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The performance of US mutual funds oriented towards the Sustainable Development Goals (SDGs)

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Towards the Sustainable Development Goals (SDGs)
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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

The performance of SDG mutual funds in the US

ABSTRACT

The aim of this dissertation is to evaluate the financial impact of investing in mutual funds that incorporate Sustainable Development Goals (SDG). For this purpose, funds in compliance with the SDGs were retrieved from the Refinitiv Eikon's platform. Additionally, they were grouped according to their geographical focus: global and domestic funds. Equally and value-weighted portfolios were constructed for both mutual fund categories. The portfolio of SDG-themed funds that invest domestically is composed of 8 funds and the portfolio of SDG-themed mutual funds investing globally is composed of 13 funds, making a total of 21 funds. Fund performance was evaluated on the basis of the Carhart (1997) and Fama and French (2015) unconditional measures and also the corresponding conditional model of Ferson and Schadt (1996).

The results reveal that the alphas generated by these SDG funds are statistically insignificant. This insignificance in alpha indicates that SDG mutual funds neither significantly outperform nor underperform their conventional counterparts on a risk-adjusted basis. When applying the conditional models, results are similar meaning that the state of the economy has no impact on the performance of the mutual funds.

Keywords: US Mutual funds, Performance evaluation, Socially Responible Investments, Sustainable Development Goals

Desempenho de fundos de investimento ODS nos EUA.

RESUMO

O objetivo desta dissertação é avaliar o impacto financeiro do investimento em fundos de investimento que incorporam Objetivos de Desenvolvimento Sustentável (ODS). Para o efeito, foram recolhidos fundos que têm ODS na plataforma Refinitiv Eikon. Além disso, os fundos foram agrupados de acordo com o seu enfoque geográfico: fundos globais e domésticos. Foram construídas carteiras igualmente ponderadas e ponderadas por valor para ambas as categorias de fundos. A carteira de fundos com a temática dos ODS que investem a nível nacional é composta por 8 fundos e a carteira de fundos com a temática dos ODS que investem a nível global é composta por 13 fundos, perfazendo um total de 21 fundos. O desempenho dos fundos foi avaliado com base nas medidas não condicionais de Carhart (1997) e Fama e French (2015) e também no modelo condicional de Ferson e Schadt (1996).

Os resultados revelam que os alfas gerados por estes fundos SDG não são estatisticamente significativos. Estes resultados indicam que os fundos de investimento com ODS não têm um desempenho significativamente superior nem inferior ao dos seus congéneres convencionais numa base ajustada ao risco. Quando se aplicam os modelos condicionais, os resultados são semelhantes, o que significa que o estado da economia não tem impacto no desempenho dos fundos de investimento.

Palavras-Chave: Fundos de investimento americanos, Avaliação do desempenho, Investimentos Socialmente Responsáveis, Objetivos de Desenvolvimento Sustentáveis.

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1.Introduction

Investing in sustainable funds has become increasingly popular recently as more people and organizations look to combine their financial aspirations with their social and environmental convictions. Sustainable funds are financial instruments that concentrate their attention on businesses and initiatives that exhibit superior social, environmental and governance standards.

The Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity (United Nations, 2015). Green finance instruments (such as green funds) have the potential to contribute to the SDGs, namely SDG 13 (Climate action) by directing the flow of capital for the execution and fulfillment of corporate environmental commitments. But there are mutual funds that aim to contribute to other SDGs, such as healthcare mutual funds, that align with SDG 3 (Good health and well-being) which aims to ensure healthy lives and promote well-being for all at all ages by facilitating enhanced funding for health services. Additionally, there are mutual funds aligned with gender-equality goals, thereby contributing to SDG 5. Other mutual funds are oriented towards water-focused investments to support the achievement of SDG 6, which seeks to ensure the availability and sustainable management of water and sanitation for all, by channeling financial resources into projects that improve water infrastructure and promote efficient water use.

The growth of sustainable funds has motivated an ongoing debate and divergent viewpoints on the effects of investing with sustainability criteria. In a model of equilibrium with sustainability conscious investors, Pástor et al. (2021) expect that sustainable investments lead to lower returns not only because there is no mispricing but also because of risk-reduction properties of sustainable assets (Edmans, 2023). However, sustainable investments can lead to abnormal returns if environmental, social and governance factors are not well recognized by the

market (Edmans, 2011, 2023) or in times when there is unexpected shift towards sustainability (Pástor et al., 2021). Empirically, there are several studies on the performance of green funds (e.g., Climent & Soriano, 2011; Chang et al., 2012). But there are just a few studies on funds that are oriented towards SDGs. For instance, Kaushik et al. (2014) and Martí-Ballester (2020) evaluate the performance of funds focused on the biotechnology and healthcare sectors; Ibikunle and Martí-Ballester (2020) evaluate water-related mutual funds; Marti-Ballester (2019a, 2019b) focus on renewable energy funds; Capelle-Blancard et al. (2022) address funds with a gender-lens orientation; and Martí-Ballester (2021) evaluates SDG funds in China.

This dissertation focuses on the performance of funds that aim to contribute to the SDGs -so called SDG mutual funds - in the US, considering funds that invest domestically and globally. Thus, a study on the performance of SDG funds in the US would add to the literature and improve knowledge of the performance of SDG funds. This proposal aims to address the financial performance of SDG funds in the USA, with the research question being "Do SDG mutual funds outperform or underperform the market?". Besides academics and investors, this topic is relevant to regulators and policymakers, considering the role of SDG funds in contributing to the sustainable transition.

2.Literature Review

There are several arguments on the performance of sustainable funds. Pástor et al. (2021) argue that due to investors' preferences for sustainability and their risk hedging benefits, sustainable portfolios will underperform in equilibrium. However, their model also predicts that in times when there is an unexpected increase in investors' preferences for sustainability, green/sustainable assets can deliver

abnormal performance. In the case of SDG funds, an additional argument that also contributes to the discussion of its performance is related to diversification. Some SDG funds are thematic, focusing on specific sectors (e.g., water, health, renewable energy, etc.) Thus, the issue of diversification is a relevant one. Although modern portfolio theory posits that optimal portfolios are well-diversified, several studies, such as Kacperzyck et al., (2005) and Fulkerson and Riley (2019), find evidence that mutual funds concentrated in specific industries can general abnormal returns.

As to the environmental dimension of the SDG, there are several empirical studies that compare the performance of green funds with conventional funds. Ibikunle and Steffen (2017) show that green mutual funds significantly underperform relative to conventional funds over the sample period (1991-2014). However, analyzing more recent data suggests that green funds start to perform much better than their black peers, particularly throughout the 2012–2014 investing window.

Regarding market conditions, according to Silva and Cortez (2016), green funds typically underperform the benchmark and when compared to times when there are no crises, green funds perform better. So, market conditions are a factor that can affect the performance of green funds. Similarly, Muñoz et al. (2014) also reach a similar conclusion, regarding the green funds against the conventional peers.

Regarding their investment strategies, socially responsible funds that are passively managed have the potential to broaden the range of financial instruments that could aid in the transition to sustainability (Chen & Scholtens, 2018). The investment strategy adopted by a manager of a green mutual fund can have an impact on the performance of the fund. However, Muñoz et al. (2014) suggest that socially responsible funds do not take advantage of their narrower investment universe to implement active investment strategies.

According to Gonçalves et al. (2021), in times of crisis green mutual funds offer investors higher risk-adjusted returns. In times of calmer times, the results are less

clear. Adamo et al. (2012) state that White (1995) contrasts environmental funds in the US and Germany with both SRI and conventional investments. He discovers that US investors in environmental mutual funds experienced lower risk-adjusted returns than both the US market (as represented by the S&P500) and a comparable index of US socially responsible businesses. According to these authors, investing in green funds is not worth the risk. On the other hand, Climent and Soriano (2011) state for the latest years of their sample period, green funds achieve adjusted returns closer to the rest of SRI or conventional mutual funds, showing that as managers and investors gain more experience investing in green funds, they may find returns approaching those obtained on conventional funds.

Among the various strategies used to screen and manage the stocks in mutual fund portfolios, the sustainability-themed strategy has demonstrated a very relevant growth (Ielasi & Rossolini, 2019).

Aligned with the SDG-themed mutual funds, Martí-Ballester (2020) finds that mutual funds engaged in the biotechnology and healthcare sectors (SDG 3) can outperform conventional mutual funds due to better management when compared with their conventional peers. Similarly, Kaushik et. al (2014) suggest that healthcare funds outperform passive market indexes.

According to Capelle-Blancard et al. (2022), regarding SDG 5 (gender equality), gender-equality funds underperform the benchmark, while gender equality indices have results that are in line with their benchmark. Similarly, Martí-Ballester (2022) state that adopting gender equality criteria has a negative impact on the financial performance of conventional and ethical funds that are both diversified throughout different economic sectors, indicating that US companies operating in SDG-related sectors are effectively implementing gender equality practices, but without having an impact on the funds' financial performance.

Regarding the potential of water-focused investments to support the achievement of SDG Goal 6, Ibikunle and Martí-Ballester (2020) investigate if market

mechanisms could help in funding sustainable water projects and found out that water mutual funds show similar performance when compared to conventional mutual funds. Furthermore, when the economy is doing well, water mutual funds offer superior risk-adjusted returns over their peers. However, when the economy is falling, the outperformance effects disappear.

Regarding mutual funds in the renewable energy sector, Marti-Ballester (2019a, 2019b) shows that fund performance is sensitive to the performance evaluation used and the benchmark used.

Finally, regarding the Chinese market, Martí-Ballester (2021) pointed out that in the medium-term, SDG-themed mutual funds have the potential to perform similarly to a diversified Chinese market index, while in the long-term it's expected to outperform the same market index. The authors also compared the performance of various categories of SDG-themed mutual funds and found that healthcare fund category significantly outperforms the energy, technology, and ethical fund categories while the energy fund category significantly underperforms the biotechnology, agribusiness, technology, and ethical fund categories. Furthermore, all the others mutual fund categories show close financial performances.

3.Methodology

In this study, mutual fund financial performance is evaluated based on Carhart's (1997) and Fama and French's (1993) models.

Risk and return characteristics of SDG-themed mutual funds are examined and compared to a reference benchmark in order to find out whether investors pay a premium for environmentally friendly strategies.

Equally and value-weighted portfolios were constructed for both mutual fund categories: those investing domestically and those investing globally. Two versions of the performance evaluation models are used: unconditional models and their conditional equivalents. Furthermore, mutual fund performance will be examined both at an aggregate level and on an individual basis.

3.1 Unconditional Models of Performance Evaluation

This dissertation makes use of multi-factor models such as the Carhart (1997) four-factor and the Fama and French (2015) five-factor models. The extra variables in the four- and five-factor models take into account important factors including firm size, book-to-market ratio, profitability, and investment, all of which have a tendency to influence portfolio returns. These models will offer a more thorough assessment of the mutual fund performance.

The single-factor CAPM-based model, which was later expanded to a multifactor model in response to criticism pointing out that one factor would not be adequate to proxy risk-adjusted anticipated returns, served as the impetus for the creation of multi-component models (Gonçalves et al., 2021), and is based on the following expression:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_p\left(r_{m,t} - r_{f,t}\right) + \varepsilon_{p,t} \qquad [1]$$

where $r_{p,t}$ is the return of portfolio p at time t; $r_{f,t}$ is risk-free rate at time t; $r_{m,t}$ is return of the market at time t; $r_{p,t} - r_{f,t}$ corresponds to the excess return of the portfolio; $r_{m,t} - r_{f,t}$ corresponds to the excess return of the market portfolio; α_p is

alpha/abnormal return; β_p is the systematic risk (Beta) of portfolio p; and $\varepsilon_{p,t}$ is the random error, which has an expected value of zero.

Despite being widely utilized to evaluate the financial performance of mutual funds, the single-factor CAPM model ignores the risk related to the investment styles of the funds, which could impact the single factor CAPM model magnitude when the investment styles vary among mutual fund categories (Martí-Ballester, 2015). Fama and French (1993) expanded the CAPM model by adding the size factor, which captures the small-size risk exposure, and the book-to-market element, which captures the bankruptcy risk, in order to reduce this omitted factor bias in the financial performance evaluation (Martí-Ballester, 2021). The model is estimated using the following equation:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_{1p}(r_{m,t} - r_{f,t}) + \beta_{2p}SMB_t + \beta_{3p}HML_t + \varepsilon_{p,t} \qquad [2]$$

where SMB_t (Small minus Big) is the difference in returns between a portfolio of small stocks and a portfolio of large stocks at time t (firm size factor); HML_t (High minus Low) represents the difference in returns between a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks at time t (value factor); $\varepsilon p,t$ represents the residual return on portfolio p at time t. β_1, β_2 and β_3 are factor coefficients.

Later, Carhart (1997), based on Jegadeesh and Titman (1993), add the momentum to the Fama-French framework. This factor aims to capture the tendency of stocks that have performed well in the past to continue to do so in the future. As a result, the stocks that have historically underperformed would do so again. The Carhart (1997) four-factor model is expressed as follows (Eq.3):

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_{1p}(r_{m,t} - r_{f,t}) + \beta_{2p}SMB_t + \beta_{3p}HML_t + \beta_{4p}MOM_t + \varepsilon_{p,t} \qquad [3]$$

where the *MOM* factor helps to explain stock returns by considering the recent past performance of stocks, positive or negative.Finally, an expanded version of the three-factor is used: the Fama-French (2015) five-factor model (Eq.4), which contains the two extra factors of profitability and investment. It is estimated using the following equation:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_1(r_{m,t} - r_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_{p,t} \quad [4]$$

where RMW_t (Robust Minus Weak) represents the profitability factor - i.e., is the difference between the returns on diversified portfolios of stocks with robust (high and steady) and weak (low) profitability, CMA_t (Conservative Minus Aggressive) represents the investment factor, i.e. is the difference between the returns on diversified portfolios of the stocks of low and high investment firms, which we call conservative and aggressive.

3.2 Conditional Models of Performance Evaluation

The multi-factor models of Carhart (1997) and Fama and French (2015) are unconditional models, since they assume that expected returns and risk are invariant over time, regardless of market conditions.

Conditional models of performance evaluation are considered more robust than unconditional models since they take economic variables into account, allowing for risk and returns to change over time. The conditional model of Ferson and Schadt (1996) assumes that market risk (beta) changes over time according to a set of predetermined public information variables (Silva & Cortez, 2016).

So, Ferson and Schadt (1996) developed a conditional model to assess mutual fund performance by accounting for varying market conditions and factors, recognizing that a comprehensive evaluation requires considering the impact of changing environments on fund returns. The conditional model of Ferson and Schadt (1996) can be expressed through the following formula:

$$R_{p,t} = a_p + \beta_{0p} R_{m,t} + \beta'_p \left(z_{t-1} R_{m,t}\right) + \varepsilon_{p,t} \qquad [5]$$

Where $R_{p,t}$ represents the excess return of fund p over period t, $R_{m,t}$ represents the excess return of the market over period t, a_p is an average alpha, β_{0p} is an average beta, which represents the (unconditional) mean of the conditional betas, β'_p is the vector that measures the response of the conditional beta of portfolio p to the public information variables (PIV), and z_{t-1} corresponds to a vector of deviations of the PIV (Z_{t-1}) (from the (unconditional) average values.

In this study, the short term-rate (STR) and dividend yield (DY) will be used as PIVs, as in Cortez and Leite (2009) and Bessler et al. (2007). So, the Ferson and Schadt (1996) conditional model will be used in a multifactor context, with four and five risk factors. With the two chosen PIV, the corresponding conditional four-factor [6] and conditional five-factor [7] models are:

$$\begin{aligned} R_{p,t} = \alpha_p &+ \beta_{0p} R_{m,t} + \beta_{1p} R_{m,t} STR_{t-1} + \beta_{2p} R_{m,t} DY_{t-1} + \beta_{3p} SMB_t + \beta_{4p} SMB_t STR_{t-1} \\ &+ \beta_{5p} SMB_t DY_{t-1} + \beta_{6p} HML_t + \beta_{7p} HML_t STR_{t-1} + \beta_{8p} HML_t DY_{t-1} \\ &+ \beta_{9p} MOM_t + \beta_{10p} MOM_t STR_{t-1} + \beta_{11p} MOM_t DY_{t-1} + \varepsilon_{p,t} \end{aligned}$$

[6]

$$R_{p,t} = \alpha_p + \beta_{0p} R_{m,t} + \beta_{1p} R_{m,t} STR_{t-1} + \beta_{2p} R_{m,t} DY_{t-1} + \beta_{3p} SMB_t + \beta_{4p} SMB_t STR_{t-1} + \beta_{5p} SMB_t DY_{t-1} + \beta_{6p} HML_t + \beta_{7p} HML_t STR_{t-1} + \beta_{8p} HML_t DY_{t-1} + \beta_{9p} RMW_t + \beta_{10p} RMW_t STR_{t-1} + \beta_{11p} RMW_t DY_{t-1} + \beta_{12p} CMA_t + \beta_{13p} CMA_t STR_{t-1} + \beta_{14p} CMA_t DY_{t-1} + \varepsilon_{p,t}$$

[7]

4.Data

4.1 Mutual fund data

This chapter provides a detailed explanation of both the data selection procedure and portfolio creation. Selecting the SDG funds is one of the most important and challenging steps of this study. The funds were identified through Refinitiv Eikon's platform, which flags funds with SDG goals. On this platform, multiple screens were used to filter the funds. As in Climent and Soriano (2011), only equity funds were included in the sample. Index funds, ETF's and bond funds were excluded. Then,

the responsible investment filter was used to select only impact investing funds that are SDG-themed. In this dataset, both active and inactive dead funds were included. Only the primary share class of each fund was considered. In addition, the dataset only contains funds that have at least 24 monthly observations, as in Silva and Cortez (2016). The fund total return series are obtained in US dollars using Refinitiv Eikon, and monthly discrete returns are then calculated. The final dataset is composed of 21 SDG mutual funds: 13 of are global funds and 8 are domestic funds. The time period of analysis spans from October 31, 2017, to October 31, 2023.

To assess the performance of SDG funds, four portfolios were constructed: two equally weighted portfolios (one containing domestic funds and the other containing global funds) and two value weighted portfolios (one for domestic funds and one for global funds).To compute the value weighted portfolios, the monthly total net assets (TNA) of funds, in US dollars, were also retrieved from Eikon's datastream for the same time period. In addition to analyzing fund performance overall, this study, as in Silva and Cortez (2016), examines fund performance on an individual basis because it is possible for results based on equally weighted portfolios to hide some notable individual performance differences.

Multiple regression analysis, based on the Ordinary Least Squares (OLS) method, was performed to estimate the values of α and β for the 21 mutual funds using the single and multifactor models. The Adjusted R-squared and p-values obtained from the regression analysis were used as part of this comparative analysis.

4.2 Risk Factors and Public Information Variables (PIV)

This study seeks to evaluate the financial performance of the SDG fund's portfolio. Data related to the multi-factor models employed in this study were obtained from

Professor Kenneth R. French's website (domestic and global)[1]; the data collected included the size premium (SMB), value premium (HML), excess return on the market ($Mkt - RF$), the momentum factor (MOM), the difference between the returns on diversified portfolios of stocks with robust and weak profitability (RMW) and the difference between the returns on diversified portfolios of stocks of high and low investment firms (CMA). The 1-month Treasury Bill from the website of Professor Kenneth R. French will be used as a proxy of risk-free rate. Given the different geographical focus of the mutual funds, it was necessary to gather risk variables according to the respective geographic regions.

To implement the conditional models, it is necessary to include public information variables in the analysis. So, as mentioned before, the dividend yield (DY) and short-term rate (STR) will be used. The short-term rate corresponds to the yield on a constant-maturity 3- month US Treasury Bill, while the dividend yield is based on the S&P 500 monthly dividend yield. A potential problem that might appear is the bias resulting from the spurious regressions, as these public variables tend to be persistent. For that reason, the procedure of Ferson et al. (2003) is used to manipulate these variables by 12- moving average. To mitigate possible scale effects on the results, these series have been used in their corresponding mean zero values (Bernhardt & Jung, 1979).

4.3 Value and equally weighted portfolio descriptive statistics

Table 1 reports the descriptive statistics for the equally and value weighted portfolios, investing globally and domestically. The descriptive statistics in this

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

table include the number of observations, average returns (%), standard deviation (%), minimum, maximum, skewness and kurtosis.

Over the period under analysis all fund portfolios present positive excess returns, even though the equally weighted global portfolio presented lower returns. Regarding the standard deviation that is associated to the average return of each portfolio, the values are quite similar among them. It measures the volatility/risk of each portfolio's returns. For example, the value weighted domestic portfolio has the highest value, meaning that has a higher risk and volatility associated to returns than the rest of the portfolios.

The minimum value across the portfolios is -0.20648 and belongs to the value weighted domestic portfolio, while the maximum value is 0.15027 and belongs to the value weighted global portfolio. Concerning the symmetry of the distribution, all portfolios have a negative skewness, indicating that the left tail of the distribution is larger than the right tail meaning that the returns are skewed to the left with most of the returns concentrated on right side of the distribution. Finally, all portfolios exhibit positive kurtosis. A positive kurtosis indicates that the distribution has heavier tails than the normal distribution, meaning there are more extreme values in the dataset. This implies that there may be more usual occurrences of large profits or losses in the portfolio. Important elements of portfolio descriptive statistics to consider when assessing mutual fund performance are skewness and kurtosis since they provide valuable insights into the risk, diversification, performance, tail risk management, helping investors in making wise financial choices (Harvey et al., 2010).

Table 1- Descriptive statistics of the portfolios

		Number of Observations	*Average returns (%)*	*Standard Deviation (%)*	*Minimum*	*Maximum*	*Skewness*	*Kurtosis*
Eq. Weighted	**Domestic**	72	0.71544	5.70152	-0.19359	0.15023	-0.43352	1.07847
	Global	72	0.34801	5.61394	-0.19210	0.13361	-0.33694	0.96873
Value Weighted	**Domestic**	72	0.69218	6.03456	-0.20648	0.14741	-0.45970	0.95782
	Global	72	0.63287	5.53553	-0.18481	0.15027	-0.37698	1.06134

This table shows the descriptive statistics for the monthly returns, of the value and equally weighted portfolios of funds that invest globally and domestically. The number of observations, average returns, standard deviation, minimum, maximum, skewness, and kurtosis that are presented, correspond to the timespan between October 2017 and October 2023

5. Empirical Results

In this chapter, the results obtained through the application of each performance evaluation model to portfolios as well as to individual funds. The analysis starts with the results of the unconditional multi-factor models (Carhart, 1997; Fama & French, 2015) and then those of the conditional approach, as in Ferson and Schadt (1996), applied to each model. By analyzing the risk-adjusted returns generated by these models, our results shed light on how multifactor models represent the complexities of asset pricing and portfolio management in different market conditions.

5.1Unconditional Models

First, fund performance is evaluated by using unconditional models. The Carhart (1997) four-factor model and the Fama and French (2015) five-factor model were applied to evaluate fund performance.

5.1.1 Unconditional Carhart (1997) four-factor model

Table 2 shows the Carhart (1997) four-factor model results for funds investing domestically during the analysis period, from October 2017 to October 2023.

Table 2 - Empirical results of the unconditional four-factor model - Domestic funds

Portfolios	α_p	$\boldsymbol{\beta Rm}$	$\boldsymbol{\beta SMB}$	$\boldsymbol{\beta HML}$	$\boldsymbol{\beta MOM}$	Adj. R^2 (%)
Eq.Weighted	-0.00172	0.9914***	0.2718***	-0.112381**	0.0633	90.35%
Val Weighted	-0.00212	1.0223***	0.3525***	-0.133881**	0.0922	87.04%
N+	3[0]	8[8]	6[5]	1[0]	6[0]	-
N-	5[0]	0[0]	2[0]	7[4]	2[0]	-

This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (αp), systematic risk (β), factor loadings associated to size (SMB), book-to-market (HML) and momentum (MOM) factors and the adjusted coefficient of determination (Adj. R^2). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.

Table 2 shows that the estimates of alpha are not statistically significant implying that the null hypothesis of alpha being equal to zero cannot be rejected. Individually, funds also exhibit non-statistically significant alphas.

Regarding market risk, both portfolios exhibit statistically significant and positive market betas at the 1% level, meaning that they are positively exposed to the market. Concerning the size factor (SMB), both portfolios exhibit positive and statistically significant betas, meaning that the funds were mainly exposed to small cap stocks. The analysis at the individual level corroborates the aggregate portfolio results.

The book-to-market risk factor (HML) displays negative and statistically significant values for both portfolios, suggesting that the funds have a higher exposure to growth stocks. Individually, the results show the same trend (negative and statistically significant values)

Looking at the momentum factor (MOM), both portfolios exhibit non statistically significant values indicating that the funds are not exposed to the past performance of companies. At the individual level, the results are consistent.

The explanatory power of this model *(Adj. R^2)* is above 85% for both portfolios. The portfolio that shows the highest coefficient is the equally weighted portfolio (90.35%) when compared with the value weighted portfolio (87.04%). As example, for the equally weighted portfolio the independent variables are able to explain 90.35% of the variation in portfolio returns.

Table 3 shows the estimates of the Carhart (1997) four factor model regressions for funds and portfolios that invest globally. The alpha estimates are insignificant, as in the domestic analysis, implying that the performance is neutral. Individually, the funds also exhibit insignificant alphas.

In relation to market risk, once more, both portfolios exhibit statistically significant and positive market betas at the 1% level, meaning that they are positively exposed to the market. However, the value-weighted portfolio presents a higher beta than

the equally-weighted portfolio, meaning that it has a higher systematic risk exposure. Regarding the size factor, only the equally-weighted portfolio shows a positive and statistically significant coefficient meaning that the portfolio was mainly exposed to smaller firms. Individually, the results vary since only half of the funds present positive and statistically significant values.

Regarding HML, both portfolios display negative and statistically significant coefficients, as in the case of domestic analysis, suggesting that the funds have a higher exposure to growth stocks. Individually, only one fund presents a positive and statistically significant coefficient, suggesting that it has a higher exposure to value stocks. Yet, most funds present similar results to the portfolio (negative and statistically significant coefficients).

With respect to the momentum risk factor (MOM), both portfolios exhibit non statistically significant values indicating that the funds are not exposed to the past performance of companies, as in the case of domestic funds.

With respect to the explanatory power of the models, both portfolios show similar values, meaning that, in general, the models are able explain most of the variations observed in the returns of the portfolios.

Table 3- Empirical results of the unconditional four-factor model - Global funds

Portfolios	α_p	βRm	βSMB	βHML	βMOM	Adj. R^2 (%)
Eq.Weighted	-0.01840	1.0215***	0.3769***	-0.154737**	0.0363	89,60%
Val. Weighted	0.00012	1.0127***	0.2214	-0.251080**	0.0671	88,32%
N+	3[0]	13[13]	12[7]	3[1]	10[0]	-
N-	10[0]	0[0]	1[0]	10[7]	3[0]	-

This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (αp), systematic risk (βp), factor loadings associated to size (SMB), book-to-market (HML) and momentum (MOM) factors and the adjusted coefficient of determination (Adj. R^2). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.

5.1.2 Unconditional Fama and French (2015) five-factor model

The Fama and French (2015) model adds the profitability (RMW) and the investment (CMA) factors to the previous model, eliminating the momentum factor (MOM). The results of this model for the different portfolios and individual funds over the period from October 2017 to October 2023 are presented in the following tables.

Table 4- Empirical results of the unconditional five-factor model - Domestic funds

Portfolios	α_p	βRm	βSMB	βHML	βRMW	βCMA	Adj. R^2 (%)
Eq.Weighted	-0.00063	0.9688***	0.1691*	-0.0368	-0.1010	-0.1835*	90.54%
Val Weighted	-0.00098	0.9826***	0.2461**	-0.0496	-0.0726	-0.2273*	87.13%
N+	4[0]	8[8]	6[2]	2[1]	4[0]	2[0]	-
N-	4[0]	0[0]	2[0]	6[1]	4[2]	6[3]	-

This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (αp), systematic risk (βp), factor loadings associated to size (SMB), book-to-market (HML), profitability (RMW) and investment (CMA) factors and the adjusted coefficient of determination (Adj. R^2). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.

Table 4 shows that compared with the previous model, despite adding the two risk factors, fund performance estimates remain neutral. The results show that the alpha coefficients remain statistically insignificant, being consistent with the previous results of neutral performance.

In terms of market risk, both betas are positive and statistically significant at the 1% level, as in the previous model. However, these coefficients present lower values than the previous, exhibiting lower systematic risk and less sensitivity to market movements. Individually, all funds are positive and statistically significant following the same trend as in the aggregate level.

Regarding the HML and RMW factors, the coefficients of the portfolios are insignificant coefficients.

Concerning the size factor (SMB), the equally weighted portfolio holds a positive and statistically significant coefficient at the 10% level, while the value-weighted portfolio holds a positive and statistically significant coefficient at the 5% level meaning that the portfolio is mainly exposed to smaller firms.

For the investment factor (CMA) both portfolios present negative and statistically significant coefficient at the 10% level, meaning that the portfolios are mainly exposed to aggressive investment strategies.

With respect to the explanatory power of the models, both portfolios show similar values, meaning that, in general, the models are able explain most of the variations observed in the returns of the portfolios. However, when comparing with the previous model (4 factor model), the results are similar.

Table 5 shows the estimates of the Fama and French (2015) five factor model regressions for funds and portfolios that invest globally. Once more, the results show that the alpha coefficients remain statistically insignificant, being consistent with the previous type of funds, showing neutral performance.

Concerning the market risk, as in the previous model, all the equally weighted portfolios and funds are positively exposed to the market since the coefficients are positive and statistically significant at a 1% significance level. Regarding the size factor, as observed in the Carhart (1997) four-factor model for global funds, only the equally weighted portfolio shows a positive and statistically significant coefficient, meaning that the portfolio was mainly exposed to smaller firms.

Regarding the HML and RMW factors, none of the portfolios shows significant coefficients. However, individually, almost half of the funds show significant coefficients regarding both factors unlike the observed at the aggregate level. Furthermore, the investment factor (CMA) coefficients present negative and significant value at the 10% level for the value weighted portfolio, unlike the domestic portfolios, where the value weighted portfolio presented significant values.

Finally, the value of the explanatory power of the model is similar to the one presented in the Carhart (1997) four-factor model for both portfolios, meaning that the addition of two extra variables didn't help to explain the excess returns of both

portfolios, with the best result indicating that 89.74% of the volatility in the excess returns of the equally weighted portfolio is explained by the independent variables.

Table 5- Empirical results of the unconditional five-factor model - Global funds

Portfolios	α_p	$\boldsymbol{\beta Rm}$	$\boldsymbol{\beta SMB}$	$\boldsymbol{\beta HML}$	$\boldsymbol{\beta RMW}$	$\boldsymbol{\beta CM}$A	Adj. R^2 (%)
Eq.Weighted	-0.01085	1.0131***	0.2869*	-0.1292	-0.1815	-0.1671	89.74%
Val. Weighted	0.00043	0.9488***	0.2117	-0.0247	0.2023	-0.4027*	88.71%
N+	4[0]	13[13]	9[4]	4[1]	7[1]	5[1]	-
N-	9[0]	0[0]	4[0]	9[5]	6[4]	8[2]	-

*This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (**αp**), systematic risk (**βp**), factor loadings associated to size (SMB), book-to-market (HML), profitability (RMW) and investment (CMA) factors and the adjusted coefficient of determination (Adj. R^2). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.*

5.2 Conditional Models

The literature has already established that conditional models are more capable of generating more robust estimates than unconditional models, by the increase of the *Adj. R²*, as shown by Cortez et al. (2012).

As mentioned in the methodology section, the conditional model of Ferson and Schadt (1996) will be applied in both multifactor model specifications, allowing for

varying market conditions and factors, according to public information variables (PIV) that express changes in the economic environment. Those variables are the short-term rate (STR) and dividend yield (DY).

5.2.1 Conditional Carhart (1997) four-factor model

Table 6 shows the estimates of the conditional Carhart (1997) four-factor model regressions for funds and portfolios that invest domestically. According to the results, estimates of alpha are not statistically significant, implying that fund performance is neutral. Individually, the funds also exhibit non-statistically significant alphas. These results are similar to the findings in the unconditional four-factor model.

Table 6 - Empirical results of the conditional four-factor model – Domestic funds

Porfolios	Eq.Weighted	Val.Weighted	N+	N-
α	-0.003	-0.003	2[0]	6[0]
β_{Rm}	0.0941***	0.0970***	8[8]	0[0]
β_{RmSTR}	-0.103**	-0.102*	6[4]	2[0]
β_{RmDY}	0.249	0.367	1[0]	7[3]
β_{SMB}	0.332***	0.427***	7[2]	1[0]
β_{SMBSTR}	-0.510***	-0.654***	2[0]	6[4]
β_{SMBDY}	1.234*	1.263	5[2]	3[0]
β_{HML}	-0.068	-0.085	0[0]	8[5]
β_{HMLSTR}	-0.059	-0.071	6[3]	2[0]
β_{HMLDY}	-0.016	-0.09	4[0]	4[0]
β_{MOM}	0.147**	0.200***	5[0]	3[0]
β_{MOMSTR}	-0.249***	-0.338***	0[0]	8[6]
β_{MOMDY}	0.373	0.801	8[0]	0[0]
Adj. R^2 (%)	93.8	91.4	-	-

*This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (**αp**), systematic risk (**βp**), factor loadings associated to size (SMB), book-to-market (HML) and momentum (MOM) factors, the adjusted coefficient of determination (Adj. R^2) and the conditional* β *coefficients (*βp*STR, βp*DY, βSMB*STR, βSMB*DY, βHML*STR, βHML*DY, βMOM*STR, BMOM*DY). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.*

In relation to market risk, once more, both portfolios exhibit statistically significant and positive market betas at the 1% level, meaning that they are positively exposed to the market. However, only the conditional beta associated with the STR is statistically significant. The beta of the equally weighted and value weighted portfolios that invest domestically associated with the short-term rate (STR) are negative and statistically significant at 5% and 10% level respectively, meaning

that systematic risk tends to increase when there are increases in short term interest rates.

Regarding the size factor, both portfolios show, once again, positive and statistically significant coefficients at the 1% level, meaning that the portfolios were mainly exposed to smaller firms. Including the PIV in the analysis, both portfolios present negative and statistically significant values at the 1%level when interacted with the STR. This implies that when there is an increase in the interest rates the portfolios start to get more exposed to larger firms than to smaller firms (as mentioned before). When interacted with the DY, the equally weighted portfolio presents a positive and significant beta meaning that the portfolio is positively affected by increases in dividend yield.

Concerning the HML factor, the portfolio coefficients are. However, individually, more than half of the funds show significant coefficients regarding this factor, unlike the results at the aggregate level. As to the interaction of HML with to the PIVs, the coefficients remain insignificant.

The momentum factor presents positive and significant coefficients for both portfolios, meaning that the funds are more exposed to companies with good past performance. This finding contrasts with the results of the unconditional four-factor model, where the values were not statistically significant. However, when it comes to its exposure to the interest rates, a negative and statistically significant coefficient at 1% level is associated to both portfolios, meaning that in times of higher interest rates the funds were more exposed to companies that recently experienced poor performance.

Finally, the values of Adj.R^2 are higher for both portfolios when compared to the unconditional Carhart (1997) four-factor model, in line with Cortez. et al. (2012).

The results of applying the same model to funds investing globally are shown in Table 7. Once more, the alpha coefficients values show a neutral performance relative to the benchmark. Concerning market risk, once again, both portfolios

exhibit statistically significant and positive market betas at the 1% level, meaning that they are positively exposed to the market. When interacted with the STR, the value weighted portfolio presents a negative and significant beta at the 10% level. On the other hand, when associated with the DY, the same portfolio presents a positive and significant beta at the 5% level, meaning that the portfolio's market risk is positively affected by increases in the dividend yield.

Regarding the size risk factor, the equally weighted portfolio presents a positive and significant coefficient at the 10% level. The conditional betas associated with the public information variables are not statistically significant.

As for the HML factor, the value weighted portfolio shows a negative and significant coefficient at the 10% level. The conditional beta associated with the short-term rate is negative and statistically significant at a 5% and 10% level for the equally weighted and value weighted portfolios, respectively, indicating that they are mostly exposed to growth firms in times of high interest rates.

The momentum factor presents a positive and significant coefficient at the 10% level for the value weighted portfolio, showing that the funds are more exposed to companies with good past performance. However, when exposed with the STR PIV, both portfolios exhibit negative and significant values at 10% level, meaning that in times of high interest rates, the funds tend to be more exposed to firms that recently experienced poor performance.

Finally, once again, the values of Adj.R^2 are higher for both portfolios when compared to the unconditional Carhart (1997) four-factor model.

Table 7 - Empirical results of the conditional four-factor model – Global funds

Porfolios	Eq.Weighted	Val.Weighted	N+	N-
α	-0.002	0.0002	2[0]	11[0]
β_{Rm}	0.987***	0.954***	13[13]	0[0]
β_{RmSTR}	-0.069	-0.108*	11[3]	2[0]
β_{RmDY}	0.189	1.030**	6[1]	7[3]
β_{SMB}	0.275*	0.177	11[1]	2[0]
β_{SMBSTR}	-0.252	-0.194	5[0]	8[4]
β_{SMBDY}	-0.24	0.912	9[2]	4[0]
β_{HML}	-0.054	-0.160*	3[0]	10[2]
β_{HMLSTR}	-0.204*	-0.279**	8[0]	5[0]
β_{HMLDY}	0.136	0.736	1[0]	12[3]
β_{MOM}	0.137	0.187*	10[0]	3[0]
β_{MOMSTR}	-0.202*	-0.230*	0[0]	13[5]
β_{MOMDY}	0.326	1.074	11[0]	2[0]
Adj. R^2 (%)	90.9	90.2	-	-

*This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (**αp**), systematic risk (**βp**), factor loadings associated to size (SMB), book-to-market (HML) and momentum (MOM) factors, the adjusted coefficient of determination (Adj. R^2) and the conditional* β *coefficients (*βp*STR, βp*DY, βSMB*STR, βSMB*DY, βHML*STR, βHML*DY, βMOM*STR, BMOM*DY). *Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.*

5.2.2 Conditional Fama and French (2015) five-factor model

Table 8 shows the Fama and French (2015) five-factor model results for funds investing domestically during the period from October 2017 to October 2023.

Table 8 - Empirical results of the conditional five-factor model – Domestic funds

Portfolios	Eq.Weighted	Val.Weighted	N+	N-
α	-0.001	-0.001	7[0]	1[0]
β_{Rm}	0.913***	0.924***	8[8]	0[0]
β_{RmSTR}	-0.074	-0.016	4[0]	4[2]
β_{RmDY}	0.22	0.118	4[2]	4[1]
β_{SMB}	0.083	0.123	4[1]	4[1]
β_{SMBSTR}	0.025	-0.007	5[0]	3[0]
β_{SMBDY}	0.434	-0.039	3[0]	5[1]
β_{HML}	-0.144*	-0.179*	1[0]	7[2]
β_{HMLSTR}	-0.219**	-0.239**	2[0]	6[1]
β_{HMLDY}	-0.236	-0.785	6[1]	2[0]
β_{RMW}	0.221**	-0.171	0[0]	8[3]
β_{RMWSTR}	0.126	-0.041	6[2]	2[0]
β_{RMWDY}	0.637	1.327	5[0]	3[0]
β_{CMA}	-0.161	-0.251	2[0]	6[3]
β_{CMASTR}	0.466***	0.578***	8[2]	0[0]
β_{CMADY}	-1.277	-0.944	0[0]	8[3]
Adj. R^2 (%)	93.69	90.79	-	-

*This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (**αp**), systematic risk (**βp**), factor loadings associated to size (SMB), book-to-market (HML), profitability (RMW) and investment (CMA) factors, the adjusted coefficient of determination (Adj. R^2) and the conditional* β *coefficients (*βp*STR, βp*DY, βSMB*STR, βSMB*DY, βHML*STR, βHML*DY, βRMW*STR, βRMW*DY, βCMA*STR, βCMA*DY)). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.*

By observing Table 8, once again, the alpha coefficients are insignificant, indicating neutral performance relative to the benchmark. Regarding market risk, both

portfolios exhibit statistically significant and positive market betas at the 1% level, meaning that they are positively exposed to the market. When interacted with the PIV's, the conditional betas are not statistically significant.

Concerning the size factor (SMB), both portfolios present non-significant coefficients, even when interacted with the public information variables.

As for the HML factor, both portfolios show negative and statistically significant coefficients at the 10% level, meaning that these funds tend to be exposed to growth companies. The conditional beta associated with the short-term rate is negative and statistically significant at 5% level for both portfolios, indicating that they are mostly exposed to growth firms in times of high interest rates.

Regarding the profitability factor (RMW), the equally weighted portfolio presents a positive and significant coefficient at the 5% level, meaning that funds are more exposed to companies with robust profitability. When associated with both PIV's, the conditional betas are not statistically significant.

The investment factor (CMA) shows a negative but not statistically significant value for both portfolios, having a neutral influence on fund performance. However, when interacted with the short-term rate both portfolios present positive and statistically significant coefficients at the 1% level, suggesting that when interest rates are high, firms tend to be more exposed to conservative investments.

Finally, once again, the values of Adj.R^2 are higher for both portfolios when compared to the unconditional Fama and French (2015) five-factor model.

The results of applying this model to funds investing globally are shown in Table 9. Looking at abnormal returns, once again the average alpha is neutral for both portfolios and for all funds individually. Concerning market risk, once again, both portfolios exhibit statistically significant and positive market betas at the 1% level, meaning that they are positively exposed to the market. When interacted with the public information variables (PIV), none of the portfolios present statistically significant betas.

Concerning the size factor (SMB), just like in the domestic case, both portfolios present insignificant coefficients, even when interacted with the public information variables.

As to the book-to-market factor (HML), both portfolios present insignificant coefficients. However, when exposed with short term rate, the coefficient is negative and statistically significant for both portfolios (at 1% level for the equally weighted portfolio while at the 5% level for the value weighted portfolio), showing that they are mostly exposed to growth firms in times of high interest rates.

Referring now to the profitability factor (RMW), only the equally weighted portfolio shows a negative and significant coefficient at 10% level, indicating that these funds are slightly exposed to companies with higher profitability. When associated with both PIV's, the conditional betas are not statistically significant.

The investment factor (CMA) shows, once again, negative but not statistically significant values for both portfolios, having a neutral influence on fund performance. However, when exposed with the short-term rate both portfolios present positive and statistically significant coefficients at 5% level, suggesting that when interest rates are high, funds tend to be more exposed to conservative investments.

Finally, the results of the R squared indicator seem to be consistent with the results obtained earlier for the same model, but in its unconditional version, suggesting that the explanatory power of the regressions is not considerably impacted by the inclusion of the public information variables.

Table 9- Empirical results of the conditional five-factor model – Global funds

Portfolios	Eq.Weighted	Val.Weighted	N+	N-
α	-0.001	0.001	9[0}	4[0]
β_{Rm}	0.945***	0.884***	13[0]	0[0]
β_{RmSTR}	0.079	0.016	9[5]	4[0]
β_{RmDY}	-0.26	0.445	5[1]	8[4]
β_{SMB}	0.025	-0.033	5[0]	8[0]
β_{SMBSTR}	-0.07	0.047	8[1]	5[0]
β_{SMBDY}	-0.148	0.257	8[0]	5[1]
β_{HML}	-0.262	-0.16	3[0]	10[6]
β_{HMLSTR}	-0.672***	-0.599**	3[0]	10[4]
β_{HMLDY}	1.142	1.018	10[3]	3[0]
β_{RMW}	-0.391*	-0.046	3[0]	10[5]
β_{RMWSTR}	-0.481	-0.362	4[0]	9[0]
β_{RMWDY}	2.029	1.734	9[2]	4[0]
β_{CMA}	-0.135	-0.365	5[1]	8[1]
β_{CMASTR}	0.937**	0.866**	10[6]	3[0]
β_{CMADY}	-2.667	-1.73	3[0]	10[3]
Adj. R^2 (%)	91.63	90.49	-	-

*This table reports the regression estimates of the equally and value weighted portfolios that invest domestically. The considered period is from October 2017 to October 2023. It reports estimates of performance (**αp**), systematic risk (**βp**), factor loadings associated to size (SMB), book-to-market (HML), profitability (RMW) and investment (CMA) factors, the adjusted coefficient of determination (Adj. R^2) and the conditional* β *coefficients (*βp*STR, βp*DY, βSMB*STR, βSMB*DY, βHML*STR, βHML*DY, βRMW*STR, βRMW*DY, βCMA*STR, βCMA*DY)). Standard errors are corrected for heteroscedasticity and autocorrelation following Newey and West (1987). The asterisks are used to identify statistical significance of the coefficients to a level of significance of 1% (***), 5% (**) and 10% (*).N+ and N- show the number of the funds that have positive and negative estimates, respectively. The square bracket indicates the numbers of funds that are statistically significant at a 10% significance level.*

6.Conclusion

"Do investors value sustainability?" (Díaz-Caro et al., 2023), "Is it possible to do well while doing good?" (Hamilton et al. 1993), "Does it pay to be gender friendly?" (Capelle-Blancard et al., 2022), "Do green mutual funds perform well?" (Chang et al., 2012), "Can water mutual funds aid sustainable development?" (Ibikunle & Martí-Ballester, 2020), are some examples of questions that investors and academics have been asking over recent times.

The aim of this dissertation is to explore and analyze the performance of US SDG-themed mutual funds between the timespan of October 2017 to October 2023, with the purpose of exploring the issue of whether the inclusion of SDG screens punishes or boosts financial performance. For this purpose, a dataset of funds was identified through Refinitiv Eikon's platform, which flags funds with SDG goals. Based on this dataset, four portfolios were constructed: two equally weighted portfolios (one containing domestic funds and the other containing global funds) and two value weighted portfolios (one for domestic funds and one for global funds). Two versions of the performance evaluation models are used: unconditional models (Carhart, 1997, and Fama and French, 2015) and their conditional equivalents. Furthermore, mutual fund performance is examined both at an aggregate level and on an individual basis.

When assessing the performance of SDG mutual funds against conventional benchmarks, the analysis reveals that the alphas generated by these SDG funds are statistically insignificant. This insignificance in alpha indicates that SDG mutual funds neither significantly outperform or underperform their conventional counterparts on a risk-adjusted basis. Essentially, the neutral performance suggests that incorporating SDG criteria into the investment strategy does not detract from or enhance the potential returns compared to traditional investment benchmarks. Therefore, investors can consider SDG mutual funds as viable alternatives to conventional funds without expecting superior or inferior

performance, allowing them to align their portfolios with sustainability objectives without sacrificing financial returns. When applying the conditional models, results are similar meaning that considering the state of the economy has no impact on the performance of the mutual funds. Regarding the explanatory power of the models, both four-factor and five-factor models exhibit higher values when incorporating the PIV.

One limitation of this dissertation is associated with the absence of a socially responsible benchmark to also evaluate the financial performance with the SDG-themed mutual funds and compare it with the results obtained using a conventional benchmark. Another limitation is the absence of conventional mutual funds to compare with SDG funds. This analysis would allow to assess whether any performance differentials between these two types of portfolios (conventional and SDG-themed) were significant. This could be an interesting avenue for future research.

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Appendices

Appendix 1- SDG Mutual funds that invest domestically.

LIPPER RIC	FUND NAME	BASE DATE
LP40220993	AB SUSTAINABLE US THEMATIC PFOLIO ADVSR	28/06/2017
LP40004027	AMG BOSTON COMMON GLOBAL IMPACT FUND I	23/05/1986
LP40229604	BLACKROCK US IMPACT FUND INSTITUTIONAL	30/06/2020
LP40103449	DWS ESG CORE EQUITY FUND S	12/08/2005
LP40027143	HSBC RADIANT US SMALLER COMPANIES FUND I	18/06/1997
LP40226772	HORIZON DEFENSIVE CORE FUND INV	26/12/2019
LP40231143	MIROVA US SUSTAINABLE EQUITY FUND N	15/12/2020
LP40064184	PUTNAM SUSTAINABLE FUTURE FUND A	23/05/2001

Appendix 2- SDG Mutual funds that invest globally.

LIPPER RIC	FUND NAME	BASE DATE
LP40000550	AB SUSTAINABLE GLOBAL THEMATIC FUND A	22/04/1983
LP40011518	AB SUSTAINABLE INTERNATL THEMATIC FD A	02/11/1995
LP40222267	BAILLIE GIFFORD GBL. STEWD.EQTIES.FD.I	14/12/2017
LP40229599	BLACKROCK GLOBAL IMPACT FUND K	27/05/2020
LP40232983	BLACKROCK INFRASTRUCTURE SUSTAINABLE OPPS FD K	30/09/2021
LP40229601	BLACKROCK INTERNATIONAL IMPACT FUND INST	30/06/2020
LP40209697	DWS ESG INTERNATIONAL CORE EQUITY FUND A	11/11/2014
LP40232480	ENVIRONMENTAL SUSTAINABILITY FUND I	13/07/2021
LP40224782	FEDERATED HERMES SDG ENGAGEMENT EQTY FD IS	06/11/2018
LP40215283	MIROVA GLBL SUSTAINABLE EQTY FD Y	31/03/2016
LP40225660	MIROVA INTERNATIONAL SUSTAINABLE EQTY FD N	28/12/2018
LP40225256	UBS ENGAGE FOR IMPACT FUND P	24/10/2018
LP40100686	ABRDN GLOBAL EQUITY IMPACT FUND A	17/05/2005