DO IMPACT INVESTING OPPORTUNITIES EXIST IN PUBLIC EQUITY? AN EMPIRICAL EXAMINATION

Søs Elisabeth Hansen *, Throstur Olaf Sigurjonsson **

* Bain & Company, Copenhagen, Denmark
** *Corresponding author*, University of Iceland, Reykjavík, Iceland; Copenhagen Business School, Copenhagen, Denmark
Contact details: University of Iceland, Gimli (G-224), Saemundargata 2, 102 Reykjavík, Iceland

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Abstract

Even though impact investing increasingly establishes a presence in public equity, research confirming that this asset class is feasible for impact investments is lacking (Phillips & Johnson, 2021). This has resulted in queries about unrealistic assumptions of achieving positive social and environmental impact, alongside financial returns, in a public equity setting (Bernal et al., 2021; Boscia et al., 2019). Resultingly, the public equity approach to impact investing has been accused of being the first step towards a total dilution of the industry's original mission of attaining goals that are not feasible through neither pure philanthropic grants nor conventional investments. Aimed at bridging the current research gap, within the literature of impact investing, this paper examines whether impact investing opportunities exist in public equity. Based on an empirical foundation of 163 publicly listed companies, which are the target of impact investments made through impact funds, it is found that impact investing opportunities exist in public equity when evaluated based on long-term measures of shareholder value creation. Theoretical implications suggest that the concept of impact investing does not need to be refined in a public equity setting and that the field could advance from discussing the fundamental assumptions to start defining the boundaries of impact investing in public equity.

Keywords: Impact Investments, Public Equity, Shareholder Value Creation, Creating Shared Value, Socially Responsible Investment

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1. INTRODUCTION

Impact investing has developed as one of the most visionary and promising areas of the social finance movement (Bernal et al., 2021; Jackson, 2013; Lehner & Nicholls, 2014; Lehner et al., 2019). Within impact investing, the goal is to create positive social or environmental impact and financial returns simultaneously (Boscia et al., 2019; Kölbel et al., 2020; Nicholls et al., 2015), whereby it can attain goals that are not feasible through neither pure philanthropic grants nor conventional investments (Roundy, 2020; Weber, 2016). Notwithstanding the expeditious and noteworthy momentum of impact investing (Ormiston et al., 2015), research has not kept pace with the growing practitioner interest (Agrawal & Hockerts, 2021). The amount of academic publications on impact investing remains limited (Kölbet et al., 2020; Wendt, 2019). The chief part of the literature currently originates from industry-based reports (Hebb, 2013), resulting in a gap between scholarly and practitioner bases of knowledge (Clarkin & Cangioni, 2016). The current landscape of industry-based reports, although

attempting to increase the transparency of this emergent industry, focuses mainly on the financial return of impact investments (Hehenberger & Harling, 2018). However, the problem is that financial data disconnected from impact fail to account for the double-bottom line (Wilburn & Wilburn, 2014) and consequently, the complex reality faced by impact investors (Hehenberger & Harling, 2018).

As a result, the rapid growth of the impact investing industry has been followed by queries about potentially unrealistic assumptions of the ability to achieve social and environmental impact alongside financial return (Phillips & Johnson, 2021; Born & Brest, 2013). In this context, academic research has a distinctive contribution to make in developing the impact investing industry, in questioning its underlying assumptions based on empirical evidence (Daggers & Nicholls, 2016). At this nascent stage of formation, the field needs to manage market expectations through a comprehensive and transparent assessment of the simultaneously generate financial return and impact (Evans, 2013). Consequently, scholars have continued to highlight the need for studies that include both impact data and data on financial return (Reisman et al., 2018; Hehenberger & Harling, 2018). At its broadest, this research aims to close this gap by empirically assessing the relationship between impact and financial return among impact investments.

Impact investing is starting to venture out of its private market origins and establishing a presence in public market investments that has generated both renewed interest and new investors (Roundy et al., 2017). Among repeat respondents of the Global Impact Investing Network's (GIIN) 2022 Annual Impact Investor survey, the highest growth of impact investing activity per asset class allocation has occurred in public equity. Public equity has grown by 33% compound annual growth rate from 2015 to 2019 (GIIN, 2022). These findings are supported by a recent report published by Blackrock (Rice & Tran, 2022); they claim that public equities can take an important "*complementary role in the impact investment ecosystem, offering solutions that private markets cannot and allowing more investors to participate in a space long available only to high-net-worth and institutional investors*". This trend is even though some scholars argue that the public equity approach to impact investing is a move towards a total dilution of the industry's original mission (Born & Brest, 2013; Balbo, 2016). O'Donohoe et al. (2010) anticipate more publicly traded investment opportunities will be greenwashing the impact investing industry. However, it is postulated that a process like greenwashing (Delmas & Burbano, 2011) might be occurring in the impact investing industry as it gradually mainstreams (Born & Brest, 2013), threatening the legitimacy of the entire concept (Findlay & Moran, 2019). Ultimately, this paper contributes to the literature by studying the relationship between impact and financial return in a public equity setting.

The value of longitudinal studies that analyse impact investments becomes progressively essential as a tool for establishing integrity and legitimacy (Suchman, 1995) and increasing investor confidence (Clarkin & Cangioni, 2016). If impact investments in public markets are adopted by interests seeking to use the term merely to inflate market share, this might have disadvantageous implications for the field's general development (Findlay & Moran, 2019). Consequently, scholars have called for future research to conduct longitudinal studies to bring further insights and causal inferences into the relationship between impact and financial performance in public equity (Urban & George, 2018). Aimed at contributing to the empirical knowledge of impact investing in public equity and derived from the above, applying 163 publicly listed companies, the problem statement of this research takes its point of departure from the identified research gap and can be summarized as:

RQ: Do impact investing opportunities exist in public equity?

Through the empirical examination of this research, it is impossible to falsify that impact investing opportunities exist for long-term impact investors, when impact investments are made into publicly listed companies, which are the target of impact funds. The findings have important theoretical implications for the field of impact investing, as they indicate that the concept of impact investing does not need to be redefined in a public equity setting when evaluated based on market-based measures of shareholder value creation. Thus, the findings suggest that the field can continue its progression and wide-ranging adoption, as impact realization can be attained *pari passu* with shareholder value creation in a public equity setting. Further, findings suggest that the field could advance from discussing the fundamental assumptions and start defining the boundaries of impact investing in public equity.

This paper is structured as follows: Section 2 outlines the theoretical background and provides hypotheses for the research. Then there is a description of the research methodology in Section 3 and presentation of the results in Section 4. Thereafter, a discussion on the research's implications is proposed in Section 5. Finally, a conclusion of the findings and directions for future research are presented in Section 6.

2. LITERATURE AND HYPOTHESES

No uniform and soundly based definition of impact investing has reached definitive status (Bernal et al., 2021; Reeder & Colantonio, 2013). Correspondingly, a definitely outlined comprehension of what the term entails is likewise still absent (Mendell & Barbosa, 2013). Despite the diverse conceptualizations, all definitions of impact investing share the achievement of societal or environmental alteration through the investment of capital (Urban & George, 2018). Notwithstanding this lack of conceptual, terminological, and definitional accuracy is intelligible since it is representative of nascent research domains (Dinneen & Beach, 2018; Wendt, 2019), it remains problematic for multiple reasons. Firstly, an ambiguous definition threatens the reliability of the entire impact investing industry, along with the credibility of associated organizations and stakeholders (Erickson, 2011). Further, it facilitates what Findlay and Moran (2019) describe as purpose washing, a term that conceptualizes what Harji and Jackson (2012) originally coined as impact

washing. Secondly, the lack of lucidity potentially impedes the progression and wide-ranging adoption of impact investing (Höchstäder & Scheck, 2015), as it obstructs the possibility that conventional investors understand and take a stance towards it (Sandberg et al., 2009). An impact investing industry deprived of concord on what constitutes impact and what data must be collected is intrinsically inhibited, making it less accessible for conventional investors who might procure additional capital were the field properly defined (Sardy & Lewin, 2016). As a result, the knowledge of the dynamics of impact investing lies with a few competent players (Höchstäder & Scheck, 2015). Furthermore, without a detailed framing of the impact investing industry, governments, policymakers, and regulatory authorities have a hard time building the required market infrastructure (Brandstetter & Lehner, 2014). Thirdly, scholarly research needs clear definitional parameters of the concept to allow for accurate discussions (Sandberg et al., 2009). Without conceptual, terminological, and definitional transparency, it becomes difficult for the impact investing industry to gain legitimacy and for corresponding theories to advance (Höchstäder & Scheck, 2015).

Despite the diverse conceptualizations, all definitions of impact investing share the achievement of societal or environmental alteration through capital investment (Urban & George, 2018). Further, like conventional investing (Höchstäder & Scheck, 2015), impact investing implicates the provision of financial resources for a financial return (Grabenwarter & Liechtenstein, 2011; Brandstetter & Lehner, 2014). Ultimately, even though the majority of scholars emphasize the absence of definitional homogeneity (Daggers & Nicholls, 2016; Agrawal & Hockerts, 2021), at the most general level, the field appears to agree on the fundamental definitional components around which impact investing is generally defined. Here, the prevailing definition of impact investing is based on the two core dimensions of financial return and social or environmental impact (Höchstäder & Scheck, 2015).

2.1. Financial return

Concerning the financial dimension of impact investing, the *return of the invested principal* seems to be the minimum requirement to classify as an impact investment (Freireich & Fulton, 2009; Ashta, 2012; Oleksiak et al., 2015; Daggers & Nicholls, 2016). That being said, the preponderance of academic publications either avoid specifying the level of expected financial return (Bugg-Levine & Goldstein, 2009; Louche et al., 2012; Geobey et al., 2012; Jackson, 2013; Hebb, 2013; Clarkin & Cangioni, 2016) or explicitly affirm an expected financial return stretching from below-market rate to market rate (Born & Brest, 2013; McGoey, 2014) or above-market rate of return (Trelstad, 2016; Nilsson & Robinson, 2018). In their inductive study, Roundy et al. (2017) find that there is a variance among impact investors in terms of the priority they put on achieving financial return and that individual impact investors have different financial targets. These findings support the claims of Hehenberger and Harling (2018), who find that it makes no sense to study impact investing from a financial perspective, decoupled from the social and environmental components of impact investing.

According to Freireich and Fulton (2009), impact investors can be generally categorized into two groups based on their primary objective impact-first and finance-first investors. To impact-first investors, the aim is to optimize social or environmental impact with a floor for financial return (Freireich & Fulton, 2009; Glänzel & Scheuerle, 2016). Hebb (2013) suggests that the impact-first investor seeks financial returns ranging from repayment of the invested principal up to a risk-adjusted market return. On the other hand, finance-first investors prioritize financial returns and understand impact investing as investments intended to create social and environmental returns in addition to financial returns but with a floor for social or environmental impact (Freireich & Fulton, 2009; O'Donohoe et al., 2010). This implies that impact investors can select from various investment approaches that offer different blends of financial return and impact to fit the rationality of their investments (Nicholls, 2010). However, both components must have a positive relationship to separate impact investing from traditional investing and philanthropy (Grabenwarter & Liechtenstein, 2011).

2.2. Impact

The notion of *impact* is the central component of impact investing that sets it apart from related concepts within the broader social finance paradigm (Nicholls et al., 2015). A comprehensive definition of impact is lacking in the current impact investing literature (Reeder & Colantonio, 2013), and the standards for impact remain largely subjective without any defined criteria for judging the impact hurdle that an investment must pass to qualify as an impact investment (Höchstäder & Scheck, 2015). Resultingly, one of the most disputed conditions remains the question of what types of impact are adequate to distinguish an impact investment (Kölbel et al., 2020; Svedova et al., 2014). However, as long as the standards for what constitutes impact is defined by the individual impact investor, Bugg-Levine and Emerson (2011) argue that almost all investments can qualify as impact investments.

In the literature, the impact is defined mainly as social or environmental impact (Boscia et al., 2019; Ashta, 2012). Another regular definition of impact is centred around the focus on solving thematic issues (Wendt, 2019), which is why impact investing is tightly linked to social and environmental problems and challenges (Spiess-Knafl & Scheck, 2017). Nicholls et al. (2015) argue that all companies create economic, social, and environmental value. However, most companies are not managed to optimize their long-term social and environmental value creation (Emerson, 2003).

However, Trelstad (2016) argues that intent is not significantly important as long as the investor manages to find an investment capable of delivering the desired impact since everyone doesn't need to share the same intentions around a specific impact for it to be realized. Countering this argument, Born and Brest (2013) maintain that while social or environmental impact is possible to achieve unintentionally, it does not imply that intention is insignificant, as investors are more likely to achieve what they intentionally seek. This is supported by Dadush (2015), who finds that the less an investor is

concerned with realizing a positive environmental or social impact, the more unlikely the investor is to proffer relevant assistance to the investee in accomplishing its environmental or social undertaking. Moreover, the less an investor cares for positive environmental or social impact, the higher the likelihood that the investor will pressure the investee to prioritize financial performance over impact realization. Embedded in this line of reasoning, Brown and Swerky (2012) add to the definition of impact investing that the intended impact must be clearly defined a priori. Thus, positive externalities in the form of incidental side-effects of commercial deals are not enough to qualify as an impact investment. Kölbel et al. (2020) argue for a greater investors impact where a lack of capabilities and financial constraints are evident. Ultimately, an impact investor must demonstrate an intention to cause both a positive environmental or social impact and a financial return (Born & Brest, 2013; Barber et al., 2021).

Ultimately, the definition of impact investing is based on the two core principles of blended value (Emerson, 2003) and financial return (Weber, 2016). In this context, the blended value principle claims that impact investing can attain both financial returns as well as social and environmental impact (Emerson & Cabaj, 2000), whereas the principle of financial return assures the lasting viability of such investments (Geobey & Weber, 2013). A prerequisite to qualify the deployment of capital for social and environmental impact in public equity as impact investing is that there must be a positive relationship between the scale of social and environmental impact achieved and the ability of the investee to generate shareholder value. Consequently, the first hypothesis can be summarized as follows:

H1: There is a positive linear relationship between social and environmental impact and shareholder value creation.

The utmost essential condition is the existence of a causal connection between the impact achieved and the generation of financial return (Grabenwarter & Liechtenstein, 2011). However, scholars point out that the existing empirical literature has not effectively dealt with the inherent causality issues of impact investing (Aguinis & Glavas, 2012). Suppose impact investing opportunities should exist in public equity. In that case, the causal relationship between social and environmental impact and shareholder value creation must be bidirectional in order to deliver blended value (Emerson, 2003) and financial return (Weber, 2016), which are the two core principles that set impact investing apart from philanthropy and conventional investing. Ultimately, this gives rise to the second set of hypotheses:

H2a: Higher levels of social and environmental impact cause higher levels of shareholder value creation.

H2b: Higher levels of shareholder value creation cause higher social and environmental impact levels.

2.3. Intentionality

Oleksiak et al. (2015) specify the deliberate structuring of investments to provide positive social or environmental impact alongside financial return, where social and environmental externalities are more than a by-product of financial value creation, as a critical trait of impact investing. Thus, unintentionally realizing a social or environmental impact in of searching for a financial return does not qualify as an impact investment (Brandstetter & Lehner, 2014).

However, Trelstad (2016) argues that intent is not important as long as the investor finds an investment capable of delivering the desired impact since everyone doesn't need to share the same intentions around a specific impact for it to be realized. Countering this argument, Born and Brest (2013) maintain that while social or environmental impact is possible to achieve unintentionally, it does not imply that intention is insignificant, as investors are more likely to achieve what they intentionally seek. This is supported by Dadush (2015), who finds that the less an investor is concerned with realizing a positive environmental or social impact, the more unlikely the investor is to proffer the relevant assistance to the investee in accomplishing its environmental or social undertaking. Moreover, the less an investor cares for positive environmental or social impact, the higher the likelihood that the investor will pressure the investee to prioritize financial performance over impact realization.

The intentionality criterion also implies that investments in sectors associated with positive externalities but driven by a pure for-profit motive do not classify as impact investments (Barber et al., 2021). Born and Brest (2013) argue that if an impact investor is unwilling to make a financial sacrifice, which they assume is not the case when investments go to publicly traded cap large-cap markets, the impact investment cannot contribute with anything the market would not have achieved anyway.

2.4. Measurability

The core of impact measurement is identifying a causal relationship between an investment and its impact while attributing both the negative and positive effects to the investment (White, 2010). *The measurement and assessment of impact* is a way for impact investors to mitigate the risk of mission drift and exploitation of impact investees, which Spiess-Knafl and Scheck (2017) consider legitimate concerns for impact investing. Nicholls et al. (2015) claim that the more impact investing is accepted within the traditional financial markets, the graver this problem will become. Reeder et al. (2015) raise the concern that if impact investing should continue to burgeon, more robust quantifications of the broader effects of impact investing are needed. However, demonstrating impact is multifaceted and impeded by methodological complications like collecting and measuring sometimes intangible effects (Reeder & Colantonio, 2013).

3. RESEARCH METHOD

3.1. Data collection and sampling

The general population to which the results are meant to apply consists of publicly listed companies that are the target of impact investments. However, it is acknowledged that no certified database exists on impact investing activities (Urban & George, 2018). Consequently, the population is reduced to a target population that is redefined to account for publicly listed companies that are the target of impact investments made through impact funds investing in public equity. This paper draws upon

existing lists from the GIIN, as the GIIN remains the sole actor within the impact investing industry that methodologically reports on the dynamics of impact investing (Balbo, 2016). First, an initial list was compiled based on all current members of the GIIN, consisting of 98 asset owners, 171 asset managers, and 64 service providers. Then, for all 51 GIIN research publications, the individual lists of participants and survey respondents for each publication are assessed and sorted into asset owners, asset managers, and service providers. Hereupon, duplicates, and service providers are removed. A manual screening process is performed from the list of asset managers where any impact fund investing in public equity is sorted into an individual list. Further, for each asset owner, this research follows the money invested in order to identify any impact fund investing in public equity, which is then added to the list of impact funds investing in public equity. However, the final list of impact funds is not perfect at excluding impact funds investing in publicly listed companies that do not apply to the target population. Membership of the GIIN is obtainable for asset owners and asset managers that are interested in deepening their engagement with the impact investing industry. Thus, they might not all be active in impact investing at the point of sampling. As a result, there is a risk that the list might include funds that do not belong to the target population. In order to mitigate the risk of this type of sampling frame error, which may contribute to bias (Zhengdong, 2011), this research performs a second round of manual screening. Here, each impact fund investing in publicly listed companies is screened for the four inclusion criteria derived from the literature review as: 1) financial return, 2) impact, 3) intentionality, and 4) measurability. Ultimately, the final sampling frame consists of the 45 impact investing funds. The literature review reveals that impact investors can select from a variation of approaches that differ in terms of financial return and impact realization (Nicholls, 2010). Thus, intentionality is the most significant defining characteristic of impact investing (Barber et al., 2021), which is why this sample frame is considered the strongest possible.

Only the top teen holdings for each of the 45 impact funds investing in public equity are accessible through DataStream. Consequently, each of the publicly listed companies included among the top teen holdings are extracted for the final sample, which, after removing duplicates and checking for data availability, consists of 163 publicly listed companies.

The impact investment market is characterized by a scarcity of publicly available data (Saltuk et al., 2013), especially when it comes to impact data (Reisman et al., 2018). Looking into the limited amount of research on impact investing, it is revealed that in the few studies where data is used, it is sourced from internal sources or based on anecdotal evidence (Glänzel & Scheuerle, 2016). This paper will rely on external archival data from DataStream in the form of ASSET4 environmental, social, and governance (ESG) indicators. The data collected is two-dimensional, as it combines both cross-sectional and time series data, where data is collected for the same company on a yearly basis repeatedly between 2013 and 2018.

3.2. Measures and variables

While methods for measuring financial returns are largely perceived as systematic and robust (Reisman et al., 2018), the parallel task with respect to the measurement of social and environmental impact lacks such historical pedigree (Reeder et al., 2015). Most often, the impact assessment conducted by evaluators is tailor-made to the individual evaluand, for which they have wide discretion when choosing indicators and methods (Ruff & Olsen, 2018). The resultant heterogeneity of approaches to impact measurement makes it difficult to compare impact across companies (Rawhouser et al., 2019).

At the most fundamental level, the assessment of social and environmental impact can be distinguished between standardized and company-specific measurements. Given that the sample includes cross-sectional data, the standardized measurement approach is favored for the purpose of this paper. One of the main challenges associated with measuring social and environmental impact, following the standardized approach is to assure comparability across companies (Kroeger & Weber, 2014). As a result, a proxy for social and environmental impact is developed based on Porter and Kramer's (2011) creating shared value (CSV) framework and the three constructs of CSV. Table 1 below outlines the six categories constituting the theoretically derived proxy for social and environmental impact. Here, all six categories are numeric variables of continuous nature that have a positive scaling ranging from 0 to 100.

Table 1. CSV constructs and categories for impact conceptualization

CSV construct	*Code*	*Category*	*Description*
"Reconceiving products and markets"	*TRESGSOPRS*	Product responsibility score	Reflects a company's capacity to produce quality goods and services integrating the customer's health and safety, integrity and data privacy.
	TRESGENPIS	Environmental innovation score	Reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.
"Redefining productivity in the value chain"	*TRESGENERS*	Emissions score	Measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.
	TRESGENRRS	Resource use score	Reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.
	TRESGSOWOS	Workforce score	Measures a company's effectiveness towards job satisfaction, healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce.
"Enabling local cluster development"	*TRESGSOCOS*	Community score	Community category score measures the company's commitment towards being a good citizen, protecting public health and respecting business ethics.

Source: Authors' conceptualization based on categories and descriptions adopted from DataStream and the CSV framework developed by Porter and Kramer (2011).

The literature, to date, has not managed to pinpoint a theoretically derived ranking of importance for the various sources of environmental and social impact as a guide for empirical work (Ioannou & Serafeim, 2012). Consequently, the three constructs of CSV are equally weighted in the construction of the proxy for social and environmental impact, as illustrated in the following calculation:

$$\textit{Social and environmental impact} = \frac{\left(\frac{\sum \textit{Reconceiving products and markets}}{2} + \frac{\sum \textit{Redefining productivity in the value chain}}{3} + \textit{Enabling local cluster development} \right)}{3} \quad (1)$$

Theoretically, scholars commonly conceptualize accounting-based measures as a reflection of short-term financial performance and market-based measures as a reflection of long-term financial performance (Gentry & Shen, 2010). The forthcoming analyses are performed on both dimensions of shareholder value creation. This is because the impact investing field has only recently begun to engage in confirmatory studies (Agrawal & Hockerts, 2021), with this paper being the first to study the concept in public equity. Adopting a multidimensional approach further increases the robustness of the forthcoming statistical modelling, as it enables the comparison of different summary measures to see if these are sensitive to disturbance before inferences are drawn to the target population.

Based on the established literature, this research adopts return on equity (*ROE*) and earnings per share (*EPS*) as accounting-based measures for shareholder value creation (Griffin & Mahon, 1997; Hall, 2016). As market-based measures of shareholder value creation, market value added (*MVA*) and market capitalization (*MRK*) are adopted.

Acknowledging that the assumptions underlying whether impact investing opportunities exist in public equity should be evaluated comparatively and unconditional of exogenous industry-specific factors, a categorical variable controlling for industry affiliation is included in the analyses. This is done by grouping the publicly listed companies based on their Thomson Reuters business classification (TRBC) industry group. The literature related to the relationship between corporate social performance disagrees whether company size constitutes a significant confounding variable for the relationship between the two (Van Beurden & Gössling, 2008). Acknowledging this ambiguity, this paper will adopt two different measures of company size, whereupon backward selection will be used to drop the least significant of the two to assure the most well-fitted model.

4. FINDINGS

H1 is tested relying on multiple linear regression. The following baseline specification is adopted, which will be performed on each measure of shareholder value creation individually:

$$SVC_{(i,t)} = \varphi_{1,j} Impact_{(i,t-j)} + \varphi_2 Size_{(i,t)} + Industry_{(i,t)}\beta + \alpha_i + \varepsilon_{(i,t)} \quad (2)$$

where, $SVC_{(i,t)}$ measures the shareholder value creation as either *ROE*, *EPS*, *MVA* or *MRK* for the *i*-companies (i = 1, 2,..., 163) included in the sample and observed during t-periods of time (from 2013 to 2018). The effect of social and environmental impact on all four measures of $SVC_{(i,t)}$ is measured by the coefficient $\varphi_{1,j}$, for *j*-lags. The effect of company size ($\varphi_2 Size_{(i,t)}$) on shareholder value creation is accounted for, capturing systematic errors in the regression. Further, control factors for industry affiliation are included in the matrix $Industry_{(i,t)}$and weighted by the vector β. Lastly, α_i captures the heterogeneity in the *i*-companies and $\varepsilon_{(i,t)}$ is an independently and identically distributed perturbation term, capturing random errors.

In order to test *H2a* and *H2b*, the causal link between social and environmental impact and shareholder value creation is addressed in the context of Granger causality (Granger, 1969). However, as the Granger (1969) causality test is designed for time series data, this paper relies on the extension provided by Dumitrescu and Hurlin (2012) specifically developed to detect causality in panel data. The following equations will be adopted and performed on all four measures of shareholder value creation individually:

$$Impact_{(i,t)} = \sum_{j=1}^{p} \varphi_j SVC_{(i,t-j)} + \sum_{j=1}^{p} \theta_j Impact_{(i,t-j)} \quad (3)$$

$$SVC_{(i,t)} = \sum_{j=1}^{p} \varphi_j SVC_{(i,t-j)} + \sum_{j=1}^{p} \theta_j Impact_{(i,t-j)} \quad (4)$$

Equation (3) tests whether shareholder value creation Granger causes social and environmental impact, and Eq. (4) tests whether social and environmental impact Granger causes shareholder value creation. For both equations, $SVC_{(i,t)}$ measures the shareholder value creation as either *ROE*, *EPS*, *MVA* or *MRK* for the *i*-company during *t*-years and $Impact_{(i,t)}$ is the social and environmental impact of the *i*-company during *t*-years. Further, the coefficients φ_j and θ_j weight the effect of the lags of shareholder value creation and social and environmental impact, respectively.

4.1. Analysis I: Correlation between impact and shareholder value creation

Analysis I relies on multiple linear regression analysis to examine the relationship between environmental and social impact and shareholder value creation, as specified in Eq. (2). To ensure that the appropriate panel data technique is adopted, the Hausman specification test is performed to

compare whether fixed effect or random effect models provide the best representation of the data. The results for each measure of the dependent variable are summarized in Table 2.

Table 2. Results of Hausman tests for each measure of the dependent variable

Measure of shareholder value creation	*Hausman test*	
	Chi²	*p-value*
Market capitalization (*MRK*)	44.78	0.0000
Earnings per share (*EPS*)	135.37	0.0000
Market value added (*MVA*)	20.13	0.0012
Return on equity (*ROE*)	17.24	0.0041

Source: Authors' findings.

As can be deduced from Table 2, the null hypothesis that the differences in coefficients are not systematic can be rejected at a significance level of less than 0.01 for all four measures of shareholder value creation. Hence, the estimations of the models with fixed effects and random effects are systematically different, suggesting that estimations with fixed effects are preferred, as the regressors are not orthogonal with the random effects.

Table 3 presents the estimates of the multiple regressions with fixed effects, controlling for company size and industry affiliation, for each of the four measures adopted for shareholder value creation. Here, the log net sales variable, controlling for company size, is excluded to avoid problems with multicollinearity. Further, the industry affiliation controls are automatically dropped because of adopting the fixed effect models, as these are perfectly correlated with the company-level fixed effects.

Table 3. Panel regression results with fixed effects

Variables	*Measure of shareholder value creation*							
	ROE		*EPS*		*MVA*		*MRK*	
Impact	0.2137	(0.1659)	0.3955**	(0.1922)	0.4056**	(0.16)	0.2528**	(0.1259)
Risk	0.089**	(0.0357)	-0.0047	(0.0346)	0.0118	(0.0603)	-0.0432	(0.0397)
R&D	0.2343	(0.1626)	0.1719	(0.1355)	0.2075	(0.1391)	0.1227	(0.0947)
Log assets	-0.4185***	(0.1246)	0.3374**	(0.1355)	0.3984***	(0.1357)	0.6422***	(0.0694)
R^2-within	0.0864		0.1620		0.2867		0.5197	
R^2-between	0.0033		0.0380		0.9698		0.9844	
R^2-overall	0.0034		0.0204		0.9681		0.9850	
N	737		738		730		735	

*Note: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.10; Robust standard errors are presented in the brackets.*
Source: Authors' findings.

The results indicate that social and environmental impact has a contemporaneous, significant and positive effect on *EPS*, *MVA* and *MRK*. For these three measures of shareholder value creation, the effect is significant at the significance level of 0.05. contrary to the aforementioned measures of shareholder value creation, the relationship between the impact proxy and *ROE* is not statistically significant.

The respective fits of the two models adopting market-based measures of shareholder value creation are high. Here, the model adopting *MVA* as a measure of shareholder value creation explains 96.8% of the variance in *MVA* and the model adopting *MRK* explains 98.5%. On the contrary, the model fits for *EPS* and *ROE* are low, with an overall R^2 of less than five percent. Specifically, these findings suggest that social and environmental impact has a relevant effect on *MVA* and *MRK*, whereas it does not affect *EPS* and *ROE*. In other words, social and environmental impact has little to no power in explaining *ROE* and *EPS*, based on their low R^2 of 0.0034 and 0.0204, respectively. This suggests that social and environmental impact has a long-term rather than a short-term effect on shareholder value creation. The values of the estimated coefficients for the models adopting market-based measures suggest that a 10% increase in social and environmental impact results in an average increase of 4.056% in *MVA* and an average increase in *MRK* of 2.528%.

4.2. Analysis II: Causality between impact and shareholder value creation

The concept of Granger causality entails that a variable *X* is said to Granger cause variable *Y* if former values of *X* help in explaining *Y*, even after controlling for the lagged values of *Y*. Dumitrescu and Hurlin (2012) provide an extension of the Granger (1969) methodology that is designed to detect causality in panel data, as the approach accounts for the heterogeneity in the data, while estimating pairwise causal relationships. However, it requires variables to be stationary. Analysis II sets out by testing the stationarity of all the variables included in the Granger causality tests, based on Harris-Tzavalis tests. Table 4 presents the results of the Harris-Tzavalis tests.

Table 4. Estimates of lagged effects of social and environmental impact

Variables	*Hypothesis testing*	*Measure of shareholder value creation*			
		ROE	*EPS*	*MVA*	*MRK*
Contemporaneous effect of *Impact*	Coefficient	0.2137	0.3955	0.4056	0.2528
	p-value	0.2020	0.0430	0.0130	0.0480
Lag 1 of *Impact*	Coefficient	0.2440	0.4038	0.3644	0.2137
	p-value	0.0650	0.0190	0.0400	0.1230
Lag 2 of *Impact*	Coefficient	0.2209	0.1449	0.5630	0.3327
	p-value	0.0690	0.3000	0.0000	0.0030
Lag 3 of *Impact*	Coefficient	-0.0315	-0.0913	0.0723	0.0233
	p-value	0.8130	0.6150	0.7840	0.8970

Source: Authors' findings.

The results of the Harris-Tzavalis tests suggest that the variables are not stationary, as it is impossible to reject the null hypothesis that the panels do not contain unit roots. Consequently, the Dumitrescu and Hurlin (2012) tests is performed based on variables in the first differences. The variables in the first differences are found by taking the change from one year to the next, ultimately removing the unit roots and ensuring the stationarity of variables (please see Table 6). It does so by proposing two null hypothesis that no statistical significance exists between impact and shareholder value creation on hand and shareholder value creation and impact on the other.

Additionally, the Dumitrescu and Hurlin (2012) test requires panels to be balanced, which is why unbalanced observations are excluded from the analysis. Further, it requires $T > 5 + 3 * k$, where T denotes the number of years and k denotes the number of lags. If this assumption is not met, the Z-bar and Z-tilde statistics will not converge to the asymptotic standard distributions. However, due to data unavailability, this paper only has observed data from 2013 to 2018. Thus, the observed data for the companies included in the sample is extrapolated to the years 2009, 2010, 2011 and 2012, using the average differences of all measures of shareholder value creation and the impact proxy. Ultimately, the time index t in Eq. (3) and Eq. (4) starts in 2009 (t = 2009, 2010,..., 2018). Specifically, four years of data are extrapolated as this paper relies on both variables and the first differences in levels. Taking the first differences imply one year of lost data, for the models adopting variables in differences, this needs $T = 10$ years of data for running the tests with one lag ($k = 1$) to meet the assumption of $T > 5 + 3 * k$.

Ideally, a lag-order selection test would have been conducted to identify the suitable number of lags. However, since four years of data are extrapolated to perform the Dumitrescu and Hurlin (2012) test, this paper is limited to conducting the tests based on one-lag, to limit manipulation of the results. The results of the tests based on one-lag are presented in Table 5.

Table 5. Results of Fisher-ADF and Harris-Tzavalis tests

Variable	*Fisher-ADF test*		*Harris-Tzavalis test*	
	Chi²	*p-value*	*rho*	*p-value*
Market capitalization (*MRK*)	113.6054	0.0013	0.9212	1.0000
Earnings per share (*EPS*)	120.7778	0.0003	0.6708	0.2810
Market value added (*MVA*)	116.3288	0.0007	0.8767	0.9998
Return on equity (*ROE*)	136.5092	0.0000	0.7910	0.9649
Impact	147.2722	0.0000	0.9247	1.0000

Source: Authors' findings.

The results suggest that a bidirectional Granger causal relationship exists between social and environmental impact and all of the adopted measures of shareholder value creation, as the null hypothesis of no Granger cause can be rejected at a significance level of less than 0.01 for all cases. This suggests a bidirectional relationship between shareholder value creation and social and environmental impact.

To test whether the one-lag is the most appropriate lag-order selection for the data, this paper tests the lag-order selection based on the coefficient of determination, with the results presented in Table 6 below.

Table 6. Results of Dumitrescu and Hurlin tests

	*Variables in levels**			*Variables in first differences**		
	W	*Z-bar*	*Z-tilde*	*W*	*Z-bar*	*Z-tilde*
H_o: Impact does not Granger-cause shareholder value creation						
Return on equity (*ROE*)	3.0181	8.5621	1.7201	13.7119	53.9320	15.3311
		(0.0000)	(0.0854)		(0.0000)	(0.0000)
Earnings per share (*EPS*)	4.3017	14.0081	3.3539	7.9674	29.5603	8.0195
		(0.0000)	(0.0008)		(0.0000)	(0.0000)
Market value added (*MVA*)	2.647	6.9877	1.2478	4.8728	16.4309	4.0807
		(0.0000)	(0.2121)		(0.0000)	(0.0000)
Market capitalization (*MRK*)	2.4488	6.1466	0.9955	5.5867	19.4599	4.9894
		(0.0000)	(0.3195)		(0.0000)	(0.0000)
H_o: Shareholder value creation does not Granger-cause impact						
Return on equity (*ROE*)	1.9744	4.134	0.3917	11.0297	42.5526	11.9172
		(0.0000)	(0.6953)		(0.0000)	(0.0000)
Earnings per share (*EPS*)	2.5157	6.4307	1.0807	5.5417	19.2687	4.9321
		(0.0000)	(0.2798)		(0.0000)	(0.0000)
Market value added (*MVA*)	4.8724	16.4291	4.0802	6.8098	24.6491	6.5462
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Market capitalization (*MRK*)	5.3237	18.3438	4.6546	8.0851	30.0594	8.1693
		(0.0000)	(0.0000)		(0.0000)	(0.0000)

Note: (*) p-values in brackets below each estimated statistic.
Source: Authors' findings.

Table 7. Coefficients of determination

Lag	*Coefficient of determination*			
	ROE	*EPS*	*MVA*	*MRK*
1	0.9965544	0.9979749	0.9998292*	0.9995796
2	0.9963383	0.9979726	0.999816	0.9994401
3	0.9966254*	0.9982796*	0.9994895	0.9999208*
4	0.9957665	0.9978286	0.9996385	0.9999179

Source: Authors' findings.

Based on the coefficients of determination, it is concluded that the optimal lag-order selection would be to apply third-order lags for *ROE*, *EPS* and *MRK*, whereas for *MVA*, the first-order panel is the preferred model. This implies that, for the cases of *ROE*, *EPS* and *MRK*, there is a risk that the analysis does not properly capture the dependence in the data. Based on the results of the Dumitrescu and Hurlin (2012) test adopting *MVA* as a measure for shareholder value creation, the null hypothesis that impact does not Granger cause shareholder value creation as well as the null hypothesis that shareholder value creation does not Granger cause impact is rejected.

5. DISCUSSION

Aimed at bridging the identified research gap in the literature on impact investing, the purpose of this paper has been to empirically examine whether impact investing opportunities exist in public equity. The findings suggest that impact investing opportunities exist in public equity for the MVA measure of shareholder value creation. This is based on the existence of a positive causal relationship between impact and shareholder value creation for the publicly listed companies included in the sample. These findings have important theoretical implications for impact investing, as they indicate that the concept of impact investing does not need to be redefined in a public equity setting when evaluated based on market-based measures of shareholder value creation. Thus, the findings suggest that the field can continue its progression and wide-ranging adoption, as impact realization can be attained *pari passu* with shareholder value creation in a public equity setting. Further, these findings suggest that the field could advance from discussing the fundamental assumptions and start defining the boundaries of impact investing in public equity.

However, this relationship is found to be highly sensitive to the adopted measures of shareholder value creation. This suggests that impact investing in public equity is a suitable strategy for long-term impact investors, but not for short-term impact investors. Having said that, Roundy et al. (2017) find that impact investors generally take what Tasch (2010) defines as a slow money approach to investments, suggesting that impact investors take a longer view on investments. The findings suggest that impact investors can rely on public equity as part of an asset allocation strategy. However, it remains questionable whether the impact realized by publicly listed companies is sufficient to meet the respective impact objectives of impact- and finance-first-impact investors. Thus, based on the findings, it seems reasonable to assume that impact investing in public equity could be part of a portfolio of impact investments spanning different asset classes. In that way, impact investing in public equity could be a way to ensure the maximization of shareholder value creation for finance-first investors. In contrast, it could be a strategy for impact-first investors, aimed at securing their floor of financial performance.

Future research would be well served to investigate whether the impact realized by publicly listed companies is sufficient to meet the respective impact objectives of both impact- and finance-first investors. A similar avenue of future research lies in investigating whether publicly listed companies that are the target of impact investments realize the social and environmental impact that is significantly higher compared to that of their respective industry peers.

What sets impact investing apart from earlier types of socially responsible investment strategies is that the intention behind the investment is to have a positive impact on society (Nicholls et al., 2015), as opposed to simply avoiding or minimizing negative effects (Verrinder et al., 2018). Whereas the literature review reveals that investor intent is a defining characteristic of impact investing, the intent of the fund manager chosen by the impact investor is not (Johnson & Lee, 2013). This implies that an investment could be an impact investment even if the fund manager to which decision-making of the investment is delegated is indifferent to social or environmental impact. Additionally, facilitated by the intentionality of clients, Bugg-Levine and Emerson (2011) argue that asset managers could undertake the original mission of impact investing by organizing investment products that seem to generate positive impact, but fail to generate more than nice narratives. Chiappini (2017) studies whether or not funds, identified as impact investment-oriented, comply with the definition of social impact investments suggested by the Organisation for Economic Co-operation and Development (OECD). She finds that none of the 156 funds included in the sample respect all of the features fixed by the OECD. However, to identify the publicly listed companies that are the target of impact investments, this paper assumes that the adoption of impact funds as a sampling frame ensures the intentionality criterion of impact investors. In the impact investing industry, like in any financial market, impact funds are intermediaries crucial in managing the relationship between those asking for capital and those providing it (Lehner et al., 2019). Considering this critical role in greater detail, impact investing intermediaries can potentially undermine impact investments irrespective of the impact investor's impact objective (Lehner et al., 2019). Thus, it might be the case that the publicly listed companies included in the sample are not really the target of intentional impact investing. Instead, they might be greenwashing investments branded to appear intentionally impact oriented (Delmas & Burbano, 2011). However, when investing in a fund, the impact investor is interested in the aggregate impact and financial return generated (Hehenberger & Harling, 2018). Considering this thought to what has been coined as a modern portfolio theory (Markowitz, 1952), it might be the case that the funds constituting the sampling frame of this paper do not exclusively include companies based on positive screening. Given that this paper can only identify the top ten holdings of each fund, such a scenario would imply that the publicly listed companies included in the sample are at risk of not meeting the defining characteristics of impact investments. Thus, another avenue of potential research lies in identifying publicly listed companies that meet the impact investing criteria of impact- and finance-first-impact investors. Based on this, studies evaluating

the absolute performance of impact investing in public equity could be initiated.

This could explain why the average impact proxy score of the sample of publicly listed companies is 66.18. The standards for what constitute sufficient impact is defined by the individual impact investor (Höchstäder & Scheck, 2015), why Bugg-Levine and Emerson (2011) argue that almost all investments are capable of qualifying as impact investments. Having said that, it still seems reasonable to assume that at least impact-first investors, who aim to optimize their impact (Freireich & Fulton, 2009; Glänzel & Scheuerle, 2016), would find an impact proxy score that is only 16.18 points higher than the average score of their industry peers to be insufficient to qualify as impact investing. Thus, even though this research is not able to falsify the existence of a positive causal relationship between impact and shareholder value creation, which is derived in the literature review as the prerequisite for impact investing opportunities to exist in public equity, it does not imply that all impact investors would consider the impact generated sufficient to qualify as impact investing.

6. CONCLUSION

Scholars agree that the current state of impact measurement is far from satisfactory (Grabenwarter & Liechtenstein, 2011; Reeder & Colantonio, 2013; Reeder et al., 2015). Based on existing theory and previous literature, this paper has constructed a proxy of impact, which is why impact is specified to include social and environmental impact. Social scientists generally express the concern that standardized measurements and proxies for impact risk neglecting or misrepresenting essential dimensions of social and environmental impact (Brandenburg, 2010). More precise findings are expected to be attainable once the industry matures further, with more comprehensive impact data on the levels of investments and companies (Vecchi et al., 2016).

In terms of practical implications, it is suggested that impact investors can rely on public equity as part of an asset allocation strategy. However, it is acknowledged that even though this research cannot falsify that impact investing opportunities exist in public equity, the findings add to the practical implications for impact investors. Specifically, it is questionable whether the impact realized by publicly listed companies is sufficient to meet the respective impact objectives of impact- and finance-first-impact investors. However, based on the findings of this research, it seems reasonable to assume that impact investing in public equity could be part of a portfolio of impact investments spanning asset classes. In that way, impact investing in public equity could be a way to ensure the maximization of shareholder value creation for finance-first investors. In contrast, it could be a strategy for impact-first investors, aimed at securing their floor of financial performance. Future research would be well served to investigate whether the impact realized by publicly listed companies is sufficient to meet the respective impact objectives of both impact- and finance-first-impact investors. Another avenue of future research lies in investigating whether publicly listed companies that are the target of impact investments realize the social and environmental impact that is significantly higher compared to that of their respective industry peers.

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