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DE EXTREMADURA

TESIS DOCTORAL

**ESTRATEGIAS DE INVERSIÓN
CON EXCHANGE TRADED FUNDS**

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PROGRAMA DE DOCTORADO EN ECONOMÍA Y EMPRESA

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DECLARACIÓN DE LOS DIRECTORES DE LA TESIS DOCTORAL “ESTRATEGIAS DE INVERSIÓN CON EXCHANGE TRADED FUNDS (ETFs)”

La presente Tesis está formada por el compendio de tres artículos de investigación publicados o aceptados para su publicación en revistas científicas de impacto pertenecientes al Journal Citation Report (JCR) de la Web of Science.

La primera investigación fue publicada 2019 en **International Journal of Finance & Economics** 24(2), 671-684 con el título “Diversification and the benefits of using returns standardized by range-based volatility estimators” (<https://doi.org/10.1002/ijfe.1685>). Esta revista ocupa el puesto 87 (cuarto cuartil) en la categoría Business, Finance de la lista JCR, ya que tiene un índice de impacto de 0.943 para el año 2019 (siendo en los últimos 5 años de 1.169). Tiene una cita en la Web of Science a fecha de cierre de la presente Tesis Doctoral.

La segunda investigación de esta Tesis Doctoral está publicada en 2019 en la revista **Business Strategy and the Environment** 28(1), 244-255 con el título “Diversification benefits of using exchange-traded funds in compliance to the sustainable development goals” (<https://doi.org/10.1002/bse.2253>). Esta revista tiene en el año de publicación del artículo un índice de impacto de 5.483 (siendo en los últimos 5 años de 6.221) en la lista JCR. Business Strategy and the Environment ocupa la posición 19 de 152 (primer cuartil) de la categoría Business, la posición 10 de 123 (primer decil) de la categoría Environmental Studies y la posición 21 de 226 (primer decil) de la categoría Management. A fecha de cierre de la presente Tesis Doctoral este artículo tiene un total de 11 citas en la Web of Science.

Por último, la tercera investigación de esta Tesis doctoral está publicada en la revista **Sustainability** en su número 12(5) de 2020 con el título: “Sustainable Development Goals and Investment Strategies: The profitability of Using Five-Factor Fama-French Alphas” (<https://doi.org/10.3390/su12051842>). Esta revista tiene a fecha de cierre de la presente Tesis un índice de impacto de 2.576 (siendo en los últimos 5 años de 2.798) en la lista JCR. Esto implica que ocupe la posición 120 de 265 (segundo cuartil) en la categoría Environmental Sciences y la posición 53 de 123 (segundo cuartil) en la categoría Environmental Studies. A la fecha de cierre de la presente Tesis el número de citas en la plataforma Web of Science ascendía a 2.

En los tres artículos descritos, el doctorando JOSÉ MANUEL DE BARROS PINHEIRO NOGUEIRA se ha encargado de la revisión de la literatura, el tratamiento de los datos, realización de los análisis empíricos y redacción del texto. Trabajos que han sido supervisados en todo momento por los directores de la Tesis.

Por todas las razones aquí expuestas, los directores de la presente Tesis Doctoral consideramos que el trabajo realizado por nuestro doctorando cumple los requisitos requeridos en el Programa de Doctorado.

Badajoz, a 17 de septiembre de 2020

Fdo.: Dr. D. José Luis Miralles Quirós

Fdo.: Dra. Dña. María del Mar Miralles Quirós

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Esta dissertação é resultado de muitas horas de trabalho por um caminho permeado de inúmeros desafios, tristezas, incertezas, alegrias e percalços e, é importante exprimir os meus mais sinceros agradecimentos a todos os que me ajudaram em mais uma etapa da minha vida e que durante estes anos estiveram sempre a meu lado.

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RESUMEN

Esta Tesis Doctoral está formada por el compendio de tres artículos de investigación publicados o aceptados para su publicación en revistas científicas de impacto pertenecientes al Journal Citation Report (JCR) de la Web of Science cuyo objetivo común es analizar diferentes oportunidades de inversión utilizando Exchange Traded Funds, ETFs.

El primer estudio tiene por objeto analizar los beneficios para los inversores de los Estados Unidos de combinar sus ETFs nacionales con los ETF que replican otros mercados desarrollados como el Reino Unido, Japón, Alemania y Francia. Evaluamos el rendimiento de seis estrategias utilizando las rentabilidades y las predicciones de volatilidad de un enfoque VAR-ADCC-GARCH en el que se utilizaron como variables endógenas rendimientos estandarizados por estimadores de volatilidad basados en rangos. Los buenos resultados iniciales de algunas estrategias que utilizaban rentabilidades clásicas mejoraron significativamente cuando las rentabilidades fueron estandarizadas mediante el estimador de volatilidad preciso de Garman-Klass. Además, nos encontramos con una gran disminución de las ponderaciones del ETF norteamericano en las estrategias de mejor rendimiento, lo que significa que es posible obtener beneficios de la diversificación.

El segundo estudio se centra en la Inversión Socialmente Responsable (ISR) que ha adquirido una dimensión global más allá de los valores morales, que incluyen la sostenibilidad, la gestión de riesgos y la responsabilidad social corporativa (RSC) como elementos principales. Al mismo tiempo, desde el lanzamiento de los 17 Objetivos de Desarrollo Sostenible (ODS) incluidos en la Agenda 2030 de las Naciones Unidas, con sus 169 resultados y 230 indicadores, se está pidiendo a los inversores que contribuyan con sus actividades empresariales, con la asignación de activos y las decisiones de inversión a resolver algunos de los problemas más urgentes a los que se enfrenta el mundo (pobreza, agua potable, energía limpia, trabajo decente y crecimiento económico, y acción climática entre otros). El objetivo de nuestra investigación es analizar los beneficios de añadir ETFs de ODSs a una cartera de bonos

Resumen

y acciones y evaluar el rendimiento de cuatro estrategias utilizando las previsiones de rendimiento y volatilidad de una ventana móvil. Nuestros resultados muestran que es posible que los inversores obtengan beneficios de la inversión en ETFs que hacen un seguimiento de las empresas centradas en la contribución a los ODSs, especialmente aquellas centradas en el trabajo decente y el crecimiento económico, y claras mejoras en el rendimiento de la cartera en comparación con la cartera inicial de acciones y bonos.

Por último, el tercer estudio se centra de nuevo en los activos relacionados con los Objetivos de Desarrollo Sostenible (ODS) y en sus oportunidades de inversión mediante ETFs pero desde un punto de vista diferente a los trabajos anteriores. En este caso se muestra que la elaboración de una estrategia de inversión sobre la base del valor de los coeficientes alfas obtenidos de la estimación del modelo de cinco factores de Fama-French mejora notablemente los resultados obtenidos mediante una cartera equiponderada (naïve), incluso cuando se consideran los costes de transacción. Además, se demuestra que los inversores deben centrar sus inversiones en dos ODS principales: Buena salud y bienestar (Objetivo 3) e Industria, innovación e infraestructura (Objetivo 9).

Estas conclusiones son importantes no sólo para los académicos sino también para gestores profesionales activos que pueden utilizar estas técnicas para añadir valor a sus estrategias de diversificación internacional.

ABSTRACT

This doctoral thesis consists of a compendium of three research articles published or accepted for publication in important scientific journals belonging to the Journal Citation Reports (JCR) of the Web of Science, whose common objective is to analyze different investment opportunities using Exchange Traded Funds, ETFs.

The first study aims to analyze the benefits for US investors of combining their domestic ETF with ETFs which track other developed markets such as the UK, Japan, Germany and France. We evaluate the out-of-sample performance of six strategies using the returns and volatility forecasts from a VAR-ADCC-GARCH approach where returns standardized by range-based volatility estimators were used as endogenous variables. The initial outperformances of some strategies using classic returns were significantly improved when returns were standardized by the Garman-Klass precise volatility estimator. Additionally, we find a large decrease in the weights of the North American ETF in the best performing strategies, meaning that it is possible to obtain benefits from diversification.

The second study focuses on Socially Responsible Investment (SRI) which has acquired a global dimension beyond moral values, which includes sustainability, risk management and corporate social responsibility (CSR) as the main elements. At the same time, from the launch of the 17 Sustainable Development Goals (SDGs) included in the UN 2030 Agenda, with its 169 outcomes and 230 indicators, investors are being asked to contribute with their business activities, asset allocations and investment decisions to solve some of the most urgent problems the world is facing (poverty, clean water, clean energy, decent work and economic growth, and climate action among others). The aim of our research is to analyze the benefits of adding SDGs ETFs to a stock-bond portfolio and evaluate the out-of-sample performance of four strategies using the returns and volatility forecasts from a rolling sample approach. Our results show that it is possible for investors to obtain benefits from investing in ETFs which track companies focused on contributing to the SDGs, especially those focused on

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Decent work and economic growth, and clear improvements in portfolio performance compared to the initial stock-bond portfolio.

Finally, the third study focuses on assets related to Sustainable Development Goals (SDGs), and their investment opportunities through ETFs but from a different point of view than the previous studies. The profitability of developing an investment strategy is shown based on the value of the alphas obtained from the estimation of the Fama-French five-factor model when compared to an equally weighted portfolio, even when transaction costs are taken into consideration. In addition, it is proven that investors should focus their investments on two main SDGs: Good health and well-being (Goal 3) and Industry, innovation and infrastructure (Goal 9).

These findings are relevant not only for academics but also for active professional managers who can use this technique to add value to their international diversification strategies.

1. INTRODUCTION

Over the last three decades, stock–bond portfolios have been considered the best way to provide protection for institutional asset managers and private investors in times of market volatility because their low correlation lead to obtain diversification benefits for investors holding both assets. However, the economy has changed.

Nowadays, there are several indirect routes through which an investor may achieve exposure to foreign equity returns in a domestic setting, such as the Exchange Trade Funds (ETFs). These assets are very similar to open-ended funds, but they can be transacted at market price any time during the trading day.

There are two main reasons for using ETFs: Firstly, Exchange Trade Funds (ETFs) are an attractive method of investing indirectly in international equities. They are similar to mutual funds because they are also valued on the basis of their holdings, but while mutual funds are priced once a day the prices of ETFs are set throughout the day. Therefore, ETFs are traded like a stock and, as a consequence, an investor may take advantage of market developments in real time. That stock-like quality of ETFs allows investors to use strategies such as short selling or margin trading, unlike mutual funds. Additionally, ETFs have lower fees on average than mutual funds and some advantages in terms of intraday liquidity, transparency and tax efficiency. Secondly, there are thousands of ETFs covering indices, equity market sectors, countries, etc. These ETFs help investors to create a diversified portfolio that meets their specific asset allocation needs such as those ETFs which respect the aim of the SDGs.

In this context, the aim of this doctoral thesis is to analyze different investment opportunities using ETFs that create value for shareholders and, indirectly, analyze the efficiency of different markets.

This thesis consists of a compendium of three research articles published or accepted for publication in influential scientific journals belonging to the Journal Citation Report (JCR) of the Web of Science.

Introduction

The first study was published in 2019 in the **International Journal of Finance & Economics** 24(2), 671-684 with the title “Diversification and the benefits of using returns standardized by range-based volatility estimators” (<https://doi.org/10.1002/ijfe.1685>). The purpose of this study was to analyze the benefits for US investors of combining their domestic ETF with ETFs which track other developed markets such as the UK, Japan, Germany and France.

The objective of this paper is to analyze alternative investment strategies using out-of-sample forecasted returns, volatilities and covariances obtained from a Multivariate GARCH approach, namely the Asymmetric Dynamic Conditional Correlation, ADCC-GARCH, model proposed by Cappiello et al (2006). The choice of this model is based on the results of Gupta and Donleavy (2009), Kalotychou et al. (2014), Zhou and Nicholson (2015), Yuan et al. (2016) and Badshah (2018) who show that modeling covariance asymmetry on the basis of the ADCC model contributes significantly to the economic value of the model due to the fact that conditional volatility, and the correlation of financial returns, tend to rise more after negative return shocks than after positive ones of the same size.

The vast majority of researchers have employed multivariate GARCH and MGARCH specifications to parameterize the dynamic equation for the conditional covariance and estimate multi-step ahead forecasts to construct their optimal portfolios. However, the Gaussian assumption that underlies their two-step procedure is likely to be violated because the returns, which are assumed to be normal with zero mean and conditional variance, are usually far from being normally distributed and often exhibit negative skewness and excess kurtosis.

Molnár (2012), provides evidence that returns normalized (devolatilized) by the standard deviation of the range-based volatility estimators are approximately normally distributed. For that reason, and because there is no need to choose any p lag, we propose using those standardized returns in the first step of the VAR-ADCC-GARCH

procedure, instead of the classic returns or the devolitized returns proposed by Pesaran and Pesaran (2007, 2010).

We employ the forecasted returns, volatilities and correlations from the previous model to construct six investment strategies which are based on two classical portfolio optimization problems: the so-called minimum-variance portfolio and the classic mean-variance strategy proposed by Markowitz (1952). Finally, we evaluate the performance of the optimization frameworks over the out of sample period in terms of the Sharpe ratio which is defined as the average out-of-sample returns divided by their sample standard deviation.

Not only ETFs covering indices or developed countries are considered but also Socially Responsible Investment (SRI) which is a very broad concept that originated in the late sixties in the United States and refers to different investment practices that consider not only the financial aspects, but also the social and environmental criteria (Renneboog *et al.*, 2008).

SRI has acquired a global dimension beyond moral values, which includes sustainability, risk management and corporate social responsibility (CSR) as the main elements. For socially responsible investors, it is not just about investing in markets, but it is about investing taking into account the social, ethical or environmental dimension of the securities in which they invest. This means that in order to prepare the investment portfolio, the behavior of companies in the extra-financial sphere is taken into account: their CSR policy. Therefore, if CSR is conceived as an optimal stage in the search for business excellence, adequate financial management will require taking into account the behavior of the company with society and the environment (Goettsche *et al.*, 2016; McWilliams *et al.*, 2016).

In this context, the launch of the 17 Sustainable Development Goals (SDGs) included in the UN 2030 Agenda, with its 169 outcomes and 230 indicators, constitute the first framework in history to transform the world through a common action plan in

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favour of people, the planet and prosperity, fostering peaceful, just and inclusive societies. From an approach of public and private collaboration, open to all agents, some of the objectives refer directly to the purpose that all business activity should have, such as Goal 8 (Decent work and economic growth) and Goal 12 (Responsible consumption and production), while the contribution of the company to society is more related to specific productive sectors, that is the case of Goal 6 (Clean water and sanitation), Goal 7 (Affordable and clean energy), Goal 9 (Industry, innovation and infrastructure) and Goal 11 (Sustainable cities and communities).

In that context, it was published in 2019 the second study in this thesis the **Business Strategy and the Environment** 28(1), 244-255 with the title “Diversification benefits of using exchange-traded funds in compliance to the sustainable development goals” (<https://doi.org/10.1002/bse.2253>). The aim of this study is to analyze the out-of-sample performance of applying the spanning procedure to four investment strategies which are commonly used by asset managers.

This study analyzes the portfolio benefits of ETFs when added to a stock-bond portfolio (benchmark) for widely implemented asset allocation strategies. Following Chiou, Lee and Chang (2009), Bessler and Wolff (2015), and Hwang et al. (2018), among others, a rolling sample approach of the previous 5 years was used to compare the out-of-sample performance of the different asset allocation strategies with that obtained by the benchmark.

In each day, we estimate the vector of expected returns and the variance-covariance matrix of asset returns, when necessary, by using returns observations over the past 1,260 trading days (that is 5 years). That process was repeated by moving the sample period one day forward and computing again the expected returns vector and the variance-covariance matrix of asset returns for the next day. These estimated parameters were then used to calculate the portfolio weights for each strategy. In all cases we excluded short selling.

Similarly to the first study, it was initially proposed to solve two optimization problems which minimize portfolio variances subject to different constraints. The first optimization problem is the Minimum-Variance portfolio and the second is the classic mean-variance strategy. However, as an alternative to the previous optimization problems we consider other two commonly implemented asset allocation strategies, the Capital Allocation Line (CAL) and the Risk-Parity (RP).

The objective of the Capital Allocation Line (CAL) is to find the portfolio weights that result in the highest slope of the CAL. Therefore, the optimization problem is to maximize the reward-to-variability ratio considering no short selling constraints and a risk free rate. The Risk-Parity approach is implemented by numerous asset managers, providing significantly better results than other common asset allocation strategies. The aim of this strategy is for each portfolio component to contribute equally to portfolio risk. We analyze the performance of the proposed optimal strategy by estimating the out-of-sample Sharpe and Sortino ratios.

Finally, the third study in this thesis was published in 2020 in the Sustainability journal in its number 12(5) with the title “Sustainable Development Goals and Investment Strategies: The profitability of Using Five-Factor Fama-French Alphas” (<https://doi.org/10.3390/su12051842>).

This article takes into account previous empirical evidence that has extensively employed multi-factor asset pricing models to explain the cross-sectional variation in expected returns of Socially Responsible Investments (SRI). More specifically, this article follows the line of Sarwar et al. (2018), who proposed estimating this five-factor model using a rolling window and then developing a long-only or a long-short trading strategy where the signals are provided by the model’s alpha that represents the risk-adjusted expected return. It is considered that a statistically significant positive (negative) alpha indicates a superior (inferior) performance of the asset in relation to the market.

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This article follows the common procedure for assessing time-varying alphas and/or betas of Fama and MacBeth (1973), Verheyden et al. (2016) and Zeng (2016), among others, and the line of the approach proposed by Sarwar et al. (2018) proposing some methodological differences. Basically, it is estimated the Fama-French five-factor model using a rolling window and then developing a long-only, a long-only with risk free asset and a long-short strategy where the signals are provided by the Jensen's alpha. In all cases, the performance of the proposed strategies was evaluated by comparing their results on the Sharpe and Sortino ratios with those obtained from an equally weighted portfolio (naïve) strategy.

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PRIMER ARTÍCULO



Diversification and the benefits of using returns standardized by range-based volatility estimators

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JEL Classification: G10; G11; G14

Abstract

The aim of our research is to analyse the benefits for the U.S. investors of combining their domestic exchange trade fund (ETF) with ETFs, which track other developed markets such as the United Kingdom, Japan, Germany, and France. We evaluate the out-of-sample performance of six strategies using the returns and volatility forecasts from a VAR Asymmetric Dynamic Conditional Correlation GARCH approach where returns standardized by range-based volatility estimators were used as endogenous variables. The initial outperformances of some strategies using classic returns were significantly improved when returns were standardized by the Garman–Klass precise volatility estimator. Additionally, we find a large decrease in the weights of the North American ETF in the best performing strategies, meaning that it is possible to obtain benefits from diversification. These findings are relevant not only for academics but also for active professional managers who can use this technique to add value to their international diversification strategies.

KEYWORDS

developed markets, exchange trade funds, international diversification, out-of-sample performance, range-volatility estimators, standardized returns

1 | INTRODUCTION

Over the last decade, numerous studies have provided evidence of the attractiveness of emerging markets due to their lower correlation with the United States (Christoffersen, Errunza, Jacobs, & Jin, 2014; Christoffersen, Errunza, Jacobs, & Langlois, 2012; Lehkonen & Heimonen, 2014; Yarovaya & Lau, 2016; Yuan, Gupta, & Roca, 2016). In contrast, international diversification in developed markets has become less attractive for the U.S. investors as the correlation between markets has steadily risen. In this context, the U.S. investors in particular display a preference for home-based investments. This phenomenon is known as the home bias puzzle, and its possible explanations are foreign investment restrictions, capital controls, transaction costs, and asymmetric information (O'Hagan-Luff & Berrill, 2015).

Despite these circumstances, there is an indirect method of achieving the benefits of international diversification, namely, investing in securities that trade domestically and provide international exposure while avoiding the costs and risks of investing abroad. Nowadays, there are several indirect routes through which an investor may achieve exposure to foreign equity returns in a domestic setting, such as the Exchange Trade Funds (ETFs). These assets are very similar to open-ended funds, but they can be transacted at market price any time during the trading day.

The vast majority of researchers have employed multivariate GARCH and MGARCH specifications to parameterize the dynamic equation for the conditional covariance and estimate multistep ahead forecasts to construct their optimal portfolios. However, the Gaussian

SEGUNDO ARTÍCULO



RESEARCH ARTICLE

Diversification benefits of using exchange-traded funds in compliance to the sustainable development goals

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Email: miralles@unex.es**Funding information**

Junta de Extremadura, Grant/Award Number: V Action Plan for Research and Development 2014/17

JEL Classification: G10; G11; G14

Abstract

Socially responsible investment has acquired a global dimension beyond moral values, which includes sustainability, risk management, and corporate social responsibility as the main elements. At the same time, from the launch of the 17 Sustainable Development Goals (SDGs) included in the United Nations 2030 Agenda, with its 169 outcomes and 230 indicators, investors are being asked to contribute with their business activities, asset allocations, and investment decisions to solve some of the most urgent problems the world is facing (poverty, clean water, clean energy, decent work and economic growth, and climate action among others). The aim of our research is to analyze the benefits of adding SDGs exchange-traded funds (ETFs) to a stock–bond portfolio and evaluate the out-of-sample performance of four strategies using the returns and volatility forecasts from a rolling sample approach. Our results show that it is possible for investors to obtain benefits from investing in ETFs, which track companies focused on contributing to the SDGs, especially those focused on decent work and economic growth and clear improvements in portfolio performance compared with the initial stock–bond portfolio. These findings are relevant not only for academics but also for active professional managers who can use this technique to add value to investment strategies.

KEYWORDS

diversification benefits, exchange-traded funds, socially responsible investment, sustainable development goals

1 | INTRODUCTION

Socially responsible investment (SRI) is a very broad concept that originated in the late 60s in the United States and refers to different investment practices that consider not only the financial aspects but also the social and environmental criteria (Renneboog, Ter Horst, & Zhang, 2008).

In the early stages of development of SRI, these investments were conceived based on negative preselection criteria. This meant that exclusion criteria were included, often based on moral values (for example, the exclusion of alcohol, pornography, or the gambling industry) to select the investment portfolio (Sandberg, Juravle, Hedesström, & Hamilton, 2009). However, the evolution of the SRI led to the idea of considering not only excluding certain activities but also including

“model” companies (those that adopt a series of good practices, both in their financial management and in environmental issues and/or social).

Therefore, SRI has acquired a global dimension beyond moral values, which includes sustainability, risk management, and corporate social responsibility (CSR) as the main elements. For socially responsible investors, it is not just about investing in markets, but it is about investing, taking into account, the social, ethical, or environmental dimension of the securities in which they invest. This means that in order to prepare the investment portfolio, the behavior of companies in the extra financial sphere is taken into account: Their CSR policy. Therefore, if CSR is conceived as an optimal stage in the search for business excellence, adequate financial management will require taking into account the behavior of the company with society and the

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Sustainable Development Goals and Investment Strategies: The Profitability of Using Five-Factor Fama-French Alphas

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Abstract: This study focuses on assets related to Sustainable Development Goals (SDGs), which are the most recent aspect of the Socially Responsible Investment framework and have caught the attention of investors due to their investment opportunities as well as the global challenges that can be achieved. The profitability of developing an investment strategy is shown based on the value of the alphas obtained from the estimation of the Fama-French five-factor model when compared to an equally weighted portfolio, even when transaction costs are taken into consideration. In addition, it is proven that investors should focus their investments on two main SDGs: Good health and well-being (Goal 3) and Industry, innovation and infrastructure (Goal 9).

Keywords: socially responsible investment; sustainable development goals; exchange traded funds; multi-factor models; portfolio performance

1. Introduction

The United Nations' Sustainability Development Goals (SDGs, hereafter) launched in September 2015 are a set of 17 goals focused on the way of solving some of the most urgent problems the world is facing: poverty, clean water, clean energy, decent work and economic growth and climate action, among others. These SDGs make up the globally agreed sustainability agenda to be reached by 2030 [1]. Both the public and the private sectors are needed to accelerate the transition to a sustainable economy and achieve these general goals. In this context, investors have an important role in promoting the reorientation of financial markets to support these goals by understanding their growth potential and their risk for example by allocating their capital into investments which support the SDGs. Therefore, investors could improve their financial performance by acting in such a way as to encourage sustainable economies and markets, in accordance with the Principles of Responsible Investment (PRI) developed by the United Nations [2].

One innovative way of contributing to achieving the SDGs is to invest in Exchange Traded Funds (ETFs) that track companies that cover these principles. ETFs are novel financial instruments very similar to mutual funds because they are portfolios of assets but with the advantage that they are also easily traded like a stock. Moreover, this article takes into account previous empirical evidence that has extensively employed multi-factor asset pricing models to explain the cross-sectional variation in expected returns of Socially Responsible Investments (SRI). This is the case, for instance, in the recent works of Joliet and Titova [3], who assessed the fundamental characteristics of SRI funds using the Fama-French five-factor model [4], finding that screening criteria guide investment decisions, or Sokolovska and Kešeljević [5] who found both overperformance and underperformance in the

5. GENERAL CONCLUSIONS

The objective of this thesis has been to enhance the evidence on the benefits for investors of using ETFs which are attractive and innovative financial products that can be traded directly by individual investors in the stock markets. This makes markets more accessible because it brings investors the opportunity of gaining autonomy instead of depend on a professional portfolio manager.

Firstly, we analyze the out-of-sample performance of different portfolio strategies using the returns and volatility forecasts from a VAR-ADCC-GARCH approach. Our initial results show that it is possible to obtain benefits from diversification since some strategies outperformed the naïve rule. However, the incorrect assumption of normally distributed endogenous variables in the VAR-ADCC-GARCH model, lead us to suggest the use of returns standardized by range based volatility estimators which have been proven to be approximately normally distributed.

By applying a new methodology, we find a significant improvement in performance when returns standardized by the Garman-Klass precise volatility estimator are used as endogenous in the VAR-ADCC-GARCH approach. We also observe a large decrease in the weights of the North American ETF in the mean-variance strategy with the positive portfolio returns constraint and without short selling constraints, which is the best performing strategy. Finally, we show that this strategy performs better than the naïve rule for multiple samples.

In order to connect researchers and investors with the current social challenges such as the Sustainable Development Goals (SDGs), we considered that one innovative way would be to invest in ETFs that track companies that covered these principles. For that reason, the second study analyzed the benefits of adding SDGs ETFs to a stock-bond portfolio and evaluate the out-of-sample performance of four strategies using the returns and volatility forecasts from a rolling sample approach.

We reached to some conclusions from this study: Firstly, investing in SDGs is good because we contribute to a better world and achieve a healthy financial return.

General Conclusions

Secondly, we obtain clear performance improvements as compared to the benchmark, and finally, we should invest especially on those ETFs which are focused on two goals: Decent work and economic growth (Goal 8) and Industry, Innovation and Infrastructure (Goal 9) because they provide the best results in terms of performance and cumulative returns.

These results lead us to keep analyzing the SGDs but from a point of view far removed from previous empirical evidence which is focused on testing the performance of the asset pricing models. Therefore, we opted for developing different investment strategies based on the value of the alphas obtained from the estimation of the Fama-French five-factor model in the third study.

It was observed that the long-only strategy, which is mainly compounded by ETFs connected to Goals 3 (Good health and well-being) and 9 (Industry, innovation and infrastructure), clearly outperformed the naïve strategy but also the other two strategies. Additionally, it is shown that the Healthcare sector is now the most important for investors who want to obtain some profits from their investments, but the Biotechnology sector, which is closely related to the Healthcare one, should also be considered.

To sum up, our results show that it is possible for investors to obtain benefits from investing in ETFs. These findings are relevant not only for academics but also for active professional managers who can use this technique to add value to their international diversification strategies.

Future research should focus on investigating the robustness of our findings for alternative investment purposes such as hedging strategies. We think that ETFs versatility allows investors to make bullish and bearish bets, or even to hedge a portfolio for safety. Moreover, this strategy, when done properly, can greatly reduce susceptibility to market fluctuations and adverse price moves.

Therefore, our future research must be oriented on analyzing the performance of different strategies such as investing on inverse ETFs which move opposite to the stock market or investing on currencies or commodities because there does not seem to be a great emphasis on hedging ETFs as its importance might dictate.