SFDR Regulation (Level 2): What Impact on the Performance of Sustainable ETFs?

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Abstract

The paper analyses the effect of Sustainable Financial Disclosure Regulation (level 2) on sustainable ETFs. First, we compare the financial performance of two samples of ETFs classified according to article 8 and those that have been downgraded from art. 9 to art. 8 of the SFDR regulation. Second, we analyze the performance of downgraded ETFs following the entry into force of SFDR level 2. Our results highlight that the funds classified as art.9 showed significant differences in performance compared to those under art. 8 and the downgrade process significantly affected the performance of the ETFs analyzed.

Keywords: SFDR regulation, sustainable ETF, financial performance

1. Introduction

The Sustainable Finance Action Plan, a strategy adopted by the European Union in 2018 and consisting of a series of interconnected regulations designed to encourage sustainable investments, is an important step in directing capital toward a sustainable economy. A key pillar of the Plan is EU Regulation 2019/2088 on Sustainability Disclosure in Financial Services (Sustainable Finance Disclosure Regulation-SFDR), which came effective on March 10, 2021 and often referred to as "SFDR Level I".

The SFDR is a regulation on sustainability-related disclosure in the financial services sector designed to help investors distinguish and compare the many sustainable investment strategies now available in the European Union. The EU SFDR helps investors by requiring greater transparency in indicating how well financial products take into account environmental and/or social characteristics, constitute sustainable investments, or set sustainable goals. This information is now presented in a more standardized way so as to help investors choose and compare between different products by requiring increasing levels of disclosure to the extent that sustainability is a relevant aspect.

The SFDR regulation provides for three different classifications of investment products:

- products classified under Article 6 integrate environmental, social, and governance (ESG) risk considerations into the investment decision-making process and do not meet the additional criteria of Article 8 or 9 strategies.

- products classified under Article 8 promote social and/or environmental characteristics and may include sustainable investments, even if these are not their primary focus.

- products classified under Article 9 have a clear measurable sustainable investment objective.

On January 1, 2023, the technical standards under EU Reg. 2022/1288 (also known as "SFDR Level II" or "SFDR Regulatory Technical Standards - RTS") became operational; these standards clarify a number of points in the SFDR, which have been generic and had left ample room for interpretation and uneven application by management companies, introducing not only new transparency criteria on the negative effects on sustainability factors, but also new mandatory and detailed pre-contractual disclosure on the composition and strategies of financial products classified as Article 8 and 9.

Therefore, the new Regulation 2022/1288 provided more precise guidance on uniform fund classification content and methodologies. Following this, many industry participants have taken a more cautious approach, updating the SFDR classification of their funds to align with the new regulatory requirements and in particular downgrading (Badenhoop

et al. 2023) many of these funds from article 9 to article 8 also reducing the risk of greenwashing and to the improvement of sustainability rating for funds classified under Art.9 (Fricke, Schlepper 2024).

The literature studying the implications of SFDR (level 2) on financial markets is quite limited. Among the work considered, Badenboop et al. 2023 focuse on the impact that this legislation may have on the different proportions of sustainable investments between German Article 8 and Article 9 funds, finding that the share of investments aligned with the taxonomy of Article 9 funds has increased over time, while it remains negligible for Article 8 funds. Fricke and Schlepper investigate whether the risk of greenwashing has decreased around the introduction of the EU SFDR. Focusing on a sample of european bond mutual funds they highlight how this risk has decreased for Article 9 funds but still remains very high for Article 8 funds.

Scheitza and Busch assess the level of ambition of declassified Article 9 mutual funds and whether they actively contribute to the achievement of the SDGs. Regarding declassified funds, the authors focus on analyzing the different investment approaches compared to those that have retained their status.

Despite the growing interest in various topics related to sustainable (ESG) investing focalized on mutual funds in general and on the SFDR's role in providing both the building blocks for clear and efficient investor decision making and in reducing greenwashing, to the best of the writer's knowledge, no author has considered ETFs as the main object of analysis.

Our study takes inspiration from part of the conclusions reached by Nishi et al. who in their study verify a significant impact of SFDR on the European market for ESG funds (mutual funds and ESG ETFs), particularly in the context of funds downgraded from Article 9 to Article 8 by documenting a noticeable decline in net flows to the funds following downgrading, underscoring the importance that investors attach to higher quality ESG with the economic implication that the SFDR classification and subsequent reclassifications determine how money is reallocated to support the transition of the economy.

For these reasons, the aim of this paper is to compare two samples of ETFs (ETF art.8 and ETF downgraded by art.9) in order to identify any differences in financial performance and understand the impact of the sustainability factor on them.

The remarkable growth experienced by ETFs in recent years in the European market led us to focus on this instrument. In Europe, 2023 was the second best year ever with growth in net inflows (+80%) (Morningstar 2024). Inflows from ETFs that follow environmental social and governance (ESG) criteria in Europe were also positive and growing with more than €4 billion. The performance of equity markets, the development of ICT, institutional policy and the financial literacy process strongly influenced this growth, contrary to the trend in recorded financial performance and the taxation level (Marszk, Lechman 2024).

The analysis focused on the impact of the downgrade on the performance of the ETFs concerned. This study allowed us to assess whether the change in classification had significantly affected the performance of the ETFs themselves and whether this impact was immediate or gradual over time. These goals make this work original from the rest of the more recent literature because no author has considered ETFs as the main object of analysis-on the contrary most of the existing literature focuses on analyzing the impact SFDR Regulation has had on mutual funds in general.

The reminder of the paper is organized as follows: section 1 describes our materials and research methodology; section 2 presents the results of the analysis; section 3 concludes.

2. Materials and Methods

In this paper, two distinct samples of ETFs were examined that have been of particular interest within the SFDR (Sustainable Finance Disclosure Regulation) regulatory environment.

The first sample of ETFs meets the requirements set forth in article 8 of the SFDR, thus representing an option for investors interested in financial products with sustainable objectives.

The second consists of ETFs that, following a re-classification, have moved from the scope of Article 9 to Article 8 of the SFDR.

The data used in this research were acquired from Refinitiv Eikon, Investing, and Marketwatch, and the type of data is based on daily time series.

We considered European ETFs and the selection was driven by the specificity of European regulation. This analysis involved some special challenges and considerations.

In line with application needs and data availability, our sample includes 10 ETFs from the first group, which fully adhere to Article 8 of the SFDR, and 10 ETFs from the second group, which were recently downgraded from Article 9 to Article 8 of the SFDR.

The sample size is the result of a purposeful selection process, as many ETFs have only recently joined the market and did not have sufficient historical data for analysis, while some presented difficulties in finding data. In addition, for some ETFs, we were unable to use specific benchmarks due to the lack of detailed data. However, to maintain representativeness of the context and performance of these funds, we opted to use more general benchmarks, known as the 'parent index' of the specific benchmarks.

In addition, in the context of the analysis, it was necessary to establish a reliable risk free rate for financial calculations. For this purpose, data from "Il Sole 24 Ore, Markets" were used to closely follow the performance of a German bond. The choice of a German bond as a benchmark for the risk-free rate was purposeful, as these government bonds are traditionally considered among the safest and most reliable globally.

The analysis period selected for the research is January 01, 2016 to January 05, 2024. The choice to start the analysis from January 2016 was dictated by the desire to include a spectrum of ETFs that was as numerous as possible. However, even then, flexibility was essential because some ETFs were introduced more recently to the financial market; consequently, the need to adjust for the availability of historical data resulted in shorter analysis periods for some ETFs.

Although this approach introduced some variations in the length of analysis for individual ETFs, it allowed us to maintain a representative sample.

3. Results

As a first step, the percentage changes in the returns of the two categories of ETFs and benchmarks were calculated, respectively, for ETFs reflecting Article 8 and ETFs that were downgraded.

Next, the average of the percentage change in returns, variance, and standard deviation was calculated for each ETF and its reference benchmark. These calculations were also based on daily returns.

Next, the covariance and correlation coefficient between the individual ETFs and their benchmark indexes was determined.

As a final step, as part of the risk calculation, attention was focused on the beta coefficient as expression of systemic risk.

Below are the summary tables of the results, in relation to the two categories of ETFs considered.

Table 1. Risk and performance of ETFs art. 8

Number	ISIN ETF	Average	Variance	Standard dev.	Covariance	Coeff. of correlation	Beta
1	LU1602144575	0,000278588	0,000122908	0,011086404	0,000108669	0,886478554	0,888814115
2	LU1681042609	0,000279412	0,00011049	0,01051143	0,000111881	0,90912114	0,816224507
3	LU0446734104	0,000172276	0,000100083	0,010004124	5,79748E-05	0,503042377	0,436845515
4	LU0136234068	0,000213529	0,000138578	0,011771918	0,000110864	0,79171791	0,783511227
5	LU1812092168	5,04167E-05	0,000143966	0,011998602	0,000134533	0,955658795	0,977320396
6	IE0008471009	0,000226861	0,000150309	0,012260076	0,000145191	0,983209345	1,00077689
7	IE00B02KXM00	0,000229058	0,000114103	0,010681914	0,000107845	0,905143578	0,866830138
8	IE00B86MWN23	0,000202143	6,96337E-05	0,008344679	5,15398E-05	0,823221766	0,915609889
9	LU1861137484	0,000416917	0,000113825	0,010668893	0,000111098	0,830008321	0,705824173
10	LU1681041460	0,000297624	9,06079E-05	0,00951882	5,34423E-05	0,56934305	0,549578161

From the Table 1, it appears that ETF number 9 shows the highest average, suggesting a higher potential return than the other ETFs. In contrast, ETF number 5 shows the lowest mean.

Regarding volatility, ETF number 6 shows the highest standard deviation, indicating greater variability in returns. In contrast, ETF number 8 shows a lower standard deviation, suggesting lower volatility.

ETFs number 5 and 6 have a very high correlation coefficient, indicating a strong positive correlation with their benchmarks. In contrast, the one with the lowest correlation with the market index is number 3.

In terms of Beta, ETF number 6 perfectly follows the sensitivity of its market index; while ETFs number 5 and 8 reflect their benchmark almost perfectly.

The following table summarizes the results for the downgraded ETFs.

Table 2. Risk and performance of downgraded ETFs

Number	ISIN ETF	Average	Variance	Standard dev.	Covariance	Coeff. of correlation	Beta
1	LU0908501058	0,000321146	0,000127985	0,01131303	0,000126069	0,983949008	0,982870406
2	LU0908501132	0,000339957	0,000233659	0,015285904	0,000227553	0,984988604	0,996236715
3	LU1291101555	0,000262019	0,000120446	0,010974792	0,000111115	0,959772978	0,998520844
4	LU1437025023	0,000122605	0,000139119	0,011794857	9,86697E-05	0,852316154	1,024242568
5	LU1437025296	0,000181687	0,00010602	0,01029662	9,1386E-05	0,904261808	0,948633187
6	LU1681042609	0,000279412	0,00011049	0,01051143	0,000111881	0,90912114	0,90912114
7	LU1753045332	0,000367655	0,000131092	0,011449533	0,000128815	0,88410469	0,79545798
8	LU1753045415	0,000242822	0,000111741	0,01057078	0,000115742	0,902391042	0,786162402
9	IE00B1XNHC34	0,000325914	0,000268294	0,016379695	0,000208614	0,834947665	0,896575661
10	LU1861137484	0,000346258	0,000119859	0,010948008	0,000124411	0,913446979	0,803852728

The Table 2 shows that the ETF with the lowest average is number 4, indicating that this ETF generated lower returns; while the ETF with the highest average is number 7.

Regarding variability in returns, number 9 shows greater variability, suggesting potential volatility in returns. In contrast, number 5 shows lower volatility.

In addition, most ETFs show a high correlation coefficient with the benchmark, indicating a strong positive relationship with the reference market. This strong correlation suggests greater stability relative to the market, while a beta greater than 1 could indicate greater volatility.

3.1 Performance Indicators of ETFs art.8

The table below presents a detailed overview of the financial characteristics of ETFs art. 8.

Table 3. Performance Indicators of ETFs art.8

Number	ISIN ETF	Sharpe ratio	Treynor index	Modigliani Index	Jensens Alpha	Information index	Sortino index	Tracking error
1	LU1602144575	4,66324112	0,05816579	0,000142738	0,005797146	0,010448415	5,709300751	0,005275698
2	LU1681042609	4,918398473	0,06333968	0,006163455	0,009567284	0,016625464	5,990937867	0,004878451
3	LU0446734104	5,157099403	0,11810185	0,007990248	0,029043582	-0,002293953	6,160438309	0,010809499
4	LU0136234068	4,386159951	0,065900161	0,00075435	0,011172714	-0,000896078	5,332931432	0,007638488
5	LU1812092168	4,289700273	0,052664822	-0,001090388	0,001141793	-0,007373908	4,948985099	0,003543309
6	IE0008471009	4,212604215	0,051606756	-0,000679743	-3,92431E-05	0,000393427	5,213918932	0,002237253
7	IE00B02KXM00	4,835186373	0,059583814	0,002511919	0,006940114	0,014974898	5,866682846	0,004777714
8	IE00B86MWN23	6,186233343	0,05638005	-0,005006704	0,00442533	0,015751626	7,352718684	0,004779563
9	LU1861137484	4,858695596	0,073441668	0,009537208	0,015346419	0,019677816	6,053160771	0,007002211
10	LU1681041460	5,433195632	0,094104198	0,002157583	0,023316837	0,004467963	6,850454624	0,008998097

The ETFs identified with higher Sharpe ratios, particularly n.8 and n.10, have been shown to offer superior returns relative to the risk taken. These results indicate that these ETFs could be an attractive choice for investors seeking an optimal balance between return and risk in their investment strategies.

In contrast, some ETFs, such as n.6, have lower Sharpe ratios, suggesting that the additional return over risk-free investment might be proportionately lower than the associated level of risk. This could influence the preference of investors who place greater emphasis on prudent risk management, making these ETFs potentially less attractive in this decision-making context.

Based on Treynor's Index analysis for the ten ETFs complying with Article 8 considered, a mixed picture of the situation emerges. Some ETFs, such as #3 and #10, show positive values, suggesting robust performance relative to market risk.

Analyzing the obtained Modigliani Indices reveals interesting variations in relative performance. Some ETFs show a positive trend, outperforming the benchmark and obtaining higher Modigliani Indices, while others show a lower performance.

ETFs with positive Modigliani Indices, such as numbers 2, 3, and 9, seem to indicate an ability to generate higher returns than the benchmark in relation to the risk taken.

On the other hand, some ETFs, such as numbers 5 and 8, have negative Modigliani Indices, suggesting underperformance relative to the benchmark. This could result from higher volatility than the benchmark market.

All ETFs show positive results for Jensen Alpha, with the exception of ETF number 6, suggesting that they exceeded expectations in relation to their systemic risk. The ETFs with higher values of Jensen's Alpha seem to indicate relatively better performance than the other funds. However, they are all values close to zero, indicating, therefore, that their performance is in line with expectations in relation to the level of risk taken.

As for the information ratio. a mixed picture emerges of each fund's ability to track and anticipate changes in its benchmark. The information index provides an indication of the quality of management and the ETF's ability to generate returns in excess or short of the benchmark market.

Among the ETFs analyzed, some are distinguished by a high information index (e.g., #2, #7, #8, and #9), suggesting that their management is particularly effective in capturing market dynamics.

In contrast, some ETFs show negative information indices (e.g., numbers 3, 4, and 5), suggesting that their ability to provide information about changes in the benchmark may be limited.

All ETFs considered have positive Sortino Indices, indicating that, overall, they were able to generate positive returns relative to risk.

The ETFs with higher Sortino Indices are number 8 and 10. These funds have demonstrated a superior ability to generate positive returns relative to risk below the specified threshold.

Overall, most ETFs have relatively low tracking error, indicating that they follow their benchmark fairly closely. ETF number 6 has the lowest tracking error, indicating greater adherence to its benchmark. In contrast, number 3 has the highest value, suggesting a greater deviation from its benchmark.

Table 4. Performance Indicators of downgraded ETFs

Number	ISIN ETF	Sharpe ratio	Treynor index	Modigliani Index	Jensens Alpha	Information index	Sortino index	Tracking error
1	LU0908501058	4,573587602	0,052642885	0,000377927	0,001000651	0,057363266	5,626336005	0,002028108
2	LU0908501132	3,386122584	0,051955468	-0,000244444	0,000196061	0,000484222	3,874050284	0,002639256
3	LU1291101555	4,709155945	0,051758565	-0,001743515	0,000122169	0,014859775	5,884952333	0,003081511
4	LU1437025023	4,369920949	0,050322642	-0,008529187	-0,001257341	-0,001236052	5,38546169	0,006173615
5	LU1437025296	5,011515689	0,054395814	-0,002231931	0,002699422	0,011626748	6,480311909	0,004425248
6	LU1681042609	4,918398473	0,06333968	0,006163455	0,009567284	0,016625464	5,990937867	0,004878451
7	LU1753045332	4,523122825	0,065104184	0,006138927	0,010692518	0,021080314	5,552725245	0,005949801
8	LU1753045415	4,887322129	0,065715187	0,007880809	0,011126333	0,019140201	5,988885118	0,005242266
9	IE00B1XNHC34	3,159149257	0,057715041	-0,003230949	0,005364176	0,001510181	4,224483012	0,009151238
10	LU1861137484	4,728371317	0,064397674	0,007403873	0,010287497	0,032739199	5,821531251	0,005079855

Regarding the group of downgraded EFTs, the Sharpe ratio shows that instruments marked with higher Sharpe ratios, particularly number 5 and 8, have been shown to generate superior returns relative to the risk taken. At the same time, ETFs with slightly lower Sharpe ratios, such as number 9, also maintain solid performance relative to risk. Each ETF, with its own peculiarities in returns and volatility, has shown the ability to generate positive returns relative to the level of risk taken.

ETFs number 7, 8, and 10 show particularly high Treynor index values, suggesting robust and consistent performance against market risk.

The remaining ETFs show positive values, indicating a good relationship between return and risk. The difference between the values is relatively small, indicating an overall balance.

Among ETFs distinguished by positive Modigliani Indices, we find number 6, 7, and 8. While ETFs that exhibit negative Modigliani Indices, reflecting returns below the benchmark, we find number 2, 3, 4, 5 and 9.

Most ETFs show positive values for Jensen's Alpha, indicating an overall performance trend above expectations given systemic risk.

In contrast, ETF number 4 shows a slightly negative Jensen's Alpha, suggesting underperformance relative to expectations given its level of risk.

Some ETFs, such as numbers 6, 7, and 8, have significantly high information ratios. These funds appear to be particularly informative relative to their respective benchmarks, suggesting that their management is effective in generating excess or deficient returns based on market dynamics.

Other ETFs, such as numbers 1, 2, 3, and 9, show moderately positive information indices. These funds may have a good ability to follow the market, albeit to a less pronounced extent than the former, still indicating efficient management.

In contrast, ETF number 4 shows a negative information index. This suggests that this fund may have limited ability to provide information relative to its benchmark.

Overall, all ETFs listed have positive Sortino Indices, suggesting an overall ability to manage negative returns relative to the specified risk threshold.

The ETFs with higher Sortino Indices are number 5, 6 and 8. These funds demonstrated a superior ability to generate positive returns relative to risk below the specified threshold.

ETF number 2 has the lowest Sortino Index, indicating a relatively lower ability to generate positive returns relative to downside risk.

Most ETFs have a relatively small tracking error, indicating a similar performance to their respective benchmarks. ETFs number 1, 2, and 3 have very low tracking error values. These ETFs track their benchmark very closely. ETF number 9 has the highest tracking error value among the listed ETFs, suggesting a larger deviation from the benchmark.

3.2 Pre- and Post-downgrade Performance Indices Compared

The objective of this section is to analyze the period before (PRE) and after (POST) the downgrade of ETFs originally classified as compliant with Article 9 of the SFDR (Sustainable Finance Disclosure Regulation). It is important to note that due to time constraints, the POST downgrade period is necessarily shorter, given the timing of the event that occurred between late 2022 and early 2023. For the PRE downgrade period, a time frame of about 7 years was considered, ranging from 2016 to the specific date of the downgrade. Some ETFs, which are more recent, have a shorter observation period in accordance with their start date.

Below is the detailed analysis of the PRE and POST downgrade periods. In the PRE downgrade period, the specific dates shown in table below were considered, using first the upper and then the lower downgrade dates of each ETF as the time limit. The approach focuses on examining each ETF individually, allowing for an in-depth assessment of performance dynamics and possible influences related to the change in classification.

Downgrade date

Numero	ISIN ETF	Downgrade date
1	LU0908501058	01/01/2023
2	LU0908501132	01/01/2023
3	LU1291101555	01/03/2023
4	LU1437025023	01/12/2022
5	LU1437025296	01/12/2022
6	LU1681042609	01/01/2023
7	LU1753045332	01/03/2023
8	LU1753045415	01/02/2023
9	IE00B1XNHC34	01/12/2022
10	LU1861137484	01/12/2022

- LU0908501058

	PRE	POST
Average	0,000274674	0,000643044
Variance	0,000136014	7,2564E-05
Dev standard	0,011662484	0,008518448
Dev standard downside	0,009550603	0,006047459
Covariance	0,000134768	6,59695E-05
Correlation coefficient	0,986837134	0,945502398
Beta	0,982850972	0,983338271
Sharpe ratio	5,073287537	0,107040751
Treynor index	0,0601995	0,000927271
Modigliani index	0,000514639	0,00060796
Jensens Alpha	0,001134301	9,28787E-05
Information index	0,064179956	0,02844795
Sortino index	6,195120784	0,150777563
Tracking error	0,001896685	0,002777091

In the PRE downgrade period, the ETF demonstrated solid performance, with a remarkable average return and a positive and close correlation with the market, as evidenced by the high correlation coefficient and beta close to 1. These results suggest effective management, with a good risk/return ratio, as indicated by the significantly positive Sharpe ratio and Treynor Index.

However, in the POST downgrade period, significant changes emerge. Although the average return has increased, indicating an apparent improvement, multiple risk/return parameters have significantly decreased. The Sharpe ratio, Treynor Index, and Sortino Index show a significant reduction in efficiency in offsetting the risk taken, suggesting greater sensitivity to market changes. Analysis of the risk parameters shows a decrease in volatility but also a reduction in excess return relative to the baseline, as indicated by the significantly reduced Modigliani Index and Jensen's Alpha.

These results may indicate greater uncertainty and less effective management after the downgrade, with the ETF possibly having been significantly impacted by the change in classification. However, it is essential to consider the limited time period of the POST downgrade, which may not fully reflect the long-term impact of the status change.

- LU0908501132

	PRE	**POST**
Average	0,000284885	0,000572684
Variance	0,000271222	7,53112E-05
Dev standard	0,016468828	0,0086782
Dev standard downside	0,014430833	0,005949663
Covariance	0,000265212	6,87704E-05
Correlation coefficient	0,986108057	0,968172863
Beta	0,994446717	1,02651133
Sharpe ratio	3,593294331	0,096962556
Treynor index	0,059507812	0,000819728
Modigliani index	-0,000211331	0,000524862
Jensens Alpha	0,000333682	-3,74968E-05
Information index	0,001856674	-0,006778548
Sortino index	4,1007576	0,141429948
Tracking error	0,002737059	0,002182814

During the period prior to the downgrade, volatility, as expressed by the standard deviation, was high. Also notable is the positive risk-return ratio, evidenced by the Sharpe ratio and Sortino Index, both of which are above average. The strong correlation with the market, reflected by the correlation coefficient and beta almost equal to 1, suggests a close connection with market dynamics, indicating management that closely follows market fluctuations.

Since the downgrade, although the average return has increased, indicating potential improvement, several risk/return indicators have deteriorated. The decrease in the Sharpe ratio and Sortino Index suggest that despite the increasing return, the fund has not efficiently compensated for the sustained risk. The significantly increased beta may indicate greater sensitivity to market changes, requiring careful assessment of associated risks.

- LU1291101555

	PRE	POST
Average	0,000292684	2,42597E-05
Variance	0,000124203	9,16792E-05
Dev standard	0,011144652	0,009574926
Dev standard downside	0,009128854	0,005707305
Covariance	0,000114583	8,45402E-05
Correlation coefficient	0,960443163	0,95277059
Beta	0,999895159	0,984429212
Sharpe ratio	5,188711468	0,058551547
Treynor index	0,057832446	0,000569494
Modigliani index	-0,001988922	6,23033E-06
Jensens Alpha	4,55557E-05	0,000101841
Information index	0,012726617	0,032487657
Sortino index	6,334462195	0,098229688
Tracking error	0,003103519	0,002911397

The ETF in the PRE downgrade generated positive returns with a standard deviation in line with market conditions. The close correlation with the market is evidenced by a beta close to 1. The high Sharpe ratio and Sortino Index indicate an excellent risk/return ratio.

After the downgrade, the drastic reduction in the Sharpe ratio and Sortino Index should be noted.

- LU1437025023

	PRE	POST
Average	0,000107845	0,000215073
Variance	0,000149241	7,59938E-05
Dev standard	0,012216426	0,008717441
Dev standard downside	0,010037301	0,00576691
Covariance	0,0001083	3,85148E-05
Correlation coefficient	0,870459324	0,623240833
Beta	1,04413987	0,766411665
Sharpe ratio	4,901873796	-0,061504279
Treynor index	0,057351875	-0,000699572
Modigliani index	-0,00985306	0,000315231
Jensens Alpha	-0,002676294	-1,57542E-05
Information index	-0,005248898	0,020362831
Sortino index	5,966084069	-0,092971787
Tracking error	0,006030197	0,007015524

In this case, during the period prior to the downgrade, the ETF averaged a return of 0.000107845, with a considerable standard deviation but in line with market conditions. The strong correlation with the market, expressed

by a beta slightly above 1, suggests greater sensitivity to market changes. The high Sharpe ratio indicates a good risk-return ratio, underscoring management that has efficiently compensated for the risk incurred.

In the period following the downgrade, the average return increased to 0.000215073, but several risk/return indicators deteriorated significantly. The standard deviation remained significant but decreased, while the beta of less than 1 suggests a slightly less close correlation with the market. However, the negative Sharpe ratio and Treynor Index indicate a performance that did not efficiently compensate for the risk incurred. The negative Sortino Index confirms less effective management in managing downside risk.

- LU1437025296

	PRE	**POST**
Average	0,000178626	0,000200861
Variance	0,000112674	6,4583E-05
Dev standard	0,010614813	0,008036353
Dev standard downside	0,008330207	0,00509209
Covariance	0,000100119	3,68334E-05
Correlation coefficient	0,926128875	0,646546201
Beta	0,965272211	0,732952372
Sharpe ratio	5,648159778	-0,06848533
Treynor index	0,062111144	-0,0007509
Modigliani index	-0,002252611	0,000265743
Jensens Alpha	0,002119846	-5,2686E-05
Information index	0,009734779	0,020049309
Sortino index	7,197199111	-0,10808377
Tracking error	0,004019575	0,006416359

Again, the ETF showed moderate sensitivity to market changes, expressed by the beta of less than 1, during the PRE downgrade period under consideration. Note, however, positive Sharpe Index and Sortino Index.

In the POST downgrade period, the standard deviation remained significant but decreased, as did the beta. Sharpe Index and Sortino Index are found to be negaitve. While, Treynor Index and Modigliani Index negative indicate a return below the level of sustained risk.

- LU1681042609

	PRE	**POST**
Average	0,000235032	0,000584889
Variance	0,000118687	5,42053E-05
Dev standard	0,010894354	0,007362425
Dev standard downside	0,008991015	0,005238477
Covariance	0,000119262	6,12017E-05
Correlation coefficient	0,914993059	0,871808219
Beta	0,833173994	0,673163506
Sharpe ratio	5,427352021	0,11594904
Treynor index	0,070966564	0,001268141

Modigliani index	0,00604145	0,000836799
Jensens Alpha	0,009899075	0,000266832
Information index	0,008597964	-0,00379526
Sortino index	6,576287019	0,162960741
Tracking error	0,004895672	0,00476639

This ETF shows a beta of less than 1 in the period before the downgrade, suggesting a moderate correlation with the market. The high Sharpe ratio and positive Sortino Index indicate good risk-adjusted performance taken.

In the period following the downgrade, the average return increased and several risk/return indicators showed improvement. The standard deviation has decreased, suggesting less volatility in the fund. Beta below 1 still indicates moderate correlation with the market, suggesting potential reduced sensitivity to market changes. The positive Sharpe ratio and Sortino Index confirm that the fund continues to efficiently offset risk, with the Sortino Index emphasizing particularly effective management in mitigating downside risk.

- LU1753045332

	PRE	**POST**
Average	0,000408051	0,00018216
Variance	0,000146787	5,93159E-05
Dev standard	0,012115561	0,007701679
Dev standard downside	0,01000555	3,18347E-05
Covariance	0,000144319	5,79755E-05
Correlation coefficient	0,893144966	0,796975302
Beta	0,811349729	0,64985426
Sharpe ratio	4,782423953	0,093294859
Treynor index	0,071414025	0,001105674
Modigliani index	0,006249378	0,000344828
Jensens Alpha	0,011084479	0,00014188
Information index	0,031573112	-0,02957769
Sortino index	5,790960746	22,57059526
Tracking error	0,006002015	0,005707708

In the period prior to the downgrade, the ETF presented a positive Treynor Index, indicating that portfolio management generated returns in excess of the risk-free return in proportion to the systematic risk taken. The positive Modigliani Index showed an improvement in portfolio allocation compared to a risk-free portfolio. Positive Jensen's Alpha suggests that the fund generated returns above expectations considering systematic risk. The Tracking Error of 0.005229748 indicates good accuracy in replicating the benchmark return.

In the period following the downgrade, the Treynor Index fell to -4.86468E-05, indicating that portfolio management generated returns below the risk-free return in proportion to the systematic risk taken. The positive Modigliani Index still indicated some improvement in portfolio allocation relative to a risk-free portfolio, but to a lesser extent than before the downgrade.

- IE00B1XNHC34

	PRE	POST
Average	0,000571219	-0,00121515
Variance	0,00027855	0,000201854
Dev standard	0,016689813	0,014207517
Dev standard downside	0,012663213	0,009199009
Covariance	0,000217997	0,000147281
Correlation coefficient	0,836557706	0,81855972
Beta	0,894218132	0,918315154
Sharpe ratio	3,615783762	-0,13840433
Treynor index	0,067485495	-0,00214129
Modigliani index	-0,003320024	-0,00100154
Jensens Alpha	0,006381847	-5,6946E-05
Information index	-0,000210011	0,01372408
Sortino index	4,765516811	-0,2137602
Tracking error	0,009291962	0,008226404

In the post-downgrade period, the ETF showed a number of negative indicators, signaling an overall less favorable performance than in the pre-downgrade period. Specifically: average returns were negative in the post-downgrade period. This suggests that, on average, the fund generated lower returns than in the pre-downgrade period. The negative Sharpe ratio and Sortino index in the post-downgrade period indicate that the fund had difficulty generating returns above the level of risk taken, reflecting a less efficient performance compared to the previous period.

The negative Treynor Index suggests that, considering market risk, the fund generated lower returns than in the previous period. Similarly, the Modigliani Index, which measures the portfolio's value added relative to a risk-free portfolio, was negative in the post-downgrade period. This indicates a decline in the efficiency of the portfolio's allocation compared to the previous period; likewise, Jensen's Alpha, which assesses the manager's ability to generate returns above expectations given systematic risk, was also negative.

In addition, it is interesting to note that the Information Index, which measures the fund's accuracy in replicating the benchmark, went from negative in the pre-downgrade period to positive in the post-downgrade period. This may indicate that despite the less favorable overall performance, the fund improved its accuracy in tracking the benchmark during the post-downgrade period.

- LU1861137484

	PRE	POST
Average	0,000329113	0,000411662
Variance	0,0001357	5,96871E-05
Dev standard	0,011649052	0,007725741
Dev standard downside	0,009581656	0,005338611
Covariance	0,000140451	6,34745E-05
Correlation coefficient	0,923096431	0,844699941
Beta	0,823287167	0,670943331
Sharpe ratio	5,159617072	-0,043953173
Treynor index	0,07300569	-0,00050611
Modigliani index	0,007615757	0,000323722

Jensens Alpha	0,010823143	-0,000202099
Information index	0,048658276	-0,025755728
Sortino index	6,272887103	-0,063606589
Tracking error	0,00503949	0,005229047

In the post-downgrade period, the ETF under review shows lower values than in the pre-downgrade period for several indicators, such as the Sharpe ratio, Treynor Index, Sortino Index, Information Ratio, and Jensen's Alpha. In particular, the Sharpe ratio and Treynor Index, which measure total and systemic risk-adjusted return, respectively, show a less favorable performance in the post-downgrade period.

On the other hand, average returns are found to be higher in the post-downgrade period, suggesting that despite the decline in some performance indicators, the fund generated, on average, higher returns in the post-downgrade period. In addition, the Tracking Error, which represents the deviation of the ETF's return from its benchmark, was higher in the post-downgrade period, indicating an increase in the variability of performance compared to the pre-downgrade period.

4. Discussion

This paper focuses on the analysis of two groups of ETFs that have been selected based on their classifications under Article 8 and Article 9 of the SFDR.

The first group includes ETFs that fall under the Article 8 classification, while the second group consists of ETFs that, following a review of the sustainability criteria adopted by the managers of the ETFs themselves or by regulators, have been downgraded from Article 9 to Article 8 of the SFDR.

The main objective of this paper was to compare these two groups of ETFs in order to identify any differences in financial performance and understand the impact of the sustainability factor on them. This comparison allowed us to assess whether the funds classified as more sustainable under the SFDR regulations showed significant differences in performance compared to those under Article 8.

Second, the analysis focused on the impact of the downgrade on the performance of the ETFs concerned. This in-depth study allowed us to assess whether the change in classification had significantly affected the performance of the ETFs themselves and whether this impact was immediate or gradual over time.

Regarding the first objective, the analysis conducted revealed an interesting picture of the performance and risks associated with the two groups of ETFs.

In the first group, composed of ETFs complying with SFDR Article 8, the standard deviation and variance showed significant dispersion in returns around the mean, suggesting some variability in performance. However, beta, which measures relative volatility relative to the market, is representative of moderate overall volatility.

On the other hand, in the second group of downgraded ETFs, we noticed a slightly higher average performance than in the first group. However, this higher performance is accompanied by higher volatility and risk, as indicated by higher standard deviation and beta. This could be attributed to the reduced compliance with ESG criteria that led to the downgrading of ETFs. In addition, the distribution of returns, as evidenced by variance, is more compact than in the first group, suggesting greater uniformity in performance.

Looking at the additional performance measures, in terms of return versus risk, both groups showed similar values for the Treynor Index and the Modigliani Index, although they appear to be slightly higher for the first group. However, analysis of Jensen's Alpha and the Information Index showed that ETFs in the first group were able to generate returns in excess of expectations and had more accurate return forecasts than the second group.

Overall, therefore, it appeared that, the group related to Article 8-compliant ETFs seemed to be more suitable for investors seeking potentially higher returns, as they showed slightly higher performance indices. However, this advantage is accompanied by greater variability of returns, as evidenced by higher variance.

On the other hand, the group of downgraded ETFs, although showing some stability in returns, as indicated by lower tracking error, seems to be more suitable for investors who are risk averse, as it is characterized by higher uncertainty and risk, attributable to their high volatility.

Therefore, investors should carefully weigh the search for returns with risk management, always keeping ESG implications in mind.

As part of the analysis conducted on the second objective of this research, concerning the impact of downgrading on the performance of the ETFs considered, a number of significant findings emerged. In particular, significant deviations between the performance of ETFs and their respective benchmarks emerged, especially during key periods. For example, it was observed how events of global significance, such as the 2020 pandemic, markedly affected the dynamics of these financial instruments.The fluctuations observed during the pandemic period underscore the crucial role of global events in directing the behavior of financial markets, requiring a careful assessment of the impacts on a global scale.

Additionally, it is noteworthy that each ETF manifested significant deviations from its benchmark even close to the downgrade date. This confirms that the downgrade process has had a tangible imprint on the performance of these financial instruments, but it is clear that the full effect of this transition will take time to unfold. Long-term assessment of the effect of the downgrade will require continuous monitoring over the years to fully understand its impact on financial markets and sustainable investments.

The results obtained, therefore, unequivocally confirm that the downgrading process has significantly affected the performance of the ETFs analyzed, paving the way for further investigation to understand the underlying dynamics and to develop strategies to mitigate the risks arising from these changes.

In conclusion, this work has provided an initial and detailed overview of a topic of great relevance in the contemporary financial (and sustainable) environment. However, it should be emphasized that the selection of ETFs was constrained by temporal and historical criteria, limiting the ability to include all available funds; in fact, many newly issued ETFs, because, precisely, they were too recent, were excluded from the analysis, consequently reducing the diversity and representativeness of the universe examined. This restriction has affected the ability to provide a comprehensive overview of sustainability-related market dynamics.

Further analytical tools, more in-depth perspectives, and, most importantly, an adequate timeframe are needed to fully assess the impacts of global events and ongoing regulatory changes on ETF dynamics.

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