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PERFORMANCE ANALYSIS OF PORTUGUESE EQUITY MUTUAL FUNDS: INDEXING VS ACTIVE PORTFOLIO MANAGEMENT

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Abstract

The present thesis was done with the objective of analyzing the portfolio management strategies followed by managers of Portuguese Equity Funds, using the *PSI Geral* as the benchmark. Thus, the quarter returns and compositions of portfolio were used. The market timing ability and the variables that may have influenced tracking error (vs. *PSI Geral*) were also analyzed.

The main conclusion was that just 1 fund managed to put successfully into practice the active portfolio management, obtaining returns above *PSI Geral*. The same happened with passive portfolio management, where only 1 fund was able to replicate the benchmark. The other funds opted initially for active or passive strategy but, in the end of the period considered, their performances were below the benchmark, with negative excess returns, even unable to replicate the *PSI Geral*. It was concluded also that there are several variables that have impact on performance of these funds, and consequently the portfolio management strategy, chosen by manager. These variables are particularly the systematic risk of the fund (beta), the benchmark volatility, percentage of *PSI Geral* stocks held in portfolio, weight of the stocks in portfolio, number of stocks above of the concentration ratio and number of common stocks between funds and benchmark, above of the concentration ratio.

Keywords: Investment Companies; Performance Appraisal; Mutual Funds; Portfolio Strategies (Indexing vs. Active Management)

JEL Classification: G11, G23

Resumo

A presente tese foi elaborada com o objectivo de analisar a estratégia de gestão de carteira seguida pelos gestores dos Fundos de Investimento de Acções Nacionais, usando o PSI Geral como mercado de referência. Assim, foram usados os retornos e as composições trimestrais de carteira. A capacidade de *Market Timing,* e as variáveis que podem ter influenciado o *Tracking Error* (vs. PSI Geral) também foram analisados.

A principal conclusão foi que só um fundo gerido conseguiu com sucesso pôr em prática a gestão activa da carteira, obtendo retornos acima do PSI Geral. O mesmo se passou com a gestão passiva, onde um fundo conseguiu replicar o mercado de referência. Os outros fundos optaram inicialmente por uma gestão activa ou passiva mas no final do período considerado, o seu desempenho ficou abaixo do mercado de referência, com excesso de retornos negativos, nem conseguindo replicar o PSI Geral. Foi também concluído que existem várias variáveis que têm impacto no desempenho destes fundos e consequentemente a estratégia de gestão de carteira escolhida pelo gestor. Estas variáveis são nomeadamente o risco sistemático do fundo (beta), volatilidade do mercado de referência, a percentagem de acções do PSI Geral na carteira, o peso das acções na carteira, número de acções acima do índice de concentração e o número de acções comuns entre o fundo e o mercado de referência, acima do índice de concentração.

Palavras-Chave: Avaliação de Desempenho; Fundos de Investimento; Estratégias de Carteira (Gestão Passiva (*Indexing)* vs. Gestão Activa)

Classificação JEL: G11, G23

Executive Summary

A mutual fund is an investment company that pools the money of various investors and buys and manages diversified portfolio securities. This type of investment have become an invaluable tool for a wide range of investors, that have goals to buy securities such as stocks, bonds, money market instruments, a combination of these investments or even other funds. The investors or shareholders buy shares of the mutual fund, representing ownership in all of fund's securities and investors share of the mutual fund they buy in direct proportion to the amount of the mutual fund shares they own. The investment management process involves selecting an investment strategy, that is, consistent with investment objectives and investment policy guidelines of the client or institution. Portfolio strategies can be classified as either active or passive. An active portfolio strategy uses available information and forecasting techniques to seek a better performance than a portfolio that is simply broadly diversified. On the contrary, a passive portfolio strategy involves minimal expectation input, and instead relies on diversification matching the performance of benchmark. However, between these extremes of active and passive strategies, several strategies have sprung up that have elements of both.

This thesis has precisely the objective of trying to understand which strategy is followed by manager of the funds and which variables were determinant in how the funds followed the benchmark, during the period considered. The funds that serve the subject of study in this analysis were the Portuguese Equity Funds, considering the period between December 1997 and December 2010. In this period 7 funds were in the market: *Banif Acções Portugal*, *Barclays Premier Acções Portugal*, *BPI Portugal*, *Caixagest Acções Portugal*, *Espírito Santo Portugal Acções*, *Millennium Acções Portugal* and *Santander Acções Portugal*. Quarter returns and the respective compositions of these funds were used and also the respective returns of *PSI Geral* (as a benchmark), because these funds mainly include domestic stocks (a minimum of 2/3). For achieving the goal of this analysis, the performance of the funds it was measured, using profitability models recognized and utilized in finance world: CAPM, Jensen Measure, Treynor Ratio and Sharpe Ratio. There is another method to determine if the strategy opted by managers was achieved with success, the market timing, because it can

translate the ability of managers to anticipate the movements of benchmark. This ability can be measured with Treynor and Mazuy, and Henriksson and Merton Models. On the other hand, there are two measures that can classify the various types of the portfolio strategies: alpha and tracking error. The alpha is the average of the difference between the fund return and the benchmark return (active return) for a given period, and in this case, for a quarter. So, the tracking error is the standard deviation of the active return, that is, this occurs when risk profile of a fund differs from that of the risk profile of the benchmark. Thus, based in this measure, the other idea in this thesis is identifying which variables have a strong or weak link with how the funds follow the benchmark, and thus verifying which variables have an important impact on the performance that the manager achieved.

Thus using these measures, we concluded that only 2 funds can achieve the initial strategy established. The fund *Espírito Santo* is one of them because during the period considered, it can get an active portfolio management, with an annualized geometric mean above the benchmark, a positive gamma in the models of the Market timing, demonstrating a capacity in anticipating the movements of the market, a positive average of active returns, a higher tracking error, reflecting the difference between risk profile of fund and benchmark, and a positive information ratio, traducing in good performance. The variable that explains better the value of tracking error is the percentage of *PSI Geral* stocks used in fund portfolio, but with moderate correlation. The other fund is *BPI* that chosen and achieved a passive strategy, with annualized geometric mean very close to the benchmark, a beta is approximately 1, indicating that its variation tends to follow perfectly the benchmark, the values of Treynor and Sharpe ratio are very close to benchmark, so the performance of fund *BPI* was approximate of the *PSI Geral*, a positive gamma of Market Timing Models, a average of active returns close of 0, tracking error is the lower of all funds and a positive information ratio. It was not possible to identify which variables influence the tracking error, because all have a weak correlation.

The measures for the others funds show that the manager pretended to follow an active or passive strategy but he was not successful, with poor performances. In case of *Banif*, the manager tried to use the active, which can be seen by tracking error, the highest value. The variables that influence this fund are the benchmark volatility and the weight of stocks in fund. The fund *Barclays* tried to use the passive strategy, which can be seen through the

market timing values and tracking error (lowest value). The percentage of common stocks between funds and *PSI Geral* above of concentration ratio is the variable that better explains the variation of tracking error. The *Caixagest* fund has a lower tracking error demonstrated that the manager tried to use the passive strategy. Relatively to the determinants of tracking error, it was not possible to understand which influence it because the correlation is weak. In the case of fund *Millennium*, through the average of active returns and tracking error, the manager tried to apply the passive strategy and the benchmark volatility was the variable with more impact in tracking error. Finally the fund *Santander*, presented a large tracking error, so the intention of manager was to use the active strategy and the variable with more impact in tracking error is the benchmark volatility.

With this analysis, it can be understood that particularly the beta of portfolio, benchmark volatility, the percentage of *PSI Geral* stocks, the weight of stocks, the percentage of *PSI Geral* stocks above of concentration ratio and the percentage of common stocks between funds and *PSI Geral* above of concentration ratio, have influence in the performance of the funds.

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Index

Contents

Figures

Graphics

Tables

List of Abbreviations

APFIPP – *Associação Portuguesa de Fundos de Investimento, Pensões e Património*

BCP – *Banco Comercial Português*

BPI – *Banco Português de Investimento*

CAC – French Stock Index

CAGR – Compound Annual Growth Rate

CAPM – Capital Asset Portfolio Management

CMVM – *Comissão do Mercado de Valores Mobiliários*

DAX – German Stock Index

EFAMA – European Fund and Asset Management Association

EU – European Union

FDIC – Federal Deposit Insurance Corporation

FEFSI – *Fédération Euripéenne des Fonds et Sociétés d'Investissement*

FIM – *Fundo de Investimento Mobiliário*

IBEX – Spanish Stock Index

MIL – Italian Stock Index

NASDAQ – National Association of Securities Dealers Automated Quotations

NAV – Net Asset Value

PSI – Portuguese Stock Index

S&P – Standard & Poor's

SML – Security Market Line

UCITS – Undertakings for Collective Investments in Transferable Securities

UK – United Kingdom

U.S. – United States

1. Introduction

This thesis falls within the areas of finance that deal with Mutual Funds, the dominant and important investment company today. Mutual funds are the common name for the open-end investment companies, that is, this type of managed companies stand ready to redeem or issue shares at their net asset value. Then this thesis can be divided in two parts.

In the first, it is presented a characterization of Mutual Funds, including the advantages, disadvantages, the cost of investing in this type of investment company and the classification by investment policy. In this analysis, was given emphasis the equity funds because this type of mutual funds are the subject of study in this thesis. It also was done research on the history and growth of this industry in Portugal, registered from early years to nowadays, trying to understand the respective evolution drivers, highlighting also the equity funds.

It was introduced the performances measures, like CAPM, Jensen Measure, Treynor ratio and Sharpe ratio, as the best available methods recognized and utilized to analyze the mutual funds. The market timing also was explained in this thesis, for understanding the ability of managers to anticipate the movements of market. At the end of the first part was introduced an explanation of the types of strategy portfolio management: active and passive.

In the second part was analyzed the performance of the Portuguese Equity Funds, using the quarter returns between December 1997 to December 2010, utilizing first the descriptive and hypothesis testing statistics, then the profitability measures and the market timing, using Treynor and Mazuy, and Henriksson and Merton Models. It also was used the measures Tracking Error, Alpha and Information Ratio that can tell us, which strategy the manager was following and achieved during the period considered. This analysis, also tries to understand which variables determinate how the these funds follow the benchmark, that is, the tracking error, obtained for each Portuguese Equity Fund. Particularly was taken into account the systematic risk of each fund, benchmark volatility and the composition of portfolio for each fund, in period considered.

2. Literature Review

2.1. Mutual Funds

The first mutual fund was created in 1849 in Switzerland (*Société Civile Genévoise d'emploi de Fonds*), the second mutual fund in the UK (Foreign & Colonial Government Trust) was created in 1868, with a definition of mutual fund as a way that allows investors of moderate resources to obtain the same advantages as a large capitalist in relation to the reduction of risk, due to portfolio diversification. In U.S., the first mutual fund was created in 1894 (Boston Personal Property Trust), while the Germans only did in 1923 (*Zickert'sche Kapitalverein*). The purpose for creating the first mutual fund was to provide diversification for small investors, as referred in the above definition. Thus, mutual funds have become the primary investment vehicle for these investors, for example in U.S. the number of mutual funds exceeded the number of securities listed on the New York Stock Exchange.

Individual investors are typically limited by resources and/or by their knowledge of the investment position of different financial assets and the difficulty of continuous monitoring of changes in a rapidly moving economic situation. Given to these investors, the small portfolio to manage, it may not be optimal to spend their time analyzing and developing various possible investment strategies. As an alternative, the investors can resort on professionals who possess the necessary knowledge to manage their funds within a specific plan.

Mutual funds are constituted for money investors and the investment will accord to specific purpose of the fund, because there are several types of mutual funds, where they differ on investment objectives, the set of asset classes and the investment strategy. Thus, the profits, after paying the costs of transaction and management, are distributed between the individual investors in proportion to their investment in the fund.

In summary, the definition of mutual fund is a collection of investment money from individual investors to be invested for a specific asset and strategy. The fund manager

determines which securities (for example, stocks and/or bonds) he or she should invest in order to achieve the strategy of the fund.

The management companies work with groups of mutual funds, so they organize an entire collection of funds and then collect a management fee for operating them. By managing a collection of funds under one umbrella, these companies make it easy for investors to allocate assets across market sectors and to switch assets across funds while still benefiting from centralized record keeping. Most mutual funds have an underwriter that has exclusive rights to distribute shares to investors. Mutual funds are generally marketed to the public either directly by the fund underwriter or indirectly through brokers acting on behalf of the underwriter.

2.2.Advantages of Mutual Funds

Diversification

The concept of diversification is to invest in a large number of assets where a loss in any investment is compensated by gains of other. Thus, the more securities the mutual fund is constituted, the less any one of them can prejudice the profits of investor. Some mutual funds are constituted by different stocks in many different industries, to obtain this advantage, which requires different investments with returns that aren't totally correlated. That is, with money of investor in different industries or assets, when the value of one investment is down, there is a high probability that another one is up. So, for decreasing the chances that all investments go down at the same time, the investor must do a good diversification, investing in different types of assets and industries.

The investor can choose by different mutual funds including money market, bonds, stocks and treasury funds, but also can diversify investments by choosing foreign or domestic markets. For a more complete diversification, the investor should also diversify inside of chosen securities, investing in different types stocks, bonds that perform well under in economic situation.

Thus, mutual funds are considered a greatly investment way and the investor can benefit of diversification in two forms:

- With diversification, the investors can reduce the volatility in the value of their portfolio, that is, when the investors apply their money in different industries and classes of asset, they can achieve the same rate of return that a single investment can offer, but with lower variations of value;

- And diversification in addition can help the investors to obtain a higher rate of return of their investment, for a specific level of risk.

Due to the reasons referred above, in the mutual fund portfolio, there is a much greater degree of diversification than is usually found in individual portfolios, making this way of investment a big attraction for investors. A correct diversification increases the probability that the fund receives the highest possible return at the lowest possible risk, given the objectives of the fund. For investors, that buy small amounts of different securities and diversify a portfolio to this level can be a costly and inefficient process, due of the transactions costs.

However some mutual funds aren't diversified as in the case of sector funds, where fund manager invest completely in only industry. These funds aren't the best because their diversification is very poor. So, if investor buys sector fund, that invests in a specific industry and if this industry crashes, the value of this fund will decrease dramatically.

Professional Portfolio Management

In order to obtain the diversification advantage professional portfolio management is needed, because the fund managers have experience in monitoring investments and making decisions according to the economic and financial situation, when they choose securities for the funds, taking in account that portfolio funds are consistent with their prospectus, where the objectives of the fund are described. This process structures risk portfolio and expected return of the fund.

Kosowski, Timmermann, Wermers, and White (2006) recognize that managers of funds with high performance are excellent at choosing the securities for their funds, obtaining good results even after the deduction of transaction costs and management fees. So, Kosowski et al

(2006) used their tests to account for the possibility that luck drives performance of these funds, and they come to the conclusion that for income funds, they detected luck in management but not exceptional for the success of funds that invest in stocks.

Ready Access to Asset Classes and Market Sectors

The mutual funds offer investors a contact to a large selection of security types, as such industry sectors, and geographic sectors. The securities that are trading in foreign markets can be difficult for individual investors to buy directly, thus mutual funds may facilitate this process.

Using mutual funds planned to invest in a specific sector or with exact style, helps investors balance their portfolios with an asset class. It is the case of the investors that are not aware of the growth classification for a specific stock, however this categorization may influence future returns, as a consequence the style of mutual funds may facilitate investors to preserve their objectives.

Economies of Scale

The fund managers trade large amounts of securities at the same time, so their transaction costs and information gathering costs are lower than for individuals.

Liquidity

In mutual funds, it is possible to convert the shares into cash at any time like in individual security. Investors can join in or leave the mutual fund as they want in open-ended mutual funds by dealing directly with the fund manager (usually in this situation the fund charges an entry and exit fee), or use the stock exchange for that purpose in the case of close-ended mutual funds.

Simplicity

Investing in mutual fund is simple, because most of banks have a line of mutual funds, with a lower minimum investment.

2.3. Disadvantages of Mutual Funds

No Insurance

Mutual funds that are regulated by the government may also suffer losses, because, although the mutual funds benefit from risk reduction due to diversification, losses can still occur.

Dilution

As said above, the diversification is the main advantage for mutual funds, because it reduces the level of risk, but on the contrary, it can transform a disadvantage through dilution. If one security of a mutual fund doubles its value, the value of mutual fund would be not double because probably this security is only small part of the fund. So, with a large number of different securities, mutual funds tend to get an average performance.

Fees and Expenses

The investors that choose a mutual fund will pay management and operating fees. But some mutual funds have high commissions and redemption fees, and in some cases trading shares so frequently that these expenses increase considerably.

Poor Performance

The returns of mutual funds are not guaranteed. In fact, on average, around 75% of all mutual funds have a poorer performance than major market indexes, creating the uncertainly about the efficiency of professional portfolio management.

Loss Control

The fund managers make all of the decisions about which securities to trade and when to trade. Thus, with these decisions, it may be difficult o manage the portfolio and optimize returns, because there are tax consequences for certain time of trading the assets. On the other hand, the investors are trusting in someone that uses their money for investing in mutual funds, what need some attention for these investments.

Trading Limitations

In general, the mutual funds are very easy to trade, but the open-ended funds, cannot be bought or sold in the middle of the trading day, only in end of the day.

Size

Some mutual funds are constituted for various companies, so finding good investments, is particularly difficult for funds that have as their target small companies, given severe regulations about how much of a single company a fund may invest. So, as the result sometimes the fund manager will be forced to lower its standards when selecting companies to invest in.

Inefficiency of Cash Reserves

Mutual funds usually keep large cash positions as a defense against possible withdrawals. These reserves offer liquidity to investors, but that money could be invested in assets rather than in cash, so this policy tends to lower the potential return for the investor.

Different Types

There are a lot of mutual funds in market, and these funds differ in asset classes, strategy, and style. So, the mutual funds are available for every investment strategy, every sector, and every region of the world. Thus the process of selecting a fund can be slow, because there are several options for investing in mutual funds.

2.4. The Cost of Investing in Mutual Funds

An investor that chooses the mutual fund as investment should consider not only the investment policy and historical performance, but also the cost of investing. Thus, the investor should pay attention to these fees:

Front-End Load

The front-end load is a fee paid when the shares are purchased, and with these loads, the amount of money invested is reduced. Obviously, the no-load funds have no front-end costs.

Back-End Load

The back-end load is commission that occurs when the investor sell his shares. These charges are known more formally as "contingent deferred sales charges".

Operating Expenses

The operating expenses are the commissions that occur when the fund manager operates the portfolio, including administrative expenses and advisory fees. These expenses periodically are deducted from the assets of the fund, reduced thus value of the portfolio.

2.5. Classification of Mutual Funds

By structure

Open-Ended and Closed-Ended Funds

In open-ended fund, the units are traded at any time, and the NAV will prevalent at the time of trading. The fund discloses the NAV on a daily basis to facilitate issue and redemption of units. In contrast of open-ended funds, closed-ended funds sell units only during their underwriting period. Afterwards, the investors can trade units to or from other investors and to facilitate those transactions, units are traded on stock exchanges. The price of closed-ended funds is determined based on demand and supply of units at the stock exchange and can be more or less (usually less) than the NAV.

Open-ended funds are usually preferable to closed-ended funds for the following reasons:

Management talent: The open-ended funds always attract more investors and thus, they can pay necessary money to employ the best managers. Closed-ended funds are also run by good managers, but generally, open-ended funds can get better talent.

Expenses: Since open-ended funds attract more investors, so more money will manage and thus this type of mutual funds can obtain lower operating expenses. The closed-ended funds normally have a smaller size, consequently they are more expensive to manage and the cost of

operating is subtracted from the returns for investors. As a result, higher expenses decrease the returns of closed-ended funds. The investor can avoid these high expenses by buying a no-load that is free of commissions, open-ended mutual fund.

Fee-free selling: As**,** the NAV always equals 100% in open-ended funds, so the investments, reduced by liability, are presently important. Thus investors don't have the cost of trading their shares with other investors as it happens with closed-ended funds. In that case investors have to sell their shares to someone who wants to purchase them, consequently closed-ended funds sometimes tend to sell at a discount.

By Investment

The fund can be classified by investment: Treasury Funds, Equity Funds, Bond Funds, Index Funds, Money Market Funds and Fund of Funds.

Treasury Funds

These funds have as characteristics the predominance of short-term investments and high liquidity, like Government Bonds or Treasury Bills. Thus, this type of fund offers a low risk and a return that equals money market interest rates, more suited to investors that have liquidity needs in the short term and/or high risk aversion, declaring itself as an substitute to investment in bank deposits.

Equity Funds

This type of fund mainly invests in stock and can be either growth funds or income funds. Growth funds focus in companies with strong growth potential, capital appreciation being the most important driver, while income funds focus in companies that have high dividend yields. In equity funds the investment in stocks from a specific industry may be restricted.

Bond Funds

The bond funds are constituted mainly of bonds or other types of debt securities. Thus, a bond fund concentrates in a particular type of bond or debt, depending on its investment objectives. The securities that bond funds operate diverge mostly in terms of risk, return, duration, and convexity.

Index Funds

This type of mutual fund has the objective of achieving the same return as a selected index. For this purpose, this fund invests in securities of companies that are included in the selected index, but some also use derivatives for the same purpose. Some fund managers choose all of the companies included in index but others invest only in a representative sample of the companies included in index.

Money Market Funds

This type of fund principally invests in highly liquid and low-risk securities, such as government securities and certificates of deposit. These funds are known for low risk, compared to other mutual funds, and pay dividends that generally reflect short-term interest rates.

Fund of Funds

These mutual funds invest in other mutual funds, adding another level of diversification. Before investing in units of any mutual fund, the manager must analyze the financial situation of companies and the strategies of competitors, using the quarterly reports that they regularly issue detailing their revenues, expenses, profits, losses, assets and liabilities.

Hedge Funds

The objective of hedge funds is not only (as their name may wrongly suggest) to reduce risk, but also to maximize return on investment. This type of fund trades any securities, such as bonds, stocks or options. Thus, the fund manager can invest in any opportunity of investment in any market where it anticipates notable gains at reduced risk.

## 2.6.Equity Funds

As the theme of this thesis is based on Equity Funds, it is important to know more about this type of mutual funds. Stocks represent a share of ownership in a company and its profits. So if companies grow or expand, stocks represent a good way for investors to participate in that success. Over the last two centuries, investors with diversified stock portfolios earned an

average return of 10% per year. In contrast the return of bond and money market investments, have historically a value of 1% or 2% per year over the rate of inflation. The investment's return of equity fund relative to the rate of inflation determines the growth in buying power of portfolio. So the real growth rate is the rate of return obtained per year minus the yearly rate of inflation.

Equity Funds are the option for the investors that want to trade stocks, so equity funds that offer diversification and a low-cost of professional manager, the investor exposes himself to risk. The most effective form to reduce the risk is diversification, because as said previously, using numerous stocks reduces the damage of any stock value decrease. Thus this type of fund reduces risk by investing in many stocks. On the other hand equity funds can reduce the risk through investments in different types of stocks of various sectors. To classify equity funds is their reliance on capital appreciation versus current income is often taken into account. As said previously, the income funds tend to choose companies with high dividend yields, which offer high current income. Instead, growth funds focus on gains of companies. The categorization of these funds is in terms of income versus capital gains, but the most important factor is the level of risk.

The growth funds are normally riskier than income funds because they respond far more dramatically to changes in economic situation. Funds that invest in stocks represent the largest category of mutual funds. Thus, the investment realized in this class of funds is long-term capital growth with some income. However, there are many different types of equity funds because there are many different types of equities. For understanding better the different types of equity funds we may take a look at the Morningstar stock style grid.

Figure 1: The Morningstar stock style grid

Source: Morning Star

The different stocks are grouped into one of seven regions: the United States, Latin America, Canada, Europe, Japan, Asia ex-Japan, and Australia/New Zealand. After, it is evaluated how it stands out relative to other companies of the same region. The process is started by determining if a security is small, medium, or large inside of its region. In investing vocabulary, stock size is called market capitalization or market cap.

Benz (2005:7) refers that the market cap is "…*the current dollar value of all of a given company's stock shares...We consider companies whose market caps land within the largest 70 % of their region to be large cap; the next 20 % are midcap; and the smallest 10 % are small caps. Although small-cap stocks only account for 10 % of each region's market, there are actually many more of them than there are large-cap companies. Having determined a security's regional and size classification, we turn our attention to its investment style. Investors typically group stocks into one of two major buckets—growth stocks or value stocks—and often identify themselves as growth investors or value investors. Understanding the difference between the two styles is critical to understanding what makes a fund tick. Growth stocks typically enjoy strong growth in earnings or revenues because they've got a new product or service. So, the market expects good things from these fast growers, and earnings growth usually drives a higher share price, investors are willing to pay more for the shares than they will pay for slower growers.*"

Stocks companies that have a classification of value contain earnings that are frequently growing in slow way, and they are in industries that have boom-and-bust cycles. Fund managers who center in value stocks are prepared to invest in less important earnings growth because they think the market is being negative about the potential of company in the future.

"Some companies display a mixture of both growth and value characteristics – we call these core stocks...To help classify a stock as growth, value, or core, we look at 10 separate factors, including dividend yields, price/earnings ratios (a company's current share price divided by its earnings), and historical and projected earnings growth. Once we have classified each stock's investment style, we then classify the entire portfolio, based on which square of our style box most of its stocks land in. Securities that the manager has weighted the most heavily will play a bigger role in determining a fund's investment style than will smaller positions...Funds that devote most of their assets to stocks with strong growth characteristics will land in the growth column of our style box, while those with a higher concentration of value stocks will land in our value column. Funds that hold both growth stocks and, value stocks, or those that focus mainly on so-called core stocks will land in the blend column of style box". (Benz, 2005:8).

The investors can make money in Equity Funds in three ways:
Dividends: The companies that can get profits give some to shareholders in the form of dividends. The companies with a high growth of their returns use these gains to invest in their or other business. The investors have an option to receive the dividends as cash or reinvest them by obtaining new shares for portfolio equity fund.

Capital gains distributions: The fund managers can get profits, selling stocks for more than they paid for them, known as capital gains, which after being be deducted by losses may then be paid to the fund's shareholders as dividends. These gains can be reinvested back into the fund. Profits from stock realized for more than one year are identified as long-term capital gains and are taxed at a lower rate.

Appreciation: The fund manager doesn't sell all the stocks that have a good performance, thus the price per share of the fund should increase, reflecting the gains in stocks that were not sold, if fund manager made good picks or if the market had a great performance. On the

contrary, if the value of stocks decreases, the share price of fund reduces. The investors just receive these profits when they sell the fund and lock them in. As said before the investors that have a fund more than one year, are qualified for low long-term capital gains tax rates when they sell. If the investors include collectively dividends, capital gains, and appreciation, they get the total return of a fund. However, stocks and the funds that invest in them, change in the magnitude of the weight that makes up their total returns, principally the dividends.

3. Mutual Funds Industry in Portugal

The activity of mutual funds in Portugal is subject to the supervision of two entities: Securities Market Commission (CMVM) and Central Bank of the Portugal (*Banco de Portugal*). CMVM holds extensive powers of supervision, that is, CMVM is the authority that, supervises and audits the funds institutionally and controls the fund managers activities and their custodians. For example, the CMVM, with the consent of the Central Bank of Portugal, is responsible of authorization the establishment of new mutual funds. The functions of the Central Bank of Portugal consist in auxiliary activities of the funds that are directed by more entities of supervision management - credit institutions and financial companies - than the activities themselves.

Mutual funds can be divided into 2 structures: harmonized funds (UCITS - Undertakings for Collective Investments in Transferable Securities) and non-harmonized funds (non-UCITS). The most important structure of this industry is the first, that is concerned in European Directive of 1985, and include all open-ended funds (statistics FEFSI - *Fédération Européenne des Fonds et Sociétés d'Investissement*). In the moment, non-harmonized funds include other types of mutual funds regulated nationally, with domination of German special funds (*German Spezialfonds*) and by UK closed-opened funds. The harmonized funds of EU countries correspond to on average about 80% of total industry of mutual funds. Portugal is, one of all EU countries, which shows lower values of assets under management, in terms of total and harmonized funds.

The history of mutual funds industry in Portugal is recent compared to other countries, including Switzerland, UK, U.S. and Germany. The first registration occurred only in June 1964 and in 1975, following the nationalization of the banking sector and the consequent cessation of activity in the capital market the units of funds were transformed into public debt. Thus, this industry was resumed in 1986 with appearance of the fund "Invest". In the next year, four more funds appeared and since then this activity has increasing importance in Portugal and the mutual funds industry gained a very rapid growth.

Restricting the analysis to Portuguese mutual funds that was marketed and administered by entities in Portugal, there is an exponential growth in NAV and the number of funds since its inception, reflecting its approval between the investors. As said previously, in 1986, the beginning of mutual funds industry, there was only one whose value amounted to just €51 million. However in late 2009 there were 288 funds that managed a total of €17,231 million. This development was not uniform past of years, and between 1986 and 1991, two events with significant consequences for the mutual funds industry: on the one hand, the stock market crash in October 1987, which possibly accounts for the negative growth rate of NAV in 1988; in addition, the resumption of capital markets in 1989, resulting in the high growth observed in this and the following two years. This period was designed as "impulse" of mutual funds industry in Portugal.

Graphic 1: Number of Mutual Funds
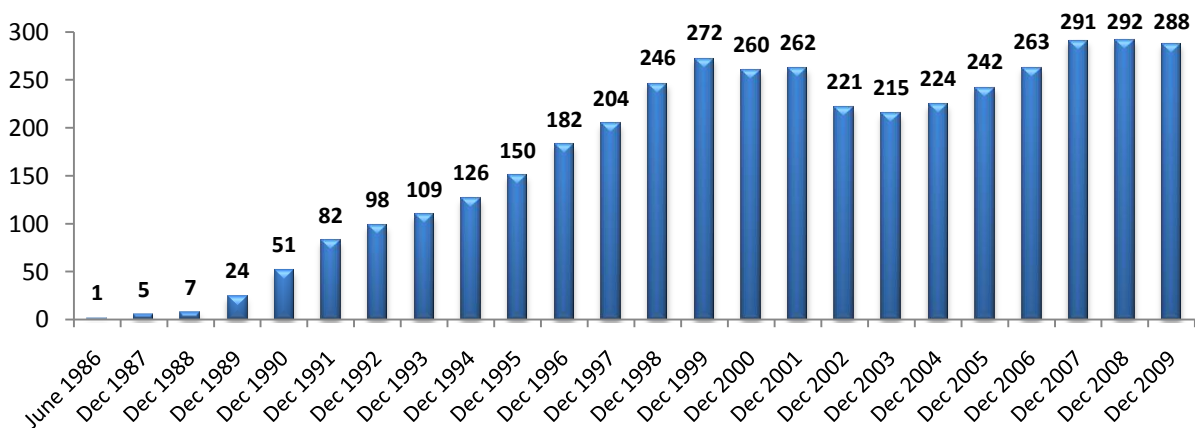
Source: CMVM, APFIPP

Between 1992 and 1998, is a period of "consolidation" of industry growth, the sharp upward trend of the NAV remained, although with lower growth rates. The significant increase of the amounts applied occurred in 1997 may be associated with a number of factors and events that contributed to the maturation of the Portuguese market and to increase investments in securities markets in general (European level). Among them may be mentioned: (i) the fact that several international financial institutions spend analysis to classify the Portuguese market in the group of developed markets, making our market more attractive and creating greater visibility of Portuguese firms abroad, (ii) the Asian crisis, which made the stock markets of the EU (including Portuguese) in natural refuges for the international financial investment, (iii) the privatization of public companies, currently holding a significant weight in national stock indices.

The year 1999, and despite the overall portfolio of investments of the mutual funds have reached the highest value ever, constitutes a year of stabilization in the industry, that found a growth rate of only 0.6%. Within next three years, there has to reduce the applications, with negative growth of 10.5%, 1.4% and 3.1% respectively.

Graphic 2: Evolution of Mutual Funds Applications
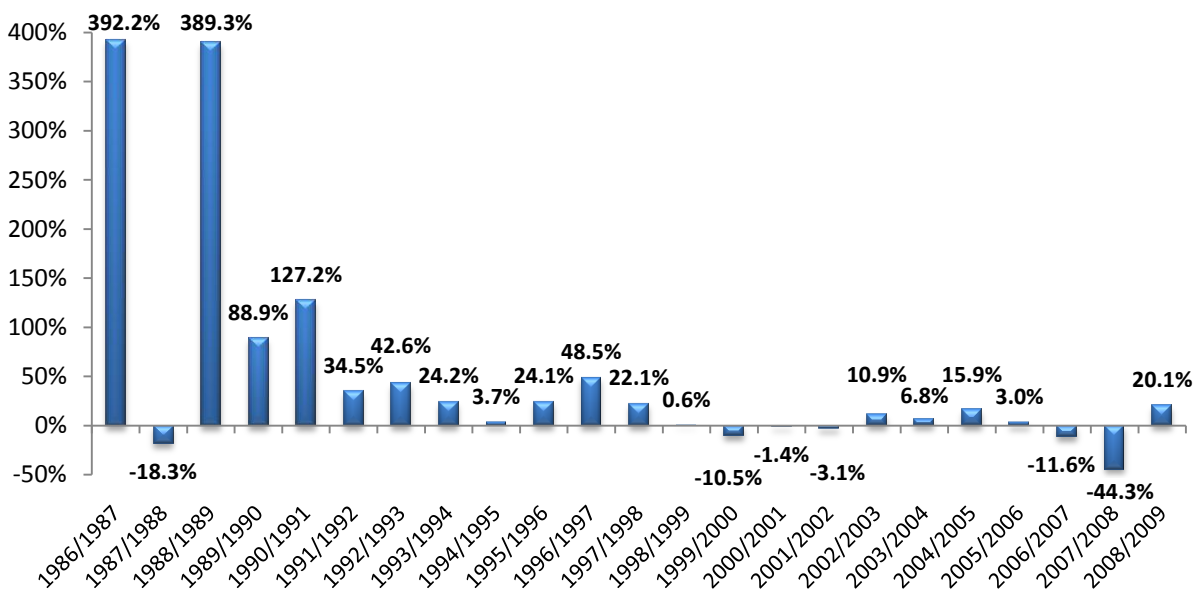
Source: CMVM, APFIPP

The year 2005 was one of great activity and of evolution for Mutual Funds domiciled in Portugal. The amounts under management of these funds increased to more than €28 billion, a growth of nearly 16% compared to previous year. Nevertheless, a part of this increase was caused by the growth of Fund of Funds which, since they invest a large part of their assets in other domestic Mutual Funds, gives rise to double reckoning of the same assets. Discounting this effect, growth amounted to 13.8% in 2005. As far as the number of active funds is concerned there was an increase of the offer, with a total of 242 funds at the end of 2005, 18 more than at the end of 2004.

The increase of demand for Mutual Funds was certainly driven not only by the performance of the funds as a whole, particularly those more exposed to the equity segments, but also by the launch throughout the year of various products offering guaranteed capital and/or a minimum return, which had good reception as far as domestic investors are concerned.

Despite the good performance of the Portuguese Market it did not perform as well as the European Investments Funds Market. Indeed, according to figures provided by EFAMA – European Fund and Asset Management Association, in the EU countries taken together the volumes of Mutual Funds under management (UCITS and non- UCITS) increased 22.6%, a growth in which Luxembourg was out-standing: in addition to being the biggest "producer" of Mutual Funds at European level, it was also one of the ones that returned the greatest growth, at 37.8%.

The fact that Luxembourg has managed to take the leadership position - regardless of the small size of its population - reflects the success of the strategy pursued by this country. The square Luxembourg managed to impose itself as the main platform for the marketing of investment funds denominated pan-European, and now second worldwide and first at European level: 80% of those funds are domiciled in Luxembourg (representing €928.4 million). This success was due to two factors: firstly, the fact of having been the first country to transpose the 1985 Directive into national law (in 1988), on the other, the strong investment by the professionals at the training and technology. In parallel, the Luxembourg maintains a very attractive legislative and fiscal environment.

The volume managed by Mutual Funds domiciled in Portugal grew for the fourth straight year. The good performance of the equity markets and the launch of new products meant that the barrier of €29 billion under management was broken for the first time at the end of December 2006, revealing a growth of 3% compared to 2005. With regard to the number of active Funds, there was a substantial increase so that there were 263 funds at the end of 2006, 21 more than at the end of 2005.

During the year 2007, total assets under the management of the domestic Mutual Funds Industry decreased 11.6% to stand at €25,763.1 million. There were two totally distinct moments during this year, As at June 30, the returns since the star of the year were positive in every category, with the exception of Funds investing in Fixed-Income Bonds, the performance of which was negatively affected by the European Central Bank's increase in interest rates. Thus, at the end of June, the Industry had achieved the highest-ever figure for Assets under Management, at €30.144 billion, with significant growth in Equity Funds.

The second half was completely different, conditioned by the subprime crisis that broke out in North America, giving rise to a liquidity crisis in most bond markets and negatively affecting not only the debt market but also the performance of the equity markets. The situation accentuated a trend that had already been noted for some time: divestment in Cash and Bond Funds. The returns, already low, worsened further, leading unit-holders to exit these products in a search for better alternatives, which the banks offered them essentially during the last quarter of the year, with remuneration rates well above inflation.

The deterioration of the economic and financial conditions throughout 2008 had a very negative impact on the Mutual Fund market not only at home but also at global level. Investors were confronted with decline of the value of securities as a whole, while they were offered, by the credit institutions, alternative investment solutions providing higher returns and a guarantee of capital invested. Thus the year 2008, was therefore marked by an ongoing, significant reduction of the amounts of Mutual Funds under management, caused by the decline of the value of the assets held by the Funds and, most particularly, by the divestment by investors.

Throughout the year total assets under management decreased by more than 44% to €14,342 million, the lowest figure since January 1997. The main cause was the subprime crisis and its consequences: during an initial stage, it gave rise to a shortage of liquidity in the debt markets and securities, leading to a reduction in the value of these assets; subsequently, it came to create difficulties for several financial institutions of global repute, which further worsened the scenario, causing even greater distortion of the risk/return factor. As a result, these funds, which historically involve low risk and a consistently positive, though not very high, return, became more volatile and, in several cases, generated negative returns, contributing to the divestment seen in 2008.

During the year 2009 was made to the recovery of the amounts placed in Mutual Funds, following the sharp drop seen in the second half of 2007 and in 2008, the result of the long economic and financial crisis originated by the subprime. Nearly everywhere in the world there was a significant increase of assets managed under instruments of this type, with several markets returning growths of more than 15%. In Portugal there was also the same trend of increasing assets managed by Mutual Funds seen around the world.

Considering harmonized and non-harmonized Funds, the total under management at the end of 2009 amounted to €17,231 million, a growth of 20.1%. There are essentially two reasons for this performance. On the one hand, the good performance of the financial markets, with a special focus on the equity segment, which caused an appreciation of the assets held by the Mutual Funds and, at the same time, awakened investor appetite for instruments of this type, with a view to benefiting from this appreciation.

Indeed, the great majority of domestic Mutual Funds generated a positive return in 2009, with two-digit performance in more than a third of the existing Funds. The second reason has to do with the decline of competition by other savings instruments, bank deposits in particular. With the reduction of short-term interest rates that act as the benchmark for the remuneration of these savings instruments, the interest rates paid by credit institutions fell and this fall cooled savers interest. At the same time, the easing of the difficulties in obtaining financing on the debt markets meant that the banks were no longer subject to so much pressure, reducing the need to attract new deposits.

3.1.Equity Funds

In the second half of the 90s, there was strong growth in applications of the mutual funds in 1997 (48.5%), which resulted from a dynamic occurring in all fund categories, especially in equity funds. There was a high rate of growth in equity funds, resulting from favorable European exchanges in general, and the Portuguese in particular. The slowdown in investment in equity funds and mixed from 2000 was basically a consequence of, the sharp depreciation in principal indices of shareholder segment during this period.

Graphic 3: Weight of Equity Funds in Mutual Funds
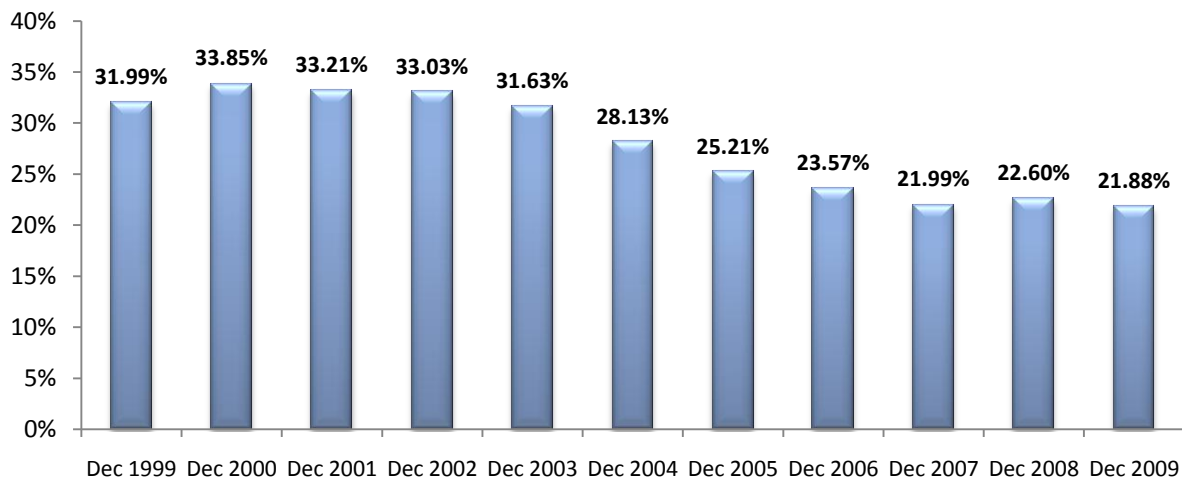
Source: APFIPP

The good performance of the stock markets allied to the appreciation of the U.S. dollar had a favorable effect on the Equity Funds, which, without exception, returned a profit in 2005. Almost all the Equity Funds grew at an annual rate of more than 15% and there were cases of Funds that exceeded the 50% mark.

Graphic 4: Evolution of Equity Funds Applications
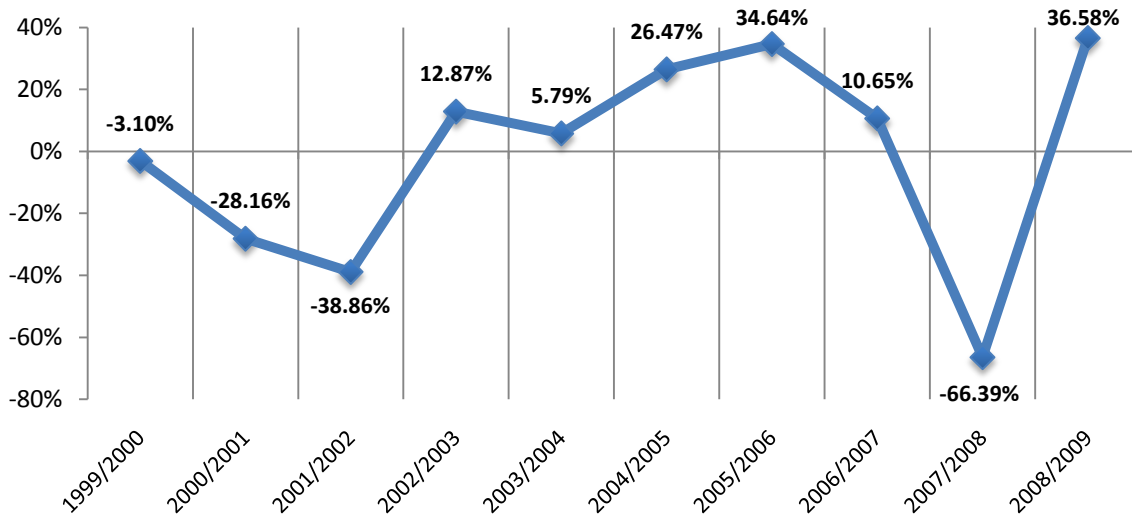
The amounts managed by Equity Funds increased by nearly 27% during the year, driven not only by these results and by the consequent capitalization of assets held, but also by the increased demand from investors wanting to access them.

In the year 2006, while the markets generally returned gains they were, in some case, partially or totally offset by the effect of the appreciation of the Euro against other currencies such as the Japanese yen or the U.S. Dollar. In fact, Equity Funds that invested in these markets or have a currency exposure in these currencies were the ones that generated the worst returns. Of the others, the focus is on the performance of Funds that invest on the domestic market, with annual returns of more than 20% and, in some cases, breaking the 30% barrier. Driven by these results and by the consequent capitalization of assets held and by the consequent investor demand, the amounts managed by Equity Funds increased 34.64%, to €2,985 million.

By the end of June 2007 the Equity Funds had grown significantly, driven by the returns they provided which, at the same time, attracted new subscriptions by savers attempting to access the returns that these Funds were presenting. During the next half, for the stated reasons, the situation reversed with the drop of the leading stock market indices exerting pressure on the portfolio assets and, at the same time, with the exit of investors, who took advantage of the situation to redeem their investments and take the accumulated profits. However, the year's

balance was positive. Equity Funds grew 10.65% owing to the returns provided by most of the Funds.

The year 2008 was marked by the sharp drop of the world's main equity markets, as seen in the analysis of the performance of their reference equity indices. The Portuguese market stood out for its negative performance, with the PSI-20 retreating more than 50%, the worst case amongst the indices considered. Of the remainder, various fell by over 40% and none performed better than a loss of 30%. This obviously conditioned the evolution of Equity Funds during that year. On the one hand, the performance of the equity markets caused a significant depreciation of the amounts in the portfolio, reflected in the negative returns presented by all Equity Funds. For these reasons, the Equity Funds returned a decrease of 66.39% of the amounts under management in 2008 and, at the end of December, stood at €1,110 million.

Graphic 5: Equity Market Performance in 2008
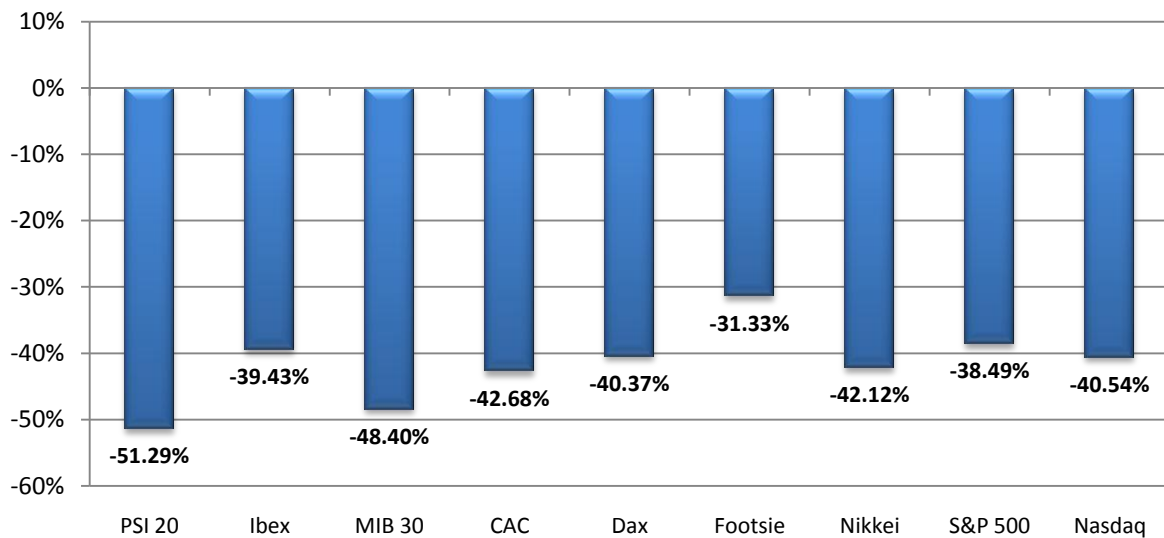
Source: APFIPP

Despite the economic environment, the Management Companies' confidence in this type of instrument continued, as demonstrated by the fact that none of these Funds were wound up, and for this reason the total number of active Equity Funds at the end of 2008 increased to 66, compared to the 64 that existed at the end of the previous year.

In 2009 the world's equity markets recouped part of their losses returned over the previous 18 months. Most of the equity indices that act as benchmark for the leading stock markets appreciated very well, with a focus on the performance of the Lisbon Stock Exchange with the PSI-20 rising 33.5%. The good performance of the equity markets exercised a positive influence on Equity Funds, which grew by 36.58% during 2009. The number of active Equity Funds fell from 66 in 2008 to 63 at the end of 2009, the result of the transfer of two Funds for another category and of the merger of a third Fund.

4. Performance Measures of Mutual Funds

Mutual Fund industry today, with about 30 players and more than six hundred schemes, is one of the most preferred investment avenues. However, with the multiplicity of schemes to choose from, the retail investor faces problems in selecting funds. Factors such as investment strategy and management style are qualitative, but the funds record is an important indicator too. Though past performance alone cannot be indicative of future performance, it is, the only quantitative way to judge how good a fund is at present.

Therefore, there is a need to correctly assess the past performance of different Mutual Funds. Returns alone should not be considered as the basis of measurement of the performance of a Mutual Fund scheme, it should also include the risk taken by the fund manager because different funds will have different levels of risk attached to them. Risk associated with a fund, in general, can be defined as variability or fluctuations in the returns it generated. The higher the fluctuations in the returns of a fund during a given period, the higher will be the risk associated with it. These fluctuations in the returns generated by a fund are resultant of two guiding forces. First, general market fluctuations, which affect all the securities, present in the market, called Market risk or Systematic Risk and second, fluctuations due to specific securities present in the portfolio of the fund, called Unsystematic risk. The Total Risk of a given fund is sum of these two and is measured in terms of standard deviation of returns of the fund.

Beta represents the systematic risk, which correspond to fluctuations in NAV of fund against benchmark, thus calculated through the returns of mutual funds and market of reference. The more receptive NAV of mutual fund is to the alterations occurred in the market, the higher will be its beta. Using the relation between risk and return, it was tried to evaluate the competitive strength of both in better method. Thus, since 1960s, various known authors developed various studies for determining and evaluating the risk of investment in funds using its returns.

The most important and generally accepted measures of performance used are:

- Capital Asset Pricing Model (CAPM)
- Jensen Measure
- Treynor Measure
- Sharpe Measure

4.1. Capital Asset Pricing Model (CAPM)

The major measures used to analyze the performance of investment funds are based on the CAPM developed by Sharpe (1964), Linter (1965) and Mossin (1966).

The CAPM model relies on these assumptions:

- The objective of investors is to maximize their goal in each period;
- Investors take into account in their decisions the expected return and variance of their investments;
- Investors are risk averse;
- All investors share the same investment horizon and the same homogeneous expectations in relation to risk and return;
- There are not transaction costs and all investors have free access to the available information;
- All assets are infinitely divisible;
- The risk-free rate used in this model is identical for all investors, which can be used either for lending or borrowing capital;
- Finally it is considered that the capital market is in equilibrium.

According to CAPM model, the expected return of a portfolio or security is linearly related to the expected return on the market, by equation (1):

$$E[R_{x,t}] = R_{f,t} + \beta_x \left(E[R_{m,t}] - R_{f,t} \right) \tag{1}$$

The $E[R_{x,t}]$ is the expected return of portfolio x in period t, the variable $R_{f,t}$ is return of asset without risk for the period t, the variable β_x is the systemic risk of the portfolio x in period t, and the variable $E[R_{m,t}]$ is the expected return of portfolio market in period t. One of the most debated points in CAPM is the choice of the benchmark, that is, the market of reference, because CAPM model is consisted with existence of a market portfolio constituting of all available assets weighted by value of each in the total market. This portfolio is not possible to replicate, so it uses the benchmark as an alternative. As this model is ex-ante analysis (forecast) and market evolution is not evident, experimental analysis of this model involves the ex-post data, and following the previous equation:

$$R_{x,t} = R_{f,t} + \beta_x \left(R_{m,t} - R_{f,t} \right) + \varepsilon_t \Rightarrow R_{x,t} - R_{f,t} = \beta_x \left(R_{m,t} - R_{f,t} \right) + \varepsilon_t \tag{2}$$

The residual variable, ε_t , has an expected value of zero ($E[\varepsilon_t] = 0$) and variance equal to a constant ($V[\varepsilon_t] = c$). The correlation between this variable and the returns of market doesn't exist ($Corr[R_m, \varepsilon_t] = 0$). As the market is not always necessarily in equilibrium, some securities may not be correctly evaluated by the previous equation, which does not restrict the regression to go through the origin, meaning that the equation must then assume this new form:

$$R_{x,t} - R_{f,t} = \alpha_x + \beta_x \left(R_{m,t} - R_{f,t} \right) + \varepsilon_t \tag{3}$$

In equation (3) the variable α_x measure the imbalance in the portfolio x. This variable with positive value means that the portfolio x had a positive risk adjusted performance. Thus analyzing the performance of a mutual fund and taking in account the assumptions of the CAPM, a positive value of α_x shows that the capacity of the fund manager to build a portfolio, adjusted for systemic risk, exceeds the performance of the market. Jensen (1968) and Treynor (1965) developed models that have as objective to evaluate the performance of

portfolios or securities, and these measures derive directly from formulation of the CAPM. The variable α_x is also referred to as Jensen (1968) measure.

4.2. Jensen Measure

The Jensen measure has the alternative formulation as follows:

$$J_{x,t} = R_{x,t} - \left[R_{f,t} + \beta_x\left(R_{m,t} - R_{f,t}\right)\right] = \left(R_{x,t} - R_{f,t}\right) - \beta_x\left(R_{m,t} - R_{f,t}\right) \tag{4}$$

The variable $J_{x,t}$ is the ratio of Jensen for the portfolio x in period t, although other variables have the same significance. This measure, while equivalent to α_x of CAPM equation, is from an operational point of view the easier way to calculate, because the value of parameter beta is the only necessary estimation for calculation of this ratio. This measure, projected by Jensen (1968), shows the difference between the return of portfolio fund and the return of the benchmark and simultaneously, with a beta equal to the fund, both excess returns are reduced by the return generated by the risk free instruments. Thus, the difference between the risk premium of the fund $\left(R_{x,t} - R_{f,t}\right)$ and the risk premium of a market of reference $\beta_x\left(R_{m,t} - R_{f,t}\right)$, will show if the fund manager was successful or failed in the selection of securities constituting the fund portfolio.

4.3. Treynor Measure

Another measure that has as objective the performance evaluation and is based on Security Market Line (SML) was proposed by Treynor (1965). Such as the Jensen's measure, this model also relies on the risk market measure (beta) as a measure of risk and thus its equation is:

$$T_{x,t} = \frac{R_{x,t} - R_{f,t}}{B_{x,t}} \tag{5}$$

The measure $T_{x,t}$ is the Treynor ratio and other variables have the meaning explained previously. This ratio highlights the excess return or risk premium of the fund, per unit of systemic (or non diversifiable) risk. Considering the measure $T_{m,t}$ as the value of excess return of the portfolio that replicates the market index, per unit of systematic risk of the market, then, when $T_{m,t} < T_{x,t}$ (or $T_{m,t} > T_{x,t}$) the performance of fund was superior (or inferior) of the market. The investors that are risk-averse want to maximize this value, because a high and positive Treynor ratio shows a superior performance of a fund adjusted by its non diversifiable risk, and a low and negative Treynor ratio, with the same adjusted, indicates that the performance is unfavorable.

4.4. Sharpe Measure

The Treynor and Sharpe Measure are very similar, however, like mentioned previously, the first ratio uses beta of portfolio as the relevant risk measure while in the second ratio the risk is the total risk of the portfolio. So the equation is:

$$S_{x,t} = \frac{R_{x,t} - R_{f,t}}{\sigma_{x,t}} \qquad (6)$$

The measure $S_{x,t}$ is the value of the Sharpe ratio for the portfolio x in period t. Thus as this ratio uses the total risk, corresponding to $\sigma_{x,t}$, the standard deviation of the portfolio in period t. So, this measure has as objective to evaluate the excess of return of fund, reduced by that of the asset without risk, per unit of total risk. A Sharpe ratio with a high and positive value shows a superior performance of a fund, adjusted by risk, and a low and negative Sharpe Ratio, with the same adjusted, is an indication of unfavorable performance.

As said previously, Sharpe and Treynor measures are similar, because these ratios both divide the excess return by a risk measure. The total risk used in Sharpe measure is adequate when it is evaluated the relationship between risk and return for portfolios with good diversification. That is, the systematic risk is the good measure of risk when it is used portfolios with poor diversification or individual stocks. Thus, for well-diversified portfolio,

the total risk (Sharpe measure) is equal to systematic risk (Treynor measure), because the total risk will be reduced to systematic risk. As a result a fund that has a poor diversification that obtained a higher ratio on Treynor measure, compared with another fund that is highly diversified, will obtain a lower ratio on Sharpe Measure.

5. Market Timing

For the analysis and the incorporation of information available in the forecast of the evolution of stocks will be facilitate, taking in account, the capacity of fund manager to predict the expected performance of the benchmark, using expectations better reasoned and realistic about the future movements of benchmark. These forecasts are translated into method of alteration of the stock investments in portfolios to increase or decrease market exposure when the expectations are the rise or fall of prices. This method is known as Market Timing. Thus with this ability to predict of market movements, the fund manager can do alterations in its portfolio, taking in account the strategy portfolio management opted, that is, if the manager readjust the portfolio according with its strategy, predicting the market movements correctly, will put in practice its active or passive portfolio management successful.

In order to understand if the portfolio of funds have capacity to beat the benchmark, it is analyzed and evaluated its abnormal returns using a specific benchmark, and estimating these abnormal returns with CAPM model. Thus, the objective of this analysis is to evaluate the capacity of fund managers to predict the performance of benchmark, that can be done using two different methodologies derived from CAPM: Treynor and Mazuy Model and Henriksson and Merton Model. The first of the two methods was projected by Treynor and Mazuy (1966), using a quadratic term of the excess market return in equation (7), giving a better support for the adjustments of the portfolio's beta in test of timing ability from manager fund. The CAPM model was modified this purpose of investment funds:

$$R_{x,t} - R_{f,t} = \alpha_x + \beta_x \left(R_{m,t} - R_{f,t} \right) + \gamma_j \left(R_{m,t} - R_{f,t} \right)^2 + \varepsilon_t \tag{7}$$

The variable γ_j is a measure of market timing ability of fund manager j and when γ_j is significantly higher (lower) than zero, this means that the investment in fund increase (decrease) the exposure of their portfolio to the market previous to an increase (decrease) in that market, then the fund's return is a convex function of market return and γ_j will be positive (negative). The fund with a strategy of portfolio management totally passive is suppose that the γ_j is zero or approximately zero, because fund managers only do reconfigurations of the portfolios in answer to changes in the benchmark.

The model developed by Henriksson and Merton (1981) is the second method of Market Timing that separates the performance of investment funds made by fund managers into two components. The first part is talent to predict the market (market timing), and second part its capacity to choose which securities will have a better performance (asset selection). The equation (8) allows this separation:

$$R_{x,t} - R_{f,t} = \alpha_x + \beta_x\left(R_{m,t} - R_{f,t}\right) + \gamma_j Max\left(0; R_{m,t} - R_{f,t}\right) + \varepsilon_t \tag{8}$$

The variable $Max\left(0; R_{m,t} - R_{f,t}\right)$ is the maximum between 0 and risk premium, what means that this expression is like the payoff of an option on the market portfolio with exercise price equal to the risk-free rate. So the variable γ_j will be good for fund managers that have capacity to do market timing successfully. If these managers have the capacity to predict the evolution of the benchmark, that is, market timing, thus the systematic risk of portfolio funds will increase when these managers suppose that rate of return of the benchmark will be higher than the risk-free rate. Consequently, from equation (8) will have this result: $\gamma_j > 0$. The capacity of fund managers to choose securities will be reflected in the context of Henriksson and Merton Model, a positive value of the parameter alpha.

6. Investment Policy

6.1.Passive Portfolio Management

The Passive Portfolio Management is a financial strategy that has as objective a fund manager adjusts the portfolio in accordance with a pre-determined strategy that does not involve any forecasting. The concept of this strategy is to minimize costs of investment and to prevent of unfavorable consequences of failing the future movements of benchmark. The method most used is to replicate like imitation of the benchmark performance. Following a benchmark, the investment portfolio usually will obtain a good diversification, low turnover maintaining low internal costs of transaction, and low costs of management. With this low costs, the investors of fund will have higher returns than a comparable fund with the same investments but with higher management fees and/or transaction costs. Thus, due to its benefits for the investor, the passive strategy is the most frequent strategy used on the equity market, where index funds following a benchmark, but actually other investments types already opt by this strategy like: bonds, commodities and hedge funds.

"There are two types of passive strategies: a buy-and-hold strategy and an indexing strategy. In a buy-and-hold strategy, a portfolio of stocks based on some criterion is purchased and held to the end of some investment horizon...While referred to as a passive strategy, there are elements of active management. Specifically, the investor who pursues this strategy must determine which stock issues to buy. An indexing strategy is the more commonly followed passive strategy. With this strategy, the manager does not attempt to identify undervalued or overvalued stock issues based on fundamental security analysis. Nor does the manager attempt to forecast general movements in the stock market and then structure the portfolio so as to take advantage of those movements. Instead, an indexing strategy involves designing a portfolio to track the total return performance of a benchmark index." Focardi and Fabozzi (2004:564)

6.2. Active Portfolio Management

In active strategy, fund manager creates a detailed portfolio with the objective to get a higher performance than benchmark. Thus, this strategy portfolio management is the contrary of passive, because as said previously in passive portfolio management the fund manager does not try to beat the benchmark performance. Preferably, the fund manager with active strategy tries to get advantages with inefficiencies of market buying securities that are undervalued or selling securities that are overvalued. Any of these methods can be used alone or both combined. Taking in account the objectives of the particular investment, for example hedge or mutual fund, the active strategy will be used to reduce volatility (risk) relative to the benchmark. Thus, as objective of this strategy, the reduction of risk can be an alternative or, in addition to, creating a return in investment of funds greater than the benchmark.

As said previously, on the contrary of the passive portfolio management, the active strategy is used principally when there is in financial markets, a moderate to low level of capital market efficiency, because the active fund managers get improved information than most other managers and/or can generate active returns, with their productive way of looking for information. In general, active strategy is classified as either a top-down or a bottom-up approach.

Top-Down

There are different connotations of top-down approach and it can be distinguished between the three types of this type of active strategy: one is passive, although two are active. Starting with top-down passive approach, the theory of portfolio said that the fund manager should invest in efficient portfolios, that is, the goal of these portfolios is to maximize the return for any given level of risk. But the other point of view of top-down passive strategy is that the fund managers are only worried with portfolio choices instead of the stocks selection choices based by company or sector.

Focardi and Fabozzi (2004:566) refer that "*Indeed, the top-down maximization of expected portfolio return for a given risk level occurs without any direct interest by the investor in the*

specific names of companies that comprise the efficient portfolio, other than to say that an individual company, industry, or sector has the potential to enhance portfolio return and reduce risk through efficient diversification. Since an efficient portfolio - such as the market portfolio - is a passively constructed portfolio, one must therefore be careful to distinguish between top-down passive investing and top-down active investing. In making the active asset allocation decision, a manager who follows a macroeconomic approach to top-down investing often relies on an analysis of the equity market to identify those sectors and industries that will benefit the most on a relative basis from the anticipated economic forecast."

Bottom-Up

The bottom-up of active investing is used when various pricing inefficiencies are in the capital markets. The fund manager that follows this approach centers on technical characteristics of the market or the economic and financial analysis of individual companies, giving thus moderately less weight to the significance of economic and market cycles. The fund manager that practices a bottom-up approach supported on certain technical aspects of the market for the base of stock selection on technical analysis. The principal method used for investing that has as support economic and financial analysis of companies is known as security analysis. This method is divided in two categories, traditional fundamental analysis and quantitative fundamental analysis.

"Traditional fundamental analysis often begins with the financial statements of a company in order to investigate its revenue, earnings, and cash flow prospects, as well as its overall corporate debt burden. Growth in revenue, earnings, and cash flow on the income statement side and the relative magnitude of corporate leverage from current and anticipated balance sheets are frequently used by fundamental equity analysts in forming an opinion of the investment merits of a particular company's stock. Specifically, the fundamental analyst attempts to determine the fair market value (or the intrinsic value) of the stock...The estimated fair value of the firm is then compared to the actual market price to see if the stock is correctly priced in the capital market." Focardi and Fabozzi (2004:567)

Relatively to Quantitative Fundamental analysis, method is evaluated the securities opted by statistical model, such as fundamental multifactor risk model, using historical returns of

securities. But this model also can be used for to build or to readjust a portfolio. Bruce Jacobs and Kenneth Levy (2008) refer to strategies that use quantitative methods to choose stocks and consequently to build fund portfolios that have the equal level of risk as a benchmark but that gives the opportunity to improve returns relative to that benchmark at correct incremental level as an engineered approach to portfolio management.

7. Data Analysis Methodology

7.1. Assumptions and Data

This analysis has like objective to understand what portfolio management strategy is used by fund managers. Selecting a portfolio strategy that is consistent with the investment objectives and investment policy guidelines of the client or institution is the third step in the investment management process. For this analysis were used, as sample, the Portuguese Equity Funds which were in the market in the last quarter of 2010: *Banif Acções Portugal, Barclays Premier Acções Portugal, BPI Portugal, Caixagest Acções Portugal, Espírito Santo Portugal Acções, Millennium Acções Portugal* and *Santander Acções Portugal*. In last two years, *Santander Asset Management* and *Millennium BCP Gestão Activos* are those Management Company which have invested more in its domestic equity funds.

Within these funds active in the market, the *Banif Acções Portugal* fund was the last to be created in late 1997 and so the period that was considered for analysis was between December 1997 and December 2010.The quarterly returns and compositions of these funds were withdrawn from Portuguese Association of Investment Funds, Pension Funds and Asset Management (APFIPP) and CMVM, respectively.

Table 1: The Management Company's weight of investment applications in domestic equity funds

Management Company	Fund	December 2009	December 2010
Banif Gestão de Activos	Banif Acções Portugal	2.11%	2.21%
Barclays Wealth Managers Portugal	Barclays Premier Acções Portugal	4.27%	4.01%
BPI Gestão Activos	BPI Portugal	16.86%	13.82%
Caixagest	Caixagest Acções Portugal	13.73%	16.07%
Esaf - F.I.M.	Espírito Santo Portugal Acções	6.38%	5.20%
Millennium BCP Gestão de Activos	Millennium Acções Portugal	21.88%	22.59%
Santander Asset Management	Santander Acções Portugal	34.77%	36.09%

Source: APFIPP

For the purpose of this analysis had to choose a relevant benchmark to compare with the funds mentioned above. Thus, the *PSI Geral* was used since it is adjusted by the amount of dividends distributed by companies that integrate it and also because the fund portfolio has a diversification superior to the PSI-20. The quarterly returns of the benchmark were calculated based on quotes provided by Central Bank of Portugal, on BPstat system and the compositions were obtained from Euronext Lisbon, on Dathis system, respectively. In the calculation of profitability measures the return of an asset without risk is required, that is, risk-free rate. Thus, it was used a yield on Portuguese Treasury Bonds with residual maturity 10 years, in the period between December 1997 and December 2010, obtained from Central Bank of Portugal.

7.2.Descriptive and Hypothesis Testing Statistics

The geometric mean was used instead of the arithmetic mean, because when evaluating investment returns as annual percent change data over several years, it will tell what the average rate of return was needed over the entire investment period in order to achieve the end result. This term is also called as the Compound Annual Growth Rate (CAGR).

From the Table 2 located below, the return's geometric mean of three funds is very close to the return's geometric mean of the *PSI Geral*, but we have to it is necessary to highlight one of them (*Espírito Santo Portugal Acções*) which had a mean higher than the index, showing that on average this fund had a performance above the index, which highlights that the fund manager has following an active portfolio management strategy. However, there are two funds that on average moved away from the benchmark and one of them (*Banif Acções Portugal*) presented a negative mean. This shows that this fund had on average a bad performance during the period considered.

Relatively to maximum and minimum of fund's returns, these are close to the benchmark, excluding the *Banif Acções Portugal* that has a very low maximum, that is, this fund, during this period, has not quarterly returns above 19.47% and a minimum like others funds, which may explain its low annualized mean.

Table 2: Statistical Measures of Portuguese Equity Funds

Funds	Mean	Maximum	Minimum	Volatility	Correlation
Banif Acções Portugal	-1.37%	19.47%	-25.55%	22.83%	0.9079
Barclays Premier Acções Portugal	0.67%	44.14%	-23.94%	26.35%	0.9832
BPI Portugal	2.63%	44.03%	-24.93%	26.35%	0.9840
Caixagest Acções Portugal	1.01%	50.12%	-24.10%	27.10%	0.9741
Espírito Santo Portugal Acções	2.82%	40.77%	-21.10%	26.11%	0.9323
Millennium Acções Portugal	2.16%	37.08%	-23.17%	25.21%	0.9708
Santander Acções Portugal	1.73%	41.37%	-21.22%	25.82%	0.9022
PSI Geral	2.71%	45.90%	-26.37%	25.94%	

Source: Author

Volatility is a statistical measure of the dispersion of returns, that is, volatility refers to the amount of uncertainty or risk about the size of changes in a fund's value. All domestic equity funds have a higher volatility and this means that a fund's value can potentially be spread out over a larger range of values, so the price of the fund can change dramatically over a short time period in either direction. With volatility higher than 20%, the risk class of these funds is 6, very high.

In addition, the correlation between the returns of each fund and the benchmark was calculated, because the correlation is a quantitative measure of the strength of the dependence between the variables and they are dependent if they move together, that is, if the returns of each fund and the benchmark are above or below their respective means in the same state. Thus, the correlation coefficient between two variables is a number that measures how these variables move together. It is zero for independent and +1 or -1 for linearly dependent deterministic variables. According to the estimated correlation coefficients it is apparent that the returns of the funds and *PSI Geral* are linearly dependent, since there correlation values are very close to 1, with no less than 0.90.

Beyond the statistical measures used, the equality of means through t-test was also tested. This test assesses whether the means of two groups are statistically different from each other. Statistical hypothesis testing uses a p-value (probability value) to decide whether it has enough evidence to reject the null hypothesis and therefore verifying that the research hypothesis is supported by the data. The p-value is a numerical measure of the statistical significance of a hypothesis test. It tells how likely it is that the final result was just due to chance the probability that the estimated value of the tested variable is purely due to chance.

This analysis is appropriate whenever we want to compare the means of two groups and this can be useful for this analysis because it can indicate what kind of portfolio management is done by each fund against the benchmark through the equality of means. The t-test was made using a confidence level of 95%, taking as null hypothesis the mean equality of funds and the benchmark. From the Table 3, it is possible to verify that for all funds, the null hypothesis is not rejected, because the p-value is greater than 5%. These results may imply that on the average the fund had a return close to the benchmark.

Table 3: T-test of mean equality of funds and the benchmark

Fund	p-value
Banif Acções Portugal	0.62
Barclays Premier Acções Portugal	0.85
BPI Portugal	0.50
Caixagest Acções Portugal	0.89
Espírito Santo Portugal Acções	0.99
Millennium Acções Portugal	0.95
Santander Acções Portugal	0.92

Source: Author

With the calculation of these descriptive and hypothesis testing statistics, it is possible to have the idea that the performance of the funds follows the performance of the benchmark, that is, it is much more likely that the fund managers have been following a passive portfolio management strategy. The objective of this strategy is to replicate the index and to achieve its returns while under active management the manager makes specific investments with the goal of outperforming an investment benchmark index.

7.3. Profitability Measures

7.3.1. CAPM

The annualized risk-free rate was obtained as above referred, and then it was converted into quarterly equivalent rates to be in agreement with the returns of funds and benchmark. For calculating the CAPM parameters the quarterly return was deducted from the quarterly risk-free rate. This measure was used to estimate the values of alpha and beta, using a simple linear regression. Table 4 shows that from the results of the estimation of the CAPM for each fund it can be concluded that the return of the benchmark explains a very important part of the return of the funds, with estimated Beta varying from a minimum of 0.80 and a maximum of 1.02, and those beta values are statistically significant, so they can be considered a good indicator of the dependent variable.

Table 4: Parameters of CAPM

Fund	α	p-value	β	p-value	R^2
Banif Acções Portugal	- 0.0110	0.1042	0.7964*	0.0000	0.8248
Barclays Premier Acções Portugal	- 0.0047	0.1685	1.0038*	0.0000	0.9669
BPI Portugal	0.0000	0.9900	1.0009*	0.0000	0.9684
Caixagest Acções Portugal	- 0.0036	0.4054	1.0212*	0.0000	0.9484
Espírito Santo Portugal Acções	0.0005	0.9437	0.9379*	0.0000	0.8697
Millennium Acções Portugal	- 0.0015	0.7311	0.9469*	0.0000	0.9428
Santander Acções Portugal	- 0.0021	0.7927	0.9021*	0.0000	0.8147

Legend:* Statistically significant parameter considering a confidence level of 95%

Source: Author

For the alpha, although only two are positive but none is statistically significant however their analytical values assume greater importance. Indeed the alpha is related to the return of each fund that is attributable to variables other than the market. This means that only two funds recorded a profitability adjusted for systematic risk, which outperformed the market and beat the market over the period between December 1997 and December 2010. However 5 funds considered, have an alpha below zero that is the adjusted return of systematic risk is lower than the market. The value of r-squared indicates the percentage of a fund's movements that can be explained by movements in benchmark index, because this coefficient of determination is a statistical measure of how well the regression line approximates the real data. Thus it can be concluded that for 4 of 7 funds the value of r-squared indicates an almost perfectly fit.

7.3.2. Jensen Measure

The Jensen's Measure is based on CAPM and this measure calculates the excess return that a portfolio generates over its expected return, that is, measures how much of the portfolio's rate of return is attributable to the manager's ability to deliver above-average returns, adjusted for market risk. In calculation of this measure were used the returns and risk-free rate annualized, and was used the beta obtained in CAPM. The results concerning the Jensen's alpha for the

Portuguese equity funds are in Table 5 and it appears that only in the case *Santander Acções Portugal* (positive alpha), the excess return obtained for the period considered, compared to a riskless asset and above that would be obtained if it were a portfolio replicating the *PSI Geral* and had a systematic risk equal to the fund. In this analysis is also noteworthy that the four funds submit an alpha significantly less than zero, which translates to a rate of the return lower than the investor, would expect in terms of its level of systematic risk.

Table 5: The Jensen's alpha for Portuguese Equity Funds

Fund	Jensen's alpha
Banif Acções Portugal	-0.0445
Barclays Premier Acções Portugal	-0.0206
BPI Portugal	-0.0011
Caixagest Acções Portugal	-0.0169
Espírito Santo Portugal Acções	-0.0242
Millennium Acções Portugal	-0.0069
Santander Acções Portugal	0.0121

Source: Author

Two of these funds have an alpha close to zero, which corresponds to the definition of this measure because, according to this model, the excess return of these funds regarding the risk-free rate relies solely on its beta coefficient. Therefore, it implies that the coefficient alpha should be zero. As the alpha is the unique return realized by the manager and none of the funds has a statistically significant alpha, then it is concluded that there is no unique return

7.3.3. Treynor Measure

As said previously, Treynor introduced the concept of the SML, which defines the relationship between portfolio returns and the market rates of returns, whereby the slope of the line measures the relative volatility between the portfolio and the market, as represented by beta. This measure was used annualized return for each fund and respectively the beta

calculated in the model of CAPM. In the case of calculating this measure for the benchmark, was given the value of 1 for the beta variable.

Table 6: The Treynor Ratio for Portuguese Equity Funds

Fund	Treynor Ratio
Banif Acções Portugal	-0.075
Barclays Premier Acções Portugal	-0.039
BPI Portugal	-0.020
Caixagest Acções Portugal	-0.035
Espírito Santo Portugal Acções	-0.045
Millennium Acções Portugal	-0.026
Santander Acções Portugal	-0.005
PSI Geral	-0.019

Source: Author

Similar to verified with the Jensen measure, the returns obtained with the application of the Treynor measure, Santander fund appears to be clearly superior to those obtained for other funds. In fact, the excess return on the investment fund Santander, from a risk-free rate per unit of systematic risk is -0.005, above of -0.019 corresponding to the *PSI Geral*. This means that the fund has achieved a better performance of all domestic equity funds, comparing to the benchmark between December 1997 and December 2010. *BPI* and *Millennium* funds have values close to the market, however 4 funds have Treynor measures very low and negative which means that these funds have an unfavorable performance.

7.3.4. Sharpe Measure

The Sharpe ratio is almost identical to the Treynor measure, except that the risk measure is the standard deviation of the portfolio instead of considering only the systematic risk, as represented by beta. So this ratio is based on total risk of portfolio. This measure closely follows his work on the CAPM and by extension uses total risk to compare portfolios to the capital market line. Thus, this measures aims to assess the excess of fund performance,

against a risk-free rate, per unit of total risk. The results obtained with ratio are summarized in table 7.

Table 7: The Sharpe Measure for the Portuguese Equity Funds

Fund	Sharpe Ratio
Banif Acções Portugal	-0.261
Barclays Premier Acções Portugal	-0.150
BPI Portugal	-0.076
Caixagest Acções Portugal	-0.133
Espírito Santo Portugal Acções	-0.160
Millennium Acções Portugal	-0.098
Santander Acções Portugal	-0.019
PSI Geral	-0.073

Source: Author

All funds show negative values for this measure. This means that investment in most domestic equity funds did not compensate the holders of units in these funds between December 1997 and December 2010 for the risk undertaken.

7.4. Market Timing

In the results presented in Table 8, it is possible to see which managers were more skilled in the field of market timing. Thus, according to the results obtained through the model of Treynor and Merton, 3 of 7 funds found to have no ability to predict market movements. The fund of *Caixagest* distinguishes itself from other funds, since it has the highest gamma value of all funds which corresponds to an anticipation of the market successfully from all domestic equity funds. Since 4 funds instead show an anticipation of the market with adverse effects on their profitability, highlighting the fund *Banif* that apart from providing a gamma value rather negative, is statistically significant, which means this fund demonstrates a market exposure which is contrary to its evolution, that is, funds are more exposed when the market subsequently goes down and less exposed in time prior to the market rises.

Table 8: The Treynor and Mazuy Model

Fund	α	p-value	β	p-value	Γ	p-value	R^2
Banif Acções Portugal	0.0030	0.6446	0.8563*	0.0000	-0.8667*	0.0001	0.8749
Barclays Premier Acções Portugal	-0.0047	0.2336	1.0038*	0.0000	-0.0005	0.9969	0.9669
BPI Portugal	-0.0002	0.9628	1.0000*	0.0000	0.0135	0.9060	0.9684
Caixagest Acções Portugal	-0.0073	0.1425	1.0056*	0.0000	0.2254	0.1312	0.9507
Espírito Santo Portugal Acções	-0.0021	0.7793	0.9268*	0.0000	0.1607	0.4841	0.8710
Millennium Acções Portugal	0.0024	0.6225	0.9633*	0.0000	-0.2360	0.1060	0.9458
Santander Acções Portugal	-0.0002	0.9809	0.9099*	0.0000	-0.1138	0.6763	0.8153

Legend:* Statistically significant parameter considering a confidence level of 95%

Source: Author

Since the fund *Barclays* obtained a value close of zero, then it can be stated that the fund manager intends to adopt a passive portfolio management in its portfolio, once the use of this strategy, managers only make reconfigurations of the portfolios in response to changes the benchmark of reference to the fund.

Table 9: The Henriksson and Merton Model

Fund	A	p-value	β	p-value	γ	p-value	R^2
Banif Acções Portugal	0.0134	0.1656	1.0738*	0.0000	-0.4987*	0.0016	0.8571
Barclays Premier Acções Portugal	-0.0056	0.3013	0.9940*	0.0000	0.0176	0.8347	0.9670
BPI Portugal	-0.0022	0.6760	0.9757*	0.0000	0.0453	0.5804	0.9686
Caixagest Acções Portugal	-0.0090	0.1874	0.9596*	0.0000	0.1107	0.3033	0.9495
Espírito Santo Portugal Acções	-0.0111	0.2832	0.8068*	0.0000	0.2357	0.1482	0.8752
Millennium Acções Portugal	0.0038	0.5723	1.0064*	0.0000	-0.1068	0.3104	0.9440
Santander Acções Portugal	0.0055	0.6571	0.9878*	0.0000	-0.1541	0.4286	0.8170

Legend:* Statistically significant parameter considering a confidence level of 95%

Source: Author

With the use of another methodology of Market Timing, it is possible to reinforce these ideas based on the model Henriksson and Merton, where the results are in table 9. In this model 4 of the 7 funds were able to demonstrate ability to conduct market timing successfully,

emphasizing the fund *Espírito Santo*, which provides best value of gamma. Thus, in case of this fund, was really not the best to anticipate market movements, despite having a positive gamma, but the anticipation that provided this was done successfully. The opposite happens with the fund of *Caixagest* because through the model of Treynor was considered the best to anticipate the movements but in practice did not do as effectively.

The fund *Banif* maintained gamma negative and statistically significant, indicating that the managers of this fund have not been able in advance to recompose the portfolio of this Portuguese equity fund.

7.5.Indexing vs. Active Strategy

Through measures of statistical and performance, it is possible to have an idea which strategy of portfolio management is used by managers but nothing concrete. So, for the investors, it would be helpful to have some way to quantifying the degree of active or passive management. It has suggested for John Loftus (2000) that way of classifying the various types of equity strategies is in terms of two measures: alpha and tracking error.

For alpha measure is necessary to begin by calculating the active return for a period. The active return is the difference between the portfolio return of fund for a given period, in this case for a quarter, and the benchmark index return for the same period. The alpha is defined as the average active return over same time period. So there are 52 quarterly active returns observed, and then the average of the 52 quarterly active returns is the alpha.

$$Alpha = Average\ of\ Active\ Return = \frac{1}{n}\sum_{t=1}^{n}(r_{t,P} - r_{t,B}) \tag{9}$$

In table 10 can be seen that only two funds have on average a positive excess of return relatively to *PSI Geral*, highlighting the fund *Espírito Santo* being the one that showed a better alpha and therefore can translate into active portfolio management because it achieved on average returns above the benchmark over the 52 quarters. The fund *BPI* has an alpha very close to 0, that it might indicate that the manager follows a passive management of his

portfolio because on average, the excess return is almost zero which translates the objective of this strategy, replicating the index. Of the 5 funds had a negative average of active return, the fund *Banif* is which had the worst performance as measured alpha. For those funds with negative alphas, it can say that the performance during the 52 quarters was very poor.

Table 10: Average of Active Return of Portuguese Equity Funds

Fund	Alpha
Banif Acções Portugal	-1.170%
Barclays Premier Acções Portugal	-0.469%
BPI Portugal	0.004%
Caixagest Acções Portugal	-0.348%
Espírito Santo Portugal Acções	0.026%
Millennium Acções Portugal	-0.164%
Santander Acções Portugal	-0.239%

Source: Author

The second measure is Tracking Error, is the standard deviation of the active return and occurs because the risk profile of a portfolio differs from that of the risk profile of the benchmark index. Calculations computed for a portfolio based on a portfolio's actual active returns reflect the portfolio manager's decisions during the observation period with respect to the factors that affect tracking error and this measure calculated from observed active returns for a portfolio is called backward-looking, ex post or actual tracking error. The problem with using backward-looking tracking error in portfolio management is that it does not reflect the effect current decisions by portfolio managers have on the future active returns and hence the future tracking error that may be realized. That is, calculating this measure using historical active returns, will have little predictive value and can be misleading regarding portfolio risks going forward.

$$Tracking\ Error = Standard\ Deviation\ of\ Active\ Return$$

$$= \sqrt{\frac{1}{n}\sum_{t=1}^{n}(r_{t,P} - r_{t,B})^2} \qquad (10)$$

In table 11 are the results of the tracking error measure of Portuguese Equity Funds. The funds *Barclays* and *BPI* have a lowest volatility active return of all funds. Since the BPI fund measured by alpha had a positive value but very close to 0 and the value of its tracking error is low, as mentioned. Then it can consider that the manager of this fund follows the passive portfolio management, because the objective of the manager is to get the returns very close to the benchmark, not creating a large difference between the returns of the funds and the benchmark. 3 of 7 funds have a high tracking error, that is, the manager of these funds takes positions substantially different from the benchmark would likely have active returns, both positive and negative which tends to an active management strategy.

Table 11: Tracking Error of Portuguese Equity Funds

Fund	Tracking Error
Banif Acções Portugal	5.38%
Barclays Premier Acções Portugal	2.38%
BPI Portugal	2.32%
Caixagest Acções Portugal	3.05%
Espírito Santo Portugal Acções	4.72%
Millennium Acções Portugal	3.06%
Santander Acções Portugal	5.65%

Source:Author

The information ratio is essentially a reward-to-risk ratio. The reward is the average of the active return, that is, alpha. The risk is the standard deviation of the active return, the tracking error, and, more specially, backward looking tracking error. The higher the information ratio, the better the manager performed relative to the risk assumed.

$$Information\ Ratio = \frac{alpha}{Tracking\ Error} \qquad (11)$$

The funds *BPI* and *Espírito Santo* have a positive information ratio, what represents the good performance of the manager of these funds and the funds with worst performance are *Banif* and *Barclays*.

Table 12: Information Ratio of Portuguese Equity Funds

Fund	Information Ratio
Banif Acções Portugal	-0.218
Barclays Premier Acções Portugal	-0.197
BPI Portugal	0.002
Caixagest Acções Portugal	-0.114
Espírito Santo Portugal Acções	0.005
Millennium Acções Portugal	-0.054
Santander Acções Portugal	-0.042

Source: Author

7.6.Determinants of Tracking Error

There are several factors that affect the level of tracking error but in this analysis were used the compositions of the Portuguese equity funds to try understand how these compositions influence the tracking error and therefore the strategy used by the manager. When investors put into practice its strategy of management and readjust the portfolio of the fund for this purpose, the big deciding factor for the success of managers will be the stocks that constitute the fund's portfolio. Thus the analysis about the determinants of Tracking Error uses portfolio beta, benchmark volatility, portfolio size, the weight of stocks in to portfolio, number of stocks in to portfolio above the concentration ratio and number of the common stocks above of the concentration ratio (agreement ratio).

Using the market model, it is possible to understand that there exist some variables that have an impact on tracking error:

$$r_p = \beta r_m + \varepsilon \tag{12}$$

Where r_p is the return of the fund, r_m is the return of the benchmark, β is the beta of the fund and ε is the residual error term. If it is subtracting the benchmark return from both sides, it is obtained the active return, r_a:

$$r_a = r_p - r_m = \beta r_m + \varepsilon - r_m = (\beta - 1)r_m + \varepsilon \tag{13}$$

But calculating the variance of the active return we arrive at the following expression:

$$\sigma^2(r_p - r_m) = (\beta - 1)^2 \sigma^2(r_m) + \sigma^2(\varepsilon) \tag{14}$$

And taking the square root on both sides and consequently the tracking error, we get:

$$\sigma(r_p - r_m) = |\beta - 1|\sigma(r_m) \tag{15}$$

As it can be seen of the equation (15), it is obtained the absolute value of $\beta - 1$, thus the beta of the fund and the benchmark volatility influence the tracking error. The impact of these variables in tracking error of Portuguese Equity Funds is going to be analyzed.

As it was mentioned before the betas of the funds were obtained through the CAPM (linear regression) and then it was to see if there was any relation between this indicator and tracking error. From table 13, it can be seen that when beta decreases relative to beta of benchmark, 1, the tracking error increases, that is, when the portfolio beta deviates from the market beta, falling below 1 or rising above 1, the tracking error increases. So the tracking error rises linearly as the beta deviates from 1.

Table 13: Relation between fund beta and tracking error

Fund	Beta	Tracking Error
Banif Acções Portugal	0.796	5.38%
Santander Acções Portugal	0.902	5.65%
Espírito Santo Portugal Acções	0.938	4.72%
Millennium Acções Portugal	0.947	3.06%
BPI Portugal	1.001	2.32%
Barclays Premier Acções Portugal	1.004	2.38%
Caixagest Acções Portugal	1.021	3.05%

Source: Author

As can be seen in equation (15), if the benchmark volatility rises, the fund tracking error increases, that is, increases the probability of dramatic underperformance but as the tracking error rises, the probability of dramatic outperformance increases just as much as the probability of dramatic underperformance. However, the portfolio management consequences of these two types of extreme relative performances are not symmetric, because the dramatic underperformance can cause a manager to be terminated. Another implication is that since an increase in benchmark increases tracking error and thereby the chances of dramatic underperformance, there is an increased need for managers to monitor the portfolio tracking error more frequently and close during periods of high benchmark volatility.

In table 14, it can be seen, that all the funds have positive correlation, which means that when benchmark volatility increases, the tracking error also increases. However, only 3 funds have a strong and very strong dependence between the indicators. The fund *Millennium* presents the correlation of 0.68, approximately 0.7, what means that the benchmark volatility and tracking error have a strong dependence between them. The funds *Banif* and *Santander* present the correlation close to 1, that is, there is very strong dependence between the benchmark volatility and the tracking error.

The other funds have a weak correlation, corresponding absent dependence between these indicators. As it was said before, the funds *BPI* and *Espírito Santo* are the ones that have a positive information ratio and are the funds that present the weakest correlation of all. So, these funds can get a good performance maybe because the market volatility doesn't influence how closely the funds follow the benchmark. On the contrary, the funds *Banif* and *Santander* that have a higher correlation, also present the highest standard deviation of active returns. Thus, the benchmark volatility probably has a big impact in performance of these funds. Concluding, in case of Portuguese equity funds, benchmark volatility has an impact in tracking error, that is, on how the funds follow the benchmark, and is visible and representative in some funds.

Table 14: Correlation between the benchmark volatility and tracking error

Fund	Correlation
BPI Portugal	0.10
Espírito Santo Portugal Acções	0.23
Barclays Premier Acções Portugal	0.23
Caixagest Acções Portugal	0.35
Millennium Acções Portugal	0.68
Banif Acções Portugal	0.90
Santander Acções Portugal	0.91

Source: Author

The average percentage of *PSI Geral* stocks was calculated and table 15 shows the results of each fund compared with the tracking error, and respectively correlation. This comparison makes sense because the fund that includes more stocks in portfolio that are also in benchmark index, the closest will be to the constitution of the benchmark, and consequently the tracking error should decrease.

Since *PSI Geral* is constituted by 100% of stocks and all funds have similar values, but the funds *Millennium* and *BPI* are those that on average their portfolios were constituted of more than half *PSI Geral* stocks. Comparing to the tracking error and ranking the funds according to an increasing average percentage, in the most funds, the tracking error decreases but it highlights that funds, in the middle, do not follow the anticipated order. It can be seen, that for the extreme values of tracking error this result is as expected, but in intermediate values it becomes confusing. The correlation between these two indicators shows that in 4 of 7 funds there is a moderate correlation with negative value, this means that if the manager of the fund increases the *PSI Geral* stocks in the portfolio of fund, the portfolio will follow more closely the benchmark (tracking error decrease), but not with an absolute certainly. The fund *BPI* was the only that has a correlation with positive value, the more stocks the manager put in the portfolio, further away the fund's returns will be of the benchmark, but the correlation has a value that represents a weak link between these indicators. So far it has not been able to establish what influences its tracking error despite being the lowest of all.

Table 15: Average Percentage of PSI Geral Stocks used in Portuguese Equity Funds

Fund	Average Percentage	Tracking error	Correlation
Banif Acções Portugal	42.20%	5.38%	-0.47
Espírito Santo Portugal Acções	42.63%	4.72%	-0.49
Barclays Premier Acções Portugal	44.94%	2.38%	-0.52
Santander Acções Portugal	47.01%	5.65%	-0.52
Caixagest Acções Portugal	47.50%	3.05%	-0.02
Millennium Acções Portugal	52.85%	3.06%	-0.28
BPI Portugal	55.30%	2.32%	0.22

Source: Author

As mentioned before, the compositions of the 7 funds were obtained through the CMVM for 52 quarters in a total sample of 371 compositions and according with APFIPP, the definition of domestic equity funds is funds with equity exposure greater than two thirds of their Total NAV and they invest 100% in securities issued by Portuguese Companies. With the compositions of the 7 funds, it was possible to obtain the weight of the stocks and as expected the weight varied across the 52 quarters.

Table 16, tries to show the relationship between the weight of the stocks in the funds and how the fund can follow the benchmark. It can be seen that as the fund have more weight of stocks in the fund, its tracking error is decreasing. The correlation was calculated for understanding how these indicators relate together, and the results show that just one fund has a negative strong correlation, the fund *Banif*, that is, when the manager readjust the portfolio and increase the weight of stocks in fund, more likely the portfolio will be close of the benchmark, as opposite to what happens with benchmark volatility. The fund Santander that has an average weight of stocks in Portuguese equity funds with a highest standard deviation of active returns, but the correlation shows that absent the dependence between these indicators. The fund *Barclays* presents the moderate correlation but the others were obtained the weak correlation with negative and positive signal.

Table 16: Average Weigh of Stocks in Portuguese Equity Funds

Fund	Average Weight	Tracking Error	Correlation
Santander Acções Portugal	84.40%	5.65%	-0.28
Espírito Santo Portugal Acções	86.61%	4.72%	-0.28
Banif Acções Portugal	87.33%	5.38%	-0.88
BPI Portugal	88.63%	2.32%	0.13
Caixagest Acções Portugal	88.85%	3.05%	0.17
Barclays Premier Acções Portugal	91.36%	2.38%	-0.62
Millennium Acções Portugal	91.77%	3.06%	-0.06

Source: Author

The other method used in this analysis, is the concentration ratio. This ratio is calculated using the compositions of funds during the 52 quarters, thus was calculated the average weight of the stocks for compositions of each fund and it was used the stocks above of this weight, that is, the stocks of funds relevant to the analysis are those with a weight above of the average. The following was obtained the same for the *PSI Geral*, and calculated average weight of the benchmark's stocks above of the concentration ratio.

In table 17, there are the results for each fund and comparing with the tracking error, the logic is how much the funds have stocks with weight above of concentration ratio the lower is the tracking error. However, the fund *Barclays* does not follow the rule but has a moderate correlation, close to 0.7 what reveals a strong dependence between these indicators. So far, the average percentage of *PSI Geral*'s stocks above of concentration ratio is the indicator that has more impact in tracking error in this fund. The fund *BPI* is the one of all funds that during the 52 quarters on average took in composition 97.70% of *PSI Geral* stocks above the concentration ratio, with weak correlation. Instead, the fund *Banif* with 66.43% of average percentage of *PSI Geral*'s stocks above of concentration ratio has one of the highest tracking errors of all funds. It can be seen in results that the extreme values of tracking error follow the rule but in the middle, the funds with intermediate values do not follow the same order. For funds *BPI, Caixagest* and *Millennium*, this variable does not have a strong impact in tracking error.

Table 17: Average percentage of PSI Geral stocks above of concentration ratio

Fund	Average percentage	Tracking Error	Correlation
Banif Acções Portugal	66.43%	5.38%	-0.51
Espírito Santo Portugal Acções	70.51%	4.72%	-0.40
Barclays Premier Acções Portugal	77.75%	2.38%	-0.64
Santander Acções Portugal	82.33%	5.65%	-0.48
Caixagest Acções Portugal	87.91%	3.05%	0.06
Millennium Acções Portugal	90.51%	3.06%	-0.15
BPI Portugal	97.70%	2.32%	0.29

Source: Author

Previously it was analyzed the weight that the stocks of the *PSI Geral* have in each fund, above of concentration ratio. In this case, it was analyzed the weight of *PSI Geral* stocks present (agreement ratio) in each fund, above of concentration ratio, that is, the stocks common between the composition of fund and the *PSI Geral* with a weight superior of the concentration ratio.

From table 18 and comparing the results, it can be seen that by increasing the percentage of commons stocks between fund and the benchmark, the lower is the tracking error. That is, as the composition of funds with *PSI Geral* stocks that have weight above of concentration ratio increases, the fund will more closely follow the *PSI Geral*. However just in 3 of 7 funds the values of correlation obtained show a moderate dependence between these variables. The fund with higher correlation is *Barclays*, with value of -0.66 close to -0.7, meaning that an increase in the portfolio of stocks that have a weight above of concentration ratio in fund and in benchmark, the lower will be the tracking error. Because the fund will have stocks with big weight as the benchmark and thus it will be able to replicate the index better. Through this analysis, it is possible to say that the determinants of tracking error's *Barclays* are essentially the compositions of the funds that the manager was readjusting during December 1997 and December 2010.

Table 18: Average percentage of common stocks between funds and *PSI Geral*, above of concentration ratio

Fund	Average percentage	Tracking Error	Correlation
Banif Acções Portugal	49.69%	5.38%	-0.62
Santander Acções Portugal	55.40%	5.65%	-0.52
Espírito Santo Portugal Acções	56.67%	4.72%	-0.37
Barclays Premier Acções Portugal	61.94%	2.38%	-0.66
Caixagest Acções Portugal	62.62%	3.05%	0.28
Millennium Acções Portugal	66.32%	3.06%	-0.01
BPI Portugal	72.16%	2.32%	0.20

Source: Author

However, for the funds *BPI*, *Caixagest* and *Millennium* the situation is the inverse, that is, the correlations obtained shows that any tracking error of these funds has not a strong dependence with the various variables related to the composition of the funds. Just one of these funds, *Millennium*, has an indicator that can explain the tracking error, the benchmark volatility.

8. Conclusion

Our primary intent with this analysis is to understand what portfolio management strategy is used by Portuguese Equity Funds, as well as developing this study, trying to understand which determinants have impact on how these funds follow the benchmark, *PSI Geral*, and consequently in portfolio management strategy used by fund managers. The statistical measures were the first method used in this analysis, and thus we concluded that the returns of funds and benchmark have a very strong correlation, that is, when this variable increases in benchmark the same happens in Portuguese equity funds.

The annualized geometric mean shows that just one fund, *Espírito Santo*, can get during 52 quarters a value above of *PSI Geral*, indicating an active strategy. The alpha of CAPM is positive, which shows that the investment done, in this fund, had a return in excess of the reward for the assumed risk. Furthermore, through the Treynor and Mazuy, and Henriksson and Merton Models, we concluded that the manager of this fund was able to anticipate the movements of market successfully. So if the manager of this fund can do it so well, easily he can get positive active returns relatively to the benchmark and was exactly that was obtained in average of the active returns, a positive value. The value of tracking error is higher, what means that fund significantly differs from the risk profile of the benchmark and the information ratio is positive. So with the confirmation of these measures, the manager of fund *Espírito Santo*, from December 1997 to December 2010, made specific investments and can outperform the investment benchmark, doing active management portfolio strategy. To understand better how this fund can put in practice this strategy, we analyze the determinants of the tracking error. For this fund the benchmark volatility has a weak dependence in its tracking error and the variable that has a higher correlation is the percentage of *PSI Geral* stocks used in this fund, explaining that when the manager increases this variable, the tracking error decreases. However the value represents a moderate correlation.

Through the annualized geometric mean, the fund *BPI* got a value smaller than benchmark, but very close. The beta of this fund is approximately 1, indicating that its variation tends to follow perfectly the benchmark. So, the fund *BPI* valorized in same proportion of the *PSI*

Geral, during the period considered. The Jensen's alpha of this fund is very close to zero, so the investment has earned a return adequate for the risk taken, like in an efficient market. The values of Treynor and Sharpe ratio obtained for this fund, is very close to the benchmark, that is, the performance of fund *BPI* was very close to *PSI Geral*. Relatively to market timing, was obtaining a positive gamma in two models, so during the period considered, the manager of this fund had ability to anticipate the movements of benchmark. Through the alpha, we can understand that the fund *BPI* got the positive value close to 0 and its tracking error value is the lowest of all funds. The average of excess returns indicates the probably passive strategy, and the tracking error is very close to zero and with the tracking error low, the strategy used by manager is passive. Because with this standard deviation of active returns, it is showing that the different between returns of fund and benchmark do not have bigger variations along the period. Although the information ratio is positive, representing the good performance of this fund. It was not possible to identify which variables had impact in tracking error of this fund, because the correlation between the variables used and tracking error presented values that correspond to a weak dependence.

The fund *Banif* presented the worst annualized geometric mean and the lower volatility of all Portuguese Equity Funds, with a maximum return very low, compared to other funds and the respective benchmark, however the minimum is close to the other funds and *PSI Geral*. The results obtained through the models of market timing, shows that the fund *Banif* was the worst fund to anticipate the movements of the *PSI Geral* with the value statistically significant. This situation can also be seen in the beta because it is the lower of all funds, so thus it was the fund that had lower oscillations than the benchmark. It was also reflected on returns, so the average of the excess returns is the lower of the all funds, but the value of the tracking error being higher shows that the manager tries to use the active strategy. However he was not successful because it was not possible put into practice the initial strategy, or at least, replicate the benchmark. The variables that have the major impact on the tracking error are the benchmark volatility, when this indicator increases, the tracking error increases, and the weight of stocks in the fund, when the manager increases the weight of the stocks in fund, *Banif* follows more closely the benchmark.

The fund *Barclays* presented the beta above 1, what means that the fund during the period considered, obtained oscillations above of the *PSI Geral*. Through market timing and the

tracking error, we concluded that the strategy used by the manager is the passive strategy, thus the value of alpha should be zero, but it is negative. So the strategy used by manager was not successful. The percentage of common stocks between funds and *PSI Geral* above of concentration ratio is the variable that explains better the variation of the tracking error in this fund, when the manager put more stocks, that have above of concentration ratio in fund and benchmark, the lower is the tracking error.

The fund with the highest beta is *Caixagest*, so was the fund that had bigger oscillations than *PSI Geral*. This fund presented a positive gamma so the manager can anticipate the movements of the benchmark. However the tracking error is the third lowest tends for passive strategy but the alpha is negative. So this strategy was not concretized. Relatively to the determinants of the tracking error, it was not possible understand which have impact in this variable, because the correlation between them is very weak.

One of the funds, that have the annualized geometric mean close to the benchmark, is *Millennium*. The models of the market timing indicated that this fund can not anticipate the movements of *PSI Geral*. So, the average of active returns is negative and the tracking error is reasonable low, transmitting that the manager wanted to follow a passive strategy but that was not successful. The benchmark volatility is the variable that had more impact in tracking error.

Just one fund had a positive Jensen's alpha, the fund *Santander*, what means that this fund was able to "beat the market", that is, earning excess returns. With the Treynor and Sharpe measure, we can conclude that this fund had better performance than benchmark, during the period considered. However market timing shows that this fund cannot anticipate the movements of the market and using the equity measures, the manager tried to use the active strategy because the tracking error is large but the negative alpha does not demonstrate this. The correlation between the benchmark volatility and the tracking error shows that this variable has an impact on how the fund Santander followed *PSI Geral*.

Through the analysis of the determinants of the Tracking Error, we can conclude that beta has an impact in tracking error, so when the systematic risk of fund deviates from the benchmark, the fund will deviate further from the benchmark. In most funds, increasing the percentage of

PSI Geral stocks and the weight of stocks used in Portuguese Equity Funds corresponds to the reduction of the tracking error. The same applies to increasing the percentage of *PSI Geral* stocks and the percentage of common stocks between funds and *PSI Geral*, above of concentration ratio, the funds follow more closely the benchmark.

As the main limitations of this study we recognize the short number of funds (only 7, tough they are the only that are dedicated to Portuguese Equities), the short period of time, with a large number of negative returns. The periodicity of the returns (quarters) also leads to a small sample, so the results are difficult to generalize.

The question of identifying variables that are more likely to explain tracking error seems to be a good start for further research.

9. Bibliography

References

Benz, C. (2005), *Morningstar Guide to Mutual Funds: Five-Star Strategies for Success,* John Wiley & Sons, Inc, 5 – 8.

Bodie, Z., Kane, A. and A. Marcus (2001), *Investments,* McGraw-Hill/Irwin, 103 – 130.

Bollen, N. P. B. and J. A. Busse (2001), On the Timing Ability of Mutual Funds Managers, *Journal of Business and Accounting* 19 (5), 659 – 675.

CMVM (2002), A Indústria de Fundos de Investimento em Portugal, http://www.cmvm.pt/CMVM/Estudos/Documents/55b8b6d10bae4e70ab76abc4aad5bc48Industria_fi_pt_final.pdf.

CMVM (2009), Rendibilidade e Activismo de Gestão de Fundos de Investimento Nacionais de Acções, http://www.cmvm.pt/CMVM/Estudos/Em%20Arquivo/Documents/EstudoCMVM0220091.pdf.

Fabozzi, F. J. and H. M. Markowitz (2002), *The Theory and Practice of Investment Management*, John & Wiley, Inc, 163 – 180

Fernando, D., L. F. Klapper, V. Sulla and D. Vittas (2003), The Global Growth of Mutual Funds, *World Bank Policy Research Working Paper No. 3055.*

Focardi, S. M. and F. J. Fabozzi (2004), *The Mathematics of Financial Modeling and Investment Management,* John & Wiley, Inc, 551 – 576.

Haslem, J. A. (2004), Index or Active (Mutual Funds: To Index or Not to Index), *Journal of Indexes* 6 (2), 8 – 12.

Haslem, J. (2003), *Mutual Funds: Risk and Performance Analysis for Decision Making,* Blackwell Publishing.

Henriksson, R.D. and R. Merton (1981), On Market Timing and Investment Performance, *Journal of Business* 54 (4), 513 – 553.

Jacobs, B. and K. Levy (1998), Investment Management: An Architecture for the Equity Market, in Frank J. Fabozzi (Ed.), *Active Equity Portfolio Management*, John & Wiley, Inc, 1 – 20.

Jensen, M. (1968), The Performance of Mutual Funds in the Period 1945-1964, *Journal of Finance* 23 (2), 389 – 416.

Kosowski, R., A. Timmermann, R. Wermers and H. White (2006), Can Mutual Fund "Stars" Really Pick Stocks? New Evidence from a Bootstrap Analysis, *Journal of Finance* 61, 2551 – 2595

Loftus, J. S. (2000), Enhanced Equity Indexing, in Frank J. Fabozzi (Ed.), *Perspectives on Equity Indexing*, John & Wiley, Inc, 78 – 97.

Linter, J. (1965), The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolio and Capital Budgets, *Review of Economics and Statistics,* 13 – 37.

Miller, R.M. (2005), Measuring the True Cost of Active Management by Mutual Funds, *Working Paper,* The State University of New York

Mobius, M. (2007), *Mutual Funds: An Introduction to the Core Concepts*, John Wiley & Sons, Inc.

Mossin, J. (1966), Equilibrium in a Capital Asset Markets, *Econometrica,* 768 – 783.

Pastor, L. and R. F. Stambaugh (2001), Investing in Equity Mutual Funds, *CRSP Working Paper* 532, University of Chicago

Rodrigues, C. (2008), *Análise da Performance de Estratégias de Fundos de Investimento no Longo Prazo.* Tese de Mestrado em Finanças, ISCTE

Rouwenhorst, K.G. (2004), The Origins of Mutual Funds, *Yale ICF Working Paper No. 04-48,* Yale School of Management

Russel, R. (2007), *An Introduction to Mutual Funds Worldwide*, John Wiley & Sons, Inc
Bello, Z. Y. (2007), How Diversified are Mutual Funds?, *North American Journal of Finance and Banking Research* 1 (1)

Sharpe, W. (1964), Capital Asset Prices – A Theory of Market Equilibrium Under Conditions of Risk, *Journal of Finance* 19 (3), 425 – 442.

Sharpe, W. (1966), Mutual Fund Performance, *Journal of Finance* 39 (1) II, 119 – 138.

Silva, P. and F. Silva (2010) São os Gestores de Fundos de Investimento de Acções capazes de antecipar os movimentos do Mercado?, *Cadernos do Mercado de Valores Mobiliários* 36.

Subtil, P. A. C. (2008), *Análise de Estilos de Fundos de Investimento Portugueses.* Tese de Mestrado em Finanças, ISCTE

Treynor, J. (1965), How to Rate Management of Investment Funds, *Harvard Business Review* 43, 63 – 75.

Treynor, J. and F. Mazuy (1966), Can Mutual Funds Outguess the Market?, *Harvard Business Review* 44, 131 – 136.

Wang, Z.J., V.K. Nanda and L. Zheng (2005), The ABCs of Mutual Funds: On the Introduction of Multiple Share Classes, *Working Paper*, State University – Higher School of Economics

Sites

Detailed Portfolio Composition of *Banif Acções Portugal*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%224OY%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Detailed Portfolio Composition of *Barclays Premier Acções Portugal*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%23%24O%5C%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Detailed Portfolio Composition of *BPI Portugal*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%23%24W%5D%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Detailed Portfolio Composition of *Caixagest Acções Portugal*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%23D%5BT%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Detailed Portfolio Composition of *Espírito Santo Portugal Acções*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%224%5BY%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Detailed Portfolio Composition of *Millennium Acções Portugal*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%23%24_T%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Detailed Portfolio Composition of *Santander Acções Portugal*
http://web3.cmvm.pt/sdi2004/fundos/carteiras/fim/dtlcart_fim.cfm?num_fun=%23%23%24O^%0A&data2=%2A%23D%5BB%23-Q%20%281%3C%22Q%40%20%20%0A

Yield on Treasury Bonds by residual maturity – 10 years
http://www.bportugal.pt/EstatisticasWEB/(S(0jadjifseo4e4qyhdzgqdjjh))/SeriesCronologicas.aspx

Share Price Index *PSI Geral* montly values (end-of-period)
http://www.bportugal.pt/EstatisticasWEB/(S(0jadjifseo4e4qyhdzgqdjjh))/SeriesCronologicas.aspx

APFIPP Annual Report 2009
http://www.apfipp.pt/backoffice/box/userfiles/file/Docs2010/apfipp_relatorio_2009_en.pdf

APFIPP Annual Report 2008
http://www.apfipp.pt/backoffice/box/userfiles/file/Relatorio_APFIPP2008_en.pdf

APFIPP Annual Report 2007
http://www.apfipp.pt/backoffice/box/userfiles/file/Relatorio_APFIPP2007.pdf

APFIPP Annual Report 2006
http://www.apfipp.pt/backoffice/box/userfiles/file/Relatorio_APFIPP2006.pdf

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http://www.apfipp.pt/backoffice/box/userfiles/file/Relatorio_APFIPP2005.pdf