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IMPACT INVESTING FROM A EUROPEAN PERSPECTIVE – DO GOOD AND EARN MONEY?

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Abstract: Impact investing provides a promising way to fund sustainable development while balancing financial, social, and environmental goals. This study compares the performance of impact, conventional, and ESG portfolios in the European stock market over more than 10 years, using Markowitz optimization and naive diversification. The findings show that impact portfolios yield the highest returns, without sacrificing financial performance when integrating sustainability criteria that go beyond the classical ESG investing.

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Introduction

At COP21 in Paris (2015), 196 parties adopted the Paris Agreement, aiming to limit global warming by well below 2°C, ideally 1.5°C, above pre-industrial levels. In the same year, all UN Member States committed to the 17 Sustainable Development Goals (SDGs) to be achieved until 2030 (United Nations, 2015; United Nations, 2016). Implementing climate-related goals requires $5–7 trillion annually until 2030 (UNCTAD, 2014). The main challenge is securing sufficient financial resources (Barua, 2020). Governments and donations alone are insufficient and private capital participation is essential (Bose, Dong & Simpson, 2019; ECOSOC Chamber, 2018).

Impact investing is an effective approach to financing the SDGs (Then & Schmidt, 2020), whereby investors' capital is used specifically to solve social and environmental problems (Busch, Bruce-Clark, Derwall, Eccles, Hebb, Hoepner, Klein, Krueger, Paetzold, Scholtens & Weber, 2021). However, the assets under management in the impact investing market are very low compared to other sustainable investment strategies (Global Sustainable Investment Alliance, 2018). Despite the increased inclusion of social and environmental criteria, financial returns remain a key priority for many investors (Barua, 2020).

Numerous studies examine the performance of sustainable investment strategies such as ESG investing (e.g., Cunha, de Oliveira, Orsato, Klotzle, Cyrino Oliveira & Caiado, 2020; Dorfleitner, Kreuzer & Sparrer, 2020). While findings vary, experts generally agree that integrating sustainability does not inherently lead to lower returns. Despite the growing interest, the research on impact investments, particularly in public equity, remains limited and yields mixed results (e.g., Biasin, Cerqueti, Giacomini, Marinelli, Quaranta & Riccetti, 2019; Giacomini, Marinelli & Riccetti, 2022; La Torre, Mango & Chiappini, 2017). This highlights a clear gap in the literature and underlines the need for further scientific investigation. We seek to address this gap by empirically analyzing the performance of European impact investment portfolios, comparing them to ESG-based and conventional equity portfolios. We aim to determine whether impact investing in public equity is financially rewarding beyond traditional ESG criteria.

The paper is structured as follows: Chapter II introduces sustainable investment strategies and impact investing. Chapter III reviews the literature. Chap-

ter IV outlines the methodology, followed by the results in Chapter V. Chapter VI discusses implications, and Chapter VII concludes with key findings.

The Concept of Impact Investing

The term 'sustainability' in capital markets encompasses ecological, social, and ethical aspects, often assessed using ESG factors (environmental, social, and governance). Examples include energy efficiency, carbon emissions, labor standards, human rights, governance structures, or risk/reputation management (CFA Institute, 2015). Terms like green money, social investments, sustainable investing, and ESG investments are often used synonymously (Forum Nachhaltige Geldanlagen e.V., n.d.; Schueth, 2003; FERI Cognitive Finance Institute, 2019). Different sustainable investment strategies vary in how sustainability is considered. Caplan, Griswold and Jarvis (2013) classify them into socially responsible investing (SRI)[1], ESG investing, and impact investing with the latter two grouped as sustainable investments[2].

Since this paper focuses on sustainable investments, we need to distinguish between ESG and impact investing. ESG strategies use ESG factors to select investments, but typically only to enhance financial performance (Caplan et al., 2013). These strategies include exclusions (e.g., weapons, tobacco) or focus on specific sectors (e.g., renewable energy or green real estate)[3]. All sustainable investment strategies prioritize financial return, with social or environmental impact being secondary (Cojoianu, Hoepner & Lin, 2020). Impact investing differs from other sustainable investments by treating financial return and positive social or environmental impact as equally important. Impact investors aim for deeper change to address social and environmental challenges (Busch et al., 2021).

As a relatively new strategy, impact investing lacks a consistent, universally accepted definition (Agrawal & Hockerts, 2019). It is also referred to as social finance, social impact investing, blended value investing, or impact finance

[1] Unlike ESG investing, SRI only excludes ecologically and socially questionable companies, without actively seeking sustainable ones (Caplan et al., 2013).

[2] For a discussion on the differences between impact investing and ESG investing, see De Jong and Rocco (2022).

[3] Also for more details of possible sustainable investment strategies, see Forum Nachhaltige Geldanlagen e.V. (n.d.).

(Martin, 2013). This paper uses the definition by the Global Impact Investing Network (GIIN): "Impact investments are made with the intention to generate positive, measurable social and environmental impact alongside a financial return" (GIIN, 2021). This definition contains four key elements – intentionality, financial returns, range of asset classes, and impact measurement – which clearly distinguish impact investing from other sustainable investment strategies.

Impact investors aim to use capital to address social and environmental issues by investing in companies offering market-based solutions (Quinn & Munir, 2017). There are no specific requirements for the extent of the non-financial impact to be considered impact investing (Johnson & Lee, 2013). What matters is the investor's intention to make a positive contribution, not the company's (Jaquier, 2016). Financially, impact investing seeks to maximize capital (Bugg-Levine & Emerson, 2011), with returns ranging from below-average to market rate (GIIN, n.d.). The focus is on achieving a return; without it, the investment would no longer qualify as impact investing (Roundy, Holzhauer & Dai, 2017). Initially focused on private equity and direct lending (Bugg-Levine & Emerson, 2011), impact investing now also applies to public equity, where it saw the highest growth between 2015 and 2019 (GIIN, 2020). Finally, measuring non-financial impact is essential. Various standards have been developed to address this (FERI Cognitive Finance Institute, 2019). The SDGs are widely used by impact investors for measuring impact (GIIN, 2020), offering a common framework for further developing the field (Schramade, 2017). In total, it can be stated that impact investors attach the same importance to the non-financial impact of their investments as to the financial return[4]. In addition, measuring the impact of investments is a mandatory prerequisite for being able to speak of an impact investment[5].

Literature Review

Many studies have examined the relationship between sustainability and equity investment performance, but few focus on impact investments from a port-

[4] This is also stated by Clarkin and Cangioni (2016) and Höchstädter and Scheck (2015).

[5] However, financial returns can easily be measured, whereas social returns are subjective and difficult to measure. Cf. Schmidt (2023), p. 508.

folio perspective[6]. Biasin et al. (2019) analyze the effects of sustainable investment strategies on portfolios of internationally listed companies, comparing conventional portfolios with those including impact investments. Using three weighting strategies, four risk aversion parameters, and a study period from 2002 to 2018, they find that for risk-averse investors, including impact investments with Markowitz optimization[7] improves total returns. For highly risk-averse investors, the inclusion of impact investments still increases returns, but only with naive diversification[8]. However, the Sharpe ratio, representing risk-adjusted performance, shows that conventional portfolios outperform those with impact investments. They conclude that impact investments increase total return across all risk aversion parameters.

Giacomini et al. (2022) investigate whether publicly listed impact firms differ from non-impact firms in terms of risk-return performance on the US stock market between 2002 and 2019. They find that while overall risk-return profiles are similar, impact firms outperform non-impact firms during the financial crisis.

La Torre et al. (2017) compare three naive diversified equity portfolios (impact, conventional, and mixed). In contrast to Biasin et al. (2019) and Giacomini et al. (2022), they find that while impact investments do not worsen diversification and can reduce unsystematic risk in mixed portfolios, the highest average return and Sharpe ratio are achieved by conventional portfolios. Both the impact and mixed portfolios show negative average returns, negative Sharpe ratios, and higher standard deviations. La Torre et al. (2017) conclude that impact investments perform worse than conventional portfolios in terms of both risk-adjusted and absolute performance[9].

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[6] Nonetheless, there are also some studies not focusing on stock-listed investments, but on venture and growth equity impact funds (e.g., Barber, Morse & Yasuda, 2021) or a wider range of asset classes (e.g., Burton, Cole, Dev, Jarymowycz, Jeng, Lerner, Mashwama, Xu & Zochowski, 2021).

[7] Markowitz optimization involves two approaches: minimizing portfolio risk for a target return or maximizing return for a target risk (Markowitz, 1952).

[8] Within naive diversification, N different securities are included in the portfolios, with the same proportion 1/N of the available assets being invested in each security (DeMiguel, Garlappi & Uppal, 2009).

[9] Some studies, like Juddoo, Malki, Mathew and Sivaprasad (2023), define impact investing differently, incorporating tax avoidance as an investment criterion.

Bernal, Hudon and Ledru (2021) construct market capitalization-weighted impact investing indices from European publicly-listed companies for 2009–2016 and compare their returns to benchmarks of non-impact companies. They find that impact investing indices underperform traditional benchmarks in terms of risk-adjusted performance.

In the ESG investing area, results are mixed. Cunha et al. (2020) and Dorfleitner et al. (2020) reach contradictory conclusions on the financial benefits of ESG investments. Cunha et al. (2020) show that sustainability's impact on performance varies by region, while Dorfleitner et al. (2020) find that the financial advantage of ESG portfolios depends on both region and the weighting strategy used. In the early years, impact investing was mainly focused on private equity and venture capital, but it has increasingly attracted attention from other investors, including individuals (Then & Schmidt, 2020). Therefore, investigating the performance of portfolios consisting of public equity is important, as individual investors can easily compile such portfolios themselves[10]. Additionally, these portfolios should be designed for easy replication by all investors[11]. Unlike previous studies on the performance of impact investments, our research combines a rigorous scientific analysis with the application of practical portfolio strategies accessible to private investors, thereby addressing the pressing need to channel more financial resources towards the achievement of the SDGs.

Data and Methodology

To determine the effectiveness of impact investing from a risk-return-perspective[12], we conducted a study based on historic data. We compiled portfolios based on different sustainability levels: conventional, ESG, and impact. For robustness, we used both the Markowitz approach and naive diversification, the

[10] Previous research (e.g., Pawłowski, 2018) has highlighted that individual investors are increasingly investing in equities, which enhances their potential influence on the achievement of the SDGs.

[11] Jacobs, Müller and Weber (2014) found that naive diversification produces Sharpe ratios similar to more complex methods, recommending it for individual investors. This is also supported by Bloomberg, Leftwich and Long (1977), and DeMiguel et al. (2009).

[12] Whereas other studies also investigate the impact on sustainability (e.g., Jacob & Wilkens, 2021), in this paper, in regard to sustainability, we compare the financial performance of different investment strategies.

latter providing an easily reproducible alternative[13]. While naive diversification may lead to suboptimal portfolios, it is easier to implement. Comparing both methods helps to determine whether the performance justifies the effort required for Markowitz optimization. We chose an European instead of a German-only perspective, to be able to choose from a larger investment universe[14]. We excluded transaction costs and taxes. The portfolios were based on stocks from three indices: conventional portfolios were constructed from the Stoxx Europe 50 Index, covering 50 stocks from 17 countries (Quontigo, n.d.(a)); ESG portfolios used stocks from the Stoxx Europe ESG Leaders 50 Index, which includes companies excelling in ESG issues (Quontigo, n.d.(b)); impact portfolios were constructed from the MSCI ACWI Sustainable Impact Index, containing companies whose core business addresses global social or environmental challenges and promotes the SDGs (MSCI, 2024a). We derived the index constituents from Thomson Reuters Datastream, initially selecting all stocks included in the indices as of April 2024. However, for comparability and a European focus, non-European companies were excluded from the Impact Index. Additionally, companies listed on the Frankfurt Stock Exchange after 2009 or not listed at all were excluded, along with Swiss companies due to trading suspensions (Börse Frankfurt, 2019). Companies with 0% quarterly returns were also excluded. These adjustments resulted in 41 conventional, 47 ESG, and 20 impact companies available for investment. Discrete quarterly total returns (reinvestment of dividends was assumed herefore) were calculated based on stock prices[15] taken from Thomson Reuters Datastream. However, aligning with Cunha et al. (2020) and taking into account the portfolio additivity, we use discrete returns in this paper.

We construct several European equity portfolios to investigate and compare the financial performance of impact, ESG and conventional investments on the European stock market. We further discuss whether the respective weighting strategy applied in form of Markowitz optimization (Markowitz, 1952) and naive diversification has an impact on the financial performance.

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[13] Berk and van Binsbergen (2025) analyze disinvestment's effect, concluding that investing, rather than disinvesting, is more effective for controlling sustainability and making an impact.

[14] The first ESG index on the German stock exchange, launched in March 2020, initially underperformed in both sustainability and financial performance. Cf. Nerlinger (2020).

[15] We used Thomson-Reuters Datastream Total Return Indices for return calculation.

For each weighting strategy a conventional, ESG and impact portfolio are constructed. Our analysis is based on a total of six portfolios.

Each portfolio is adjusted quarterly on the last day of March, June, September, and December. Covering the period from January 1, 2011, to December 29, 2023, this results in 51 rebalancing dates[16]. While quarterly adjustments may not suit all investors or market conditions, it allows for comparability with common indices, which also use quarterly rebalancing (Stoxx, 2024; MSCI, 2024b)[17].

We calculated the expected returns for the next quarter as geometric mean of the four preceding quarters[18]. Standard deviation and Sharpe ratio were calculated for all stocks per quarter for an assessment of the risk-return characteristics of the securities.

The Markowitz optimization portfolios aimed to maximize return with a target risk of 10.08%, reflecting the 3-month volatility of the Stoxx Europe 50 at the time of data collection. In the naive diversification portfolios, each stock was equally weighted. To evaluate risk-adjusted performance, we calculated the Sharpe ratios (Sharpe, 1992) quarterly, using the 3-month EURIBOR rate as the risk-free rate, sourced from Thomson Reuters Datastream.

Results for Performance of Portfolios built by Markowitz Optimization

We assess portfolio performance based on absolute returns, similar to Brzeszczynski and McIntosh (2014), by tracking a hypothetical 10,000 EUR investment from January 1, 2011, reinvested quarterly through December 2023. Additionally, we analyze quarterly returns and Sharpe ratios for risk-adjusted performance, before evaluating the overall results.

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[16] This rebalancing is according to the quarterly rebalancing for the stock indices used in this study and to reflect a portfolio approach that can be modelled by individual investors.

[17] Professional investors often rebalance based on dynamic factors, but this is impractical for retail investors. Both practitioners (Zhang, Ahluwalia, Ying, Rabinovich & Geysen, 2022; Zilbering, Jaconetti & Kinniry, 2015) and academic research (Cuthbertson, Hayley, Motson & Nitzsche, 2016) advise against overly frequent rebalancing, as it may not be optimal.

[18] Note that in the following, ex-post returns are meant to describe historical performance when referring to the expression return.

Although 41 companies are available for the conventional portfolio, 47 for the ESG portfolio, and 20 for the impact portfolio, it is notable that in most quarters, only two to four securities are selected in the portfolios constructed using Markowitz optimization. Table 1 shows the five companies with the highest weights in each sustainability grade.

Table 1. Top Five Admitted Companies under Markowitz Optimization

	Conventional portfolio	ESG portfolio	Impact portfolio
Highest weight	ASML Holding	Adidas	Salmar
	Novo Nordisk	ASML Holding	Novo Nordisk
	ING Group	Kering	Vestas Wind Systems
	Airbus	Stellantis	Berkeley Group
Lowest weight	Unicredit	Iberdrola	Ipsen

S o u r c e : own calculation based on data described.

The quarterly absolute performance for the portfolios constructed using Markowitz optimization, based on an initial investment of 10,000 EUR are shown in table 2. By the end of 2023, the impact portfolio reached approximately 11,387,000 EUR, growing by around 9,467,000 EUR from the end of 2019 despite crises such as COVID-19 and the Ukraine War. The conventional and ESG portfolios ended at approximately 2,370,000 EUR and 5,780,000 EUR, respectively. Although the impact portfolio had the highest final value, the conventional and ESG portfolios showed higher percentage increases (710% and 664%) compared to the impact portfolio's 493% growth between 2020 and 2023. All three portfolios performed well during the COVID-19 crisis, but the impact portfolio had a stronger performance from 2011 to early 2020, showing less resilience during market downturns.

Table 2. Absolute Performance of Portfolios under Markowitz Optimization

	Conventional portfolio (EUR)	ESG portfolio (EUR)	Impact portfolio (EUR)
2011-01-01	10,000	10,000	10,000
2011-12-30	14,438	15,758	17,171
2012-12-31	22,763	25,663	29,278
2013-12-31	34,943	41,985	67,638
2014-12-31	54,209	72,454	146,625
2015-12-31	77,589	109,747	246,289
2016-12-30	99,522	179,012	401,813
2017-12-29	146,248	335,905	735,491
2018-12-31	192,178	494,771	1,310,729
2019-12-31	292,564	756,181	1,919,518
2020-12-31	412,185	1,029,336	2,875,332
2021-12-31	859,697	2,260,080	5,215,246
2022-12-30	1,243,074	2,941,312	7,657,491
2023-12-29	2,369,545	5,780,025	11,386,977

S o u r c e : own calculation based on data described.

Descriptive statistics of quarterly returns and Sharpe ratios are provided in table 3. The results reveal that the impact portfolio has the highest average quarterly return of 14.61%. The conventional and the ESG portfolio show lower numbers (11.18% and 13.12%). The range of returns of the conventional portfolio is also lower than those of the ESG and the impact portfolio. In terms of the Sharpe ratio, the impact portfolio has the highest average value, which is due to the fact that a uniform target risk of 10.08% was assumed for all portfolios and the impact portfolio has the highest average return.

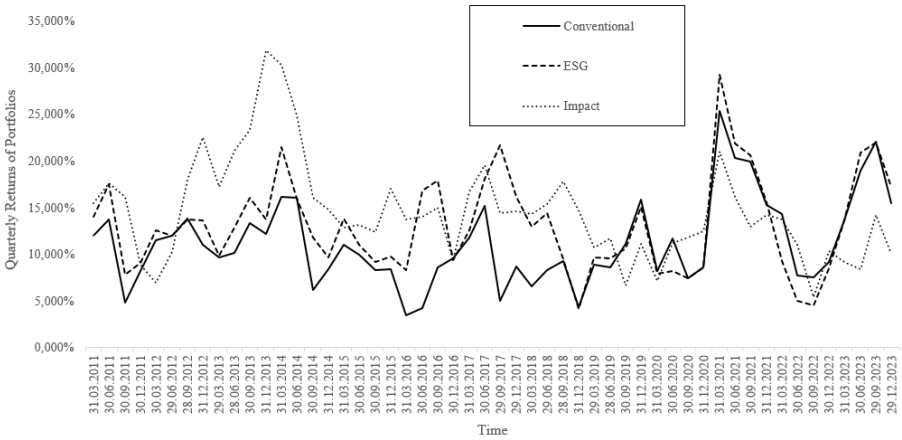
Table 3. Descriptive Statistics for Markowitz Optimization

	Conventional portfolio	ESG portfolio	Impact portfolio
Quarterly return			
Max %	25.37	29.30	31.91
Min %	3.40	4.09	5.40
Mean %	11.18	13.12	14.61
Quarterly Sharpe ratio			
Max	2.57	2.96	3.14
Min	0.33	0.33	0.42
Mean	1.08	1.27	1.42

S o u r c e : own calculation based on data described.

Graph 1 shows the quarterly returns of all portfolios. The conventional and ESG portfolios generally show similar returns due to overlapping companies, with occasional periods where one outperforms the other. Notably, the ESG portfolio outperforms in first three quarters of 2016 and from Q2 2017 to Q2 2018, driven by stocks like Adidas, Kering, and Stellantis. The impact portfolio, initially outperforming the other two, sees its best performance from 2012 to 2014, mainly due to high returns from companies like Jazz Pharmaceuticals, Mowi ASA, and Vestas Wind Systems. However, in 2021 and from Q4 2022 to the end of 2023, it shows lower returns than both the Conventional and ESG Portfolios, particularly due to missing out on Mercedes and Infineon, which boosted the other portfolios. Despite the reduced diversification in the impact portfolio, it achieves higher absolute performance, driven by a few standout stocks. Without these, the performance would align more closely with the conventional and ESG portfolios.

Graph 1. Quarterly Returns of Portfolios structured by Markowitz Optimization



S o u r c e : own calculation based on data described.

Results for Performance of Portfolios structured by Naive Diversification

As an alternative approach to structuring the portfolios, we use naive diversification. Although this may result in suboptimal portfolios from a theoretical perspective, it is easier to implement, making it a practical choice for individual investors. We will analyze performance, focusing on return, volatility, and Sharpe ratio. Since all available companies are included in the portfolios with equal weighting in naive diversification, there is no need to discuss portfolio constituents. Instead, we will focus on evaluating the Sharpe ratio, as there is no predetermined risk level in this method.

Table 4 presents the absolute financial performance on a quarterly basis. By the end of 2023, the impact portfolio's asset value reaches approximately 44,940 EUR, with an increase of 8,314 EUR (22.70%) from 2020 to 2023. The conventional and ESG portfolios have lower asset values at 41,450 EUR and 40,097 EUR, respectively. Despite the challenges of the COVID-19 crisis and the Ukraine War, the impact portfolio ends with the highest absolute value. However, the conventional and ESG portfolios show higher percentage in-

creases during the 2020–2023 period, at 53% and 52%, compared to the impact portfolio's 22.70%. In earlier years, the impact portfolio outperforms in percentage value growth.

Table 4. Absolute Performance of Portfolios structured by Naive Diversification

	Conventional portfolio (EUR)	ESG portfolio (EUR)	Impact portfolio (EUR)
2011-01-01	10,000	10,000	10,000
2011-12-30	10,548	10,258	10,396
2012-12-31	11,857	11,085	11,177
2013-12-31	14,445	13,944	14,732
2014-12-31	17,232	16,546	19,337
2015-12-31	19,713	19,269	23,986
2016-12-30	19,525	18,990	25,823
2017-12-29	23,477	23,601	29,291
2018-12-31	23,568	23,696	34,457
2019-12-31	27,112	26,372	36,626
2020-12-31	24,715	24,726	34,873
2021-12-31	32,938	34,518	45,987
2022-12-30	33,540	32,053	44,452
2023-12-29	41,450	40,097	44,940

S o u r c e : own calculation based on data described.

Table 5 presents the descriptive statistics of quarterly returns, standard deviations, and Sharpe ratios for the portfolios. The impact portfolio has the highest average quarterly return at 3.00%, followed by the conventional (2.82%) and ESG (2.78%) portfolios. The impact portfolio also has the widest range of quarterly returns, with the worst return nearing -5.50%. The conventional portfolio exhibits the lowest average risk, with a quarterly standard deviation of 7.07%. In terms of risk-adjusted performance, the impact portfolio leads with the highest Sharpe ratio, despite its greater fluctuations.

Table 5. Descriptive Statistics for Naive Diversification

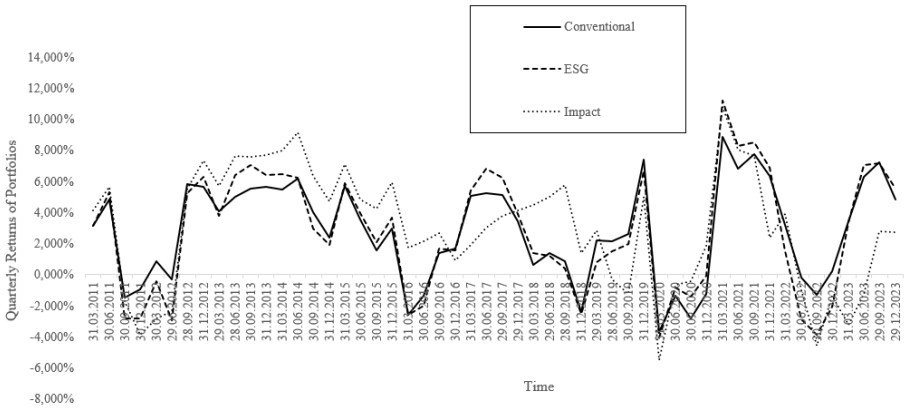
	Conventional portfolio	ESG portfolio	Impact portfolio
Quarterly return			
Max %	8.88	11.19	10.79
Min %	-3.70	-4.04	-5.49
Mean %	2.82	2.78	3.00
Quarterly standard deviation			
Max %	18.92	20.49	22.22
Min %	1.92	1.82	1.78
Mean %	7.07	8.03	7.87
Quarterly Sharpe ratio			
Max	2.18	2.45	3.28
Min	-0.38	-0.68	-0.55
Mean	0.64	0.57	0.72

S o u r c e : own calculation based on data described.

Graph 2 compares the portfolios built using naive diversification. The performance of the conventional and ESG portfolios, which largely mirror each other due to overlapping holdings, is very similar. However, the ESG portfolio outperforms the conventional portfolio during specific periods, such as Q2 2013 to Q1 2014, Q2–Q3 2017, and 2021, when exclusive ESG companies like Stellantis and Infineon generated high returns. Conversely, from Q3 2011 to Q2 2012, the ESG portfolio underperforms due to losses from certain exclusive companies like Intesa Sanpaolo and Nokia. The impact portfolio's returns often differ from the conventional and ESG portfolios due to its distinct holdings, with the exception

of Novo Nordisk. Notable periods include Q4 2013 to Q4 2015 and Q1 2018 to Q1 2019, where companies like Vestas and Salmar contributed strong returns. Conversely, in Q4 2016–Q3 2017 and Q1 2020, the impact portfolio underperformed due to significant losses from stocks like Ipsen and Unibail. The most striking period was 2023, when the impact portfolio showed weaker returns, with Novo Nordisk being the only strong performer, unlike the conventional and ESG portfolios, which had more consistent positive returns.

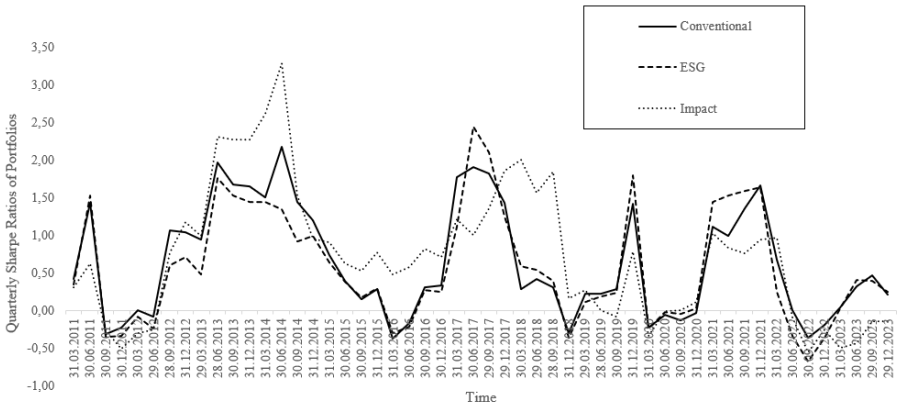
Graph 2. Quarterly Returns of Portfolios under the Naive Diversification



S o u r c e : own calculations based on data described.

The Sharpe ratios of the portfolios built using naive diversification (graph 3) show varying risk-adjusted performances. The ESG portfolio outperforms the conventional portfolio in mid-2017 and the first three quarters of 2021. The impact portfolio excels in Q4 2012 to Q3 2014 and late 2017 to Q3 2018, driven by high returns and low risk. However, in 2021 and 2023, the impact portfolio underperforms due to higher risk and lower returns, particularly influenced by the volatility of stocks like Unibail and EDP Renovaveis.

Graph 3. Sharpe Ratios of Portfolios under Naive Diversification



S o u r c e : own calculation based on data described.

Overall, the impact portfolio delivers the best absolute performance under naive diversification, largely driven by companies like Vestas and Jazz Pharmaceuticals, though some of these stocks also contribute to its lower performance in certain periods compared to the other portfolios.

Discussion

The impact portfolio delivers the highest absolute performance, regardless of the strategy used. However, Markowitz optimization outperforms naive diversification significantly. Using Markowitz optimization, the asset value reaches approximately 11,387,000 EUR, while with naive diversification, it is only 44,940 EUR. This huge difference is due to Markowitz optimization's focus on a few high-return stocks each quarter, compared to the more evenly distributed holdings in naive diversification. Table 6 compares the final portfolio values for all three portfolios across both strategies.

Table 6. Asset Values

	Conventional portfolio (EUR)	ESG portfolio (EUR)	Impact portfolio (EUR)
Markowitz optimization			
Asset value per 2023-12-29	2,369,545	5,780,025	11,386,977
Naive diversification			
Asset value per 2023-12-29	41,450	40,097	44,940

Source: own calculation based on data described.

Table 7 clearly shows that portfolios using Markowitz optimization significantly outperform those using naive diversification. Markowitz optimization generates returns ranging from 3% to 31% per quarter, while naive diversification returns range from nearly -5.5% to just under 11%[19]. Markowitz optimization achieved no negative returns, and its risk-adjusted performance consistently outperforms naive diversification throughout the study period (see table 7). Only in a few short periods, naive diversification's Sharpe ratio exceeds or approaches that of Markowitz optimization. However, in those instances, the portfolio risks of naive diversification were notably lower than the 10.08% target risk set for Markowitz optimization.

Table 7. Portfolio Returns and Sharpe Ratios

	Conventional portfolio (EUR)		ESG portfolio (EUR)		Impact portfolio (EUR)	
	Markowitz	Naive	Markowitz	Naive	Markowitz	Naive
Portfolio return %						
2011-12-30	8.22	-0.98	9.09	-2.82	8.91	-3.86
2012-12-31	11.04	5.64	13.63	6.27	22.53	7.34
2013-12-31	12.20	5.64	13.73	6.39	31.91	7.70

[19] The exact values of the ranges of the quarterly returns are not fully evident from table 7 and are derived from the analysis of all quarters.

Table 7. Portfolio...

	Conventional portfolio (EUR)		ESG portfolio (EUR)		Impact portfolio (EUR)	
	Markowitz	Naive	Markowitz	Naive	Markowitz	Naive
2014-12-31	8.36	2.38	9.63	1.93	14.80	4.72
2015-12-31	8.37	2.96	9.74	3.64	17.04	5.94
2016-12-30	9.55	1.67	9.39	1.54	9.39	0.93
2017-12-29	8.65	3.45	16.11	3.88	14.57	4.10
2018-12-31	4.32	-2.42	4.09	-2.53	14.71	1.37
2019-12-31	15.86	7.39	15.12	6.72	11.07	4.98
2020-12-31	8.57	-1.26	8.57	-0.05	12.51	1.84
2021-12-31	15.30	6.36	15.55	6.86	14.22	2.36
2022-12-30	9.14	0.20	8.53	-2.05	10.36	-1.34
2023-12-29	15.46	4.85	17.23	5.50	10.01	2.73
Sharpe ratio						
2011-12-30	0.68	-0.23	0.77	-0.34	0.75	-0.51
2012-12-31	1.08	1.04	1.33	0.71	2.22	1.17
2013-12-31	1.18	1.65	1.33	1.44	3.14	2.28
2014-12-31	0.82	1.20	0.95	0.99	1.46	0.95
2015-12-31	0.84	0.28	0.98	0.30	1.70	0.77
2016-12-30	0.98	0.33	0.96	0.25	0.96	0.71
2017-12-29	0.89	1.43	1.63	1.24	1.48	1.86
2018-12-31	0.46	-0.30	0.44	-0.36	1.49	0.16
2019-12-31	1.61	1.42	1.54	1.79	1.14	0.79
2020-12-31	0.90	-0.04	0.90	0.02	1.29	0.11
2021-12-31	1.57	1.66	1.60	1.63	1.47	0.94
2022-12-30	0.70	-0.19	0.63	-0.37	0.82	-0.25
2023-12-29	1.15	0.21	1.32	0.24	0.60	-0.15

S o u r c e : own calculation based on data described.

Investors must understand that while Markowitz optimization yields much higher absolute performance, it relies heavily on the exceptional performance of a small number of selected companies. In contrast, naive diversification achieves only a fraction of the absolute returns from Markowitz optimization but results in a more diversified portfolio. Although Markowitz optimization aims to create efficient portfolios, it does not ensure adequate diversification, as shown in our study period.

Conclusion

Our findings align with Biasin et al. (2019), showing that impact portfolios not only lead to non-financial benefits but also outperform in terms of return and risk-adjusted performance[20]. However, our results contrast with those of La Torre et al. (2017) and Bernal et al. (2021), primarily due to our longer study period, which spans over ten years and includes the effects of the COVID-19 crisis. Both prior studies focus on shorter timeframes and Bernal et al. (2021) only compares impact vs. conventional investments, while we also include ESG portfolios. Unlike Biasin et al. (2019), who examines both stocks and bonds, our research focuses solely on public equities, offering a stronger foundation for future research.

While theory suggests that limiting the investment universe to ESG or impact investments may lead to suboptimal risk-return combinations (Renneboog, Horst & Zhang, 2008), our study indicates that impact investing offers a premium and/or diversification advantage, suggesting market inefficiency. To strengthen these findings, further research should explore alternative portfolio construction methods and rebalancing strategies, especially given the limitations of Markowitz optimization (Markowitz, 1952) in providing diversified portfolios.

[20] This corresponds to the finding of Dorfleitner, Utz and Zhang (2022) that green bonds show a premium, so we can assume that sustainable investing has higher return regardless of the asset class.

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