Universidade do Minho
Escola de Economia e Gestão

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Financial performance of US low-carbon mutual funds

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To the university, that despite a short period of time was my home during these two years.

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.

Desempenho financeiro de fundos mútuos com baixas emissões de carbono dos EUA

Resumo

Com o passar dos anos, a importância das questões ambientais aumentou significativamente devido às mudanças climáticas, afetando não só a sociedade, mas também os mercados financeiros e os investidores, que passaram a considerar suas preocupações ambientais nos seus investimentos. Neste estudo, é possível avaliar o desempenho financeiro dos fundos mútuos com baixas emissões de carbono dos EUA (domésticos). O período em análise corresponde a janeiro de 2000 até outubro de 2022. De forma a poder comparar o desempenho destes fundos, são recolhidas informações que dizem respeito a fundos com altas emissões de carbono. Relativamente aos modelos, são utilizados modelos incondicionais e modelos condicionais. A amostra é composta por 131 fundos com altas emissões de carbono e 33 fundos com baixas emissões de carbono. De uma forma geral, é possível concluir que não existe um desempenho significativamente diferente entre os fundos com baixas emissões e os fundos com altas emissões. No entanto, os fundos com altas emissões de carbono apresentam uma maior exposição a ações de capitalização baixa em relação aos fundos com baixas emissões de carbono. Relativamente aos modelos condicionais, mais precisamente o modelo condicional de quatro fatores de Carhart (1997), os fundos com altas emissões de carbono têm uma melhor performance no mercado em comparação aos fundos de baixas emissões de carbono quando as taxas de juro se encontram mais altas. O teste de Wald não mostrou evidencias de alfas que variam no tempo, mas, por outro lado, demonstram a existência de betas que variam no tempo, bem como alfas e betas que variam no tempo. Estes resultados acabam por indicar que que os fundos variam consoante as condições económicas ao longo do tempo, indicando a necessidade do uso de modelos condicionais.

Palavras-chave: fundos com altas emissões de carbono, fundos com baixas emissões de carbono, modelos condicionais, modelos incondicionais.

Financial performance of US low-carbon mutual funds

Abstract

Over the years, the importance of environmental issues has increased significantly due to climate change, affecting not only society but also financial markets and investors who have started to consider their environmental concerns in their investments. In this study, it is possible to evaluate the financial performance of US (domestic) low-carbon mutual funds. The period under analysis corresponds to January 2000 through October 2022. To be able to compare the performance of these funds, information is collected that concerns high-carbon funds. Regarding the models, both unconditional and conditional models are used. The sample is composed of 131 high-carbon funds and 33 low-carbon funds. Overall, it can be concluded that there is no significantly different performance between low-carbon and high-carbon funds. However, the high-carbon funds have a higher exposure to small-cap stocks compared to the low carbon funds. Concerning the conditional models, more precisely the conditional Carhart's (1997) four-factor model, high-carbon funds perform better in the market compared to low-carbon funds when interest rates are higher. Wald's test showed no evidence of time-varying alphas, but on the other hand demonstrates the existence of time-varying betas, as well as time-varying alphas and betas. These results ultimately indicate that funds vary with economic conditions over time, indicating the need for the use of conditional models.

Keywords: conditional models, high-carbon funds, low-carbon funds, unconditional models.

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1. Introduction

Over the years, the evolution in world have affect significantly various areas and, consequently, society is more aware of environmental concerns due to the problem of climate change, which is largely caused by human activity. Among many others, the climate change, the depletion of natural resources and the global warming have become some of the most important issues regarding the global environment concerns in society. The high cost of implementing clean energy and programs aimed at changing consumption and production patterns to adapt to this new environment are some of the reasons why this is happening (Eyraud et al., 2013).

For this reason, various laws, actions, and even agreements between different countries have been implemented. Some examples include the Kyoto Protocol and the Paris Agreement. These agreements happened as climate awareness increased, representing a change in the mentality of our society.

With these environmental changes, the financial system started to transform, affecting not only investors but also market participants. Despite this change of mentality, the existing content about climate change is quite small, and Diaz-Rainey et al. (2017) prove that between January 1998 and June 2015 only 12 articles of 20725 published were related to Climate Finance. Nevertheless, interest in socially responsible investments has started to grow strongly over the years.

This type of investments can be seen as the investment process that incorporates some criteria such as environmental, social, and corporate governance (Ibikunle & Steffen, 2017). Socially responsible investments have firmly established its position in the financial markets, and according to US SIF Foundation (2020), the total US-domiciled assets under management that were adopting sustainable investment strategies increased from $12.0 trillion at the beginning of 2018 to $17.1 trillion at the beginning of 2020, growing 42%. That accounts for 33% of the $51.4 billion in total US assets under professional management. This demonstrates that society is increasingly demanding about its business practices, especially regarding natural resources.

In this context, we understand the emphasis that is given to investments (SRI), because investing sustainably is an opportunity to combat the consequences of human activities on the environment, and facilitate a smooth transition to a low-carbon economy (Louche et al., 2019). With that line of thought, and in order to control and transfer risks and costs associated with carbon emissions and also to generate more sustainable profits, financial institutions started to create a variety of carbon-based insurance

products, derivatives and structured products, which we can attribute the name of low-carbon investments (Zeng & Zhang, 2011). According to Crippa et al. (2019), the Greenhouse gas (GHG) emissions and their concentration in the atmosphere are at their highest levels since the pre-industrial period. Concerns about this subject and its well-known effects, as mentioned earlier, create a great global challenge requiring great efforts to mitigate some problems, but also to adapt to this new reality (Orsato et al., 2019). The implementation of this type of principles requires a substantial amount of new investment, but could reduce the risk associated with potential carbon pricing for the investor (Cunha et al., 2021). Motivated by personal concerns, but also with the environment, the interest in SRI and low-carbon investments have emerged.

The low-carbon mutual funds are the primary focus of this study when it comes to the performance of the funds. This topic is still poorly explored in the literature when compared to socially responsible funds, but more recently it is possible to notice a greater inclusion of this subject in some articles. Aside from directly addressing the subject, several articles investigate possible connections with other topics. Soler-Domínguez et al. (2021), for example, investigated the relationship between socially responsible funds and the low-carbon economy. Although these relationships are being explored, there is still plenty of room for future research so that the topic of low-carbon mutual funds can be thoroughly investigated. Still about performance, there is no consensus regarding the type of methodology that should be applied to evaluate the financial performance of the funds. Nevertheless, some authors argue that conditional models should be used, as is the case of Silva and Cortez (2016).

With this context, the main question of this research is to determine whether investing in low-carbon mutual funds, a more sustainable type of investment, requires investors to make a sacrifice. To address this, the main goal of this dissertation is to evaluate the financial performance of US low-carbon mutual funds. To accomplish this goal, (i) the performance of the low-carbon funds is analysed, comparing low-carbon funds with high-carbon funds, as well as (ii) a performance analysis of the low-carbon mutual funds through the use of unconditional and conditional models. To make this comparison, a low-carbon and a high-carbon portfolio were established, along with a portfolio of differences.

The methodology is divided into unconditional models and conditional models. In the unconditional models, the Carhart (1997) four-factor model and the Fama and French (2018) six-factor model are used. Relative to the conditional models, they are based on the Christopherson et al. (1998) model, which allows for time-varying alphas and betas.

This work will contribute to the growth of the low-carbon investments subject, specifically regarding mutual funds, which hold significant relevance in today's society, that is more interested in social reasons and environmental concerns.

This research is structured as follows: Section 2 presents the literature review which addresses how sustainable practices can influence the corporate financial performance, the performance of SRI funds, and the performance of low-carbon investments, including low-carbon mutual funds. Section 3 presents the methodology, where the models applied on the dataset are presented and discussed. Section 4 presents the description of the data used in this research. Section 5 presents the empirical results. Section 6 presents the final conclusions and limitations of this research.

2. Literature Review

Climate finance is one of the main challenges of today's society and can be defined as the local, national or transnational financing, where the main objective is to mitigate and adapt through our actions, to face challenges related to climate change (United Nations [UNFCCC], 2022). Public and private investments are included in this concept through governments, corporations, and households, since they are the ones that contribute to the transition of the world economy to a low-carbon path. As a result, we are able to reduce the greenhouse gas (GHG) concentrations and build resilience of other countries on climate change (Hong et al., 2020).

As we know, the industry of mutual funds has been growing steadily over the years. Consequently, the increasing interest from investors in sustainable alternatives has allowed SR funds to have a greater prominence in recent years, especially in the US and European markets. It is through this type of actions that strategies with a focus on capital allocation are applied to have an advantage over climate-resilient opportunities (Soler-Domínguez et al., 2021).

Therefore, this literature review is going to address how sustainable practices could influence corporate financial performance directing the focus to gas emissions. It will also cover some past studies on the performance of SRI funds, since in addition to being a category that has been highlighted in the industry of mutual funds, it can contribute to the increase interest of investors in sustainable investing, allowing the creation of an opportunity to this transition. Additionally, the financial performance of low-carbon investments will be approached, including the performance of low-carbon mutual funds.

2.1. The Relationship between sustainability practices and corporate financial performance

As far as the literature on socially responsible investments is concerned, in some articles, there is the presence of a company-related perspective that always tries to understand whether the application of sustainable practices is associated with benefits or losses in terms of financial performance. As this question is analysed, some studies consider that there is a more positive impact, while others perceive a more negative point of view. However, there is also a more neutral side regarding the application of environmental practices and their effects on corporate financial performance.

According to Dunn and Burton (2006), and with a more negative point of view, the adoption of environmental practices may result in an increase in production costs, thus reducing profitability.

Manrique and Martí-Ballester (2017), on the other hand, states that the implementation of environmental actions improves the long-term performance of the company, meaning that the advantages exceed the costs. In addition to these conclusions, it was possible to realize that during periods of crisis companies with a better corporate environmental performance present a better corporate financial performance. With a more neutral perspective, Puopolo et al. (2015) affirms that the coefficient of firms is not statistically significant, not influencing abnormal returns. The evidence shows that there is neither a penalty or a bonus for those who decide to apply these practices, adding that larger firms have a greater influence, relative to smaller firms, on the market point of view.

As can be observed, the studies show mixed results regarding the impact that environmental practices can have on financial performance. Nevertheless, the perspectives presented above concern a more general view of this topic. Given that the subject of this research is related to carbon emissions, we can look further into whether there is evidence in past literature that reducing carbon emissions affects a company's financial performance.

According to Hart and Ahuja (1996), it was possible to conclude that it pays to be green. In general, there is greater evidence that the positive results are more significant in firms with higher emissions levels. As companies approach the "zero pollution" threshold, and although the costs are quite high, the marginal costs of reducing emissions rarely exceed the marginal benefits. The data used in this study is from the period of 1988 to 1989, where companies in the petrochemicals, forest products, and automobile industries had not reached dramatic levels in relation to the reduction of emissions.

Continuing in this perspective, and based on evidence from Japanese manufacturing companies, it was determined that a reduction in gas emissions leads to an increase in financial performance across the sample, as well as in clean industries. On the other hand, no significant effects on financial performance were found in dirty industries (Iwata & Okada, 2011).

Furthermore, in an article conducted by Gallego-Álvarez et al. (2015), an analysis was performed to understand if the variation in carbon emissions affects the financial and operational performance. The results demonstrated that a reduction in the emissions leads to a positive impact on financial performance. Regarding operational performance, the findings show no evidence. The financial improvement observed can be attributed to the competitive advantage gained by more responsible companies. These companies possess sustainable resources and capabilities that are difficult to replicate by companies that are less environmentally proactive competitors.

However, a more recent study, that presents an opposite point of view, evaluates some evidence from Portugal, during the period of 2008 to 2016, to see how the environmental performance and the financial performance of portuguese companies are related. The conclusions from this study, carried out by Robaina and Madaleno (2020), show that a higher level of the emissions results in a higher level of financial performance, to a certain extent, making this relation a negative one (the firm pollutes more to get a higher financial performance, making the growth based on that). These results can be explained by the fact that Portugal is a country made up of small and medium-sized companies, where environmental protection programs and the business structure are weak.

Concerning this topic, it is possible to verify that there is some literature that relates sustainable practices with financial performance, but most of these studies do not address gas emissions in specific, making the literature on this topic quite small. Even so, regarding the evidence presented, we have mixed results where it is possible to perceive that two of the possible factors that affects the existence of positive results in financial performance is the country and the costs associated with this transition. As it was possible to verify in the article by Robaina and Madaleno (2020), not all countries are prepared to apply sustainable practices and to follow this path since these involve costs. Not all companies are willing to make this kind of investment and even if they do, they may have negative results in terms of financial performance. One of the main motivations for the application of such practices is to increase the economic value, but with no financial support this is not possible. In the light of the previous statements, the inclusion of the US in this study makes sense, as this country has a distinct corporate structure than Portugal, for example, and it is a reference worldwide.

2.2. Performance of socially responsible investment funds

The constant growth of the mutual funds industry has sparked the interest of several academics in exploring the performance of SRI funds. The concept of socially responsible investments consists in the incorporation of financial and non-financial aspects in investment decisions, with a focus on issues related to ethics and the environment (Ferruz et al., 2012). Due to this non-financial aspect, the investor's behaviour is reflected in his investments. Their investment opportunities present some limitations, since they need to understand which assets fit this parameter of being socially suitable (Bollen, 2007). Despite this limitation, this group of investments has a great importance for the decarbonization process, due to its differentiating aspect of incorporating environmental, social and governance (ESG) issues to the investment process (Muñoz, 2019).

On this topic, we have two opposite perspectives about the impact of socially responsible investments on financial performance. On one side, some authors argue that this type of investment can impair financial performance due to a lack of diversification (Markowitz, 1952). Regarding costs, Kurtz (1997) states that there are some costs related to socially responsible investments, and Cortez et al. (2009) also mention that some additional costs related to monitoring social performance can cause a lower performance of socially responsible investment funds. These factors could affect the investor, but also the company. On the other side, some authors believe that implementing these types of criteria could bring an advantage to financial performance. One of them is Bollen (2007), who states that the use of social and ethical screens allows us to identify and choose firms that possess good management and avoid firms with bad management. This selection could improve the performance of our investments in the future. Additionally, according to Waddock and Graves (1997), a company that is more socially responsible than others, is more likely to be better managed and perform better. In a more recent perspective, Liang and Renneboog (2020) argue that socially responsible investment funds could achieve higher returns if the market underestimates the effect of corporate ESG policies.

Regarding the empirical literature on the socially responsible effects on financial performance, we have mixed results. Most of the literature is focused on the differences between the performance of SRI and conventional investment funds (Rathner, 2013). Hamilton et al. (1993) made this comparison and formulate three hypotheses concerning the returns of these two types of funds. The first hypothesis holds that the (risk-adjusted) expected returns of socially responsible portfolios are equivalent to the expected returns of conventional portfolios. According to the second hypothesis, the socially responsible portfolios have lower expected returns than conventional portfolios. The third and final hypothesis argues that the expected returns of stocks in socially responsible portfolios outperform those of conventional portfolios. After applying a single-factor model to evaluate the financial performance, they conclude that the performance of the socially responsible funds is not statistically significant from the conventional funds. Authors like Goldreyer et al. (1999) and Statman (2000) also failed to find statistically significant differences in the performance of these two groups of funds. These studies correspond to the first studies on the performance of SRI mutual funds in relation to conventional funds.

In a more recent and different scenario, the financial performance of socially responsible global funds from the US and Europe was evaluated. The findings of Cortez et al. (2012) indicated that the European global SRI funds don't exhibit abnormal performance using the two different benchmarks, but on the other hand, the US and Austrian funds underperformed. Also, Chang et al. (2018), when evaluating

the socially responsible funds in the US from the period of 2007 to 2016, found that the socially responsible funds underperformed compared to the average of all mutual funds within the same category. The reason for this was due to expenses related to socially responsible funds. Renneboog et al. (2008) also discovered evidence relative to socially responsible investments around the world and determined that these types of funds exhibit a lower performance relative to their domestic benchmark. In some countries like Japan and France, the socially responsible funds' performance wasn't statistically different when compared to the conventional funds.

From another perspective, Gil-Bazo et al. (2010) when evaluating the US socially responsible funds observed different results. This analysis was conducted from 1997 to 2005, and the results led to the conclusion that the US socially responsible funds outperform the conventional funds when they are operated by firms specialized in the management of SRI. When these funds are managed by companies that are not specialized, they do have lower performance compared to conventional funds. Because of this article, we can conclude that the management characteristics of a company can influence the performance of socially responsible funds. With a similar outcome, another study that explores the European and North American socially responsible funds proved that these funds present a higher performance than the market benchmark, showing that if we choose to implement our beliefs on an environmental, social, and ethical level, we will not harm the financial performance (Lean et al., 2015). On the other hand, according to Kiymaz (2019), when conducting an analysis on the performance of socially responsible funds, it was possible to determined that the SRI funds have, on average, lower returns compared to the non-SRI control sample and different benchmarks. Despite that conclusion, considering a control group and benchmarks that use various risk adjusted measures, the SRI funds present higher returns, leading to in mixed results.

Relative to the relation between the performance and the sustainability scores, it was possible to observe an increase in the fund's performance when companies have a better sustainability score (Durán-Santomil et al., 2019). Additionally, the authors also found evidence that the higher the sustainability score of the mutual fund, the better the protection against extreme losses. Omura et al. (2021), when analysing whether the responsible investments paid off during economic downturns, discovered that there was an outperformance of SRI indices during this period of time, making it possible for investors to use this to their favour and protecting themselves by choosing SR companies. This evidence is quite recent, and the period in question corresponds to the COVID-19 pandemic. On the other hand, Matallín-Sáez et al. (2019) found evidence that funds with high levels of socially responsible attributes perform worse.

This is due to the presence of funds with a very negative performance, making the process of fund selection very important. In addition, the author adds that investing in the best socially responsible funds generally leads to better returns in most SR areas and levels.

Recently it was possible to find some studies that establish the connection between SRI funds and the low-carbon economy. Soler-Domínguez et al. (2021), the author of one of these articles, made this connection and has been able to draw some conclusions. It was evident in this study that the higher the sustainability of a fund, the higher its performance when compared to funds that are more related/exposed to carbon and fossil fuels. Contrary to previous studies, clear evidence was obtained relative to the comparison between conventional funds and SR funds. The study showed a favourable outcome in favour of sustainability when it comes to performance. Also, the authors Muñoz (2021), on a sample of SR funds that was collected, was able to notice that these types of funds are less exposed to black industries. Moreover, he concluded that a large exposure to the metals and fossil fuel industries has a negative impact on the risk-adjusted financial performance of SR funds.

Although there are several studies regarding SRI, in general, the literature presents mixed results. The results exhibited about the performance of SRI funds in relation to conventional funds, tell us that there are no financial advantages or disadvantages and that almost 75% of the performance comparisons between these two groups of funds don't show significant differences in terms of performance (Rathner, 2013). Despite these results, the most recent studies show a more positive aim of this type of investment.

As mentioned by the author Soler-Domínguez et al. (2021): "Sustainable investment responds to demands for carbon and climate-neutral societies". It is with this thought that by investing in a sustainable way, in this case, investing in SRI funds with the highest levels of sustainability, we could create an opportunity to do a transition to a low-carbon economy. Managers and well-diversified managers have the power to take action and combat some harmful practices caused by human activity to the environment. The importance of financial markets for this transition has already been emphasized by some authors, such as Louche et al. (2019), who proves that it is possible to make this change, which is still at the beginning of the process.

2.3. Performance of low carbon investments

Given that low-carbon investments are a fairly recent topic, the existing literature on the subject is quite small. Nevertheless, this type of issue has been discussed over the years, especially due to the growth of socially responsible investments. This growth allowed companies, and even government organizations, to act as time passed. The Paris Agreement in 2015 happen when the interest in climate consciousness peaked, representing a change in the mentality of our society. An agreement has been made between countries to commit to reducing emissions of gases (GHG) into the atmosphere. After this agreement, financial institutions were also adapting their business to a more eco-label system and began to adopt certain behaviours/measures. One of the companies was Morningstar, which is one of the most important providers of data regarding the mutual fund industry (Ceccarelli et al., 2022). The creation of the Low Carbon Designation (LCD) allowed more information to the investor for his decision-making since it is granted to funds with both low-carbon risk scores and lower levels of exposure to companies attached to fossil fuels (Hale & Bioy, 2018). The fund is more sustainable when the score is lower. The existence of this type of information becomes very relevant since the mutual fund industry is a very important part of global financial markets (Ceccarelli et al., 2022). In order to achieve some of the objectives of the Paris Agreement, the role of investments and financial markets becomes essential (Ji et al., 2021).

Regarding the financial performance of low-carbon investments, Busch & Lewandowski (2018) used a meta-analysis to see if it pays off to be green. When conducting this analysis, they focused on corporate carbon performance expressed by the firm's level of carbon dioxide. It was possible to conclude that financial performance and carbon emissions vary inversely, indicating that higher financial performance is typically positively correlated with good carbon performance. The investor's perspective is one of the emerging topics in the empirical literature relative to the financial performance of low-carbon investments, and in some recent studies, it was evaluated whether the improve in the risk-adjusted returns were a result of decarbonizing funds or stock portfolios, such as in the article of Cunha et al. (2021). Following this line of thought, Fang et al. (2019) concluded that in the North America stock market, the carbon-intensive industries had an inferior financial performance, and Hunt & Weber (2019) discovered that carbon-intense asset divestment methods on the Canadian stock markets enhanced financial results.

Most of the studies on this topic concern developed economies, but Cunha et al. (2021) decided to explore this perspective in emerging economies, specifically in Brazil. According to this study, investing in carbon-efficient businesses has improved portfolio performance while lowering investors' exposure to climate risk. Relative to the business managers that invest in carbon efficiency, they may see an

improvement in the return and risk of their stocks and, consequently, in the overall financial success of their company.

In relation to fund's performance, the authors Ji et al. (2021), in a study where the impact of carbon neutrality on investment performance was analysed, it was possible to draw the conclusion that carbon emissions negatively affect investment performance, therefore opening the door to more carbon neutral options. By evaluating equity funds from different countries such as Brazil, China, Russia and South Africa, the author determined that green funds, those that prioritize environmental sustainability and have lower emissions, have a better performance than funds with higher carbon emissions. Of all the funds collected from this sample of countries, the Chinese funds are the ones that stand out the most, presenting a better performance.

According to Ceccarelli et al. (2022) in a fairly recent paper, there was an increase in demand by the fund investor in the category of "low-carbon", especially those who through their diversification give high risk-adjusted returns. Still about the low-carbon labels related to mutual funds, it became clear that they are not a marketing strategy which suggests that the funds that exhibit this types of labels actually invest differently (Muñoz, 2021).

Regarding risk, Bolton and Kacperczyk (2021) and Engle et al. (2020) state that individual low-carbon risk securities have generally less risk, in terms of exposure to climate change news and volatility. In terms of portfolio, low-carbon funds have lower exposure to climate risks, but comparing their volatility with funds with a carbon risk closer to the average, there aren't many differences (Engle et al., 2020).

Although the literature on this topic is quite small, in general, the low-carbon investments do not harm the financial performance. In fact, most studies indicate that the performance of this type of investment is predominantly positive. Besides the performance usually being positive, the risks tend to be lower, more precisely climate risks. Therefore, it is important to continue the study low-carbon investments, to understand if these conclusions remain consistent or if they eventually ended up changing in the future.

3. Methodology

To evaluate the performance of low-carbon mutual funds, unconditional and conditional models are applied. In terms of unconditional models, the Carhart´s (1997) four-factor model, a frequently used model in the literature, and the Fama and French (2018) six-factor model, a more recent one, are implemented in this study in order to analyse the performance of mutual funds.

Relative to the conditional models and based on the Christopherson et al. (1998) model, the Carhart (1997) four-factor model and the Fama and French (2018) six-factor model are used once again, but with public information variables that will represent the state of the economy.

3.1. Unconditional Models

Jensen´s (1968) alpha is an unconditional single-factor model, based on the Capital Asset Pricing Model (CAPM), that considers the excess return of the market portfolio. This model is expressed by the following equation:

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

Where $r_{p,t}$ is the portfolio return p during period t, $r_{f,t}$ is the risk-free rate on period t, α_p is the variable that describes the abnormal return, $r_{m,t}$ is the market portfolio return on period t, and $\varepsilon_{p,t}$ is the error term. The factor coefficient is beta.

Since this model has been used in several scientific articles, it has received some criticism. Some examples could be Fama and French (1993), who mentioned that this model doesn't fully explain the cross-section of the expected returns, and Bauer et al. (2007) who states that Jensen´s (1968) single-factor model does not take into consideration risk associated with non-index holdings.

Regarding the Fama and French (1993), they suggested a new model incorporating three-factors, which included two additional risk factors that were added to the single factor model. These factors are size (SMB) and book-to-market (HML). This model is expressed by the following equation:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_{p1} \left(r_{m,t} - r_{f,t}\right) + \beta_{p2} \left(SMB_t\right) + \beta_{p3} \left(HML_t\right) + \varepsilon_{p,t} \quad (2)$$

Where SMB_t (size) is the difference between the returns of a small stocks portfolio and a large stocks portfolio, and the HML_t (book-to-market) is the difference between the returns of a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks, both during period t.

The Carhart (1997) four-factor model, in relation to the previously mentioned model, adds the momentum factor (MOM) in order to try to catch the tendency of returns. Carhart (1997) is a widely used model since it produces evidence that can explain significant variations in returns. This model is expressed by the following equation:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_{p1}\left(r_{m,t} - r_{f,t}\right) + \beta_{p2}\left(SMB_t\right) + \beta_{p3}\left(HML_t\right) + \beta_{p4}\left(MOM_t\right) + \varepsilon_{p,t} \quad (3)$$

Where MOM_t (momentum) is the difference between the returns of a portfolio of past winners and a portfolio of past losers, on period t.

After some time, Fama and French (2015) decided to create a five-factor model by including two additional risk factors to the model they created earlier, namely profitability (RMW) and investment (CMA) risk factors. This model is expressed by the following equation:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_{p1}\left(r_{m,t} - r_{f,t}\right) + \beta_{p2}\left(SMB_t\right) + \beta_{p3}\left(HML_t\right) + \beta_{p4}\left(RMW_t\right) + \beta_{p5}\left(CMA_t\right) + \varepsilon_{p,t} \quad (4)$$

Where RMW_t (profitability risk factor) is the difference between the returns of two diversified portfolios of stocks, where one presents robust profitability and the other one weak profitability, and CMA_t (investment risk factor) is the difference between the returns of two diversified portfolios of the stocks, one composed with low investment firms and the other composed with high investment firms, making a distinction between conservative firms and more aggressive firms.

More recently, Fama and French (2018) added and extra risk factor to the previous model, the momentum factor (MOM). Since this model is relatively recent in the literature, it has not been widely tested. This model is expressed by the following equation:

$$r_{p,t} - r_{f,t} = \alpha_p + \beta_{p1}\left(r_{m,t} - r_{f,t}\right) + \beta_{p2}\left(SMB_t\right) + \beta_{p3}\left(HML_t\right) + \beta_{p4}\left(RMW_t\right) + \beta_{p5}\left(CMA_t\right) + \beta_{p6}\left(MOM_t\right) + \varepsilon_{p,t} \quad (5)$$

3.2. Conditional models

Unconditional models, in contrast to conditional models, do not take into account that the expected return and risk may vary over time in accordance with the economic situation we find ourselves in. To have a more complete evaluation, conditional models will be used.

The conditional approach to performance evaluation proposed by Ferson and Schadt (1996) allows beta to vary over time based on a linear function of a vector of predefined information variables. This model is expressed by the following equation:

$$r_{p,t} = \alpha_p + \beta_{0p} r_{m,t} + \beta'_p\left(z_{t-1}\, r_{m,t}\right) + \varepsilon_{p,t} \quad (6)$$

Where α_p is the average alpha of the portfolio, β_{0p} is the average conditional beta, β'_p is the vector which concerns the conditional beta and z_{t-1} is the vector of predefined public information variables.

Since in the above model the alphas are constant, Christopherson et al. (1998) expanded the model to include alphas that vary over time, leading to the following expression:

$$r_{p,t} = \alpha_{0p} + A'_p z_{t-1} + \beta_{0p} r_{m,t} + \beta'_p\left(z_{t-1}\, r_{m,t}\right) + \varepsilon_{p,t} \quad (7)$$

Where α_{0p} is an average alpha of the portfolio, A'_p evaluates the conditional alpha's sensitivity with the information variables, the vector z_{t-1} is the predefined public information variables at time $t\text{-}1$, β_{0p} is the average conditional beta and β'_p is the vector that concerns the conditional betas.

In this way, by combining the Carhart (1997) four factor model and the Fama and French (2018) six-factor model with the Christopherson et al. (1998) we obtain conditional multi-factor models with the following expressions:

$$r_{p,t} = \alpha_{0p} + A'_p z_{t-1} + \beta_{1p} r_{m,t} + \beta_{1p}\left(z_{t-1}\, r_{m,t}\right) + \beta_{2p}\,(SMB_t) + \beta_{2p}\,(z_{t-1} SMB_t) + \beta_{3p}\,(HML_t) + \beta_{3p}(z_{t-1} HML_t) + \beta_{4p}\,(MOM_t) + \beta_{4p}\,(z_{t-1} MOM_t) + \varepsilon_{p,t} \quad (8)$$

$$r_{p,t} = \alpha_{0p} + A'_p z_{t-1} + \beta_{1p} r_{m,t} + \beta_{1p}\left(z_{t-1}\, r_{m,t}\right) + \beta_{2p}\,(SMB_t) + \beta_{2p}\,(z_{t-1} SMB_t) + \beta_{3p}\,(HML_t) + \beta_{3p}\,(z_{t-1} HML_t) + \beta_{4p}\,(RMW_t) + \beta_{4p}\,(z_{t-1} RMW_t) + \beta_{5p}\,(CMA_t) + \beta_{5p}\,(z_{t-1} CMA_t) + \beta_{6p}\,(MOM_t) + \beta_{6p}\,(z_{t-1} MOM_t) + \varepsilon_{p,t} \quad (9)$$

4. Data

The dataset, the variables, and the selection process used in this investigation are described in this section. This chapter presents the dataset of the funds to be analysed, as well as the description of public information variables, risk factors and the risk-free rate for a later evaluation. After the selection process was complete, a sample of 131 high-carbon funds and 33 low-carbon funds with a period between 31 January 2000 to 31 October 2022 was obtained.

4.1. Data sources and selection process

The dataset used in this study consists of low-carbon mutual funds from the US. At the moment of the selection process, the market decision was essential since it affected how the dataset was created. In the present situation, the US market was selected due to its worldwide importance, as well as its diversity and innovation. These characteristics end up becoming crucial, allowing easier access to data in a topic that is still being debated in the literature. The US low-carbon mutual funds of this research are domestic. Global funds were excluded from the sample due to a factor that was applied at the time of data collection, which will be explained in more detail below. Even though funds with this classification are excluded, we still possess a considerable sample size.

The identification of the funds used in this dataset was made through the Eikon Refinitiv, where they were filtered by criteria. For the low-carbon funds, two of the main criteria used in terms of carbon emissions were the ESG with a focus on the environment and the emissions score. Concerning the criteria "Emissions score", and after some research, it was possible to notice the existence of different levels which vary according to the different amounts of carbon emissions. This score presents values between 0 and 100, where funds with values closer to 100 have a better classification, and funds closer to 0 have a worse classification. In addition, similar to other criteria such as the ESG score, within this range there are multiple ratings spanning from a D- to an A+. These ratings vary according to the value between 0 and 100 that is attributed. In what concerns this research, and for the low-carbon funds, a range for the emissions score between 75 and 100 was chosen with the purpose of including the funds that are better classified in this parameter, that is, funds with a classification of A-, A or A+. The ESG criteria, with a focus on the environmental part, was also added to get the final sample since this criterion, in its various components, also includes emissions. Turning now to the high-carbon funds, the main criteria used to obtain the sample was the emissions score. In this case, the established range was between 0 and 25, therefore including the funds that are worse classified in this category, namely D-, D and D+.

With respect to the time period, funds with less than 24 months of observation are not used, similar to the approach taken in Silva & Cortez (2016) article. In this specific case, the primary flag is "Yes", which implies that we have the main funds selected. Only funds classified as equity will be considered, making ETFs, index funds and bonds excluded from the sample. In this dataset, dead funds were included to ensure that the results are not biased by survivorship bias. Through Refinitiv Datastream, and in a first approach, we collected some extra information about the funds, like the base date, the total net assets, the geographical focus and the Lipper Global Classification. Afterwards, the monthly returns of each fund, in US dollars, were collected and computed in a discrete way. The final sample includes 131 high-carbon funds and 33 low-carbon funds, making a total of 164 mutual funds. The analysis period goes from 31 January 2000 to 31 October 2022, presenting of a considerable time period. The list of the high-carbon and low-carbon funds with more detailed information is presented in Appendix A and B.

High-carbon and low-carbon funds will be analysed, considering their financial performance from an individual perspective, but also through portfolios. As a result, it will be necessary to construct two equally weighted portfolios: the first, which is referred to as the low-carbon portfolio, is formed by US low-carbon domestic funds; the second, which is referred to as the high-carbon portfolio, is formed by US high-carbon domestic funds. In addition to these two portfolios, a portfolio of differences is also constructed, consisting in the difference between the high-carbon portfolio and the low-carbon portfolio.

The risk factors and the risk-free rate were collected from the Professor Kenneth French´s website (only the domestic ones). The benchmark was also collected from Professor Kenneth French's website. All the companies that are listed on the US market are included in this benchmark, which is based on the CRSP index. This benchmark was selected due to being more inclusive since it covers all the US companies regardless of their size or sector.

Relative to the conditional models, and based on Cortez et al. (2012), public information variables will be utilized, more precisely the dividend yield and the short-term interest rate. The dividend yield corresponds to the FTSE US index and the short-term interest rate corresponds to the 3-month US Treasury Bill. The short-term interest rate was collected from the Federal Reserve website while the dividend yield from Refinitiv Datastream. According to Ferson et al. (2003) and in order to avoid a problem related to bias due to public variables, we subtract the 12-months moving average. These variables have their corresponding mean zero values to mitigate potential scale effects on the results (Bernhardt & Jung, 1979).

Table 1 reports the descriptive statistics of the two equally weighted portfolios, the benchmark and the risk factors that concern domestic funds. This table, which covers the period January 2000 to October 2022, includes the number of observations, the mean excess returns (%), the standard deviation (%), the excess kurtosis, the skewness, the minimum, maximum, and the Jarque-Bera p-value.

Table 1. Descriptive statistics

US domestic funds								
	Observations	Mean excess returns (%)	Standard deviation (%)	Excess Kurtosis	Skewness	Min	Max	JB p-value
Low-Carbon	274	0,5240	4,3600	0,5670	-0,4200	-0,16	0,12	0,0028
High-Carbon	274	0,6070	5,6400	1,1440	-0,4420	-0,22	0,17	0,0000
Benchmark	274	0,6510	4,6000	0,8220	-0,5050	-0,17	0,14	0,0001
SMBc	274	0,1870	3,2000	9,6600	0,7760	-0,17	0,21	0,0000
SMBf	274	0,2590	3,0900	5,8000	0,4330	-0,15	0,18	0,0000
HML	274	0,2520	3,4900	2,4150	0,2400	-0,14	0,13	0,0000
RMW	274	0,4620	2,9200	8,7900	-0,3650	-0,19	0,13	0,0000
CMA	274	0,3140	2,1700	2,0190	0,8140	-0,07	0,09	0,0000
MOM	274	0,2070	5,1900	9,1900	-1,4430	-0,34	0,18	0,0000

This table summarizes the descriptive statistics of the two equally weighted portfolios, the benchmark, and the risk factors that concern US domestic funds. This table provides the statistics for the number of observations, the mean excess returns (%), the standard deviation (%), the excess kurtosis, the skewness, the minimum, the maximum, and the Jarque-Bera p-value from January 2000 to October 2022.

We can observe that the mean excess returns are all positive and close to zero. When comparing the high-carbon and low-carbon funds through their portfolios, it is possible to verify that the high-carbon portfolio presents a higher mean excess return and a higher standard deviation in relation to the low-carbon portfolio. This suggests that, although the high-carbon portfolio presents a higher return than the low-carbon portfolio, it also presents a higher volatility, indicating higher risk. The benchmark has a higher mean excess returns relative to the high-carbon portfolio and the low-carbon portfolio, and regarding the standard deviation, the value is in between the two portfolios.

The two equally weighted portfolios presented in this table have negative skewness, which indicates that there is a higher concentration of values in the left tail than in the right tail, with the left side being longer than the right. Regarding the risk factors, there are both values with negative and positive skewness. The two portfolios and the benchmark that are in the table above have excess kurtosis,

suggesting that the distribution is leptokurtic (when comparing to a normal distribution it has a positive kurtosis that is larger).

For the last column presented, this concerns the Jarque-Bera test, that consists in verifying if the data presented follows a normal distribution. As observed, the results don't follow the normal distribution, considering that the null hypothesis is rejected, and in this case, at all levels of significance (1%, 5%, and 10%). The rejection of the normal distribution, more specifically when it comes to the excess return of the funds, validates the preference to the use of conditional models rather than unconditional models (Adcock et al., 2012).

5. Empirical results

The financial performance of US low-carbon mutual funds is discussed in this chapter. The Carhart (1997) four-factor model and the Fama and French (2018) six-factor model will be used in this analysis as unconditional models. Regarding the conditional models they are based in the Christopherson et al. (1998) and will also be presented. The Wald test will be performed when it comes to conditional models. All these models will be applied to the two equally weighted portfolios (high-carbon and low-carbon portfolios), to the portfolio of differences, and to the individual funds. For the funds, a 5% significance level is used.

5.1. Unconditional models

Table 2, presents the results of the unconditional Carhart (1997) four-factor model for the two equally weighted portfolios (high-carbon portfolio and low-carbon portfolio), to the funds individually (additional details can be found in Appendices C and D), and the portfolio of differences. This information refers to domestic funds from the period of January 2000 to October 2022.

Table 2. Results of the Unconditional Carhart (1997) four-factor model.

US Domestic funds							
Portfolios	High-Carbon (1)	N+	N-	Low-Carbon (2)	N+	N-	Portfolio of differences (1)-(2)
α_p	-0,0009	37(2)	89(20)	0,0004	19(0)	14(5)	-0,0012*
β_p	1,0070***	131(131)	0(0)	0,9495***	33(33)	0(0)	0,0575***
β_{SMBc}	0,6662***	131(130)	0(0)	-0,0493***	7(4)	26(18)	0,7155***
β_{HML}	0,1152***	84(69)	47(33)	-0,0440**	12(8)	21(11)	0,1592***
β_{MOM}	0,0294	84(37)	47(11)	0,0228*	17(7)	16(1)	0,0066
$Adj.R^2$	97,16%			97,63%			82,69%

This table reports a summary of the regression estimates generated from the unconditional Carhart (1997) four-factor model, for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio), the funds individually and the portfolio of differences. N+ and N- corresponds to the number of mutual funds that have positive and negative coefficients, respectively, and the number between parentheses are the funds that are with positive or negative statistically significant coefficients, at the significant level of 5%. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented. The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

The explanatory power of this model is 97.16% for the high-carbon portfolio and 97.63% for the low-carbon portfolio. Comparing the two portfolios, the high-carbon portfolio has a lower explanatory power than the low-carbon portfolio.

Regarding the alphas, none of the values displayed in the table presents statistical significance, with the high-carbon portfolio presenting a negative value and the low-carbon portfolio a positive value. The fact that the portfolios do not present statistical significance suggests a more neutral performance of the portfolios. In terms of the funds individually, in a total of 159 funds, only 27 present statistically significant alphas, which corresponds to less than half. Observing the results presented in the portfolio of differences, it is possible to perceive that the alpha is negative and statistically significant at a 10% significance level. This result indicates that the high-carbon funds underperform the market when compared to the low-carbon funds.

Concerning the market risk, both the high-carbon portfolio and the low-carbon portfolio present positive and statistically significant betas at the 1% significance level. The values presented are considered "normal" meaning that the portfolios are positively exposed to the market. Relative to the individual funds, all the high-carbon and low-carbon funds have market betas that are positive and statistically significant, making all funds positively exposed to the market. As for the portfolio of differences, in terms of market risk, the beta is positive and statistically significant at the 1% significance level, which indicates that the high-carbon funds are more exposed to the market, in a positive way, than the low-carbon funds.

With respect to the size (SMBc) factor, the two equally weighted portfolios present statistically significant betas at a 1% significance level. The high-carbon portfolio, as can been seen in the table, presents a positive and statistically significant beta suggesting that this portfolio is more exposed to small-cap stocks. With a different perspective, the low-carbon portfolio presents a negative and statistically significant value revealing that the portfolio is more exposed to large-cap stocks. Regarding the funds individually, the high carbon funds present 130 funds with positive and statistically significant betas in a total of 131 funds, and the low-carbon funds have 18 funds with negative and statistically significant betas, in a total of 33 funds. Therefore, high-carbon funds have a greater exposure to small-cap stocks, while low-carbon funds have a greater exposure to large-cap stocks. Relative to the portfolio of differences, the beta is positive and statistically significant at 1% significance level, which means that the high-carbon funds are more exposed to small-cap stocks than the low-carbon funds.

In relation to the risk factor book-to-market (HML), both portfolios present statistically significant values, however the low-carbon portfolio presents a negative and statistically significant beta at a 5%

significance level, meaning that this portfolio is more exposed to growth stocks. On the other hand, the high-carbon portfolio has a beta that is positive and statistically significant at a 1% significance level, demonstrating that this portfolio, unlike the low-carbon one, is more exposed to value stocks. At the individual fund level, and as far as low-carbon funds are concerned, 11 funds out of 33 are negative and statistically significant, indicating that these funds are more exposed to growth stocks. Relative to the high carbon funds, 69 in 131 funds have a positive and statistically significant betas, making them more exposed to value stocks. In the portfolio of differences, it is possible to verify the existence of a positive and statistically significant value at 1% significance level, which means that high-carbon funds are more exposed to value stocks in relation to low-carbon funds.

Regarding the momentum (MOM) risk factor, only the low-carbon portfolio is statistically significant, in this case showing a positive and statistically significant beta at the 10% significance level. This suggests that the low-carbon portfolio is more exposed to strong past performance. In what concerns individual funds, 7 out of 33 low-carbon funds present positive and statistically significant betas indicating that these funds are more exposed to strong past performance. The portfolio of differences does not present a beta that is statistically significant.

After this analysis, Table 3 presents the results obtained from the unconditional Fama and French (2018) six-factor model for the two equally weighted portfolios (high-carbon portfolio and low-carbon portfolio), the funds individually (additional details can be found in Appendices E and F), and the portfolio of differences. This information refers to domestic funds from the period of January 2000 to October 2022.

Table 3. Results of the Unconditional Fama and French (2018) six-factor model.

US Domestic funds							
Portfolios	High-Carbon (1)	N+	N-	Low-Carbon (2)	N+	N-	Portfolio of differences (1)-(2)
α_p	-0,0004	46(2)	84(24)	-0,0001	12(0)	19(6)	-0,0004
β_p	0,9844***	131(131)	0(0)	0,9582***	33(33)	0(0)	0,0262
β_{SMBf}	0,6788***	131(127)	0(0)	-0,0059	12(6)	21(10)	0,6847***
β_{HML}	0,0564	80(55)	51(27)	-0,0525***	14(3)	19(8)	0,1088***
β_{RMW}	-0,0425	58(23)	73(36)	0,0946***	29(18)	4(1)	-0,1371***
β_{CMA}	-0,1619***	16(2)	114(51)	-0,0312	16(2)	17(9)	-0,1307**
β_{MOM}	0,0412**	93(48)	38(10)	0,0200*	19(9)	14(3)	0,0212
$Adj.R^2$	97,86%			97,85%			86,25%

This table reports a summary of the regression estimates generated from the unconditional Fama and French (2018) six-factor model, for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio), the funds individually and the portfolio of

differences. N+ and N- corresponds to the number of mutual funds that have positive and negative coefficients, respectively, and the number between parentheses are the funds that are with positive or negative statistically significant coefficients, at the significant level of 5%. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML), profitability (RMW), investment (CMA) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented. The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

The explanatory power of this model is not very different from the explanatory power from the unconditional Carhart (1997) four-factor model since it is around 97%, more precisely 97.86% for the high-carbon portfolio and 97.85% for the low-carbon portfolio. With this we can state that although the model is different, since it adds two new risk factors, the model's explanatory power does not present major changes. In this specific model, the high-carbon portfolio presents a higher value than the low-carbon portfolio, a different outcome from the previous model.

The high-carbon portfolio and the low-carbon portfolio do not present statistically significant alphas. The same happened in the unconditional Carhart (1997) four-factor model where the values were also not statistically significant. Therefore, we can state again that the presence of non-statistically significant alphas suggests a more neutral performance of the portfolios. Regarding the individual funds, only 32 funds in a total of 161 present statistically significant alphas, which corresponds to less than half of the total funds. In this model, the portfolio of differences loses statistical significance resulting in no significant differences in terms of performance between the high-carbon portfolio and the low-carbon portfolio, contrary to what happened with the unconditional Carhart (1997) four-factor model.

Relative to the market risk, the present betas are positive and statistically significant at the 1% significance level, as observed in the unconditional Carhart (1997) four-factor model. This means that the portfolios are, once again, positively exposed to the market. With respect to the individual funds, all of them show positive and statistically significant betas. As it was possible to observe in the unconditional Carhart (1997) four-factor model, the funds are positively exposed to the market. With respect to the portfolio of differences, the unconditional Fama and French (2018) six-factor model loses statistical significance compared to the model presented previously.

Concerning the risk factor size (SMBf), the high-carbon portfolio has a positive and statistically significant beta at the 1% significance level, as in unconditional Carhart (1997) four-factor model. This indicates that this portfolio is more exposed to small-cap stocks. On the other hand, the low-carbon portfolio lost statistical significance. Looking at the funds individually, it is possible to observe that 127 out of 131 high-carbon funds present betas that are positive and statistically significant, which

corresponds to most of the funds. This suggests, once again, that these funds are more exposed to small-cap stocks. Still regarding the risk factor size, the portfolio of differences presents a positive and statistically significant beta at the 1% significance level, as it was possible to verify in the previous model.

In relation to the risk factor book-to-market (HML), the high-carbon portfolio lost statistical significance, when comparing to the unconditional Carhart (1997) four-factor model. On the other hand, the low-carbon portfolio presents a beta that is negative and statistically significant, the same result as in the unconditional Carhart (1997) four-factor model, but this time at the 1% significance level. This negative and statistically significant beta indicates that the low-carbon portfolio is more exposed to growth stocks. Relative to the individual funds, 8 low-carbon funds in 33 have negative and statistically significant betas, meaning that these funds are more exposed to growth stocks. The portfolio of differences presents the same result as the unconditional Carhart (1997) four-factor model, by having a positive and statistically significant beta at a 1% significance level.

Regarding the profitability (RMW) risk factor, only the low-carbon portfolio presents a beta that is positive and statistically significant at a 1% significance level, suggesting that this portfolio is more exposed to companies that have a more robust profitability. When observing the individual funds, it was possible to conclude that 18 in 33 low-carbon funds present positive and statistically significant betas, indicating that these funds are exposed to companies that have a more robust profitability. The portfolio of differences, in this case, has a negative and statistically significant beta at a 1% level of significance, meaning that the high-carbon funds are more exposed to companies that have weaker profitability, than the low-carbon funds.

As for the investment (CMA) risk factor, the high-carbon portfolio has a negative and statistically significant beta at a 1% significance level, indicating that this portfolio is quite exposed to high investment firms. On the other hand, the low-carbon portfolio doesn't have a statistically significant beta. Relative to the individual funds, 51 in 130 high-carbon funds are negative and statistically, making them more exposed to high investment firms. In the portfolio of differences, it is possible to observe a negative and statistically significant beta at a 5% level of significance. This demonstrates that the high-carbon funds are more exposed to high investment firms in relation to low-carbon funds.

Finally, the momentum (MOM) risk factor presents statistically significant values in the two portfolios but with different significance levels. Relative to the high-carbon portfolio, and comparing to the unconditional Carhart (1997) four-factor model, the beta gain statistical significance by having a positive and statistically significant at a 5% significance level, meaning that the high-carbon portfolio is more

exposed to strong past performance. Still comparing to the unconditional Carhart (1997) four-factor model, the low-carbon portfolio presents a similar result by having a positive and statistically significant beta at a 10% significance level, indicating that the portfolio is more exposed to strong past performance. Looking at the funds individually, it is possible to verify that 48 in 131 high-carbon funds and 9 in 33 low-carbon funds have positive and statistically significant betas, which means that the funds are more exposed to companies that have a stronger past performance. The portfolio of differences, in this model, doesn't have statistical significance.

5.2. Conditional models

Table 4, presents the results conditional Carhart (1997) four-factor model for the two equally weighted portfolios (high-carbon portfolio and low-carbon portfolio), the funds individually (additional details can be found in Appendices G and H), and the portfolio of differences. This information refers to domestic funds from the period of January 2000 to October 2022.

Table 4. Results of the Conditional Carhart (1997) four-factor model.

US Domestic funds							
Portfolios	High-Carbon (1)	N+	N-	Low-Carbon (2)	N+	N-	Portfolio of differences (1)-(2)
α_p	-0,0011	36(0)	94(17)	0,0002	15(1)	16(7)	-0,0014*
α_{ST}	0,0012	79(9)	50(4)	-0,0008	18(1)	15(2)	0,0020*
α_{DY}	-0,0005	59(10)	72(14)	-0,001	11(1)	22(4)	0,0006
β_{p*rm}	1,0092***	131(130)	0(0)	0,9587***	33(33)	0(0)	0,0505**
β_{ST*rm}	-0,0331*	50(11)	80(18)	0,0051	23(6)	10(1)	-0,0382*
β_{DY*rm}	-0,0341	81(10)	50(4)	-0,0798	13(1)	20(1)	0,0457
β_{SMBc}	0,6936***	130(128)	1(0)	-0,0378*	13(4)	20(14)	0,7315***
$\beta_{ST*SMBc}$	-0,0063	72(16)	59(7)	0,034	12(3)	21(4)	-0,0403
$\beta_{DY*SMBc}$	0,085	94(20)	37(4)	0,1956*	25(8)	8(0)	-0,1107
β_{HML}	0,1186***	83(72)	48(29)	-0,0345**	13(8)	20(13)	0,1532***
β_{ST*HML}	0,0627**	81(20)	49(11)	0,0388*	23(5)	10(3)	0,0239
β_{DY*HML}	-0,0121	80(16)	51(2)	0,0042	13(0)	20(4)	-0,0162
β_{MOM}	0,0346	90(41)	41(16)	0,0172	19(6)	14(2)	0,0173
β_{ST*MOM}	-0,0406	55(9)	76(16)	-0,0161	12(4)	21(3)	-0,0245
β_{DY*MOM}	-0,0516	68(16)	63(3)	0,0022	15(3)	18(4)	-0,0538
$Adj.R^2$	97,18%			97,70%			82,78%

This table reports a summary of the regression estimates generated from the conditional Carhart (1997) four-factor model, for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio), to the funds individually and the portfolio of differences. N+ and N- corresponds to the number of mutual funds that have positive and negative coefficients, respectively, and the number between

parentheses are the funds that are with positive or negative statistically significant coefficients, at the significant level of 5%. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented, as well as the public information variables short-term rate (ST) and the dividend yield (DY). The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

The explanatory power of this model, once again, is very identical to the explanatory power of the unconditional Carhart (1997) four-factor model, but also to the unconditional Fama and French (2018) six-factor model, where they present values that are below 98%. In this specific case, the high-carbon portfolio presents an explanatory power of 97.18% and the low-carbon portfolio presents an explanatory power of 97.70%, making the low-carbon portfolio the portfolio with a higher value.

Relative to the conditional alphas that are related to the public information variables short-term rate and dividend yield, the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio) do not present evidence of time-varying alphas. In terms of the individual funds, 16 in 162 funds present time-varying alphas associated with the short-term rate, and 29 in 164 funds present time-varying alphas that are related with the dividend yield (this numbers correspond to the total of funds in both portfolios, high-carbon portfolio and low-carbon portfolio). However, it is possible to verify that the conditional alpha of the portfolio of differences associated with the short-term rate is positive and statistically significant at the 10% significance level. This indicates that high-carbon funds overperform the market in relation to low-carbon funds in times of higher interest rates.

Generally speaking, in the conditional betas associated with the short-term rate and the dividend yield, it is possible to verify that there are no time-varying betas in the two equally weighted portfolios for the 1% significance level. In terms of the individual funds, we can state that less than half of the funds show evidence of time-varying betas. In the portfolio of differences, it is possible to verify the existence of a conditional beta associated to the short-term rate that is negative and statistically significant at the 10% significance level, indicating that high-carbon funds are more negatively exposed to the market than low-carbon funds.

In a more specific way, we can state that, as far as the market risk of the high-carbon portfolio is concerned, the portfolio presents a conditional beta related to the short-term rate that is negative and statistically significant at the 10% significance level. This indicates that this portfolio is more exposed in a negative way to the market when the interest rates are higher. Relative to the individual funds, 18 in 130 high-carbon funds exhibits a negative and statistically significant conditional betas that are related to the short-term rate, which indicates, once again, that these funds are more negatively exposed to the market

when the interest rates are higher. The portfolio of differences also presents a negative and statistically significant conditional beta associated with the short term, meaning that the high-carbon funds are more exposed in a negative way to the market than the low-carbon funds, when the interest rates are higher.

Concerning the risk factor size (SMBc), the conditional beta related to the dividend yield of the low-carbon portfolio is positive and statistically significant at 10% significance level, meaning that this portfolio is more exposed to small-cap stocks when the dividend yield is higher. Looking at the individual funds, 8 in 33 low-carbon funds have a positive and statistically significant conditional beta associated to the dividend yield, making these funds more exposed to small-cap stocks when the dividend yield is higher.

As for the risk factor book-to-market (HML), both portfolios present positive and statistically significant conditional betas that are associated with the short-term rate, but with different significance levels, more precisely the high-carbon portfolio has a significance level of 5% and the low-carbon portfolio has a significance level of 10%. This means that both portfolios are more exposed to value stocks in times of higher interest rates.

Regarding the alpha of the conditional Carhart (1997) four-factor model it is possible to observe that the results are no different from the unconditional version of this model, where there is a presence of non-statistically significant alphas. The risk factors, when comparing with the unconditional Carhart (1997) four-factor model remain quite similar, but there are some exceptions. The two exceptions concern the size (SMBc) risk factor, where the low-carbon portfolio loses statistical significance, going from 1% significance level to 10% significance level, and the momentum (MOM) risk factor, where from one model to another lost all statistical significance, in the low-carbon portfolio.

Table 5, corresponds to the results of the Wald test for the conditional Carhart (1997) four-factor model for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio). The w1, w2 and w3 correspond to the probability values of the Wald test to no time-varying alphas, no time-varying betas, and no time-varying alphas and no time-varying betas, respectively.

Table 5. Results of the Wald test for the conditional Carhart (1997) four-factor model.

US domestic funds		
	High-Carbon	Low-Carbon
w1	0,4839	0,4869
w2	0,2072	0,0051***
w3	0,3463	0,0086***

This table reports a summary of the Wald test results of the conditional Carhart (1997) four-factor model, for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio). W1, w2 and w3 correspond to the probability values of the Wald test to no time-varying alphas, no time-varying betas, and no time-varying alphas and no time-varying betas, respectively. The time frame under consideration is from January 2000 to October 2022. The level of statistical significance for the two equally weighted portfolios is defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Based on the results, there is no evidence of time-varying alphas in the two portfolios under examination (high-carbon portfolio and low-carbon portfolio). In the low-carbon portfolio it is possible to observe, at a 1% level of significance, the existence of time-varying betas and time-varying alphas and betas.

Table 6, presents the results of the conditional Fama and French (2018) six-factor model for the two equally weighted portfolios (high-carbon portfolio and low-carbon portfolio), the funds individually (additional details can be found in Appendices I and J), and the portfolio of differences. This information refers to the domestic funds from the period of January 2000 to October 2022.

Table 6. Results of the Conditional Fama and French (2018) six-factor model.

US Domestic funds							
Portfolios	High-Carbon (1)	N+	N-	Low-Carbon (2)	N+	N-	Portfolio of differences (1)-(2)
α_p	-0,0006	45(2)	83(18)	0	11(1)	21(4)	-0,0006
α_{ST}	0,0004	77(5)	54(4)	-0,0008	13(1)	19(0)	0,0012
α_{DY}	-0,003	52(10)	79(11)	0,0002	19(1)	14(3)	-0,0033
β_{p*rm}	0,9855***	131(129)	0(0)	0,9623***	33(33)	0(0)	0,0232
β_{ST*rm}	-0,0368**	41(7)	90(20)	0,0055	16(4)	17(1)	-0,0423**
β_{DY*rm}	-0,0244	71(11)	60(7)	-0,0853*	12(2)	21(3)	0,0609
β_{SMBf}	0,7067***	128(122)	3(0)	0,0071	17(4)	16(10)	0,6996***
$\beta_{ST*SMBf}$	0,0173	88(17)	43(3)	0,0630**	17(4)	16(3)	-0,0458
$\beta_{DY*SMBf}$	0,1022	90(10)	41(4)	0,1197	22(2)	11(3)	-0,0175
β_{HML}	0,0871***	81(56)	50(25)	-0,0424***	14(2)	19(9)	0,1295***
β_{ST*HML}	0,0812**	72(5)	59(7)	0,0098	18(1)	15(3)	0,0714*
β_{DY*HML}	-0,2040*	56(6)	75(14)	-0,0277	11(1)	22(4)	-0,1762
β_{RMW}	-0,0674***	59(27)	72(36)	0,0928***	27(10)	6(1)	-0,1602***
β_{ST*RMW}	0,0334	91(16)	40(5)	0,0413	22(8)	11(0)	-0,0079
β_{DY*RMW}	0,0911	66(12)	65(7)	-0,0941	9(1)	24(7)	0,1852
β_{CMA}	-0,2009***	18(1)	113(49)	-0,0378	11(2)	22(7)	-0,1631***
β_{ST*CMA}	-0,0285	73(11)	58(2)	0,0072	20(4)	13(1)	-0,0357
β_{DY*CMA}	0,3664**	84(20)	47(4)	-0,0748	17(2)	16(3)	0,4412***
β_{MOM}	0,0523**	90(47)	41(13)	0,0185	21(7)	12(1)	0,0339
β_{ST*MOM}	-0,0570**	49(2)	82(13)	-0,0085	13(4)	20(7)	-0,0485
β_{DY*MOM}	-0,1333**	59(6)	72(15)	0,0173	15(2)	18(5)	-0,1506**
$Adj.R^2$	97,99%			97,90%			86,76%

This table reports a summary of the regression estimates generated from the conditional Fama and French (2018) six-factor model, for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio), the funds individually and the portfolio of differences. N+ and N- corresponds to the number of mutual funds that have positive and negative coefficients, respectively, and the number between parentheses are the funds that are with positive or negative statistically significant coefficients, at the significant level of 5%. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML), profitability (RMW), investment (CMA) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented, as well as the public information variables short-term rate (ST) and the dividend yield (DY). The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Starting with the explanatory power, the values are once again below 98%, but a little bit higher than the values presented in the unconditional Carhart (1997) four-factor model and in the unconditional Fama and French (2018) six-factor model. As far as portfolios are concerned, the high-carbon portfolio has an explanatory power of 97.99%, presenting the highest value, and the low-carbon portfolio has an explanatory power of 97.90%.

With respect to the conditional alphas related to the public information variables short-term rate and dividend yield, it is possible to observe that once again there are no changes regarding the performance of the high-carbon and low-carbon portfolios, since there are no time-varying alphas. Relative to the individual funds, 10 in a total of 163 funds present time-varying alphas that are associated with the short-term rate and 25 in a total of 164 funds present time-varying alphas that are associated with the dividend yield.

Concerning the market risk conditional betas that are associated with the public information variables we verify the presence of time-varying betas. Regarding the high-carbon portfolio, the portfolio presents a conditional beta related to the short-term rate that is negative and statistically significant at a 5% significance level, indicating that this portfolio is more exposed to the market in a negative way when the interest rates are higher. At the individual funds level, 20 in 131 high-carbon funds present time-varying betas associated with the short-term rate since the conditional beta is negative and statistically significant at 5% significance level. This means that these funds are more negatively exposed to the market in times of higher interest rates. The portfolio of differences has a conditional beta associated to the short-term that is negative and statistically significant at a 5% significance level, which means that the high-carbon funds are more exposed in a negative way to the market when compared to the low-carbon funds, in times of higher interest rates. Furthermore, in relation to market risk, we can verify the presence of time-varying betas associated with the dividend yield. The low-carbon portfolio has a conditional beta related to the dividend yield that is negative and statistically significant at a 10% significance level, meaning that the low-carbon portfolio is more exposed to the market in a more negative way when the dividend yield is higher. Looking at the individual funds, only 3 in 33 present a negative and statistically significant conditional beta associated with the dividend yield, indicating that these funds are more negatively exposed to the market in times of higher dividend yield.

Moving on to the size (SMBf) risk factor, the low-carbon portfolio has a conditional beta associated with the short-term rate that is positive and statistically significant at 5% significance level. This means that the low-carbon portfolio is more exposed to small-cap stocks when the interest rates are higher. Relative to the individual funds, 4 in 33 low-carbon funds have a positive and statistically significant conditional beta related to the short-term rate, meaning that these low-carbon funds are more exposed to small-cap stocks when the interest rates are higher.

Concerning the book-to-market (HML) risk factor, the high-carbon portfolio presents time-varying betas relative to the short-term rate and the dividend yield. Relatively to the short-term rate, the high-

carbon portfolio has a positive and statistically significant conditional beta at a 5% significance level, which indicates that the high-carbon portfolio is more exposed to value stocks in times of higher interest rates. In terms of individual funds, only 5 in 131 high-carbon funds have positive and statistically significant that are associated with the short-term rate, making them have the same conclusion as the high-carbon portfolio. The conditional beta related to the short-term of the portfolio of differences it's also positive and statistically significant at a 10% significance level, which means that the high-carbon funds are more exposed than the low-carbon funds to value stocks, in times where the interest rates are higher. Stil concerning this risk factor, but this time related to the dividend yield, the high-carbon portfolio has a negative and statistically significant conditional beta at a 10% significance level. Therefore, it is possible to conclude that this portfolio is more exposed to growth stocks when the dividend yield is higher. At the individual funds level, 14 in 131 high-carbon funds have a conditional beta that is negative and statistically significant, meaning that the funds are more exposed to growth stock in times of higher dividend yield.

Regarding the risk factor investment (CMA), there is a positive and statistically significant conditional beta associated to the dividend yield, at a 5% significance level, in the high-carbon portfolio, meaning that the portfolio is more exposed to low investment firms in times of higher dividend yield. When looking at the funds individually, 20 in 131 high-carbon funds present a positive and statistically significant conditional beta related to the dividend yield, making these funds having the same conclusion as the portfolio by being more exposed to low investment firms when the dividend yield is higher. The portfolio of differences has a positive and statistically significant conditional beta related to the dividend yield, at a 1% significance level. With this it is possible to conclude that the high-carbon funds are more exposed than the low-carbon funds to low investment firms in times where the dividend yield is higher.

With respect to the momentum (MOM) risk factor, the high-carbon portfolio has negative and statistically significant conditional betas that are associated with the short-term rate and the dividend yield, at a 5% significance level, indicating that the high-carbon portfolio is more exposed to poor past performance in times where the interest rates and the dividend yield are both high. In terms of the individual funds, 13 in 131 and 15 in 131 high-carbon funds are more exposed to poor past performance when the interest rates and the dividend yield are higher since they have a conditional beta that is negative and statistically significant. In the portfolio of differences, the conditional beta associated with the dividend yield is negative and statistically significant at a 5% significance level, indicating that the high-carbon funds are more exposed than the low-carbon funds to poor past performance in times of higher dividend yield.

Relative to the alphas, the results presented in this table are the same as in the unconditional Fama and French (2018) six-factor model, since the alphas do not present statistically significant values. Regarding the risk factors, and comparing to the unconditional Fama and French (2018) six-factor model, the results remain basically the same, but with some exceptions. In the risk factor book-to-market (HML) the high-carbon portfolio gains statistically significance by becoming a positive and statistically significant beta at a 1% significance level. The profitability (RMW) risk factor is another exception since the high-carbon portfolio now have a beta that is negative and statistically significant at a 1% significance level. Also, the portfolio of differences relative to the investment (CMA) risk factor gains statistical significance going from 5% to 1% significance level. Concerning the momentum (MOM) risk factor, the low-carbon portfolio has lost statistical significance.

Table 7, corresponds to the results of the Wald test for the conditional Fama and French (2018) six-factor model for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio). The w1, w2 and w3 correspond to the probability values of the Wald test to no time-varying alphas, no time-varying betas, and no time-varying alphas and no time-varying betas, respectively.

Table 7. Results of the Wald test for the conditional Fama and French (2018) six-factor model.

US domestic funds		
	High-Carbon	Low-Carbon
w1	0,5196	0,6419
w2	0,0009***	0,0100**
w3	0,0007***	0,0101**

This table reports a summary of the Wald test results of the conditional Fama and French (2018) six-factor model, for the two equally weighted portfolios (the high-carbon portfolio and the low-carbon portfolio). W1, w2 and w3 correspond to the probability values of the Wald test to no time-varying alphas, no time-varying betas, and no time-varying alphas and no time-varying betas, respectively. The time frame under consideration is from January 2000 to October 2022. The level of statistical significance for the two equally weighted portfolios is defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

As can be seen from the results, there is no evidence of time-varying alphas in the two portfolios under examination (high-carbon portfolio and low-carbon portfolio). However, it's possible to observe that the high-carbon portfolio and the low-carbon portfolio both present time-varying betas and time-varying alphas and betas. The high-carbon portfolio has time-varying betas and time-varying alphas and betas at a 1% significance level and the low-carbon portfolio has time-varying betas and time-varying alphas and betas at a 5% significance level.

These results are quite similar to those presented by Cortez et al. (2012), since it is possible to verify the existence of more time-varying betas than time-varying alphas, especially in the conditional Fama and French (2018) six-factor model, where it is possible to identify the existence of time-varying betas in the two portfolios under analysis. According to Cortez et al. (2012), this may happen due to the social criteria that are applied to the funds when they are selected, which may be contributing to a more stable performance.

6. Conclusions

The main question of this research is to determine if investing in low-carbon mutual funds requires investors to make a sacrifice to opt for this more sustainable type of investment. As far as the low-carbon literature is concerned, in general we verified that there is a predominantly positive trend in the analysed studies. However, it is important to acknowledge that the literature on this topic is still relatively limited.

This study aims to evaluate the financial performance of US low-carbon funds. For this reason, a sample composed of 131 high-carbon and 33 low-carbon funds, all domestic, was analysed using some well-known models from January 2000 to October 2022. The models in question concern the Carhart (1997) four-factor and the Fama and French (2018) six-factor model in the unconditional and conditional versions. Two equally weighted portfolios were constructed: the low-carbon portfolio that includes US low-carbon domestic funds and a high-carbon portfolio composed with US high-carbon portfolio domestic funds. A portfolio of differences was created, corresponding to the difference between the high-carbon portfolio and the low-carbon portfolio.

In general, we can conclude that there are no significant differences between the performance of low-carbon funds and high-carbon funds in all the models used for this analysis.

Relative to the market risk, the two portfolios under analysis (the high-carbon portfolio and the low-carbon portfolio) are positively exposed to the market.

In the risk factor size (SMB), there are some differences between the two portfolios. The high-carbon portfolio, in all models, exhibits a higher exposure to small-cap stocks, while the opposite happens with the low-carbon portfolio (Despite not happening in all models). When considering the portfolio differences, the high-carbon funds have a greater exposure to small-cap stocks compared to low-carbon funds.

With respect to the book-to-market (HML) risk factor, the low-carbon portfolio presents a higher exposure to growth stocks, while the high-carbon portfolio has a higher incidence in value stocks. In the unconditional Fama and French (2018) six-factor model this doesn't happen since statistical significance is not observed. Across all models, the portfolio differences, indicates that the high-carbon funds are more exposed to value stocks compared to low-carbon funds.

The momentum (MOM) risk factor showed evidence that the two portfolios are more exposed to strong past performance, although this is not consistent in all models.

In the profitability (RMW) risk factor, the low-carbon portfolio is quite constant in terms of the results presented, since it is more exposed to companies that have a more robust profitability in the model under analysis. The high-carbon portfolio, in the conditional Fama and French (2018) six-factor model, is more exposed to companies with weak profitability. Relative to the portfolio of differences, in both types of models applied (unconditional and conditional), the high-carbon funds are more exposed to companies with weak profitability compared to low-carbon funds.

The investment (CMA) risk factor reveals evidence that the high-carbon portfolio is more exposed to high investment firms. The low-carbon portfolio does not present statistical significance, meaning that the investment risk factor does not affect the returns of this portfolio. The portfolio of differences indicates that high-carbon funds are more exposed to high investment firms than the low-carbon funds.

By comparing the explanatory power of the conditional Carhart (1997) four-factor model and the Fama and French (2018) six-factor model with their unconditional versions, it is evident that the conditional models present a higher explanatory power, as noted in Cortez et al. (2012). Considering the conditional models used in this research, in general, no evidence of time-varying alphas was found. However, in the conditional Carhart (1997) four-factor model, it was possible to verify that in the portfolio of differences, the conditional alpha associated with the short-term rate presents a positive and statistically significant value, indicating that high-carbon funds overperform the market in comparison to low-carbon funds in times of higher interest rates. Concerning the risk factors, in the conditional Fama and French (2018) six-factor model, it is possible to confirm the presence of several conditional betas associated with the public information variables utilized in this research. With respect to the Wald test results we verify that there is no presence of time-varying alphas in the two models used. According to Cortez et al. (2012), this may happen due to the social criteria that are applied to the funds when they are selected, which may be contributing to a more stable performance. These results are in agreement with the results presented previously. Nevertheless, it was possible to observe the existence of time-varying betas and time-varying alphas and betas in the two models. The findings indicate that there are variations in funds depending on economic conditions over time, thus recommending the use of conditional models.

Considering these results, it can be concluded that they hold significant importance as they demonstrate that investors can align their beliefs and values in a more environmental way to their investments decisions. There is no evidence in this research of worse or better performance between low-carbon and high-carbon funds, thereby supporting this theory. Furthermore, this research has contributed

to the literature on the performance of low-carbon mutual funds by incorporating a very recent time period, but also a recent model, in this case the Fama and French (2018) six-factor model.

It is important to recognize that this dissertation has some limitations. These limitations could be addressed when developing future research. One of the biggest limitations concerns data collection, which is one of the most important steps in this research. Regarding the emission scores, there is no historical information available in order to verify if these funds have always been low-carbon since their creation. This historical issue also applies to the "Domestic" classification of the funds. Besides these issues, this research is limited to the chosen time period and region, which in this case was the USA.

In terms of future research, this topic can still be investigated using different approaches. Using an alternative benchmark with a more environmental focus or even using the S&P 500 can cause changes in the results obtained. The inclusion of global funds in the dataset to contribute to a more global perspective, as well as the use of conventional funds, could impact the outcome of the results. Furthermore, the incorporations of public information variables and the utilization of models that analyse crisis and non-crisis periods are also potential alternatives for future research.

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8. Appendices

Appendix A. List of US high-carbon domestic funds

High-Carbon Funds			
	Name	Base Date	Total Net Assets ($)
US46141Q3948	361 US SMALL CAP EQUITY FUND I	30/12/2016	10,7932
US86704E8425	AIG SMALL-CAP QUALITY FUND A	06/02/2014	30,0906
US00170L5030	AMG GW&K INTERNATIONAL SMALL CAP FUND I	30/08/1994	24,5297
US00170L8000	AMG GW&K MID CAP FUND Z DEAD - Merged:9048CT	08/01/1993	13,5387
US00171A5149	AMG GW&K SMALL CAP VALUE FUND II I	27/12/2011	53,9974
US00170J1025	AMG MANAGERS BRANDYWINE ADVISORS MCG N	09/11/2000	1,0173
US00191K7248	AQR TM SMALL CAP MULTI- STYLE FUND I	11/02/2015	18,7214
US34984Y8075	ACUITAS US MICROCAP FUND INST	18/07/2014	46,574
US74925K3427	ADARA SMALLER COMPANIES FUND	21/10/2014	431,0598
US0155654504	ALGER SMALL CAP FOCUS FUND A	03/03/2008	198,0397
US0155655006	ALGER SMALL CAP GW.FD. CL.B	03/04/1989	2,8051
US0155701040	ALGER SMALL CAP GW. INSTL.FD.CL.I	27/05/1998	73,5568
US01900C4252	ALLIANZGI MICRO CAP FD. INSTL.CL.	12/04/2010	10,7565
US01900C4179	ALLIANZGI ULTRA MICRO CAP FD.INSTL.CL.	12/04/2010	5,0448
US62827P3376	ALPHA CENTRIC LIFE SCI HEALTHCARE FUND I	29/11/2019	48,2771
US02368A5395	AMERICAN BEACON SML.CP. IDX.FD.INST.CL.	18/01/2001	0,1
US02368A1337	AMERICAN BEACON STEPHENS SMCP.GW.FD.INV.CL.	01/12/2005	15,2844
US0245246543	AMER.BEACON ZEBRA SMCP. EQ.FD.Y CL.	01/06/2010	24,8126
US03332V7819	ANCORA MICROCAP FD.CL.I	02/09/2008	13,511
US66538B3886	ATHENA BEHAVIORAL TACTICAL FUND I	15/05/2015	35,0798
US09658V5378	BMO SMALL-CAP CORE FUND I	27/12/2013	0,3741
US09658L5966	BMO SMALL CAP VALUE FUND CL.I	28/02/2011	79,2228
US1087478418	BRIDGEWAY SMALL-CAP GROWTH FUND	07/11/2003	31,4983
US1087473047	BRIDGEWAY FD.ULTRA SML.	18/12/1996	79,0487
US1087474037	BRIDGEWAY FD.ULTRA SML. CO.MKT.FD.	06/08/1999	187,7464
US1152918330	BROWN CAP.MAN.SML.CO. INV.SHS.	13/05/1997	811,7905
US1195303011	BUFFALO EARLY STAGE GROWTH FUND INVEST	02/06/2004	49,0486
US1256774019	CM ADVISORS SMALL CAP VALUE FUND	18/04/2011	14,4342
US1281203919	CALAMOS TIMPANI SMALL CAP GROWTH FUND I	23/03/2011	261,3301
US14214M7992	CARILLON SCOUT SMALL CAP FUND I	22/10/1992	238,2989

US62827L8726	CATALYST GROWTH OF INCOME FUND A	30/12/2009	0,5217
US62827L1044	CATALYST VALUE FD.CL.A DEAD - Merged:77443R	22/10/2007	4,4857
US0079896272	CHASE MID-CAP GW.FD.CL.N DEAD - Merged:271507	21/05/2003	10,5277
US52470H8152	CLEARBRIDGE SMALL CAP GROWTH FUND CL.A	05/08/1999	869,1724
US1971998547	COLUMBIA ACORN SELECT FUND I	26/08/1999	117,9241
US19765P8106	COLUMBIA DISCIPLINED SMALL CORE FUND I	18/12/1992	9,099
US19765P5961	COLUMBIA SMALL CAP GROWTH FUND I	11/10/1996	638,7917
US56166Y8755	CSC SMALLCAP VAL.FD. INSTL.CL.	22/10/2001	31,8425
US2332035045	DFA US.9-10 SML.CO.PRTF.	24/02/1986	6235,477
US98148J8403	DGHM MICRO CAP VALUE FUND INSTITUTIONAL	01/06/2016	8,0604
US98147A5680	DGHM V2000 SMALL CAP VALUE FUND INSTITUTIONAL	01/07/2010	0,4887
US9695577687	DAVENPORT SMALL CAP FOCUS FUND	31/12/2014	537,7729
US24610A8027	DEL SCG FD INSTL	30/06/2016	130,2214
US2459061022	DEL.SMID CAP GW.FD.CL.A	30/01/1987	673,2073
US2620287985	DRIEHAUS MCR.CAP GW.FD.	18/11/2013	176,3299
US3176092464	EMERALD FINANCE&BANKING INNOVATION FUND A	17/09/1997	24,8689
US3176092878	EMERALD GW.FD.CL.A	07/01/1994	81,8861
US31761R6669	EMERALD SMALL CAP VALUE FUND INSTITUTIONAL	04/12/2012	0,2528
US90386H4121	EVOLUTIONARY TREE INNOVATORS FUND I	09/09/2020	19,6934
US31421R7594	FEDERATED HERMES MDT SCG FD INST	23/09/2005	242,8825
US3163893296	FIDELITY SMALL CAP GROWTH K6 FUND	25/05/2017	1307,746
US33731W1302	FIRST TRUST/CONFLUENCE SMALL CAP VAL.FD.CL.I	13/01/2011	22,5329
US3551482066	FRANKLIN MICROCAP VAL. FD.CL.I	26/03/1996	148,2886
US56167N6967	FRIESS SMALL CAP GROWTH FUND INSTITUTIONAL	06/08/2002	4,1413
US14064D6343	FULLER&THALER BEHAVIORAL MICRO-CAP EQ FD INS	28/12/2018	16,1801
US36256V8744	GMO US SMALL CAP VALUE FUND VI	02/07/2019	58,8109
US38142V8037	GLDS.CORE STRUCD.SMCP. EQ.FD.INSTL.SHS.	26/08/1997	123,2563
US38143H1831	GOLDMAN SACHS STRUCD. SMCP.GW.FD.INSTL.CL	27/06/2007	40,3347
US39137C8753	GREAT-WEST INVESCO SMALL CAP VALUE FUND INVESTOR	07/04/2010	9,59
US41012R8299	HANCOCK HORZ BURKENROAD SMCP FD INV	04/01/2002	53,9302
US41012R5303	HANCOCK HORIZON MICROCAP FUND INSTITUTIONAL	29/05/2015	15,0958
US4115126504	HARBOR SMALL CAP GROWTH OPPS FUND ADMINISTRATIVE	03/02/2014	0,1842
US4115118436	HARBOR SML.CP.VAL.FD. INSTL.CL.	13/02/2002	1405,389
US42588P8749	HENNESY SMALL CAP FINL. FD.INVR.CL.	31/10/2012	86,55
US44929K2261	ICON OPPORTUNTIES FUND DEAD - Merged:28402X	28/09/2012	12,56

US00141T2548	INVESCO SELECT COS.FD.A SHS.	26/11/2003	209,0569
US00142J2143	IVS.SMCP.DSY.FD.CL.A DEAD - Merged:874906	02/02/2001	308,748
US4697853079	JACOB DISCOVERY FUND INSTITUTIONAL	20/01/1998	11,0889
US4697856049	JACOB INTERNET FD.INVR. CL.SHS.	06/01/2000	48,3105
US4697851099	JACOB SMCP.GW.FD.INVR. CL.SHS.	01/02/2010	3,1453
US4702598131	JAMES MICRO CAP FUND	01/07/2010	21,0831
US47803X8754	JOHN HANCOCK NEW OPPORTUNITIES FUND 1	17/10/2005	22,518
US48266A2042	KP SMALL CAP EQUITY FUND INSTL	10/01/2014	460,8403
US3499032296	LISANTI SMALL CAP GROWTH FUND	16/03/2004	60,5809
US61747T1060	MORGAN STANLEY INSIGHT FUND A	23/03/1998	662,3618
US6174405083	MORGAN STANLEY INST DISCOVERY PORTFOLIO I	26/08/1992	326,3044
US62823N8074	MUT.AM.INSTL.FUND.SMALL CAP GW.FD.	13/10/2010	17,5261
US62823N7084	MUT.AM.INSTL.FUND.SMALL CAP VAL.FD.	13/10/2010	15,0294
US63867V2189	NWIDE.SML.CO.GW.FD. INSTL.SVS.CL.	03/01/2012	132,5581
US63983V3087	NEEDHAM SMALL CAP GROWTH FUND RETAIL	23/05/2002	59,1853
US00774Q7262	NICHOLAS PARTNERS SMALL CAP GROWTH FUND INST	16/01/2019	84,3811
US66538A2996	NORTH STAR MICRO CAP I	31/05/2013	90,3865
US67064Y5454	NUVEEN SMALL/MID CAP VALUE FUND I	18/01/2007	17,1688
US00770X4363	O'SHAUGHNESSY SMALL CAP VALUE FUND I	26/02/2016	1,5058
US6743758525	OBERWEIS SMALL-CAP VALUE FUND INSTL	30/06/2014	0,2867
US66538F5531	ORCHARD SMALL CAP VALUE FUND I	29/12/2015	3,6222
US69355A8898	PPM SMALL CAP VALUE FUND INSTITUTIONAL	01/05/2018	0,01403
US6943364058	PACIFIC ADVS.SMCP.VAL. FD.CL.A	03/11/1995	3,0924
US69448A2841	PACIFIC FUNDS SMALL-CAP GROWTH INVESTOR	31/12/2014	1,6
US98147A3370	PERKINS DISCOVERY FD.	02/10/2000	7,5571
US7144022032	PERRIT MICRO CAP.OPPS. FD.	10/12/1990	53,6828
US3608751653	POLEN US SMALL COMPANY GROWTH INSTITUTIONAL	31/10/2017	68,3582
US3608738221	PRIVATE CAPITAL MAN. VALUE FD.CL.I SHS.	28/05/2010	41,75
US74318Q8649	PRO FUNDS SMALL-CAP GROWTH PRO FUND INVESTOR	20/09/2001	3,5387
US7467635493	PUTNAM SML.CAP GW.CL.A	10/07/2002	391,679
US7468026106	PUTNAM SML.CAP.VAL.A SHS.	26/07/1999	138,3139
US74926P6051	RBC ENTERPRISE FUND CL.A	19/04/2004	0,6779
US74926P3652	RBC MICROCAP VALUE I	28/11/2012	104,2245
US74968B4077	RMB MENDON FINANCIAL SERVICES FUND A	01/01/2001	67,602
US75281Y4044	RANGER MICRO CAP FUND INST	06/06/2018	6,0781

US00758M2127	RICE HALL JAMES MICRO CP.PRTF.INSTL.CL.	19/08/1996	33,9973
US7809057091	ROYCE MICO CAP.FD.INV. CL.	10/09/1993	150,0103
US7809057331	ROYCE SMALL-CAP VALUE FUND SERVICE	16/01/2002	68,5963
US7809057414	ROYCE SMALLER-COMPANIES GROWTH FUND SERVICE	16/01/2002	105,7919
US78355E5511	RYDEX SR.FUND.S&P SMCP. 600 PURE GW.FD.H CL.	14/05/2004	13,7285
US7839258370	SEI INST MGD SMALL CAP GROWTH FUND F	30/04/1992	283,3054
US81580H8034	SEGALL BRYANT & HAMILL MICRO CAP FD RTL	23/06/2008	1,0504
US81580H7044	SEGALL BRYANT & HAMILL SCV DIV FD RTL	13/12/2004	5,0564
US7849247066	STATE STREET DYNAMIC SMALL CAP FUND N	14/06/1993	17,531
US77957Q1031	T ROWE PRICE SML.CP. VAL.FD.	13/09/1988	4566,609
US88166L6526	TETON WESTWOOD MIGHTY MITES FD.CL.AAA	11/01/1999	90,7887
US87244W8394	TIAA-CREF QUANT SMALL- CAP EQUITY FUND INST	02/10/2002	1473,26
US87244W5739	TIAA-CREF INSTL.SML.CAP. BLEND INDEX FD.	02/10/2002	2425,307
US71709W7992	TAYLOR FRIGON CORE GROWTH FUND	27/12/2016	30,8361
US8939584624	TRANSAMERICA CAP.GW.CL.A	12/06/2000	328,8499
US89360T4673	TRANSAMERICA SMALL CAP CORE R4	11/09/2000	0,7444
US9032888508	USAA MUT.FD.TST.SML.CAP FD.	19/10/1999	566,095
US92647K1842	VICTORY RS SELECT GROWTH FUND A	07/08/1996	69,0052
US92647K1438	VICTORY RS SMALL CAP EQUITY FUND A	26/06/1997	33,514
US92647Q1085	VICTORY RS SMALL CAP GROWTH FUND A	01/02/1991	308,1179
US92647Y2000	VICTORY THB US SMALL OPPORTUNITIES FUND I	30/03/2012	71,697
US92913K5469	VOYA SMID CAP GROWTH FUND A	06/12/2016	0,2793
US1011562063	WALDEN SMALL CAP FUND DEAD - Merged:32656E	30/10/2008	103,0307
US9367725085	WASATCH MICRO CAP FD.	17/10/1995	514,2488
US9367935049	WASATCH MICRO CP. VAL.FD.	30/07/2003	251,9968
US9367721027	WASATCH AGRSIV.EQ.	26/03/1993	826,4263
US9367932079	WASATCH MICRO CAP VAL. FD.	24/04/1998	608,2578
US9367724096	WASATCH MID-CAP FD.	29/07/1994	937,7815
US9718973012	WILSHIRE TAR.FUND.SML. CO.GW.INV.CL.SHS.	18/05/1993	5,9385
US4614184285	ZACKS SMALL-CAP CORE FUND INVESTOR	30/06/2011	14,7323
US09253F8041	ISHARES RUSSELL 2000 SC IDX FUND INSTITUTIONAL	05/05/1997	399,0605

This table reports the high-carbon domestic funds that were collected in Refinitiv Eikon. The ISIN, the name, the base date and the total net assets were collected for each fund.

Appendix B. List of US low-carbon domestic funds

Low-Carbon Funds			
	Name	Base Date	Total Net Assets ($)
US0155664099	ALGER RESPONSIBLE INVESTING FUND A	11/01/2007	33,8181
US0228652089	AMANA MUT.FUND.TST.GW. FD.	18/07/1995	1656,682
US0228651099	AMANA MUT.FUND.TST.INC. FD.	14/06/1993	732,418
US0250831304	AMERICAN CTRY SUSTAINABLE EQTY FD A	30/11/2004	81,8726
US3608021024	AMERICAN FUNDS FUNDAMENTAL INVESTORS A	02/01/1973	55416,4
US04537W2026	ASPIRATION REDWOOD FUND	16/11/2015	128,1026
US09661D4097	BNY MELLON SUSTAINABLE US EQUITY FUND Z	02/01/1973	297,6335
US0919361206	BLKRK SUSTAINABLE ADV LRG CP CORE:INST	05/10/2015	460,4927
US74316J6800	BOSTON COMMON ESG IMPACT US EQUITY FUND	30/04/2012	49,9613
US1011561073	BOSTON TRUST WALDEN EQUITY FUND	22/06/1999	250,0793
US1152334058	BROWN ADVISORY WINSLOW SUSTBY.FD.ADVI.SHS.	29/06/2012	291,3647
US52469C7020	CLEAR BRIDGE SUSTAINABILITY LDS FD I	31/03/2015	95,586
US92046L4529	DANA EPIPHANY ESG EQUITY FUND INST	29/03/2010	57,7658
US46600A6174	DELAWARE SUSTAINABLE EQUITY INCOME FUND I	20/04/2017	90,3273
US2571321007	DOMINI IMPACT EQUITY FUND INVESTOR	26/10/1993	688,9834
US31635V3987	FID US SUSTAINABILITY IDX FD	09/05/2017	2007,054
US38144N2889	GOLDMAN SACHS US EQUITY ESG FUND A	30/11/2009	6,9364
US3927683058	GREEN CENTURY EQUITY FUND INDIVIDUAL INVESTOR	22/09/1997	271,0371
US45890C8468	INTEGRITY GROWTH & INCOME FUND A	25/04/2005	44,9365
US4812A13087	JP MORGAN US SUSTAINABLE LEADERS FUND I	03/03/2003	76,7163
US47803N7865	JOHN HANCOCK ESG LARGE CAP CORE FUND I	06/06/2016	96,5651
US52107V1879	LAZARD US SUSTAINABLE EQUITY PORTFOLIO INST	30/06/2020	12,2216
US6412246059	NEUBERGER BERMAN SUSTAINABLE EQTY FD INV	18/04/1996	326,9604
US6651623273	NORTHERN US QUALITY ESG FUND K	02/10/2017	330,564
US6707256623	NUVEEN WINSLOW LARGE-CAP GROWTH ESG FUND I	27/02/1997	362,9438
US7042234861	IMPAX LARGE CAP FUND INSTITUTIONAL	09/12/2016	1291,371
US7042234036	IMPAX US SUSTAINABLE ECON FD INDV INVES	30/01/1998	159,7849
US7236821002	PIONEER FUND CLASS A	02/01/1973	5426,41
US74006E8681	PRAXIS GW.IDX.FD.CL.I	01/05/2007	377,6621
US7469161050	PUTNAM SUSTAINABLE LEADERS FUND A	10/10/1991	4423,918
US14064D7333	REYNDERS MC VEIGH CORE EQUITY FUND INST	29/03/2019	54,0595
US92837N8166	VIRTUS SILVANT FOCUSED GROWTH FUND C	02/03/1984	18,5723

US3608767006	FUNDX SUSTAINABLE IMPACT FUND	31/03/2017	13,725

This table reports the low-carbon domestic funds that were collected in Refinitiv Eikon. The ISIN, the name, the base date and the total net assets were collected for each fund.

Appendix C. Results of the unconditional Carhart (1997) four-factor model - US high-carbon funds

US High-Carbon funds						
	α_p	β_p	β_{SMBc}	β_{HML}	β_{MOM}	$Adj.R^2$
x1	-0,0045**	1,1070***	0,8225***	0,3295***	0,2145***	97,48%
x2	-0,0027*	0,9941***	0,8586***	0,2353***	0,0916	94,82%
x3	-0,0016	0,9832***	0,7519***	0,2073***	0,1426***	84,06%
x4	-0,0006	1,0300***	0,2618***	0,1360	0,2226***	84,33%
x5	-0,0021**	0,9859***	0,6673***	0,4199***	0,0017	92,93%
x6	-0,0058***	1,0259***	0,3974***	-0,0187	0,3241***	77,94%
x7	-0,0022	1,0289***	0,6949***	0,3924***	0,1099***	96,19%
x8	0,0002	0,9976***	0,9714***	0,3599***	0,0245	92,49%
x9	0,0000	0,9575***	0,9855***	0,1486***	0,1297***	95,43%
x10	-0,0026	1,0546***	0,7384***	-0,4362***	0,0735	86,26%
x11	-0,0034**	1,1123***	0,6163***	-0,2860***	0,1340***	90,51%
x12	-0,0022	1,1198***	0,6961***	-0,2817***	0,1782***	90,68%
x13	-0,0027*	1,1582***	1,2267***	0,0092	0,1679***	93,06%
x14	-0,0014	1,1212***	1,2348***	0,0594	0,1770***	92,18%
x15	0,0042	0,3895***	0,8388***	-0,3075**	-0,1602	48,16%
x16	-0,0011**	1,0315***	0,8261***	0,2143***	0,0366***	98,49%
x17	-0,0012	1,0356***	0,7603***	-0,1952***	0,0928**	91,75%
x18	-0,0002	0,8899***	0,7530***	0,3637***	-0,0076	91,59%
x19	0,0009	0,7920***	0,8520***	0,4207***	-0,2185***	88,49%
x20	-0,0017	0,5974***	0,6080***	0,0649	-0,1934*	50,41%
x21	-0,0013	1,0274***	0,7535***	0,4261***	0,1098***	96,14%
x22	-0,0015	1,0107***	0,6179***	0,5055***	-0,0221	95,03%
x23	-0,0035**	1,1667***	0,7982***	0,1393*	0,1636***	91,03%
x24	0,0010	1,0321***	0,8193***	0,3845***	-0,0064	81,77%
x25	0,0005	0,9270***	0,7697***	0,3986***	-0,0528	86,34%
x26	0,0015	1,0084***	0,7432***	-0,2739***	0,0456	83,90%
x27	-0,0007	0,9885***	0,9474***	-0,0507	-0,0941*	85,79%
x28	-0,0021	0,8343***	0,9585***	0,5087***	-0,4102***	75,56%
x29	-0,0013	1,1101***	1,0357***	-0,2529***	0,3037***	88,02%
x30	0,0015	0,9294***	0,3105**	0,3071***	0,0611	76,07%

US High-Carbon funds (continuation)						
	α_p	β_p	β_{SMBc}	β_{HML}	β_{MOM}	$Adj.R^2$
x31	-0,0031	0,8739***	0,0135	0,3907	-0,0609	76,98%
x32	-0,0064*	0,9550***	0,7517***	-0,0945	-0,0269	65,10%
x33	-0,0005	0,9363***	0,3211***	-0,1552***	0,1412***	85,66%
x34	0,0002	1,1015***	0,5755***	-0,0819	0,0830*	89,95%
x35	0,0016	1,0362***	0,2092***	0,1151	0,0008	82,66%
x36	-0,0001	0,8965***	0,5786***	0,5520***	-0,0200	90,20%
x37	-0,0011	1,1262***	0,7371***	-0,1753***	0,1473***	88,10%
x38	-0,0024	0,9233***	0,5778***	0,3623***	-0,1968***	82,22%
x39	0,0000	0,9830***	0,9699***	0,3372***	0,0033	97,21%
x40	0,0007	0,7141***	0,7309***	0,5449***	-0,0656	88,89%
x41	-0,0024**	0,9782***	0,5661***	0,4403***	0,0583	95,11%
x42	0,0007	0,9924***	0,4501***	0,1921**	0,0188	86,25%
x43	-0,0058	1,2881***	0,9466***	-0,5557***	0,1512	80,83%
x44	0,0003	1,0816***	0,4820***	-0,4332***	0,0576*	84,05%
x45	0,0052**	1,1063***	1,5230***	-0,1806***	0,3421***	88,93%
x46	0,0002	0,8505***	0,4761***	0,5729***	0,0853	56,49%
x47	-0,0018	1,0602***	0,7786***	-0,0213	0,1367***	90,19%
x48	-0,0045*	1,0415***	0,7786***	0,3991**	0,0256	89,33%
x49	-0,0125	0,9509***	1,0492***	-0,5887***	-0,0430	79,96%
x50	-0,0022*	1,0965***	0,8545***	-0,0224	0,1652***	90,70%
x51	-0,0023	1,0682***	0,6162***	-0,1897**	0,1618**	90,03%
x52	-0,0011	0,8265***	0,4544***	0,1400***	-0,0794	87,33%
x53	0,0020*	0,6602***	0,6029***	0,5506***	-0,0477	82,99%
x54	-0,0020	1,0130***	0,9811***	-0,0190	0,2648***	86,14%
x55	-0,0072*	1,3280***	1,3716***	0,5707***	0,1716*	93,54%
x56	-0,0025	1,0431***	0,5263***	0,5805***	-0,0864	97,16%
x57	-0,0021**	1,0102***	0,7229***	0,3251***	0,0560**	93,53%
x58	-0,0050*	1,0406***	0,9709***	-0,0630	0,0782*	69,74%
x59	-0,0025	0,9528***	0,8040***	0,4540***	0,0504	91,07%
x60	0,0002	0,9432***	0,7215***	0,3316***	0,0986**	89,52%
x61	-0,0047**	0,9114***	0,8215***	0,5182***	0,0749	90,88%
x62	-0,0028	1,0714***	0,8900***	0,1150	-0,0472	87,33%
x63	0,0001	1,0311***	0,5046***	0,3275***	0,0248	92,65%
x64	0,0021	0,7744***	0,9453***	0,8246***	-0,0296	80,48%
x65	-0,0039*	1,2322***	0,8237***	0,3154**	0,0267	86,64%
x66	0,0000	0,9601***	0,4639***	0,1435	-0,1175***	85,70%

US High-Carbon funds (continuation)						
	α_p	β_p	β_{SMBc}	β_{HML}	β_{MOM}	$Adj.R^2$
x67	-0,0023*	1,0429***	0,6662***	-0,1506***	0,1702***	91,05%
x68	-0,0016	1,1506***	0,8852***	0,0572	0,1301*	75,82%
x69	-0,0024	1,4258***	0,6518***	-0,8555***	-0,2762***	74,50%
x70	-0,0043	1,0889***	1,2631***	-0,3329***	-0,2564**	76,47%
x71	-0,0025	1,0161***	0,6973***	0,4510***	0,0531	86,99%
x72	-0,0022**	1,0754***	0,6561***	0,1327***	-0,0777**	94,79%
x73	-0,0012	1,0317***	0,7506***	0,2351***	0,0825***	98,12%
x74	-0,0019	1,0380***	0,9601***	-0,1829***	0,2228***	85,20%
x75	-0,0006	1,2414***	0,4126***	-0,8140***	-0,0146	82,46%
x76	0,0000	1,1290***	0,4301***	-0,5754***	0,0424	76,05%
x77	-0,0023*	1,0194***	0,7688***	-0,1196***	0,0889**	93,30%
x78	-0,0028**	0,9157***	0,6034***	0,4725***	0,0836	92,29%
x79	-0,0014	1,0130***	0,6736***	-0,4738***	0,0342	84,17%
x80	0,0017	0,8714***	0,8335***	-0,2554***	-0,1700	74,28%
x81	0,0030	0,9929***	0,9478***	-0,2937***	0,0364	86,73%
x82	-0,0026	0,9095***	0,7324***	0,3139***	0,0225	84,28%
x83	-0,0015	1,0540***	0,5380***	0,3083***	-0,0795*	89,64%
x84	-0,0062**	1,0600***	0,7526***	0,6917***	0,0543	96,36%
x85	-0,0030*	1,0266***	0,6471***	0,6117***	0,0154	96,09%
x86	0,0000	1,0016***	0,8902***	0,5914***	-0,1603	91,32%
x87	-0,0040	1,1018***	0,7210***	0,6223***	-0,2210***	97,15%
x88	-0,0035	1,0927***	0,9175***	0,7553***	-0,0887	73,43%
x89	-0,0026*	1,0223***	0,7593***	-0,1046	0,0839	90,04%
x90	-0,0008	0,9261***	0,9489***	-0,0667	-0,0417	69,19%
x91	0,0001	0,9208***	0,9529***	0,2458***	-0,0705	86,07%
x92	-0,0040	1,1375***	0,6739***	-0,2646***	0,1205	86,49%
x93	0,0005	0,9721***	0,6662***	0,2992***	-0,1535***	88,41%
x94	-0,0017**	0,9856***	0,7714***	0,1607***	0,0836**	95,89%
x95	-0,0023*	1,0862***	0,8139***	-0,1276***	0,1001***	90,68%
x96	-0,0004	0,9959***	0,6220***	0,6654***	-0,0446	93,74%
x97	-0,0018*	0,9371***	0,8928***	0,3130***	-0,0193	91,61%
x98	-0,0003	0,8675***	0,7913***	0,5283***	0,0410	94,59%
x99	0,0031	0,6475***	0,5526***	0,6991***	-0,0167	72,82%
x100	-0,0027	1,0027***	1,1893***	-0,0698	0,2146	67,75%
x101	0,0004	0,9829***	0,7932***	0,2029***	0,0113	92,87%
x102	0,0005	0,9109***	0,7136***	0,3259***	-0,0932***	87,68%

US High-Carbon funds (continuation)						
	α_p	β_p	β_{SMBc}	β_{HML}	β_{MOM}	$Adj.R^2$
x103	-0,0005	0,9679***	0,5954***	0,2519***	-0,1105**	83,93%
x104	0,0001	1,0382***	0,8932***	-0,0882*	-0,0220	88,58%
x105	-0,0032	0,9982***	0,9752***	0,1071	-0,0301	82,04%
x106	-0,0036***	1,1641***	0,8939***	-0,0555	0,0695*	93,77%
x107	0,0005	0,7955***	0,9010***	0,2700*	0,0775**	83,25%
x108	-0,0019*	0,9277***	0,6541***	0,4480***	0,0122	93,99%
x109	-0,0017	1,0399***	0,5574***	0,3466***	0,0847***	92,28%
x110	0,0019**	0,8544***	0,5327***	0,4410***	0,0134	91,56%
x111	0,0010	0,7113***	0,4905***	0,3261***	0,0171	86,46%
x112	-0,0011	1,0190***	0,8216***	0,2315***	0,0412**	96,91%
x113	-0,0025***	1,0113***	0,8803***	0,1797***	0,0261*	95,69%
x114	-0,0017	1,2437***	0,9893***	-0,4614***	0,1543*	89,45%
x115	0,0014	1,0469***	0,2067**	-0,3507**	-0,0012	72,35%
x116	-0,0035***	1,0141***	0,7832***	0,3147***	0,0294	95,98%
x117	-0,0028***	0,9981***	0,8240***	0,1449***	0,0966***	92,20%
x118	-0,0022	1,0956***	0,6713***	-0,2717***	0,0478	85,75%
x119	-0,0007	1,0809***	0,7123***	-0,1073*	0,1694***	90,24%
x120	-0,0036**	1,1799***	0,9050***	-0,4064***	0,1202**	89,88%
x121	-0,0015	0,9842***	0,9861***	0,3839***	0,0370	92,76%
x122	-0,0048**	1,0387***	0,3917***	-0,3528***	-0,1370*	95,38%
x123	0,0003	0,7947***	0,6430***	0,1917**	0,0338	82,69%
x124	0,0026	0,9760***	0,6648***	0,0316	-0,0087	80,01%
x125	0,0018	0,9640***	0,6762***	0,0076	-0,0033	83,06%
x126	0,0021	1,0093***	0,5886***	-0,1445**	-0,0260	87,33%
x127	0,0015	0,9822***	0,5286***	0,3986***	-0,0468	86,39%
x128	0,0025	1,0692***	0,6553***	-0,2747***	-0,0358	80,98%
x129	-0,0017	1,0460***	0,6117***	0,0439	0,1022***	90,57%
x130	0,0034	0,9276***	0,6057***	0,4299***	0,1370	51,52%
x131	-0,0013***	1,0176***	0,7916***	0,2781***	0,0398	96,84%

This table reports a summary of the regression estimates generated from the unconditional Carhart (1997) four-factor model for US high-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented. The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix D. Results of the unconditional Carhart (1997) four-factor model - US low-carbon funds

US Low-Carbon funds						
	α_p	β_p	β_{SMBc}	β_{HML}	β_{MOM}	$Adj.R^2$
x1	-0,0015	1,0648***	-0,0660*	-0,2689***	0,0078	94,52%
x2	0,0019*	0,9386***	0,1230*	-0,1942***	0,0795**	89,68%
x3	0,0012	0,7919***	-0,1214***	0,1023***	0,0698***	81,03%
x4	0,0003	0,9900***	-0,1246***	-0,0077	0,0186**	98,13%
x5	0,0008	0,9409***	-0,0840***	0,0877***	-0,0113	94,15%
x6	-0,0021	1,0284***	0,2170**	0,0564	-0,0944*	87,67%
x7	-0,0013**	0,9798***	-0,0948***	-0,1314***	-0,0415*	96,16%
x8	-0,0002	0,9881***	0,0078	0,0423***	0,0060	99,17%
x9	-0,0015**	0,9358***	-0,1050***	-0,0288	-0,0363*	96,47%
x10	0,0007	0,8991***	-0,1765***	0,1051***	0,0265*	94,91%
x11	0,0010	1,0042***	-0,0348	-0,3469***	0,0667	91,32%
x12	0,0013	0,9286***	-0,0022	-0,0667***	0,0169	95,05%
x13	-0,0020***	0,9748***	-0,0671**	0,0553**	-0,0039	96,44%
x14	0,0013	0,8567***	-0,1714**	0,1972***	-0,0379	89,95%
x15	0,0039	1,0113***	-0,0256	-0,0862	-0,0849	34,07%
x16	0,0001	0,9557***	-0,1629***	-0,0187	-0,0266	97,82%
x17	-0,0016*	0,9786***	-0,0940***	-0,0715**	-0,0143	95,94%
x18	-0,0007*	0,9658***	-0,1445***	-0,0313**	-0,0336**	97,03%
x19	-0,0013	0,9505***	-0,1249***	-0,0708*	0,0569*	87,72%
x20	-0,0002	1,0191***	-0,0184	-0,0074	0,0291	95,56%
x21	0,0004	0,9440***	-0,0987**	-0,0032	-0,0143	97,13%
x22	0,0025	0,8632***	-0,1511**	-0,0869	-0,0621	94,64%
x23	0,0008	0,9288***	-0,0926*	0,1252***	-0,0325	92,04%
x24	0,0010	0,9699***	-0,1192***	0,0169	-0,0149	98,91%
x25	0,0068	0,6791***	-0,2082	-0,1486	-0,0179	17,48%
x26	0,0018	0,9493***	-0,1351***	0,0383	-0,0428	96,87%
x27	-0,0016	0,9670***	0,1416***	-0,0157	0,0966**	88,41%
x28	0,0001	0,9530***	-0,1745***	0,0742***	0,0044	95,64%
x29	0,0007	1,0253***	-0,1239***	-0,2427***	0,0285*	97,33%
x30	-0,0018**	1,1184***	0,1832***	-0,3591***	0,0394	92,13%
x31	0,0004	0,9959***	0,2674***	-0,1901***	0,1200**	95,85%
x32	-0,0016*	1,1134***	-0,0481*	-0,2972***	0,1289***	93,42%
x33	-0,0045**	0,9120***	0,0495	0,0182	0,2562**	88,35%

This table reports a summary of the regression estimates generated from the unconditional Carhart (1997) four-factor model for US low-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented.

The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix E. Results of the unconditional Fama and French (2018) six-factor model - US high-carbon funds

US High-Carbon funds								
	α_p	β_p	β_{SMBf}	β_{HML}	β_{RMW}	β_{CMA}	β_{MOM}	$Adj.R^2$
x1	-0,0044**	1,0394***	0,7577***	0,2577***	-0,1645	-0,2922*	0,1548***	97,78%
x2	-0,0022	0,9351***	0,8674***	0,1616**	-0,0336	-0,2845***	0,0917**	95,86%
x3	-0,0016	0,9706***	0,7888***	0,0950	0,0111	-0,1173	0,1493***	84,64%
x4	-0,0009	1,0239***	0,3210***	0,0931	0,0579	-0,0987	0,2227***	84,87%
x5	-0,0019*	0,9464***	0,7599***	0,2992***	0,2255**	-0,0838	0,0216	93,45%
x6	-0,0054***	0,9990***	0,4147***	-0,0270	-0,0386	-0,1775	0,3312***	78,43%
x7	-0,0023**	0,9746***	0,8093***	0,2443***	0,2961*	-0,0275	0,1389***	96,92%
x8	0,0006	0,9521***	1,0107***	0,2617***	0,0592	-0,2002	0,0566	93,61%
x9	0,0008	0,9227***	0,9505***	0,0827**	-0,0765	-0,2301**	0,1510***	96,44%
x10	0,0003	1,0163***	0,5560***	-0,4031***	-0,6088***	-0,2896***	0,1027*	89,83%
x11	-0,0016	1,0591***	0,5217***	-0,2449***	-0,2803***	-0,1898***	0,1587***	91,67%
x12	-0,0001	1,0618***	0,5788***	-0,2480***	-0,3328***	-0,1692**	0,2043***	92,08%
x13	-0,0016	1,1134***	1,1232***	-0,0843	-0,4124***	-0,2379**	0,1598***	94,01%
x14	-0,0007	1,0842***	1,1792***	-0,0709	-0,2355**	-0,1470	0,1733**	92,58%
x15	0,0104	0,4680***	0,4285	-0,2515	-0,7702*	-0,1929	-0,2107	56,41%
x16	-0,0010**	1,0179***	0,8256***	0,0746***	-0,0578***	-0,0215	0,0367***	98,79%
x17	-0,0003	1,0058***	0,7297***	-0,2222***	-0,1161**	-0,2304***	0,1139***	92,51%
x18	-0,0006	0,8786***	0,8073***	0,1917***	0,1536	0,0672	0,0013	91,77%
x19	0,0009	0,7864***	0,8638***	0,2414**	-0,0274	0,0906	-0,2144***	88,92%
x20	0,0009	0,6378***	0,3017	0,1271	-0,7183***	-0,1552	-0,2404**	54,86%
x21	-0,0010	0,9923***	0,7683***	0,3153***	0,0754	-0,0679	0,1086***	96,09%
x22	-0,0010	0,9780***	0,6151***	0,4767***	-0,0057	-0,2028*	-0,0080	95,43%
x23	-0,0035***	1,1439***	0,8154***	0,0587	0,0221	-0,1802	0,1767***	91,42%
x24	0,0005	1,0372***	0,8662***	0,1923**	0,0581	0,0087	-0,0087	82,00%
x25	0,0004	0,9233***	0,7876***	0,2375***	-0,0121	0,0138	-0,0524	86,64%
x26	0,0027*	0,9697***	0,6757***	-0,3189***	-0,2225**	-0,0888	0,0616*	84,66%
x27	0,0006	0,9510***	0,8672***	-0,0909	-0,2953***	-0,2518**	-0,0734	87,00%
x28	-0,0021	0,8814***	0,8660***	0,1836	-0,3662	0,6100*	-0,4286***	76,23%
x29	0,0004	1,0786***	0,8558***	-0,1879***	-0,4018***	-0,4381***	0,3299***	90,64%

US High-Carbon funds (continuation)								
	α_p	β_p	β_{SMBf}	β_{HML}	β_{RMW}	β_{CMA}	β_{MOM}	$Adj.R^2$
x30	-0,0014	0,9819***	0,5795***	0,0946	0,5307***	-0,0695	0,0389	81,94%
x31	-0,0024	0,8354***	0,0979	0,5272	0,2148	-0,4571	-0,0412	78,52%
x32	-0,0054*	0,9467***	0,6375***	-0,2307	-0,3412	0,1321	-0,0262	64,74%
x33	-0,0005	0,9149***	0,3575***	-0,0828	0,0754	-0,3699***	0,1544***	87,04%
x34	0,0010	1,0729***	0,5490***	-0,1215*	-0,1325**	-0,0906	0,0943**	90,58%
x35	0,0004	1,0657***	0,3349***	0,0150	0,2498***	-0,1092	-0,0094	83,88%
x36	-0,0027***	0,9680***	0,7812***	0,2588***	0,4231***	0,0219	-0,0460	93,93%
x37	0,0002	1,0788***	0,7312***	-0,1633***	-0,1254	-0,3077***	0,1709***	89,38%
x38	-0,0032*	0,9335***	0,6243***	0,1862	0,1254	0,1536	-0,2108***	82,72%
x39	0,0004	0,9679***	0,9423***	0,1784***	-0,1009**	-0,0200	0,0111	97,19%
x40	0,0008	0,6047***	0,9118***	0,4810***	0,2829*	-0,3896**	0,0009	91,46%
x41	-0,0024***	0,9608***	0,6295***	0,3872***	0,2608***	-0,1112	0,0740	95,88%
x42	0,0005	0,9570***	0,5379***	0,1199	0,1846*	-0,0854	0,0450	86,86%
x43	-0,0032	1,3143***	0,6569***	-0,4740***	-0,6350***	-0,3581*	0,1481	82,81%
x44	0,0015	1,0397***	0,4459***	-0,3944***	-0,1594**	-0,2148**	0,0773**	84,78%
x45	0,0065***	1,0698***	1,4408***	-0,3062***	-0,2302	-0,2628*	0,3593***	90,62%
x46	0,0008	0,8154***	0,5525***	0,6458***	0,0789	-0,4906**	0,1104	58,32%
x47	-0,0010	1,0254***	0,7709***	-0,0699	-0,1098*	-0,1909**	0,1531***	91,12%
x48	-0,0042	0,9928***	0,8230***	0,3252	0,1126	-0,2290	0,0461	89,75%
x49	-0,0039	1,0150***	0,4899**	-0,2971	-0,8609***	-0,6853*	0,0501	88,99%
x50	-0,0009	1,0599***	0,7979***	-0,0312	-0,1875*	-0,3006**	0,1917***	91,66%
x51	-0,0007	1,0459***	0,5426***	-0,1216	-0,1825*	-0,3473***	0,2014***	91,94%
x52	-0,0014	0,8013***	0,5585***	0,0733	0,2256***	-0,0885	-0,0499	88,60%
x53	0,0004	0,6872***	0,7387***	0,3514***	0,2641***	-0,0316	-0,0577*	85,17%
x54	-0,0010	0,9706***	0,9656***	-0,0535	-0,0930	-0,4016***	0,2725***	87,69%
x55	-0,0066*	1,3319***	1,3075***	0,2962*	-0,1450	0,0858	0,1824	93,61%
x56	-0,0035**	0,9937***	0,7005***	0,4808***	0,2933***	-0,1143	0,0102	98,23%
x57	-0,0021***	0,9990***	0,7469***	0,2154***	-0,0015	-0,0980	0,0626**	93,89%
x58	-0,0022*	0,9772***	0,8332***	0,0461	-0,4162	-0,5896	0,1262**	71,98%
x59	-0,0023	0,9348***	0,8126***	0,3803***	0,0830	-0,1312	0,0629	91,12%
x60	-0,0011	0,9570***	0,8393***	0,1754***	0,3580***	-0,1269	0,0693**	92,06%
x61	-0,0045**	0,8394***	0,9329***	0,3894***	0,1940	-0,1892	0,1043	91,69%
x62	-0,0019	1,0003***	0,7870***	0,0798	-0,3796**	-0,3382**	-0,1186	88,47%
x63	-0,0002	1,0236***	0,5639***	0,2782***	0,1569***	-0,1796***	0,0177	93,69%
x64	0,0036	0,6928***	0,8705***	1,0651***	-0,0205	-0,9143***	0,0453	85,69%
x65	-0,0025	1,0855***	0,9615***	0,3764***	0,5703***	-0,7582***	0,0388	90,50%

US High-Carbon funds (continuation)								
	α_p	β_p	β_{SMBf}	β_{HML}	β_{RMW}	β_{CMA}	β_{MOM}	$Adj.R^2$
x66	-0,0012	0,9617***	0,5671***	0,0759	0,3399***	-0,0942	-0,1058***	87,10%
x67	-0,0006	0,9687***	0,6444***	-0,0922**	-0,2253***	-0,4291***	0,1975***	92,94%
x68	-0,0013	1,1209***	0,9516***	-0,0161	0,0212	-0,2926*	0,1458**	76,98%
x69	0,0036	1,2725***	0,2958*	-0,4680***	-0,8647***	-0,5857***	-0,1992***	78,27%
x70	-0,0015	1,0582***	1,0333***	-0,2123	-0,6307***	-0,6028**	-0,2006*	80,00%
x71	-0,0026	0,9734***	0,8329***	0,3758***	0,3317***	-0,1970	0,1011*	88,41%
x72	-0,0017**	1,0599***	0,6139***	0,0722	-0,1081	-0,0976	-0,0668*	94,78%
x73	-0,0008	0,9888***	0,7250***	0,1701***	-0,0403	-0,2084***	0,0652**	98,45%
x74	0,0000	0,9840***	0,8432***	-0,1418**	-0,4037***	-0,4490***	0,2541***	87,84%
x75	0,0035*	1,1201***	0,2699***	-0,4377***	-0,4303***	-0,7929***	0,0524	86,28%
x76	0,0020	1,0590***	0,4091***	-0,3979***	-0,1647	-0,5283***	0,0804	77,82%
x77	-0,0016	0,9890***	0,6808***	-0,1534***	-0,2680***	-0,2221**	0,0856**	94,16%
x78	-0,0028**	0,9020***	0,6430***	0,3793***	0,1173	0,0000	0,0943*	92,61%
x79	-0,0004	1,0040***	0,5197***	-0,4347***	-0,3197***	-0,2600**	0,0397	85,17%
x80	0,0029	0,8498***	0,6832***	-0,4664***	-0,5550***	0,4092**	-0,1322*	78,65%
x81	0,0064**	0,9926***	0,7915***	-0,1652*	-0,3165*	-0,5483**	0,1549*	90,73%
x82	-0,0032	0,8718***	0,8473***	0,1430*	0,2887**	0,0017	0,0541	84,87%
x83	-0,0018	1,0460***	0,5720***	0,2272**	0,0930	-0,0382	-0,0709	89,81%
x84	-0,0056**	0,9815***	0,8091***	0,5807***	0,1840	-0,1321	0,0410	96,54%
x85	-0,0031**	1,0154***	0,7028***	0,4487***	0,2235	0,1582	0,0319	96,26%
x86	0,0004	0,9227***	0,9657***	0,4687***	0,2988	-0,1364	-0,1377	91,53%
x87	-0,0027	1,0497***	0,7238***	0,6096***	-0,0430	-0,3774**	-0,1678**	91,53%
x88	-0,0040	1,0911***	1,0062***	0,5613**	0,0880	-0,0977	-0,0947	74,09%
x89	-0,0026*	0,9956***	0,7829***	-0,1634	0,0313	-0,1228	0,0701	90,56%
x90	0,0007	0,8739***	0,8975***	-0,1273	-0,2854**	-0,1448	-0,0097	70,25%
x91	0,0006	0,8996***	0,9588***	0,1479*	-0,0251	-0,2233**	-0,0538	85,95%
x92	-0,0018	1,1030***	0,5646***	-0,1314	-0,0631	-0,5301***	0,2006**	87,61%
x93	0,0012	0,9327***	0,7030***	0,3800***	0,0969	-0,4579***	-0,0902*	90,39%
x94	-0,0016***	0,9716***	0,7976***	0,0735**	0,0656	-0,1644***	0,0834***	96,57%
x95	-0,0012	1,0551***	0,7374***	-0,1640***	-0,2578***	-0,2060***	0,1219***	91,43%
x96	-0,0018**	1,0176***	0,7600***	0,4662***	0,2385***	-0,0225	-0,0549*	95,37%
x97	-0,0023**	0,9233***	0,9407***	0,1782***	0,1392**	-0,0727	-0,0089	92,31%
x98	-0,0003	0,8189***	0,8922***	0,4262***	0,2723***	-0,1669**	0,0830**	95,78%
x99	0,0035	0,6224***	0,5807***	0,7409***	0,0944	-0,4212***	-0,0113	74,78%
x100	0,0033	0,9859***	0,8395***	0,3217	-0,4805	-1,1214**	0,3985**	74,48%
x101	-0,0001	0,9853***	0,8348***	0,0252	0,0448	-0,0030	0,0102	93,24%

US High-Carbon funds (continuation)								
	α_p	β_p	β_{SMBf}	β_{HML}	β_{RMW}	β_{CMA}	β_{MOM}	$Adj.R^2$
x102	-0,0006	0,9231***	0,8335***	0,1447**	0,1955***	-0,0784	-0,0978***	89,14%
x103	-0,0011	0,9677***	0,6570***	0,1508	0,1850*	-0,0884	-0,1225**	84,65%
x104	0,0021	0,9842***	0,8153***	-0,0765	-0,3452***	-0,3300***	0,0187	90,45%
x105	-0,0023**	0,9557***	0,9300***	0,1176	-0,1037	-0,4330	0,0006	83,03%
x106	-0,0013	1,0994***	0,7516***	-0,0511	-0,3993***	-0,1438*	0,0974***	95,49%
x107	0,0004	0,8074***	0,8010***	-0,0114	-0,4022	0,4785	0,0559	84,13%
x108	-0,0024**	0,9235***	0,6841***	0,3590***	0,1652***	-0,0504	0,0149	94,40%
x109	-0,0024**	1,0486***	0,6334***	0,2164***	0,1267**	-0,0953	0,0810**	92,92%
x110	0,0005	0,8770***	0,6732***	0,2705***	0,2609***	-0,0652	0,0050	93,77%
x111	-0,0004	0,7359***	0,6172***	0,1548**	0,2436***	-0,0269	0,0074	88,78%
x112	-0,0005	0,9956***	0,8017***	0,1517***	-0,1058**	-0,1337**	0,0551***	97,47%
x113	-0,0021***	0,9929***	0,8611***	0,0688***	-0,0827***	-0,0780**	0,0378***	95,97%
x114	0,0004	1,2595***	0,7488***	-0,4642***	-0,4762***	-0,2280	0,1472	90,38%
x115	0,0016	1,0317***	0,2366**	-0,3537***	-0,0136	-0,0961	0,0051	72,47%
x116	-0,0037***	1,0089***	0,7920***	0,1684***	0,0106	-0,0308	0,0213	96,20%
x117	-0,0017*	0,9595***	0,8002***	0,1190**	-0,1205	-0,2594**	0,1187***	92,88%
x118	0,0002	1,0224***	0,5663***	-0,1814**	-0,3499***	-0,2849***	0,0804**	87,88%
x119	0,0001	1,0457***	0,7204***	-0,1361**	-0,0828	-0,2283***	0,1863***	91,32%
x120	-0,0003	1,0874***	0,7178***	-0,2981***	-0,5134***	-0,3134***	0,1637***	92,42%
x121	-0,0011	0,9668***	0,9636***	0,2354***	-0,0439	-0,0402	0,0464	92,71%
x122	-0,0049**	1,0491***	0,3520***	-0,4269***	-0,1659	0,0771	-0,1459**	95,13%
x123	-0,0002	0,8069***	0,6462***	0,0120	0,0172	0,2630***	0,0285	82,90%
x124	0,0023	0,9648***	0,7555***	-0,0681	0,0918	-0,1725	-0,0040	81,36%
x125	0,0024	0,9332***	0,6579***	0,0182	-0,0771	-0,3053**	0,0214	83,93%
x126	0,0023	0,9894***	0,6296***	-0,2016***	-0,0006	-0,1626	-0,0172	88,19%
x127	0,0001	1,0053***	0,6733***	0,2220***	0,2619***	-0,0492	-0,0566	88,08%
x128	0,0038*	1,0277***	0,6046***	-0,2951***	-0,2075**	-0,1187	-0,0197	81,87%
x129	-0,0019*	1,0381***	0,6792***	-0,0443	0,0809	-0,1625**	0,1080***	91,41%
x130	0,0037	0,8408***	0,7985***	0,5601***	0,5143*	-0,6743**	0,2393***	55,32%
x131	-0,0013***	1,0097***	0,7989***	0,1178***	-0,0471**	0,0284	0,0406	97,46%

This table reports a summary of the regression estimates generated from the unconditional Fama and French (2018) six-factor model for the high-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML), profitability (RMW), investment (CMA) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented. The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix F. Results of the unconditional Fama and French (2018) six-factor model - US low-carbon funds

US Low-Carbon funds								
	α_p	β_p	β_{SMBf}	β_{HML}	β_{RMW}	β_{CMA}	β_{MOM}	$Adj.R^2$
x1	-0,0011	1,0489***	-0,0736**	-0,1532***	0,0351	-0,2583***	0,0254	95,05%
x2	0,0018*	0,9416***	0,1121**	-0,2302***	-0,0111	0,0361	0,0786**	89,55%
x3	-0,0009	0,8451***	0,0055	-0,0532	0,3040***	0,1985***	0,0434**	84,32%
x4	0,0000	0,9917***	-0,1000***	0,0131	0,0859***	-0,0174	0,0186**	98,21%
x5	0,0003	0,9511***	-0,0403	0,0704**	0,0865***	0,0143	-0,0169	94,22%
x6	-0,0012	0,9890***	0,2210***	0,1688***	0,0236	-0,3515***	-0,0499	88,67%
x7	-0,0012**	0,9785***	-0,0959***	-0,0979***	0,0079	-0,0402	-0,0394**	96,19%
x8	-0,0004	0,9793***	0,0484**	0,0259*	0,0828***	0,0062	0,0147	99,26%
x9	-0,0015**	0,9245***	-0,0790**	0,0213	0,0864**	-0,0956**	-0,0243	96,67%
x10	-0,0005	0,9283***	-0,0914***	0,0491**	0,1976***	0,0672*	0,0127	95,88%
x11	0,0014	0,9780***	-0,0567	-0,1871***	0,0323	-0,3530***	0,0936*	92,67%
x12	0,0013	0,9085***	0,0208	-0,0152	0,0873	-0,1440**	0,0334	95,38%
x13	-0,0022***	0,9700***	-0,0154	0,0555*	0,1185***	-0,0055	0,0017	96,58%
x14	-0,0003	0,8403***	0,0130	0,0778	0,3092***	0,2171***	-0,0241	91,58%
x15	0,0023	1,0442***	0,1275	-0,1564	0,3341	-0,0862	-0,0957	34,45%
x16	-0,0001	0,9462***	-0,1257***	0,0148	0,0875**	-0,0368	-0,0158	97,88%
x17	-0,0015**	0,9826***	-0,1131***	-0,0561	-0,0423	0,0118	-0,0185	95,95%
x18	-0,0012***	0,9790***	-0,1127***	-0,0373	0,0879***	0,0175	-0,0387***	97,22%
x19	-0,0019*	0,9567***	-0,0740	-0,0676	0,1855**	0,0119	0,0554*	88,11%
x20	-0,0003	1,0226***	-0,0109	-0,0210	0,0242	0,0388	0,0267	95,55%
x21	0,0000	0,9276***	-0,0345	0,0032	0,1444***	-0,0227	0,0024	97,36%
x22	0,0001	0,8521***	0,0290	0,0128	0,2528***	-0,1833**	0,0325	96,45%
x23	-0,0004	0,9561***	-0,0100	0,0490	0,1784***	0,0892*	-0,0470**	92,71%
x24	0,0001	0,9574***	-0,0400	-0,0114	0,1615***	0,0525*	-0,0069	99,26%
x25	0,0051	0,7078***	-0,0148	-0,1524	0,4011***	-0,2132	-0,0255	18,59%
x26	0,0013	0,9386***	-0,0696	0,0344	0,1314*	0,0170	-0,0317	96,98%
x27	-0,0016	0,9639***	0,1560**	-0,0299	0,0166	-0,0512	0,0989**	88,40%
x28	-0,0007	0,9725***	-0,1258***	0,0423	0,1143***	0,0742	-0,0060	95,88%
x29	0,0005	1,0247***	-0,1055***	-0,1919***	0,1174***	-0,0885**	0,0338**	97,62%
x30	0,0006	1,0590***	0,0375	-0,1862***	-0,3349***	-0,2470***	0,0708**	93,93%
x31	0,0003	0,9944***	0,2591***	-0,2607***	0,0142	0,0409	0,1181**	95,47%
x32	-0,0009	1,0920***	-0,0523*	-0,1888***	-0,0252	-0,2232***	0,1432***	93,86%
x33	-0,0051**	0,8923***	0,1397**	-0,0175	0,1553	0,0010	0,2801**	88,43%

This table reports a summary of the regression estimates generated from the unconditional Fama and French (2018) six-factor model for the low-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML), profitability (RMW), investment (CMA) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented. The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix G. Results of the conditional Carhart (1997) four-factor model - US high-carbon funds

US High-Carbon funds																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x1	-0,0014	0,0036	0,0847***	1,1000***	0,1095***	-0,0049	0,8387***	-0,0381	-0,0763	0,3615***	0,2003	3,2749***	0,2445***	-0,0064	0,8172	98,48%
x2	-0,0022	0,0089***	-0,0050	0,9959***	-0,0009	0,6484**	0,9746***	-0,0164	1,1270**	0,2512***	-0,0217	0,7734**	0,1496***	-0,0414	1,3651***	96,03%
x3	-0,0019	0,0027	0,0060	0,9763***	-0,0276	0,0016	0,7887***	-0,0547	0,7387*	0,2125***	0,0366	-0,0283	0,1812***	-0,0006	-0,0339	84,20%
x4	-0,0010	0,0033	-0,0037	1,0174***	-0,0686	0,1500	0,3094***	0,1397*	0,3266	0,1880**	0,1866**	-0,5249	0,2449***	-0,0452	-0,0900	85,41%
x5	0,0007	-0,0013	0,0405***	0,9991***	0,1164**	0,0298	0,8111***	-0,0339	1,1872**	0,4404***	-0,1557	0,3569	0,0720	-0,1416	1,5062***	94,79%
x6	-0,0066***	0,0072**	-0,0046	1,0884***	0,1434	-0,4308	0,4121***	0,1058	0,3821	-0,0141	0,0031	-0,0890	0,3016***	-0,0539	-0,3131	80,17%
x7	-0,0020	-0,0031	-0,0111	1,0325***	0,0174	0,3879	0,7586***	-0,0364	0,8118	0,3547***	-0,1500	-0,5529	0,1441***	-0,1633**	0,8377**	96,48%
x8	0,0010	-0,0024	-0,0165	1,0154***	-0,0714	0,4943*	0,9437***	0,0754	-0,0513	0,3868***	-0,3260***	0,7646*	0,0725	0,0394	1,1566***	93,11%
x9	-0,0016	0,0048**	-0,0227***	0,9584***	-0,0450	0,2298	1,0618***	-0,3006*	0,6241*	0,1146***	-0,0249	0,2720	0,1497***	-0,0305	0,5905	95,70%
x10	-0,0032*	0,0052*	-0,0093	1,0248***	-0,0202	0,2460	0,7388***	0,0971	-0,1421	-0,4663***	0,1201	-0,1420	0,1000	0,1141	-0,1043	86,44%
x11	-0,0036**	0,0031*	-0,0059	1,0801***	-0,0570	0,1625	0,6171***	0,0772	-0,0310	-0,2753***	0,1175*	-0,1669	0,1661***	0,0160	-0,2270*	90,90%
x12	-0,0021	0,0024	-0,0048	1,0805***	-0,0531*	0,1340	0,6663***	0,1700**	0,0420	-0,2569***	0,1198**	-0,1393	0,2125***	0,0799	-0,2210*	91,47%
x13	-0,0039*	0,0059	-0,0360**	1,1259***	-0,1144	0,9974***	1,1340***	0,4042	0,5378	0,0009	0,1362	0,5784	0,1521**	0,0327	0,6005	93,66%
x14	-0,0015	-0,0019	-0,0379**	1,0721***	-0,1681	0,8337***	1,0926***	0,7484**	1,2662*	0,0593	0,1729	1,0839	0,1342**	0,2839	0,5673*	93,61%
x15	0,0045	-0,0262	0,0382	0,3722	0,2800	-1,1882	0,8672	1,0729	0,0716	-0,2705	0,2096	-1,3130	-0,1803	0,9735*	-1,7182	33,61%
x16	-0,0007	0,0008	0,0052**	1,0124***	-0,0466**	-0,0421	0,8600***	0,0842**	0,2191*	0,1836***	-0,0478	0,0725	0,0410**	-0,0063	-0,0129	98,60%
x17	-0,0012	0,0008	-0,0020	1,0094***	-0,0745*	0,0889	0,7752***	0,0829	0,0731	-0,1946***	0,1346**	0,0687	0,1017**	0,0169	-0,0687	91,84%
x18	0,0019	-0,0032	0,0424***	0,8829***	0,1339**	-0,2529	0,7893***	-0,1133	-0,1539	0,3891***	-0,0630	0,0815	0,0139	-0,1229	0,4550**	92,35%
x19	-0,0013	-0,0001	-0,0247**	0,8082***	0,0085	0,0337	0,8213***	0,1338	0,0862	0,3975***	0,0786	-0,5499**	-0,1824***	0,1717**	-0,1124	88,83%
x20	-0,0099**	0,0213***	-0,0433	0,7865***	-0,3611***	-0,3484	0,1063	0,4514	-4,9118***	-0,0092	0,2515**	-0,6400	-0,3609***	-0,1517	-1,3425	58,49%
x21	0,0007	-0,0038	0,0419**	1,0137***	0,0906	0,1371	0,7564***	0,0520	0,2793	0,4509***	-0,2513	0,1263	0,1461***	-0,1295	0,2136	96,50%
x22	-0,0006	0,0002	0,0063	1,0273***	0,0000	0,3685	0,5821***	0,4093***	-0,2638	0,4672***	-0,1803*	-0,1854	-0,0295	-0,0710	0,7182*	95,56%
x23	-0,0030**	0,0025	0,0059	1,1529***	0,0066	0,2936	0,8376***	0,1345	0,2215	0,1514*	0,1543	0,0707	0,1136***	-0,0538	0,2969**	91,27%
x24	0,0005	-0,0018	0,0022	1,0467***	-0,0358	0,0687	0,8860***	0,0573	-0,0946	0,3960***	0,1392**	-0,0571	-0,0271	-0,2093***	-0,2175	82,12%
x25	0,0002	-0,0019	0,0022	0,9556***	-0,0585	-0,0353	0,8357***	-0,1269	-0,7229*	0,3770***	0,0339	0,1521	-0,0893**	-0,2246***	-0,0755	87,82%

US High-Carbon funds (continuation)																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x26	0,0014	0,0000	0,0038	0,9856***	-0,1304**	0,0658	0,7334***	0,0169	0,2209	-0,2591***	0,0157	-0,1606	0,1022**	0,0232	-0,1648	84,12%
x27	-0,0009	0,0016	-0,0122	0,9487***	-0,0514	0,0979	0,9491***	-0,0776	-0,1143	-0,0992**	0,0532	0,2778	-0,0367	0,1837***	-0,0784	86,85%
x28	-0,0042	0,0150	0,0495	0,9013***	0,1282	-1,0348*	0,7910***	1,3265***	2,5838*	0,5755***	1,1882**	-0,9371	-0,4152***	0,6257**	-0,4400	77,05%
x29	-0,0034	0,0120**	-0,0416**	1,0991***	-0,0417	0,4674	1,1221***	-0,6053	0,2290	-0,3145***	0,0599	0,5255	0,2929***	-0,3578	0,7519	88,48%
x30	0,0001	0,0038*	0,0077	0,9685***	-0,0073	-0,0470	0,4813***	-0,2075	0,3602	0,2915***	0,1849*	0,0982	0,0447	-0,3195***	-0,1407	80,13%
x31	-0,0017	-0,0057	-0,0235	0,9073***	-0,1257	-0,1682	-0,0445	0,1576	-0,5379	0,4011***	-1,3344***	3,9354**	-0,0303	-0,6950**	-0,2289	87,20%
x32	-0,0092***	0,0014	0,0009	1,1813***	0,4718***	-0,9969***	0,6847***	0,1202	-0,2771	0,0267	0,4313	0,9017	0,0015	0,2785*	-0,1661	71,18%
x33	-0,0009	0,0031	-0,0084	0,9080***	-0,0822*	0,0670	0,3154***	0,2372***	0,4765***	-0,1076*	0,1300	-0,4077*	0,1670***	-0,0297	-0,2246	86,24%
x34	-0,0007	0,0015	-0,0081	1,0910***	-0,1181***	-0,0173	0,6239***	0,0085	0,3280	-0,0614	0,1917***	-0,2232	0,1322**	-0,0572	-0,2881**	90,79%
x35	0,0008	-0,0016	-0,0087	1,0263***	-0,0500	0,1695	0,2295***	0,1013	0,4324	0,1590**	0,1133	-0,6355	0,0358	-0,0639	-0,2428	83,08%
x36	-0,0013	-0,0007	0,0007	0,9216***	0,0573	0,1367	0,6617***	-0,1696**	0,4212	0,5379***	0,1316*	0,1055	-0,0008	-0,1491**	-0,1285	92,14%
x37	-0,0014	0,0017	-0,0051	1,1094***	-0,0972*	0,1131	0,7944***	0,0423	0,3933	-0,1673**	0,1692**	-0,1006	0,1713***	-0,0683	-0,0866	88,35%
x38	-0,0040**	0,0058*	0,0005	0,9489***	-0,0393	-0,1538	0,6025***	-0,2202**	0,6496**	0,3793***	0,0897	-0,6583**	-0,1544***	0,0166	-0,1071	83,10%
x39	0,0005	0,0004	0,0040	0,9800***	0,0369	0,0069	0,9589***	0,0394	0,0566	0,3319***	-0,0489	0,1644	-0,0157	0,0139	0,0849	97,28%
x40	0,0012	0,0008	-0,0380	0,7078***	0,0146	0,6237	0,9307***	0,3642	2,0965***	0,4787***	-0,3442	0,4519	0,0192	0,0300	1,6951***	92,49%
x41	-0,0008	-0,0053	0,0183	0,9765***	-0,0615	-0,1884	0,5469***	0,3055**	0,2516	0,4157***	-0,4589***	0,0155	0,0311	-0,0883	0,4043	95,66%
x42	0,0018	-0,0009	-0,0076	0,9081***	-0,1131**	0,5615	0,6563***	0,0002	2,1617***	0,1955***	0,1184	1,1574**	0,0163	-0,1543	0,8325	89,57%
x43	-0,0127*	0,0099	-0,0541	1,2744***	-0,0840	-0,0731	1,2981***	-0,5369	2,4594***	-0,6180***	0,3760	-1,0478	0,2150	-0,2688	-0,2506	79,63%
x44	0,0003	-0,0003	-0,0088	1,0740***	-0,0661	0,0172	0,4795***	0,1451**	0,2285	-0,4164***	0,0413	-0,2789	0,0630	-0,0187	-0,0883	83,81%
x45	-0,0004	0,0120**	-0,0701**	1,1047***	-0,1279	0,3826	1,7330***	-0,7229*	2,0099**	-0,2948***	0,1800	-0,0973	0,3747***	-0,0440	0,8028	90,58%
x46	0,0008	-0,0009	0,0099	0,9049***	0,1628	-0,2281	0,5110***	-0,2991**	-0,6712	0,5032***	-0,2353	0,7479	-0,0167	-0,1158	0,4440	59,21%
x47	-0,0021	0,0025	0,0031	1,0653***	-0,0213	-0,1710	0,8237***	-0,0397	0,2120	-0,0198	0,1007**	0,2897	0,1385***	-0,0445	-0,0603	90,20%
x48	0,0005	-0,0030	0,0530***	1,0001***	0,0931	-0,1949	0,8711***	-0,3581	0,1701	0,5679***	0,0185	3,9466***	0,0499	0,0591	0,8817	93,60%
x49	-0,0625**	0,0607	-0,2400**	1,1041***	0,4151	-0,1109	1,5224**	-0,1765	2,6714	0,4471	-2,4179	4,7414*	0,5132	1,0405	1,3646	74,44%
x50	-0,0016	0,0014	0,0004	1,0787***	-0,0009	0,1865	0,8759***	0,0443	0,0932	-0,0491	-0,0240	0,0634	0,1512***	0,0308	0,2476*	90,50%
x51	-0,0027	0,0053	-0,0123	1,0309***	0,0239	-0,3539	0,8777***	-0,3283*	1,8597***	-0,1703***	-0,0579	0,7220**	0,1871**	-0,0532	0,2066	89,88%
x52	0,0008	-0,0010	0,0163	0,8086***	0,1328**	-0,1073	0,5173***	-0,0011	0,6273	0,1439***	-0,1878***	0,5690*	-0,0728	0,0450	0,9370**	88,73%

US High-Carbon funds (continuation)																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x53	0,0016	0,0003	-0,0037	0,6902***	0,0344	-0,0956	0,6815***	-0,0777	0,4607***	0,5330***	0,0084	0,0508	-0,0824**	-0,1537***	0,0975	84,21%
x54	-0,0022	0,0051	-0,0060	1,0017***	-0,0384	0,0505	1,0442***	-0,1162	0,2655	-0,0529	0,2024	0,2540	0,2121***	0,0148	0,3981***	86,59%
x55	-0,0128**	0,0116	-0,1001**	1,3689***	-0,1474	1,3448**	1,3438***	0,1385	-0,2332	0,4627***	-0,0721	-0,0168	0,2153	-0,1783	1,1537	93,52%
x56	-0,0031	0,0021	-0,0199	0,9977***	-0,0769	0,5286	0,7295***	0,1537	0,6868	0,5863***	0,0762	0,3137	-0,0977	-0,2639*	0,7791	97,00%
x57	-0,0025**	0,0019	0,0017	1,0047***	-0,0084	0,0854	0,7699***	-0,0386	0,3674*	0,3240***	0,0893**	0,0021	0,0703**	-0,0405	-0,0073	93,70%
x58	-0,0050*	0,0011	0,0023	1,0146***	0,0140	0,1896	0,9992***	-0,0749	0,3366*	-0,0622	0,0580	-0,0178	0,1218**	0,0579	-0,0353	68,42%
x59	-0,0042*	0,0003	-0,0439*	0,9829***	0,0456	0,8424***	0,7610***	-0,3408**	-1,3390	0,4050***	-0,4920***	-1,3815	0,0739*	-0,2470***	-0,0915	92,17%
x60	0,0006	-0,0064***	0,0087	0,9625***	0,0568	-0,0241	0,7309***	0,1916*	0,5157**	0,4089***	0,2173*	0,4234	0,0867*	-0,0048	0,1056	90,40%
x61	-0,0058*	0,0088	-0,0166	0,9522***	0,0323	0,7035	0,8274***	-0,0828	-0,2370	0,4877***	-0,1729	0,5031	0,1128	-0,0450	1,0739*	91,05%
x62	-0,0022	0,0000	-0,0398**	1,0007***	0,1339*	1,6235**	0,8481***	0,2702	0,6555	-0,0374	-0,6865*	2,1168*	-0,1892	0,2668	2,3089**	91,73%
x63	0,0009	-0,0032	0,0135**	1,0100***	0,0166	0,3066**	0,5117***	0,0715	-0,0391	0,3240***	0,0234	0,1968	0,0265	0,0625	0,2569*	93,09%
x64	0,0036	-0,0057	0,0028	0,8086***	0,1077	0,5941	0,9808***	-0,2983	0,5115	0,8432***	-0,6027**	-0,1721	0,1285	0,1551	2,0954*	83,29%
x65	-0,0017	-0,0007	0,0417	1,1776***	0,1215	0,6363	0,9606***	-0,4973	4,2390***	0,3076***	-0,0070	3,0982**	0,0609	0,1998	2,9138**	88,52%
x66	-0,0004	0,0039*	-0,0219**	0,9088***	-0,1570**	-0,1676	0,5044***	0,0221	0,4199	0,1239	-0,0322	-0,3753	-0,0968**	-0,0462	-0,3303**	86,22%
x67	-0,0014	0,0055**	0,0028	1,0106***	-0,0271	-0,0245	0,7152***	0,1675***	0,3519	-0,1109**	0,1386	0,2063	0,1914***	0,0755	0,0909	91,87%
x68	-0,0021	0,0023	-0,0146	1,1519***	-0,1741**	-0,1327	0,9607***	-0,1482	-0,1363	0,0375	0,1483	0,0718	0,1482	-0,0815	0,0336	76,32%
x69	-0,0036	-0,0051	-0,0142	1,4038***	-0,0879	0,3755	0,5575***	-0,0802	-1,4521*	-0,8215***	0,1359	-0,9805*	-0,1801**	0,2003	-0,2427	75,37%
x70	-0,0098***	0,0123*	-0,0963***	1,1186***	-0,2905***	0,6690	1,1790***	0,0364	0,3170	-0,4184***	-0,0005	0,3787	-0,3146***	0,3829*	-0,3646	78,44%
x71	-0,0003	-0,0037	0,0297	0,9855***	0,0105	0,1173	0,7779***	0,0310	1,1357	0,5164***	-0,2428***	0,2673	0,1156*	-0,0993	0,6174	87,26%
x72	-0,0018***	-0,0006	0,0096*	1,0699***	-0,0540**	-0,0978	0,6598***	0,2082**	0,0657	0,1406***	0,0352	0,2679	-0,0405	0,1359*	0,0636	95,25%
x73	-0,0012	0,0017	-0,0065	1,0258***	0,0486	0,2831	0,8287***	-0,2229**	1,1376*	0,2051***	-0,1926*	-0,1567	0,0960***	-0,1558**	0,4119	98,41%
x74	-0,0020	0,0006	-0,0120	1,0271***	-0,0511	-0,0084	0,9493***	0,0931	-0,0092	-0,2053***	-0,0378	-0,0554	0,2475***	0,0997	0,0088	85,03%
x75	-0,0008	-0,0015	-0,0224*	1,1916***	-0,1497**	-0,0401	0,3279***	0,0026	0,1260	-0,7921***	0,0736	-0,2454	0,0925**	0,2720***	-0,1820	84,40%
x76	-0,0003	0,0003	-0,0265*	1,0862***	-0,1488*	0,1182	0,4182***	-0,0121	-0,0397	-0,5827***	0,0412	-0,3113	0,1068	-0,0151	-0,4637*	76,60%
x77	-0,0022*	-0,0042	-0,0124	1,0211***	0,1184**	0,1639	0,7844***	-0,1978	0,0009	-0,1128**	-0,0553	-0,0178	0,0956*	-0,1466	-0,1474	93,16%
x78	-0,0025*	0,0030	0,0204	0,9172***	-0,0552	0,3168	0,5398***	0,1765	-1,2401***	0,4464***	-0,2599**	1,3646***	0,0665	0,0571	0,2296	92,98%
x79	0,0003	-0,0011	0,0246	0,9807***	0,0103	0,0164	0,7351***	-0,2516	0,5433	-0,3983***	-0,2005	0,7326	0,0652	-0,0896	-0,2495	83,77%

US High-Carbon funds (continuation)																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x80	0,0015	-0,0023	0,0032	0,8757***	-0,0294	0,1958	0,8014***	0,0944	-1,0748***	-0,2170***	0,1486	-0,2323	-0,2314**	-0,1759	-0,1033	75,19%
x81	-0,0046	0,0083	-0,0806**	0,9868***	-0,3068***	1,3814*	1,2807***	-0,3627	2,1663**	-0,3437***	0,0000	0,4949	0,2846*	-0,3497	2,6176**	88,69%
x82	-0,0006	-0,0159***	-0,0069	0,8512***	-0,1519*	0,0690	0,8014***	-0,0771	0,9678*	0,3892***	0,0870	0,4971	0,0436	-0,0423	-0,4904	87,92%
x83	-0,0020	0,0023	-0,0077	1,0189***	-0,0642	0,2377	0,6122***	0,0364	0,8141***	0,3175***	0,1955**	-0,3848	-0,0556	0,0102	0,0065	90,26%
x84	-0,0087**	0,0124	-0,0112	1,0928***	-0,1857**	-0,2869	0,7688***	0,2810	1,8374	0,5900***	-0,1256	0,4755	0,0075	-0,2096	0,6643	97,07%
x85	-0,0027*	0,0045	0,0646***	1,0434***	-0,1109	-0,7631**	0,5642***	0,5007***	0,1306	0,6113***	-0,0843	1,3502**	0,0163	0,0035	-0,4733	97,05%
x86	-0,0039	0,0037	-0,0169	0,8671***	0,0085	-3,0303***	1,0357***	0,2458	4,5076**	0,5379***	0,5749***	1,2346	-0,4022***	0,5651***	-3,0260*	94,03%
x87	-0,0031	0,0062	-0,0315	1,2315***	0,3220***	1,2242***	0,7870***	0,0866	0,4905	0,6354***	0,2598	-0,1529	-0,0857	0,1185	1,0480***	98,55%
x88	-0,0053	0,0020	-0,0182	1,1979***	0,3893	-0,3154	0,9725***	0,2460*	0,4798	0,8269***	0,5078***	0,8185	-0,1449*	-0,1783	-0,6075**	76,66%
x89	0,0019	-0,0182	-0,0685**	0,9694***	0,1664	0,4715	0,7468***	-0,0303	-0,0513	-0,2458	0,3413	-2,2484	0,1173	-0,4421*	-0,2447	90,42%
x90	-0,0004	0,0028	-0,0205	0,9221***	-0,0003	-0,1023	0,9897***	0,2115	-0,5715	-0,0818	0,0409	-0,0027	-0,1115*	-0,1009	-0,0960	69,50%
x91	-0,0003	-0,0010	-0,0090	0,9221***	-0,0599	-0,1046	0,9785***	-0,0242	0,3476	0,2473**	0,0156	-0,0678	-0,0486	-0,0878	-0,2749*	86,00%
x92	-0,0089	0,0160**	-0,0512	1,0992***	-0,0919	0,6579	1,0481***	-1,1403***	2,0685**	-0,3159***	0,0461	0,6878*	0,2189	-0,4924*	0,8332	87,43%
x93	-0,0004	0,0059	-0,0249	0,9982***	-0,0741	-0,1048	0,6886***	0,0146	0,6235	0,3150***	-0,2342*	0,4895	-0,1382**	0,0037	0,4059	88,97%
x94	-0,0014*	0,0002	0,0013	0,9763***	0,0274	-0,0062	0,7686***	0,0175	-0,0895	0,1468***	-0,0310	0,2506**	0,0942***	0,0509	-0,0289	96,02%
x95	-0,0024*	0,0029	-0,0101	1,0550***	-0,0332	0,1377	0,8386***	0,1428**	0,2808	-0,1565***	0,1177*	0,0349	0,1047***	0,0887	0,0533	90,96%
x96	-0,0007	0,0004	-0,0001	1,0048***	-0,0065	0,0211	0,6936***	-0,1619***	0,3361	0,6456***	0,0744	0,1803	-0,0423	-0,0620	0,1764	94,38%
x97	-0,0017	0,0038*	0,0028	0,9115***	-0,0007	0,1179	0,9579***	-0,0244	0,3657	0,2916***	0,1246**	0,2771	-0,0802**	-0,0964**	0,1868	91,96%
x98	0,0023*	-0,0077**	0,0033	0,8430***	0,0450	-0,1019	0,8949***	0,1690	1,4450**	0,5894***	-0,2007***	0,6294**	0,0894**	-0,0074	0,7803*	95,72%
x99	0,0034*	-0,0054*	0,0192*	0,6933***	0,1401**	-0,0800	0,5137***	-0,0225	-0,5517	0,6524***	-0,2143***	0,3166	-0,0487	0,1259	0,4004*	74,29%
x100	-0,0043	0,0104	-0,0465	0,9974***	-0,2196*	0,7975	1,6308***	-0,5990	2,5080**	-0,0301	-0,1939	1,0475*	0,4219**	-0,5855**	1,9557**	62,48%
x101	0,0001	0,0040**	0,0042	0,9935***	-0,0048	-0,1081	0,8495***	-0,0821	0,0910	0,1928***	0,0708	0,2117	0,0007	-0,0571	0,0655	93,07%
x102	-0,0003	-0,0013	-0,0099	0,9266***	-0,0386	0,0690	0,8225***	-0,0543	0,5182**	0,3238***	0,1995***	-0,1082	-0,0974**	-0,1689***	0,0290	89,08%
x103	-0,0011	0,0034	0,0098	0,9704***	-0,0433	0,0324	0,6521***	0,2601**	0,4478	0,2978***	0,2462**	-0,3399	-0,1545***	-0,1094	0,0603	85,14%
x104	0,0000	0,0015	0,0020	1,0333***	-0,0833*	-0,0483	0,9052***	-0,0067	0,0054	-0,0950*	0,0685	0,0006	-0,0070	0,0594	0,0527	88,44%
x105	-0,0026	-0,0028**	0,0082	0,9923***	0,0469	0,0468	0,9265***	-0,0854	-0,5332**	0,0936	-0,0817*	0,3683**	0,0293	0,1669**	-0,0426	82,24%
x106	-0,0038***	0,0025	-0,0047	1,1291***	-0,0399	0,1047	0,8630***	0,0717	0,1795	-0,0338	0,1174**	-0,1666	0,1223***	0,1564***	-0,0656	94,69%

US High-Carbon funds (continuation)																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x107	-0,0004	-0,0010	-0,0085	0,8400***	0,3671**	0,2365	0,8328***	0,2885	-0,5164*	0,2706	-0,0145	0,3004	0,0423	0,1100	-0,0034	84,71%
x108	-0,0012	0,0020	0,0080	0,8859***	-0,1055	0,0654	0,6616***	0,1938**	0,1529	0,4403***	-0,1293	-0,1493	0,0300	-0,0373	-0,0704	94,19%
x109	-0,0019*	0,0023	0,0012	1,0424***	0,0368	0,2026	0,6186***	-0,0831	0,2887	0,3548***	0,1740**	0,1921	0,0982***	-0,0061	0,2006*	92,86%
x110	0,0015*	-0,0005	0,0010	0,8616***	-0,0233	0,0838	0,6120***	-0,0603	0,5591*	0,4316***	0,0540	0,0144	0,0133	-0,1616***	-0,0471	92,75%
x111	0,0008	0,0005	0,0014	0,7619***	0,0870**	-0,3161**	0,5584***	-0,0051	0,1530	0,3214***	0,0506	0,2919	-0,0572**	-0,1298***	0,1935*	89,37%
x112	-0,0009	0,0011	0,0048*	1,0124***	0,0157	0,0233	0,8476***	-0,0347	0,2500*	0,2246***	0,0092	0,1173	0,0406*	0,0194	0,1136*	96,92%
x113	-0,0020***	-0,0020	0,0064***	1,0044***	0,0037	-0,0009	0,8871***	0,0456	0,1134	0,1822***	-0,0008	0,2461***	0,0315	0,0426	0,0999*	95,68%
x114	-0,0061	0,0086	-0,0294	1,2910***	-0,2285***	1,5509***	0,9624***	-0,6551	-0,5472	-0,4938***	-0,1562	-0,1725	0,3146*	-0,3404	0,8863	91,41%
x115	0,0020	-0,0011	-0,0144	1,0162***	-0,0626	0,2002	0,2130**	0,0395	-0,0697	-0,3853**	-0,1400	-0,0601	-0,0135	-0,1142	-0,1780	72,62%
x116	-0,0032***	0,0014	0,0111*	1,0088***	-0,0096	0,0596	0,8017***	0,0538	0,1371	0,3382***	0,0792	0,1219	0,0340	0,0227	0,1453*	96,05%
x117	-0,0017	-0,0011	0,0058	0,9736***	-0,0149	0,1235	0,8004***	0,1903**	0,3059	0,1541***	0,0169	0,2356*	0,0797*	0,0716	0,2420**	92,69%
x118	-0,0026*	-0,0012	-0,0025	1,0848***	0,0143	0,0701	0,6481***	-0,0953	0,1280	-0,2646***	0,0535	-0,0991	0,0947**	0,1572**	0,1227	85,90%
x119	-0,0007	0,0025	0,0056	1,0853***	0,0096	-0,1857	0,7150***	-0,0147	0,2524	-0,1077*	-0,0543	0,1783	0,1714***	-0,0153	-0,1194	90,14%
x120	-0,0035**	0,0025	-0,0045	1,1458***	-0,0655	-0,1359	0,8358***	0,1853**	0,1759	-0,3648***	0,1216*	-0,0308	0,1703***	0,2340***	-0,0844	91,41%
x121	-0,0009	-0,0045	-0,0107	0,9820***	-0,1608**	0,7151***	0,9345***	0,1566	-0,4852	0,3930***	-0,0783	0,7732**	0,0439	-0,0321	0,8863*	93,31%
x122	-0,0049	-0,0012	-0,0129	1,1067***	0,0410	0,1609	0,3187**	0,0528	-2,1781*	-0,2790*	0,2302	-1,4142*	-0,0923	-0,0024	-1,1594*	95,96%
x123	-0,0002	0,0032	0,0008	0,8273***	0,6323***	-0,2705	0,5845***	0,0960	-0,1949	0,2494***	-0,3061	0,3587	-0,0043	0,0144	-0,3170	90,75%
x124	0,0022	-0,0007	-0,0034	0,9621***	-0,1650***	0,2022	0,7499***	-0,1289	-0,0183	0,0144	0,1462	0,0216	0,0214	-0,1520**	-0,0599	81,20%
x125	0,0003	0,0007	-0,0283***	0,9348***	-0,1101*	0,1764	0,7177***	0,1117	0,2838	-0,0117	0,4133***	-0,3924	-0,0303	0,0229	-0,0667	84,97%
x126	0,0020	-0,0024	0,0039	0,9956***	-0,1029**	-0,0090	0,5901***	0,0047	0,0989	-0,1272*	0,1071	0,1311	0,0130	0,0349	-0,0439	87,63%
x127	0,0007	-0,0005	-0,0107	0,9936***	-0,0491	-0,0024	0,6170***	-0,0854	0,3546	0,3908***	0,1109	-0,1005	-0,0389	-0,2003***	-0,2548	87,41%
x128	0,0021	-0,0020	-0,0169	1,0338***	-0,1984***	0,2605	0,6922***	0,0873	-0,1012	-0,2579***	0,2650**	-0,2868	0,0112	-0,0542	-0,1983	82,22%
x129	-0,0019*	0,0014	0,0019	1,0476***	-0,1035***	0,0081	0,6722***	-0,0422	-0,0276	0,0377	0,0922	0,0642	0,1041**	-0,1132*	-0,0115	90,85%
x130	0,0081	-0,0118	0,0387	0,8823***	0,1078	-0,1325	0,6867***	0,2406	1,1647**	0,5122***	-0,3608***	1,1707**	0,1705*	0,0171	1,3178***	49,58%
x131	-0,0013**	0,0015*	0,0066**	1,0146***	-0,0309	-0,0164	0,8256***	-0,0038	0,2047	0,2809***	0,0792*	0,1887**	0,0435	-0,0273	0,0315	96,98%

This table reports a summary of the regression estimates generated from the conditional Carhart (1997) four-factor model for the high-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented, as well as the public information variables short-term rate (ST) and the dividend yield (DY). The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically

significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix H. Results of the conditional Carhart (1997) four-factor model - US low-carbon funds

US Low-Carbon funds																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x1	-0,0020**	-0,0005	-0,0101	1,0603***	-0,0031	-0,0940	-0,0647	-0,0024	0,2247	-0,2547***	-0,0099	-0,0775	0,0359	-0,0166	-0,2576***	94,67%
x2	0,0018*	-0,0008	-0,0009	0,9344***	0,0339	-0,1712*	0,0707*	0,1111**	0,3284**	-0,1591***	0,0492	-0,0239	0,1046***	0,1625***	-0,0378	90,91%
x3	0,0009	0,0005	0,0100**	0,8202***	0,0173	-0,1931*	-0,0808**	0,0152	0,2683*	0,1190***	0,0721*	0,1053	0,0523*	-0,0556	0,0606	81,40%
x4	0,0000	0,0010	-0,0015	0,9955***	0,0338***	-0,0801*	-0,1071***	-0,0165	0,2395**	-0,0129	0,0069	0,0169	0,0188*	0,0320**	0,0543	98,29%
x5	0,0004	0,0011	-0,0004	0,9488***	-0,0381	-0,0578	-0,0360	0,0022	0,3417**	0,0962***	0,1014***	-0,0392	-0,0060	-0,0575*	-0,0074	94,54%
x6	-0,0045	0,0098	-0,0264	0,9885***	-0,1082**	0,6107	0,3967***	-0,4910**	1,2364*	0,0626	-0,0635	0,5962	-0,0533	-0,2245	0,1011	88,48%
x7	-0,0013**	0,0004	-0,0022	0,9805***	-0,0324	-0,0323	-0,0752***	0,0533	0,0137	-0,1272***	0,0595*	0,0354	-0,0513*	-0,0498*	-0,0419	96,17%
x8	0,0000	-0,0016	0,0041	0,9777***	0,0252	-0,1338	0,0220	0,0078	0,2011	0,0373**	0,0404**	-0,1357	-0,0030	0,0733***	-0,1603	99,16%
x9	-0,0019**	0,0021	-0,0027	0,9375***	0,0090	-0,0060	-0,1003***	-0,0867	-0,0654	-0,0451	0,0157	0,0858	-0,0451**	0,0036	0,0940	96,32%
x10	0,0006	-0,0013	0,0004	0,9111***	0,0165	-0,0307	-0,1475***	-0,0441	0,1053	0,0985***	0,0052	0,1012	0,0140	-0,0743***	-0,0091	95,30%
x11	0,0019	-0,0004	-0,0023	0,9748***	0,0516	0,5986**	0,0953*	-0,5253***	0,9847**	-0,3087***	-0,2548***	0,3527	0,1615***	-0,2237*	0,7693**	92,49%
x12	0,0018	-0,0012	-0,0059	0,9276***	0,0333	0,2025	0,0029	0,0184	-0,1095	-0,0664***	-0,0192	-0,0764	0,0336	-0,1149*	0,3391	95,15%
x13	-0,0022***	0,0007	-0,0078	0,9666***	0,0137	0,0365	-0,0361	-0,0474	0,4612**	0,0531*	-0,0112	-0,1747	0,0085	-0,0143	0,0058	96,39%
x14	0,0024	0,0008	0,0193	0,8654***	0,0226	0,0434	-0,0067	-0,1712	0,9434*	0,2016***	-0,0365	0,0572	0,0657	-0,1193	1,1366**	90,12%
x15	0,0041	0,0007	0,0029	1,0364***	-0,0288	-0,2184	0,0396	-0,0667	-0,0979	-0,1115	-0,0345	0,4214	-0,1334	-0,2123*	-0,0760	32,26%
x16	-0,0005	0,0006	-0,0067	0,9544***	0,0284	-0,1662	-0,1156***	-0,0651	0,3638	-0,0226	0,0115	-0,1173	-0,0188	0,0231	-0,0875	97,55%
x17	-0,0028***	0,0035	-0,0151**	0,9899***	0,0045	0,0742	-0,1213***	0,1415	-0,1273	-0,1097***	0,0958**	-0,1634	-0,0395	0,0158	0,0395	96,08%
x18	-0,0007*	-0,0005	-0,0019	0,9712***	0,0199	-0,0471	-0,1520***	-0,0645*	-0,1595*	-0,0422***	-0,0639**	0,0372	-0,0363**	-0,0182	-0,0728**	97,19%
x19	-0,0015	-0,0006	0,0030	0,9513***	0,0630**	0,1581	-0,0852*	-0,0817	0,2548	-0,0652**	0,1573***	-0,0857	-0,0078	-0,1165**	0,1632*	89,34%
x20	-0,0012*	0,0030**	-0,0120***	1,0211***	0,0091	0,0441	0,0095	-0,1151*	0,2657	-0,0179	0,0696*	-0,3747***	0,0167	-0,0452	-0,0420	96,20%
x21	-0,0010	0,0029	-0,0143	0,9462***	-0,0183	0,0880	0,0066	-0,1074	0,7552**	-0,0164	0,0281	-0,0848	0,0287	-0,0748	0,3650*	97,00%

US Low-Carbon funds																
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBc}	$\beta_{ST*SMBc}$	$\beta_{DY*SMBc}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x22	0,0012	0,0072	-0,0039	0,7913***	0,1880***	-0,6602	0,2180	-1,1261***	2,0581**	-0,2946***	0,3191**	-1,2095***	0,1450	-0,3957*	0,9823***	95,86%
x23	0,0001	-0,0001	-0,0012	0,9413***	0,0146	0,0466	-0,0638**	-0,0959*	-0,0597	0,1248***	0,0398	-0,2107	-0,0204	-0,0538	-0,0878	92,37%
x24	0,0009	-0,0013	0,0023	0,9669***	0,0454***	-0,1931	-0,0793**	-0,0399	0,2997	0,0169	0,0324	-0,2665	-0,0027	0,0391	-0,1191	98,88%
x25	0,0079	-0,0172	0,0078	0,7589***	0,2039*	-0,6314*	-0,2709	0,2827	0,4654	-0,0969	0,0174	0,8147	-0,1407	0,1436	0,7755	20,25%
x26	0,0031***	-0,0054**	0,0088	0,9400***	0,1039***	-0,5629***	-0,1191**	0,0339	0,0933	0,0521**	0,0674	-0,3515**	-0,0617	0,0725	-0,4401*	97,48%
x27	-0,0016	0,0014	-0,0019	0,9676***	-0,0215	-0,1532	0,1374***	0,1549**	0,4428	0,0078	0,0158	-0,1088	0,0979***	-0,0186	-0,1833	88,67%
x28	-0,0001	0,0001	-0,0083***	0,9484***	0,0010	0,0879	-0,1412***	-0,0167	0,2601**	0,0645***	0,0352	-0,0564	0,0042	-0,0657*	-0,0550	95,91%
x29	0,0001	-0,0006	-0,0057*	1,0300***	0,0372**	0,0108	-0,1473***	-0,1616***	0,0294	-0,2350***	-0,0596***	-0,2297***	0,0631***	-0,0055	-0,2008***	97,70%
x30	-0,0019**	0,0010	-0,0053	1,1044***	-0,0027	-0,0143	0,1501***	0,0863	0,3333*	-0,3359***	0,0711	-0,1833	0,0683	0,1660***	0,1153	93,09%
x31	0,0020	0,0008	0,0062	0,9689***	0,0575	-0,0238	0,2365**	-0,3367	-0,3556	-0,1909***	0,0731	0,0657	0,0464	-0,2785**	-0,0082	96,53%
x32	-0,0019**	-0,0024*	-0,0093**	1,1075***	-0,0235	-0,1070	-0,0831***	0,1100***	0,1231	-0,2697***	0,0483	-0,1544	0,1526***	0,0441	-0,2537**	93,78%
x33	-0,0025	-0,0088**	0,0135	0,9533***	-0,0211	0,4939	0,0208	-0,0649	-0,2597	0,0135	-0,2157	0,1795	0,4152***	0,0586	1,8627*	91,38%

This table reports a summary of the regression estimates generated from the conditional Carhart (1997) four-factor model for the low-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML) and momentum (MOM). The regressions' adjusted coefficient of determination ($Adj.R^2$) is also presented, as well as the public information variables short-term rate (ST) and the dividend yield (DY). The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix I. Results of the conditional Fama and French (2018) six-factor model - US high-carbon funds

	US High-Carbon funds																				
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x1	-0,0018	0,0076	0,0797***	0,9759***	0,1482**	-0,6684	0,8975***	0,0463	0,6926	0,2049*	0,5394	3,6938***	0,2755	-0,1045	3,1387*	-0,1429	-0,5031	-2,4925	0,1822	0,0294	0,7280	98,47%
x2	-0,0012	0,0067*	0,0188	0,9763***	-0,1599***	0,3968	0,9106***	0,2472**	0,1188	0,1797***	-0,0072	0,7614**	-0,1639*	0,7417***	-1,4518*	-0,1913**	0,1967	0,0574	0,1428***	0,0831	0,5205	96,53%
x3	-0,0016	0,0009	0,0119	0,9585***	-0,0149	-0,0743	0,8472***	0,0165	0,6062	0,0822	0,0532	-0,0956	-0,0138	0,1433	-0,7300**	-0,0658	-0,0699	-0,2205	0,2000***	0,0109	0,0596	84,86%
x4	-0,0015	0,0050*	-0,0067	1,0127***	-0,0596	0,1651	0,3570***	0,1216	0,2553	0,1485*	0,1370	-0,6447*	0,0745	-0,0865	0,3334	-0,1576	0,0918	-0,2026	0,2350***	-0,0610	-0,1541	86,13%
x5	0,0007	-0,0005	0,0452***	0,9793***	0,1804**	-0,0464	0,9049***	-0,1041	0,8128	0,2935***	-0,0051	0,0870	0,3205***	-0,1519	0,6433	0,0512	-0,1866	1,2217**	0,0909**	-0,2100*	1,3001***	95,35%
x6	-0,0063***	0,0063**	-0,0035	1,0632***	0,1580	-0,4604	0,4515***	0,1352	0,3384	-0,0167	-0,0739	-0,2975	0,0375	0,1576	-0,2148	-0,2756*	-0,0530	-0,7411	0,2922***	-0,1354	-0,3379	81,31%
x7	-0,0018	-0,0039	-0,0073	0,9903***	0,0024	0,2437	0,7997***	0,2291**	0,7381	0,2341***	-0,0432	-0,4435	0,2901***	0,4885*	0,5259	-0,0955	0,0596	-1,1761*	0,1411***	-0,0607	0,6806	97,22%
x8	0,0011	-0,0031	-0,0210	0,9610***	-0,0270	0,2493	0,9205***	0,1556	-0,2794	0,2894***	-0,2790*	1,0010*	0,1738	-0,2248	1,2145	-0,2013	0,0800	-0,7820	0,0621	0,0209	1,0558**	93,86%
x9	0,0000	0,0021	-0,0123	0,9221***	-0,0628	0,1089	0,9629***	-0,1597	-0,0431	0,0631	-0,0067	0,0758	-0,1263	0,0947	-0,3802	-0,2898**	0,1877	0,2310	0,1413***	-0,0367	0,0772	96,55%
x10	-0,0009	0,0042	-0,0129**	0,9946***	-0,0035	0,0022	0,5562***	0,0592	0,1134	-0,4000***	0,1312	0,0134	-0,5546***	0,0024	0,6890**	-0,4087***	0,2523**	-0,4724	0,1097*	0,0261	-0,2095	90,12%
x11	-0,0018	0,0009	-0,0111	1,0407***	-0,0632*	0,1282	0,5472***	0,1129	0,2947	-0,2497***	0,1459	-0,1609	-0,2751***	0,1412*	0,9065***	-0,1739**	-0,0688	-0,1082	0,1912***	-0,0572	-0,3884***	92,26%
x12	-0,0005	0,0004	-0,0098	1,0418***	-0,0561*	0,1035	0,5841***	0,1793***	0,3310	-0,2419***	0,1530	-0,1229	-0,2939***	0,0760	0,7645***	-0,1533*	-0,0742	-0,1189	0,2338***	0,0163	-0,3553**	92,69%
x13	-0,0019	0,0027	-0,0140	1,1030***	-0,2921***	0,8698***	0,9816***	0,7854**	0,0077	-0,0442	-0,1199	0,2884	-0,5588***	1,2826***	-0,6757	-0,2946**	0,6216	-1,6402	0,1438**	0,3249	0,4228	94,95%
x14	-0,0002	-0,0067	-0,0291**	1,0484***	-0,1693	0,7858***	0,9859***	0,9795***	0,9957	-0,0174	-0,3355	0,1098	-0,3338***	0,4734	-0,2649	-0,1902	1,0288**	0,3074	0,1345**	0,4599	0,3512	94,02%
x15	0,0273	0,0099	0,1279	0,3929	-0,0612	-3,0049**	0,0587	0,3838	-0,7091	-0,3670	-0,4183	-3,4725	-1,1291	1,2306	-0,1348	-0,2106	1,9518	2,9415	-1,4207	-0,3407	-7,4025	54,95%
x16	-0,0007*	0,0005	0,0058***	1,0055***	-0,0506**	-0,0723**	0,8514***	0,0764*	0,2135*	0,0448	-0,0190	0,0596	-0,0575**	0,0030	-0,0806	0,0122	-0,0371	-0,0136	0,0405**	0,0019	0,0178	98,83%
x17	-0,0005	0,0009	-0,0047	0,9859***	-0,0852**	0,0510	0,7410***	0,0716	0,1356	-0,1979***	0,0876	-0,2032	-0,1100*	0,0703	0,3417	-0,2860***	0,0834	0,5432*	0,1199***	-0,0232	-0,2010*	92,67%
x18	0,0008	-0,0004	0,0461***	0,8961***	-0,0149	-0,1220	0,8201***	0,0019	-0,9928**	0,2367***	-0,0640	-0,2440	0,0701	0,5602***	-1,1869**	0,0398	-0,0753	1,1914**	0,0307	-0,1753*	-0,1715	93,27%
x19	-0,0007	-0,0006	-0,0233***	0,8044***	-0,0508	0,0638	0,8393***	0,1574	0,1707	0,2557**	-0,0392	-1,0378***	-0,0791	0,2329	-0,0534	0,0669	-0,0233	1,1662**	-0,1740***	0,1042	-0,2743	89,30%
x20	-0,0076**	0,0202***	-0,0372	0,8332***	-0,5776***	-0,6497	-0,1197	0,7904**	-4,5029***	0,1896	-0,2582	-1,0280	-0,5736	0,7592*	0,5458	-0,4646	0,7742*	1,2838	-0,3905***	-0,2167	-2,1525***	63,28%
x21	0,0001	-0,0021	0,0299	0,9817***	0,0451	-0,3414	0,7691***	0,2552*	-0,0162	0,3520***	-0,0709	-0,0101	0,1918	0,3301	1,9068*	-0,1852*	-0,1359	-1,5565	0,1161**	-0,0791	-0,2513	96,81%
x22	-0,0005	0,0015	0,0113	1,0023***	-0,0192	0,3804*	0,5774***	0,3625**	-0,7336	0,4655***	-0,1818	-0,1326	0,0224	-0,0994	-0,1344	-0,2042**	0,0093	0,4234	-0,0107	-0,1346	0,5481*	95,87%
x23	-0,0034**	0,0037	0,0033	1,1339***	-0,0292	0,2777	0,8428***	0,1291	0,2080	0,0744	0,1778	-0,0541	0,0171	-0,1214	0,1362	-0,2033*	-0,2360	0,0642	0,1153***	-0,0872	0,2143	91,65%
x24	0,0007	-0,0032	-0,0034	1,0321***	-0,0750	0,1632	0,8980***	0,1291	-0,0024	0,2780***	0,3342**	-0,0071	-0,0519	0,0763	0,4516	-0,0732	-0,4084*	0,2908	-0,0170	-0,1680**	-0,2506	82,48%
x25	0,0008	-0,0034	-0,0011	0,9372***	-0,0678	-0,0342	0,8097***	-0,0783	-0,6057*	0,2698***	0,1496	0,3532	-0,1340*	0,0771	0,3692	-0,0376	-0,1634	-0,1062	-0,0792*	-0,2271***	-0,1187	88,12%

US High-Carbon funds (continuation)																					
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x26	0,0034**	-0,0038*	0,0092	0,9513***	-0,1290**	-0,0596	0,7402***	0,0934	0,4610	-0,3430***	-0,1584	-0,4131	-0,2302**	0,4084***	-0,0732	-0,0204	0,0883	0,3163	0,1543***	-0,0718	-0,2667	85,51%
x27	0,0004	0,0010	-0,0189*	0,9246***	-0,0833	0,0139	0,8688***	-0,0054	0,1790	-0,1231**	-0,0609	-0,0877	-0,2520***	0,1887*	1,0936***	-0,2750**	0,1882	0,8302	-0,0147	0,0974	-0,3646**	88,30%
x28	-0,0048	0,0167	0,0320	0,9162***	0,2882*	-0,8895**	0,7766***	1,2214**	3,6878**	0,2954*	1,0000	-1,3435	-0,0914	-0,5950	2,6162	0,4747	-0,0366	0,5811	-0,4405***	0,5802	0,0898	76,89%
x29	-0,0012	0,0085	-0,0301*	1,0627***	-0,0489	0,4346	0,9484***	-0,5321	-0,2771	-0,2503***	0,2137	0,0316	-0,3941***	-0,0087	-0,4314	-0,4877***	0,0852	1,2654*	0,3178***	-0,4112*	0,3968	91,39%
x30	-0,0010	0,0043*	0,0029	0,9860***	-0,0528	0,0433	0,6993***	-0,0299	0,3823	0,0972	0,1423	-0,2236	0,4172***	0,3104***	0,8613*	-0,0997	-0,1009	0,3863	0,0520	-0,2951***	-0,2791	84,88%
x31	-0,0015	-0,0088	-0,0244	0,8990***	0,1804	-0,2144	-0,0753	0,4101	-0,4300	0,5223***	-2,1136***	2,4524*	0,2172**	-0,7523	-0,7457	-0,5265***	2,8337***	0,7647	-0,0126	-0,5567*	-0,1248	89,26%
x32	-0,0081***	0,0019	-0,0072	1,1602***	0,4264**	-1,0938***	0,5692***	0,2284	0,1368	0,0555	0,8295**	1,7584**	-0,2542	0,0115	1,9105*	-0,2592	-0,7085	-1,2123	0,0096	0,2814*	-0,2065	71,96%
x33	-0,0012	0,0034	-0,0054	0,8937***	-0,0517	-0,0271	0,3820***	0,2106**	0,3990**	-0,0401	0,0323	-0,5876	0,1432*	0,1337	-0,2475	-0,3859***	0,1150	-0,3693	0,1658***	-0,0557	-0,1540	87,93%
x34	0,0005	0,0001	-0,0079	1,0597***	-0,1169***	-0,0561	0,6141***	0,0155	0,4530*	-0,0776	0,1275	-0,5513**	-0,1776***	0,0958	-0,0882	-0,1345	0,0791	0,5489**	0,1597***	-0,1141*	-0,3858***	91,62%
x35	-0,0001	0,0002	-0,0118	1,0438***	-0,0252	0,1898	0,3371***	0,1272	0,3263	0,0744	-0,0101	-0,8523*	0,2562***	-0,0239	0,2142	-0,1828*	0,1298	-0,3820	0,0192	-0,0652	-0,2773	84,27%
x36	-0,0027***	0,0001	0,0010	0,9608***	0,0530	0,1430	0,8238***	-0,0682	0,3348	0,2616***	0,1130	-0,0186	0,3343***	0,1245	-0,0444	0,0218	-0,0868	-0,0661	-0,0217	-0,0973	-0,0613	94,56%
x37	-0,0002	0,0010	-0,0108*	1,0704***	-0,0783	0,0497	0,7701***	0,0624	0,5536**	-0,1686***	0,1349	-0,1935	-0,1550*	0,0537	0,8706**	-0,3076***	0,1282	-0,4333	0,1885***	-0,1431**	-0,2601**	90,07%
x38	-0,0049**	0,0078**	-0,0048	0,9575***	-0,0665	-0,0473	0,6489***	-0,1992*	0,6730**	0,2336**	0,0097	-1,2189***	0,1413	-0,0748	0,3594	0,0727	0,0777	1,0498**	-0,1499***	0,0144	-0,2699	83,80%
x39	0,0006	0,0002	0,0032	0,9689***	0,0494*	-0,0078	0,9330***	0,0137	0,0045	0,1858***	-0,0817	0,0027	-0,0902**	-0,0464	-0,2444	-0,0373	0,0664	0,2563	-0,0048	0,0170	0,0577	97,24%
x40	0,0036	-0,0022	-0,0081	0,6062***	0,0493	-0,2472	0,9873***	0,5462*	2,0012	0,3977***	-0,5302*	-0,1423	0,3546	-0,0046	1,6639	-0,2745	0,3838	-0,3458	0,0183	0,0490	1,1496*	92,71%
x41	-0,0008	-0,0035	0,0200	0,9636***	-0,0376	-0,2264	0,6001***	0,5503***	0,5526	0,4058***	-0,3687**	-0,0679	0,2723***	0,3693	0,9956	-0,2137***	0,1223	-1,4540*	0,0500	-0,0346	0,5374	96,69%
x42	0,0025	-0,0005	0,0095	0,9045***	-0,1741***	0,4487	0,6573***	0,0731	1,3738**	0,1200	-0,2397	0,0990	0,0117	0,1993	-0,6282	-0,1854	0,5996*	1,1400	0,0282	-0,2924*	0,2058	90,78%
x43	-0,0120	0,0128	-0,0775	1,3365***	-0,2153	0,1942	1,1478***	-0,5005	3,9242*	-0,7646***	0,6931	-3,2018**	-0,8548***	0,3282	0,1711	0,0257	-0,5176	3,5929*	0,1778	-0,4116	-0,2617	82,65%
x44	0,0009	0,0004	-0,0164	1,0423***	-0,0638	0,0619	0,4291***	0,0872	0,2647	-0,3332***	0,0559	-0,5614**	-0,1530**	-0,1806	0,4564	-0,3038***	0,0810	0,4838	0,0682*	-0,0588	-0,2479	84,74%
x45	0,0033	0,0045	-0,0456*	1,0475***	-0,0733	0,2502	1,5512***	-0,5902**	0,9664	-0,3990***	0,3326	-0,1557	-0,3869*	-0,0601	-1,4056	-0,3376*	0,1864	-0,2430	0,3536***	0,0053	0,1947	92,06%
x46	0,0018	-0,0018	0,0057	0,8608***	0,1674	-0,1884	0,5314***	-0,2516	-0,8751	0,6727***	-0,0478	0,7143	-0,0460	-0,0602	-0,0494	-0,5743**	-0,1147	0,3769	0,0047	-0,1201	0,3569	60,62%
x47	-0,0011	0,0018	-0,0015	1,0328***	-0,0177	-0,1890	0,8032***	-0,0373	0,3813	-0,0517	0,0853	0,0332	-0,1572**	0,0366	0,4409	-0,2154**	0,0707	0,2892	0,1592***	-0,0969**	-0,2103**	91,24%
x48	0,0016	-0,0037	0,0661***	0,9284***	0,0452	-0,3041	0,9282***	-0,1842	-0,0703	0,4891***	0,3583*	4,4765***	0,2269	0,4764	0,0285	-0,2556*	-0,4091	-1,8191***	0,0475	0,1053	0,7459	94,42%
x49	-0,0236	-0,0162	-0,1947	1,2795	-0,9814	3,7568*	-1,4021	7,7251	-12,0556	1,7012	-4,6649	11,2542	-2,5132	4,3625	-10,7429	-1,6384**	0,7089	-2,5858	-0,0433	2,9803	-1,4757	92,20%
x50	-0,0002	0,0003	-0,0011	1,0545***	-0,0213	0,2137	0,8194***	0,0322	0,1163	-0,0196	0,0043	-0,3549	-0,2159*	0,0832	0,0031	-0,3197**	-0,0972	1,2040**	0,1748***	-0,0008	0,1083	91,62%
x51	0,0020	-0,0017	0,0227	1,0369***	-0,0518	-0,1630	0,6284***	-0,0811	0,1226	-0,0927*	-0,2119	0,6011	-0,4600***	0,4004*	-2,3051*	-0,4450***	0,4347*	0,0289	0,1932**	-0,0196	-0,3067	91,82%
x52	0,0002	0,0012	0,0231**	0,8134***	0,0431	-0,1609	0,5728***	0,0946	0,1732	0,0664	-0,4837***	0,1549	0,1778**	0,2695*	-0,0932	-0,1321	0,5032**	0,2164	-0,0432	-0,0991	0,6319	90,18%

US High-Carbon funds (continuation)																					
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x53	0,0005	0,0014	-0,0096	0,6972***	0,0029	0,0443	0,7645***	-0,0378	0,3097	0,3920***	0,1209	-0,2283	0,1925***	-0,0449	0,1916	-0,1006	-0,2046*	0,6599*	-0,0875***	-0,0849*	0,0562	85,92%
x54	-0,0013	0,0046	-0,0078	0,9769***	-0,0244	-0,0172	1,0180***	-0,0798	0,2369	-0,0956	0,2045	0,0689	-0,0698	0,2450	0,4445	-0,4331***	0,0734	-0,2389	0,2040***	-0,0598	0,2786**	88,32%
x55	-0,0114**	0,0123	-0,0879	1,4097***	-0,3079***	1,9163***	1,3631***	0,2355	-1,1081	0,1103	-0,3260	0,0291	-0,4194	0,6198*	-2,9605	0,2555	0,2197	0,5446	0,2306	-0,2577	0,6713	94,09%
x56	-0,0050	0,0107	-0,0321*	0,9589***	-0,1167	0,7248**	0,8667***	0,0390	-0,0188	0,3562***	0,2491	-0,1660	0,3913**	-0,0473	0,3736	0,1025	-0,3978*	1,6923*	-0,1367	-0,4232*	0,2808	98,40%
x57	-0,0021***	0,0010	-0,0001	0,9891***	-0,0125	0,0806	0,7881***	0,0101	0,4071*	0,2213***	0,1049	-0,1536	-0,0356	0,0842*	0,1267	-0,1003	-0,0476	0,1273	0,0844***	-0,0461	-0,0605	94,00%
x58	-0,0025*	0,0001	-0,0015	0,9681***	0,0261	0,0949	0,8360***	-0,1688	0,4229*	0,1062	0,0983	-0,5184	-0,4737	0,0553	0,3333	-0,6938	0,1049	1,1590	0,1589**	0,0117	-0,2295	70,73%
x59	-0,0034*	-0,0034	-0,0411*	0,9858***	0,0941	0,7126**	0,7302***	-0,0047	-1,2166*	0,3395***	-0,6629***	-1,3576	0,1287	0,2132	0,2948	-0,1323	0,7372*	-1,6290	0,0960**	-0,1856	-0,1117	92,17%
x60	-0,0009	-0,0032	0,0088	0,9633***	0,0610	0,0102	0,8438***	0,1266	0,1672	0,2590***	0,1905	0,1849	0,2996***	-0,1441	-0,5923**	-0,1406*	0,0405	0,0302	0,0609	0,0060	0,1310	92,60%
x61	-0,0062**	0,0088	-0,0096	0,9201***	-0,0198	0,4515	0,9041***	0,1738	-0,7130	0,3688***	-0,1327	0,5246	0,3205***	0,5713	0,4447	-0,1435	0,2640	0,1014	0,1371*	0,0258	0,4998	91,64%
x62	-0,0017	0,0061	-0,0150	1,0162***	-0,1830*	1,9776***	0,7612***	0,4425	3,3528***	-0,1206	-0,3202	1,5223	-0,8998***	2,3068***	3,2853**	0,0331	-0,9475	-0,7913	-0,2284***	0,3941	3,5955***	94,35%
x63	0,0008	-0,0030*	0,0154**	0,9978***	-0,0087	0,2953**	0,5878***	0,0829	-0,1710	0,2813***	-0,0124	-0,0020	0,1626***	0,1922**	-0,1959	-0,1843***	0,0264	0,2576	0,0251	0,0290	0,2124*	94,09%
x64	0,0062*	-0,0113*	0,0288	0,7185***	0,1400	0,5006	0,8055***	-0,1253	-1,6611	1,0639***	-0,2722	-0,1181	-0,0400	-0,1221	-1,3857	-0,8541***	-0,1182	1,0032	0,1188	0,2406	1,0568*	87,09%
x65	-0,0001	-0,0035	0,0369	1,0259***	0,3212	-0,1126	1,0553***	-0,5859	3,3070**	0,3103***	0,1760	2,1347	0,6814***	-1,2226	2,2797	-0,6200***	-0,2038	-0,9526	0,0616	-0,0875	2,3670**	91,21%
x66	-0,0023	0,0069**	-0,0277***	0,9177***	-0,1390**	-0,0462	0,5945***	0,0214	0,3138	0,0519	-0,1133	-0,7466**	0,3778***	-0,0880	0,3559	-0,1178	0,1189	0,3767	-0,0787*	-0,0546	-0,4505**	87,82%
x67	-0,0007	0,0047**	-0,0009	0,9679***	0,0007	-0,0558	0,6887***	0,1531***	0,3297	-0,1450***	0,0674	0,1102	-0,1705***	0,0331	0,4151	-0,3576***	-0,0643	-0,8895**	0,1762***	-0,0157	-0,0114	93,43%
x68	-0,0022	0,0034	-0,0202*	1,1297***	-0,1452**	-0,1646	0,9875***	-0,1616	-0,1936	-0,0484	0,1604	0,0580	0,0083	-0,0889	0,4784	-0,2930*	0,1615	-0,4329	0,1496	-0,1020	-0,0691	77,40%
x69	0,0027	-0,0133**	-0,0092	1,2632***	-0,0709	0,2463	0,3117**	-0,0943	-1,2204	-0,2578*	0,2583	-1,2412*	-0,9687***	0,1503	-1,1265	-0,8080***	-0,0978	1,7361	-0,0706	0,0142	-0,4295*	79,86%
x70	-0,0057*	0,0040	-0,0806***	1,0702***	-0,2276**	0,6273	0,9227***	0,1058	-0,1779	-0,2951*	0,0722	0,2954	-0,6994***	-0,2100	-0,9363	-0,5931**	0,1616	0,1582	-0,2816**	0,4307*	-0,5209	81,64%
x71	-0,0012	0,0003	0,0374	0,9707***	-0,0729	0,3365	0,8929***	-0,0112	-0,2343	0,3987***	-0,2884*	-0,1306	0,2895**	0,2182	-1,1543	-0,1231	0,0443	1,2745	0,1591***	-0,2539*	0,0652	88,56%
x72	-0,0002	-0,0036	0,0135*	1,0483***	-0,1339***	-0,1638	0,6484***	0,3282***	0,2522	0,0981*	-0,0638	-0,0623	-0,1185	0,4693***	0,1082	-0,0918	-0,0427	0,8123**	-0,0284	0,0630	-0,0562	95,76%
x73	-0,0001	-0,0011	0,0108	1,0065***	-0,0482	-0,0230	0,7638***	0,0125	0,6975	0,1575***	-0,2599*	-0,7685	-0,1188*	0,3808**	-0,9458	-0,2088***	0,3259*	0,4039	0,0846**	-0,0913	-0,1174	98,69%
x74	-0,0012	0,0014	-0,0206**	0,9931***	0,0042	-0,1278	0,8141***	0,0191	0,0643	-0,1285*	-0,1046	-0,2509	-0,3558***	-0,2339*	0,6449**	-0,5646***	0,3387**	0,2085	0,2688***	0,0684	-0,1591	87,99%
x75	0,0021	-0,0039	-0,0268**	1,1093***	-0,1027	-0,1594	0,2192***	0,0037	0,2080	-0,4384***	0,1590	-0,1842	-0,3743***	-0,0436	0,5406	-0,7462***	0,1011	-0,6600	0,1285**	0,1560**	-0,3501*	87,59%
x76	0,0011	-0,0003	-0,0405***	1,0394***	-0,1536*	0,1280	0,3697***	0,0464	0,3275	-0,4326***	0,1942	-0,1410	-0,1606	0,0198	1,9773***	-0,4764**	-0,1037	-0,7691	0,1137	-0,0900	-0,7193***	79,41%
x77	-0,0013	-0,0052	0,0028	0,9986***	-0,0116	-0,0763	0,7216***	-0,1084	0,2341	-0,1379***	-0,0681	-0,5302	-0,2749**	0,2502	-0,0786	-0,2236**	0,0288	1,0988	0,1054**	-0,1998	-0,2336	93,84%
x78	-0,0019	0,0011	0,0223	0,9039***	-0,0641	0,2751	0,5366***	0,3653**	-1,6230***	0,3953***	-0,2767**	1,9082***	0,0825	0,4055*	-0,5230	-0,0484	0,2273	-2,3781**	0,0839*	0,1574	-0,0086	93,24%
x79	0,0014	-0,0039	0,0276	0,9805***	-0,1232	0,1165	0,5638***	-0,0657	0,4813	-0,3859***	0,0184	0,5395	-0,5170***	0,6500**	-1,2485	-0,2096	-0,2241	0,1787	0,0518	0,0216	-0,5629	84,96%

US High-Carbon funds (continuation)																					
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x80	0,0037*	-0,0066**	0,0042	0,8555***	-0,0431	0,2525	0,6739***	0,0640	-0,6949**	-0,2900***	0,0213	-0,5609	-0,5786***	-0,0483	-0,3267	0,2432	-0,1075	2,0443***	-0,1430**	-0,1689*	-0,1959	80,16%
x81	0,0044	0,0161*	-0,0408*	0,9643***	-0,3083***	0,9661**	1,1225***	-0,6926**	1,4668*	-0,4245***	0,0212	-1,1808*	-0,4946**	0,1023	-1,1108	-0,2694	0,3519	3,0818*	0,0603	-0,7305***	0,4160	95,42%
x82	-0,0015	-0,0145***	-0,0107	0,8381***	-0,2458***	0,0574	0,8300***	0,1672	0,5147	0,2421***	0,0692	0,0639	0,2028	0,2716	0,2848	-0,0379	-0,0237	0,5724	0,0469	-0,0710	-0,8120	88,41%
x83	-0,0018	0,0024	-0,0043	1,0101***	-0,0881	0,3114	0,6526***	0,0182	0,6762**	0,2335***	-0,0514	-1,2849***	0,0465	0,1211	-0,5459	-0,0650	0,2448	1,5162***	-0,0450	-0,0570	-0,1570	90,80%
x84	-0,0079**	0,0143	0,0060	0,9715***	-0,1232	-0,7883	0,8223***	0,4215***	2,4233	0,4635***	0,1337	0,8633	0,5268**	-0,7681*	-0,1813	-0,0822	-0,2974	0,4178	-0,0520	-0,1594	0,7616	97,29%
x85	-0,0034**	0,0059	0,0620**	1,0351***	-0,0485	-0,8514***	0,5545***	0,8664***	0,0094	0,5200***	-0,2145	0,9527	0,2686*	0,2402	-0,5710	-0,0088	0,6367	-0,5925	0,0005	0,2926	-0,8233	97,28%
x86	-0,0030	0,0040	-0,0314	0,7030***	0,2329	-2,9058***	1,1176***	0,2426	5,2568**	0,3800***	0,7273*	0,7765	0,5688**	-0,9073**	2,2139	-0,0964	-0,3571	-1,9346	-0,3699***	0,4058*	-2,2028	94,45%
x87	-0,0018	-0,0036	0,0248	1,2644***	0,3879***	0,3333	0,7643*	0,3494	-0,5345	0,5768***	-0,1407	-0,9010	0,1472	0,3139	0,0918	0,1048	1,0722**	1,5405	-0,0374	0,2506	-0,3732	98,79%
x88	-0,0044	-0,0031	-0,0174	1,1676***	0,4796*	-0,2410	1,1400***	0,4136***	0,4701	0,6729***	-0,0334	-0,2264	0,0688	0,5831*	-0,4975	-0,2185	0,3932	0,9701	-0,0873	-0,2886**	-0,7945**	78,36%
x89	0,0022	-0,0172	-0,0455	0,9697***	0,0945	-0,0945	0,7711***	-0,1296	-0,9500	-0,3656	0,3854	-2,5962*	0,2102	-0,7338	-2,1765	0,0771	-0,4798	0,0492	0,1239	-0,6331	-0,7672	89,27%
x90	0,0008	0,0011	-0,0331**	0,8902***	-0,0236	-0,0598	0,8835***	0,2233	-0,1791	-0,1109	0,3019	0,4224	-0,2889**	0,0488	1,7161**	-0,1891	-0,4346*	-0,5606	-0,1051	-0,1265	-0,2543	71,69%
x91	-0,0006	0,0003	-0,0150	0,9019***	-0,0316	-0,0542	0,9063***	-0,1115	0,0698	0,2116**	0,2333*	-0,0242	-0,0833	-0,3620***	-0,1951	-0,2871**	-0,1076	-0,2354	-0,0594	-0,0235	-0,2348*	86,36%
x92	-0,0031	0,0053	-0,0181	1,0664***	-0,1209	0,5983	0,6043*	-0,5963	-0,1425	-0,1341	0,0919	0,8572	-0,2291	0,2587	-1,1185	-0,7333**	0,4061	-0,7396	0,2044	-0,2937	0,2234	87,38%
x93	0,0002	0,0068	-0,0268	0,9666***	-0,0245	-0,2862	0,7288***	-0,0493	1,0938	0,3525***	-0,1975	0,4378	0,2316**	-0,3498	2,1643***	-0,4062***	0,1404	-0,6535	-0,0945*	-0,1687	0,8367**	90,88%
x94	-0,0015**	0,0003	0,0007	0,9664***	0,0185	-0,0214	0,7993***	0,0226	-0,1340	0,0488	-0,0062	0,2295	0,0906**	0,1094	0,0862	-0,1231***	-0,0350	-0,1425	0,0914***	0,0238	-0,0718	96,65%
x95	-0,0011	0,0008	-0,0117**	1,0292***	-0,0543	0,0897	0,7717***	0,1595*	0,4498	-0,1608***	0,1129	-0,2477	-0,2612***	0,1719	0,1967	-0,2375***	-0,0569	0,6607*	0,1321***	0,0520	-0,0505	91,74%
x96	-0,0017**	0,0012	-0,0022	1,0124***	-0,0230	0,0821	0,8032***	-0,1092**	0,2160	0,4570***	0,0855	-0,0698	0,1956***	0,0533	0,0239	-0,0251	-0,0424	0,4055	-0,0432	-0,0244	0,1467*	95,67%
x97	-0,0012	0,0026	0,0086	0,8973***	-0,0495*	0,2170**	1,0236***	-0,0063	0,2269	0,1720***	0,0288	-0,4638**	0,0567	0,2481***	-0,8133***	-0,0564	-0,0494	1,6240***	-0,0629**	-0,1449***	0,0803	93,26%
x98	0,0024**	-0,0072**	0,0142	0,8137***	0,0113	-0,0865	0,9370***	0,2199	0,3889	0,4581***	-0,2886**	0,2736	0,2030***	0,1004	-0,7205	-0,1123	0,0946	0,6743*	0,1029***	-0,0687	0,2397	96,51%
x99	0,0037*	-0,0052	0,0137	0,6753***	0,1517***	0,0341	0,5013***	-0,0969	-0,8662*	0,8436***	-0,0781	-0,0523	-0,0269	-0,2165**	-0,3572	-0,6324***	-0,1497	1,5023***	-0,0289	0,1539	0,2911	77,85%
x100	0,0031	-0,0084	-0,0094	0,9979***	-0,3629	0,8700	0,7394	0,0400	-0,3435	0,4452	0,0811	1,4705	-1,0303	1,0359	-2,9404	-1,3659	0,1214	-1,7112	0,4517**	-0,0296	0,9209	67,50%
x101	0,0000	0,0031*	0,0047	0,9859***	-0,0219	-0,0735	0,9007***	-0,0374	0,0570	0,0405	0,1198	-0,0053	0,0132	0,0795	-0,4168**	-0,0274	-0,1480*	0,6440**	0,0174	-0,0253	0,0757	93,57%
x102	-0,0006	-0,0021	-0,0088	0,9128***	-0,0528	0,1161	0,9116***	0,0054	0,3171	0,2101***	0,3509***	-0,2171	0,0753	0,0428	-0,5517**	-0,1519**	-0,2859***	0,2838	-0,0857**	-0,1079**	0,1089	90,44%
x103	-0,0016	0,0040	0,0148	0,9579***	-0,0459	0,0474	0,7614***	0,2011	0,1023	0,2527***	0,0856	-0,9215***	0,2103**	0,0040	-1,1440***	-0,2374**	0,1849	0,9010**	-0,1433***	-0,1228	0,0574	86,90%
x104	0,0016	-0,0009	-0,0007	0,9927***	-0,0446	-0,1083	0,8129***	-0,0679	0,1193	-0,0456	0,2109**	0,0301	-0,3730***	-0,0550	0,0246	-0,3723***	-0,1207	0,0543	0,0222	0,0464	0,0322	90,26%
x105	-0,0021	-0,0035*	-0,0011	0,9681***	0,0164	-0,0090	0,8634***	-0,0233	-0,2365	0,1415	0,0797	0,4716	-0,0943	0,1318	1,2490***	-0,4342	-0,2187	0,2954	0,0513	0,1332**	-0,2101	83,49%
x106	-0,0018**	0,0004	-0,0041	1,0814***	-0,0245	0,0335	0,7813***	0,0217	0,3355	-0,0220	0,0085	-0,5797***	-0,3653***	0,0505	-0,2715	-0,1725**	0,1793**	0,7979***	0,1623***	0,0666	-0,2002**	96,25%

US High-Carbon funds (continuation)																					
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x107	0,0018	-0,0065	0,0198	0,8489***	0,0641	-0,1898	0,8818***	0,3617*	-0,1608	-0,0732	0,6229	1,5338**	-0,3776*	1,8369***	-0,2244	0,8054*	-1,9837*	-0,6762	0,0122	0,1991	0,3195	88,87%
x108	-0,0016*	0,0019	0,0086	0,8835***	-0,0821	0,1153	0,7194***	0,2254***	0,1422	0,3423***	-0,2607***	-0,4255	0,2569***	0,2102*	-0,1142	-0,0281	0,2624*	0,0869	0,0332	-0,0523	-0,0512	94,77%
x109	-0,0024**	0,0023	-0,0007	1,0512***	0,0519	0,2270	0,6824***	-0,0284	0,2897	0,2041***	0,1130	-0,0393	0,1183*	0,0664	0,0923	-0,0495	0,0699	0,1458	0,0968***	-0,0004	0,1672	93,25%
x110	0,0009	-0,0005	0,0003	0,8631***	-0,0467	0,1447	0,7315***	0,0241	0,4386**	0,3003***	0,0243	-0,4019**	0,1919***	0,1073	-0,1863	-0,1067*	-0,0511	0,7539**	0,0249	-0,1341**	-0,0942	94,43%
x111	-0,0002	0,0016	-0,0002	0,7696***	0,0835***	-0,2757**	0,6550***	0,0305	-0,0399	0,1900***	0,0032	0,0831	0,2061***	0,0051	-0,0456	-0,1062*	0,0421	0,2637	-0,0564***	-0,0988***	0,1599*	91,13%
x112	-0,0004	0,0009	0,0047	0,9935***	0,0220	-0,0140	0,8281***	-0,0663	0,2319*	0,1611***	-0,0720	-0,2281**	-0,1225***	0,0391	-0,0819	-0,1789***	0,1603***	0,5210***	0,0613***	-0,0103	0,0265	97,58%
x113	-0,0013**	-0,0031	0,0079***	0,9872***	-0,0110	-0,0408	0,8736***	0,0479	0,1547*	0,0871***	-0,0458	0,0272	-0,1033***	0,1531*	-0,0923	-0,0896***	0,0212	0,3889***	0,0527***	0,0146	0,0464	95,97%
x114	0,0001	-0,0038	-0,0093	1,2792***	-0,2033*	1,2556**	0,5190**	-0,2214	-0,9217	-0,3787***	-0,4336*	0,6621	-0,5738*	0,0758	-0,0479	-0,5418**	0,9390**	-2,7645**	0,2946*	-0,1977	0,9677	92,95%
x115	0,0023	-0,0011	-0,0229*	1,0062***	-0,1098	0,3314	0,2252*	0,0509	0,1560	-0,3514***	-0,0362	-0,3258	-0,0457	0,0256	0,8095	-0,1189	-0,2403	1,0354	-0,0034	-0,1177	-0,3427	73,04%
x116	-0,0037***	0,0022	0,0105*	1,0114***	0,0073	0,0220	0,8115***	0,0424	0,0893	0,1629***	0,0204	0,0835	0,0281	-0,0648	-0,0529	0,0285	0,1727**	-0,1679	0,0217	0,0274	0,1680*	96,31%
x117	-0,0019*	0,0005	-0,0015	0,9554***	0,0143	0,1319	0,7456***	0,1266	0,1646	0,1275**	0,0298	0,1684	-0,0582	-0,2863***	0,3530	-0,2777***	0,1465	-0,3130	0,0691*	0,0706	0,1585*	93,74%
x118	-0,0003	-0,0030	-0,0012	1,0237***	0,0507	-0,0467	0,5679***	-0,1681*	0,2800	-0,1432**	-0,0109	-0,4256	-0,3928***	-0,0056	-0,3482	-0,3247***	0,2501	0,4408	0,1340***	0,0476	0,0039	88,33%
x119	-0,0005	0,0033*	-0,0030	1,0592***	0,0094	-0,1306	0,6858***	-0,0520	0,3019	-0,1123*	0,0629	0,0513	-0,0990**	-0,1693**	0,5964**	-0,2523***	-0,0427	0,1207	0,1685**	-0,0225	-0,2319**	91,45%
x120	-0,0013	0,0013	-0,0056	1,0872***	-0,0180	-0,2497*	0,7064***	0,0756	0,2493	-0,2645***	-0,0192	-0,3636	-0,4218***	-0,1132	-0,1561	-0,3440***	0,3537***	0,3170	0,2045***	0,1211*	-0,2445*	93,39%
x121	-0,0010	-0,0031	-0,0131	0,9777***	-0,2310***	0,8032***	0,9097***	0,1846	-0,6367	0,2619***	0,0050	0,5101	-0,0670	0,2070	0,0536	-0,0144	-0,2486	1,0584*	0,0508	-0,0835	0,6355	93,26%
x122	-0,0048	-0,0006	-0,0162	1,0981***	0,1027	0,1118	0,0176	0,5970	-3,9416*	-0,0386	-0,3072	-0,3305	-0,6976*	1,5185**	-2,9227	-0,2396	0,3428	-2,9914	-0,0503	0,0075	-1,2885	96,00%
x123	0,0000	0,0015	0,0089	0,8453***	0,4908***	-0,3020	0,6684***	0,0704	0,0745	0,0473	-0,0623	0,5097	0,0263	0,9949***	0,1635	0,4194***	-0,8447**	0,4364	-0,0053	0,0316	-0,2662	91,99%
x124	0,0028	-0,0017	-0,0067	0,9370***	-0,2022***	0,2716*	0,8421***	-0,0593	0,1115	-0,0341	0,1245	-0,5321*	0,0044	0,1831	0,1312	-0,2272*	-0,0655	1,3997***	0,0557	-0,1819**	-0,2327*	82,78%
x125	0,0007	0,0007	-0,0330***	0,9063***	-0,1094	0,0683	0,6767***	0,1260	0,3034	0,0605	0,3897***	-0,5261*	-0,0805	0,0513	0,6755	-0,4922***	0,1333	0,0700	-0,0079	-0,0107	-0,1897	86,61%
x126	0,0027*	-0,0031	0,0029	0,9762***	-0,1152***	-0,0131	0,6657***	0,0558	0,1715	-0,1755***	-0,0967	-0,4526**	0,0096	0,1830**	0,1075	-0,1848*	0,2209	1,0804***	0,0451	-0,0341	-0,2435**	88,83%
x127	0,0001	-0,0003	-0,0141	0,9939***	-0,0816	0,0878	0,7328***	-0,0176	0,3285	0,2614***	0,1156	-0,4811	0,1736***	0,1296	0,2251	-0,1070	-0,1152	0,8029*	-0,0258	-0,1766**	-0,3451**	88,71%
x128	0,0037*	-0,0042	-0,0198*	0,9909***	-0,2249***	0,2882	0,6741***	0,1106	0,0955	-0,2255***	0,2520*	-0,6732**	-0,2522***	0,1257	0,1535	-0,2012	-0,0668	1,1541**	0,0479	-0,1198	-0,3674**	83,37%
x129	-0,0018*	0,0006	0,0014	1,0348***	-0,1031***	-0,0085	0,7328***	0,0319	-0,0879	-0,0515	0,1354*	0,1136	0,0514	0,0980	0,0495	-0,1543	-0,0896	-0,2351	0,1152***	-0,1032	-0,0172	91,63%
x130	0,0093	-0,0133	0,0597*	0,7933***	0,1271	-0,1972	0,7610***	0,3003	-0,6867	0,7067***	-0,4955	1,9290	0,5338	-0,2014	-0,3236	-0,8991	0,6015	-1,6387	0,2463***	-0,1218	1,0715*	52,25%
x131	-0,0010**	0,0006	0,0074***	1,0043***	-0,0305	-0,0558	0,8437***	0,0290	0,2731*	0,1108***	0,0222	0,0497	-0,0632***	0,1128***	-0,0727	0,0436	0,0370	0,1200	0,0571	-0,0442	0,0015	97,66%

This table reports a summary of the regression estimates generated from the conditional Fama and French (2018) six-factor model for the high-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML), profitability (RMW), investment (CMA) and momentum (MOM). The regressions' adjusted coefficient ($Adj.R^2$) is also presented, as well as the public information variables short-term rate (ST) and the dividend yield (DY). The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and

autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).

Appendix J. Results of the conditional Fama and French (2018) six-factor model - US low-carbon funds

	US Low-Carbon funds																				
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x1	-0,0016	-0,0008	-0,0059	1,0388***	-0,0016	-0,2443**	-0,0631	0,0222	0,1277	-0,1642***	0,0172	0,1308	0,0488	0,1577*	-0,0571	-0,2616***	0,1164	-0,8337***	0,0426	-0,0050	-0,1578*	95,57%
x2	0,0016*	-0,0013	0,0040	0,9414***	0,0409	-0,2151**	0,1091**	0,1344**	0,2368*	-0,2251***	-0,0405	-0,0758	0,0615	0,0869	-0,4708**	0,0683	0,0423	-0,0803	0,1115***	0,1703***	0,0250	91,06%
x3	-0,0007	0,0010	0,0131***	0,8546***	-0,0108	-0,1352	0,0493	0,0884	0,1381	-0,0456	0,0955	0,1536	0,2988***	0,1258**	-0,2465	0,2129***	-0,2095**	-0,0179	0,0412	0,0223	0,1808**	84,68%
x4	-0,0001	0,0011	-0,0013	0,9958***	0,0252**	-0,0545	-0,0855***	-0,0087	0,2094*	0,0123	0,0277	-0,0440	0,0751***	0,0196	-0,0083	-0,0257	-0,0545	0,1170	0,0190*	0,0341**	0,0568*	98,35%
x5	0,0001	0,0012	0,0012	0,9505***	-0,0425	-0,0432	0,0007	0,0143	0,2457	0,0884***	0,1334**	-0,0702	0,0574	0,0032	-0,2472*	-0,0018	-0,0693	0,0324	-0,0084	-0,0372	0,0424	94,51%
x6	-0,0030	0,0090	-0,0038	1,0049***	-0,2443***	0,8544***	0,3407**	-0,3402	-0,0928	0,1084	-0,0488	-0,1112	-0,2068*	0,5583***	-2,0248**	-0,2380*	0,0424	1,8266**	-0,0373	-0,2518	-0,6478	89,81%
x7	-0,0009*	-0,0004	0,0002	0,9784***	-0,0219	-0,0942*	-0,0640***	0,0901**	0,0346	-0,1120***	-0,0280	0,0700	0,0100	0,1066***	0,0128	-0,0286	0,0916*	-0,2987*	-0,0423*	-0,0763**	-0,0523	96,41%
x8	0,0001	-0,0017*	0,0097	0,9774***	0,0078	-0,0897	0,0312	0,0340	-0,2069	0,0347	-0,0028	-0,1335	0,0409	0,0750*	-0,4472**	-0,0226	0,0591	0,0796	0,0015	0,0723***	-0,3087**	99,22%
x9	-0,0013	-0,0004	0,0055	0,9193***	-0,0144	-0,1004	-0,1412***	0,0789	-0,6971**	0,0487	0,0033	0,5211***	0,0395	0,1743**	-0,6005	-0,2124***	0,1722*	-0,9602***	-0,0551***	0,0964*	-0,1811	96,81%
x10	-0,0001	-0,0007	0,0023	0,9277***	0,0083	-0,0174	-0,0718***	-0,0077	0,0296	0,0479**	-0,0665*	-0,0228	0,1730***	0,0681	-0,1598	0,0599	0,0522	0,1983	0,0114	-0,0605***	0,0014	95,95%
x11	0,0025**	-0,0016	0,0064	0,9515***	0,0499	0,6999**	0,0551	-0,5230***	0,1955	-0,2057***	0,0417	0,2689	-0,0398	0,0634	-1,0452*	-0,2411**	-0,2594	0,6179	0,1662***	-0,1762**	0,4825	93,42%
x12	0,0024	-0,0035	0,0039	0,8924***	0,0526	0,1333	-0,0191	0,0890	-0,9070***	0,0197	0,0005	0,3668	0,0863	-0,0151	-0,6568	-0,2412***	0,1193	-0,6845	0,0266	-0,0470	0,0356	95,63%
x13	-0,0025***	0,0014	-0,0059	0,9691***	-0,0009	0,0200	0,0018	-0,0384	0,3504	0,0374	-0,0675	-0,2043	0,0963	0,0585	-0,0778	0,0127	0,1027	-0,1695	0,0119	-0,0402	-0,0064	96,43%
x14	0,0011	0,0039	0,0285	0,8889***	-0,0136	-0,1007	0,1436	-0,1947	0,8570	0,0342	-0,3504***	-0,5203	0,2342	0,1805	-0,1659	0,2318**	0,4576***	0,2928	0,0886	-0,2237**	0,7862	92,51%
x15	0,0034	0,0011	0,0045	1,0550***	-0,0312	-0,2465	0,1845	0,0474	-0,1607	-0,1978	-0,2537*	0,1739	0,3176	0,2171	0,1124	-0,0761	0,2293*	0,1410	-0,1225	-0,2270**	-0,1615	31,54%
x16	0,0001	-0,0002	0,0037	0,9575***	0,0111	-0,2551	-0,1397**	-0,0006	-0,0289	0,0142	-0,1504**	-0,1883	0,0531	0,1074	-0,2158	-0,0875	0,3008***	-0,2104	-0,0173	0,0208	-0,2791	97,66%
x17	-0,0027***	0,0032	-0,0139***	0,9970***	-0,0432	0,1345	-0,1561***	0,1956	-0,2335	-0,0878**	0,0188	-0,2250	-0,1041*	0,2061*	-0,5262*	-0,0015	0,0505	0,1715	-0,0464	0,0401	-0,0222	96,15%
x18	-0,0008*	-0,0006	-0,0002	0,9796***	0,0126	-0,0484	-0,1075***	-0,0280	-0,1601*	-0,0512**	-0,1456***	-0,0808	0,0905***	0,1100**	-0,0696	0,0250	0,0639	0,2942**	-0,0289	-0,0264	-0,1000***	97,50%
x19	-0,0018	0,0000	0,0049	0,9520***	0,0696**	0,2222	-0,0510	-0,1210	0,0817	-0,0329	0,1772*	-0,2636*	0,1142	-0,0500	-0,4436	-0,0605	-0,0254	0,3269	-0,0036	-0,0998**	0,1908*	89,52%
x20	-0,0009	0,0020*	-0,0073	1,0162***	-0,0016	0,0309	0,0334	-0,1095	0,2213	-0,0271	0,0889	-0,4682***	0,0028	0,1439	-0,4201**	0,0231	-0,0427	0,1129	0,0201	-0,0463	0,0043	96,31%
x21	-0,0012	0,0037	-0,0108	0,9417***	-0,0191	-0,0815	0,0256	-0,0705	0,6973*	-0,0417	-0,1010	-0,4368*	0,1607*	-0,0058	0,5360	-0,0107	0,2302**	0,1004	0,0254	-0,1177*	0,2308	97,22%
x22	-0,0120	0,0558***	-0,0499	1,0773***	-0,2764	0,0682	1,0498**	-3,4296***	6,7342**	-0,3575*	-0,0589	-2,3616**	0,6561	-0,4458	3,9549	-0,1395	1,8075**	-0,4631	0,3054	-2,1557***	1,9582	96,90%

US Low-Carbon funds (continuation)																					
	α_p	α_{ST}	α_{DY}	β_{p*rm}	β_{ST*rm}	β_{DY*rm}	β_{SMBf}	$\beta_{ST*SMBf}$	$\beta_{DY*SMBf}$	β_{HML}	β_{ST*HML}	β_{DY*HML}	β_{RMW}	β_{ST*RMW}	β_{DY*RMW}	β_{CMA}	β_{ST*CMA}	β_{DY*CMA}	β_{MOM}	β_{ST*MOM}	β_{DY*MOM}	$Adj.R^2$
x23	-0,0004	-0,0004	0,0034	0,9531***	0,0048	0,0400	0,0321	-0,0364	-0,1531	0,0594*	-0,0207	-0,2981*	0,1545***	0,1406***	-0,4453**	0,0716*	0,0071	0,2532	-0,0152	-0,0405	-0,0426	93,09%
x24	-0,0001	0,0002	0,0024	0,9642***	0,0371*	-0,1685	-0,0003	-0,0625	0,1790	-0,0282	0,0475	-0,3708**	0,1543*	0,0239	-0,1003	0,0909*	-0,0656	0,2730	0,0033	0,0226	-0,2045	99,24%
x25	0,0060	-0,0139	0,0022	0,7757***	0,2037*	-0,5379	-0,1445	0,3064	0,1058	-0,0372	0,0921	0,9245	0,3942***	-0,2387	0,3566	-0,3038	-0,0766	-0,6410	-0,1742	0,2173	0,8102	20,37%
x26	0,0021*	-0,0030	0,0058	0,9313***	0,0961***	-0,6667***	-0,0481	0,0405	0,1178	0,0338	0,0437	-0,6631***	0,2193**	-0,0320	0,6751	0,0267	-0,0119	0,5553*	-0,0673*	0,0288	-0,5753**	97,67%
x27	-0,0020**	0,0018	-0,0016	0,9700***	-0,0038	-0,1944	0,1517***	0,1608**	0,3631	-0,0377	-0,0026	0,0278	0,0573	-0,0337	0,0891	-0,0254	0,0343	-0,7391*	0,0890**	-0,0090	-0,1402	88,79%
x28	-0,0003	-0,0004	-0,0058**	0,9559***	-0,0194	0,1147*	-0,0835***	0,0315	0,2299**	0,0383	0,0271	-0,1663	0,0849***	0,1197***	-0,2061*	0,0745	-0,0939*	0,3362	0,0085	-0,0517	-0,0281	96,22%
x29	-0,0002	-0,0003	-0,0039	1,0286***	0,0462**	-0,0029	-0,1263***	-0,1643***	-0,0634	-0,1934***	0,0375	-0,0738	0,1128***	-0,0070	-0,2012	-0,0644**	-0,0600	-0,3973***	0,0677***	0,0295	-0,1125**	98,03%
x30	0,0000	-0,0011	-0,0015	1,0606***	0,0343	-0,1187	0,0440	0,0440	0,2946	-0,1571***	0,0820	-0,1999	-0,3142***	-0,0460	-0,5694**	-0,2618***	0,0731	-0,1623	0,0940**	0,1118**	0,1290	94,65%
x31	0,0029*	-0,0061	0,0239	0,9734***	-0,0519	0,2203	0,1601	0,0607	-1,5391**	-0,1459	0,1497	0,7597*	-0,2657*	0,5911**	-2,4934**	-0,1178	-0,0108	-0,8175	0,0421	-0,0600	-0,5717	96,81%
x32	-0,0016**	-0,0022	-0,0122***	1,0934***	-0,0156	-0,1013	-0,0942***	0,1132***	0,0702	-0,1522***	0,1269*	-0,0230	-0,0075	-0,0785	0,3080	-0,2369***	-0,0691	-0,4341	0,1507***	0,0438	-0,2686***	94,39%
x33	-0,0034	-0,0066	0,0016	0,9063***	0,0701	0,1325	0,0399	-0,1070	0,1169	0,0115	-0,1782	0,1059	0,4037***	-0,4683*	2,5992**	-0,0856	0,0290	-0,2100	0,4020***	-0,0062	2,0784**	92,05%

This table reports a summary of the regression estimates generated from the conditional Fama and French (2018) six-factor model for the low-carbon funds. In this table, it is possible to observe estimates of performance (α_p), and the risk factors, in this case, market (β_p), size (SMB), book-to-market (HML), profitability (RMW), investment (CMA) and momentum (MOM). The regressions' adjusted coefficient ($Adj.R^2$) is also presented, as well as the public information variables short-term rate (ST) and the dividend yield (DY). The time frame under consideration is from January 2000 to October 2022. According to Newey and West (1987), the standard errors are corrected for heteroscedasticity and autocorrelation. The level of statistically significance for the two equally weighted portfolios and the portfolio of differences are defined by asterisks as follows: statistically significant at the level of 1% (***), statistically significant at the level of 5% (**), and statistically significant at the level of 10% (*).