m,t} - r_{f,t}) + \beta_{i,2}SMB_t + \beta_{i,3}HML_t + \beta_{i,4}RMW_t + \beta_{i,5}CMA_t + \varepsilon_{i,t} \tag{4}$$

Where:

$\beta_{i,4}$ is the exposure of index *i* to the profitability factor, meaning how the index covaries with the excess returns of profitable firms over unprofitable firms.

RMW_t is the one-month return of the profitability factor at time *t*, e.g. the one-month excess return of profitable firms over unprofitable firms in January 2012.

$\beta_{i,5}$ is the exposure of index *i* to the investment factor, meaning how the index covaries with the excess returns of conservative firms over aggressive firms.

CMA_t is the one-month return of the investment factor at time t, e.g. the one-month excess return of conservative firms over aggressive firms in January 2012.

Data for these models is collected from the official website of Kenneth R. French and is used to estimate the listed models in the empirical analysis section (French, 2018). Market data for the global factors are based on global stock exchanges while the American factors are based on NYSE, NASDAQ and AMEX. The risk-free rate is the US one-month T-bill rate. Data for the conventional indexes we compare with is collected from the Morningstar Direct database for an ETF on the relevant index (Morningstar, 2018). Specifically, we collect monthly market returns for the iShares MSCI ACWI ETF, iShares Russell 2000 ETF, iShares Core S&P 500 ETF and SPDR Dow Jones Industrial Average ETF over the sample period (iShares, 2018a, 2018b, 2018c; SPDR, 2018). All returns are in USD.

5.5 OLS assumptions

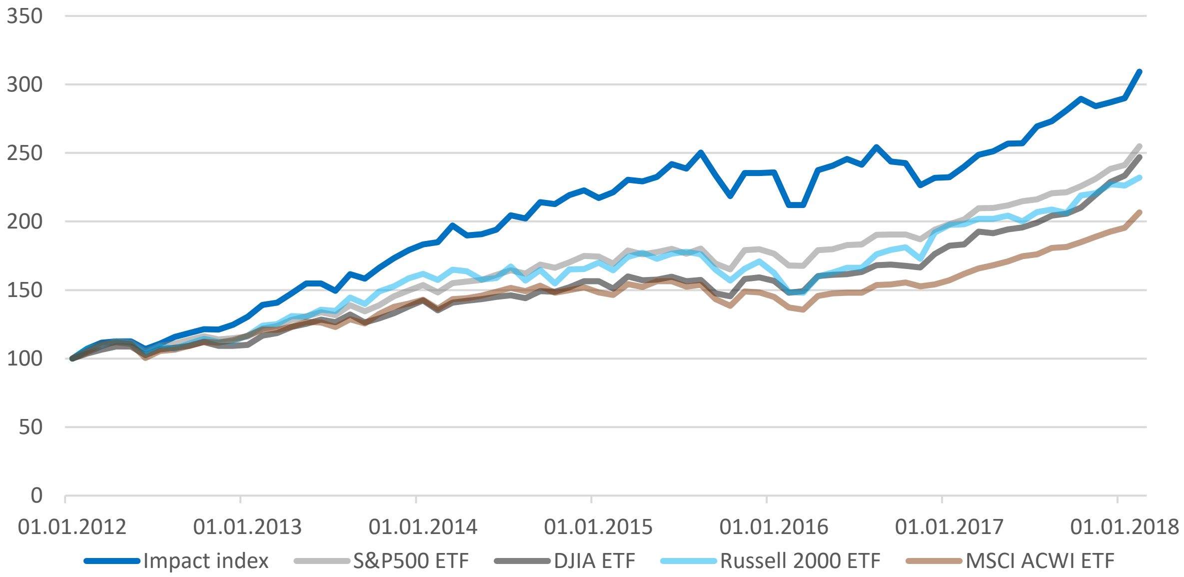
Before moving on to the empirical analysis there are some assumptions needed about the data to get unbiased and efficient results. Presence of multicollinearity, autocorrelation, heteroskedasticity and unit-root can provide false evidence, so we will test for these problems in Appendix C.

6. Empirical analysis

6.1 Comparative analysis

Figure 6.1 plots the cumulative return of our impact index together with the cumulative returns of four global indexes from January 2012 throughout January 2018. As we can see, our impact index yields a higher return over the period of time than any of its peers. We can also see that the US-based indexes seem to outperform the MSCI ACWI index capturing the global market. Investing $100 in our impact index at the beginning of the period would have returned just over $300 by the end, while the MSCI ACWI index would have returned just over $200. The best conventional index is the S&P 500 which returns just above $250 on a $100 investment over the period illustrated. This plot suggests that our impact index outperforms but is superficial without accounting for risk. The plot does seem to suggest our impact index is more volatile than its peers.

Figure 6.1: Cumulative returns over the sample period (2012-2018)



Cumulative returns for our impact index, iShares Core S&P 500 ETF (S&P 500 ETF), SPDR Dow Jones Industrial Average ETF (DJIA ETF), iShares Russell 2000 ETF (Russell 2000 ETF) and iShares MSCI ACWI ETF (MSCI ACWI ETF) from January 1st, 2012 to January 31st, 2018. (Source: Morningstar Direct database (Morningstar, 2018))

Table 6.1: Average returns, standard deviations, and Sharpe-ratios

	12-month			36-month			72-month		
	Mean	Std	Sharpe	Mean	Std	Sharpe	Mean	Std	Sharpe
Impact index	0,02	0,02	0,93	0,01	0,04	0,23	0,02	0,04	0,41
S&P 500 ETF	0,02	0,02	1,18	0,01	0,03	0,39	0,01	0,03	0,45
DJIA ETF	0,03	0,02	1,25	0,01	0,03	0,44	0,01	0,03	0,42
Russell 2000 ETF	0,01	0,02	0,57	0,01	0,04	0,25	0,01	0,04	0,29
MSCI ACWI ETF	0,02	0,01	1,50	0,01	0,03	0,32	0,01	0,03	0,32

Monthly arithmetic average returns, standard deviations and Sharpe-ratios for our impact index, iShares Core S&P 500 ETF (S&P 500 ETF), SPDR Dow Jones Industrial Average ETF (DJIA ETF), iShares Russell 2000 ETF (Russell 2000 ETF) and iShares MSCI ACWI ETF (MSCI ACWI ETF) over the past 12 months, 36 months and 72 months

Table 6.1 displays the monthly arithmetic average returns, standard deviations, and the Sharpe-ratios of our impact index along with the conventional indexes. The statistics reflect much of the same picture we saw in the cumulative plot. Our impact index achieved a higher average return and a higher standard deviation than its peers over the sample period. By accounting for risk and return through the Sharpe-ratio, the outperformance suggested by the cumulative plot is now dependent on what index we compare with. We can see that our impact index still achieves a higher Sharpe-ratio than the MSCI ACWI and Russell 2000 index, suggesting outperformance but underperforms the S&P 500 and the DJIA index. The performance of our impact index also depends on the measured time-period. We can see that over the past year, our impact index underperformed all conventional indexes except the Russell 2000 index. Over the past three years, our impact index underperformed all the conventional indexes.

6.2 Risk-adjusted returns

In this section we will present the regression results for our impact index regressed against all four factor models reviewed in section 5. We also present the regression results for the difference in return against a conventional peer. Since we are taking a global perspective we use the difference in return against the MSCI ACWI index capturing global stock market. By the same rationale, we use risk factors based on the global stock market in our regressions.

Table 6.2: Regression results for our impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	1,040***	0,044	1,061***	0,070	1,115***	0,118	1,035***	0,014
	(10,11)	(0,50)	(13,50)	(0,82)	(13,29)	(1,32)	(11,23)	(0,10)
SMB			0,237	0,390*	0,264	0,378*	0,100	0,175
			(1,27)	(1,91)	(1,42)	(1,87)	(0,46)	(0,68)
HML			-0,471***	-0,458***	-0,326*	-0,274	-0,720***	-0,760***
			(-3,22)	(-2,94)	(-1,94)	(-1,48)	(-3,22)	(-3,02)
UMD					0,194*	0,224*		
					(1,69)	(1,70)		
RMW							-0,475	-0,669
							(-1,49)	(-1,66)
CMA							0,271	0,240
							(0,83)	(0,63)
Alpha	0,005	0,005*	0,004*	0,005*	0,003	0,003	0,005*	0,006**
	(1,53)	(1,90)	(1,72)	(1,92)	(0,99)	(1,10)	(1,92)	(2,05)
R^2	0,688	0,003	0,731	0,140	0,742	0,172	0,741	0,193
Adjusted R^2	0,683	-0,011	0,719	0,102	0,727	0,122	0,721	0,133
Observations	73	73	73	72	73	72	73	73

Monthly returns of our impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{Impact,t} - r_{MSCI,t}$. Impact adjusted for heteroskedasticity in equation (1). Diff MSCI adjusted for heteroskedasticity in equation (4), and for autocorrelation in equation (2) and (3). T statistics in parentheses $^{*}p < 0{,}10$, $^{**}p < 0{,}05$, $^{***}p < 0{,}01$. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))

Table 6.2 presents regression results for the full index and the difference in return against the MSCI ACWI index. First, we can see that our impact index returns positive alphas in all models indicating returns in excess of its exposure to systematic risk. However, these alphas are only significant in the Fama-French three factor and five factor models at a 10 percent level of significance. The results suggest a monthly alpha in the range 0,4 to 0,5 percent, 4,8 to 6 percent annualized.

Two patterns seem clear in explaining the returns of our impact index. The index obtains a positive market close to 1 in all models which is significant at a 1 percent level. This indicates that our impact index is varies similarly to the market. The index also obtains a negative loading on the value factor in all models where it is included. It is significant at a 1 percent level in both the Fama-French three factor and five factor models but only at a 10 percent level in the Carhart four factor model. This clearly indicates that our impact index is exposed to growth companies. However, the sensitivity to this risk seems to vary between the models with a loading ranging from negative 0,326 to negative 0,72. Other patterns are unclear. The Carhart four factor model produces a positive loading on the momentum factor indicating that the index is slightly exposed to past winners, but this is barely significant at a 10 percent level. The models consistently seem to produce positive loadings on the size factor but are not significant at any reasonable level. The profitability factor also achieves a negative loading in the Fama-French five factor model that is on the verge of becoming significant. However, a large share of the variation in the returns of our impact index remain unexplained by the models. At best the Carhart four factor model can explain 72,7 percent of the variation, leaving nearly 30 percent unexplained.

The difference in return produces a positive alpha in all models. It is significant at a 5 percent level in the Fama-French five factor model and at a 10 percent level in the CAPM and the Fama-French three factor model. The results indicate that our impact index outperformed the MSCI ACWI index over the sample period. The models suggest an annual outperformance ranging from 6 to 7,2 percent compared to the MSCI ACWI index. This aligns with the findings in table 6.1 where our impact index produced a slightly higher Sharpe-ratio over the full sample period.

The differences in return between these indexes seem largely explained by differences in exposure to the value factor. In both the Fama-French three factor and five factor models the differences in return are explained by a negative and highly significant loading on the value factor. This means that exposure to growth stocks seem to be driving the differences in return between our impact index and the MSCI ACWI index. The results also indicate that our impact index is more exposed to small firms and past winners than the MSCI ACWI index. The differences in returns are explained by positive loadings on the size factor in all models where it is included but it is only significant at a 10 percent level in the Fama-French three factor and the Carhart four factor models. The Carhart four factor models additionally produces a positive loading on the momentum factor which is significant at a 10 percent level.

The results indicate that our impact index could have been an attractive investment opportunity for a fully diversified investor over this period. Our impact index produced a positive and significant alpha ranging from 4,8 to 6 percent which the investor could have exploited by increasing his portfolio weights towards these companies. However, the alpha is only significant at a 10 percent level and is not consistent throughout the models. The Carhart four factor model, which fits the data best, does not produce a significant alpha. The results also indicate that our impact index outperformed the MSCI ACWI index over the sample period by an excess risk-adjusted return ranging from 6 to 7,2 percent. This means that an investor holding the global stock market as his optimal mean-variance portfolio could increase his performance of by selling a share of his portfolio and buying our impact index. This seems consistent throughout the models except the Carhart four factor model and is significant at a 5 percent level in Fama-French five factor model. Finally, the results suggest that the returns of the impact investing index can be replicated by holding the market and tilting towards growth stocks and past winners. These results provide a first indication that it is possible to do well by doing good.

6.3 Robustness tests

The results in section 6.2 suggest that our impact index provides an attractive investment opportunity from a financial point of view. However, we mentioned several weaknesses of our approach in section 4 that could affect the results. To provide an indication of how sensitive our results are to these weaknesses we provide a series of tests presented in Appendix D. First, the descriptive statistics in section 4 showed us that our impact index includes a large share of healthcare companies, representing 63 percent of the weights by 2018. We distinguish between healthcare and non-healthcare companies in the appendix to determine how this affects the performance of the index. We also found indications by previous research that impact investing focuses on small firms at an early stage of their life cycle. To determine what effect this would have on performance we remove all companies categorized as large-cap from the index and analyse the remaining companies. Second, we took a global perspective of impact investing in the main section, using global risk factors and comparing with an index capturing the global stock market. However, the descriptive statistics in section 4 showed us that the dominant share of companies in our impact index are based in North America and the results in section 6.1 indicated that the relative performance of our impact index depends on the peer. Therefore, we will try using risk factors based on American stock exchanges and compare with indexes tracking companies listed in the US to see how this affects our results. Third, we mentioned the level of subjectivity underlying the selection of companies for our impact index in section 4. To see how sensitive the results are to changes in the selection process we create three new that track the performance of companies that are found eligible as impact investments by the definitions of other institutions. We analyse these indexes separately to see how this affects the results. Finally, we have mentioned that our approach to analysing the performance of impact investments might imply problems with survivorship bias. We cannot overcome this problem, but we can give an indication of how it affects our results.

7. Discussion

We started this thesis with two goals: to raise the understanding of impact investing and investigate the financial performance of the strategy applied in public equities. In this section we will summarize our main findings and elaborate on the implications of the results.

7.1 Defining impact investing

The first goal of raising the understanding of the term implies investigating how impact investing is defined. We reviewed literature on the subject and found a definition that captures the core concepts of impact investing. It refers to investing with the intention of generating financial returns and positive benefits for the society and environment. Impact investments may target financial returns ranging from capital preservation to market rate returns. They can target a wide range of societal and environmental challenges, but the impact should be measured or at least be measurable. The impact objective does not have to be prioritized over the financial objective, but the investor should be committed to both. This places impact investing at the intersection between conventional investing and philanthropy.

The research we have reviewed is largely based on the definitions and work of GIIN (2018b). This means that our findings could be slightly biased towards their criteria and definitions. It could be interesting for further research to see whether impact investing is defined in the same way outside GIIN to provide further evidence on how the term is understood globally. On the other hand, the impact investing industry is evolving and GIIN was established to direct this development. Thus, the definitions and criteria used by GIIN (2018b) might be most relevant. By exploring existing literature, we also found unanswered questions about the structure of impact investments. The questions surrounding impact investing in public equities are especially important for the potential growth. One of these questions is whether impact investments must create an additional impact after controlling for what would have happened without the investment. If this is the case the potential for impact investing public equities will be restricted, as traditional passive investments in companies would not be enough. If investing in companies that have a positive impact is enough, the boundaries to related investment strategies must be clarified. This entails establishing a clear definition of impact investments that includes criteria for organizational characteristics. The process of making and managing impact investments in public equities also needs clarification. The impact of an impact investment must be measured or at least be measurable which makes traditional approaches to public equity investments problematic. A public equity investor is usually distanced from his investments and takes small positions in many companies. This makes it difficult to observe and measure the impact, raising the question of whether impact investing can occur through diversified portfolios or whether it is restricted to direct investments.

The answers to these questions will set implications for the potential scope and profitability of impact investing, but the lack of consensus is holding back the growth of the industry. As the industry matures and the concept is further clarified it will be easier to identify impact investments in public equities which implies more precise information about the profitability of the strategy. For now, this analysis can serve as a first indication of the potential profitability of impact investing in public equities.

7.2 Financial performance

The second goal of this thesis was to investigate the potential profitability of impact investing in public equities. We do so by creating an impact investing index and evaluating its performance. By considering the cumulative return and Sharpe-ratio of the index we get an idea of how it performs relative to conventional indexes. To investigate the profitability of making impact investments from a fully diversified perspective, we analyse the alphas and the relative performance of our impact index against a conventional peer.

Our initial results indicate that it is possible to do well by doing good. Our impact index produced positive alphas, suggesting that a fully diversified investor would have improved his risk-adjusted performance by increasing his exposure to the index. We also analyse the difference in return against a conventional peer which indicates outperformance by our impact index. This means that an investor would earn higher risk-adjusted returns by investing in our impact index over the conventional index. In other words, impact investing could be a profitable strategy for investors in public equities. An implicit result of our analysis is also suggesting a portfolio for replicating the performance of our impact index. This can be achieved by holding the global stock market and tilting towards growth stocks and past winners. This might be a more convenient way of gaining exposure toward impact investments.

However, by digging deeper into the weaknesses of our approach we find indications that the results are sensitive to changes in the underlying assumptions. By analysing healthcare and non-healthcare companies separately we find that the healthcare sector drives the outperformance of the full impact index. By using American risk factors and comparing with American stock market indexes, all signs of outperformance disappear. The overall trend by using American risk factors seems to be that positive estimates become less significant while negative estimates become more significant. By creating three new indexes based on companies found eligible for impact investing by a third party we find that our results are robust within a certain range of defining impact investments. Two out of the three indexes provide similar results in terms of performance and risk factors exposure, while the last one provides contradicting evidence. Finally, we try to indicate how survivorship bias affects our results. We do so by creating a subsample consisting only of the companies that have data throughout the sample period. We find a slight underperformance by this restricted subsample, meaning that the companies that are added along the way affect the performance of the index positively. Including the companies that have disappeared during the sample period would likely depress performance further. Thus, we must be careful in concluding that impact investing will provide profitable investment opportunities on average.

On the other hand, none of the analyses find any signs of underperformance by our impact index. While the healthcare companies outperform, the non-healthcare companies do not underperform. In addition, it is important to remember that the healthcare sector is an important part of the impact investing industry, so their performance should not be disregarded when assessing the performance of impact investments. With more data it could be interesting to distinguish between more sectors to see if some impact objectives are more profitable than others. Using American risk factors lowers the performance of our impact index slightly but does not make it underperform. However, when we argue for a global perspective of impact investing the results using global factors are more relevant. We also saw that these fit the data slightly better than the American factors. Finally, although the analysis we have performed suggests that adjusting for survivorship bias would remove all signs of outperformance, the bias would have to be very large for the index to underperform given the results we have found.

8. Conclusion

In this thesis we have clarified the definition of impact investing and where it is placed in the universe of responsible investment strategies. We have done so in an effort to raise the global understanding of the term and taken a step towards a more unified definition. The definition we find places impact investing at the intersection between philanthropy and conventional investing by requiring financial returns and an intentional positive impact on the society and environment. We have also investigated the profitability of impact investments in public equities, extending the scarce literature on the topic. Our initial results indicate that impact investments can offer attractive returns but after adjusting for the limitations of our approach, we cannot conclude that they do so on average. On the other hand, our analysis finds no indications of concessionary returns compared to conventional investing, suggesting that it is possible to do as well by doing good.

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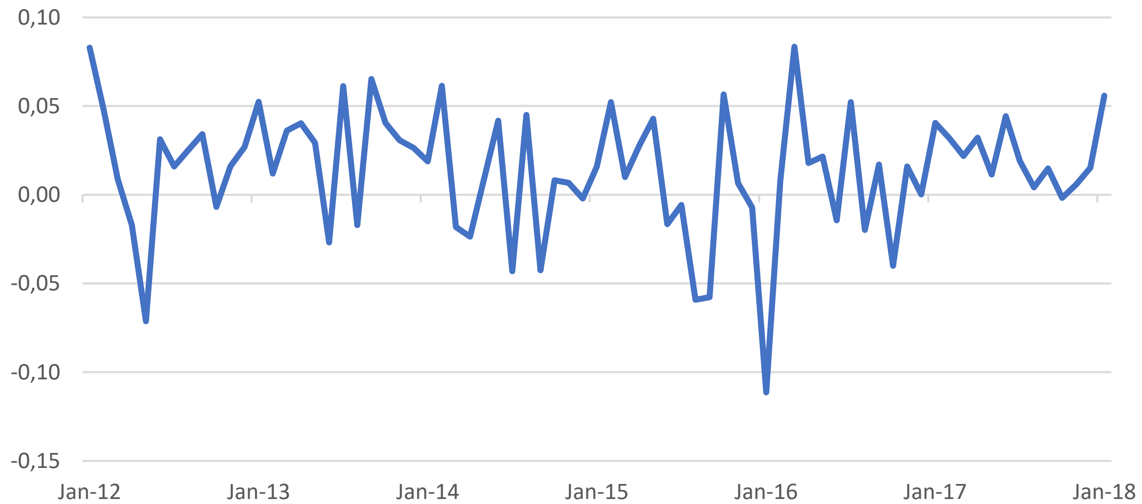
Appendix

Appendix A: Removing large-cap companies from the index

Höchstädter and Scheck (2015) found the size and nature of the investments to be a commonly cited difference between impact investing and SRI. Existing literature suggests that impact investments usually target small companies at an early stage of their life cycle. Contradicting this suggestion, our impact index includes a significant share of companies categorized as large-cap. To shed further light on the performance of impact investments we want to see if the index provides entirely different results if we only analyse small- and mid-cap companies. This means that we remove companies with a market capitalization of $10 billion or greater. However, if we use their market capitalization by the end of the sample period we remove companies that were small- or mid-cap in the beginning and have grown. On the other hand, if we use their market capitalization at the beginning of the sample period we remove companies were large-cap to begin with and have been unsuccessful. Therefore, we calculate the average market capitalization over the sample period for each company and remove the ones that obtain an average greater than $10 billion. This leaves us with 84 companies by 2018 which we use to create a value weighted index in the same way as in section 4.2. Figure A.1 plots the monthly market returns of the index over the sample period which shows a similar pattern to what we saw for the full index in figure 4.4.

Figure A.1: 10-year monthly market returns for the small- and mid-cap impact index (2008 – 2018)



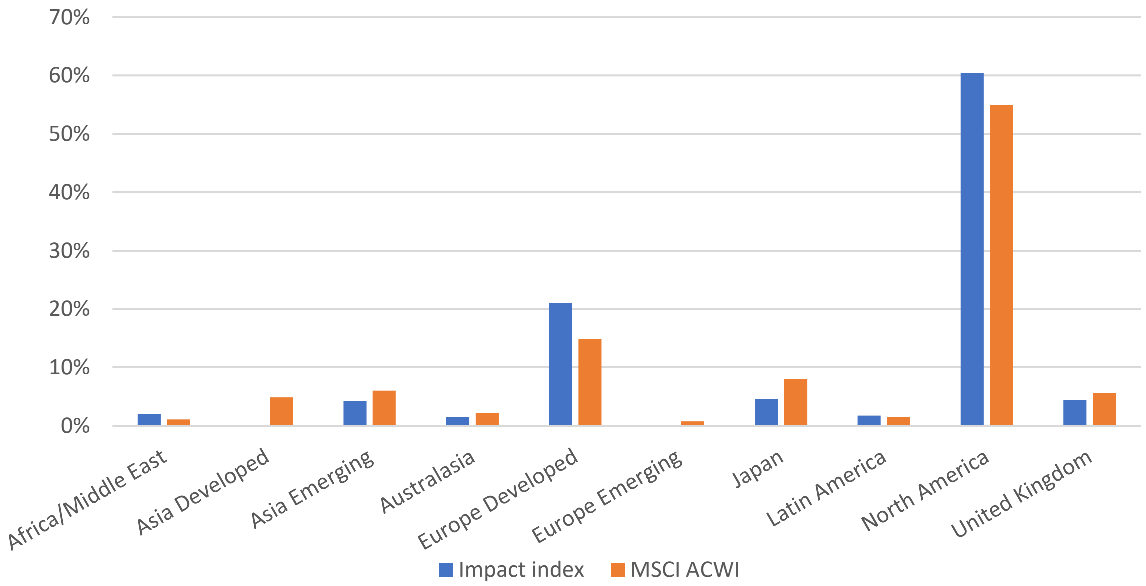
Monthly market returns for the small- and mid-cap impact index from January 31st, 2008 to January 31st, 2018

Table A.1: Number of companies included in the small- and mid-cap impact index by the start of each year

Year	Number of companies 01.01.
2012	55
2013	57
2014	66
2015	73
2016	77
2017	83
2018	84

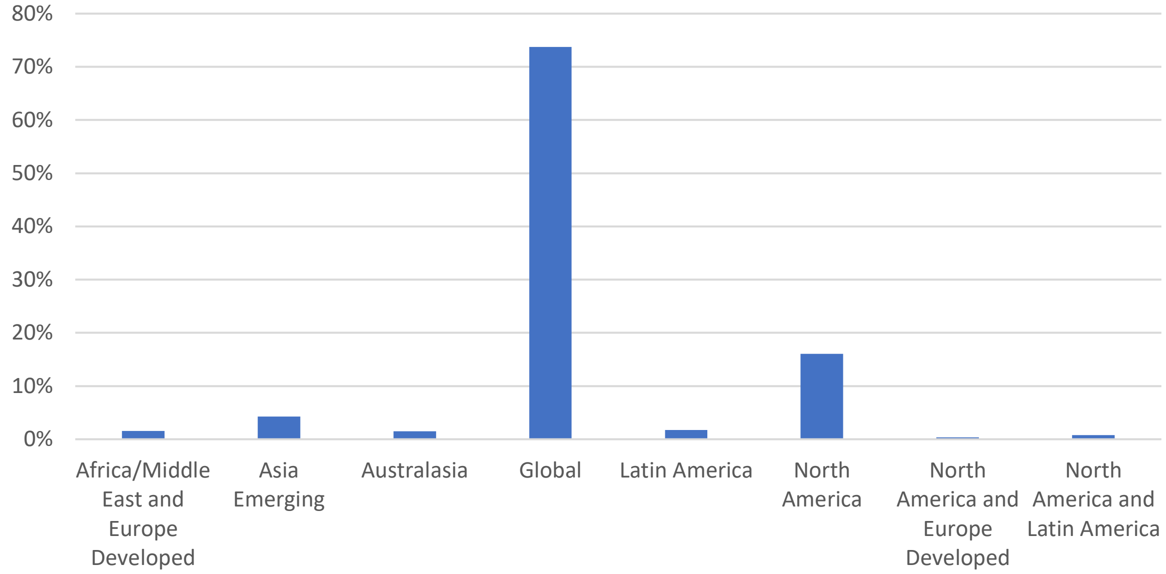
Figure A.2 plots the index weights by world region in 2018 for the small- and mid-cap impact index and the MSCI ACWI index. The distributions between regions are still similar. There is a slight overweight on North America and Europe Developed compared to the MSCI index, but the differences are small. Figure A.3 plots the target geography of the companies underlying the small- and mid-cap impact index. This illustrates that the index primarily consists of global companies. In other words, the index characteristics supports a global perspective.

Figure A.2: Geographic spread of the small- and mid-cap impact index by nationality



Portfolio weights for the small- and mid-cap impact index (impact index) and the iShares MSCI ACWI ETF (MSCI ACWI) by world region by the end of January 2018. Portfolio weights for the iShares MSCI ACWI ETF retrieved from the Morningstar Direct database (Morningstar, 2018)

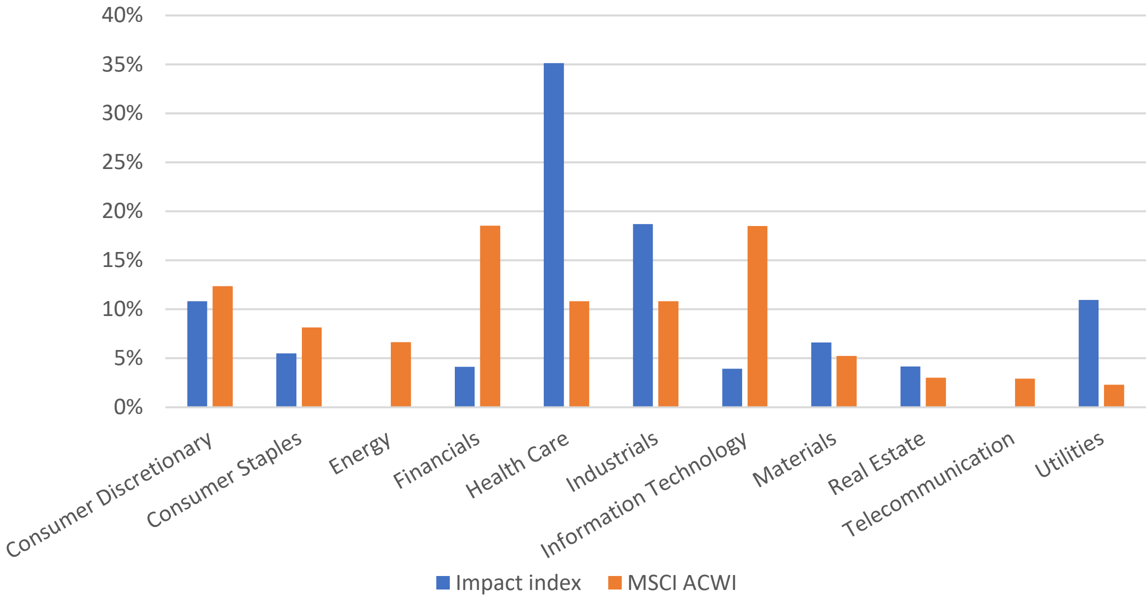
Figure A.3: Geographic spread of the small- and mid-cap impact index by target geography



Portfolio weights for the small- and mid-cap impact index by target geography by the end of January 2018

Figure A.4 plots the index weights by GICS sector for the small- and mid-cap impact index and MSCI ACWI index in 2018. The index seems more evenly distributed between sectors but is still underrepresented in some groups compared to the MSCI ACWI index. The dominant share of healthcare companies is reduced. The healthcare sector now represents 35 percent of the weights compared to 63 percent in the full impact index. This means that the healthcare sector will have less influence on this index than on the full impact index. It also means that the relative influence of the other sectors increases, which is clearly illustrated. However, healthcare is still the largest sector.

Figure A.4: Sector spread by GICS classification



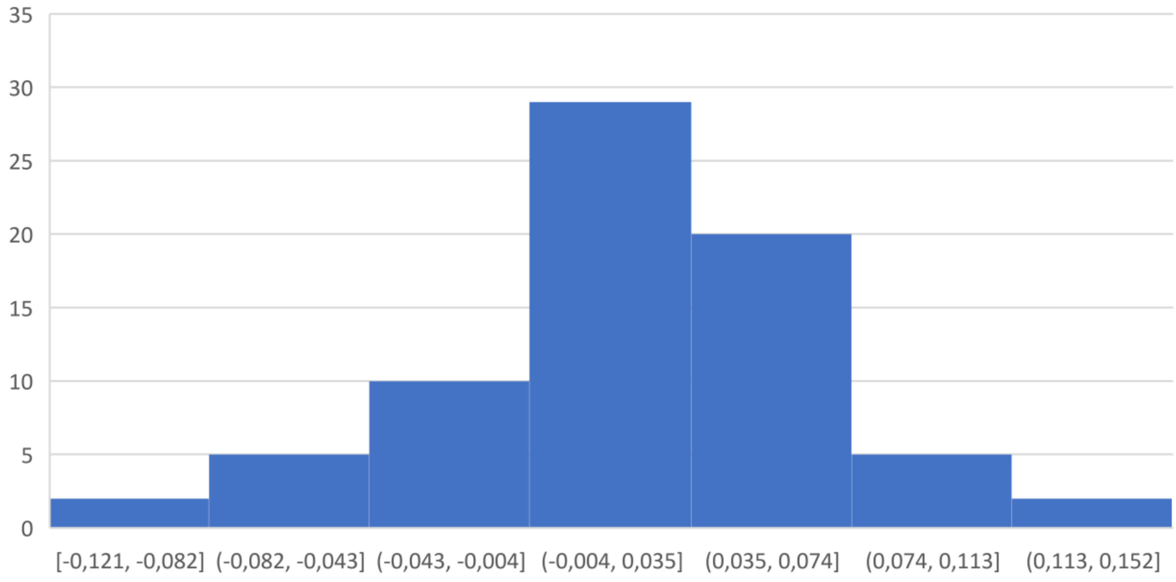
Portfolio weights for the small- and mid-cap impact index and the iShares MSCI ACWI ETF (MSCI ACWI) by Global Industry Classification Standard (GICS) sector by the end of January 2018. Data for the iShares MSCI ACWI ETF retrieved from the Morningstar Direct database (Morningstar, 2018)

Making this distinction has kept the geographical spread intact while reducing the dominance of the healthcare sector. The argument for only including small- and mid-cap companies is based on the current state of the impact investing industry. Knowing that the industry is evolving, the focus on small growth companies may only be a result of its immaturity. Thus, the small- and mid-cap distinction might not be more representative than the full sample, but we will nonetheless analyse it separately in the appendix to see if it returns entirely different results. This will at least give us an indication of how sensitive the results are to this uncertainty.

Appendix B: Sampling distributions of sub-groups

In section 4 we found that significant share of the companies in the full impact index by 2018 were in the healthcare sector. To analyse how this affects our overall results we will analyse the performance of healthcare and non-healthcare companies separately in the appendix. To do so we have to check whether the basic assumption of normally distributed of stock market returns also holds for these distinctions. We plot histograms for the returns of healthcare and non-healthcare companies and display them below. Figure B.1 and B.2 suggest that the returns for both groups are normally distributed. Both plots display a distribution with most weight around the median value with observations on either side. However, descriptive statistics in table B.1 and B.2 tells us that the distributions are slightly negatively skewed and more concentrated than a standard normal distribution. The healthcare and the non-healthcare index get a skewness of negative 0,48 and 0,29 respectively. This means that both have a longer negative tail than a symmetrical normal distribution. The two indexes get a kurtosis of 1,06 and 0,38 respectively. This means that the indexes are less likely to achieve extreme observations than a normal bell curve. Overall, the healthcare and non-healthcare distinctions seem to have normally distributed returns.

Figure B.1: Histogram of returns for the healthcare companies over the sample period (2012-2018)



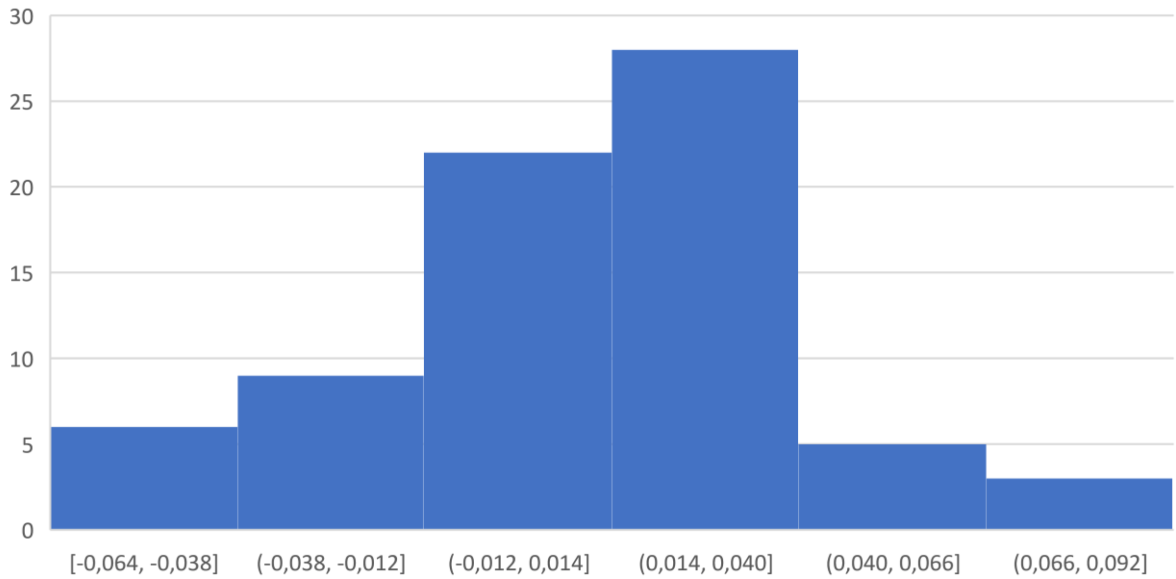
Distribution of monthly returns for the healthcare impact index over the period January 1st, 2012 to January 31st, 2018

Table B.1: Summary statistics for the healthcare index over the sample period (2012-2018)

	Healthcare impact index
Mean	0,0203
Median	0,0231
Standard deviation	0,0463
Sample variance	0,0021
Kurtosis	1,0572
Skewness	-0,4812
n	73

Summary statistics for the returns of the healthcare impact index. Arithmetic average return, median return, standard deviation, sample variance, kurtosis, skewness, and number of observations (n) over the sample period

Figure B.2: Histogram of returns for the non-healthcare companies over the sample period (2012-2018)



Distribution of monthly returns for the non-healthcare impact index over the period January 1st, 2012 to January 31st, 2018

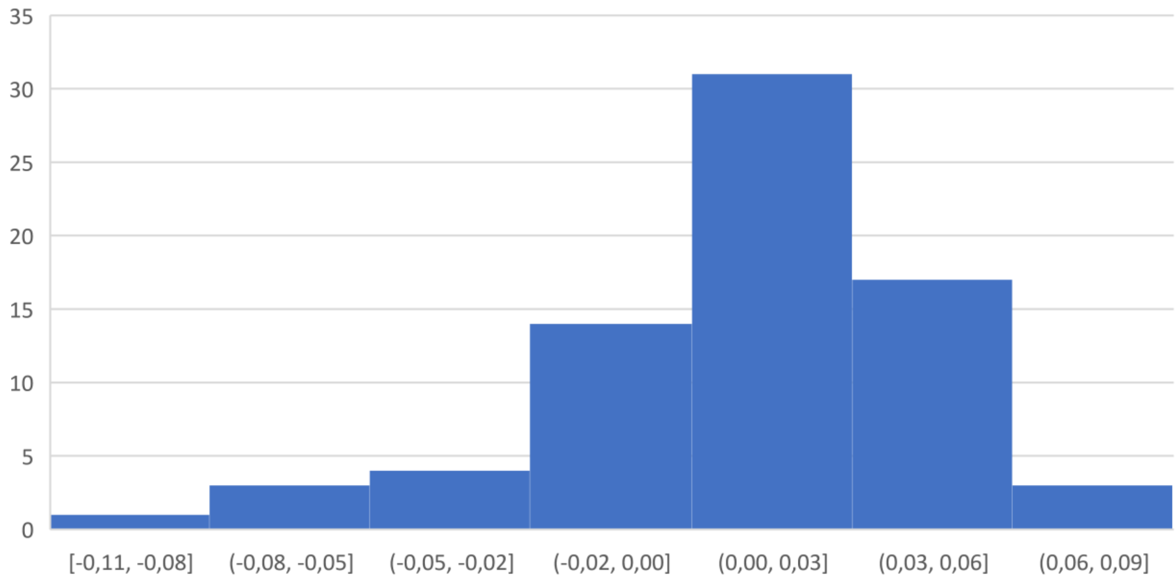
Table B.2: Summary statistics for the non-healthcare index over the sample period (2012-2018)

	Non-healthcare impact index
Mean	0,0110
Median	0,0130
Standard deviation	0,0309
Sample variance	0,0010
Kurtosis	0,3867
Skewness	-0,2955
n	73

Summary statistics for the returns of the non-healthcare impact index. Arithmetic average return, median return, standard deviation, sample variance, kurtosis, skewness, and number of observations (n) over the sample period

We also made a distinction toward small- and mid-cap companies to see if the results in our main section are sensitive to the argument that impact investment on small growht companies. We also need to check the assumption of normal distribution for this distinction. Figure B.3 plots a histogram of the returns over the sample period which indicates that the returns of the small- and mid-cap impact index are normally distributed. The plot displays a distribution with emphasis around the median value and observations on either side. However, the plots seems to suggest a long negative tail which is confirmed by the statistics in table B.3. The index obtains a skewness of negative 0,83 and a kurtosis of 1,55. This means that the distribution does have a longer negative tail and is more concentrated than a standard Gaussian distribution. Overall, the assumption of normal distribution seems to hold.

Figure B.3: Histogram of returns for the small- and mid-cap companies over the sample period (2012-2018)



Distribution of monthly returns for the small- and mid-cap impact index over the period January 1st, 2012 to January 31st, 2018

Table B.3: Summary statistics for the small- and mid-cap index over the sample period (2012-2018)

	Small- and mid-cap impact index
Mean	0,0137
Median	0,0160
Standard deviation	0,0351
Sample variance	0,0012
Kurtosis	1,5867
Skewness	-0,8424
n	73

Summary statistics for the returns of the small- and mid-cap impact index. Arithmetic average return, median return, standard deviation, sample variance, kurtosis, skewness, and number of observations (n) over the sample period

Appendix C: Testing the OLS assumptions

Multicollinearity

Multicollinearity means that there is a linear relationship between the explanatory variables. Presence of this problem can cause the estimates to be biased because it will be impossible to separate the effects of the different explanatory variables from each other. Multicollinearity can easily be tested for by considering the Variance Inflation Factor (VIF) value, which can be obtained directly from a statistical calculator after regressing the model. We regress the full index on all the models and obtain the results listed in table C.1.

Table C.1: Multicollinearity test for all factor models

	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
Variables	VIF	1-(1/VIF)	VIF	1-(1/VIF)	VIF	1-(1/VIF)	VIF	1-(1/VIF)
MktRF	1	1	1,01	0,010	1,18	0,153	1,39	0,281
SMB			1,02	0,020	1,03	0,029	1,39	0,281
HML			1,02	0,020	1,38	0,275	2,4	0,583
UMD					1,59	0,371		
RMW							2,34	0,573
CMA							1,84	0,457

Variance Inflation Factor (VIF) values for all explanatory variables

The critical value for VIF is debated. Some state that as long as the VIF is below 10 you are safe, others argue for even lower critical values (Allison, 2012; Mendenhall & Sincich, 2013, pp. 349-355). VIF is calculated as:

$$VIF_i = \frac{1}{1 - R_i^2}$$

Where R_i^2 represents how much of the variation in explanatory variable i is explained by the other explanatory variables in the model. A VIF value of 10 means that 90 percent of the variation in one of the explanatory variables can be explained the rest. However, the largest VIF value observed for our model is 2,4 for the value factor (HML) in the Fama-French five factor model, meaning that 58,3 percent of the variation in HML can be explained by the other factors. This is generally considered very low, so we conclude that multicollinearity is not a problem for our models.

Autocorrelation

Autocorrelation means that there is correlation between the residuals at different points in time of a time-series. This is a violation of the assumption of identical and independent distribution of the residuals in an OLS model and will make the model inefficient, and in small samples can also affect the coefficients. Since we want to make statistical inference we need the model to be efficient. Autocorrelation can easily be tested through a Breusch-Godfrey test on the residuals with a specified number of lags. The zero hypothesis is that there is no autocorrelation. Tables C.2 through C.6 display the results of Breusch-Godfrey tests for the full impact index, the subsamples and the MSCI ACWI index. The test is performed with a different number of lags for all factor models. Generally, our data does not provide sufficient evidence to reject the null-hypothesis and state that we have a problem with autocorrelation. However, the null-hypothesis is rejected at a 10 percent level of significance for the MSCI ACWI index with one lag in the Fama-French three factor model and the Carhart four factor model. Hence, we will adjust for autocorrelation in cases where this index is regressed on those factors models through the Cochrane-Orcutt procedure.

Table C.2: Breusch-Godfrey test for autocorrelation, impact index

Model	lags(p)	chi2	df	Prob > chi2
CAPM	1	0,391	1	0,5318
	12	12,681	12	0,3927
	24	32,606	24	0,1127
Fama-French three factor model	1	0,025	1	0,8751
	12	14,49	12	0,2705
	24	32,07	24	0,1253
Carhart four factor model	1	0,088	1	0,7668
	12	11,937	12	0,4507
	24	30,573	24	0,1665
Fama-French five factor model	1	0,409	1	0,5224
	12	12,468	12	0,4088
	24	29,736	24	0,1937

Breusch-Godfrey test for autocorrelation for our impact index in all models, H0: No autocorrelation

Table C.3: Breusch-Godfrey test for autocorrelation, healthcare impact index

Model	lags(p)	chi2	df	Prob > chi2
CAPM	1	0,069	1	0,7926
	12	11,549	12	0,4825
	24	29,362	24	0,2068
Fama-French three factor model	1	0,004	1	0,9488
	12	15,652	12	0,2077
	24	29,709	24	0,1946
Carhart four factor model	1	0,025	1	0,8745
	12	13,59	12	0,3276
	24	29,194	24	0,2129
Fama-French five factor model	1	0,195	1	0,6585
	12	14,73	12	0,2565
	24	27,172	24	0,2965

Breusch-Godfrey test for autocorrelation for the healthcare impact index in all models, H0: No autocorrelation

Table C.4: Breusch-Godfrey test for autocorrelation, non-healthcare impact index

Model	lags(p)	chi2	df	Prob > chi2
CAPM	1	0,597	1	0,4397
	12	10,324	12	0,5876
	24	19,923	24	0,7012
Fama-French three factor model	1	0,209	1	0,6476
	12	7,342	12	0,8342
	24	15,414	24	0,9081
Carhart four factor model	1	0,188	1	0,6643
	12	7,77	12	0,8029
	24	17,649	24	0,8197
Fama-French five factor model	1	1,077	1	0,2994
	12	11,075	12	0,5225
	24	25,042	24	0,4035

Breusch-Godfrey test for autocorrelation for the non-healthcare impact index in all models, H0: No autocorrelation

Table C.5: Breusch-Godfrey test for autocorrelation, small- and mid-cap impact index

Model	lags(p)	chi2	df	Prob > chi2
CAPM	1	1,145	1	0,2846
	12	13,069	12	0,3641
	24	23,498	24	0,4906
Fama-French three factor model	1	0	1	0,9945
	12	10,403	12	0,5807
	24	19,989	24	0,6974
Carhart four factor model	1	0,005	1	0,943
	12	9,044	12	0,6992
	24	20,189	24	0,686
Fama-French five factor model	1	0,164	1	0,6855
	12	10,413	12	0,5798
	24	26,696	24	0,3188

Breusch-Godfrey test for autocorrelation for the small- and mid-cap impact index in all models, H0: No autocorrelation

Table C.6: Breusch-Godfrey test for autocorrelation, iShares MSCI ACWI ETF

Model	lags(p)	chi2	df	Prob > chi2
CAPM	1	1,947	1	0,1629
	12	13,295	12	0,348
	24	23,409	24	0,4958
Fama-French three factor model	1	3,365	1	0,0666
	12	8,155	12	0,7729
	24	18,148	24	0,7957
Carhart four factor model	1	3,425	1	0,0642
	12	8,156	12	0,7728
	24	18,536	24	0,7763
Fama-French five factor model	1	1,56	1	0,2116
	12	5,951	12	0,9185
	24	15,594	24	0,9022

Breusch-Godfrey test for autocorrelation for the iShares MSCI ACWI ETF in all models, H0: No autocorrelation

Heteroskedasticity

Heteroskedasticity means that the variance of the error term relies on the value of the explanatory variables. This does not affect the estimates, so the model will still be unbiased, but it does affect the efficiency of the estimators and by extension the inference. Since we want to use the regression results for inference we thus need the assumption of homoskedasticity to hold. Heteroskedasticity can easily be tested for through a Breusch-Pagan test, by regressing the predicted residuals against the explanatory variables and testing whether there is a linear relationship. So, with k number of regressors the model estimated will look like this:

$$\hat{u}^2 = \delta_0 + \delta_1 * x_1 + \cdots + \delta_k * x_k + \varepsilon$$

The null hypothesis will be that there is no violation of the assumption of homoskedasticity:

$$H_0 = \delta_1 = \cdots = \delta_k = 0$$

Rejecting the null hypothesis means that there is evidence of heteroskedasticity. We run the Breusch-Pagan test for the full index, the healthcare index, the non-healthcare index, the small-mid-cap index, and the MSCI ACWI index on all models. We can see that the null-hypothesis is rejected for the full impact index and the healthcare index using the CAPM model at a 5 percent level of significance. It is also rejected for the small- and mid-cap index at a 5 percent level of significance in the CAPM and Fama-French three factor model, and at a 10 percent level of significance in the Carhart four factor model. Finally, the null-hypothesis is rejected for the MSCI ACWI index in the Fama-French five factor model at a 5 percent level of confidence. This means that our data does display slight signs of heteroskedasticity and we will adjust for this using heteroskedasticity robust standard errors.

Table C.7: Breusch-Pagan test for heteroskedasticity

	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Chi2	Prob > chi2	Chi2	Prob > chi2	Chi2	Prob > chi2	Chi2	Prob > chi2
Impact index	3,98	0,046	2,58	0,4616	2,11	0,7153	5,36	0,3734
Healthcare impact index	4,25	0,0393	2,91	0,4061	4,2	0,3794	3,96	0,5548
Non-healthcare impact index	0,04	0,8412	3,98	0,2633	3,93	0,41449	4,48	0,4822
Small- mid-cap impact index	11,87	0,0006	10,97	0,0119	9,48	0,0501	7,64	0,1775
iShares MSCI ACWI ETF	1,69	0,1934	0,72	0,868	5,24	0,2634	20,34	0,0011

Breusch-Pagan test for heteroskedasticity for our impact index, the healthcare impact index, the non-healthcare impact index, the small- and mid-cap impact index, and the iShares MSCI ACWI ETF H0: Homoskedasticity

Stationarity

Since we are dealing with time-series data we need to test whether the data is a stationary process or not. If it is not a stationary process it can affect the inference significantly leading to false results. Stationarity can be tested for using a Dickey Fuller test. If there are signs of autocorrelation lagged differences can be included in the test in which case the test is called Augmented Dickey Fuller. We found little evidence of autocorrelation in the tests above, so it does not appear necessary to add lagged differences, but we will nonetheless assess the Akaike Information Criterion (AIC) to find the optimal number of lags. By considering this statistic we find that zero lags are optimal for all the indexes. The Dickey Fuller test can also be run in different formats, either without a constant and time-trend, with a constant but without a time-trend, or with a constant and a time trend. We run this test in all three formats using zero lags. We only display the results from running the test with a constant but without a time-trend in table C.8, but all the tests rejected the null-hypothesis. This means that our data provides sufficient evidence to state that we are dealing with a stationary time-series.

Table C.8: Dickey Fuller test for stationarity

Time-series	Lags	Test stat	P-value	1% Critical Value	5% Critical Value	10% Critical value
Impact index	0	-9,444	0	-2,381	-1,667	-1,294
Healthcare impact index	0	-9,345	0	-2,381	-1,667	-1,294
Non-healthcare impact index	0	-8,7	0	-2,381	-1,667	-1,294
Small- Mid-cap impact index	0	-8,453	0	-2,832	-1,668	-1,294
iShares MSCI ACWI ETF	0	-9,095	0	-2,832	-1,668	-1,294

Dickey-Fuller test for unit root for our impact index, the healthcare impact index, the non-healthcare impact index, the small- and mid-cap impact index, and the iShares MSCI ACWI ETF H0: Unit root

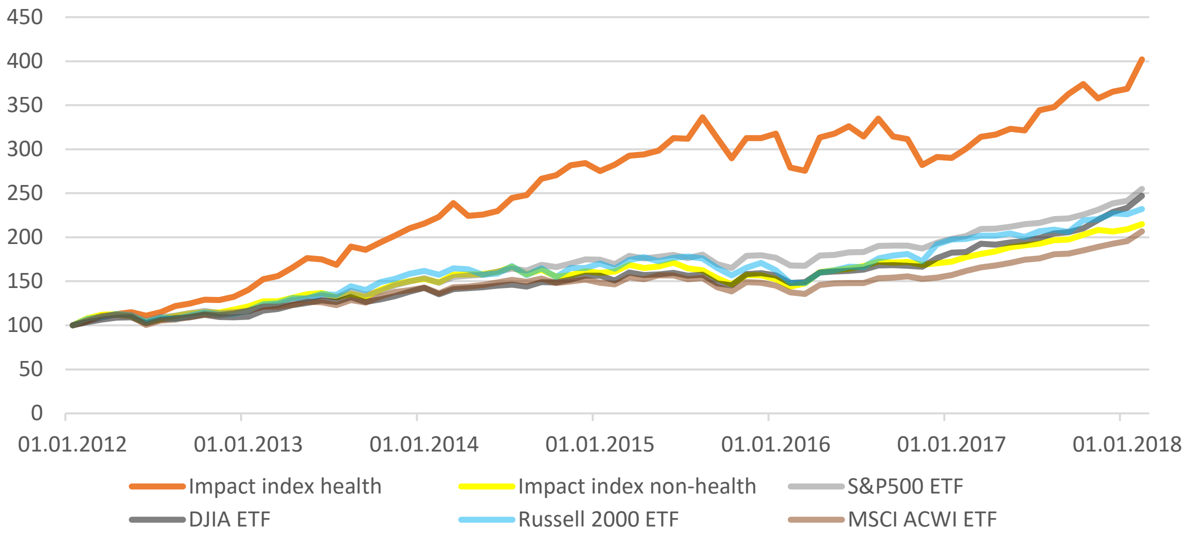
Appendix D: Robustness tests

Distinctions to our index

In this section we analyse the healthcare, non-healthcare and small- and mid-cap impact indexes separately. We continue taking a global perspective, so we use risk factors based on the global stock market and calculate the differences in return against the MSCI ACWI index. We start by reviewing descriptive performance statistics before moving on to the regression results.

Figure D.1 plots the cumulative return of the healthcare and non-healthcare companies separately along with the conventional peers used in the main section. The plot illustrates that most of the outperformance we saw in the cumulative return of the full impact index is driven by the healthcare sector. $100 invested in the healthcare companies at the start of 2012, would have grown into just over $400 by the end of January 2018. The non-healthcare index on the other hand seems to perform similarly to the conventional indexes, slightly outperforming the MSCI ACWI index while underperforming the rest. However, by accounting for risk the results the outperformance of the healthcare companies disappears as illustrated in table D.1. Looking at both a 1-year and a 3-year horizon the healthcare companies underperform the conventional indexes. Interestingly it also underperforms the non-healthcare companies over these horizons. Considering the full sample period, the healthcare companies offer a Sharpe-ratio in line with the DJIA index and slightly below the S&P 500, while outperforming the rest. The non-healthcare companies on the other hand underperform the S&P 500 and the DJIA indexes, while performing in line with the Russell 2000 and MSCI ACWI indexes. Overall, it seems clear that the healthcare companies drive the outperformance of the full impact index when compared with the MSCI ACWI index. On the other hand, no clear signs of underperformance appear from the non-healthcare companies. However, these results vary by measured time-period and peer.

Figure D.1: Cumulative returns over the sample period (2012-2018)



Cumulative returns for the healthcare impact index (impact index health), non-healthcare impact index (impact index non-health), iShares Core S&P 500 ETF (S&P 500 ETF), SPDR Dow Jones Industrial Average ETF (DJIA ETF), iShares Russell 2000 ETF (Russell 2000 ETF) and iShares MSCI ACWI ETF (MSCI ACWI ETF) from January 1st, 2012 to January 31st, 2018. (Source: Morningstar Direct database (Morningstar, 2018))

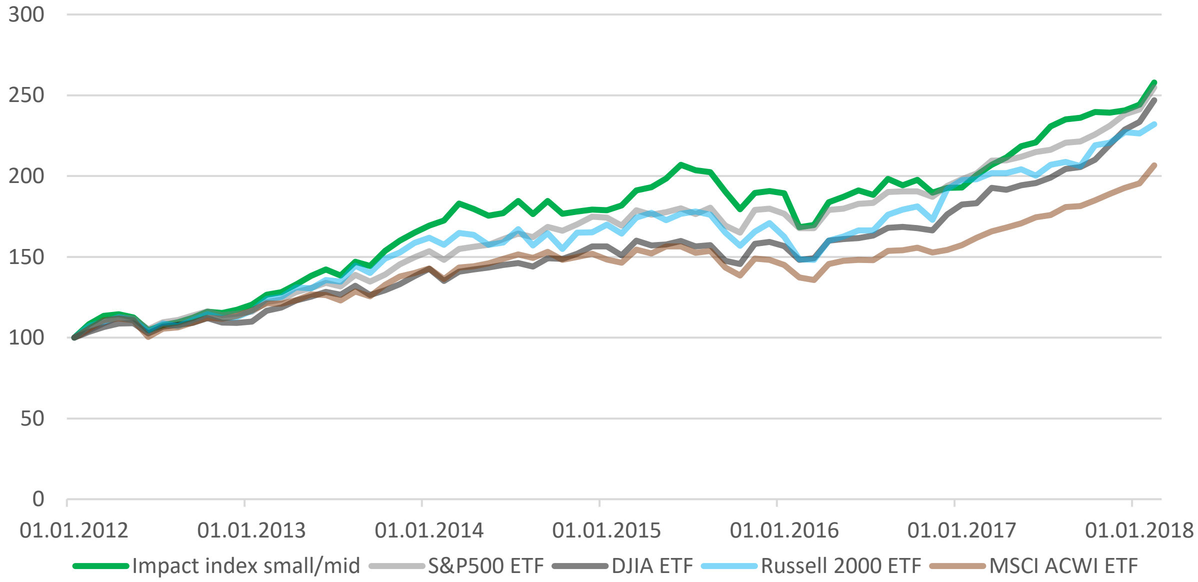
Table D.1: Average returns, standard deviations, and Sharpe-ratios

	12-month			36-month			72-month		
	Mean	Std	Sharpe	Mean	Std	Sharpe	Mean	Std	Sharpe
Healthcare impact index	0,03	0,04	0,69	0,01	0,05	0,21	0,02	0,05	0,42
Non-healthcare impact index	0,02	0,01	1,45	0,01	0,03	0,27	0,01	0,03	0,33
S&P 500 ETF	0,02	0,02	1,18	0,01	0,03	0,39	0,01	0,03	0,45
DJIA ETF	0,03	0,02	1,25	0,01	0,03	0,44	0,01	0,03	0,42
Russell 2000 ETF	0,01	0,02	0,57	0,01	0,04	0,25	0,01	0,04	0,29
MSCI ACWI ETF	0,02	0,01	1,50	0,01	0,03	0,32	0,01	0,03	0,32

Monthly arithmetic average returns, standard deviations and Sharpe-ratios for the healthcare impact index, non-healthcare impact index, iShares Core S&P 500 ETF (S&P 500 ETF), SPDR Dow Jones Industrial Average ETF (DJIA ETF), iShares Russell 2000 ETF (Russell 2000 ETF) and iShares MSCI ACWI ETF (MSCI ACWI ETF) over the past 12 months, 36 months and 72 months

Figure D.2 plots the cumulative return of the small- and mid-cap impact index. The plot illustrates a slight outperformance compared with the MSCI ACWI index. However, the outperformance is lower than for the full impact index, which is clearly illustrated by similar performance as the S&P 500 index. The descriptive statistics in Appendix A showed us that this index has a lower share of healthcare companies and having seen the performance of healthcare versus non-healthcare companies above this is likely an explanation for why the performance has decreased. Accounting for risk in table D.2 reflect the indications provided by the cumulative plot. The small- and mid-cap index returns a lower Sharpe-ratio over the sample period than the full impact index. However, it still outperforms the MSCI ACWI and Russell 2000 indexes while underperforming the S&P 500 and DJIA indexes. The performance also by the measured time-period. The small- and mid-cap index underperforms the MSCI ACWI index both over a 1-year and 3-year period but outperforms over the full period. Overall, this distinction does not radically change our results. The small- and mid-cap index slightly underperforms the full sample but still outperforms the MSCI ACWI index.

Figure D.2: Cumulative returns over the sample period (2012-2018)



Cumulative returns for the small- and mid-cap impact index (impact index small/mid), iShares Core S&P 500 ETF (S&P 500 ETF), SPDR Dow Jones Industrial Average ETF (DJIA ETF), iShares Russell 2000 ETF (Russell 2000 ETF) and iShares MSCI ACWI ETF (MSCI ACWI ETF) from January 1st, 2012 to January 31st, 2018. (Source: Morningstar Direct database (Morningstar, 2018))

Table D.2: Average returns, standard deviations, and Sharpe-ratios

	12-month			36-month			72-month		
	Mean	Std	Sharpe	Mean	Std	Sharpe	Mean	Std	Sharpe
Small- and mid-cap impact index	0,02	0,02	1,20	0,01	0,04	0,27	0,01	0,03	0,36
S&P 500 ETF	0,02	0,02	1,18	0,01	0,03	0,39	0,01	0,03	0,45
DJIA ETF	0,03	0,02	1,25	0,01	0,03	0,44	0,01	0,03	0,42
Russell 2000 ETF	0,01	0,02	0,57	0,01	0,04	0,25	0,01	0,04	0,29
MSCI ACWI ETF	0,02	0,01	1,50	0,01	0,03	0,32	0,01	0,03	0,32

Monthly arithmetic average returns, standard deviations and Sharpe-ratios for the small- and mid-cap impact index, iShares Core S&P 500 ETF (S&P 500 ETF), SPDR Dow Jones Industrial Average ETF (DJIA ETF), iShares Russell 2000 ETF (Russell 2000 ETF) and iShares MSCI ACWI ETF (MSCI ACWI ETF) over the past 12 months, 36 months and 72 months

Table D.3 and D.4 present regression results for the healthcare and non-healthcare companies regressed on the factor models separately. Included is also the regression results for the difference in return between each group and the MSCI ACWI index. Our previous analysis suggested that we should expect higher performance by the healthcare group and this is also reflected in the alphas. We can see that the healthcare companies obtain a positive and significant alpha in all models except the Carhart four factor model suggesting an annual excess risk-adjusted return ranging from 9,6 to 10,8 percent. These results are significant at a 10 percent level in the CAPM and Fama-French three factor model, and at a 5 percent level in the Fama-French five factor model. The non-healthcare companies on the other hand produce no significant alphas.

The alphas on the difference in returns between the respective subsamples and the MSCI ACWI index provide similar indications. The healthcare companies seem to significantly outperform the conventional index by an excess risk-adjusted return ranging from 9,6 to 13,2 percent depending on the model. These results are significant at a 10 percent level in the CAPM and at a 5 percent level in the Fama-French three factor and five factor models. The non-healthcare companies neither underperform nor outperform significantly. This is consistent with the results we found in table D.1 where the non-healthcare companies obtained a Sharpe-ratio similar to what was obtained by the MSCI ACWI index over the sample period while the healthcare companies achieved a higher Sharpe-ratio.

Table D.3: Regression results for the healthcare impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	1,091***	0,095	1,121***	0,150	1,217***	0,222	1,057***	0,036
	(7,01)	(0,56)	(9,20)	(1,16)	(9,42)	(1,63)	(7,42)	(0,18)
SMB			0,286	0,493	0,333	0,478	0,028	0,103
			(0,98)	(1,59)	(1,17)	(1,55)	(0,08)	(0,26)
HML			-0,665***	-0,680***	-0,407	-0,397	-1,052***	-1,092***
			(-2,94)	(-2,85)	(-1,57)	(-1,40)	(-3,05)	(-2,77)
UMD					0,346*	0,342*		
					(1,95)	(1,69)		
RMW							-0,833*	-1,027*
							(-1,69)	(-1,71)
CMA							0,328	0,296
							(0,65)	(0,49)
Alpha	0,008*	0,009*	0,008*	0,008**	0,005	0,005	0,009**	0,011**
	(1,74)	(1,79)	(1,96)	(2,06)	(1,14)	(1,26)	(2,26)	(2,22)
R^2	0,509	0,007	0,565	0,130	0,588	0,162	0,584	0,170
Adjusted R^2	0,502	-0,007	0,547	0,092	0,564	0,112	0,553	0,109
Observations	73	73	73	72	73	72	73	73

Monthly returns for the healthcare impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{Healthcare,t} - r_{MSCI,t}$. Impact adjusted for heteroskedasticity in equation (1). Diff MSCI adjusted for heteroskedasticity in equation (4), and for autocorrelation in equation (2) and (3). T statistics in parentheses $^{*}p < 0,10$, $^{**}p < 0,05$, $^{***}p < 0,01$. (Sources: Morningstar Direct database and Kenneth R. French online data library (French, 2018; Morningstar, 2018))

Table D.4: Regression results for the non-healthcare impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	0,924***	-0,072	0,929***	-0,079	0,937***	-0,058	0,998***	-0,023
	(17,77)	(-1,38)	(17,81)	(-1,55)	(16,50)	(-1,06)	(16,61)	(-0,38)
SMB			0,156	0,251**	0,160	0,250**	0,277*	0,352**
			(1,25)	(2,04)	(1,27)	(2,03)	(1,95)	(2,26)
HML			-0,080	-0,037	-0,059	0,037	-0,136	-0,176
			(-0,82)	(-0,40)	(-0,52)	(0,33)	(-0,94)	(-1,26)
UMD					0,027	0,095		
					(0,35)	(1,20)		
RMW							0,215	0,021
							(1,03)	(0,10)
CMA							0,370*	0,339
							(1,73)	(1,64)
Alpha	0,001	0,001	0,000	0,001	0,000	0,000	-0,001	0,000
	(0,36)	(0,81)	(0,29)	(0,70)	(0,14)	(0,12)	(-0,45)	(0,26)
R^2	0,816	0,026	0,822	0,094	0,822	0,113	0,834	0,143
Adjusted R^2	0,814	0,013	0,814	0,054	0,811	0,060	0,822	0,080
Observations	73	73	73	72	73	72	73	73

Monthly returns for the non-healthcare impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{Nonhealthcare,t} - r_{MSCI,t}$. Diff MSCI adjusted for heteroskedasticity in equation (4), and for autocorrelation in equation (2) and (3). T statistics in parentheses $^{*}p < 0{,}10$, $^{**}p < 0{,}05$, $^{***}p < 0{,}01$. (Sources: Morningstar Direct database and Kenneth R. French online data library (French, 2018; Morningstar, 2018))

Finally, table D.5 presents the regression results for the small- and mid-cap impact index and the difference in return against the MSCI ACWI index. This changes the results slightly compared to the full impact index. The alphas are still positive but are now less significant. Only the Fama-French five factor model returns a significant alpha of 0,3 percent suggesting an annual excess risk-adjusted return of 3,6 percent. This result is significant at a 10 percent level. There are no radical changes to the risk factor exposure compared with the full impact index. The loading on the size factor is still positive but is more significant which is unsurprising and the loading on the profitability factor is still negative but also more significant. In other words, this more clearly exposed to small and unprofitable firms. Finally, a greater share of the variation in the returns of the index are explained by the factor models compared to the full index. The Fama-French five factor model can explain 87,3 percent of the variation compared to 72,7 by the Carhart four factor model for the full index.

These changes are also reflected in the relative performance against the MSCI ACWI index. The alphas on the difference in return are still positive, but only significant in the Fama-French five factor model which suggests an annual outperformance of 6 percent. This result is significant at a 5 percent level. This is consistent with what we saw in table D.2, where the small- mid-cap impact index achieved a slightly higher Sharpe-ratio than the MSCI ACWI index. The differences in return between the indexes are still explained by exposure towards growth companies by the impact index but are now also explained by exposure to small unprofitable firms.

Table D.5: Regression results for the small- mid-cap impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	1,020***	0,024	1,046***	0,052	1,079***	0,086	0,979***	-0,042
	(12,19)	(0,24)	(16,41)	(0,64)	(16,77)	(1,07)	(17,04)	(-0,53)
SMB			0,775***	0,919***	0,791***	0,916***	0,570***	0,645***
			(6,01)	(5,60)	(6,05)	(5,55)	(4,19)	(5,26)
HML			-0,343***	-0,327***	-0,255***	-0,209**	-0,547***	-0,587***
			(-3,95)	(-3,38)	(-2,78)	(-2,07)	(-3,93)	(-4,28)
UMD					0,118*	0,146		
					(1,67)	(1,59)		
RMW							-0,585***	-0,779***
							(-2,93)	(-3,70)
CMA							0,035	0,003
							(0,17)	(0,01)
Alpha	0,002	0,003	0,002	0,002	0,001	0,001	0,003*	0,005**
	(0,87)	(0,99)	(0,85)	(1,03)	(0,34)	(0,45)	(1,94)	(2,04)
R^2	0,774	0,002	0,867	0,401	0,871	0,420	0,882	0,512
Adjusted R^2	0,770	-0,013	0,861	0,375	0,864	0,386	0,873	0,476
Observations	73	73	73	72	73	72	73	73

Monthly returns for the small- and mid-cap impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{smallmid,t} - r_{MSCI,t}$. *Impact adjusted for heteroskedasticity in equation (1), (2) and (3). Diff MSCI adjusted for heteroskedasticity in equation (4), and for autocorrelation in equation (2) and (3). T statistics in parentheses* $^{*}p < 0{,}10$, $^{**}p < 0{,}05$, $^{***}p < 0{,}01$. *(Sources: Morningstar Direct database and Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

In this section we have analysed the returns of the different subgroups separately. Making these distinctions have shown us that most of the outperformance by the full impact index seems to be driven by the underlying healthcare companies. While the healthcare companies outperform both compared to their systematic risk exposure and relative to the MSCI ACWI index, the non-healthcare companies do not. The distinction toward small- and mid-cap companies do not change our results significantly. The outperformance is slightly reduced both compared to systematic risk exposure and relative to the MSCI ACWI index, and a larger share of the variation in the returns of the index is explained by the factor models. This suggests that it is not of critical importance whether the index is restricted by the size of the companies. Finally, none of the results show signs of underperformance by the impact investing indexes either compared to systematic risk exposure or to a conventional peer.

Risk factors based on US stock exchanges

The companies underlying our impact index target the global market but are mainly based in North America. In this section we will test what effect it has on our results if we use American risk factors instead of global as we did in the main section. We obtain these factors from the Kenneth French online data library (French, 2018). To isolate the effect of changing the risk factors we hold everything else equal to the main analysis. Thus, we calculate the difference in return against the MSCI ACWI index capturing the global stock market. It could be argued that we should also calculate the difference in return against an American index when we use American risk factors. We will perform an analysis later where we use both American risk factors and compare with an American index but for now we want to illustrate the effect of only changing the former. Before we run the regression models we test for multicollinearity, autocorrelation and heteroskedasticity. These tests show no signs of multicollinearity but do show slight signs of autocorrelation and heteroskedasticity in some of the models. The regression results are adjusted for these problems.

Table D.6 presents the regression results for our impact index and the difference in return calculated against the MSCI ACWI index. The results are slightly different from what we found in section 6.2. The alphas of our impact index are still positive but none of them are significant, while the estimates on the risk factors show similar results. Our impact index still has a positive and highly significant market beta which is close to 1 in all models. The index also obtains negative and highly significant loadings on the value factor but the Carhart four factor model returns a more significant estimate than previously. The estimate on the profitability factor also becomes more significant while the momentum factor changes signs and becomes insignificant. Finally, the adjusted R2 seems to decrease for all models, suggesting that the global factors are a slightly better fit for our impact index.

The alphas on the difference in return seem consistent with what we found in section 6.2. The alpha is positive in all models, and significant in all models except CAPM. The results indicate an annual outperformance over the MSCI ACWI index ranging from 6 to 7,2 percent. The alphas seem to become more significant in both the Fama-French three factor and Carhart four factor model compared to the results in the main section. However, the alpha is no longer significant in the CAPM. The explanation of the difference in return also seems to change slightly. It is still explained by a different exposure towards the value factor, with our impact index being more exposed to growth stocks but this pattern becomes more significant. We also saw slight signs of our impact index being more exposed to small stocks in the main analysis and this pattern is also clearer. The estimate on the size factor is positive but more significant in the Fama-French three factor and Carhart four factor model. The loading on the size factor is still insignificant in the Fama-French five factor model but the estimates on the profitability and investment factor become significant at a 5 percent level. Finally, the estimate on the momentum factor becomes insignificant.

Table D.6: Regression results for our impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	1,064***	0,096	1,048***	0,048	1,036***	0,084	1,052***	0,061
	(10,37)	(1,05)	(12,36)	(0,56)	(11,49)	(0,93)	(12,16)	(0,71)
SMB			0,135	0,314***	0,133	0,316***	-0,005	0,168
			(1,22)	(2,82)	(1,18)	(2,79)	(-0,04)	(1,35)
HML			-0,446***	-0,421***	-0,470***	-0,335**	-0,549***	-0,588***
			(-3,93)	(-3,71)	(-3,68)	(-2,57)	(-3,87)	(-4,22)
UMD					-0,038	0,126		
					(-0,41)	(1,30)		
RMW							-0,420**	-0,442**
							(-2,36)	(-2,55)
CMA							0,318	0,479**
							(1,40)	(2,15)
Alpha	0,002	0,005	0,003	0,006**	0,003	0,005*	0,003	0,006**
	(0,61)	(1,58)	(0,96)	(2,15)	(1,02)	(1,75)	(1,12)	(2,60)
R^2	0,663	0,015	0,724	0,212	0,725	0,227	0,735	0,291
Adjusted R^2	0,658	0,001	0,712	0,178	0,709	0,180	0,715	0,237
Observations	73	73	73	73	73	72	72	72

*Monthly returns for our impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using US risk factors. Diff MSCI calculated as $r_{Impact,t} - r_{MSCI,t}$. Impact adjusted for heteroskedasticity in equation (1) and autocorrelation in equation (4). Diff MSCI adjusted for autocorrelation in equation (3). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

The performance of our impact index seems sensitive to the choice of risk factors. Using American risk factors, our impact index no longer produces positive alphas which means that there is no incentive for a fully diversified investor to increase his exposure towards these stocks. The overall pattern seems to be that using American risk factors, all estimates that were previously negative become more significant and all estimates that were previously positive become less significant. However, the adjusted R2 slightly decreases for all models suggesting that the global factors fit our impact index better. The relative performance against the MSCI ACWI index only changes slightly. The alphas on the difference in return become slightly more significant, suggesting an annual outperformance ranging from 6 to 7,2 percent. The explanation of the difference in return also changes slightly as the estimates generally become more significant. However, we should careful in interpreting the relative performance since we are using American risk factors to explain the returns of the global stock market.

Comparing with American indexes

In the main analysis we used the MSCI ACWI index for comparison, to determine the relative performance of our impact index. We argued for a global perspective of impact investing and thus used an index on the global stock market to calculate the relative returns. However, as we saw in section 4.3 the dominant share of companies in our index are based in North America and table 6.1 also gave indications that the relative performance would vary by peer. Thus, we include an analysis where we calculate the relative return of our impact index against indexes capturing the American stock market. We compare with the S&P 500, DJIA and Russell 2000 indexes but use the global risk factors. Using the American risk factors might be more purposeful when we compare with American indexes, but we want to isolate the effect of changing the peer and therefore keep everything else equal to the main analysis. We also run tests for heteroskedasticity, autocorrelation and unit-root and adjust for this when necessary.

Table D.7: Regression results for our impact index and difference in return against S&P 500 over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff S&P	Impact	Diff S&P	Impact	Diff S&P	Impact	Diff S&P
Mkt-RF	1,040***	0,171*	1,061***	0,195**	1,115***	0,241***	1,035***	0,154
	(10,11)	(1,74)	(13,50)	(2,44)	(13,29)	(2,81)	(11,23)	(1,63)
SMB			0,237	0,553***	0,264	0,576***	0,100	0,428*
			(1,27)	(2,90)	(1,42)	(3,03)	(0,46)	(1,91)
HML			-0,471***	-0,392**	-0,326*	-0,268	-0,720***	-0,519**
			(-3,22)	(-2,64)	(-1,94)	(-1,56)	(-3,22)	(-2,26)
UMD					0,194*	0,167		
					(1,69)	(1,42)		
RMW							-0,475	-0,358
							(-1,49)	(-1,09)
CMA							0,271	0,026
							(0,83)	(0,08)
Alpha	0,005	0,001	0,004*	0,001	0,003	-0,001	0,005*	0,002
	(1,53)	(0,36)	(1,72)	(0,26)	(0,99)	(-0,28)	(1,92)	(0,59)
R^2	0,688	0,053	0,731	0,209	0,742	0,232	0,741	0,223
Adjusted R^2	0,683	0,040	0,719	0,175	0,727	0,187	0,721	0,165
Observations	73	73	73	73	73	73	73	73

*Monthly returns for our impact index (Impact) and monthly differences in return against the iShares Core S&P 500 ETF (Diff S&P) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff S&P calculated as $r_{Impact,t} - r_{S\&P500,t}$. Impact adjusted for heteroskedasticity in equation (1). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Table D.7 presents the regression results for our impact index and the relative return calculated against the S&P 500 index. We no longer find signs of outperformance against the peer. The alphas are positive in all models except the Carhart four factor model but are not significant at any reasonable level. This means that our impact index neither underperformed nor outperformed the S&P 500 over the sample period. Considering the Sharpe-ratios we found in table 6.1 for our impact index and the S&P 500 this is in line with expectations.

Table D.8: Regression results for our impact index and difference in return against Dow Jones Industrial Average (DJIA) over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff DJIA	Impact	Diff DJIA	Impact	Diff DIA	Impact	Diff DJIA
Mkt-RF	1,040***	0,203*	1,061***	0,233**	1,115***	0,273***	1,035***	0,178
	(10,11)	(1,89)	(13,50)	(2,46)	(13,29)	(2,66)	(11,23)	(1,59)
SMB			0,237	0,607***	0,264	0,627***	0,100	0,453*
			(1,27)	(2,69)	(1,42)	(2,77)	(0,46)	(1,71)
HML			-0,471***	-0,518***	-0,326*	-0,411**	-0,720***	-0,647**
			(-3,22)	(-2,94)	(-1,94)	(-2,00)	(-3,22)	(-2,38)
UMD					0,194*	0,144		
					(1,69)	(1,02)		
RMW							-0,475	-0,422
							(-1,49)	(-1,09)
CMA							0,271	-0,029
							(0,83)	(-0,07)
Alpha	0,005	0,001	0,004*	0,001	0,003	-0,001	0,005*	0,002
	(1,53)	(0,32)	(1,72)	(0,21)	(0,99)	(-0,18)	(1,92)	(0,58)
R^2	0,688	0,053	0,731	0,214	0,742	0,226	0,741	0,228
Adjusted R^2	0,683	0,040	0,719	0,179	0,727	0,180	0,721	0,171
Observations	73	73	73	73	73	73	73	73

*Monthly returns for our impact index (Impact) and monthly differences in return against the SPDR Dow Jones Industrial Average ETF (Diff DJIA) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff DJIA calculated as $r_{Impact,t} - r_{DJIA,t}$. Impact adjusted for heteroskedasticity in equation (1). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Table D.8 contains regression estimates for our impact index and the relative return calculated against the DJIA index. We can see much of the same patterns as we saw with the S&P 500. The alphas on the difference in return are positive in all models except the Carhart four factor model but insignificant. This means that our impact index neither underperformed nor outperformed the DJIA index significantly over the sample period. Our impact index and the DJIA index produced similar Sharpe-ratio in table 6.1 over the full sample period so these results are as expected.

Table D.9: Regression results for our impact index and difference in return against Russell 2000 over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff Russ	Impact	Diff Russ	Impact	Diff Russ	Impact	Diff Russ
Mkt-RF	1,040***	0,050	1,061***	0,071	1,115***	0,112	1,035***	0,060
	(10,11)	(0,54)	(13,50)	(0,66)	(13,29)	(1,10)	(11,23)	(0,46)
SMB			0,237	-0,616**	0,264	-0,621**	0,100	-0,599**
			(1,27)	(-2,38)	(1,42)	(-2,33)	(0,46)	(-2,13)
HML			-0,471***	-0,523***	-0,326*	-0,381	-0,720***	-0,302
			(-3,22)	(-2,71)	(-1,94)	(-1,54)	(-3,22)	(-0,91)
UMD					0,194*	0,183		
					(1,69)	(1,06)		
RMW							-0,475	0,312
							(-1,49)	(0,68)
CMA							0,271	-0,333
							(0,83)	(-0,69)
Alpha	0,005	0,003	0,004*	0,003	0,003	0,002	0,005*	0,003
	(1,53)	(1,01)	(1,72)	(1,09)	(0,99)	(0,47)	(1,92)	(0,76)
R^2	0,688	0,003	0,731	0,186	0,742	0,201	0,741	0,206
Adjusted R^2	0,683	-0,012	0,719	0,150	0,727	0,153	0,721	0,146
Observations	73	72	73	72	73	72	73	73

*Monthly returns for our impact index (Impact) and monthly differences in return against the iShares Russell 2000 ETF (Diff Russ) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff Russ calculated as $r_{Impact,t} - r_{Russell2000,t}$. Impact adjusted for heteroskedasticity in equation (1). Diff Russ adjusted for autocorrelation in equation (1), (2) and (3), and heteroskedasticity in equation (3) and (4). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Finally, table D.9 displays the regression results for our impact index and the difference in return calculated against the Russell 2000 index. Considering the Sharpe-ratios of these two indexes displayed in table 6.1 we would have expected outperformance by our impact index, but the alphas tell a different tale. After adjusting for these systematic risk factors, we find no evidence of outperformance by our impact index. The alphas on the relative return are all positive but insignificant. This means that our impact index neither underperformed nor outperformed the Russell 2000 index.

Overall, the regression results provide further evidence that the relative performance of our impact index depends on the index we compare with. We find no signs of outperformance relative to any of the indexes capturing the American stock market, as opposed to what we found when comparing with the MSCI ACWI index. On the other hand, we do not find any traces of statistical underperformance over the sample period compared to any of the indexes we have considered. However, we should be careful in interpreting the relative performance in this section since we are using global risk factors to explain the performance of American indexes. Therefore, we add a final analysis where we compare the returns of our impact index with an American index while using American risk factors.

Comparing with an American index using US risk factors

In the above analysis we have found that using American risk factors seemed to depress the alpha produced by our impact index over the sample period. We also found that comparing with American indexes seemed to depress the relative performance of our impact index. However, when we used American risk factors we compared with an index capturing the global stock market and when we compared with American indexes we used global risk factors. To make analysis complete we run a regression using the American risk factors where we calculate the relative return against an American index.

Table D.10: Regression results for our impact index and difference in return against S&P 500 over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff S&P	Impact	Diff S&P	Impact	Diff S&P	Impact	Diff S&P
Mkt-RF	1,064***	0,102	1,048***	0,062	1,036***	0,049	1,052***	0,061
	(10,37)	(0,94)	(12,36)	(0,70)	(11,49)	(0,55)	(12,16)	(0,71)
SMB			0,135	0,269***	0,133	0,267***	-0,005	0,119
			(1,22)	(2,69)	(1,18)	(2,68)	(-0,04)	(0,96)
HML			-0,446***	-0,449***	-0,470***	-0,474***	-0,549***	-0,535***
			(-3,93)	(-3,73)	(-3,68)	(-3,67)	(-3,87)	(-3,78)
UMD					-0,038	-0,041		
					(-0,41)	(-0,49)		
RMW							-0,420**	-0,462**
							(-2,36)	(-2,59)
CMA							0,318	0,280
							(1,40)	(1,24)
Alpha	0,002	0,002	0,003	0,003	0,003	0,003	0,003	0,003
	(0,61)	(0,50)	(0,96)	(0,96)	(1,02)	(1,06)	(1,12)	(1,17)
R^2	0,663	0,017	0,724	0,216	0,725	0,219	0,735	0,279
Adjusted R^2	0,658	0,003	0,712	0,182	0,709	0,173	0,715	0,224
Observations	73	73	73	73	73	73	72	72

*Monthly returns for our impact index (Impact) and monthly differences in return against the iShares Core S&P 500 ETF (Diff S&P) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using US risk factors. Diff S&P calculated as $r_{Impact,t} - r_{S\&P500,t}$. Impact adjusted for heteroskedasticity in equation (1) and autocorrelation in equation (4). Diff S&P adjusted for heteroskedasticity in equation (2) and (3). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Table D.10 presents the regression results using American risk factors for our impact index and the difference in return calculated against the S&P 500. The result reflects our previous findings in terms of performance. The alphas are insignificant both for our impact index itself and on the relative performance against an American index. Interestingly, the alphas produced for the difference in return seems to be more significant than in the previous section where we used global risk factors. In conclusion, the performance of our impact index seems to depend on both the choice of risk factors and peers.

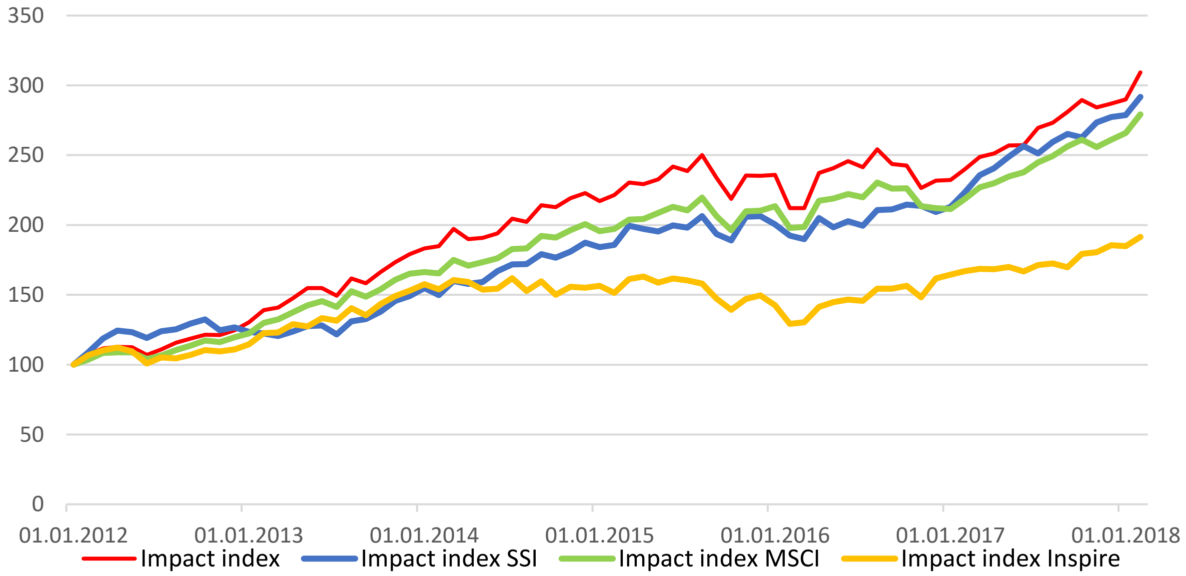
Testing the inclusion criteria

The impact index we analyse is based on companies we deem eligible for impact investing. The selection process is based on criteria we consider necessary to be classified as an impact investment and the evaluation of companies against these criteria is based on our understanding of how the company operates. In section 4 we argued that this level of subjectivity decreases the robustness of our results. To give an indication of how sensitive our results are to the selection process we create three new indexes based on companies included in the SSI Impact index, the MSCI ACWI Sustainable Impact Index, and the Inspire Small/Mid Cap Impact Equal Weight Index (Inspire, 2018b; MSCI, 2018b; SSI Indexes, 2018). We use the holdings of these indexes by the end February 2018 to create three value weighted indexes, tracking the performance of these companies from 2012 to 2018. Data is retrieved from the Morningstar Direct database (Morningstar, 2018). In other words, we create three indexes that track the performance of companies found eligible for impact investing by the definitions of these institutions. If the performance of these indexes is similar to what we found, it implies that our results are robust within certain limits.

The SSI index is the most precise index out of the three, as it explicitly seeks to track the performance of public equity impact investments (SSI Indexes, 2018). The MSCI index is somewhat more inclusive as it does not explicitly state that it will track the performance of impact investees, but rather companies that derive at least 50 percent of their revenue from addressing one or more of the UN Sustainable Development Goals (MSCI, 2018b; United Nations, 2018). The most inclusive index is the Inspire index which selects companies based on a standardized scorecard with both positive and negative contributions to society (Inspire, 2018b). The 500 highest scoring companies are added to the index while any company involved in any of the negative activities are excluded. The reason the index is considered inclusive and a somewhat imprecise measure of impact investments is that there is a wide range of activities that affect the score positively and may not directly align with impact investment. For example, compliance with conflict mineral agreements might be enough to be added to the index.

One major challenge with this approach is to determine how long these companies would have been eligible for these indexes. The oldest one is the MSCI index starting in 2016, while the two others have only been available since 2017 but we need longer performance records to provide valuable information. This means that in the years prior to their existence we have to assess whether the company would have been eligible for the relevant index, had the index existed at that point in time. Many of these companies are also included in our impact index so we use the same method for determining their eligibility as we used when creating our index. For the companies that are not included in our index this process is more difficult. We solve this by reviewing each company and checking whether there has been a significant change to their non-financial strategy since the beginning of the sample period. If no such change is found, the company is included all the way, otherwise they are included since this change occurred. If we find no information about what makes them eligible the company is only included as far back as it was tracked by the original index.

Figure D.3: Cumulative returns over the sample period (2012-2018)



Cumulative returns for our impact index, the SSI impact index (SSI index), the MSCI impact index (MSCI index) and the Inspire impact index (Inspire index) from January 1st, 2012 to January 31st, 2018

Figure D.3 plots the cumulative returns of the four impact indexes from over the sample period. We can see that the SSI index and the MSCI index seem to perform similarly to our impact index returning just under $300 on a $100 investment at the beginning of the sample period. The Inspire index on the other hand, follows a similar pattern until 2014 where it starts underperforming. By 2018 it returns just under $200 on a $100 investment in 2012. The cumulative plot does not account for risk so table D.7 presents the monthly arithmetic average returns, standard deviations, and Sharpe-ratios of these indexes along with the MSCI ACWI index.

Table D.11: Average returns, standard deviations, and Sharpe-ratios

	12-month			36-month			72-month		
	Mean	Std	Sharpe	Mean	Std	Sharpe	Mean	Std	Sharpe
Impact index	0,02	0,02	0,93	0,01	0,04	0,23	0,02	0,04	0,41
SSI index	0,02	0,02	0,98	0,01	0,04	0,37	0,01	0,03	0,41
MSCI index	0,02	0,02	1,19	0,01	0,03	0,29	0,01	0,03	0,46
Inspire index	0,01	0,02	0,51	0,01	0,04	0,18	0,01	0,04	0,23
MSCI ACWI ETF	0,02	0,01	1,50	0,01	0,03	0,32	0,01	0,03	0,32

Monthly arithmetic average returns, standard deviations and Sharpe-ratios for our impact index, the SSI impact index (SSI index), the MSCI impact index (MSCI index), the Inspire impact index (Inspire index) and the iShares MSCI ACWI ETF (MSCI ACWI ETF) over the past 12 months, 36 months and 72 months

The Sharpe-ratios for the full 72-month sample period reflect the cumulative plot. Both the SSI and MSCI index provide similar risk-adjusted returns as our impact index and they all outperform the conventional MSCI ACWI index. The Inspire impact index on the other hand underperforms all the indexes. In other words, the results do not provide an obvious indication that our results are robust for changes to the selection process. Two of the indexes provide similar results to what we found while the last one returns contradicting evidence. However, we argued that the Inspire index uses the most inclusive selection procedure and it ends up underperforming. This could be an indication that our results are robust within certain ranges of the impact investing definition.

To provide further tables D.12 through D.14 present the regression results for these new indexes. The original SSI Impact Index and the Inspire Small/Mid Cap Impact Equal Weight Index are solely based on companies listed on NYSE and NASDAQ. This means that the SSI and Inspire index that we create only include companies from these two stock exchanges. In this sense it might be more fitting to use American risk factors and compare with an American peer when analysing these indexes. However, to isolate the effect of changing the underlying companies we want to hold everything else equal to the main analysis. Therefore, we use global risk factors and calculate the difference in return against the MSCI ACWI index throughout this section. Before running the regressions, we test for problems with heteroskedasticity, autocorrelation and unit root. Overall, we only found a few cases where autocorrelation or heteroskedasticity was present and this is adjusted for in the relevant model.

Table D.12: Regression results for the SSI impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	0,905***	-0,091	0,923***		0,886***	-0,105	0,882***	-0,140
	(10,32)	(-1,06)	(12,94)		(9,69)	(-1,09)	(10,70)	(-1,42)
SMB			-0,474***	-0,383**	-0,565***	-0,343**	-0,461**	-0,386**
			(-2,79)	(-2,25)	(-3,97)	(-2,55)	(-2,36)	(-2,50)
HML			-0,691***	-0,657***	-0,673***	-0,769***	-0,400**	-0,440**
			(-5,21)	(-4,89)	(-3,47)	(-4,02)	(-2,00)	(-2,23)
UMD					-0,027	-0,122		
					(-0,22)	(-1,00)		
RMW							0,243	0,049
							(0,85)	(0,19)
CMA							-0,612**	-0,644**
							(-2,08)	(-2,39)
Alpha	0,005*	0,006**	0,005**	0,005*	0,005**	0,007***	0,006**	0,007***
	(1,85)	(2,16)	(2,28)	(1,99)	(2,15)	(2,84)	(2,34)	(2,71)
R^2	0,600	0,016	0,745	0,321	0,756	0,341	0,761	0,373
Adjusted R^2	0,594	0,002	0,734	0,301	0,741	0,302	0,743	0,326
Observations	73	73	73	72	72	73	73	73

Monthly returns for the SSI impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{SSIimpact,t} - r_{MSCI,t}$. Impact adjusted for heteroskedasticity in equation (3). Diff MSCI adjusted for autocorrelation in equation (2) and (3) and heteroskedasticity in equation (4). T statistics in parentheses $^{*}p < 0,10$, $^{**}p < 0,05$, $^{***}p < 0,01$. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))

Table D.12 presents the regression results for the SSI index and the difference in return calculated against the MSCI ACWI index. The results we obtain are consistent with what we found in the main analysis. The index obtains a positive and significant alpha in all models suggesting an annual excess risk-adjusted performance ranging from 6 to 7,2 percent. This is significant at a 10 percent level in the CAPM and 5 percent in all other models. The exposure to systematic risk factors is slightly different from what we found for our impact index. The exposure to market risk seems slightly lower with returning a market beta around 0,9. More significantly, the SSI index returns negative loadings on the size factor indicating that it is in fact exposed to large companies as opposed to the positive but insignificant estimate for our impact index. Finally, the SSI index returns a negative and significant estimate on the investment factor indicating that it is exposed to companies with an aggressive investment strategy. Once again, this contradicts the findings for our impact index which had positive but insignificant loading on this factor.

The difference in return between the SSI index and the MSCI ACWI index also returns results that are consistent with our impact index. The estimates suggest an annual outperformance over the MSCI ACWI index ranging from 6 to 8,4 percent. These results are significant at a 10 percent level in the Fama-French three factor model, 5 percent in the CAPM and 1 percent in the final two models. This aligns with the Sharpe-ratios we observed in table D.11 over the full sample period. The difference in return is still largely explained by exposure towards growth stocks but is now helped on by exposure to large companies with an aggressive investment strategy.

Table D.13: Regression results for the MSCI impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor models	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	0,859***	-0,137*	0,874***	-0,103	0,908***	-0,084	0,868***	-0,153
	(13,01)	(-1,95)	(14,40)	(-1,55)	(13,92)	(-1,19)	(12,00)	(-1,50)
SMB			-0,038	0,155	-0,021	0,152	-0,071	0,004
			(-0,26)	(0,97)	(-0,15)	(0,94)	(-0,42)	(0,02)
HML			-0,437***	-0,440***	-0,346**	-0,374**	-0,499***	-0,538***
			(-3,87)	(-3,68)	(-2,65)	(-2,61)	(-2,84)	(-2,71)
UMD					0,123	0,084		
					(1,37)	(0,82)		
RMW							-0,116	-0,310
							(-0,46)	(-1,05)
CMA							0,068	0,036
							(0,26)	(0,10)
Alpha	0,005**	0,006**	0,005**	0,006***	0,004*	0,005**	0,005**	0,006**
	(2,34)	(2,53)	(2,48)	(2,94)	(1,81)	(2,33)	(2,38)	(2,60)
R^2	0,704	0,051	0,759	0,206	0,765	0,215	0,760	0,207
Adjusted R^2	0,700	0,038	0,748	0,171	0,751	0,168	0,742	0,147
Observations	73	73	73	72	73	72	73	73

*Monthly returns for the MSCI impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{MSCIimpact,t} - r_{MSCI,t}$. Diff MSCI adjusted for autocorrelation in equation (2) and (3) and heteroskedasticity in equation (4). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Table D.13 presents the regression results for MSCI index that the difference in return calculated against the MSCI ACWI index. These results are also consistent with what we found in the main analysis. The MSCI impact index produces positive and significant alphas in all models suggesting annual excess risk-adjusted returns ranging from 4,8 to 6 percent. These results are significant at a 10 percent level in the Carhart four factor model and 5 percent in the rest. The risk factor exposure of this index is also very similar to our findings for our impact index in section 6.2. The returns of the index are largely explained by exposure to market risk and growth companies. However, the market beta seems to be slightly lower for the MSCI index varying around 0,9.

The alpha on the difference in return is also consistent with what we found in section 6.2. The results suggest an annual outperformance over the MSCI ACWI index ranging from 6 to 7,2 percent. This is significant at a 1 percent level in the Fama-French three factor model and 5 percent in the rest. This aligns with the Sharpe-ratios we observed for the MSCI index in table D.11. The difference in returns is explained through exposure towards growth companies.

Finally, table D.14 presents the regression results for the Inspire index and the difference return against the MSCI ACWI index. This regression produces results contradicting what we found in section 6.2. The Inspire index produces negative but insignificant alphas in all models. It also differs in terms of risk factor exposure. It has a similar market beta to what we found for our impact index varying just above 1. However, the Inspire index has a positive and significant exposure toward the size factor as opposed to a positive but insignificant estimate for our impact index. This is as we would have expected since the original Inspire index solely tracks small- and mid-cap companies. The more surprising and significant difference is the exposure toward the value factor. Our impact had a clear exposure towards growth companies while the Inspire index is neutral. Finally, the Inspire is significantly exposed towards unprofitable firms with a conservative investment strategy. Our impact index has no significant exposure towards the investment factor but was on the verge of being significantly exposed to unprofitable firms.

The results for the difference in return calculated against the MSCI ACWI index suggest that the Inspire index underperforms but the estimates are insignificant. By considering the Sharpe-ratio over the full sample period we would have expected underperformance by the Inspire index but there is not enough evidence to conclude. The difference in return is largely explained by exposure towards big and unprofitable firms.

Table D.14: Regression results for the Inspire impact index and difference in return against MSCI ACWI over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI	Impact	Diff MSCI
Mkt-RF	1,069***	0,071	1,047***	0,055	1,066***	0,073	1,037***	0,026
	(13,70)	(0,81)	(16,06)	(0,75)	(14,16)	(0,87)	(12,03)	(0,29)
SMB			0,608***	0,821***	0,595***	0,807***	0,443**	0,595***
			(3,91)	(4,88)	(3,84)	(4,79)	(2,40)	(3,05)
HML			0,158	0,147	0,217	0,209	-0,269	-0,350
			(0,77)	(0,67)	(1,03)	(0,95)	(-1,21)	(-1,49)
UMD					0,078	0,080		
					(0,68)	(0,68)		
RMW							-0,707**	-0,890***
							(-2,43)	(-3,00)
CMA							0,574*	0,598*
							(1,89)	(1,79)
Alpha	-0,002	-0,002	-0,002	-0,002	-0,003	-0,002	-0,001	-0,000
	(-1,23)	(-0,72)	(-1,15)	(-0,73)	(-1,18)	(-0,84)	(-0,61)	(-0,08)
R^2	0,728	0,009	0,766	0,236	0,769	0,238	0,795	0,340
Adjusted R^2	0,724	-0,005	0,756	0,202	0,755	0,192	0,779	0,290
Observations	72	72	72	72	72	72	72	72

Monthly returns for the Inspire impact index (Impact) and monthly differences in return against the iShares MSCI ACWI ETF (Diff MSCI) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff MSCI calculated as $r_{Inspireimpact,t} - r_{MSCI,t}$*. Impact adjusted for autocorrelation in equation (1), (2), (3) and (4), and for heteroskedasticity in equation (2), (3) and (4). Diff MSCI adjusted for autocorrelation in equation (2) and (3) and heteroskedasticity in equation (4). T statistics in parentheses* $^{*}p < 0,10$, $^{**}p < 0,05$, $^{***}p < 0,01$*. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Overall, the results are inconclusive. The SSI index and the MSCI index returns similar results to what we found in the main section, while the Inspire index returns contradicting evidence. As we mentioned above, the latter index has the most inclusive criteria for adding companies to the index which we feel makes it a somewhat imprecise measure of impact investments. Since the two most precise indexes provide similar results to what we found we would argue that our findings are robust within certain thresholds of the definition.

This approach to testing the robustness of our results is not unproblematic. First, with this approach, the indexes we create are subject to survivorship bias in the same way as our impact index. All the companies evaluated for the index are alive by 2018 which means that we overlook the companies that disappear during the sample period. Second, determining how long the companies would have been eligible for the original indexes is problematic. We get around this problem by looking for changes to the societal and environmental strategies over our sample period, implicitly arguing that if no such change happened they would be eligible in the years prior. Finally, many of the companies we analyse in this section are also included in our impact index. This means that this section is not based on an entirely different dataset which decreases its informational value.

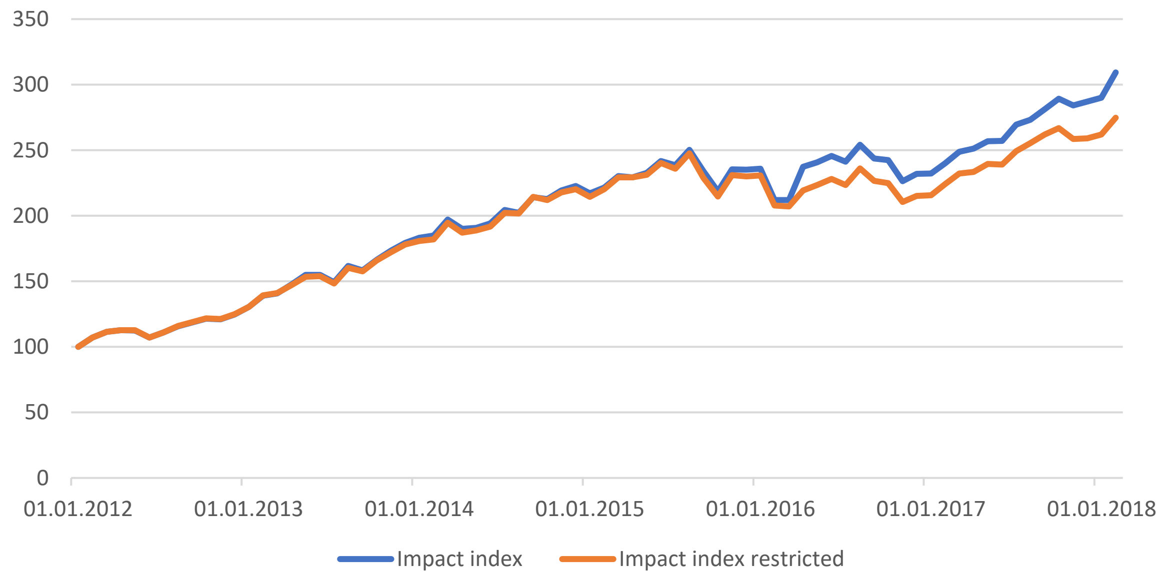
Testing for survivorship bias

A weakness of our approach to analysing the financial performance of impact investments is survivorship bias. We talked about how this might affect our results in section 4 and now we will try to give an indication of how much it could possible influence our conclusions. To do so we create new indexes consisting only of companies that have data available throughout the sample period. We do this for the full index, the healthcare and non-healthcare distinctions, and for the index consisting only of small- and mid-cap companies. The argument is that these companies were available for investment at the beginning of the measured period, so an investor could have been lucky enough to invest in these companies without knowing they would survive. The companies that are added to the index during the sample period were unavailable to the investor at this point, so we want to investigate how the companies that were added affect the performance of the index. We will start by plotting the cumulative returns of these subsamples against the full sample of each index, to see if they vary. If we find any significant differences in the cumulative plot we will present regression results for the relevant samples to see if these vary significantly. The cumulative plots are presented in figures D.4 through D.7.

Figure D.4 plots the cumulative returns of the full impact index against the restricted impact index. We can see the returns deviate slightly suggesting that the added companies have a positive influence on the performance of the index. The full index ends up returning just above

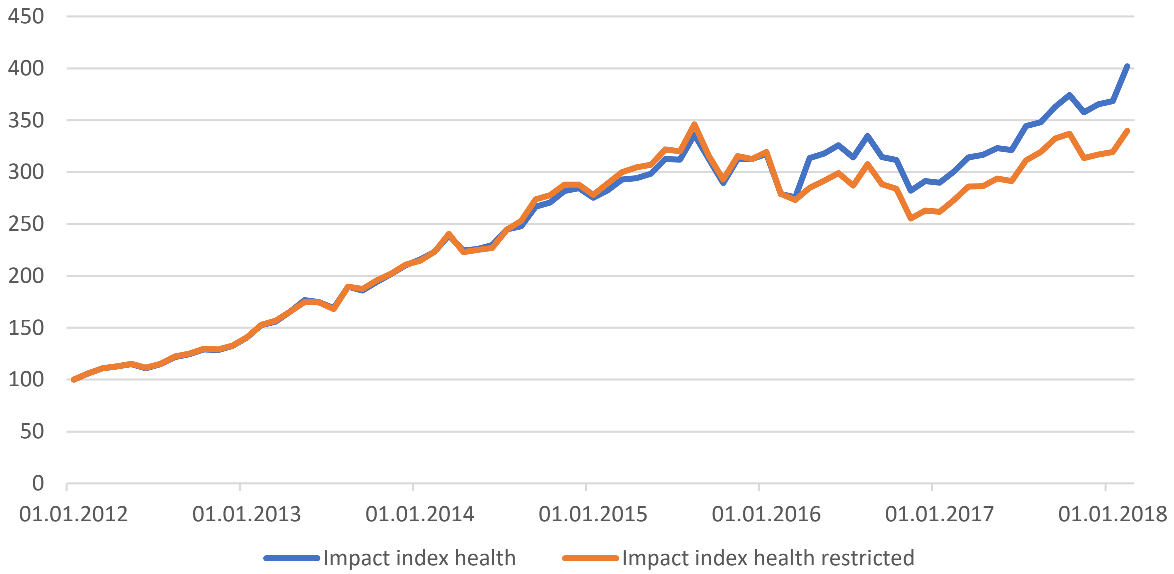
$300, while the restricted index ends up around $270. Distinguishing between healthcare and non-healthcare companies in figure D.5 clearly illustrates that the healthcare companies cause this problem. The restricted and the full healthcare samples vary significantly by the end of the sample period. The full healthcare index returns just over $400 while the restricted healthcare index returns just below $350. The cumulative returns of the restricted and full non-healthcare index are indistinguishable as illustrated in figure D.6. Finally, the cumulative returns of the small- and mid-cap index are plotted in figure D.7. The plots of the full sample and the restricted sample vary somewhat, but this is negligible. The samples end up with the same return by the end of January 2018. The plots indicate that the companies that are added throughout the sample bias the returns of the index upwards. This only seems to be a problem in the full impact index caused by the healthcare companies. Therefore, we present regression results for our impact index and the healthcare index in tables D.15 and D.16.

Figure D.4: Cumulative returns over the sample period, impact index (2012-2018)



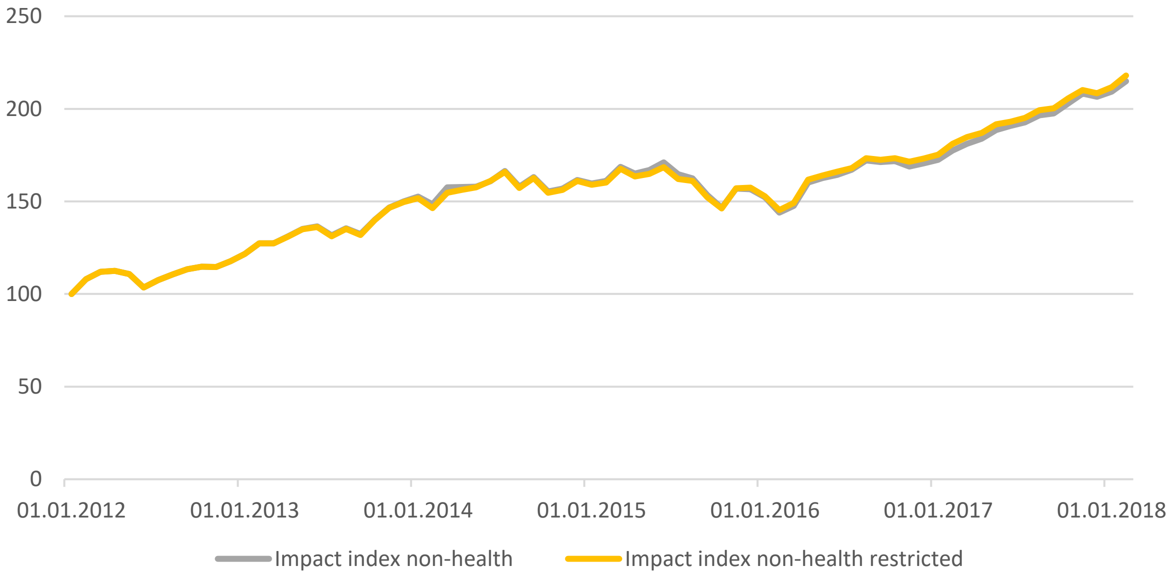
Cumulative returns for the full impact index (impact index) and its restricted subsample including only companies with data throughout the sample period (impact index restricted) from January 1st, 2012 to January 31st, 2018

Figure D.5: Cumulative returns over the sample period, healthcare impact index (2012-2018)



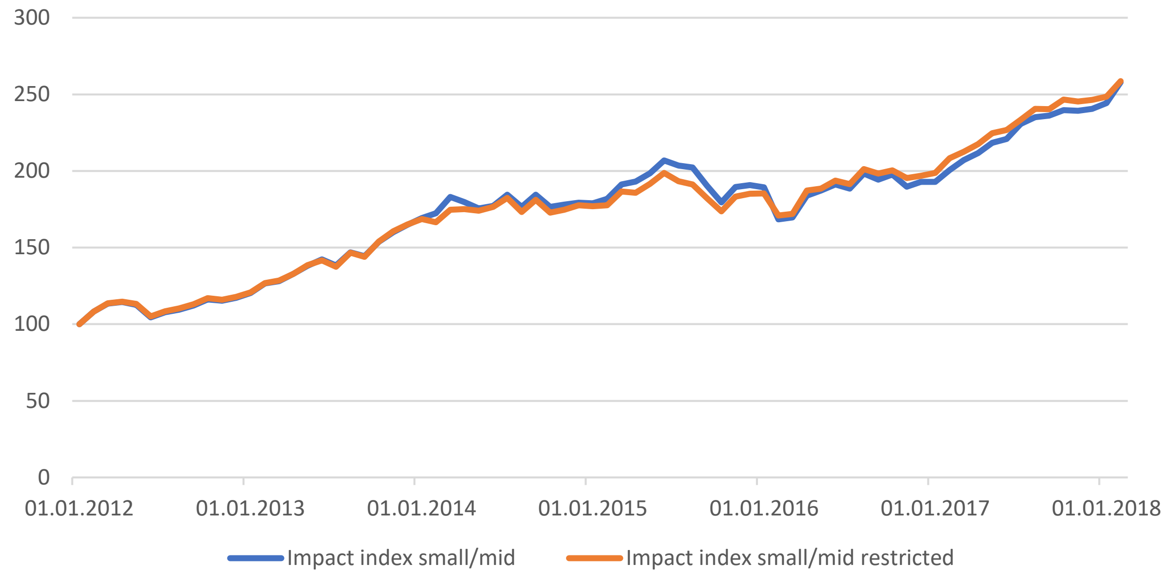
Cumulative returns for the full healthcare impact index (impact index health) and its restricted subsample including only companies with data throughout the sample period (impact index health restricted) from January 1st, 2012 to January 31st, 2018

Figure D.6: Cumulative returns over the sample period, non-healthcare impact index (2012-2018)



Cumulative returns for the full non-healthcare impact index (impact index non-health) and its restricted subsample including only companies with data throughout the sample period (impact index non-health restricted) from January 1st, 2012 to January 31st, 2018

Figure D.7: Cumulative returns over the sample period, small- and mid-cap impact index (2012-2018)



Cumulative returns for the full small- and mid-cap impact index (impact index small/mid) and its restricted subsample including only companies with data throughout the sample period (impact index small/mid restricted) from January 1st, 2012 to January 31st, 2018

Table D.15 and D.16 present regression results for the restricted sample of the full index and the healthcare index. We also calculate the difference in return by subtracting the returns of the full sample from the restricted sample and regress this difference on the factor models. We find slight differences between the restricted and unrestricted sample. The alphas in the restricted samples are still positive, but only significant in the Fama-French five factor model.

Table D.15: Regression results for the restricted impact index and a difference in return against the full impact index over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Restr	Diff	Restr	Diff	Restr	Diff	Restr	Diff
Mkt-RF	0,964***	-0,067	0,993***	-0,070**	1,050***	-0,066*	0,938***	-0,101***
	(9,96)	(-1,18)	(12,13)	(-2,14)	(12,34)	(-1,88)	(10,16)	(-2,69)
SMB			0,154	-0,086	0,192	-0,072	-0,089	-0,176*
			(0,79)	(-1,09)	(1,02)	(-0,93)	(-0,41)	(-1,98)
HML			-0,444***	0,027	-0,305*	0,020	-0,800***	-0,066
			(-2,96)	(0,46)	(-1,79)	(0,29)	(-3,56)	(-0,72)
UMD					0,193	-0,001		
					(1,65)	(-0,03)		
RMW							-0,785**	-0,271**
							(-2,46)	(-2,06)
CMA							0,305	0,004
							(0,93)	(0,03)
Alpha	0,004	-0,001	0,003	-0,001	0,002	-0,001	0,005*	-0,000
	(1,23)	(-1,56)	(1,32)	(-0,97)	(0,63)	(-0,84)	(1,98)	(-0,19)
R^2	0,647	0,057	0,689	0,074	0,712	0,066	0,713	0,132
Adjusted R^2	0,641	0,043	0,675	0,033	0,695	0,011	0,691	0,066
Observations	72	72	72	72	73	73	72	72

*Monthly returns for the restricted impact index (Restr) and monthly differences in return against the full impact index (Diff) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff calculated as $r_{Impactrestricted,t} - r_{Impact,t}$. Restr adjusted for autocorrelation in equation (1), (2) and (4), and for heteroskedasticity in equation (1). Diff adjusted for heteroskedasticity in equation (1). T statistics in parentheses *p < 0,10, **p < 0,05, ***p < 0,01. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))*

Table D.16: Regression results for the restricted healthcare impact index and difference in return against the full healthcare impact index over the sample period (2012-2018)

	(1)		(2)		(3)		(4)	
	CAPM		Fama-French three factor model		Carhart four factor model		Fama-French five factor model	
	Restr	Diff	Restr	Diff	Restr	Diff	Restr	Diff
Mkt-RF	1,005***	-0,097	1,050***	-0,098*	1,127***	-0,090	0,906***	-0,169***
	(6,15)	(-1,08)	(7,66)	(-1,79)	(7,81)	(-1,55)	(5,89)	(-2,78)
SMB			0,299	-0,062	0,281	-0,062	-0,197	-0,265*
			(0,92)	(-0,48)	(0,87)	(-0,47)	(-0,54)	(-1,85)
HML			-0,731***	-0,028	-0,419	-0,002	-1,335***	-0,219
			(-2,86)	(-0,27)	(-1,36)	(-0,01)	(-3,54)	(-1,47)
UMD					0,370*	0,032		
					(1,71)	(0,37)		
RMW							-1,519***	-0,596***
							(-2,82)	(-2,79)
CMA							0,303	-0,031
							(0,56)	(-0,14)
Alpha	0,007	-0,001	0,006	-0,001	0,003	-0,002	0,010**	0,000
	(1,29)	(-1,09)	(1,40)	(-0,76)	(0,66)	(-0,85)	(2,28)	(0,25)
R^2	0,415	0,045	0,483	0,050	0,498	0,051	0,531	0,156
Adjusted R^2	0,406	0,031	0,460	0,008	0,468	-0,005	0,496	0,092
Observations	72	72	72	72	72	72	72	72

Monthly returns for the restricted healthcare impact index (Restr) and monthly differences in return against the full healthcare impact index (Diff) over the period January 1st, 2012 to January 31st, 2018, regressed on equation (1), (2), (3) and (4) using global risk factors. Diff calculated as $r_{Healthcarerestricted,t} - r_{Healthcare,t}$. Restr adjusted for autocorrelation in equation (1), (2), (3) and (4), and for heteroskedasticity in equation (1). Diff adjusted for heteroskedasticity in equation (1). T statistics in parentheses $^{*}p < 0{,}10$, $^{**}p < 0{,}05$, $^{***}p < 0{,}01$. (Sources: Morningstar Direct database and the Kenneth R. French online data library (French, 2018; Morningstar, 2018))

In other words, the restricted samples seem to perform slightly worse than their unrestricted counterparts. This is confirmed by considering the alpha on the difference in return. These are all negative but insignificant. The companies that are added throughout the sample period thus seem to bias the performance of the full index positively. This bias seems negligible, but it is important to remember that it only reflects the positive bias of the added companies. The index still overlooks the effect of companies that have disappeared during the sample period but should have been included based on company characteristics. Adding these companies would likely have depressed the performance of the index further. Thus, we must be careful in concluding that impact investments yield attractive risk-adjusted returns on average.