ICADE BUSINESS SCHOOL

DO SPANISH MUTUAL FUND MANAGERS GENERATE *ALPHA*?

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ABSTRACT

In recent years, the debate between passive and active management of mutual funds is a very recurrent topic. The creation of the Exchange Traded Funds (ETF) in the Nineties, increased the importance of the passive management, extending this concept. However, it was not until the year 2006 when the ETFs were introduced in Spain. Both strategies have their own advantages and disadvantages, but active management has always been criticized due to its high costs and poor results. For that reason, this End of Master Project aims to analyze if Spanish mutual fund managers do add value to their investment portfolios. It will be studied the theory of the Capital Asset Pricing Model (CAPM) developed by William F. Sharpe, together with the Jensen's Alpha coefficient. Moreover, a model will be tested attending to those two theories to try to answer to the following question: *Do Spanish mutual fund managers generate alpha?*.

RESUMEN

En los últimos años, el debate entre la gestión activa y pasiva de fondos de inversión ha tomado fuerza. La creación en los años noventa de los *Exchange Traded Funds* (ETF) o fondos de inversión cotizados, dio importancia a la gestión pasiva, extendiendo este concepto. Sin embargo, no fue hasta el año 2006 cuando se comercializó el primer ETF en España. Ambas estrategias tienen sus respectivas ventajas e inconvenientes, aunque la gestión activa ha sido siempre criticada por sus elevados costes y sus pobres resultados. Por esa razón, este Trabajo de Fin de Máster tiene como objetivo analizar si los gestores de fondos de inversión españoles son capaces de aportar valor a sus carteras de inversión. Para ello, se analizará la teoría del *Capital Asset Pricing Model* (CAPM) o Modelo de Valoración de Activos Financieros, desarrollada por William F. Sharpe, además del coeficiente Alfa de Jensen. Asimismo, se pondrá en práctica un modelo basado en esas dos teorías, con el fin de intentar responder a la siguiente pregunta: ¿*Generan alfa los gestores de fondos españoles?*

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1. INTRODUCTION

Nowadays, mutual funds are one of the most common ways of investing due to their remarkable advantages, but not everybody knows that it is a relatively new investment vehicle. The idea behind the mutual fund industry is simple; instead of investors investing individually, they put their capital together on a fund which is managed by an experienced investor and finally, they collect their capital gains or losses. However, the origin of mutual funds is quite uncertain. Many historians set this origin in the year 1774 in the Netherlands, when a Dutch merchant named Abraham van Ketwich created the first "mutual fund". Its name was *Eendragt Maakt Magt*, which in English means "unity creates strength", and it owned bonds of foreign governments and plantation loans in the West Indies.

After spreading across Europe, the concept reached America in 1893, and it was created the first closed end mutual fund, the Boston Personal Property Trust. It became popular in the United States, and many more were created. Moreover, the Massachusetts Investors Trust (MITTX) is considered the first official open ended mutual fund, created in 1924. Nevertheless, the stock market crash of 1929 and the resulting Great Depression, stopped this expansion. The mutual fund industry then, had to wait until the 1980's and 90's to gain popularity again. In 1993, another crucial event happened, the creation of the first Exchange Traded Fund, better known as ETF. It was Nathan Most who created the Standard & Poor's Depository Receipts (SPDR, commonly known as Spider), based on the S&P 500 index. Today, is still one of the most successful funds. Today, there are more than 14,000 different mutual funds, which reinforce the concept of how successful was this idea of mutual investment.

Nevertheless, the emergence of the ETFs and the index funds, revived the endless debate between active and passive management. People generally consider passive behavior to be inferior, and they prefer to take action. The general perception is that active management should be a better strategy, but over the past few years investors have paid more attention to passive investment. In this context arises the question of whether active management really is worth or not.

Both strategies have its advantages and disadvantages. The most remarkable advantage of active management is the possibility of outperforming the reference index, but active fund investor will have to deal with the high costs of this strategy. On the other hand, passively managed mutual funds offer diversification and access to the market, at relatively low cost, and that is precisely what has increased the popularity of this kind of strategy. Then, the choice between one strategy or the other, will depend on the characteristics of each investor.

Therefore, the objective of this End of Master Project is to test whether Spanish mutual fund managers are able to outperform their reference indexes. The methodology is based on the Capital Asset Pricing Model theory developed by William F. Sharpe (1964), and the later development of the Jensen's Alpha coefficient. This theory was the first one that explained the market equilibrium of assets prices; which results to be the relationship between the expected returns and the systematic risk of the assets. After that, Michael C. Jensen (1967) on his "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios", and later "The Performance of Mutual Funds in the period 1945-1964", introduced the concept of alpha as a risk adjusted measure of portfolio performance, that estimates how much added value does the mutual fund manager contribute to his or her portfolio. The choice of this model remains on its simplicity, which makes it easy to test, and obtain solid results.

It will be analyzed a sample of mutual funds domiciled in Spain that invest on Eurozone Equities, being the Euro Stoxx 50 the reference market index. The model will be run with the help of the econometric software Gretl, with the aim of discovering if the alpha is significant or not. If it is significant and positive, it will mean that the manager is contributing to the index, obtaining better results than the market reference index. On the other hand, if the alpha is significant but negative, it will mean that the fund is obtaining worse results than the index. Besides, it will have to be taken into account the significance level of the results.

This End of Master Project has been divided into two main chapters. In the first one, it will be described the theoretical framework, starting from an overview of what mutual funds are and the differences between active and passive management. On the last section of this theoretical part, it will be described deeply the background of the model and the reason for choosing it. The second chapter addresses the practical approach of the study, which is dedicated to gathering all the necessary data and running the model. First it is presented and explained all the required data, and the model and variables. On the last section, and after testing the model, the results will be analyzed and commented. The project ends with a conclusion, and a list of the references used to develop it.

2. MUTUAL FUNDS

This first part of the projects aims to give an overall approach to Mutual Funds, defining their objectives and characteristics, but also identifying the difference between active and passive management. The history about mutual funds is uncertain, but most historians agree on their origin in the Netherlands in 1774, as a closed end fund format. The first open end fund was created in Massachusetts (Boston) in the year 1924, but it was not until the 1980's and 90's, when they captured the investors' attention. As of today, they are one of the most popular investments for their advantages and variety.

2.1. Overview of Mutual Funds

According to the Comisión Nacional de Valores (CNMV), the Spanish stock market authority, a mutual fund is defined as an investment vehicle constituted by the contribution of multiple investors. The managers administrating that mutual fund are responsible for investing those contributions in different financial asset such as, equities, bonds or money market instruments. The market evolution of those assets will determine the capital gains or losses of the participant.

Simplifying, a fund sells participations to the investors and the money obtained is allocated in different kind of assets by the fund manager, creating a portfolio. The evolution of the assets in the portfolio will define the price of the participations, and therefore, the capital gains or losses of the investors.

The fund manager is responsible for managing the portfolio and the investment strategies, and to cover these services, the investor will be charged with some fees such as, administration fees, custodian fees or management fees.

2.1.1. Advantages of Mutual Funds

Mutual funds have a number of advantages against other investment vehicles or securities. An investment in a mutual fund provides exposure to the stock market with a low investment. Mutual Funds provide exposure to a large amount of stocks, in a cheaper way than investing in each of those stocks. Moreover, this access to the stock market is managed by a professional, which can be a positive aspect for beginners or investors with no time to develop the necessary analyses to study the behavior of the securities or companies.

Furthermore, nowadays the mutual fund industry is very developed; which offers investors the possibility to choose the most suitable fund according to their preferences, among a wide range of mutual funds. In addition, funds registered in the Spanish territory are regulated by the Comisión Nacional de Valores (CNMV), promoting investors' protection and the fair application of the regulation.

One of the most remarkable advantages of investing in mutual funds is the diversification they provide to the investor. When investors want to gain exposure to the stock market, they have three options: buying or selling the stocks directly, entering into derivative contracts, or investing in a mutual fund. Derivative contracts could be a complex instrument for non-professional investors, so the possibilities decrease to two options. When buying or selling securities directly, the investment needed to diversify the risk among different stocks is quite high. The price of participations in mutual funds, compared to the investment mentioned before, is more affordable. A single participation in a mutual fund offers exposure to the stock market, with a diversified portfolio, and with a low investment needed. This has been one of the factors that led the success of the mutual fund industry.

2.1.2. Characteristics of Mutual funds

There are several characteristics that make the difference between one mutual fund and another one. Every investor will have to take into account these characteristics when choosing in which mutual fund to invest. These characteristics can be defined as the following ones:

TIME HORIZON

The time horizon of an investment is an important issue that should be analyzed before carrying it out. It is different investing for a short term than for a longer one, and consequently, the asset allocation of the portfolio will be different too.

According to Grable et al. (2009), the time horizon can be separated into two segments. The first one is the decision time frame, which is the period that will define the success of the investment according to each investor. The second one is the investment time horizon, which is the period that goes from the point in which the objective is fixed until the point in the future when the investor will need the assets.

Mutual funds are designed to fulfill whichever their objective is, in a defined time horizon. Therefore, when an investor picks a funds, they should take into account that the time horizon of the fund matches with the point in the future when they will need the assets.

FINANCIAL OBJECTIVE

Every investor that allocates his or her wealth in a mutual fund has a financial objective in their mind. The financial objective is a definition of the amount of wealth desired with a specific purpose, in a determined point in the future. These goals can vary depending on each investor, but some examples could be saving for retirement, or for university.

Specifying the objective and bearing it in mind when choosing among different funds is very important in order to select the most suitable one.

RISK PROFILE

According to Grable et al. (2017), an individual's risk profile is assumed to be a combination of objective and subjective attributes consisting of a set of relatively stable parameters, that should be considered when evaluating the financial choices. More precisely, the risk profile of an investor is defined as the capacity to take risks, both emotionally and financially.

The risk profile of the investor will determine if it is risk averse or risk lover; and this will impact on the decision of which mutual fund should choose, regarding the asset composition of the portfolio.

ASSET COMPOSITION OF THE FUND

The manager of a mutual fund will decide where to invest the contributions of the investors, and this defines the type of fund that it is formed. Some of the most common mutual funds are the following ones, but nowadays, the list could be infinite.

- **Fixed income funds**. These are mutual funds that invest only in bonds. The objective of each fund is different, focusing each of them in different categories such as, corporate bonds or treasury bonds, investment grade or high yield… The interest rate evolution is the factor that affects most to this kind of funds.
- **Equity funds**. According to the Comisión Nacional del Mercado de Valores, these funds have to invest at least the 75% in equities to be denominated equity funds. Equity funds are usually classified depending on several factors (geography, activity sectors, characteristics of the companies…). In general, equity funds are more volatile than fixed income funds.
    - **Eurozone Equity funds**: These funds are specialized in the specific area of the Eurozone. This means that they invest on companies based on countries part of the Eurozone. Moreover, and as mentioned before, it has to be at least the 75% invested in equities. To develop the empirical test, this has been the category of funds chosen. Besides, the funds chosen are domiciled in Spain, to analyze whether the Spanish mutual fund industry is able to generate alpha, or not.
- **Mixed or balanced funds**. Mixed mutual funds invest both in fixed income assets and in equities. Each fund holds a different asset allocation, with different asset class percentages.

- **Index funds**. Index based mutual funds or ETFs are funds that try to replicate an index, so the results are normally similar to the ones of the base index. These types of funds are also called Passive Management funds, which will be discussed later.
- **Global funds**. Global funds usually refer to those mutual funds whose investment policy does not match with any other category.

COSTS

Every mutual fund charges some fees or expenses to its investors for the services offered. These fees can differ from one fund to another but the most common ones are the following ones: Redemption fee, Purchase fee, Management fee, Administration and Custodian fees, and many more. Fees regarding actively managed fees are usually higher than those for passive management funds, since the service offered is costlier.

There are several studies analyzing the performance of funds, compared to the fees charged by each of them, and the results show different points of view. Sharpe (1966) states that the lower the expenses of a fund are, the better its performance; and Golec (1996) finds that fees are associated to negative excess returns. However, Ippolito (1989) finds no significant relation between fees and expenses, and performance of mutual funds.

Taking into account all these characteristics, every investor should analyze and identify the mutual funds that suit best their preferences. As there is such wide range of possibilities, mutual funds are a very convenient investment tool for all kind of investors; from the most informed ones, to the beginner ones.

2.2. Active Management vs. Passive Management

There are two types of management strategies when referring to mutual funds: Active Management and Passive Management. Both of them have several advantages and disadvantages, and depending on personal preferences, it will be more suitable one or the other.

The debate between active and passive management has always been opened, and research have shown a wide range of different conclusions, that can be classified into two main groups.

On the first group, it can be found those academics and researches that have identified that active managers fail to contribute added returns to their portfolios; as for example, Elton et al. (1996), who state that “There is overwhelming evidence that, post expenses, mutual fund managers on average underperform a combination of passive portfolios of similar risk.”, or Malkiel (1995), who using a data set which contained all equity mutual

funds each year (between 1971 and 1991), concludes that "These study takes a new look at mutual fund returns during the 1971 to 1991 period and utilizes a data set that includes the returns form all mutual funds currently in existence and, thus, excludes funds that have terminated operations. Our data set permits us to obtain measures of survivorship bias, which we estimate to be substantial. When returns from all funds are analyzed, we find that mutual funds have tended to underperform the market, not only after management expenses have been deducted, but also gross of all reported expenses except load fees. Moreover, fund returns are analyzed in the context of the Capital Asset Pricing framework. We not only fail to document any evidence of excess returns but also fail to verify the risk return relationship posited by the Capital Asset Pricing Model, a conclusion similar to that of Fama and French (1992) for individual securities.".

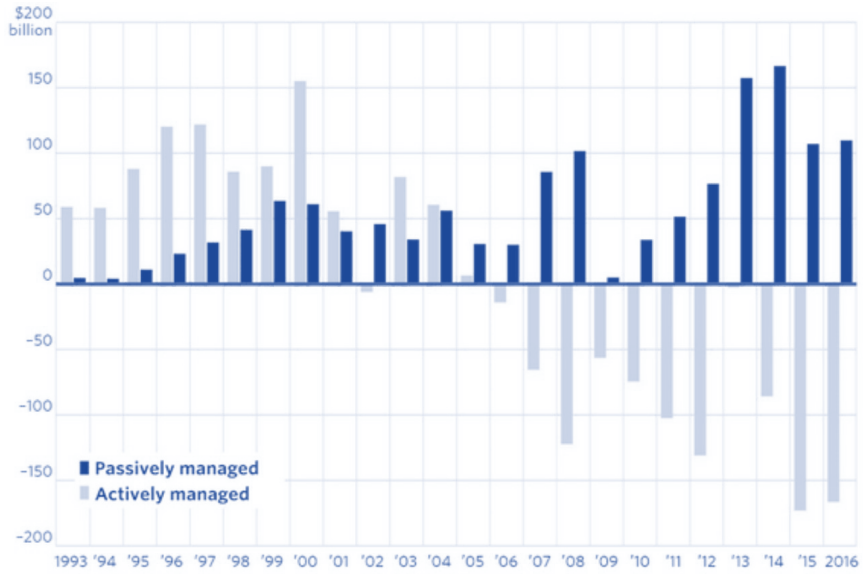
Moreover, Jensen (1968) on an article which will be analyzed later, concludes that the performance of mutual funds in the period between 1945 and 1964, is inferior than the performance of randomly selected portfolios with the same risk; on his words, "The evidence on mutual fund performance indicates not only that these 115 mutual funds were on average not able to predict security prices well enough to outperform a buy-the-market- and-hold policy, but also that there is very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance. It is also important to note that these conclusions hold even when we measure the fund returns gross of management expenses (that is assume their bookkeeping, research, and other expenses except brokerage commissions were obtained free). Thus, on average, the funds apparently were not quite successful enough in their trading activities to recoup even their brokerage expenses.".

The other group, is composed by those studies claiming that active managers outperform the market, providing to their investors higher risk adjusted returns. Henriksson (1984) and Chang and Lewellen (1984) concluded that the net returns to mutual fund investors, lie along the Security Market Line; implying that managers had the ability to compensate their fees and commissions. However, on the same paper they conclude the following: "A parametric statistical procedure that allows a joint test for the presence of either superior market timing or security selection skills in managed portfolios has been applied to examine empirically the investment performance of a sample of mutual funds during the decade of the 1970s. The test permits a more complete appraisal of the constituents of that performance than did prior methodologies and can eliminate certain biases in the estimates provided by the latter. We have discussed these in detail, and the empirical results are consistent with the new model's predictions. Nonetheless, those same results suggest that neither skillful

market timing nor clever security selection abilities are evident in abundance in observed mutual fund return data, and the general conclusion of the prior literature that mutual fund return data, and the general conclusion of the prior literature that mutual funds have been unable collectively to outperform a passive investment strategy still seems valid.". Furthermore, Ippolito (1989) finds that "readers who believe in the overall efficiency of the market and the adequacy of Capital Asset Pricing Model to explain performance will be encouraged by the results reported below. Estimated alphas for the mutual fund industry are significantly greater than zero, a result which contradicts the notion that mutual fund managers do not add value to portfolio management. On average, however, the alphas are not sufficiently large to offset load charges that are not reflected in the data.".

No matter which is the result of that debate, the reality is that in recent years the money is flowing out of active management and into passive management funds. According to Morningstar, investors withdrew more than $150 billion out of US Equity Mutual Funds, and invested around $100 billion in passively managed US Equity Mutual Funds. The graph below (Figure 1) shows the evolution of money flows between actively and passively managed mutual funds in the United States.

FIGURE 1. NET FLOWS OF US EQUITY MUTUAL FUNDS



SOURCE: MORNINGSTAR.

In this section, the theory about both types of funds management strategies will be covered, highlighting the main differences between both of them, and the principal advantages and disadvantages of each of them.

2.2.1. Definition

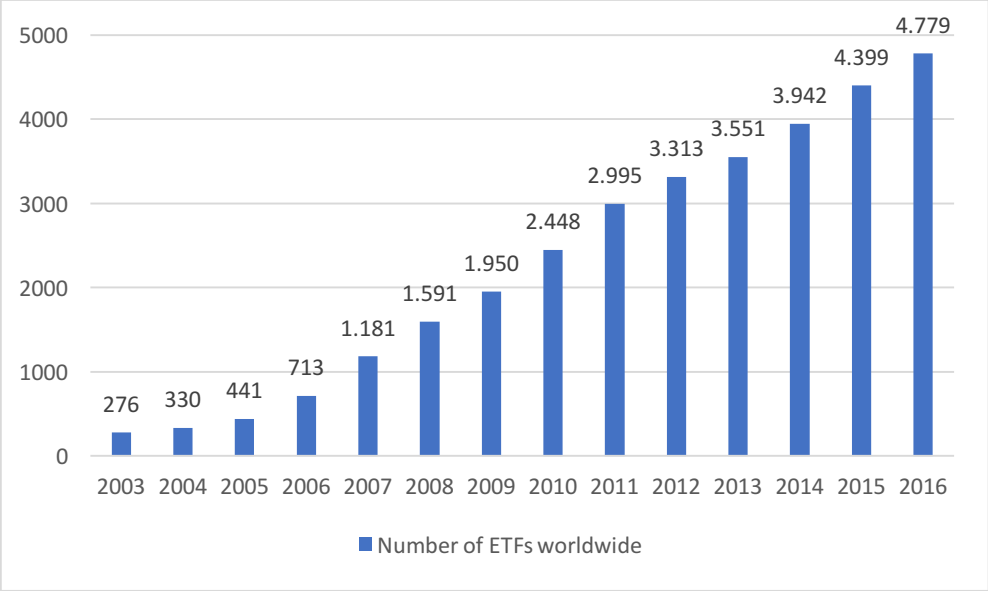
PASSIVE MANAGEMENT

Passive management refers to the mutual fund management strategy which intends to replicate the performance and returns of a benchmark or index; for this reason, this type of funds are also called Index Funds. This means that they accept that the market prices of the securities are the fair prices (they are not under or overvalued), assuming that they reflect all the available information. In other words, passive management implies assuming that the markets are efficient. Some authors as Jensen (1968), Sharpe (1966) or Lintner (1965) support the idea of efficient markets, meaning that it would be impossible for mutual fund managers to beat the market. Fama and Miller (1972) developed a theory trying to find a technique to beat the market; with the result of being it impossible in the long term. This means that investors or managers can outperform the stock market on the short term, but on the longer term this situation would balance.

The history of the first Index Fund goes back to 1976, when The Vanguard Group launched the one called "Vanguard Index Trust - 500 Portfolio". It was developed by Jack Bogle, a manager of the fund, and his idea was simple: "investors as a group cannot outperform the market, because they are the market". Therefore, his belief was that buying and holding the whole stock market provided better performance than trying to outperform the market itself. It was a great success, since it attracted many investors; and since then, the index funds market was not stopped growing.

Inside passively managed funds, a broadly expanded vehicle is found: the ETFs. ETF stands for Exchange Traded Funds, and this kind of Index Fund has the particularity of being traded on the stock market. The first ETF appeared at the Toronto Stock Exchange in 1990, and three years later, in 1993, the American Stock Exchange launched their S&P 500 Depository Receipt (SPDR). This last one continued growing, until being one of the largest and most liquid ETFs in the world nowadays. In the year 2000, there were around 90 ETFs globally, and just only years later, the number had grown to around 2500. Their expansion had to wait for some years, but nowadays, Exchange Traded Funds have gained popularity and have become one of the most used investment vehicles. In the Figure 2, the previously mentioned evolution of the number of ETFs can be found.

FIGURE 2. EVOLUTION OF THE NUMBER OF ETFS WORLDWIDE



SOURCE: OWN ELABORATION. DATA: STATISTA.COM

Index funds generally use two approaches to try to replicate the chosen index. The first one is named "Replication", and as the name suggests, consists in composing an index fund holding the same securities, and in the same proportion, as the selected benchmark. For example, if a manager was to replicate the Ibex35 (knowing that BBVA represents an 8% more or less), this manager would have to invest in BBVA the 8% of the total fund assets. Besides, and more commonly used for very complex and extensive indexes, managers can use the "Sampling" technique. This technique consists in selecting the most significant samples of stock for one index, and investing on similar ones in terms of risk and behavior.

ACTIVE MANAGEMENT

From the opposite position, actively managed funds are found. As their name suggests, the managers of this type of mutual funds manage them actively, normally, on a daily basis. Following Ippolito's (1993) findings, this kind of management assumes that the stock markets are inefficient, and consequently, some securities could be incorrectly priced. In other words, active management consists on managers anticipating the turns in the stock market and adjusting their portfolios, to finally, outperform the stock market.

This strategy is based on picking a reference index as a benchmark, and using the skills of the fund manager to beat it. Managers go through the process of stock-picking, which basically consists in identifying the stocks that are over or undervalued, and after it they buy or sell the previously selected stocks. This stock-picking process can be

accomplished following two different approaches: the Top-down approach and the Bottom-up approach.

- **Top-down approach**. This technique focuses on studying global indicators first, which gives an overall view that will help identifying countries or sectors with potential to outperform the other. Once the search has been reduced to a few industry or geographical sectors, the companies included on them will be analyzed individually.
- **Bottom-up approach**. On the contrary, this approach does not take into consideration the sector or country of a company. It tries to identify companies with potential not reflected on the current price, analyzing them individually.

Even if the fund manager follows a Top-down or a Bottom-up approach, they can manage the fund attending to two different styles: value investing or growth investing. A value stock, by definition, is a stock that is undervalued by the stock market; hence, that is trading below its fair value. In consequence, value investors are those that try to analyze and identify these value stocks before they reach their intrinsic value. On the other hand, growth stocks or companies, are those that show a high potential to increase the earnings on the following periods. Some indicator such as, the Price to Earnings ratio (P/E ratio) or the Book Value to Market Value ratio (BV/MV ratio), can reflect the orientation of a portfolio, regarding these two investing styles.

2.2.2. Advantages and disadvantages

Once having explained what active management and passive management means, it is clear that both strategies have different approaches. This section aims to highlight positive and negative points of view for both strategies. The objective of this theoretical part is to explore both strategies, without selecting a single winner; that will be the goal of the practical part of the project, which will be developed on the following chapter.

ACTIVE MANAGEMENT

Regarding the active management, the advantages that are more obvious could be the analytical part or the possibility to perform better that the reference index. As it has been explained on the previous part, the manager of an active fund has the task of analyzing and tracking securities, to identify the ones with more potential to benefit the performance of the mutual fund. This means that the manager spends time tracking several stocks, hence, their picks will be based on those analysis, together with the experience and expertise of the mutual fund manager.

The main objective of active management is to outperform the index, consequently, exists the possibility of having better performance than the reference index, unlike with

passive management. If the mutual fund manager makes the correct decisions, it will have the possibility of beating the stock market; especially, on bearish market periods. That is another advantage for active management, the possibility to use defensive measures. When the market is experiencing a downward trend, active managers may adjust their portfolios and find good performing stocks, that could save their portfolios from that bearish trend.

With respect to disadvantages of active management, the most mentioned one is the high cost of this strategy. The fees and expenses of actively managed funds are usually quite higher than the ones of index funds or ETFs. The explanation of this is simple; as they require more attention and analysis, the cost of the service rises.

It was mentioned on the advantages that there was the possibility of the beating the index, but one of the disadvantages is the opposite, having a worse performance than the reference benchmark. If the manager makes wrong choices when selecting the stocks, this may result on lower performance than the index.

PASSIVE MANAGEMENT

On the other hand, focusing on passive management, several advantages can be found as well. One of the most remarkable advantages is its low costs. Index mutual funds are a simple investment, which only require to replicate the reference index and leave it there. This lack of analysis and management is reflected on the fees, which are much lower than the ones of active funds.

The performance of index funds could also be considered an advantage, since it is known in advance that it will be close to the performance of the index itself. Active funds have the possibility of outperforming the index, but also exists the uncertainty of ending below the result of the index. On index funds the investor has certainty that the result of the fund will be close to the index, but below, because of the fees and expenses.

Regarding the disadvantages of passively managed mutual funds, the outstanding one is the lack of control that characterizes these funds. Unlike in actively managed funds, index fund managers cannot take defensive decisions when the stock market is on a downward trend. In this case, the investors will have to resign to the results of the market. Another weak aspect found in index funds is that, sometimes, the reference indexes are concentrated into the largest companies that compose them. If it is like this, the result of the fund, and of the index itself, would be determined by the result of these few companies. This factor would break the widely-spread characteristic of mutual funds diversification, concentrating the risk in a small number of securities.

The table below this paragraph (Figure 3) shows and overview with regard to the most remarkable characteristics of actively and passively managed mutual funds.

FIGURE 3. OVERVIEW OF ACTIVE AND PASSIVE MANAGEMENT CHARACTERISTICS

	ACTIVE MANAGEMENT	PASSIVE MANAGEMENT
Fees and expenses	Requires time for analysis and management - High fees	Low management requirements - Low fees
Performance	Possibility of outperforming the reference index, subject to the decisions of the manager	Subject to the performance of the reference index, but always lower because of fees
Control over the investments	Daily changes, so it can be difficult for the investors to maintain a control over their investments.	Simplicity - The investor knows what he or she is getting.
Defensive decisions	The managers can make decisions according to their predictions.	Managers are unable to make decisions when the stock market is about to make a turn.

SOURCE: OWN ELABORATION.

2.3. Capital Asset Pricing Model

This section aims to explain and analyze the Capital Asset Pricing Model, which has been chosen as the model to verify the fundamental hypothesis of this End of Master Project. The reason of this choice remains on the simplicity of this model, which makes it easy to test. Besides, since it was published, it has been widely spread as the most standard theory and the basis, when aiming to analyze the returns of financial assets. Finally, the main reason for the choice of this model is the possibility of checking the outperformance of a stock thanks to Jensen's Alpha. In other words, the Jensen's Alpha within the CAPM is associated to the fact of outperforming the market, and that is precisely the main objective of this report.

The Capital Asset Pricing Model (CAPM) theory developed initially by William F. Sharpe (1964), John Lintner (1965), Jack Treynor (1961), and Jan Mossin (1966) was the first model that explained the market equilibrium theory of asset prices. Nevertheless, Sharpe's version is the most broadly spread and used. The final result of this model explains the existing relationship between the expected risk premiums (expected return) and the systematic risk (β) of assets. This theory awarded William F. Sharpe with a Nobel Prize in 1990.

The foundation for this theory can be found on Markowitz's (1952) paper Portfolio Selection, where he provided the first steps towards the modern portfolio theory. This theory explains the selection of a portfolio through the maximization of expected return, and minimization of the risk; for this reason, it is usually named the mean - variance portfolio theory. The best combination of this two variables is called the Efficient Frontier, which is supposed to connect all those portfolios offering the best possible combination between risk and expected return. The drawbacks of this theory are that the model and formulas are very complex, and therefore, difficult to test.

After this Portfolio Selection theory just explained, William F. Sharpe developed a more practical approach to Markowitz's technique, simplifying the relationships among securities; which finally lead to his Capital Asset Pricing Model. Before analyzing the model, it should be underlined that the development of this model is based on some assumptions. Jensen et al. (1972), on their The Capital Asset Pricing Model: Some Empirical Tests, state that those assumptions are the following ones:

1) All investors are single period risk averse utility of terminal wealth maximizers, and can choose among portfolios solely on the basis of mean and variance.
2) There are no taxes or transaction costs.
3) All investors have homogeneous views regarding the parameters of the joint probability distribution of all security returns.
4) All investors can borrow and lend at a given riskless rate of interest.

The Capital Asset Pricing Model is based on the Portfolio Selection theory developed by Harry Markowitz (1952). Markowitz introduced the mean-variance approach for portfolio selection; and Sharpe and Treynor incorporated some assumptions that created a model which could deduce the correct price of a risky asset. The resulting CAPM theory is an explanation of how markets price the securities, according to their risk. In other words, this model pretends to provide the price of a specific asset, being its systematic risk (β) the only factor affecting it; together with the risk-free interest rate and the expected return of the market, which are equal for all securities in the same market.

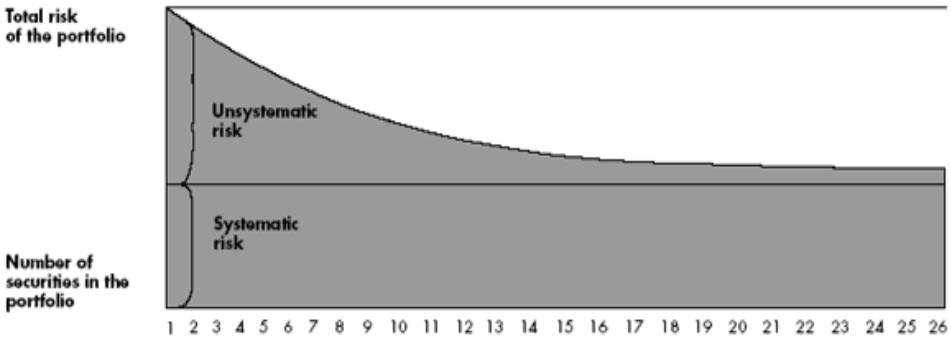
The CAPM theory presented the existence of two different types of risks for every asset, being those the followings:

- **Unsystematic risk.** It is defined as the specific risk for each stock, which can be avoided by increasing the number of stocks in the portfolio; or what is the same, through diversification. Since it is a risk that can be reduced, it does not increase the price of a given security.

- **Systematic risk.** It is the risk of the market seen as a whole, and therefore it cannot be diversified or reduced. As a result, it is pointed as the only risk explaining the price of a given security.

The illustration below this paragraph (Figure 4), shows how the systematic risk is constant on a portfolio, but the unsystematic risk decreases as the number of securities in the portfolio increases.

FIGURE 4. REDUCTION OF RISK THROUGH DIVERSIFICATION



SOURCE: HARVARD BUSINESS REVIEW.

That systematic risk is defined as Beta (β), which explains the volatility or sensitivity of the return of an asset, compared to a variation in the return of the market. This can be understood more easily through an example. An asset with a β equal to 1.5, means that if the return of the market would increase by one unit, the return of that particular asset would increase by 1.5. On the contrary, when the return of the market decreases one unit, the return of the same asset decreases by 1.5. The β of the market (β_M) will be always be 1, which is logical, since the volatility of the market compared to itself is the same always. The CAPM theory sees the systematic risk of a stock as the only factor affecting its price; apart from the risk-free interest rate and the expected return of the market. The calculation of the β is defined with the following formula:

$$\beta_{iM} = \frac{cov(R_i, R_M)}{\sigma^2(R_M)}$$

The result of that equation, provides four different scenarios with respect to the systematic risk of an asset, which are the following ones:

- **β_{iM} > 1:** when the beta of an asset is higher than one, it means that its risk is higher than the risk of the market. This is translated into a higher sensitivity in

the changes of the returns, and more fluctuations. Since the risk is higher, the expected return for that security should be higher as well.

- **β_{iM} = 1:** if the beta equals to one, it involves that the risk of that security and the risk of the market are the same, and therefore they fluctuate in the same manner. Consequently, their risks should be equal.
- **β_{iM} < 1:** in case of the beta being lower than one, the risk of that assets is seen as lower to the risk of the market. This implies that the sensitivity and fluctuations of this asset should be smoother than the ones of the market, and for that reason, the expected return should be lower too.
- **β_{iM} = 0:** this last case, describes an asset that is uncorrelated with the market return; precisely, the risk - free asset.

The CAPM theory describes the expected return of a risky asset, as the sum of the risk-free rate return and the market premium multiplied by the systematic risk of that asset (the β_{iM}). Consequently, the CAPM formula is as follows:

$$E(R_i) = R_F + \beta_{iM}\,[E(R_M) - R_F] \qquad \text{where,}$$

$E(R_i)$ = expected return of asset i

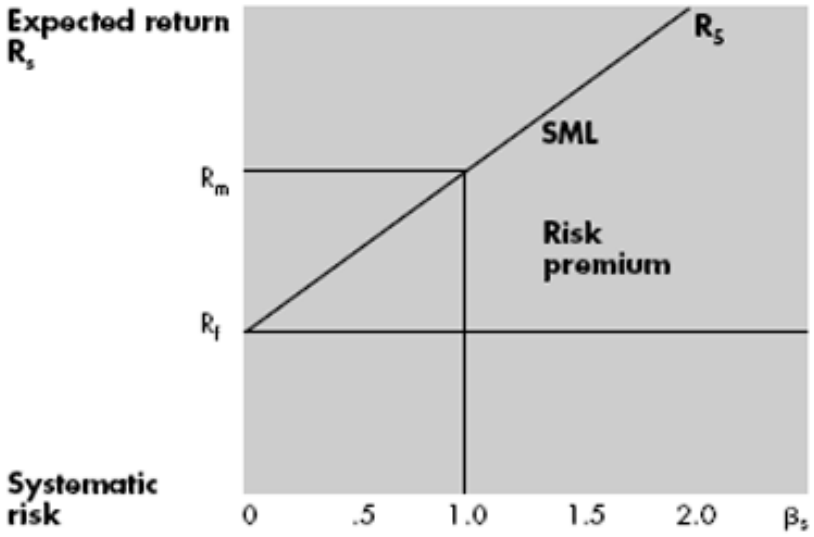
R_F = risk - free interest rate

β_{iM} = the market beta of asset i

$E(R_M)$ = expected return of the market as a whole

This formula is supposed to provide the price for every single stock in the market, composing with all of them the Security Market Line (SML). The theory suggests that the price of all assets should fall on that line. The graph below (Figure 5) illustrates the Security Market Line, and the relationship between risk and expected return explained before.

FIGURE 5. THE SECURITY MARKET LINE



SOURCE: HARVARD BUSINESS REVIEW.

As the graph shows, the expected return of the risk - free asset is constant with indifference of the systematic risk of the asset (as a result of the zero beta), which could also be seen as the price of time. However, the expected return of a specific security increases as its systematic risk level rises. The main reason for this is the risk aversion that characterizes the market participants; hence, the riskier an asset is, the more expected return it will have to offer, and the other way around. This additional expected return is also described as the price of risk, which would be the additional expected return per unit of risk added.

Briefly explained, this would be the functioning of the CAPM theory developed by Sharpe. Although it is the most well-known and used theory regarding security pricing models, those assumptions limit it. Many experts have criticized it, stating that it is an invalid theory when developing the empirical tests. Probably, the most well-known critic is the one published by Eugene F. Fama and Kenneth R. French. In their paper The Capital Asset Pricing Model: Theory and Evidence they conclude the following: "Unfortunately, the empirical record of the model is poor - poor enough to invalidate the way it is used in applications. The CAPM's empirical problems may reflect theoretical failings, the result of many simplifying assumptions.". In the same way as Fama and French, several propositions of relaxing those assumptions have arisen; nevertheless, the results have increased the complexity of the model, which makes them hard to test.

Therefore, Sharpe's original CAPM is still the most used model for pricing securities; seen as the theoretical representation of the behavior of financial markets, when it

comes to price securities. As it has been explained, the model is a way of representing how risk is quantified and translated into expected returns.

2.3.1. Jensen's Alpha

Once having the original Capital Asset Pricing Model developed by Sharpe in mind, several studies support it as an adequate model to describe the relation between risk and return for securities. But, on the other hand, there are some more studies indicating that the model does not provide a complete description of the structure of securities' returns. Douglas (1969) and, more recently, Miller and Scholes (1972) are adherent to this second idea.

Besides, Michael C. Jensen (1967) in his "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios", and later "The Performance of Mutual Funds in the period 1945-1964", introduced the concept of alpha. Nowadays, that *Jensen's Alpha* concept is widely spread and used across the financial language, and sometimes misusing it. However, in its origin, M. Jensen (1967) introduced it as "a risk adjusted measure of portfolio performance (now known as "Jensen's Alpha") that estimates how much a manager's forecasting ability contributes to the fund's returns.". In his work, he tries to "estimate the predictive ability of 115 mutual fund managers in the period 1945-1964 - that is their ability to earn returns which are higher than those we would expect given the level of risk of each of the portfolios."; in other words, he deduces that mutual fund managers could be getting higher returns than those deduced with the CAPM formula, and derives a risk adjusted measure (the alpha) to estimate them. Moreover, that measure is based on the theory of capital asset pricing developed by Sharpe (1964), Lintner (1965) and Treynor (Undated). Jensen concentrates his work in evaluating the predictive ability of portfolio managers, which is defined as their ability to earn returns trough successful prediction of security prices which are higher than those which could be expected given the level of riskiness of the portfolio.

For the reason of the purpose of this study being similar to the one developed by Jensen, and because of the wide use of the Jensen's Alpha concept in mutual funds world to track performance, this section aims to analyze the work of Michael C. Jensen and prepare the lector for the following empirical chapter.

As a definition, the Jensen's Alpha is the positive or negative deviations of the expected returns of an asset, over those given by the Security Market Line (SML). Moreover, it is a risk adjusted measure, which means that it can be used to evaluate the performance of portfolios with different risks, and across different time periods. It is presented as the measurement of the predictive ability of a portfolio manager, meaning that if a portfolio manager has a talented predictive ability, he or she will be able to forecast the price of

a security and consequently, the performance of the portfolio will be higher than the one expected with the use of the CAPM.

Therefore, and taking as a reference the equation of the Capital Asset Pricing Model, it is deducted that the excessive return of an asset could introduced with the following formula:

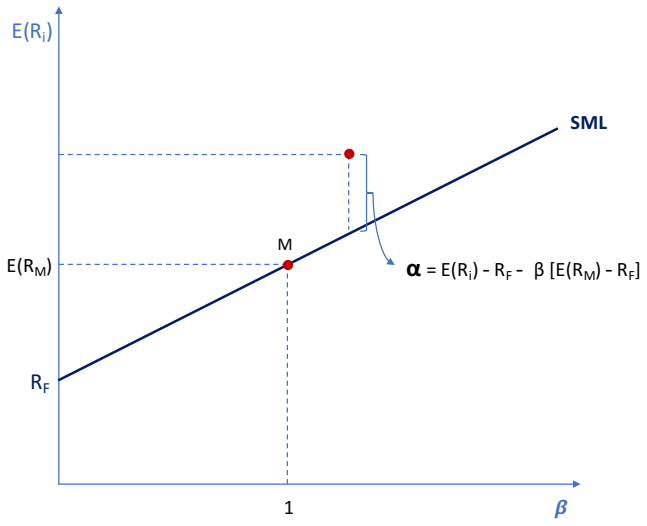
$$E(R_i) - R_F = \alpha_i + \beta_{iM}\,[E(R_M) - R_F]$$

Attending to this formula, and assuming that the CAPM is correct, if the fund manager would not have any predictive ability to outperform the market, the alpha would be zero. In this case, the equation would represent that the risk premium earned for the i portfolio (left side of the equation), is equal to the market premium multiplied by the systematic risk of the security i (right side). However, if the portfolio manager has that ability to forecast the price of a security, the term α would be positive, and according to Jensen's words, it would represent "the average incremental rate of return on the portfolio per unit time which is due solely to the manager's ability to forecast future security prices.". On the other hand, if the alpha is negative, it would mean that the fund manager does not have that predictive ability, meaning that its portfolio is obtaining worse returns that the market portfolio, and this result could be due to the generation of the expenses.

From this point, it can be deducted that Jensen's Alpha is deduced from the following formula, and illustrated as Figure 6 shows:

$$\alpha_i = E(R_i) - R_F - \beta_{iM}\,[E(R_M) - R$$

FIGURE 6. ILLUSTRATION OF JENSEN'S ALPHA



SOURCE: OWN ELABORATION.

This means that if a security would be priced above the Security Market Line, it would be overvalued; since the expected return required for that level of systematic risk (β), is lower. Therefore, if a portfolio manager would be able to recognize that overvaluation and sell that security before it gets back to its place, he or she will be generating a higher return that other managers, and that is precisely, what Jensen means with predictive ability. The other way around, if a security would be priced below the SML, it would be undervalued; because it would be offering a lower return than other securities, for holding the same risk. In this case, a portfolio would be generating higher returns if the manager would be able to detect that security and buy it, before it reaches its expected price. In conclusion, there are three possible scenarios regarding the result of the equation mentioned before,

- α_i **> 0:** in this first case, it would mean that a portfolio is generating higher returns than those expected given its level of risk. The reason for this would be that the manager of the fund has been able to forecast an under or overvalued security, and has included it in his or her portfolio. When that security reaches its fair price, the returns of the portfolio result to have outperformed the expected ones.
- α_i **= 0:** if the alpha equal to zero, means that the CAPM theory is fulfilled, or in other words, that the expected return of the portfolio matches the one predicted by the pricing theory of Sharpe, and that the manager has no contribution to the performance of the fund. Jensen also describes it as "a naïve random selection buy and hold policy can be expected to yield a zero intercept", implying that a passive management style of replicating an index would generate a zero alpha.
- α_i **< 0:** On the opposite scenario, the term alpha would be negative, meaning that the portfolio is generating less returns that those expected, given its level of risk. This involves that not only the manager is not able to predict the future security prices, but also, he or she is doing it worse than a random selection buy and hold policy. Even if it seems difficult to do it worse than a random selection policy, those results are possible due to the expenses generated on the forecasting attempts.

Being those the possible scenarios for the performance of a mutual fund, the first case would mean not only that a fund's performance has beaten the performance of the market, but also that the markets are not efficient, as Markowitz and Sharpe assumed on their theories. In free competitive markets described by the Capital Asset Pricing Model, no security can be priced lower or higher than its appropriate expected return on the SML, and therefore, this concept of alpha would not exist. However, in practice markets are not completely effective and the assumptions expressed by Sharpe are not

accomplished. For this reason, in some cases it is possible to find those alphas, and that is exactly what will be tested in the following chapter.

In conclusion, the Capital Asset Pricing Model is supposed to deduce the price of any security, under some assumptions. This is done by determining the price of an asset as the expected return of a risk-free asset, plus a market risk-premium, times the systematic risk of that one asset. Doing this with every asset, it can be built the Security Market Line, which can be used to identify the expected return of a security knowing its level of systematic risk.

Under those assumptions, every security is supposed to lie on the SML, but in practice come assets can be over or underpriced, meaning that they will lie above or below the SML. Regarding mutual funds and portfolios, this involves that if managers have the ability to forecast the price of securities, they will be able to obtain higher returns than those given by the level of risk of their portfolios. That is precisely what the Jensen's Alpha measures: "a risk-adjusted measure of portfolio performance that estimates how much a manager's forecasting ability contributes to the fund's performance.".

3. PRACTICAL APPROACH: Do Spanish mutual fund managers generate *alpha*?

In this second chapter, it will be developed the empirical part of this End of Master Project. The main point is to test whether the Spanish mutual fund industry generates alpha or not, or what is the same, if the manager contributes any added value to their investment portfolios. By testing this hypothesis, several information can be obtained. First, if the alpha coefficient is significant and positive, it will mean that the Spanish mutual fund managers are outperforming the reference index. However, if it is significant, but negative, this will mean that they are getting lower returns than the market as a whole. Besides, it will have to be taken into account the significance level of the results; meaning that, if it is not achieved a given significance level, it will not be possible to conclude any relevant result.

The foundation of this practical approach is the theory explained on the previous chapter; indeed, William F. Sharpe's Capital Asset Pricing Model theory and Michael C. Jensen's work on Mutual Fund Performance and his development of the coefficient Jensen's Alpha. The chapter is divided in three parts; starting with the introduction of the model to be used and the data, followed by the explanation and presentation of the test of the hypothesis, and ending with the analysis of the results obtained.

3.1. Methodology and data presentation

DATA

Before testing the model, it was necessary to collect all the required data. This data includes the annual returns of a sample of mutual funds, the return of the reference market index, the risk - free benchmark and the betas of those selected mutual funds; all this, for a time period of 4 years (between 2013 and 2016). All the information has been retrieved using the platform Thomson Reuters Eikon, which is a financial tool that contains one of the broadest data sets regarding asset classes, sectors and geographies.

This study will be based on a sample composed by 88 mutual funds. These mutual funds are domiciled in Spain, and invest in Eurozone equities. There are two main reason for basing the selection on these criteria. First, as all of them invest on the same category of assets, Eurozone equities, it can be chosen as the reference benchmark the same index for all the funds of the sample. That reference index is the Euro Stoxx 50, which is composed by the 50 largest companies of the Eurozone, in terms of market capitalization. Secondly, by choosing the mutual funds that are domiciled in Spain it can be measured the performance of Spanish mutual fund managers, which is precisely one of the objectives of this End of Master Project. Therefore, by applying those two

restrictions the sample reduced to 88 mutual funds, which will be used to carry out this study.

As mentioned before, the reference benchmark index is the Euro Stoxx 50, and the risk - free rate chosen has been the 3 Month Euribor, as it is the one used as benchmark within the Eurozone. This risk - free rate is measured in three months, therefore it has to be annualized multiplying it by for. With all this data, it will be possible to analyze whether Spanish mutual fund managers are able to outperform the reference index or not.

On the following pages, it can be found a table with the information about the mutual funds which will be analyzed (see Fig. 7), and the returns of the market reference index and risk free rate (see Fig. 8).

FIGURE 7. SAMPLE OF MUTUAL FUNDS

	RIC	Name	Fund Management Company
1	LP68061762	AB FCP I-Eurozone Equity Portfolio A EUR	AllianceBernstein (Luxembourg) S.a r.l.
2	LP65077947	Allianz Best Styles Euroland Equity - AT - EUR	Allianz Global Investors GmbH - Frankfurt
3	LP65055006	Allianz Euroland Equity Growth - AT - EUR	Allianz Global Investors GmbH - Frankfurt
4	LP65144752	Amundi Fds Equity Euro Concentrated - AE (C)	Amundi Luxembourg SA
5	LP65136799	Amundi Index MSCI EMU - AE (C)	Amundi Luxembourg SA
6	LP60055954	Aviva Eurobolsa A, FI	Aviva Gestion SGIIC SA
7	LP60041003	AXA Euro Valeurs Responsables C	AXA Investment Managers Paris SA
8	LP60069853	AXA Rosenberg Eurobloc Equity Alpha B EUR	AXA Rosenberg Management Ireland Ltd
9	LP60000568	AXA WF Framlington Euro Relative Value AC	AXA Funds Management SA (Luxembourg)
10	LP65150236	AXA WF Framlington Eurozone AC	AXA Funds Management SA (Luxembourg)

11	LP68084236	AXA WF Framlington Eurozone RI A EUR	AXA Funds Management SA (Luxembourg)
12	LP60016804	Bankia Euro Top Ideas, FI	Bankia Fondos SGIIC SA
13	LP60016185	Bankia Indice Eurostoxx, FI	Bankia Fondos SGIIC SA
14	LP60015694	Bankinter Renta Variable Euro, FI	Bankinter Gestion de Activos, S.A, SGIIC
15	LP60000635	Barclays Equity Euro Fund C	Barclays Funds SICAV
16	LP60015148	BBVA Bolsa Euro, FI	BBVA Asset Management S.A., SGIIC
17	LP60015149	BBVA Bolsa Indice Euro, FI	BBVA Asset Management S.A., SGIIC
18	LP60013796	BGF Euro-Markets A2 EUR	BlackRock (Luxembourg) SA
19	LP60023808	BNP Paribas L1 Equity Euro Classic Cap	BNP Paribas Asset Management Luxembourg SA
20	LP68226498	BPI Global Invest Fd BPI Euro Large Caps R Cap	BPI Global Investment Fund Management Company SA
21	LP60016946	Caixabank Bolsa Gestion Euro Estandar, FI	Caixabank Asset Management SGIIC SAU
22	LP60016221	Caixabank Bolsa Indice Euro Estandar, FI	Caixabank Asset Management SGIIC SAU
23	LP60015852	Caja Ingenieros Bolsa Euro Plus, FI	Caja Ingenieros Gestion SGIIC, S.A.
24	LP60054120	Caminos Bolsa Euro, FI	Gestifonsa, SGIIC, S.A.
25	LP65107468	Candriam Equities L EMU C Cap	Candriam Luxembourg SA
26	LP65055657	Candriam Quant Equities Mlt-Factor EMU C Cap	Candriam Luxembourg SA
27	LP65008988	Credit Agricole Mercaeuropa Euro, FI	Credit Agricole Mercagestion SGIIC
28	LP68117729	CS (Lux) Eurozone Active Opportunities Eq Fd B EUR	Credit Suisse Fund Management SA

29	LP60094759	DB Platinum IV CROCI Euro R1C	Deutsche Asset Management S.A.
30	LP60071397	Deutsche Invest I Top Euroland LC	Deutsche Asset Management S.A.
31	LP68093012	DPAM CAPITAL B Equities EMU Behavioral Value B	Degroof Petercam Asset Management SA
32	LP60022708	DPAM Equities L EMU Dividend B EUR Capitalisation	Degroof Petercam Asset Services SA
33	LP60025368	DPAM INVEST B Equities Euroland B	Degroof Petercam Asset Management SA
34	LP65006067	Dux Renta Variable Euro, FI	Dux Inversores SGIIC
35	LP60039054	Edmond de Rothschild Euro Leaders C	Edmond de Rothschild Asset Management (France) SAS
36	LP65139896	Epsilon Fund Euro Q-Equity R	Eurizon Capital SA
37	LP65103235	Eurizon Fund Equity Euro LTE Z	Eurizon Capital SA
38	LP65023386	Euro Capital Durable N C	Groupama Asset Management SA
39	LP60016093	Eurovalor Bolsa Europea, FI	Allianz Popular Asset Management
40	LP60016112	Eurovalor Emergentes Empresas Europeas, FI	Allianz Popular Asset Management
41	LP60033961	Fidelity Funds - Euro Blue Chip A-EUR	FIL Investment Management (Luxembourg) S.A.
42	LP60033964	Fidelity Funds - Euro Stoxx 50TM A-EUR	FIL Investment Management (Luxembourg) S.A.
43	LP60093944	Fidelity Funds - Inst Euro Blue Chip I-ACC-EUR	FIL Investment Management (Luxembourg) S.A.
44	LP60016168	Fon Fineco Valor, FI	GIIC Fineco SGIIC SA
45	LP60016175	Fonbilbao Eurobolsa, FI	Grupo Catalana Occidente Gest de Activos SA SGIIC
46	LP60016446	Fondonorte Eurobolsa, FI	Gesnorte SGIIC

47	LP65027319	Gescooperativo Small Caps Euro, FI	Gescooperativo, S.A., SGIIC
48	LP60079311	Gesiuris Euro Equities, FI	Gesiuris Asset Management, SGIIC, SA
49	LP60002852	Henderson HF Euroland A2	Henderson Management SA
50	LP60081726	HSBC GIF Euroland Equity AC EUR	HSBC Investment Funds (Luxembourg) SA
51	LP60096534	HSBC GIF Euroland Growth M1C EUR	HSBC Investment Funds (Luxembourg) SA
52	LP65006837	ING Direct Fondo Naranja Euro Stoxx 50, FI	Amundi Iberia SGIIC, S.A.
53	LP60056293	Intermoney Variable Euro, FI	Intermoney Gestion SGIIC SA
54	LP68332023	Invesco Euro Equity Fund A EUR Acc	Invesco Management SA
55	LP68130363	JPM Euroland Dynamic A (perf) Acc EUR	JPMorgan Asset Management (Europe) Sarl
56	LP60033899	JPM Euroland Equity A Dis EUR	JPMorgan Asset Management (Europe) Sarl
57	LP65086495	JPM Euroland Select Equity A Acc EUR	JPMorgan Asset Management (Europe) Sarl
58	LP60034498	Julius Baer EF Euroland Value-EUR B	GAM (Luxembourg) S.A.
59	LP60015417	Kutxabank Bolsa Eurozona, FI	Kutxabank Gestion, SGIIC, SA
60	LP60015759	Laboral Kutxa Bolsas Europeas, FI	Caja Laboral Gestion, SGIIC, SA
61	LP68016577	Lazard Objectif Alpha Euro R	Lazard Freres Gestion SAS
62	LP60015251	Liberbank Renta Variable Euro, FI	Liberbank Gestion SGIIC SA
63	LP60063728	Liberty Euro Stock Market, FI	Bankia Fondos SGIIC SA

64	LP65062677	Lyxor Euro Stoxx 50 (DR) I EUR	Lyxor International Asset Management SA
65	LP60079300	MainFirst - Classic Stock Fund A	MainFirst Affiliated Fund Managers S.A.
66	LP60088717	Mirabaud Equities Eurozone A	Mirabaud Asset Management (Europe) S.A.
67	LP68238461	Mirova Euro Sustainable Equity R/A (EUR)	Natixis Asset Management SA
68	LP60013869	Morgan Stanley Eurozone Equity Alpha A EUR	Morgan Stanley Investment Management Ltd
69	LP65007137	MSMM Eurozone Agg B EUR	Russell Investments (Ireland) Ltd
70	LP68240050	Natixis Euro Value Equity R/A (EUR)	Natixis Asset Management SA
71	LP60024219	NN (L) Euro Equity P Cap EUR	NN Investment Partners Luxembourg S.A.
72	LP68137746	Oddo Active Equities CR-EUR	Oddo Meriten Asset Management SA
73	LP60095382	Oddo Proactif Europe CR-EUR	Oddo Meriten Asset Management SA
74	LP68015349	Pareturn Cartesio Equity I B Cap	MDO Management Company SA
75	LP60023794	PARVEST Equity Best Selection Euro Classic Cap	BNP Paribas Asset Management Luxembourg SA
76	LP60016642	PBP Bolsa Europa, FI	Popular Gestion Privada SGIIC SA
77	LP65033070	Pictet-Euroland Index-P EUR	Pictet Asset Management (Europe) SA
78	LP65000939	R Conviction Euro C	Rothschild & Cie Gestion SCS
79	LP60017016	Rural Euro Renta Variable, FI	Gescooperativo, S.A., SGIIC
80	LP60094324	Sabadell Euroaccion Base, FI	Bansabadell Inversion, S.A., SGIIC
81	LP60017075	Santander Acciones Euro A, FI	Santander Asset Management SGIIC SA

82	LP60092592	Santander Indice Euro Openbank, FI	Santander Asset Management SGIIC SA
83	LP60035668	Schroder ISF EURO Equity A Acc	Schroder Investment Management (Luxembourg) SA
84	LP68224015	SSgA Eurozone Value Spotlight Fund P	State Street Global Advisors Luxembourg Mgt Sarl
85	LP60006488	Templeton Euroland A (acc) EUR	Franklin Templeton International Services S.a r.l.
86	LP60039159	Tocqueville Ulysse C	Tocqueville Finance SA
87	LP60036234	UBS (Lux) Eq Fd - Euro Co Opportunity (EUR) P-acc	UBS Fund Management (Luxembourg) SA
88	LP68040412	Vanguard Eurozone Stock Index Inv EUR	Vanguard Group (Ireland) Limited

SOURCE: OWN ELABORATION. DATA: THOMSON REUTERS.

FIGURE 8. OVERVIEW OF THE DATA TO BE USED FOR THE CROSS SECTION ANALYSIS

	EURO STOXX 50	EURIBOR 3 MONTHS	AVERAGE EXPECTED RETURN OF THE SAMPLE OF MUTUAL FUNDS
2016	0.70 %	- 0.32 %	2.35 %
2015	3.85 %	- 0.13 %	10.12 %
2014	1.20 %	0.08 %	2.15 %
2013	17.95 %	0.29 %	22.16 %

SOURCE: OWN ELABORATION. DATA: THOMSON REUTERS.

METHODOLOGY

The methodology to be followed is a cross section analysis of a multiple regression, for a determined period of time. The regression analysis is a statistical process for estimating the relationship among the variables of the model. It is a way of analyzing how the explanatory variables affect the dependent variable. The cross section study analyzes data collected for a sample, for a determined period of time. Using this type of study, it is possible to recognize the effects that explanatory variables have on a determined dependent variable.

As it has been mentioned on previous sections, the regression to be used is based on the one developed by Michael C. Jensen, based on the Capital Asset Pricing Model of William F. Sharpe, and it will be tested using the econometrics software package Gretl, which is a widely used and stablished program for statistical analysis. The model follows the equation below:

$$E(R_i) - R_F = \alpha_i + \beta_{iM}[E(R_M) - R_F]$$

The variables can be described as follows:

1. α_i: it is the dependent variable. It represents the excess return of the mutual fund i, that exceeds the expected annual return, for a given level of systemic risk.
2. $E(R_i)$: the expected annual return of the mutual fund i, measured in percentage change from one year to another.
3. R_F: the annual return of the Euribor 3 months multiplied by four (annualized).
4. β_{iM}: the level of systematic risk of the mutual fund i.
5. $[E(R_M) - R_F]$: the market risk premium. It is the difference between the return offered by the risk - free asset annualized and the return of the market, representing the premium demanded for increasing the level of risk of the investment.

As the data is introduced in Gretl, the model analyzed will have three variables which are the following:

1. **DEPENDENT VARIABLE:** $E(R_i) - R_F$ **.** This part of the equation shows the additional return expected, for investing on a risky asset (in this case each the return of each mutual fund of the sample) instead of investing on the risk - free asset.
2. **CONSTANT:** α **.** This variable should be equal to zero if the CAPM theory applies, and as a result both parts of the equation would be equal. On the contrary, if the dependent variable and the explanatory variable result to be different, this variable will take a value.
3. **EXPLANATORY VARIABLE:** $\beta_{iM}[E(R_M) - R_F]$ **.** The other part of the equation is formed by the difference between the return of the market as a whole and the risk - free asset, also known as market premium, times the systematic risk of each asset (the beta of each mutual fund).

The interpretation of this model is the following one: The Capital Asset Pricing Model theory states that the return of an asset should be the return of the risk - free asset, plus

a market risk premium multiplied by the systematic risk of each asset. If this was true, the return of an asset would be equal to that equation, and therefore, the alpha would be equal to zero. On the other hand, if the results of those two parts of the equation would be different, the difference would be the value of the alpha. Accordingly, the alpha could be defined as the excess return of an asset, compared to a given level of systematic risk.

So, if a statistical point of view is applied, this last case would mean that the alpha is significant, and the following step would be to identify the value of it. If it is significant and positive, it will mean that the manager of that fund is adding value to his or her mutual fund, and consequently, that mutual fund is beating the reference index. Otherwise, if the alpha is significant but negative, it will mean that that fund is underperforming the index, achieving lower results than it. The reason for this last case could rest on the fees and commissions that the fund requires to its investors.

Once the results of the model are obtained, it has to be taken into consideration the significance level of the variables and the model as a whole, to reject or accept the corresponding hypothesis.

The global significance level of the model will be tested attending to the F statistic, which measures the significance of the model as a whole attending to the following hypothesis:

$$H_0: \beta_2 = \beta_3 = \dots = \beta_k = 0$$

$$H_1: \beta_i \neq 0 \quad i \in [2, 3, \dots k]$$

If this indicator is greater than 2, it will mean that the null hypothesis can be rejected, and as a consequence, that the model is globally significant.

On the other hand, the significance level of the variables has to be tested separately, which can be done using the p value and the t statistic. This test attends to the following hypothesis:

$$H_0: \beta_i = 0$$

$$H_1: \beta_i \neq 0 \quad i \in [2, 3, \dots k]$$

Regarding the p value, if it is lower than 0.01, it means that the probability of having the error of rejecting the null hypothesis when this is true, is less than 1%. Hence, in those cases, the variable will be significant in the determination of the dependent variable. Besides, if the t statistic is greater than 2, that variable will be significant at a 5% significance level, only for samples with more than 30 individuals. In that case, it will be possible to reject H_0, and therefore, that variable will be independently significant.

Once the significance level has been determined, it would be possible to analyze the results obtained.

3.2. Estimated models

As it has been explained on the previous section, the model presented was run using the econometrics software Gretl. It was done following a cross section model, and therefore, the same procedure had to be repeated for the different years. After doing this, the results presented below were obtained.

FIGURE 9. GRETL RESULTS WITH 2016 DATA

```
Modelo 1: MCO, usando las observaciones 1-88
Variable dependiente: Ri_Rf

             Coeficiente   Desv. Típica   Estadístico t   valor p
  ------------------------------------------------------------
  const         1,27173       2,39775         0,5304       0,5972
  BetaRm_Rf     1,12580       1,11621          1,009       0,3160

Media de la vble. dep.  3,652932   D.T. de la vble. dep.   3,928092
Suma de cuad. residuos  1326,709   D.T. de la regresión    3,927703
R-cuadrado              0,011690   R-cuadrado corregido    0,000198
F(1, 86)                1,017265   Valor p (de F)          0,315998
Log-verosimilitud      -244,2439   Criterio de Akaike      492,4877
Criterio de Schwarz     497,4424   Crit. de Hannan-Quinn   494,4838
```

SOURCE: GRETL.

FIGURE 10. GRETL RESULTS WITH 2015 DATA

```
Modelo 1: MCO, usando las observaciones 1-88
Variable dependiente: Ri_Rf

             Coeficiente   Desv. Típica   Estadístico t   valor p
  ------------------------------------------------------------
  const         12,7818       2,76113          4,629     1,29e-05 ***
  BetaRm_Rf    -0,432755      0,582026        -0,7435      0,4592

Media de la vble. dep.  10,76036   D.T. de la vble. dep.   4,511308
Suma de cuad. residuos  1759,306   D.T. de la regresión    4,522946
R-cuadrado              0,006387   R-cuadrado corregido   -0,005166
F(1, 86)                0,552841   Valor p (de F)          0,459186
Log-verosimilitud      -256,6615   Criterio de Akaike      517,3229
Criterio de Schwarz     522,2776   Crit. de Hannan-Quinn   519,3190
```

SOURCE: GRETL.

FIGURE 11. GRETL RESULTS WITH 2014 DATA

```
Modelo 1: MCO, usando las observaciones 1-88
Variable dependiente: Ri_Rf

             Coeficiente   Desv. Típica   Estadístico t   valor p
  ------------------------------------------------------------------
  const         6,31698       1,55021          4,075      0,0001  ***
  BetaRm_Rf    -4,67565       1,60195         -2,919      0,0045  ***

Media de la vble. dep.   1,861864   D.T. de la vble. dep.   2,646817
Suma de cuad. residuos   554,5574   D.T. de la regresión    2,539359
R-cuadrado               0,090130   R-cuadrado corregido    0,079550
F(1, 86)                 8,519007   Valor p (de F)          0,004485
Log-verosimilitud       -205,8633   Criterio de Akaike      415,7265
Criterio de Schwarz      420,6812   Crit. de Hannan-Quinn   417,7226
```

SOURCE: GRETL.

FIGURE 12. GRETL RESULTS WITH 2013 DATA

```
Modelo 1: MCO, usando las observaciones 1-84
Variable dependiente: Ri_Rf

             Coeficiente   Desv. Típica   Estadístico t   valor p
  ------------------------------------------------------------------
  const         6,98447       2,92694          2,386      0,0193   **
  BetaRm_Rf     0,820246      0,161232         5,087      2,26e-06 ***

Media de la vble. dep.   21,63974   D.T. de la vble. dep.   5,413613
Suma de cuad. residuos   1848,930   D.T. de la regresión    4,748465
R-cuadrado               0,239905   R-cuadrado corregido    0,230636
F(1, 82)                 25,88125   Valor p (de F)          2,26e-06
Log-verosimilitud       -249,0357   Criterio de Akaike      502,0715
Criterio de Schwarz      506,9331   Crit. de Hannan-Quinn   504,0258
```

SOURCE: GRETL.

Once having these results, the regressions for the four years would be as follows:

- **2016:** $E(R_i) - R_F = 1.27173 + 1.1258\ \beta_{iM}\ [E(R_M) - R_F]$
- **2015:** $E(R_i) - R_F = 12.7818 - 0.432755\ \beta_{iM}\ [E(R_M) - R_F]$
- **2014:** $E(R_i) - R_F = 6.31698 - 4.67565\ \beta_{iM}\ [E(R_M) - R_F]$
- **2013:** $E(R_i) - R_F = 6.98447 + 0.820246\ \beta_{iM}\ [E(R_M) - R_F]$

3.3. Analysis of the results

Prior to analyzing the results obtained after performing the regression analysis, it should be assessed the significance level of the variables and the model itself as a whole. If a model happens to be significant it means that the results obtained did not happen by chance, meaning that a relationship between the variables exists. However, if a model

is non - significant it means that there is nothing that relates the variables, and therefore, it will not be possible to conclude anything in those cases.

2016

The model calculated using the 2016 data shows a F statistic equal to 1.017265, which is lower than 2. If the F statistics is lower than 2, it means that it is not globally significant, and consequently, the model cannot be accepted as a whole. Moreover, if the variables are analyzed separately, it can be seen that neither of them is significant, as the t statistics are lower than 2 and the p values are greater than 0.01.

2015

In the model with 2015 data, happens a similar thing. The F statistic shows a value of 0.552841, being lower than 2. This means that it is not globally significant, and therefore, the model cannot be accepted as a whole. Analyzing the variables separately, it can be seen that the explanatory variable is non - significant, as the t statistic is lower than 2 and the p value is higher than 0.01. However, the constant variable happens to be significant with a t statistic equal to 4.629, which is higher than 2, and a p value equal to 1.29e-05, which is close to zero and less than 0.01.

2014

On the third model, the one with 2014 data, the F statistic is equal to 8.519007, which is higher than 2. This means that it is globally significant, and as a consequence, the model can be accepted as a whole. Besides, both variables are significant when analyzing them separately. The constant variable has a t statistic equal to 4.075, which is higher than 2, and a p value equal to 0.0001, which is lower than 0.01. Regarding the explanatory variable, it shows a t statistic equal to -2.919, which is higher than 2 (in absolute terms), and a p value equal to 0.0045, which is lower than 0.01. Therefore, the H_0 can be rejected with less than 1% probability of having an error, for both variables.

2013

Finally, the last model performed with 2013 data shows a F statistic equal to 25.88125, which is higher than 2. This means that it is globally significant, and as a result, the model can be accepted as a whole. Moreover, both variables are significant when analyzing them separately. The constant variable has a t statistic equal to 2.386, which is higher than 2, and a p value equal to 0.0193, which is higher than 0.01 but lower than 0.05. So, it can be said that H_0 can be rejected with less than 5% probability of having an error; precisely, with less than 1.93% probability. Regarding the explanatory variable, it shows a t statistic equal to 5.087, which is higher than 2, and a p value equal to 2.26e-06, which is close to zero and less than 0.01. Consequently, the H_0 can be rejected with less than 1% probability of having an error.

After analyzing the significance levels of the four different models, it can be concluded the following regarding the significance scope: the model and the variables appear to be non - significant on the year 2016, which makes impossible to be able to conclude anything with that model for that year. Nevertheless, the regression is significant with 2014 and 2013 data, which makes possible to continue with the analysis. Moreover, and even if the regression is globally non - significant on the year 2015, the constant variable, which represents the value for the alpha, is very significant, so it will also be considered.

Once having said this, the study of the performance of Spanish mutual fund managers will be continued attending to the results obtained with the data of the years 2015, 2014 and 2013. It has to be mentioned that during the years 2015 and 2016, the risk - free rate was negative, and that could be a reason for the results being skewed. However, this is only a possibility, since this supposition has not been tested.

According to the results obtained with the data collected, the following results can be highlighted:

FIGURE 13. OVERVIEW OF THE RESULTS

	Significance of the model	Alpha value
2016	Non - significant	-
2015	Non - significant, but the constant variable significant	12.7818 %
2014	Significant	6.31698 %
2013	Significant	6.98447 %

SOURCE: OWN ELABORATION.

Analyzing these results, it can be said that, on average, Spanish mutual fund managers generated 12.7818 %, 6.31698 % and 6.98447 % excess return on the year 2015, 2014 and 2013, respectively; and as mentioned before, for the year 2016 nothing can be concluded with the data analyzed. The constant variable of the regressions represents Jensen's alpha, which takes a value different to zero when both parts of the equation are different. This means that the results obtained by the mutual fund managers on the period between 2013 and 2015, are different to those predicted by the Capital Asset Pricing Model theory. Moreover, as the alphas are positive, it means that they have managed efficiently their investment portfolios obtaining higher results than those predicted by the CAPM for the given level of systematic risk of their portfolios.

Consequently, the results affirm that the Spanish mutual fund managers have outperformed the market, and in addition, those results have increased over the years. On the year 2013, the average alpha generated by these Spanish mutual fund managers

was 6.98447 %. In the year 2014, this figure decreased a few points, obtaining a result of 6.31698 %. Finally, on the year 2015, the increase was remarkable, obtaining a final value of 12.7818 %, which is more than the double compared to the previous year. For the year 2016, as it has been mentioned, nothing can be concluded since both, the model and the variables, resulted to be non - significant.

4. CONCLUSIONS

At this point, it is the time to bring to a conclusion everything that has been mentioned. This End of Master Project has focused on the mutual fund industry, whose origin dates from the 18th century, but which has gained considerable popularity recently. A mutual fund is a very simple investment concept, which did not become widespread until the 1980's and 90's. The idea behind it is quite simple: instead of investors investing on their own, they pool their money together into a fund, which is collected by a professional portfolio manager, who will create a consolidated portfolio for all those investors. In the end, those individual investors will collect their capital gains or losses. This vehicle offers the advantage of gaining exposure to the stock market, with a relatively low investment.

At the beginning, only the concept of active management was considered, but on the year 1976 the first index fund was introduced (Vanguard Index Trust - 500 Portfolio). After this, the Exchange Traded Funds, or ETFs, were created, directing the attention of the mutual fund industry towards the passive management strategy. These are two completely different strategies, and it is the investor the one that should choose the one that suits best to his or her preferences. The active strategy is defined as the one where the portfolio manager has the control over the portfolio, and manages it according to his or her believes. The main advantage of this strategy relies on the possibility of outperforming the reference index, but for this x the investor will be charged with higher fees. The passive strategy, on the contrary, is based on the replication of a reference index. For that reason, the performance is linked to the one of that benchmark; but, the expenses and fees will be lower, as it requires less effort for the portfolio manager.

The eternal debate between active and passive management has motivated many studies among academic authors, resulting on a wide range of different opinions. This End of Master Project is also motivated by that debate and, through the empirical study of the Spanish mutual fund market, it tries to answer to the following question: Do Spanish mutual fund managers generate alpha?

The empirical part of this report is based on the risk adjusted measure developed by Michael C. Jensen, known as Jensen's Alpha. At the same time, Jensen based his work on the Capital Asset Pricing Model theory developed by William F. Sharpe. The foundation of Jensen's work is that some mutual fund managers could be generating more returns than those expected by the CAPM, and in that case, those excess returns would represent the alpha. For this study, the sample of mutual funds was limited by those domiciled in the Spanish territory and investing on Eurozone equities, and therefore, the Euro Stoxx 50 was the selected benchmark. The study was made for the years between 2016 and 2013, through a cross section analysis, helped with the

econometrics software Gretl. The results obtained can be divided in two parts. The outcomes of the last year, 2016 and 2015, resulted to be both, globally and the variables separately, non - significant, and consequently, nothing could be concluded for that period. On the other hand, the model for the years 2014 and 2013 resulted to be significant, and for the year 2015, even if the model was non - significant as a whole, the constant variable (representing the alpha) resulted to be significant; showing some interesting conclusions.

The results show that the alpha is positive in those three years, meaning that the Spanish mutual fund managers generated excess returns over the market. Those results show that in 2013, Spanish mutual fund managers were able to generate on average 6.98447% more return than the one expected by the CAPM theory for the given level of systematic risk of their investment portfolios. Two years later, in 2015, they were able to double that figure, obtaining a 12.7818 % excess return. These alphas, on Jensen's words are defined as "how much a manager's forecasting ability contributes to the fund's returns", so the conclusion here is that Spanish mutual fund managers' forecasting ability contributed a 6.98447 % on the year 2013, a 6.31698 % on the year 2014, and a 12.7818% on the year 2015, to their investment portfolios.

However, the empirical study developed faces some limitations regarding its application to other fields and periods, as well as some areas where further research could be needed. The following chapter specifies more this field of study.

5. LIMITATIONS AND FUTURE DEVELOPMENTS

This last chapter aims to give a critical point of view to this End of master Project, highlighting the areas of improvement or the points where a deeper research could be developed.

First, it should be mentioned that this report has several limitations that should be taken into account when studying it. The empirical part of it is based on a sample of mutual funds with some limitations, such as its size (88 mutual funds), the period analyzed (between 2013 and 2016), or the category of the mutual funds. Therefore, the results obtained only apply to that four-year period between 2013 and 2016, and to that specific category of mutual funds, which are those domiciled in the Spanish territory and investing on Eurozone equities. As a result to this limitation, those results could vary when referring other periods, or to a different category of mutual funds.

Besides, there are some areas where further research could be made. First, it would be interesting to test whether those results apply to different categories of funds, as well as to other time periods. In addition, the study obtained a non - significant result for two of the periods, which coincided in having negative risk - free rates. It was mentioned that there could be a relationship between these two events, but no evidence was found. For future developments, it would be interesting to analyze deeper this possible relationship.

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