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At the Frontier of Sustainable Finance: Impact Investing and the Financial Tradeoff; Evidence from Private Portfolio Companies in the United Kingdom

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Abstract: Drawing from the extremely novel impact investing landscape and the limited existing literature on the topic, it appears that investing in social enterprises should come at the cost of partially sacrificing financial returns to invested capital. This paper investigates the existence of this tradeoff by assessing how the performance of impact investing funds compares to that of traditional private equity and venture capital operators. Focusing on portfolio firm operating performance, we construct a dataset of 85 impact-investing observations and 5310 traditional observations over the period ranging from 2009 to 2020, in order to compare the performance of the traditional investor-backed firms with those of sustainable companies participated by social impact investors. Advanced matching methods such as Radius and Kernel matching suggest that the composition of the shareholding structure significantly affects the profitability of the company, with traditional firms outperforming their socially-concerned counterparts. Looking instead within the subsample of impact investor portfolio companies, and focusing only on the post-investment observations, we analyze how the percentage owned by the impact investors impacts the performance of the owned companies. The results show that, similarly to traditional ownership, a greater share controlled by impact investors leads to higher returns.

Keywords: sustainable finance; impact investing funds; matching

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1. Introduction

Recent events at the global level are shedding light on a seemingly endless list of social and environmental issues. Political unrest, environmental challenges, the strains on the economic and financial systems worldwide, and the magnitude of disastrous effects on entire sectors caused by the widespread Coronavirus pandemic: these factors all come together to undermine humans' quality of life and the solidity of the economic structure they inhabit. These massive environmental and social events necessarily require a certain paradigm shift for private and public exigences to harmonically align, leveraging on capital and investments to tackle these social and environmental challenges.

The Organization for Economic Co-operation and Development (OECD) and the respective governments of participating countries have adopted the Sustainable Development Goal (SDG) blueprint, which sets universal, and transformative goals for a healthier and more inclusive world. With a yearly injection of over $10 trillion euros in health and education initiatives, government investments increased circa 50% compared to 60 years ago. Despite these valuable efforts, the public sector alone is not enough to cover for such structural and systemic problems.

In an attempt to respond to such wicked environmental and social problems, the financial sector promptly reacted, and it has developed innovative instruments of sustainable finance, such as green bonds, microfinance, and social impact bonds (SIBs), among many others. In this framework, impact investing is at the frontier of the financial sector. Impact

investing strives to generate positive and measurable social and environmental impact in addition to financial returns on invested capital. Hence, the impact investing literature and academic research is quite limited and mostly hinges on descriptive and case-based analyses. Additionally, the lack of available data related to private companies further limits the research on this theme.

Looking at the novelty of studies investigating the impact of social investing, this paper contributes to the research by testing the existence of this tradeoff, by investigating the performance of impact investing funds in comparison to that of traditional private equity and venture capital operators. The performance of these two types of investments is examined by analyzing the performance of the respective funds' portfolio companies. In more detail, this is done by assessing whether the presence of an impact investing fund has any effect on the financial and operating performance of a set of portfolio companies, and specifically by testing whether impact investors tend to accept below- or close-to-market rate returns. In order to complete the task, this paper will focus on companies established in the United Kingdom, as this region is the birthplace of impact investing with the opportunity of collecting a large set of observations, as well as because the UK has enhanced mandatory disclosure requirements. Following this initial analysis, the paper examines how the fraction of ordinary shares held by the impact investor affects the portfolio company's performance, with the goal of understanding whether a larger share owned by these innovative investors changes the profit-making capabilities of the firm, and not only whether they are on average more (or less) profitable.

A series of analyses are carried out, in order to investigate whether the presence of an impact investing fund within a company's shareholding structure has an effect on its operating and financial performance. The analyses are run on a unique dataset with observations from 27 impact investor portfolio companies and 917 control portfolio companies, collected across the period of 12 years ranging from 2009 to 2020. The final sample, composed of 170 observations, is derived by employing a Propensity Score Matching procedure, which allows to pair observations from the group of impact investor-backed portfolio companies (the treatment group), namely 85 impact investing observations, and the "closest" portfolio companies belonging to traditional private equity or venture capital firms (the control group). Matching is initially carried out by using the Nearest Neighbor without replacement method. Then, a multiple OLS regression analysis is run on the matched sample. Specifically, the impact investing presence, a binary variable which takes value 1 when there is an identified impact investor within the company's shareholding structure and 0 otherwise, is used as the predictor for the firm's performance metrics, after controlling for other company-specific factors such as firm age, capital structure, and firm size.

In light of the empirical strategy mentioned above, the remainder of the paper is structured as follows: in the second section an overview of the sustainable investing landscape is carried out, in order to shed light and clarify the different methods and strategies that have been recently developed, with a particular focus dedicated to impact investing. Section 3 presents the data and the data collection process. Section 4 introduces the research question, hypotheses development, and research methodology. Section 5 provides the empirical analyses and findings, related to the effects of impact investing fund presence on portfolio companies' performance as well as the effects of impact investing fund's particular stake within a company's shareholding structure on its performance. In Section 4 robustness tests are carried out, in order to verify and validate the results derived in the previous section. Finally, the last section is dedicated to the final conclusions.

2. Background

Sustainability in finance has been defined in different ways along the years and different regulatory frameworks have been put in place to provide a reliable and shared taxonomy around sustainable investing. European regulations (such as the Sustainable Finance Disclosure Regulation and the taxonomy Regulation) define "sustainable" investments as investments in activities which contribute and do not harm any environmental

and social objective. Academic literature has in recent defined two pillars of sustainable investing: the identification of the dimensions of sustainability, i.e., objectives comprising both environmental and social concerns, and the definition of the economic sectors and activities which contribute to these objectives [1].

Impact investing represents a specification of the macro-class of sustainable investing and it is an extremely recent phenomenon. The term was first coined in 2007, at the Rockefeller Foundation meeting in Bellagio, Italy, where impact was defined in its simplest terms as "the measure of an action's benefit to people and the planet" [2]. Before plunging into the definition and detailed description of this novel investment strategy, it is necessary to explain the framework in which it is collocated. The increasing trend towards sustainability which has characterized the past decade, and which has intensified in the most recent years, has reopened a traditional, ongoing debate about the ultimate role of the private sector with regards to social and environmental issues. Such debate can ultimately be traced back to the Shareholder versus Stakeholder controversy, embodied by its two major and opposing advocates Milton Friedman, who argued that the social responsibility of business is the maximization of profits [3], and Ed Freeman, who believed that private corporations are responsible towards society and their stakeholders, such that they have a broader constituency to serve than merely their shareholders [4]. The majority of corporate law jurisdictions around the world, in fact, define financial profit as the sole objective of investors and, as a consequence, maximizing shareholders' welfare becomes the only goal of company managers and directors. In such a context, the fiduciary issue within companies is limited to the alignment of directors' actions to shareholders' interests [5]. However, when investors demonstrate social and environmental preferences, the agency problem takes a whole different shape, which requires a new set of financial and non-financial incentives to be addressed.

Businesses must necessarily be profitable, in order to survive in the competitive arena of the market. However, in order to embrace public sentiment and the widespread demand for a greener and more sustainable product offering, enterprises are challenged to become themselves instruments of social and environmental change. This is particularly evident in 2020, as the Coronavirus pandemic has accelerated this transition towards sustainable solutions for corporations: Microsoft has pledged to reach carbon neutrality within the next 30 years, as well as offsetting by 2050 all of the company's emissions since its establishment 46 years ago. Meanwhile, Google has completely offset its historical emissions and has committed to run on exclusively renewable energy by 2030, and many more enterprises have targeted to reach carbon neutrality in the next years across their supply chains, such as Apple and Amazon [6].

This accelerating transition has also been reflected in capital markets: in 2018 BlackRock's CEO and chairman, Larry Fink, released his annual letter to the CEOs of the largest asset management firm's portfolio companies, titled "A Sense of Purpose", which, suggested that successful enterprises must serve a greater social purpose, and stated that "companies needed to do more than make profits—they need to contribute to society as well if they want to receive the support of BlackRock" [7]. According to Larry Fink's 2021 letter to the CEOs [8], in the first eleven months of 2020, mutual fund and ETF investors allocated $288 billion in sustainable assets all around the world, which represents an increase of 96% from the previous year. Within the realm of financial investments and capital markets, different ways of integrating sustainability and ethical considerations throughout the investment process are proliferating.

Impact investing is among those strategies which introduce the definition of "blended value" finance, looking to combine social and economic values with profitability objectives. There is, however, more than one way to balance between economic and social logics and each investor willing to commit to blended value finance can choose how to shape their investment proposition. That is why academic literature still lacks agreement around what the definition of impact investor is: some scholars classify investors based on their ethical aspirations; others focus on their actual investment portfolios. Other literature insists on the

alignment between intentions and effective investment decisions. Impact investors who are strongly determined to generate social and environmental impact usually establish some investment criteria aimed at ensuring that the business models they invest into reflects their intentions and that outcomes generated are measurable.

This increased attention towards sustainability has contributed to the development and widespread use of different terms such as Environmental, Social and Governance (ESG), Socially Responsible Investing (SRI) and impact investing, which are often erroneously used interchangeably. Differences among these terms exist and shape the way portfolios are structured, by defining which companies become investment targets and, conversely, which are excluded from the potential investment pipeline. A brief overview of these sustainable investing approaches is synthesized in Table 1 below.

Table 1. An Overview of Sustainable Investment Approaches.

ESG	ESG focuses on a company's environmental, social, and governance practices, alongside more traditional financial measures
Socially Responsible Investing (SRI)	SRI involves actively removing or choosing investments based on specific ethical guidelines
Impact investments	Impact investments are investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return

Impact investing differs from ESG investing and Socially Responsible Investing (SRI), as it goes well beyond merely striving to reduce or minimize harmful outcomes and instead advocates for the positive and proactive generation of beneficial ones, by offering concrete solutions to social and environmental challenges with measurable outcomes. According to Cohen, the impact investing market is growing at exemplary rates, having recorded a size of $230 billion in 2017, $502 billion the following year, and currently heading towards $1 trillion [2].

Three core characteristics which distinguish impact investing from other forms of investments are the intentionality, financial returns, and impact measurement [9,10]. Intentionality represents the mission of impact investors to actively and intentionally contribute to solutions to ameliorate the environmental and social situation. This includes establishing impact goals and devising an investment strategy which revolves around such goals. The second feature of impact investing, the search for financial return on capital invested, ranging from below to market rate returns, distinguishes impact investing from other forms of philanthropy. Finally, impact measurement is the most important characteristic of impact investing, which avoids guesswork as well as merely qualitative data and focuses instead on measurable and dependable impact data.

Furthermore, according to the characterization of impact investing players provided by the Tiresia Research Center, based on the full or partial adherence to the aforementioned three features, an impact investor may be considered either "impact" or "strictly impact". As displayed in Figure 1, operators which intentionally finance positive environmental and social change while expecting a financial return on the capital invested, fall under the category of "impact" investors, whereas those which go one step further and embed impact quantification in the pipeline screening process as well as in the management of their investments are classified as "strictly impact" [9].

Impact investing originated in the United Kingdom, where it was applied for the first time through an instrument which acted as a catalyst within private markets: the Social Impact Bond (SIB). This is an outcome-based contract, introduced in 2010, that was applied to reduce the challenging social problem of reoffending rates of male prisoners released from the Peterborough jail, located in the UK. Following the success of the Peterborough SIB, investment funds with impact generation as their principal investment focus began emerging in the UK, across Europe, and in the United States.

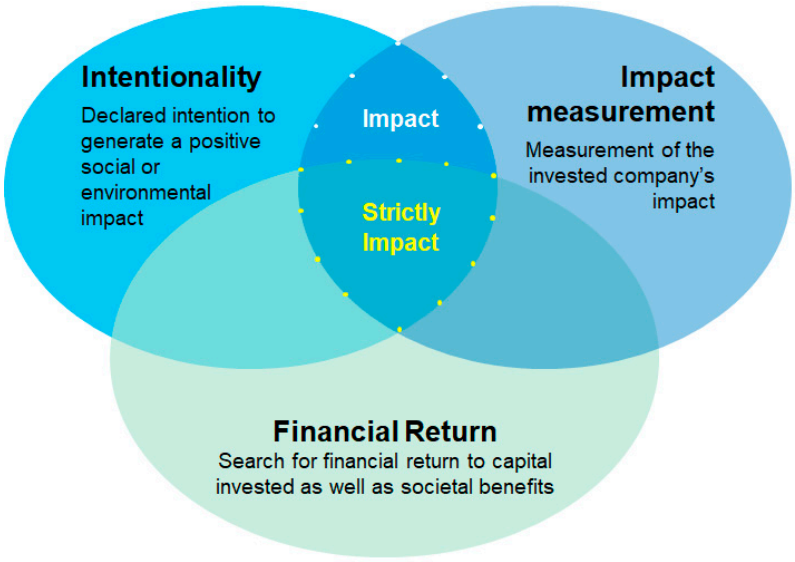

Figure 1. Core Characteristics of Impact Investing.

Addressing the first pillar of impact investing, we understand that a necessary condition for us to talk about impact is the intentionality towards an environmental and social impact. There are, however, some critics whose thesis can be summarized in the idea that, in a portfolio allocation framework reflecting the feature of impact investment decisions, individuals fail to choose portfolios that efficiently achieve social or environmental outcomes. According to behavioral finance studies [11], the lack of outcome efficiency is a consequence of the categorization of investment options which leads impact investors to deal with an unfamiliar combination of notions of value.

It is interesting to notice how the second pillar of impact investing, the search for financial returns, is in conflict, at least theoretically, with a wide variety of literature spanning from the beginning of the century to recent years, providing evidence that SRI-driven investments either underperform or show no difference in performance compared to conventional investments [12,13]. Conversely, investors in socially responsible firms seem to be less sensitive to performance [14].

Additionally, moving to the field of debt capital markets, scholars have been supporting the existence of the so-called "greenium". Apparently, in fact, investors have been paying a premium to purchase green-labelled bonds, a financial instrument which forces issuing entities to invest the resources in project that address climate change and environmental issues in general. These types of instruments, which exist in their "social" form as social-bonds, have recently grown in popularity helping bond issuers raise a total of $523 bn in 2021. However, numerous studies since 2017 show how such commitment comes at a cost for the financial returns of investors. The same applies, to some extent, to other similar issuances as "sustainability-linked bonds" and it is fundamental to take debt investing into account, alongside equity, especially in periods of markets disruption and economic turmoil, such as the pandemic, when debt instruments dominate the field of impact investing [15].

If the Coronavirus pandemic has put pressure on companies to step up their social and environmental commitment, it has also put the spotlight back on the all-time relevant issue in the field of portfolio investing: diversification [16]. Interdependence between asset classes has in fact intensified during the COVID-19 pandemic, pushing investors and portfolio managers to look for alternative sources of hedging and to explore opportunities within commodity and digital assets markets. Any successful investment strategy focusing on social and environmental impact should always consider the need for profitability and positive returns, as well as that of making the portfolio resilient to periods of increased volatility. Empirical research has shown how socially responsible investment (SRI) portfo-

lios bear a loss in diversification, determined by the shrinking of the investable universe, which translates into lower returns for investors.

Looking specifically at impact investment, the literature and academic research on the topic is quite limited and mostly hinges on descriptive and case-based analyses [17,18]. That is most likely due to the novel nature of the phenomenon. Nonetheless, it appears that the issue of profitability has not been studied extensively. Papers that uniquely target the financial performance of impact investors are quite rare, and even more uncommon are those that use statistical methods to assess their difference to traditional investment strategies. Literature on the topic in the past [19,20] has shown that there is a limit to the financial return that impact investors are willing to sacrifice to achieve social impact. However, more recent research [15] shows that, in unprecedented environments such as the pandemic, investors are willing to sacrifice more if there is an opportunity to achieve higher than usual social impact.

3. Data, Sample, Variable Measurement and Descriptive Statistics

3.1. Data and Sample

A representative dataset of sustainable firms acquired by a selected group of impact investors has been collected: the final merged dataset is a comprehensive sample of UK portfolio companies, which feature either a traditional Private Equity (PE) or Venture Capital (VC) investment fund or alternatively a "strictly" impact investing fund within their shareholding structure.

The analysis is based on a sample of companies incorporated in the United Kingdom. The reason behind this geographical limit is that the United Kingdom represents the birthplace of impact investing. Furthermore, the UK provides convenient disclosure requirements for private companies. Indeed, a great portion of impact investors are private market investors, and since we only considered, for comparability purposes, privately held companies, this generally translates as a lack of financial statement data. Thus, the United Kingdom legislation allows us to overcome the challenge of accessing accounting information as well as ownership data, since UK firms are obliged to disclose and file annual reports, documents with ownership details and other information to Companies House, the national registrar office. Data from the Companies House is then collected and stored in Bureau van Dijk (BvD)'s database FAME, which features general accounting and ownership information for a given registered company over the last 20 years.

Based on the screening criteria exposed in Table 2, a selected set of impact investors is identified, resulting in a list of 10 strictly impact intermediaries (The resulting list of impact investors focused on Private Equity and Venture Capital investments in the United Kingdom are the 10 operators exposed in Exhibit A of the Appendix A).

Table 2. Impact Investing Screening Criteria.

Screening Criteria	
Organization type	For-profit fund managers
Asset class focus	Private Equity & Venture Capital
Geographical Focus	United Kingdom
Impact strategy	100% impact investments/"Strictly Impact"

The resulting dataset of portfolio companies belonging to the identified impact investors is composed of 212 social enterprises. Finally, because the research hinges on the comparison of financial and operating performance between companies belonging to the portfolios of traditional Private Equity and Venture Capital funds and those belonging to a particular subset within these kinds of funds, a second broader dataset is determined. This comprises all the companies established in the UK which are backed by at least one Private Equity or Venture Capital operator and which feature similar characteristics to the 212 social enterprises. That is, the control group of companies is selected such that (i) there is at least one Private Equity and/or Venture Capital fund present within

the company shareholder structure; (ii) the firm belongs to one of the 19 sectors of the abovementioned impact investors. Hence, the control group is made up of companies operating in the same 19 industries as the aforementioned 212 social enterprises backed by impact investors, specifically: (1) agriculture, horticulture & livestock, (2) biotechnology and life sciences, (3) Computer software, (4) Construction, (5) Banking, insurance & financial services, (6) Wholesale, (7) Business services, (8) Media & broadcasting, (9) Travel, personal & leisure, (10) Industrial, electric & electronic machinery, (11) Public administration, education & health social services, (12) Property services, (13) Retail, (14) Printing & publishing, (15) Communications, (16) Textiles & clothing manufacturing, (17) Food manufacturing, (18) Transport, freight & storage, and (19) Miscellaneous manufacturing. Moreover, (iii) only private limited enterprises (iv) with turnover under €10b across the analyzed period (2009–2020) are selected. This results in a final sample of 1278 companies, 1066 of which are backed by traditional PE and VC funds, whereas the remaining 212 are participated by the selected impact investors.

For each company within the final sample, financial and shareholding data is manually downloaded from the FAME database. Data refer to the period which ranges from 2009 to 2020. It is important to underline that this time window is quite long considering that impact investing is a novel phenomenon. Indeed, earlier time periods are not expected to be particularly relevant for a study which strives to compare impact investing companies specifically, given the scarcity of available and viable data for the selected portfolio companies. Prior to any activity of data cleaning, the resulting merged database has 15,336 observations (one for each company per year under analysis): 2544 observations related to portfolio companies belonging to impact investors and 12,792 related to companies backed by traditional PE and VC funds.

Financial data includes Gross margin and EBITDA margin (EBITDA %) in order to capture firm marginality, Return on Assets (ROA), Operating Return on Assets (Operating ROA), Asset Turnover and Return on Equity (ROE) to capture firm financial and operating performance, and Leverage Ratio, Equity to Total Assets to control for firm capital structure. It must be noted that these variables are corrected in order to remove outlier and extraordinary values from the analysis. Indeed, extreme observations are truncated using −100% and +100% as a threshold (meaning that if ROE is below −100%, the observation is registered as −100%).

Screening is carried out, in order to filter out the portfolio companies which are inactive as of 2021, as well as ones which do not disclose financial information, yielding the following results for impact investors' portfolio companies. Details on the sample determination are reported in Table 3.

Table 3. Sample Determination.

Impact Investor Portfolio Companies	No Companies	No Observations
Initial	212	2544
Inactive	−7	−84
Data not available	−178	−2375
Final	27	85

3.2. Descriptive Statistics

Table 4 presents the pairwise Pearson correlations between all the variables considered for the regression analysis. As shown on the table below, Firm Age shows the highest negative correlation (correlation coefficient equal to −0.87) with Date of incorporation, which is understandable given that firm age is calculated by subtracting Date of incorporation from the Year under consideration. Hence, Date of incorporation is not included in the final regression analysis. Finally, logarithm of Number of employees and logarithm of Turnover seem to be highly correlated (with a correlation coefficient of 0.74). Seeing as both are variables that capture firm size, logarithm of Turnover is not considered in the analysis.

Table 4. Pearson Correlation Matrix for the propensity score specification.

		V1	V2	V3	V4	V5	V6	V7	V8
Date of incorporation	V1	1.00							
Impact Investor	V2	0.32	1.00						
Firm Age	V3	−0.87	−0.08	1.00					
Asset Turnover	V4	−0.13	0.05	0.08	1.00				
Equity to Total Assets	V5	−0.14	−0.06	0.16	0.01	1.00			
log Turnover	V6	−0.14	0.14	0.16	0.51	0.06	1.00		
log N employees	V7	−0.09	0.14	0.11	0.30	−0.05	0.74	1.00	
log Total Assets	V8	−0.07	0.13	0.13	−0.08	−0.01	0.64	0.63	1.00

3.3. Propensity Score Matching

This study loosely follows the matching method applied by [21], by comparing the operational and financial performance of the impact investing funds' portfolio companies with that of matched peers, the control firms. The matching procedure utilized, Propensity Score Matching (PSM), allows each impact investing portfolio company to be matched to the one closest firm belonging to the control group in terms of an indicator called the propensity score. The propensity score, initially defined by [22], represents the probability that the treatment is assigned to the members within the treatment group subject to certain observed baseline characteristics [23].

PSM is a procedure which envisions two major steps: the first one involves estimating the propensity score which is used in phase two to match observations within the treatment group (Impact Investor Presence = 1) to the most similar firms within the control group (Impact Investor Presence = 0).

Defining impact investor presence as $I = 1$ for the treatment group and $I = 0$ for the control group, the propensity score for each subject (i) is:

$$P(x) = P(I = 1|X_i) \tag{1}$$

where X_i are the covariates, or confounder variables, which affect both the treatment, or presence of an impact investor within the firm's shareholding structure, and the outcome, in this case the firm performance. Factoring in X_i in the calculation of the propensity score is crucial in order to control for confounders. Ideally, the true propensity score $P(x)$ should be calculated exactly. However, when it is applied to observational studies, as in this case, the true $P(x)$ is unknown and must be estimated as $\hat{P}(x)$ using available data. While there are various methods which allow the estimation of the true propensity score, for the sake of this analysis the estimate is derived by running a logistic regression. The logistic regression is run with Impact Investor as the treatment variable and Firm age, Logarithm of number of employees, Logarithm of total assets, Asset turnover, and Equity to total assets as the control variables. The structure of the model is the following:

$$\hat{P}(x) = \ln\left(\frac{\hat{P}(z_i = 1|x_i)}{1 - \hat{P}(z_i = 1|x_i)}\right) = b_0 + b_1 x_{1i} + \ldots + b_k x_{ki} \tag{2}$$

where $\hat{P}(x)$ is the estimated propensity score for subject i (where $i = 1, \ldots, N$), z_i is the impact investing presence variable, b_0 is the estimated intercept, $x_{1i}, \ldots, x_{ki}$ represent the independent variables, and $b_1, \ldots, b_k$ their respective estimated coefficients. Given that the propensity score assigns a probability to each data point, its value ranges from 0 to 1.

Considering Firm Age as a control variable is crucial, given that the sample includes a wide variety of firms at different stages of "life", some of which are extremely new with only few years of operations. The different firm age has an inevitable effect on its performance and financial stability, hence effecting performance measurements and confounding the results of this analysis. For instance, not controlling for firm age may bring survivorship bias into the data, which is the bias caused by the fact that older firms are usually better performing given their experience, stability, and longer survival [24].

Finally, the next step is to actually construct matches. The method utilized to derive these matched pairs is the one-to-one Nearest Neighbor Matching without replacement. In one-to-one matching, a matched sample is composed by pairing treated and control units such that the total pairwise distance between the propensity score (which summarizes covariate characteristics) is minimal, mimicking a randomized matched-pair experiment. The result of PSM is the creation of a final dataset composed of the 85 matched pairs across a time frame of 12 years, from 2009 to 2020, that will be used to run the OLS regressions and test if there indeed exists a causal effect between impact investor presence in the shareholder structure of a firm and the company's performance, compared to traditional portfolio firms.

Table 5 shows the distribution of the observations across time and sectors. Observations are mostly concentrated in the six most recent years, especially for the ones from the impact investor ownership group, which is quite understandable given the novelty of impact investing. Focusing on the sector distribution of investments across the selected time frame, target companies appear to be spread out across several specific industries, with the majority unsurprisingly concentrated in the Business Services sector. Indeed, companies which offer services to the individual or to businesses are most evidently and directly related to impact investing, given that the impact on the community and general surroundings is immediately identifiable. It is also not a surprise that Public Administration, Education and Health Services is another among the most frequently targeted sectors by impact investors. In this sample, in particular, the observations of firms operating in this sector represent 12% of total impact investing portfolio companies observations.

Table 5. Distribution across (**a**) time period (2009–2020) and (**b**) sectors.

(**a**)	
Year under Consideration	**No. of Observations**
2009	5
2010	6
2011	10
2012	14
2013	17
2014	8
2015	20
2016	13
2017	18
2018	18
2019	28
2020	13
Total No. of observations	170
(**b**)	
Sectors	**No. of Observations**
Agriculture, horticulture & livestock	0
Banking, Insurance & Financial Services	6
Biotechnology and Life Sciences	2
Business Services	72
Computer Software	9
Construction	1
Food & Tobacco Manufacturing	9
Industrial, Electric & Electronic Machinery	6
Media & Broadcasting	5
Miscellaneous Manufacturing	1
Printing & Publishing	1
Public Administration, Education, Health Social Services	16
Retail	4
Textiles & Clothing Manufacturing	10
Transport, Freight & Storage	2
Travel, Personal & Leisure	16
Wholesale	10
Total No. of observations	170

4. Empirical Results

4.1. Comparing Performance of Impact Investing-Backed Firms and Traditional Funds' Portfolio Companies

Drawing from social entrepreneurial literature, we known that measuring performance is a strongly debated issue, especially when considering a sample that includes firms which are still in their startup phases as well as ones in their earliest stages of life. That said, great majority of the literature generally still adopts traditional measures based on financial data such as turnover, net income, and market share. For the purpose of this research and given that this analysis includes companies which have been targeted by traditional and impact Private Equity operators and used as benchmark firms in order to derive a potential difference in firm performance, traditional performance measurement ratios and metrics are employed at the risk of returning contrasting and conflicting results (i.e., a ratio may indicate success for a given firm while simultaneously all else being equal, a second metric may instead indicate failure of the same firm).

The differences in firm performance are estimated by fitting four OLS linear regression models, with the dependent variable being respectively Return on Equity (ROE), which measures the profit available to firm shareholders, and Return on Assets (ROA), which focuses on the operating performance of the company. The key explanatory variable for all the regressions is a binary dummy variable that denotes whether the company is owned by an impact investing fund (*Impact Investing Presence* = 1) or not (*Impact Investing Presence* = 0). Matched control firms are included and take a value of zero. The set of control variables included in the analysis are the following: Firm Age, natural logarithm of Number of Employees, and natural logarithm of Turnover to capture firm size, Asset Turnover, and logarithm of Total Assets, as well as Equity to total assets ratio. These do not need to be included again when running the regression models, as they have already been factored in the calculation of the propensity score and, consequently, during the matching procedure. Considering these variables in the OLS regression as well would create some bias, given that it would be like adjusting twice for the controls. Moreover, in order to control for the substantial differences in performance related to the industry in which the company operates, the categorical variable "Sector" is transformed into a dummy variable, thus allowing for the creation of a total of 17 sector-specific dummy variables.

In order to investigate the simple difference in company performance of impact investing-backed firms and traditional funds' portfolio companies, a preliminary regression analysis is run:

$$Y_i = b_0 + b_1(Impact\ Investing\ Presence)_i + e_i + \tau + \theta \quad (3)$$

where Y_i represents the measure of firm performance for firm i (with $i = 1, 2, \ldots, N$), b_0 is the intercept, $(Impact\ Investing\ Presence)_i$ is the explanatory variable which takes on the value of 1 with impact investor backed firms and value of 0 with control firms and b_1 represents its estimated coefficient which indicates the impact that the presence of an impact investor fund has on firm performance. Finally, τ represents the industry fixed effects and θ which captures the time fixed effects.

According to this model, the independent variable fails to have statistical significance in explaining the effect on firm marginality, operating, and financial performance. Indeed, as shown in Table 6, for both regression (1) and (2) the role of Impact Investor Presence cannot be considered statistically significant.

Comparing these results with those derived from the Nearest Neighbor PSM without replacement analysis, which are displayed in the table below (Table 7), the results appear to be similar. In both cases, the presence or absence of an impact investor within a company's shareholding structure does not seem to have an effect on the firm's performance.

Table 6. Regression Results. Impact investing presence and firm performance.

	(1)	(2)
Dependent Variable	**ROE**	**ROA**
Constant	0.124	−0.476 ***
	(1.173)	(−4.361)
Impact Investor Presence	−0.051	−0.048
	(−0.545)	(0.507)
Sector fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	170	170
R-squared	0.16	0.22

Note: Industry and year fixed effects are introduced in all the regression models. T-values are reported in parentheses underneath each respective variable. The superscript *** denotes statistical significance at the 1% level.

Table 7. Results from NN matching without replacement for Return on Equity (ROE) and Return on Assets (ROA).

Variable	ATT	t-Stat
ROE	−0.05	−0.8
ROA	−0.11	−1.16

While the OLS regression necessarily controls for the firm characteristics in a linear way, propensity score matching avoids the linearity assumption. Hence, the benefit of matching compared to analyzing the data through a linear regression is that, provided that the propensity score is correctly estimated, matching is non-parametric. Aside from the specific benefits and differences among the two methods, PSM and OLS regression should yield the same results.

These results are derived from the Nearest Neighbor matching without replacement procedure, which is partially limited in that it reduces the sample size, thus decreasing efficiency in estimates, allowing for larger standard errors and high t-values. This may be the underlying reason explaining why the results above are not significant. Hence, to improve efficiency, other PSM methods are run, taking Return on Assets as the dependent variable. The methods used to carry out the matching are: (i) Nearest Neighbor with replacement, (ii) radius with caliper set at 0.1, (iii) radius with caliper set at 0.05, and (iv) Kernel.

Nearest Neighbor with replacement follows a similar procedure to Nearest Neighbor without replacement, except that one control may be matched to several units from the treatment group. Order does not matter and does not have an influence on the final matches. Nevertheless, as each treatment unit is matched to its closest control unit on a one-to-one basis. Radius matching allows the setting of a caliper, a determined threshold which sets the highest accepted distance between the propensity score of the treatment observation and that of the control units. Using the radius around each treatment observation, the closest control observations among all are considered and chosen as matches. Radius matching increases efficiency because each treated unit is matched with more control units than in the Nearest Neighborhood, but with the condition of considering only similar observations that have propensity scores which belong to a predetermined neighborhood of the treated unit's p-score [25]. The size of the neighborhood depends on the radius: radius matching with caliper equal to 0.10 provides interesting findings, reported in Table 8. For this lower threshold, the Average Treatment effect of the Treated (ATT) is negative (−0.16) and statistically significant at 5% level (with a T-statistic of −2.26). Finally, a last framework for matching is implemented, using the Gaussian kernel. In this last method, the entire subsample of controls is used and weighted using the Gaussian kernel, a weighting function that has the shape of the normal (Gaussian) distribution curve. This last analysis

yields significant results which are similar to the Radius matching with caliper equal to 0.10, even if a greater bias is allowed for the estimates. The results are summarized below:

Table 8. PSM Results: ROA as the dependent variable.

Variable	ATT	Standard Error	T-Statistic
NN without replacement	−0.11	0.096	−1.160
NN with replacement	−0.11	0.100	−1.150
Radius matching (r = 0.05)	−0.10	0.073	−1.410
Radius matching (r = 0.10)	−0.16 **	0.073	−2.260
Gaussian Kernel	−0.17 **	0.072	−2.370

Note: The superscripts ** denotes statistical significance at the 5% level.

Contrary to initial expectations, the results from the linear regression models as well as from causal inference determined using the Nearest Neighbor PSM method with and without replacement seem to suggest that there is no meaningful and statistically significant relationship between the dependent and independent variables, within the analyzed models.

These results seem to defy the widespread intuition that investment managers considering investing in social enterprises with the potential to generate positive impact are faced with the tradeoff between financial return and impact generation, and that impact investing indeed implies foregoing market-returns. This research suggests instead that company performance is not influenced by the presence (or absence) of one of the selected impact investing operators, compared to other traditional portfolio companies.

It is important to highlight that such a result hinges heavily on the way that the models and methods used to analyze the topic are structured. Indeed, the present analysis has some criticalities that must be pointed out. Firstly, the sample of impact investing observations is particularly limited: there are merely 85 observations compared to the much broader number of observations from traditional fund portfolio companies. The limit of the sample size becomes evident following the propensity score matching procedure which, initially matching each treatment observation with the one closest control observation, reduces the sample size to 170 paired observations.

Indeed, once the problem of the reduced sample size is addressed with alternative matching methods such as Radius matching and Kernel matching, the results become significant, suggesting that operating performance, based on the traditional Return on Assets metric, appears to be greater in companies acquired by traditional Private Equity and Venture Capital funds compared to those belonging to the portfolio of impact investing funds. This will be shown in Section 4.3, which is dedicated to robustness tests and running the analysis using alternative matching methods. There are multiple potential explanations for this phenomenon. Nevertheless, the results seem to be consistent with the general and widespread idea that impact investors face a tradeoff between returns and positive impact.

4.2. Does the Impact Investing Ownership Stake Influence the Performance of Portfolio Firms?

The second part of the analysis conducted in this research focuses only on the impact investor-backed pool of portfolio companies. These companies are analyzed in terms of the percentage stake held by impact investors within their shareholder structures, in order to understand whether such stakes have an effect on the company performance.

Firstly, only the observations with Impact investor presence = 1 are selected from the initial sample. Then these are further screened by identifying a specific subsample which includes only those observations which have occurred after the investment of the impact investing fund. This specific subsample is composed of 51 observations. This final sample of 51 impact investor-backed enterprises features observations distributed across the period ranging from 2012 to 2020 and across seven different sectors, following the BvD sector classification. To underline the effects of the impact investing fund's ownership stake

on company performance, another OLS linear regression model is performed, with the following specification:

$$Y_i = b_0 + b_1(Stake)_i + b_i X_i + e_i + \tau + \theta \quad (4)$$

the dependent variable Y_i is a measure of operating performance (ROA and Operating ROA), financial performance (ROE), and firm marginality (EBITDA margin), whereas the explanatory variable $(Stake)_i$ represents the fraction of ordinary shares held by the impact investing operator which is part of the firm's shareholding structure.

Similarly to the previous regression models, this OLS model features a selected group of variables which control for certain firm characteristics, such as Firm Age, size (measured by taking the natural logarithm of the Number of employees and of Turnover), Asset Turnover, the natural logarithm of Total assets and the Equity to total assets ratio. As in the previous models, year and sector fixed effects are included (respectively as τ and θ). In order to test for multicollinearity, the Pearson correlation matrix is analyzed once again. Table 9 provides the full correlation matrix. In addition, in this case, Firm age and Date of incorporation show a very high correlation (correlation coefficient equal to -0.91), hence Date of incorporation is not included in the regression analysis. Once again, Log Turnover has a high correlation with Equity to total assets ratio, so in order to decrease the risk of incurring in multicollinearity it is also removed.

Finally, two different OLS linear regressions are run for each different dependent variable: (i) in the first regression, only the explanatory variable and no control variables are included but with year and sector fixed effects, while (ii) in the second regression adds all the control variables, as well as sector and year fixed effects.

Table 10 present the results of the regressions. While for the models constructed with ROA, ROE, and Operating ROA as the dependent variables, the percentage owned by the impact investor is not a statistically significant variable. When analyzing the firm performance by focusing on marginality, a higher investment stake appears to have a slightly positive effect on firm marginality at the 5% significance level.

Table 9. Pearson Correlation Matrix. Impact investor ownership stake and its impact on firm performance.

		V1	**V2**	**V3**	**V4**	**V5**	**V6**	**V7**	**V8**
Date of incorporation	V1	1.00							
Firm Age	V2	−0.96	1.00						
Asset Turnover	V3	−0.13	0.09	1.00					
Equity to Total Assets	V4	−0.29	0.31	−0.16	1.00				
log Turnover	V5	−0.27	0.27	0.63	−0.13	1.00			
log N employees	V6	−0.18	0.21	0.38	−0.18	0.65	1.00		
log Total Assets	V7	−0.04	0.10	−0.35	0.11	0.11	0.17	1.00	
Stake	V8	0.30	−0.34	0.05	−0.40	0.07	0.13	−0.03	1.00

Analyzing the effect of impact investor ownership on the EBITDA margin is crucial because margins are an important aspect that PE and VC funds consider when deciding whether or not to invest in a target company and similarly represent a key metric to control and improve upon once the target becomes part of their portfolio companies. The EBITDA margin provides an immediate and quick measurement of short-term operational efficiency. Margin improvements are one of the key drivers of organic growth that private equity funds leverage on for the sake of value creation.

Table 10. Regression Results. Impact investor ownership stake and its impact on firm performance.

	(1)	(2)	(3)	(4)
Dependent Variable	**ROE**		**EBITDA %**	
Constant	−0.118	0.6507	−0.206	0.326
	(−0.610)	(0.964)	(−1.431)	(1.559)
Stake	0.004	0.004	0.004	0.006**
	(0.871)	(0.957)	(1.201)	(2.630)
Firm Age		0.043		−0.221***
		(0.530)		(−5.254)
Asset Turnover		−0.011		0.085
		(−0.032)		(0.486)
Equity to Total Assets		−0.232		0.375***
		(−1.055)		(3.197)
Log_N employees		−0.097		0.057
		(−1.037)		(1.138)
Log_Total Assets *		−0.10		−0.02
		(−1.400)		(−0.480)
Sector fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations				
R-squared	0.31	0.40	0.30	0.68
	(5)	**(6)**	**(7)**	**(8)**
Dependent Variable	**ROA**		**Operating ROA**	
Constant	−0.420**	0.0197	−0.221	0.260
	(−2.549)	(0.070)	(−1.591)	(1.353)
Stake	−0.002	0.003	−0.002	0.002
	(−0.502)	(0.867)	(−0.753)	(1.320)
Firm Age		−0.021		−0.155 ***
		(−0.366)		(−4.017)
Asset Turnover		0.130		0.233
		(0.531)		(1.455)
Equity to Total Assets		0.351 **		0.477 ***
		(2.168)		(4.433)
Log_N employees		−0.192 **		−0.055
		(−2.422)		(−1.193)
Log_Total Assets *				
Sector fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations				
R-squared	0.32	0.57	0.35	0.729

Note: Industry and year fixed effects are introduced in all the regression models. T-values are reported in parentheses underneath each respective variable. The superscripts ***, **, and * denote statistical significance at the1%, 5%, and 10% level respectively. OLS Models with ROA, EBITDA %, and Operating ROA as the dependent variable are run without the variable Log_Total Assets.

Indeed, part of the strategy with which Private Equity operators succeed in extrapolating returns from their investments hinges on the improvements of a firm's operational efficiency. PE funds generate value through various methods, such as internationalization, market expansion, inorganic growth through mergers and acquisitions, as well as organic growth. Organic growth is achieved by carrying out operational improvements, such as cost cutting, improving contractual terms with suppliers, increasing the percentage of revenues deriving from exports, standardizing and unifying reporting standards, ameliorating the inventory management, and other improvements which ultimately contribute to the increase in profitability. Many of the operating improvements result in a higher marginality, hence the positive relation between the percentage invested by an impact investor within its portfolio company and the firm's performance intuitively makes sense. It also sheds light on the similarity between impact investors and traditional private equity

funds, in terms of their strategy of economic value creation. On the one hand, the EBITDA margin is a crucial factor in the a priori investment decision, that is, before the investment is actually completed the EBITDA margin becomes an important tool for screening of the pipeline. Hence, funds may choose to invest more, gaining a greater share of ownership, in companies that have a higher potential for margin improvements. On the other hand, a greater presence of the impact investor within the company's shareholder structure may be indicative of a greater presence within the company's management, perhaps indicating that the fund may have a say in the firm's daily operations and decisions. This is especially true when the ownership stake is a controlling stake, in which case the fund holding a majority of the shares may be in charge of making a wide range of the firm's decisions, from naming the management team and defining the firm strategy, to closing down unprofitable branches or business activities.

4.3. Robustness Tests

In this section a series of checks are run in order to test the robustness of the previously presented findings. Firstly, in order to ensure that the data used to carry out the analysis is free of bias and that there is no risk of incurring in endogeneity, a reverse causality check is carried out. Indeed, there may be some potential issues tied to the sampling procedure, specifically to the calculation of the propensity score and the related matching procedure, given that the PSM also includes observations following the date of investment (that is, "post-treatment"). This may lead to a reverse causality because calculating the propensity score using observations that have already received the treatment is likely to alter the results of the regression due to the non-randomness of the selected sample. Therefore, the regression cannot provide reliable estimates of the probability of a company being targeted by an impact investor fund based on certain firm characteristics seeing as the existing impact investor presence may already have an effect on the firm characteristics (hence incurring in reverse causality).

Thus, the propensity score is calculated once again considering the sub-sample of impact investing-backed firm observations which have occurred before the investment date of the impact investing fund (i.e., only "pretreatment" ones). Considering this time lag with respect to the date of investment, the resulting sample of impact investor portfolio companies is composed of 34 observations. As above, the propensity score is then applied to the Nearest Neighbor one to one matching method, without replacement, which leads to a final PSM dataset of 68. As shown in Table 11, the resulting differences in the average of each variable for the treatment and control groups appears to be consistent with the initial PSM findings, with the extended sample of 85 impact investor-backed firms. In both cases the results are not statistically significant, as the *p*-values result extremely high compared to what is considered acceptable. Although not completely conclusive, treatment effect estimates from the two different models are not so different, so that this evidence provides a valid argument against reverse causality, for both (i) the first regression with the explanatory variable and no control variables but with year and sector fixed effects, and for (ii) the second regression with the addition of all the control variables, as well as sector and year fixed effects.

Table 11. Original analysis and Reverse Causality Check.

Variable	ATT	ATT
	Original	Reverse Causality
ROE	−0.05	−0.05
ROA	−0.07	−0.07
Operating ROA	−0.01	−0.01
EBITDA %	0.09	0.09

To increase efficiency, alternative PSM methods are run taking Return on Assets as the dependent variable. The methods used to carry out the matching are: (i) Nearest Neighbor with replacement, (ii) radius with caliper set at 0.1, (iii) radius with caliper set at 0.05, and (iv) Kernel. Radius matching decreases bias because each treated unit is matched solely with control units that have propensity scores which belong to a predetermined neighborhood of the treated unit's p-score [25]. The size of the neighborhood is determined by the radius, and in this case is set at 0.05 initially, which does not yield significant results, and then at 0.10. Radius matching with caliper equal to 0.10 suggests that the Average Treatment effect of the Treated (ATT) is negative (−0.164) and statistically significant (with a T-statistic of −2.26). Finally, the last framework for matching is carried out, using the Gaussian kernel. In this last method, the entire subsample of controls is used and weighted using the Gaussian kernel. This last analysis yields significant results which are similar to the Radius matching with caliper equal to 0.10. The results are summarized in Table 12 below.

Table 12. PSM Results: ROA as the dependent variable. Robustness check.

Variable	ATT	Standard Error	T-Statistic
NN without replacement	−0.110	0.096	−1.160
NN with replacement	−0.110	0.100	−1.150
Radius matching (r = 0.05)	−0.100	0.073	−1.410
Radius matching (r = 0.10)	−0.160 **	0.073	−2.260
Gaussian Kernel	−0.170 **	0.072	−2.370

Note: The superscripts ** denotes statistical significance at the 5% level.

Once the problem of the reduced sample size is solved with alternative matching methods such as Radius matching and Kernel matching, the results become significant, suggesting that operating performance, based on the traditional Return on Assets metric, appears to be greater in companies acquired by traditional Private Equity and Venture Capital funds compared to those belonging to the portfolio of impact investing funds. There are multiple potential explanations for these results. Nevertheless, the results seem to be consistent with the general and widespread idea that impact investors face a tradeoff between returns and positive impact. Indeed, although the pursuit of economic return is a fundamental characteristic of impact investing, due to the fact that these particular investors strive to invest in companies with an overarching mission to provide beneficial services or products from which the environment and the community is able to benefit, they are willing to forego part of the economic return and, in many cases, accept below-market-rate or close-to-market-rate returns.

5. Conclusions

This research paper strives to understand the results and economic returns of the novel impact investing method compared to that of traditional private equity and venture capital funds. This is analyzed by looking at whether the presence of an impact investor within a portfolio company's shareholder structure has an effect on its financial and operating performance. The analysis is then further amplified by focusing on whether the percentage share held by an impact investor has an effect on the performance of its portfolio company. Results from this last analysis suggest that a greater shareholding stake held by impact investors is correlated with a higher firm marginality (measured using the EBITDA margin), hinting at perhaps similarities in the economic value creation strategies used by traditional private equity operators and impact investors alike.

The first basic analysis is carried out as a comparison between various methods, namely propensity score matching by using the Nearest Neighbor procedure without replacement and the OLS linear regression model run on the resulting sample, as well as alternative matching methods, such as Nearest Neighbor with replacement, Radius and Gaussian kernel matching. Results from the OLS regression model suggest a negative linear relationship between the presence of an impact investor within a portfolio

company's shareholding structure and its operating performance (using Return on Assets as the performance metric). This is in line with the results yielded by the analyses leveraging on radius and kernel matching, which show significant results that seem to hint that operating performance (measured by the Return on Assets) appears to be greater in companies acquired by traditional Private Equity and Venture Capital funds compared to those belonging to the portfolio of impact investing funds. This result is coherent with the thesis that, because they are allocating capital to projects and enterprises with the mission to generate measurable positive impact, impact investors are willing to accept lower returns compared to traditional funds.

It Is important to highlight that the other alternative matching methods used do not yield results with a satisfactory statistical significance. This is mainly because of the limited data availability, which results in a reduced sample size. This critical aspect derives from the great challenge of analyzing a pool of privately-owned companies, which are for the most part at their initial stages of the firm life cycle. As a matter of fact, these are not obliged by law to publicly disclose all the information and annual reports which public companies must file yearly. By focusing on companies incorporated in the United Kingdom and having access to the FAME database, this problem is partially overcome. However, there is still a huge lack of data availability for what concerns startups and newly established companies. From an initial sample of 212 companies backed by impact investors, following the procedure of data cleaning and removal of null, as well as not available values, the remaining impact investor portfolio companies are merely 27. From these 27 companies, 85 observations are derived across the different years, and these observations are used to carry out the final matching procedures and the regressions.

Moreover, another aspect to point out is the fact that this research compares impact investor-backed enterprises with firms belonging to the portfolio of traditional investors using traditional performance metrics such as Return on Assets and Return on Equity. These metrics, although applied to a wide range of corporate finance studies, display a great limitation if applied to social enterprises targeted by impact investors, as they are not comprehensive of the positive externalities and impact generated. These last considerations are factored in the screening process that impact investors go through in order to carry out an investment, so that a company's ability to create positive impact is integrated in the company valuation is evaluated alongside more traditional valuation methods (e.g., DCF, trading and transaction multiples). Following this logic, determining company performance with traditional performance indicators when considering a sample of impact investor-backed firms may result in a limited analysis, which omits an important factor: impact measurements.

Impact measurement is crucial for impact investment [26,27]. Borrowing the parallelism defined by Sir Ronald Cohen in his most recently published book, "Impact: Reshaping Capitalism to Drive Real Change", just like a rocket ship necessitates a sound navigation system, impact investing requires a dependable way of measuring the impact generated by companies [2]. Today, 150 different impact assessment methods are present across the world, which provide different metrics, frameworks and ways of defining impact. In order to correctly navigate towards making impact investing a viable and more widespread investing solution, it is mandatory to determine a standardized way of defining, valuing and quantifying impact, just like we do for profit. Among the most promising efforts to standardize impact measurement is a project launched in 2019 and incubated at Harvard Business School, called the Impact-Weighted Accounts Initiative (IWAI). This research-led project is devising a universal framework which allows to systematically measure a company's impact in monetary terms by looking at its products and services, such that this measurement is then reflected in the company's financial statements. Thus, ultimately this initiative strives to build a financial accounting framework which integrates the positive and negative impact that a company creates, by introducing impact-weighted accounts [28]. The end goal is for companies to quantify in monetary terms and disclose impact through these impact-weighted financial accounts that will, eventually, become

widespread accounting tools and crucial elements to allow for comparison between firms, as well as to incorporate in the company valuation process from the side of the investors.

The results of a standardized and widespread impact measurement method, which leads to monetizing the positive and negative externalities generated by firms, would have the power to revolutionize the way capital flows, and thus have a profound effect on the entire economic system. Another meaningful comparison that can be found in Cohen's book is related to the current investing-decision making process which hinges on the prevailing risk-return model. The founder of Bridges Fund Management sheds light on the comparability between the introduction of risk into the risk-return model in the second half of the twentieth century and the potential integration of impact considerations into the model today. Indeed, just like impact today, risk "used to be considered unmeasurable, but the academic community eventually found ways to standardize its measurement across all forms of investment. The measurement of risk has had profound implications for the investment community" [2]. The same paradigm shift that took place following the standardization of risk measurement, will happen with impact, leading to what Cohen defines the Impact Revolution, a peaceful world-changing movement advocated by young entrepreneurs, investors, and consumers working to disrupt the current system and reimagine capitalism, in order to reduce inequalities, improve lifestyle, and solve environmental challenges.

Nevertheless, the fact that impact investors earn less supports the concerns for the existence of a tradeoff between profitability and social responsibility that may hinder the ability to actualize this transition. In this framework, the results displayed in that paper may display practical implications: the fact that traditional and impact invested firms experience the same effect of a larger control share suggests that these two categories of firms are not completely unlike each other. Rather, investing in a socially responsible firm does not mean the shareholder completely disregards profit incentives, and will be able to pursue them better if it has more freedom to manage. Overall, these results constitute a first step in the right direction, improving our ability to understand impact investment and its underlying tradeoffs, that up until now are often given for granted.

Before concluding it is important to mention the limitations of the paper: the present study uses a well-known database to perform a novel analysis on the profitability of impact invested firms. Despite our best efforts, there are clear limitations related to the relatively small sample of firms that fall under this category. Further investigations would certainly benefit from the growing popularity of the subsector, so that the entry of more interested investors will enlarge the sample and allow researchers to draw more conclusive results, without the worry of limited power of the statistical analysis. In more detail, the inclusion of more firms in the sample may imply a cross-country approach which will be able to take into account also for macro-economic variables in the study and for external governance [29,30] and regulatory mechanisms [31].

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Appendix A. Exhibit A—Impact Investors in UK Social Enterprises

	Management Company	HQ	Description
1	Ananda Ventures	Germany	Ananda Impact Ventures is an impact investor operating in Europe, which strives to address social challenges in vital areas such as education, health, consumption, and ageing population.
2	Ascension Ventures	UK	Ascension is an early-stage VC built by exited entrepreneurs to back the next generation of tech and impact founders.
3	Bethnal Green Ventures	UK	Bethnal Green Ventures is a VC which invests in ambitious founders using technology to tackle big social and environmental problems that aim to radically improve millions of lives.
4	Bridges Fund Management	UK	Bridges Fund Management is a specialist private markets investor, which invests in solutions that support the transition to a more inclusive and sustainable economy.
5	Connect Ventures	UK	Connect Ventures is a venture capital firm specialized in investments in seed, startup, series A, and early-stage companies. They are passionate about the power of product to transform people's lives, on a massive scale.
6	Impact Ventures UK	UK	Impact Ventures UK is a fund that provides long-term growth capital for social enterprises with innovative business models making positive and sustainable improvements to the lives of less advantaged people in the UK.
7	Nesta	UK	Nesta invests through its Nesta Impact Investments fund which focuses on three innovation missions: a fairer start for every child; a healthy life for all, and a sustainable future where the economy works better for people and the planet.
8	Social and Sustainable Capital (SASC)	UK	SASC, launched in 2014, is a social investment funds with an emphasis on social enterprises that provide long term solutions to social challenges.
9	Generation Investment Management	UK	Generation Investment Management, established in 2004 by Al Gore and Goldman Sachs' Asset Management head David Blood, is an investment management. It is focused on sustainable investment options for their mutual funds and other investments.
10	WHEB	UK	WHEB is a positive impact investor focused on the opportunities created by the transition to a low carbon and sustainable global economy.

Appendix B. Exhibit B—Variable Definition

Variable	Definition
Impact Investor Presence	Binary variable which takes on the value of 1 should there be one of the previously identified impact investors within the company's shareholding structure and 0 otherwise
Stake	represents the fraction of ordinary shares held by the impact investing operator which is part of the firm's shareholding structure
Gross Margin	Calculated as Gross Profit/Turnover
EBITDA %	Calculated as (Earnings before interest, taxes, depreciation and amortization)/Revenues
Turnover	Calculated as the total amount of revenues generated by a company through the sale of goods and/or services pertaining to primary operations of the business
Log_Turnover	Natural logarithm of Turnover
Total Assets	Calculated as the sum between Fixed assets and Current assets
Log_Total Assets	Natural logarithm of Total Assets
Asset Turnover	Calculated as Net Sales/Total Assets
Firm Age	Represents how many years the firm has been active, thus the number of years since its establishment. Calculated as the difference between Year under consideration * and Date of incorporation
Log_N employees	Natural logarithm of the total number of full time employees (FTEs) for each analyzed year
Log_Turnover	Natural logarithm of the total amount of revenues generated by a company through the sale of goods and/or services pertaining to primary operations of the business
Leverage Ratio (LR)	Calculated as Debt/EBITDA
Debt to Total Assets	Calculated as Debt/Total Assets
Equity to total assets	Calculated as Shareholder's Equity/Total Assets
ROE	Return on equity, defined as the ratio of profit after tax (net income) to shareholder's equity
ROA	Return on assets, defined as the ratio of profit after tax (net income) to total assets
Operating ROA	Operating return on assets, defined as the ratio of operating profit (also known as EBIT) to total assets

* Year under consideration indicates which particular year the general and financial information is related to, as data is collected for each year across a time period ranging from 2009 to 2020.

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