ISCTE Business School
Instituto Universitário de Lisboa

Market Timing and Selectivity: evaluating both contributions towards the performance of Portuguese Equity Funds

Chandni Govan

Project submitted as partial requirement for the conferral of

Master in Finance

Supervisor:

Prof. Helena Luísa Matos Soares, ISCTE Business School, Departamento de Finanças

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To my Lovely Parents

To my Dear Sisters

ABSTRACT

This study attempts to understand the selectivity and market timing abilities of the Portuguese mutual fund managers. Therefore, the focus of the present investigation will be the evaluation of the performance of 51 Portuguese Equity Funds between January 2001 and December 2010. In order to achieve this, the methodology developed by Merton and Henriksson in 1981 will be used. The Jensen measure (1968) will also be applied in order to compare the results. Additionally, the problem of heteroscedasticity and autocorrelation of the errors will also be addressed, where the following methods will be used: the method of White (1980), the method of Newey-West (1987) and the method of Cochrane-Orcutt (1949).

The results of this study shows that there is neither clever selectivity (security selection) nor skillful market timing abilities evidenced by most of the analyzed Equity Fund managers which is consistent with prior studies realized by Romacho (2004) and Afonso (2010). Other finding is regarding the negative correlation between the both abilities which is more evident in the international group of funds.

Keywords: Evaluation of the performance of Mutual Funds, Selectivity, Market Timing, Portuguese Equity Funds, Mutual Fund Managers

JEL: G11, G14

Resumo

O presente estudo pretende analisar as capacidades de selectividade e de *market timing* dos gestores de fundos de investimento Portugueses. Neste sentido o foco da investigação incide sobre o desempenho de 51 Fundos de Acções Portugueses durante o período de Janeiro de 2001 a Dezembro de 2010. Para tal foi aplicada a metodologia de Henriksson e Merton (1981). Também foi utilizada a medida de Jensen (1968), como forma de comparar os resultados. Adicionalmente, foram considerados os problemas da heteroscedasticidade e da auto-correlação dos erros, sendo que foram aplicados os seguintes métodos: o método de White (1980), o método de Newey-West (1987) e o método de Cochrane-Orcutt (1949).

Os resultados obtidos não evidenciam capacidades significativas de selectividade e de *market timing* por parte da maior parte dos gestores de fundos de acções analisados. Na verdade estes resultados estão de acordo com conclusões de estudos anteriormente realizados por Romacho (2004) e Afonso (2010). A presente investigação também demonstra a existência de uma correlação negativa entre ambas capacidades, estando esta mais patente nos grupos de fundos internacionais.

Palavras-chave: Avaliação do desempenho de fundos de investimento, Selectividade, *Market Timing*, Fundos de Acções Portugueses, Gestores de Fundos de Investimento

JEL: G11, G14

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Any omissions and errors, inevitably present in this work, are the responsibility of the author.

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ABBREVIATIONS

ADF - Augmented Dickey Fuller

APFIPP - Associação Portuguesa de Fundos de Investimento Pensões e Patrimónios

APT - Arbitrage Pricing Theory

CAPM - Capital Asset Pricing Model

CML - Capital Market Line

ECB - European Central Bank

EFAMA - European Fund and Asset Management Association

EURIBOR - European Interbank Offered Rate

IMF - International Monetary Fund

MPT - Modern Portfolio Theory

OLS - Ordinary Least Squares

PSI 20 - Portuguese Stock Index 20

SML - Security Market Line

Chapter 1 - Introduction

The performance of mutual fund investment portfolios has been the subject of extensive examination within the finance literature, due to the high market value attributed to the Mutual Funds at the global level.

In the second quarter of 2010, according to the National Mutual Fund Associations and European Fund and Asset Management Association (EFAMA), the investment funds assets increased by 3.0% worldwide, reaching 17.5 trillion Euros representing more than 68 thousand Mutual Funds. From which, the Equity Funds asset share represents 38.0%, equivalent to about 6.7 trillion Euros. By taking into account Non-Undertakings for Collective Investment in Transferable Securities Directives (non-UCITS), at the end of the second quarter of 2010, the European market share reached 36.3% compared to the 44.4% for the United States of America (USA).

Although the value of the Portuguese Mutual Funds is experiencing a decreasing trend when compared to the real estate funds, in 2010 the Mutual Funds still managed to represent 55.0% of the total investments. Mutual Funds were valued at 14.2 million Euros equivalent to 291 funds.

Performance measurement consists in verifying if the managers have succeeded in reaching their objectives, such as obtaining high return to overcome the risks taken and comparing these results with their peers. It is also important to understand if the manager's skills are credible to lead to a positive performance or this is just a result of pure luck. The capability to achieve higher returns and of better forecasting would violate the Market Efficient Theory, having far reaching implications for the theory in finance.

According to Sharpe, Alexander and Bailey (1999), the investment process follows the following steps:

1. Definition of the investment policy
2. Analysis of the financial assets
3. Construction of the portfolio
4. Revision of the portfolio
5. Evaluation of the performance

The ability of the managers in terms of selectivity and market timing are taken during the third step, which is to identify the assets in which to invest as well as determining the proportions of the investor´s wealth to put in each one. The focus of this study is related with the fifth step, "Evaluation of the performance", with regards to the two components of the performance: selectivity and market timing abilities. Although being the last step it is of

extreme importance, as it has to be conducted during the whole investment process. Therefore, the main objective of this study is to evaluate both abilities (selectivity and market timing) within the Portuguese Market with regard to 51 Equity Funds.

In Portugal, although we have assisted to a decreasing trend in the amount of assets under management in mutual funds, from January 2001 to December 2010, they still represent more than 50.0% of the total investment funds. Hence, it is important to investigate if it is worth full to invest on this type of financial instrument and also to evaluate the performance of the fund´s managers. Moreover, for academics it is also important to know if there is in fact "skill" behind the management of the equity funds or it is just a matter of "luck". Being the "skill" the main reason, it would go against the Market Efficient Theory, adversely affecting the equilibrium valuation of securities. Since there is a lack of studies in the last years this investigation will be done between the years 2001 to 2010.

According to the APFIPP (Associação Portuguesa de Fundos de Investimento, Pensões e Patrimónios) classification, the Mutual Funds include Equity Funds, Equity-Saving Funds, Index Equity Funds, Bond Funds, Cash Funds and Other Mutual Funds. This study will focus on Equity Funds which, according to the division made by APFIPP, are divided into 5 groups:

1. Domestic Equity Funds
2. European Union, Switzerland and Norway Equity Funds
3. North American Equity Funds
4. Sector Equity Funds
5. Other International Equity Funds

The methodology used in this study is the parametric tests developed by Merton and Henriksson in 1981. This model has been chosen to its theoretical structure as it allows to separately analyze the two performance components, namely selectivity and market timing, by using market and portfolio excess returns. Additionally, the previous conclusions while using this method, present negative market timing estimates and negative correlation between the two abilities, selectivity and market timing. Hence, it is important to investigate if these conclusions are still verified during January 2001 to December 2010, within the Portuguese Equity Market, or if there are substantial changes in the performance of the Equity Fund´s managers. The Jensen measure (1968) is also used in order to compare the results. For the data analysis, monthly data will be used as the most of the studies applied it and as daily data is found to be very noisy.

The current study is organized as follows:

- Chapter two describes the Portuguese Mutual Funds Industry between 2001 and 2010 period;
- Chapter three revises the relevant theoretical models;

- Chapter four describes the methodology applied;
- Chapter five analyses the data used in the Empirical study and the respective results along with the variable definitions used; and
- Section six provides a conclusion of the study.

Chapter 2 - The Portuguese Mutual Funds Industry

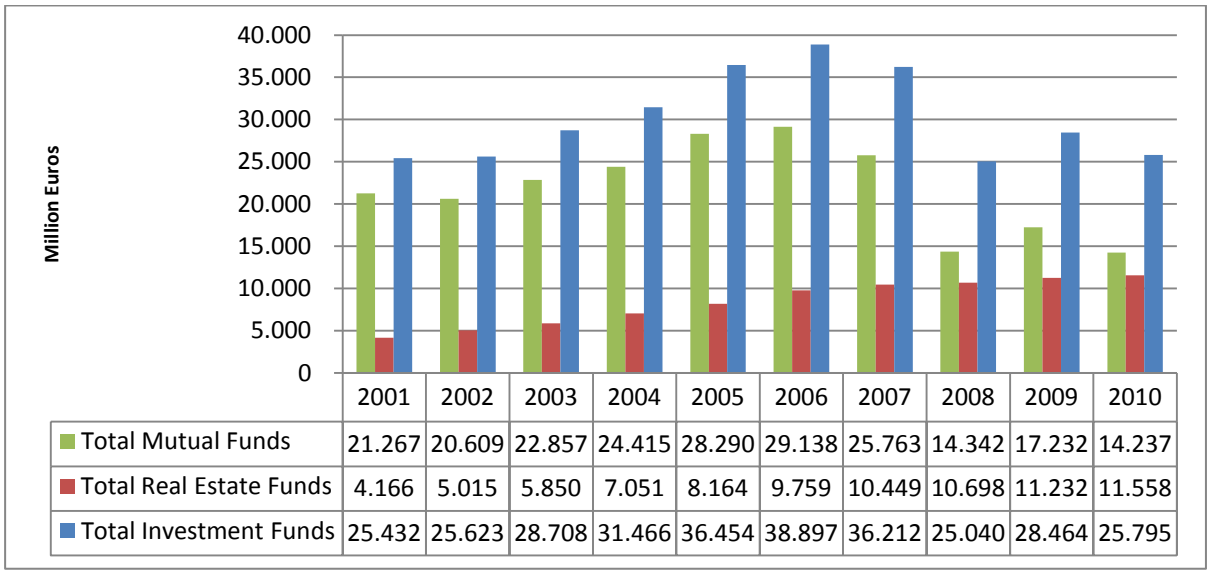
The purpose of this chapter is to give a brief summary, for the decade under analysis in this study (January 2001 to December 2010) in terms of the main events in the global economy and Portuguese economy in particular and in the Financial Markets, with special attention to the Domestic Equity Market, as a way to contextualize the results obtained from this research. Moreover, as different economic and market settings influence the attractiveness of the Equity Funds, it is important to review those conjunctures, as they are determinant in offering a specific weight and relative performance in the Equity Funds share within the Total Investment Funds.

We conclude further that the Equity Funds represent, also in Portugal, an important share of the Total Investment Funds and compete, together with the Bond and Cash Funds, in the market of the products that can attract more private investors for their saving applications.

2.1 Evolution of the assets under management in the Portuguese Mutual Funds

The Portuguese investment funds include Mutual Funds and Real Estate funds. During the period from 2001 to 2010 the global economy experienced a huge variety of contexts, from stagnation to expressive growths, with periods of great instability, having lived the biggest financial crisis in history. In spite of the significant decrease in assets under management, caused by that financial crisis, the mutual funds in Portugal still accounted for more than 55% of the total investment funds by 2010, representing a value of 14.237 million. According to the AFPIPP classification, the Mutual Funds in Portugal include Equity Funds, Equity-Saving Funds, Index Equity Funds, Bond Funds, Cash Funds and Other Mutual Funds.

Chart 1 - Investment Funds in Portugal – Assets under management (2001 -2010)
Source: Annual Reports from the period 2001-2010, APFIPP



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Mutual Funds	21.267	20.609	22.857	24.415	28.290	29.138	25.763	14.342	17.232	14.237
Total Real Estate Funds	4.166	5.015	5.850	7.051	8.164	9.759	10.449	10.698	11.232	11.558
Total Investment Funds	25.432	25.623	28.708	31.466	36.454	38.897	36.212	25.040	28.464	25.795

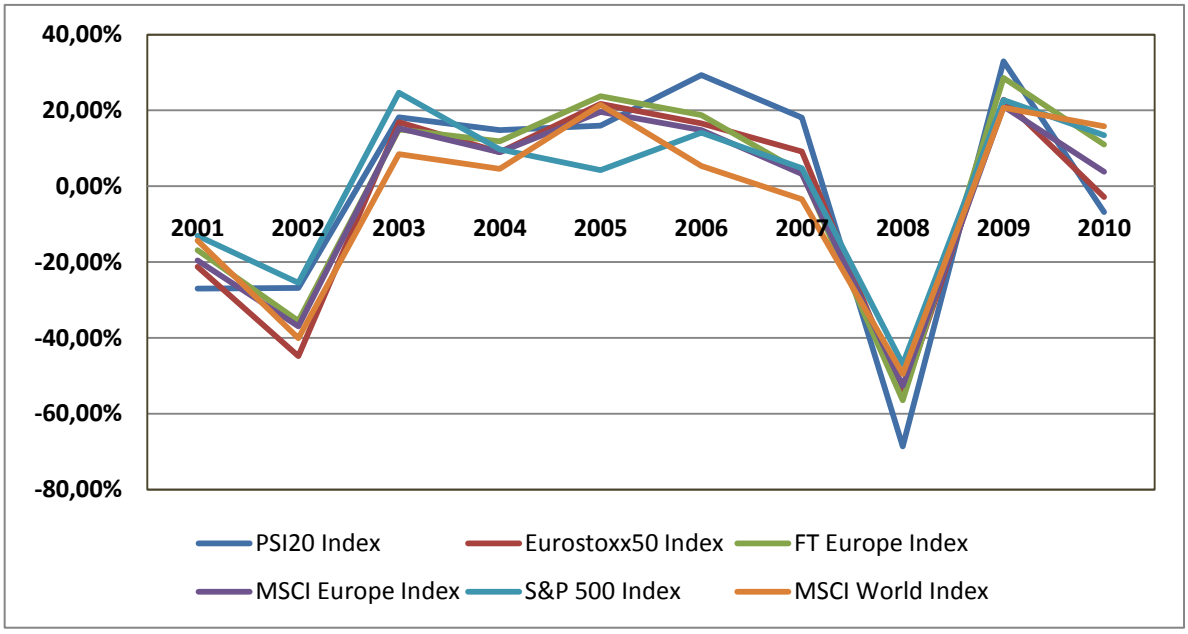
Between 2001 and 2004 the Equity Market Indexes in the world´s major markets, such as Standard & Poor´s 500 Index, Eurostoxx 50 Index, amongst others (see Chart 2), had negative performances in every year.

After this negative period, during 2004 the Equity Market started to recover, where the majority of equity indexes in the developed countries registered positive performances. The Portuguese Stock Market had a good performance by closing the year with an accumulated gain of 15.0%.

In spite of the stagnation verified in the Portuguese economy, caused by the slowdown of the Portuguese consumption, the positive trend on the equity market remained until 2007. As a result, a positive growth was also seen in the Equity Funds in terms of assets under management. In fact, the Equity Funds gained market share until 2007, representing in this year 11.0% of the Total Mutual Funds, comparing to the 5.0% in 2004.

In contrast, during the period 2004 to 2007, the amount of assets under management in Cash Funds and Bond Funds dropped by 30.0% each. This was due to fund´s yields lower than the inflation rate and to the positive performance of the equity markets. Although these graduals fall, both categories continued to be the Funds that had the biggest volume under management.

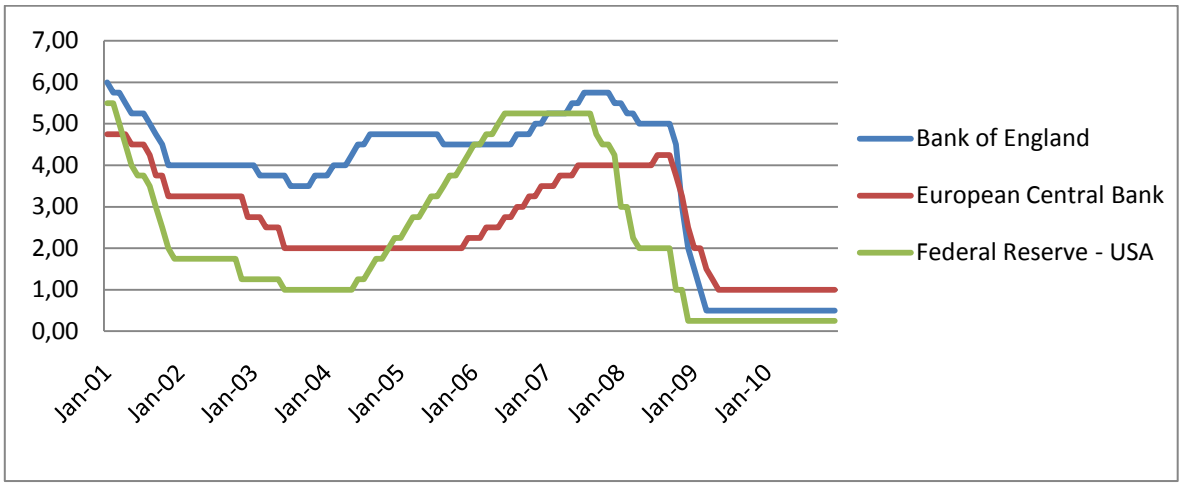
Chart 2 - Equity Market Performance – Annually Returns (2001- 2010)
Source: Data Stream



In June 2007 the Subprime mortgage crisis in USA affected the financial markets and quickly spread around the world affecting many economies, including Portugal.

Throughout 2008, the effects of the Subprime mortgage crisis led to a negative growth of the major developed and undeveloped economies worldwide. This was the biggest financial crisis in history. Changes in the macro-economic conditions were made by the Central Banks of Euro Area, USA and UK to decrease the interest rates. From October until December 2008 the ECB decreased the reference rate three times, from 4.0% to 1.0% (see chart 3).

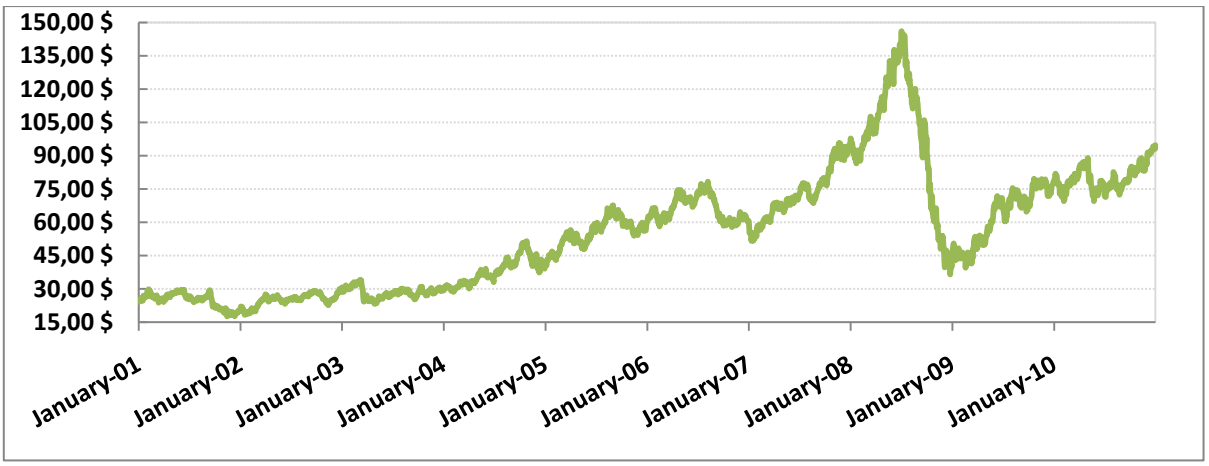
Chart 3 - Central Banks Interest Rates (2001-2010)



Source: Bloomberg Platform

The price of several commodities also registered record increases. The price of the ICE Brent Futures, which is a deliverable contract based on Exchange of Futures for Physical (EFP) delivery, increased about 6 times, from USD 24.30 in January 2001 to USD 146.08 by July of 2008. Following the same trend, the prices of the most basic food commodities increased on international markets. Rice prices reached ten year highs while the wheat price doubled from February 2007 to February 2008.

Chart 4 - ICE Brent Futures Price (2001-2010)



Source: Bloomberg Platform

Additionally, the collapse of large North-American financial institutions such as Bear Stearns, Lehman Brothers and AIG, amongst others, negatively affected the equity markets. The American government had to intervene to assist the financial institutions with funding, in order to ensure stability of the financial market.

In Portugal, according to National Institute of Statistics (INE), the Portuguese economy recorded a 0.0% growth in 2008, the lowest growth among their Euro Zone partners. In the same year, the inflation and unemployment rates were also affected, and both reached 2.6% and 7.6% respectively.

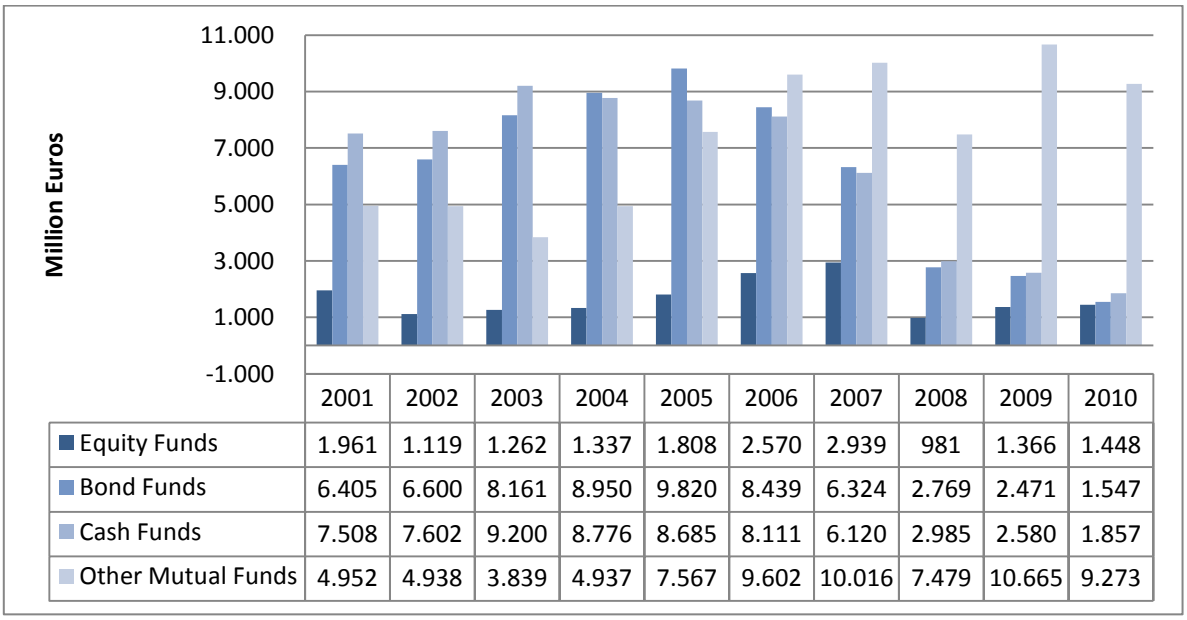
Consequently, with the decrease in security prices, the Portuguese investors switched their investments from Equity Funds to bank deposits, as banks offered higher interest rates than the expected Equity Funds returns.

This conjuncture caused the decrease in 44.0% of the value of the Mutual Funds, from 25.7 million Euros in 2007 to 14.3 million Euros in 2008, the lowest value since 1997. The Equity Funds were the most affected, with a decrease of 67.0%. This decrease is also a consequence of the depreciation of the Equity Markets themselves. In 2008 the Portuguese market fell by more than 60.0%.

Subsequent to this challenging period, by 2009 the low levels of interest rates offered by the banks contributed to the return of the investors to the Equity and Bond Funds. The Mutual

Funds registered a growth above 20.0%, representing a positive net balance of subscriptions less redemptions of 2.0 billion Euros. The good performance of equity markets, where PSI-20 increased by 32.0%, positively affected the evolution of the Equity Funds, which reported a growth of 39.0% during 2009.

Chart 5 - Total Mutual Fund Applications in Portugal by categories (2001-2010).



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Equity Funds	1.961	1.119	1.262	1.337	1.808	2.570	2.939	981	1.366	1.448
Bond Funds	6.405	6.600	8.161	8.950	9.820	8.439	6.324	2.769	2.471	1.547
Cash Funds	7.508	7.602	9.200	8.776	8.685	8.111	6.120	2.985	2.580	1.857
Other Mutual Funds	4.952	4.938	3.839	4.937	7.567	9.602	10.016	7.479	10.665	9.273

Source: Annual Reports from the period 2001-2010, APFIPP

By 2010, the debt crisis in the Portuguese economy was characterized with an unemployment rate of 10.0%, a contraction in the economic growth, a budget deficit of 7.0% of the GDP and the government debt being issued with above-average interest rates exceeding 7.0% November.

A drop of 17.0% in the mutual fund assets under management was observed, which can be easily explained by the conjuncture experienced in Portugal. However, the Equity Funds increased their value in 6.0%, especially because of the growth in the Other International Equity Funds and the North American Equity Funds. This might be due to the consciousness of the investors regarding the crisis situation in Europe, mainly caused by the PIGS where Portugal is included, and the better opportunities seen outside the Euro Zone.

2.2 Evolution of the Performance of the Portuguese Equity Funds

According to the APFIPP classification, the Equity Funds are divided into 5 groups:

1. Domestic Equity Funds
2. European Union, Switzerland and Norway Equity Funds
3. North American Equity Funds
4. Sector Equity Funds
5. Other International Equity Funds

While analyzing the overall period, it is possible to identify an irregular behavior in terms of the returns within the 51 Portuguese Equity Funds. In spite of this variety in returns, for the analyzed funds during the period from January 2001 to December 2010, there were two periods in which all funds had significant negative returns. The first is from 2001 to 2004 and the other is from 2007 to 2009.

From 2004 to 2007, the majority of the Equity Funds experienced a recovery, in terms of achieving positive returns. This was the result of the investors shifting to the Equity Market, as the Bond and Cash Funds were offering rates lower than the inflation rate.

In 2007, the Subprime mortgage crises in USA rapidly affected their financial system, spreading the effects into the economy at a worldwide level. As a result, a change occurred on the positive trend observed between the years 2004 to 2007. Hence, all the Portuguese Equity Funds registered a negative return, where the fourth group, the Sector Equity Funds, was the worst category from the Equity Funds group.

By 2009, in spite of the stagnation and even recession of major economies, the Equity Market started to observe a good performance, as a result of the recovery plans initiated by the European Governments and the Central Banks. The decrease of the interest rates offered by the banks was the main engine that contributed to the positive performance of the Equity Funds. Portuguese Equity Funds had positive annual returns where many funds obtained an annual return greater than 20.0% and others exceeded the threshold of 50.0%. According to the 2009 annual report from APFIPP, this was an impressive performance bearing in mind the Euro's appreciation against other currencies like the U.S. dollar and Japanese Yen, which offset part of the gains from investment in securities denominated in those currencies.

After the improvement seen during 2009, in 2010 the Euro Zone was affected by the sovereign debt crisis that broke the positive trend in the performance of the Equity Funds. Although the performance was less negative than in 2007 to 2009, almost all of the Equity Funds managed in Portugal observed monthly negative returns (about 10.0%). The charts regarding the monthly returns of the five groups of Equity Funds can be seen in the Appendix.

Chapter 3 - Literature Review

3.1 Introduction

The performance of portfolio managers is getting a considerate amount of attention amongst the financial analysts. Therefore, it is important to understand if Mutual Fund managers are adding value to the portfolios or only excessive transactions costs through their active management. The possibility of finding significant evidence of forecasting ability would be a violation of the efficient market hypothesis and would challenge the theory of finance with respect to optimal portfolio holdings of investors and the equilibrium valuation of securities.

The literature review summarizes the main methodologies that have been developed with respect to the evaluation of portfolio managers.

3.2 Capital Market Models (1952-1976)

The Work of Harry Markowitz (1952) on portfolio selection revolutionized the finance theory and laid the foundation for modern capital market theory known as Modern Portfolio Theory (MPT). Harry Markowitz defined the investor portfolio selection by taking into account the utility maximization curves under uncertain conditions, which was an exceptional contribution to the finance theory. MPT seeks to reduce the total variance of the portfolio assuming that investors are rational and that the market is efficient. It defines:

- Asset returns as a normally distributed function,
- Risk as the standard deviation return, and
- Portfolio return as the weighted combination of the asset returns.

The "Markowitz bullet", also known as the efficient frontier, corresponds to a collection of optimal portfolios which represents the combination that offers the best possible returns for a given risk level. The investor chooses the portfolio that maximizes its satisfaction by using an utility function. The best portfolio will be in the tangency point between the indifference curves of an investor and the efficient frontier.

As an extension to Markowitz work, Tobin (1958) highlighted another approach where it is assumed that since most investors are risk adverse, investors prefer to combine risky and risk-free assets in order to decrease the risk level on a portfolio. This creates the Capital Market Line and the point of tangency between this line and the Markowitz Efficient Frontier represents the Market Portfolio. After choosing the optimal portfolio, the investor defines the proportion of his wealth to be invested in both risky and risk-free assets. The methodology of compiling an efficient portfolio and then combining it with a riskless asset are the basics of

the Separation Theorem. This separation plays an important role in the development of the Capital Asset Pricing Model, which will be addressed later in the study.

To simplify the Markowitz (1952) model, Sharpe (1963), in his Model of Market, proposed to connect the evolution of the asset return with a specific Market Index. This allowed the division of total risk into two parts: (1) the systematic risk which cannot be eliminated through diversification of assets and the (2) specific risk which can be eliminated through diversification by selecting assets with negative correlations.

The Capital Asset Pricing model (CAPM) was introduced independently by Sharpe (1964), Lintner (1965) and Mossin (1966). According to this model, the investor chooses the optimal portfolio based on the Markowitz model assumptions. The relation between the expected return and portfolio risk are established in order to determine returns that ensure equilibrium in the Capital Markets. The model takes into account (1) the asset´s sensitivity to non-diversifiable risk (systematic risk), which is represented by the quantity Beta (β), (2) the expected market return and (3) the expected theoretical risk-free asset return.

There is a linear relation between the Beta and the expected return known as the: Security Market Line (SML) which graphs the line of the CAPM formula results. The market risk premium is determined by the SML slope. The SML represents a single- model factor such as the asset price, where the Beta represents the exposure to changes in the market value.

3.3 Risk-Adjusted Measures

The development of the capital assets pricing theory lead to the emergence of traditional risk-adjusted measures for portfolio performance.

The Treynor (1965) measure, also known as reward-to-volatility ratio, was the first measure that included risk in the portfolio performance. Treynor's (1965) objective was to find a performance measure that could be applied to all investors, regardless of their risk preferences. This measure represents the portfolio´s return per unit of systematic risk by assuming that the investor has a diversified portfolio.

The Sharpe (1966) measure, also known as reward-to-variability ratio is quite similar to the Treynor´s measure. Sharpe (1966) measures takes into account the standard deviation as a risk measure, representing the portfolio´s return per unit of total risk.

Similarly, to the above mentioned portfolio performance measures, Jensen's (1968) measure is also a direct application of the theoretical result of CAPM which tries to capture the ability of portfolio manager to increase returns by predicting security prices and by minimizing the "insurable risk" amount . In other words, it measures the specific part of the portfolio´s rate of return that belongs to the manager´s ability to obtain above the average returns adjusted for market risk. This measure is also known as Alpha.

$$R_{p,t} - R_{f,t} = \boldsymbol{\alpha_p} + \beta_{1p}\left(R_{m,t} - R_{f,t}\right) + \epsilon_{p,t} \qquad (\mathbf{3.1})$$

Where,

$R_{p,t}$ = Return of the portfolio p in period t
$R_{f,t}$ = Risk − free rate in period t
$\boldsymbol{\alpha_p}$ = **Jensen measure**
β_{1p} = Systematic risk of the portfolio, obtained form the Market Model
$R_{m,t}$ = Return of the market portfolio in period t
$\varepsilon_{p,t}$ = Residual variable with the following characteristics:

$E(\varepsilon_{p,t}) = 0$;
$Var(\varepsilon_{p,t},) = \sigma^2$;
$Cov(\varepsilon_{p,t}, R_{m,t}) = 0$ and $Cov(\varepsilon_{p,t}, \varepsilon_{j,t}) = 0$

Jensen (1968) showed in his study that in the presence of timing abilities the market risk estimates can be negatively skewed where as in the selectivity abilities the market risk is positively skewed. The Alpha value includes both abilities. This argument was contested by Grant (1977), who stated that Alpha measure can be negatively skewed when timing abilities are ignored.

The Treynor and Jensen measures provide similar results when evaluating a certain portfolio in terms of relative performance regarding the market portfolio. However, when comparing two portfolios, the same conclusion is not verified as Treynor believes that one portfolio can be better than the other and Jensen disagrees with this conclusion.

If a portfolio is already diversified, the Treynor measure would be the most correct to use, as it considers the systematic risk, rather than using the Sharpe measure.

3.3.1 Limitations regarding traditional measures

One of the limitations associated with the traditional measures and that is questioned by many students, is that because they are based in the CAPM model, the Index of the market is used as proxy for the portfolio market which is not correct, as this can lead to weak results. Roll (1978, pp.6) refers that "*…there is a Beta for every individual asset (and thus for every portfolio); but these Betas can be different for different indices and will be different for most. For every asset, an index can be found to produce a Beta of any desired magnitude, however large or small. Thus, for every asset (or portfolio) judicious choice of the index can produce any desired measured "performance", against the securities market line*".

Another limitation was attributed to Jensen (1968) and Treynor (1965) methodologies, where it was argued that they only consider exclusively the manager´s security selection skills by assuming that the portfolio risk levels are stationary throughout the time frame. A superior performance could be obtained, if both the ability of security selection and the ability of timing were considered by the managers.

According to Romacho (2004), the security selection (selectivity) refers to the microforecasting ability of managers to select under or overvalued assets. Thus, according to the CAPM model, the selectivity lies off the security market line. The market timing is the macroforecating ability of managers to forecast changes in the macroeconomic environment in order to change the portfolio Beta and maximize its future return.

Although, studies from Jensen (1969) and Blume (1971), for example, substantiate the assumption of stationary levels of systematic risk of the portfolio, others studies such as Klemkosky and Maness (1978) and Sunder (1980) studies did not verify this statement. These studies, are consistent with the hypothesis that managers are engaged in timing strategies, that is, they stated that "*the systematic risk levels were not constant over successive 2 and 4-year periods, and systematic risk could not be predicted from prior risk level with a high degree of certainty*" (Klemkosky and Maness, 1978, pp. 639). Fabozzi and Francis (1979), who followed the same technique used by Klemkosky and Maness (1978), Chen and Stockum (1986) and Chen, Lee, Rahman and Chan (1990), were of the opinion that the fund´s Beta may change even if the fund manager does not plan to change the portfolio risk. Fabozzi and Francis (1979) justified this belief with two reasons (1) the Beta value for the individual securities may be intertemporally unstable or (2) changes in the relative market value weights of individual securities in the portfolio will change the portfolio Beta, which is simply a weighted average Beta, even if the individual security Betas are unchanged. The stability of the systematic risk can only be verified if the managers modify the composition of the portfolio in order to maintain the same level of the Beta.

Kon and Jen (1978), using the Switching Regression model also reached the same result of the non-stationary level of the systematic risk.

3.4 Arbitrage Pricing Theory

As an attempt to overcome the limitations of the previous methodologies, Ross (1976, 1977) proposed a new approach which was known as the Arbitrage Pricing Theory (APT). Ross's (1976, 1977) theory had less restrictions, whereby he assumed that each investor holds a unique portfolio, thus the expected return of a financial asset could be explained by various macro-economic factors. These are represented by a factor-specific Beta-coefficient. Although these methods were advantageous in terms of being less restrictive in its assumptions, Ross (1976, 1977) failed to specify the factors that could affect the portfolio returns. Therefore, with this limitation, the APT showed to be an unreliable method to evaluate the performance of Mutual Funds.

3.5 Selectivity and Market Timing Methodologies

Due to the existence of non stationary levels of risk, it is believed that managers follow or use a particular market timing strategy; therefore it is crucial to take into account the timing

ability measure. There are various methods that evaluate manager's performance by using both selectivity and market timing abilities. These methods will now be analyzed.

The study written by Treynor and Mazuy (1966) was the first to consider the market timing ability in the performance evaluation. In their study a quadratic term was added on the regression analysis conducted by the Jensen´s (1968) measure (equation 3.1), in order to test the market timing ability:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_{1p}\left(R_{m,t} - R_{f,t}\right) + \boldsymbol{\beta_{2p}}\left(\boldsymbol{R_{m,t}} - \boldsymbol{R_{f,t}}\right)^{\mathbf{2}} + \epsilon_{p,t} \quad (\mathbf{3.2})$$

By assuming a constant level of the risk measure over time, it was argued by Treynor and Mazuy (1966) that, if the managers can forecast market returns then managers will hold a greater or a smaller proportion of the market portfolio when the market return is high or low, respectively. Therefore, the portfolio return will be a nonlinear function of the market return.

In the Treynor and Mazuy (1966) empirical study they did not find significant timing abilities within the managers, although one manager had a positive significant timing ability: "*A least-squares regression technique was employed to fit characteristic –line data for 57 open-end Mutual Funds in our sample; It shows no statistical evidence that the investment managers of any of the 57 funds have successfully outguessed the market; … only one displayed even an F value of 5.6*."(Treynor and Mazuy, 1966, pp.6).

Other empirical studies that were done using the Treynor and Mazuy (1966) model, also reported negative coefficients on the quadratic term. The empirical examination of Cumby and Glen (1990), for example, which studied 15 United States based Mutual Funds concluded: "*All 15 funds have estimates of β2 that are significantly negative at the five percent level*" (Cumby and Glen, 1990, pp.21).

On Fama's (1972) study, two types of abilities of the fund managers performance were highlighted, the security selection (selectivity) and the market timing (timing). Nevertheless this method was complex to implement due to the type of information needed.

In order to separate both abilities, Jensen (1972) developed a theoretical structure and concluded that it is impossible to separately measure the contributions for the overall performance when only return data is used. It was also demonstrated by Jensen (1972) that the timing ability could be measured by the correlation between manager's forecasts and actual market returns.

Moreover, Fabozzi and Francis (1972), in order to measure the two components of the performance, suggested to test the stability of the systematic risk in bear and bull markets. For that they introduced a binary variable in the Jensen Equation (3.2). In their study they analyzed 85 funds and didn´t find positive selectivity and market timing abilities.

Merton (1981) and Henriksson and Merton (1981), suggested another approach on which a theoretical structure was proposed where it was possible to separate the both performance components, the market timing and the selectivity. This model will be explained with more detail in Chapter 4.

The Merton and Henriksson (1981) model was used by Henriksson (1984) for 116 Mutual Funds, from 1968 to 1980, where no timing abilities were found. The same result was obtained by Chang and Lewellen (1984) who analyzed 67 Mutual Funds from 1971 to 1979 and by Cataquet and Armada (1992) who analyzed Mutual Funds from United Kingdom.

Vieira (1995) and Rao (2000, 2001) also used the Merton and Henriksson model (1981) and didn´t find timing abilities. Connor and Korajczyk (1991) also applied the same model and in the APT context no timing abilities were found.

Another methodology proposed for the timing ability by Bauer and Dahlquist (2001) is the Roulette Wheels on which they didn´t find significant timing ability.

In 2004, Romacho (2004) applied the Merton and Henriksson (1981) model on 21 Portuguese investment funds between the period of 1996 and 2001 and, similarly to other findings, no significant ability for both selectivity and market timing were found.

Another study that also didn´t find significant selectivity and market timing abilities is the research developed by Nikolaos (2002) within the Greek Market. Nikolaos (2002) analyzed 19 Greek mutual funds through the Merton and Henriksson (1981) and Treynor and Mazuy (1966) methods. He justified the negative statistical coefficient of market timing stating that: "*is a phenomenon attributable to the lack of experience of their managers within the short period of the life of mutual funds in Greece*" (Nikolaos, 2002, pp. 104).

Additionally, Lhabitant (2001), Tripathy (2006), Casaccia (2009) and Murhadi (2010) studies´ findings are also in line with the previous conclusions while using the same methods. Lhabitant (2001) analyzed 60 Swiss mutual funds, Tripathy (2006) 31 Indian mutual funds, Casaccia (2009) 106 Brazilian mutual funds and Murhadi (2010) 55 Indonesian mutual funds. None of them found significant estimates of the two components of the performance.

Offsetting these results, recent studies while applying more complex methods and on a daily frequency data, demonstrate a better evaluation of the performance of the mutual fund´s managers. Leite and Cortez (2006) ´s study, for example, incorporated public information by using conditional models developed by Ferson and Schadt (1996). In their study they show that using conditional models they observe a slight improvement in the mutual fund estimates and in the explanatory power of the models. Other study that can be highlighted is the Sehgal (2008) research. Sehgal (2008), while analyzing 60 Indian mutual funds, through the Carhart (1997) 4-factor model, concludes that: "*45% and 28% of the sample funds demonstrate significantly positive market timing coefficients for multi-factor versions of Treynor-Muazy and Hendrikson-Merton models respectively*" (Sehgal, 2008, pp. 9). Moreover, the study of Afonso (2010) that used the conditional model of Treynor and Mazuy (1966) and Henriksson and Merton (1981) by using public information related with economic conditions (Ferson and

Schadt (1996)) provides evidence that whatever the model applied, the funds show better estimates when using daily data. This finding is in line with Bollen and Busse (2001) suggestion, while stating that the possible explanation for finding negative market timing ability among the fund managers relies on using monthly or annually returns on the studies. Nevertheless, Afonso (2010), didn´t find positive significant market timing abilities, while analyzing 33 Portuguese Equity Funds, whatever the model applied.

When evaluating the manager's performance in terms of selectivity and timing, the majority of the empirical studies such as: Henriksson (1984), Armada (1992), Cortez and Armada (1997), Lhabitant (2001), Romacho (2004) and Afonso (2010) found a negative correlation between the two abilities.

Henriksson (1984) justifies this with 4 possible reasons:

- Errors in the estimates of the model´s variables
- Dependence of the abilities regarding the Market returns
- Deficient specification of the Market portfolio (the Index may not include all the securities that are in the fund)
- Omission of relevant factors in the model

Armada´s (1992) justification regarding the negative correlation is similar to the first justification given by Henriksson (1984).

In the Portuguese scenario, Romacho (2004) stated that as the funds become internationalized the correlation coefficient becomes more negative, and for that, the less specialization of the International Fund managers comparing to the Domestic or European Union Fund managers can be a possible cause.

For Coggin, Fabozzi and Rahmann (1993), where the inverse relation of the selectivity and timing abilities were also verified, this remains an unsettled question in the literature.

Among many methodologies, the theories of Merton (1981) and Merton and Henriksson (1981) will be used in the present empirical investigation, as it allows to separately analyze the two performance components, selectivity and market timing. This will be explained in the next Chapter.

Chapter 4 - Methodology

4.1 Merton (1981) and Merton and Henriksson (1981)

Merton (1981) analyzed the patterns of returns resulting from market timing strategy and realized that they were similar to the returns obtained from an option strategy (of the put-protective type). Through this, Merton (1981) developed a theory structure to assess the managers timing ability. It was assumed that there were two possible previsions from the market timer´s forecasts:

- Either stocks will outperform bonds (Bull Market) or
- Bonds will outperform stocks (Bear Market).

Within this forecast, the investor adjusts the proportion of the fund invested in the Market Portfolio ($R_{m,t}$) and in the risk free asset ($R_{f,t}$), without having the need to predict the magnitude of the difference between $R_{m,t}$ and $R_{f,t}$.
This model can be described in terms of conditional probability. If the variable γ_t represents the market timer´s forecast, where $\gamma_t = 1$, if the forecast in t-1, for t, is $R_{m,t} > R_{f,t}$, and $\gamma_t = 0$, if the forecast in t-1, for t, is $R_{m,t} \leq R_{f,t}$, the conditional probabilities of a correct forecast will be:

$$P_{1,t} = Prob\left(\gamma_t = 0 \,/\, R_{m,t} \leq R_{f,t}\right) \qquad (\mathbf{4.1})$$

$$P_{2,t} = Prob\left(\gamma_t = 1 \,/\, R_{m,t} > R_{f,t}\right) \qquad (\mathbf{4.2})$$

And the conditional probabilities of an incorrect forecast will be:

$$1 - P_{1,t} = Prob\left(\gamma_t = 1 \,/\, R_{m,t} \leq R_{f,t}\right) \qquad (\mathbf{4.3})$$

$$1 - P_{2,t} = Prob\left(\gamma_t = 0 \,/\, R_{m,t} > R_{f,t}\right) \qquad (\mathbf{4.4})$$

Consequently, the conditional probability of a correct forecast depends only on whether or not $R_{m,t} > R_{f,t}$.

In addition, statistical procedures, parametric and nonparametric tests, were developed by Henriksson and Merton (1981) to investigate market timing and selectivity abilities of investment managers.

To use the nonparametric procedures to test investment performance, the forecaster predictions must be observed. Since this information is not readily available it is possible under certain conditions to infer from the portfolio return series the manager´s forecasts. However, according to Henriksson and Merton (1981), such inferences will only, in general, provide noisy estimates of the forecasts.

As in the present study the previous information (predictions of the managers) was difficult to access, we used the parametric tests. This assessment will be carried out bellow.

4.1.1 Parametric Tests

In order to overcome the problem of using a proxy for the predictions of the managers, parametric tests were suggested by Henriksson and Merton (1981). This test allows the identification and separation of the abilities of selectivity and market timing using just the excess returns of the market and of the portfolio. The parametric tests are based under the assumption that the assets are appraised in accordance with the CAPM model, although it can be applied in a multifactorial context, APT for example.

It assumed that the managers do not try or at least are not successful in forecasting the market returns and that they choose between two target risk levels (systematic risk):

η_1 when the manager forecast is that $R_{m,t} \leq R_{f,t}$; and

η_2 when the manager forecast is that $R_{m,t} > R_{f,t}$

If the manager is rational, the condition $\eta_1 < \eta_2$ has to be verified, as the risk assumed for a bear market ($R_{m,t} \leq R_{f,t}$) has to be less than in the bull market ($R_{m,t} > R_{f,t}$).

Since the forecasts of the managers are unknown, the systematic risk β_t (Beta of the portfolio in time t) has to be a random variable for a portfolio with market timing, that will assume $\eta_1$or η_2 according to the manager forecast relatively to a bear or bull market. As a result, the return of the portfolio p, in period t, $R_{p,t}$, can be presented as:

$$R_{p,t} = R_{f,t} + (b + \theta_t)x_t + \lambda + \varepsilon_{p,t} \qquad (\mathbf{4.5})$$

Where,

b = Unconditional expected value of β_t;
$\theta_t = \beta_t - b$ = Unanticipated component of β_t, depend of the prediction;
$x_t = R_{m,t} - R_{f,t}$;
λ = Excess expected return due to the ability of selectivity;
$\varepsilon_{p,t}$ = Residual variable with the following characteristics:

$E(\varepsilon_{p,t}) = 0$;
$E(\varepsilon_{p,t}, x_t) = 0$;
$E(\varepsilon_{p,t}, \varepsilon_{p,t-i}) = 0$, $i = 1,2,3, \ldots$

A least-squares regression analysis is used to identify the separate increments of performance from microforecasting and macroforecasting. The regression specification can be written as:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_{1p}x_t + \beta_{2p}y_t + \varepsilon_{p,t} \qquad (\mathbf{4.6})$$

Where $y_t = \max(0, R_{f,t} - R_{m,t}) = \max(0, -x_t)$

The previous equation suggested by Merton (1981) shows that up to an additive noise term, the return obtained through market timing strategy will be similar through an investment in options, like partial protective put. The later is related to buy $(P_1 + P_2 - 1)(n_2 - n_1)$ put options (without considering the payment of the premium), in the market portfolio, with an exercise price of $R_{f,t}$, which correspond to an investment of $P_2 n_2 + (1 - P_2)n_1$ monetary units in the market portfolio. The rest of the invested amount should be invested in risk free assets. The variable y_t corresponds to the effective return provided by the options strategy, (the option will only be exercised if $R_{f,t} > R_{m,t}$ and the gain will be equal to $R_{f,t} - R_{m,t}$.

It is important to note that the equation (4.6) is similar to the equation suggested by Jensen (1968) in 3.1, where the only difference is that there is not the term representing the market timing ability.

Still regarding the Merton and Henriksson model (1981), for big samples the parameters of the previous equation can be written as:

$$P\ lim\widehat{\alpha_p} = \lambda \qquad (\mathbf{4.7.1})$$

$$P\ lim\,\widehat{\beta_1} = P_2\eta_2 + (1 - P_2)\eta_1 \qquad (\mathbf{4.7.2})$$

$$P\ lim\,\widehat{\beta_2} = (P_1 + P_2 - 1)(\eta_2 - \eta_1) \qquad (\mathbf{4.7.3})$$

Where $\widehat{\alpha_p}$ measures the contribution of the selectivity ability for the performance of the portfolio, which correspond to test $H_0: \alpha_P = 0$ (the managers don´t have the selectivity ability); the value of $\widehat{\beta_1}$ represent the proportion invested in the portfolio market following a strategy of investment in options; and the value $\widehat{\beta_2}$ represent the number of put options acquired in the market depending on the market timing capabilities of the managers, which correspond to test $H_0: \beta_{2,p} = 0$.

Consequently, the value of the market timing ability (according to Merton (1981)) is given by:

$$\widehat{\beta_2} * g_t = (P_1 + P_2 - 1)(\eta_1 - \eta_2) * g_t \qquad (\mathbf{4.8})$$

Where g_t is the market price of the put option when implementing the strategy in options.

Still regarding the equation 4.6, Henriksson and Merton (1981) shows that:

$$lim_{N\to\infty}\left[\frac{\sum \varepsilon_{p,t}}{N}\right] = 0 \qquad (4.9)$$

The least squares method will lead to unbiased estimates of the parameters of the portfolio performance. However, as the β_t is not stationary, Henriksson and Merton (1981) shows that the standard deviation of the error ($\sigma\varepsilon$ p,t) is an increasing function of x_t. Thus, as a way to improve the efficiency of the estimates it is important to correct the heteroscedasticity.

Instead of using the equation 4.6, Henriksson and Merton (1981) proposed through a linear transformation another structure:

$$R_{p,t} - R_{f,t} = \alpha`_p + \beta`_{1p} x_{1,t} + \beta`_{2p} x_{2,t} + \varepsilon`_{p,t} \qquad (\mathbf{4.10})$$

Where:

$x_{1,t}$= *min (0,* $R_{m,t} - R_{f,t}) = min\ (0, x_t)$*;*

$x_{2,t}$= *max (0,* $R_{m,t} - R_{f,t}) = max\ (0, x_t)$.

Since $x_{1,t}=x_t$ and $x_{2,t}=0$ when $x_t \leq 0$ (bear market), and $x_{1,t}=0$ and $x_{2,t}= x_t$ when $x_t>0$ (bull market), the $\beta`_{1p}$ can be interpreted as the Beta for the portfolio when there is bear market and $\beta`_{2p}$ as the Beta when there is bull market. Thus, it implies to test the following hypothesis:

$$H_0: \beta`_{1p} = \beta`_{2p}$$

In other words, test if $\beta`_{2p}$ is significantly greater than $\beta`_{1p}$ show that the expected "up-market" Beta of the portfolio is greater than the expected "down-market" Beta of the portfolio. The meaning of the $\alpha`_p$ remains the same as it has in equation 3.1., measuring the selectivity ability of the portfolio managers.

Chapter 5 - Empirical Study

According to the Associação Portuguesa de Fundos de Investimento, Pensões e Patrimónios (APFIPP) classification, the Portuguese Mutual Funds include Equity Funds, Equity-Saving Funds, Index Equity Funds, Bond Funds, Cash Funds and Other Mutual Funds. This study will focus on Equity Funds, which according to the division made by APFIPP, is divided into 5 groups:

1. Domestic Equity Funds
2. European Union, Switzerland and Norway Equity Funds
3. North American Equity Funds
4. Sector Equity Funds
5. Other International Equity Funds

Monthly returns from Portuguese Equity Funds associated with the APFIPP will be examined, from January 2001 to December 2010, which corresponds to a total of 120 observations. In order to belong to this group, each fund must have at least fifty observations during this period. Table 1 demonstrate the final sample consisting of 51 Mutual Funds, which assets account for 91.0% of the total Portuguese Equity Funds. The returns data include all dividends paid by the fund and are net of all management costs and fees and other incurred expenses.

Management Companies	Equity Funds	
Banif Gestão de Activos	Domestic Equity Funds	1-Banif Acções Portugal – BAP
Barclays Fundos		2-Barclays Premier Acções Portugal – BPAP
BPI Gestão de Activos		3-BPI Portugal – BPIP
Caixagest		4-Caixagest Acções Portugal – CAP
Caixagest		5-Caixagest Gestão Lusoacções – CGL
ESAF		6-Espírito Santo Portugal Acções – ESPA
Millennium BCP		7-Millennium Acções Portugal – MAP
Santander		8-Santander Acções Portugal – SAP
Banif Gestão de Activos	European Union, Norway and Switzerland Equity Funds	9-Banif Euro Acções – BEA
BBVA Gest		10-BBVA Bolsa Euro – BBVABE
BPI Gestão de Activos		11-BPI Europa Valor – BPIEV
BPI Gestão de Activos		12-BPI Europa Grandes Capitalizações – BPIEGC
BPN Gestão Activos		13-BPN Acções Europa – BPNAE
Caixagest		14-Caixagest Acções Europa – CAE
Caixagest		15-Caixagest Gestão Euroacções – CGE
Caixagest		16-Postal Acções – PSA
Crédito Agrícola Gest		17-Raiz Europa – RE
ESAF		18-Espírito Santo Acções Europa - ESAE

Finivalor		19-Finicapital – FC
Gerfundos		20-Popular Acções – PPA
Millennium BCP		21-Millennium Eurocarteira – ME
Montepio Gestão de Activos		22-Montepio Acções – MA
Montepio Gestão de Activos		23-Montepio Acções Europa – MAE
Santander		24-Santander Acções Europa – SAE
BPI Gestão de Activos	**North American Equity Funds**	25-BPI América – BPIA
Caixagest		26-Caixagest Acções EUA – CAEUA
Caixagest		27-Caixagest Gestão EUA – CGEUA
ESAF		28-Esp. Santo Acções América – ESAA
Millennium BCP		29-Millennium Acções América – MAA
Santander		30-Santander Acções USA – SAUSA
Santander		31-Santander Acções América – SAA
BPI Gestão de Activos	**Sector Equity Funds**	32-BPI Tecnologias – BPIT
Millennium BCP		33-Millennium Eurofinanceiras – MEF
Millennium BCP		34-Millennium Global Utilities – MGU
Montepio Gestão de Activos		35-Montepio Euro Telcos – MET
Montepio Gestão de Activos		36-Montepio Euro Utilities – MEU
Santander		37-Santander Euro Futuro Acções Defensivo – SEFAD
Santander		38-Santander Euro Futuro Banca e Seguros – SEFBS
Santander		39-Santander Euro Futuro Cíclico – SEFC
Santander		40-Santander Euro Futuro Telecomunicações – SEFT
BPI Gestão de Activos	**Other International Equity Funds**	41-BPI Reestruturações – BPIR
BPN Gestão Activos		42-BPN Acções Global – BPNAG
Caixagest		43-Caixagest Acções Emergentes – CAEM
Caixagest		44-Caixagest Acções Japão – CAJ
Caixagest		45-Caixagest Acções Oriente – CAO
ESAF		46-Espírito Santo Mercados Emergentes – ESME
ESAF		47-Espírito Santo Acções Global – ESAG
Finivalor		48-Finifundo Acções Internacionais – FAI
Millennium BCP		49-Millennium Acções Japão – MAJ
Millennium BCP		50-Millennium Mercados Emergentes – MME
Millennium BCP		51-Millennium Acções Mundiais – MAM

Table 1- Equity Funds and their respective management company

5.1 Survivorship Bias

One of the problems that affect the evaluation of the fund's performance during a period is the exclusion of the failed funds, which causes the survivorship bias.

There are different opinions regarding the impact of the survivorship bias on the evaluation of Investment Funds. Studies such as Grinblatt and Titman (1989b) and Leite and Cortez (2006) stated that the effect is minimum while other studies such as Elton, Gruber e Blake (1996) mentioned that the impact depends on the time frame used.

The following table highlights the number of existing funds and the number of liquidated funds between 2001 and 2010. The average of the liquidated funds is about 3.0%, this is considered to be low and may not impact the final result, and therefore it will not be taken into account in the final analysis.

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Mean**
1)	75	62	57	52	49	51	53	55	52	51	55
2)	6	4	1	4	2	0	1	0	0		2
3)	8%	5%	2%	7%	4%	0%	2%	0%	0%	0%	**2,77%**

Table 2 - Number of liquidated Equity Funds between January 2001 to December 2010.

Source: APFIPP

1) - Number of existing Funds (31/December)
2) - Number of liquidated Funds
3) - Liquidated Funds (%)

5.2 Returns of the Investment Funds

The Equity Funds data returns were sourced from the APFIPP and the following logarithmic base is used:

$$R_{p,t} = ln\left(\frac{UP_{p,t}}{UP_{p,t-1}}\right) \qquad (\mathbf{5.1})$$

Where,

$R_{p,t}$= Monthly return from Fund p at period t

$UP_{p,t}$= Value of the investment unit in fund p at period t

$UP_{p,t-1}$= Value of the investment unit in fund p at period t-1.

5.3 Market Returns

To determine Market returns the Equity Index were used as they are considered to benchmark the market portfolio.

Since it was not possible to obtain the benchmark for all funds, a specific Equity Index was used depending on the type of the fund and on the relevant information from the Complete Prospectus. The Equity Index prices were obtained from the Bloomberg platform and for the returns the following logarithmic base was used:

$$R_{m,t} = \ln\left(\frac{I_{m,t}}{I_{m,t-1}}\right) \qquad (\mathbf{5.2})$$

Where,

$R_{m,t}$= Monthly return of the market in period t

$I_{m,t}$= Equity Index price in period t

$I_{m,t-1}$ = Equity Index price in period t-1

5.3.1 Equity Index for the different type of Fund

For the Domestic Equity Funds, the PSI20 Total Return was used to represent the market portfolio, as it is the Index considered by those managers.

For the European Union, Switzerland and Norway Equity Funds, 5 Indexes were considered:

1. Dow Jones Eurostoxx 50Net Total Return
2. Stoxx 600 Net Total Return
3. MSCI Europe Local Index
4. Stoxx Europe Large 200
5. FT Europe

For the Finicapital and Montepio Acções funds, a mix of the following Equity Indexes were used for their benchmark, namely the IBEX35, PSI20 Total Return, Dow Jones Eurostoxx 50 Net Total Return and STOXX 600 Net Total Return. For the Finicapital fund the first three were considered and for the Montepio Acções, the PSI20 Total Return and the STOXX 600 Net Total Return were used. The Finicapital and Montepio Acções funds are managed by Finivalor and Montepio Gestão de Activos Financial Institutions, respectively.

Regarding the North American Funds, the Equity Index Standard and Poor's 500 Net Total Return was used as a benchmark for the market portfolio. Although the fact that not every manager hedges the currency risk, for simplicity it was assumed that all seven funds do the hedging and the comparison was done with the Index´s price expressed in USD currency.

For the Sector Equity Funds group, depending on the Equity Fund sector, a related Equity Index was used. For the BPI Tecnologias, fund managed by BPI Gestão de Activos, the following two Indexes were considered, the NASDAQ 100 STOCK and the Currency Index ECB Euro Exchange Reference Rate USD, as the hedging of the currency risk exposure is not done and the fund is exposed to the USD Dollar behavior.

For the Millennium Eurofinanceiras fund, three Indexes were taken into account: the Dow Jones Stoxx 600 Banks Supersector Return Index, the Dow Jones Stoxx 600 Financial Services Supersector Return Index and the Dow Jones Stoxx 600 Insurance Index.

For Millennium Global Utilities fund, the MSCI Utilities USD Index is used through their management which is converted into Euros as the hedging of the currency risk exposure is not conducted.

For the Montepio Euro Telcos and Santander Euro Futuro Telecomunicações Funds the Index Stoxx 600 Telecommunications was used as the benchmark for the market portfolio, which is stated in the Full Prospectus. The Montepio Euro Telcos and Santander Euro Futuro Telecomunicações Funds are managed by Montepio Gestão de Activos and Santander Asset Management, respectively.

Other assumptions are as follows:

1. For the Montepio Euro Utilities the Index Euro Stoxx Utilities was used as the benchmark.
2. For the Santander Euro Futuro Banca e Seguros the following two Indexes were assumed, the Dow Jones Stoxx 600 Banks Supersector Return Index and the Dow Jones Stoxx 600 Insurance Index.
3. For the Santander Euro Futuro Acções Defensivo and Santander Euro Futuro Cíclico funds, the MSPE Index was used as the benchmark.

For the Other International Equity Funds group the following Equity Indexes were used:

1. The Equity Index MSCI World (Euros) for the BPI Reestruturações fund;
2. The Equity Index MSCI World Total Return (Euros) for the BPN Acções Global, Finifundo Acções Internacionais, and Millennium Acções Mundiais funds;
3. The Equity Index MSCI World (Local Currency) for the Espírito Santo Acções Global fund;
4. The Equity MSCI Emerging Markets for Caixagest Acções Emergentes and for the Espírito Santo Mercados Emergentes fund;

5. The Equity Index FTSE Japan for the Caixagest Acções Japão and Millennium Acções Japão funds;
6. The Equity Index MSCI Pacific (excluding Japan) for the Caixagest Acções Oriente fund, and;
7. The Equity Index MSCI Emerging Markets Free Index for the Millennium Mercados Emergentes fund. The Currency Index ECB Euro Exchange Reference Rate USD was also used, as the hedging of the currency risk is not conducted and there is an exposition to the USD Dollar behavior.

In the Appendix it is exposed a table with the Equity Indexes respective annual returns.

5.4 Risk-free Rate Return

For the Risk-free rate a one month Euro Interbank Offered Rate (Euribor) was used. This rate was obtained from the Reuter's platform and recapitalized for monthly rates which is depicted in the following logarithmic base:

$$R_{f,t} = ln\left(1 + \frac{i_a}{1200}\right) \qquad (\mathbf{5.3})$$

Where,

$R_{f,t}$ = Risk-free Rate Return
i_a = Euribor Rate 1 Month

5.5 Descriptive Statistics

The following table presents the principal descriptive statistics of the Portuguese Equity Funds returns as well as of the respective Equity Indexes during the decade of 2001 to 2010.

It is important to notice that in the five groups of funds (Domestic Equity Funds, European Union, Switzerland and Norway Equity Funds, North American Equity Funds, Sector Equity Funds and Other International Equity Funds), most of the funds have an average return bellow the average return of their respective equity index. In relation to the volatility of the funds, measured by the standard deviation, most of the funds are riskier than their respective equity index.

By comparing and analyzing the five groups of funds, the best funds belong to the Sector Equity Funds, as these funds represent better values of the mean and standard deviation comparing to their specific benchmark. In this way, the best funds are the following:

- Montepio Euro Telcos
- Santander Euro Futuro Acções Defensivo
- Santander Euro Futuro Cíclico

- BPI Reestruturações
- Caixagest Mercados Emergentes
- Espírito Santo Mercados Emergentes

Descriptive Stats	Mean	Standard Deviation	Median	Minimum	Maximum
Domestic Equity Funds	-0,0002	0,0579	0,0057	-0,2070	0,1385
PSI20	**0,0000**	**0,0572**	**0,0083**	**-0,2320**	**0,1149**
European Union, Norway and Switzerland Equity Funds	-0,0029	0,0595	0,0082	-0,2013	0,1287
Eurostoxx50	**-0,0023**	**0,0597**	**0,0074**	**-0,2062**	**0,1440**
Millennium Eurocarteira	-0,0036	0,0542	0,0076	-0,1969	0,1315
FT Europe	**0,0003**	**0,0502**	**0,0103**	**-0,1536**	**0,1371**
BPN Acções Europa	-0,0014	0,0540	0,0041	-0,1349	0,1035
MSCI Europe	**-0,0031**	**0,0521**	**0,0047**	**-0,1459**	**0,1131**
Finicapital	0,0038	0,0533	0,0149	-0,1957	0,1359
IBEX_PSI_Eurostoxx50	**0,0090**	**0,0888**	**0,0236**	**-0,3537**	**0,2312**
Montepio Acções	-0,0004	0,0515	0,0092	-0,1833	0,1359
PSI_Stoxx600	**0,0000**	**0,0507**	**0,0085**	**-0,1867**	**0,1242**
European Union, Norway and Switzerland Equity Funds	-0,0031	0,0516	0,0021	-0,1590	0,1412
Stoxx Large 200	**-0,0008**	**0,0498**	**0,0088**	**-0,1529**	**0,1540**
European Union, Norway and Switzerland Equity Funds	-0,0035	0,0530	0,0039	-0,1664	0,1239
Stoxx 600	**0,0000**	**0,0501**	**0,0087**	**-0,1515**	**0,1334**
North American Equity Funds	-0,0038	0,0483	0,0017	-0,1424	0,0933
SP500TR	**0,0007**	**0,0481**	**0,0095**	**-0,1844**	**0,0909**
BPI Tecnologias	-0,0087	0,0817	-0,0043	-0,3434	0,2454
Nasdaq + ECB	**0,0005**	**0,0447**	**0,0056**	**-0,1557**	**0,0866**
Millennium Eurofinanceiras	-0,0065	0,0784	0,0029	-0,3097	0,2818
Dow Jones FS, Banks and Inssurance	**-0,0034**	**0,0716**	**0,0031**	**-0,2430**	**0,2460**
Millennium Global Utilities	0,0009	0,0400	0,0098	-0,1248	0,0962
MSCI Utilities	**0,0011**	**0,0386**	**0,0096**	**-0,1162**	**0,0727**
Montepio Euro Telcos	0,0013	0,0393	0,0088	-0,1026	0,0747
Stoxx 600 Telecommunications	**-0,0005**	**0,0432**	**-0,0008**	**-0,1039**	**0,0857**
Montepio Euro Utilities	0,0029	0,0470	0,0104	-0,1240	0,1061
Eurostoxx Utilities	**0,0039**	**0,0552**	**0,0147**	**-0,1508**	**0,0974**
Santander Euro Futuro Acções Defensivo and Santander Euro Futuro Cíclico	0,0017	0,0413	0,0060	-0,1296	0,0940
MSPE Index	**-0,0030**	**0,0492**	**0,0072**	**-0,1496**	**0,1197**
Santander Euro Futuro Banca e Seguros	-0,0056	0,0757	0,0036	-0,2810	0,2779
Dow Jones Banks and Inssurance	**-0,0051**	**0,0787**	**0,0027**	**-0,2947**	**0,2695**
Santander Euro Fut.	-0,0060	0,0693	0,0067	-0,2335	0,2055

Telecomunicações					
Stoxx 600 Telecommunications	**-0,0048**	**0,0638**	**-0,0004**	**-0,2338**	**0,2066**
BPI Reestruturações	0,0044	0,0375	0,0095	-0,1257	0,0794
MSCI World	**-0,0026**	**0,0457**	**0,0037**	**-0,1256**	**0,1055**
BPN Acções Global	0,0010	0,0494	0,0037	-0,1987	0,1334
MSCI World Total Return	**0,0014**	**0,0443**	**0,0078**	**-0,1239**	**0,1092**
Caixagest and Esp. Santo Merc. Emergentes	0,0072	0,0682	0,0184	-0,2224	0,1629
MSCI Emerging Markets	**0,0029**	**0,0555**	**0,0100**	**-0,1837**	**0,1395**
Millennium Acções Japão and Caixagest Acções Japão	-0,0049	0,0520	-0,0048	-0,1226	0,1400
FTSE Japan JPY	**-0,0020**	**0,0537**	**0,0043**	**-0,2338**	**0,1191**
Caixagest Acções Oriente	0,0065	0,0554	0,0130	-0,1697	0,1181
MSCI Pacific X Japan (USD)	**0,0068**	**0,0637**	**0,0140**	**-0,2890**	**0,1330**
Esp. Santo Acções Global	-0,0041	0,0494	0,0034	-0,2266	0,0979
MSCI World Local Currency	**-0,0009**	**0,0463**	**0,0081**	**-0,1798**	**0,0955**
Finifundo Acções Internacionais	-0,0039	0,0632	0,0070	-0,2706	0,1530
MSCI World Total Return	**-0,0007**	**0,0457**	**0,0061**	**-0,1239**	**0,1092**
Millennium Mercados Emergentes	0,0062	0,0697	0,0157	-0,2391	0,1480
MSCI Emerging Markets (USD) + ECB	**0,0155**	**0,0905**	**0,0213**	**-0,4340**	**0,2184**
Millennium Acções Mundiais	-0,0073	0,0478	0,0052	-0,1300	0,0897
MSCI World Total Return	**-0,0030**	**0,0467**	**0,0047**	**-0,1239**	**0,1092**

Table 3 - Measures of descriptive statistics of the five groups of funds:
(Domestic Equity Funds, European Union, Switzerland and Norway Equity Funds, North American Equity Funds, Sector Equity Funds and Other International Equity Funds)

5.6 Diagnostic Tests

In all series of sample data the ADF Test (Augmented Dickey Fuller) was made in order to verify the stationary property. The null hypothesis (H0) of the ADF Test is that the series of the data analyzed had a unit root (are not stationary). The results of the ADF Test can be seen in the following tables:

	Mutual Funds	ADF Test	Prob.
Domestic Equity Funds	Banif Acções Portugal	-8.929.981,00	0,00
	Barclays Premier Acções Portugal	-8.604.139,00	0,00
	BPI Portugal	-8.628.636,00	0,00
	Caixagest Accões Portugal	-8.417.373,00	0,00
	Caixagest Gestão Lusoacções	-6.577.827,00	0,00
	Espírito Santo Portugal Accões	-8.830.953,00	0,00
	Millennium Acções Portugal	-8.898.092,00	0,00
	Santander Accões Portugal	-8.924.692,00	0,00
	PSI20	-9.149.991,00	0,00
European Union, Norway and Switzerland Equity Funds	Banif Euro Acções	-9.516.138,00	0,00
	BBVA Bolsa Euro	-5.490.664,00	0,00
	BPI Europa Grandes Capitalizações	-9.738.746,00	0,00
	Popular Acções	-9.427.886,00	0,00
	Eurostoxx50	-9.713.421,00	0,00
	Millennium Eurocarteira	-8.282.078,00	0,00
	FT Europe	-8.635.824,00	0,00
	BPN Acções Europa	-6.011.688,00	0,00
	MSCI Europe	-5.702.520,00	0,00
	Finicapital	-8.042.910,00	0,00
	IBEX_PSI_Eurostoxx50	-8.026.680,00	0,00
	Montepio Acções	-9.208.709,00	0,00
	PSI_Stoxx600	-8.707.025,00	0,00
	Esp, Santo Acções Europa	-8.938.304,00	0,00
	Raiz Europa	-9.522.451,00	0,00
	Santander Acções Europa	-9.217.954,00	0,00
	Stoxx Large 200	-8.818.076,00	0,00
	BPI Europa Valor	-8.205.383,00	0,00
	Caixagest Acções Europa	-8.959.463,00	0,00
	Caixagest gestão Euroacções	-6.928.713,00	0,00
	Montepio Acções Europa	-9.491.691,00	0,00
	Postal Acções	-8.435.280,00	0,00
	Stoxx 600	-8.571.778,00	0,00

Table 4 - ADF Test for the Equity Funds: Group 1 and 2.

	Mutual Funds	ADF Test	Prob.
North American Equity Funds	BPI América	-9.432.042,00	0,00
	Caixagest Acções EUA	-9.485.735,00	0,00
	Caixagest Gestão EUA	-6.218.592,00	0,00
	Esp. Santo Acções América	-9.328.374,00	0,00
	Millennium Acções América	-9.643.335,00	0,00
	Santander Acções América	-7.177.875,00	0,00
	Santander Acções USA	-6.472.406,00	0,00
	SP500TR	-6.448.779,00	0,00
Sector Equity Funds	BPI Tecnologias	-1.062.106,00	0,00
	Nasdaq + ECB	-9.121.114,00	0,00
	Millennium Eurofinanceiras	-8.754.005,00	0,00
	Dow Jones FS, Banks and Inssurance	-8.782.810,00	0,00
	Millennium Global Utilities	-9.657.577,00	0,00
	MSCI Utilities	-9.561.738,00	0,00
	Montepio Euro Telcos	-6.653.305,00	0,00
	Stoxx 600 Telecommunications	-6.499.282,00	0,00
	Montepio Euro Utilities	-6.685.105,00	0,00
	Eurostoxx Utilities	-6.782.487,00	0,00
	Santander Euro Futuro Acções Defensivo	-8.481.461,00	0,00
	Santander Euro Futuro Cíclico	-8.984.137,00	0,00
	MSPE Index	-8.694.856,00	0,00
	Santander Euro Futuro Banca e Seguros	-8.785.605,00	0,00
	Dow Jones Banks and Inssurance	-9.391.708,00	0,00
	Santander Euro Fut. Telecomunicações	-9.934.642,00	0,00
	Stoxx 600 Telecommunications	-5.121.158,00	0,00
Other International Equity Funds	BPI Reestruturações	-9.764.885,00	0,00
	MSCI World	-8.811.648,00	0,00
	BPN Acções Global	-4.473.324,00	0,00
	MSCI World Total Return	-8.492.125,00	0,00
	Caixagest Acções Emergentes	-7.061.358,00	0,00
	Esp. Santo Merc. Emergentes	-5.942.749,00	0,00
	MSCI Emerging Markets	-9.159.732,00	0,00
	Caixagest Acções Japão	-8.769.251,00	0,00
	Millennium Acções Japão	-8.750.951,00	0,00
	FTSE Japan	-9.022.520,00	0,00
	Caixagest Acções Oriente	-8.918.126,00	0,00
	MSCI Pacific	-8.608.320,00	0,00
	Esp. Santo Acções Global	-8.779.924,00	0,00
	MSCI World Local Currency	-8.423.936,00	0,00
	Finifundo Acções Internacionais	-9.567.817,00	0,00

	MSCI World Total Return	-8.806.142,00	0,00
	Millennium Mercados Emergentes	-9.330.570,00	0,00
	MSCI Emerging Markets and ECB	-8.807.663,00	0,00
	Millennium Acções Mundiais	-8.356.548,00	0,00
	MSCI World Total Return	-8.361.780,00	0,00

Table 5 - ADF Test for the Equity Funds: Group 3 to 5.

In the table "Prob." identifies the p-values for the ADF Test. As the probability associated to the t statistic is bellow 0,05 for all the funds as well as for their respective Equity Index, this implies that the H0 is rejected with a confidence level of 95% . This means that the series of the data analyzed is stationary. With these results it is possible to state that the regressions cannot be considered spurious, indicating the robustness of the data.

No test was conducted to verify the normality of the errors. As the sample size is higher than 30 funds, the statistical inference is valid even if the normality of the errors is violated.

After estimating the parameters, two tests were conducted to verify the homoscedasticity property and if there is a presence of first order autocorrelation of the errors. For the homoscedasticity property the White (1980) Heteroscedasticity Test was realized, where the null hypothesis (H0) is that there is homoscedasticity. For the auto-correlation of the errors, the Breusch (1978) and Godfrey (1978) Serial Correlation LM Test was used where the null hypothesis is that there isn´t autocorrelation of the errors.

According to the results of the abovementioned tests the following corrections were made:

Property violated	Methods used for the correction
Homoscedasticity is violated	White (1980) Correction
Presence of Heteroscedasticity and autocorrelations of the errors	Newey-West (1987) Correction
Autocorrelation of the errors	Cochrane-Orcutt (1949) Method
Neither of the properties violated	No correction was made

In the following subsection, firstly the results of the empirical study are presented without any correction and then the results are analyzed with the respective corrections.

5.7 Empirical Results

The empirical results of the Portuguese Equity Funds performance were conducted using two different specifications. Firstly the Jensen (1968) measure, equation 3.1 is presented where the market timing ability is ignored. Thereafter the Merton and Henriksson's (1981),

equations 4.6 and 4.10 are provided where both the selectivity and market timing abilities are measured.

The tests were run for the entire period at which each fund existed and the Ordinary Least Square method was used to estimate the parameters. The results are presented on tables 6, 7 and 9.

5.7.1 Jensen Equation (1968)

Starting with the Domestic Equity Funds group, about 50.0% of the group shows positive selectivity abilities (Alpha > 0). However none of them are statistically significant. This result suggests that none of the funds are capable to overcome the returns indicated for their level of risk and that they do not have the selectivity ability. Within this group the Caixagest Acções Portugal fund was the worst performer with a negative value of the Alpha parameter of 0.0022.

The systematic risk, showed on table 6 that all the Funds have high levels of systematic risk with an average of 0,97. In addition, all of them are statistically significant with a significance level of 1.0%. Only two Funds are considered to be aggressive as they have a Beta1 > 1. These funds are Barclays Premier Acções Portugal and Santander Acções Portugal.

In the second group, European Union, Switzerland and Norway Equity Funds, the results are weaker as only BPN Acções Europa fund from a group of sixteen funds has a positive selectivity parameter but it is not statistically significant. The rest of the funds had negative selectivity parameter from which eight are statistically significant at 10.0% significance level. The fund with the worse performance was the Caixagest Gestão Euroacções.

Like in the Domestic Equity Funds the systematic risk also presented high values between 0.56 and 1.21, with a statistically significance level of 1.0%. The average value is of 0,96 and there are 8 defensive funds (Beta1 < 1) and 8 aggressive funds (Beta1 > 1).

In the North American Funds all seven funds had a negative selectivity coefficient where three of them are statistically significant at 5% significant level namely the BPI América, Caixagest Gestão EUA and Millennium Acções América funds. The worst performer in terms of selecting underestimated or overestimated assets was the fund Caixagest Gestão EUA. The systematic risk coefficient is positive and statistically significant at 1.0% significance level across all funds with an average value of 0,83. The only aggressive fund is the Caixagest Gestão EUA with a Beta2 coefficient above one.

In the Sector Equity Funds, three out of the nine funds have a positive selectivity parameter. From which only the Santander Euro Futuro Cíclico fund is statistically significant at 5.0% significance level. The other six funds that have a negative parameter, two of them, BPI Tecnologias and the Millennium Eurofinanceiras funds, are statistically significant at 10.0% significance level.

The average of the Sector Equity Fund's systematic risk is quite high with a value of 0,94. All the funds demonstrate a positive systematic risk and are statistically significant at 1.0% significance level. From the nine funds that compose this group the BPI Tecnologias and Millennium Eurofinanceiras funds are aggressive.

The Other International Equity Funds group shows only two funds with a positive selectivity parameter from which only the BPI Reestruturações is statistically significant at 5.0% significance level. The rest of the funds have a negative selectivity ability from which four of them are statistically significant at 10.0% significance level (Caixagest Acções Emergentes, Espírito Santo Acções Global, Espírito Santo Acções Emergentes and Millennium Acções Mundiais).

The systematic risk also presents high values with an average value of 0,85, with all of them statistically significant at 1.0% significance level. From the eleven funds only Espírito Santo Acções Global, Espírito Santo Mercados Emergentes and Finifundo Acções Internacionais funds are considered to be aggressive.

Table 6 - Jensen (1968) measure (Equation 3.1) for the period of January of 2001 to December 2010.

The following tables shows the estimates for the coefficients obtained through a linear regression $R_{p,t} - R_{f,t} = \alpha_p + \beta_{1p}(R_{m,t} - R_{f,t}) + \epsilon_{p,t}$ from January 2001 to December 2010.

1. Domestic Equity Funds									
	αp		**t-stat**	**β1p**		**t-stat**	**R2**	**F-stat**	
BAP	-0,0001		-0,04	0,98	+	31,34	0,89	982,06	+
BPAP	-0,0005		-0,35	1,01	+	39,77	0,93	1581,77	+
BPIP	0,0008		0,42	0,91	+	26,81	0,86	718,90	+
CAP	-0,0022		-1,32	0,99	+	33,39	0,90	1114,98	+
CGL	0,0009		0,39	0,91	+	20,06	0,88	402,45	+
ESPA	-0,0005		-0,33	0,98	+	35,82	0,92	1283,15	+
MAP	0,0007		0,46	0,98	+	35,22	0,91	1240,21	+
SAP	0,0010		0,59	1,03	+	34,34	0,91	1178,91	+
Mean	**0,0000**			**0,97**			**0,90**		
Number of Funds	**αp > 0**		**4**						

2. European Union, Switzerland and Norway Equity Funds									
	αp		**t-stat**	**β1p**		**t-stat**	**R2**	**F-stat**	
BEA	-0,0038	-	-2,80	1,04	+	45,90	0,95	2107,22	+
BBVABE	-0,0016		-0,83	1,01	+	32,17	0,91	1035,10	+
BPIEGC	-0,0003		-0,15	0,84	+	28,29	0,87	800,22	+
PPA	-0,0016	(---)	-1,88	0,96	+	67,52	0,98	4559,15	+
ME	-0,0038	-	-4,03	1,06	+	56,39	0,96	3179,59	+
BPNAE	0,0015		0,50	0,95	+	17,33	0,85	300,50	+
FC	-0,0022		-1,08	0,56	+	24,91	0,87	620,57	+

MA	-0,0004		-0,53	1,00	+	70,94	0,98	5033,10	+
ESAE	-0,0007		-0,43	0,85	+	25,12	0,84	631,12	+
RE	-0,0033	(---)	-1,89	0,85	+	24,28	0,83	589,32	+
SAE	-0,0030	(--)	-2,05	1,21	+	41,24	0,94	1700,53	+
BPIEV	-0,0014		-0,68	0,94	+	23,04	0,82	530,80	+
CAE	-0,0045	-	-4,24	1,03	+	49,51	0,95	2450,98	+
CGE	-0,0069	-	-5,12	1,03	+	38,99	0,97	1520,10	+
MAE	-0,0020	-	1,68	1,04	+	44,60	0,94	1988,80	+
PSA	-0,0004		-0,16	0,92	+	19,40	0,76	376,18	+
Mean	**-0,0021**			**0,96**			**0,90**		
Number of Funds	**αp > 0**		**1**						

3. North American Equity Funds									
	αp		**t-stat**	**β1p**		**t-stat**	**R2**	**F-stat**	
BPIA	-0,0060	(--)	-2,03	0,76	+	12,34	0,56	152,28	+
CAEUA	-0,0047		-1,42	0,75	+	10,66	0,50	113,60	+
CGEUA	-0,0098	(--)	-2,15	1,10	+	10,13	0,68	102,70	+
ESAA	-0,0031		-1,59	0,90	+	21,92	0,80	480,53	+
MAA	-0,0059	(--)	-2,06	0,84	+	14,18	0,63	201,17	+
SAA	-0,0041		-1,20	0,59	+	8,10	0,46	65,68	+
SAUSA	-0,0017		-1,59	0,88	+	38,70	0,95	1497,88	+
Mean	**-0,0051**			**0,83**			**0,66**		
Number of Funds	**αp > 0**		**0**						

4. Sector Equity Funds									
	αp		**t-stat**	**β1p**		**t-stat**	**R2**	**F-stat**	
BPIT	-0,0085	(---)	-1,73	1,40	+	12,82	0,59	164,40	+
MEF	-0,0027	(--)	-1,99	1,07	+	57,19	0,97	3270,76	+
MGU	-0,0002		-0,15	0,96	+	26,30	0,85	691,49	+
MET	0,0014		0,81	0,85	+	21,03	0,87	442,30	+
MEU	-0,0007		-0,45	0,82	+	30,87	0,93	952,96	+
SEFAD	0,0015		0,85	0,53	+	14,30	0,64	204,42	+
SEFC	0,0046	(++)	2,33	0,94	+	23,28	0,82	542,18	+
SEFBS	-0,0009		-0,81	0,95	+	71,04	0,98	5047,14	+
SEFT	-0,0013		-0,48	0,99	+	24,42	0,83	596,19	+
Mean	**-0,0007**			**0,94**			**0,83**		
Number of Funds	**αp > 0**		**3**						

5. Other International Equity Funds									
	αp		**t-stat**	**β1p**		**t-stat**	**R2**	**F-stat**	
BPIR	0,0052	(++)	2,25	0,62	+	12,46	0,57	155,32	+
BPNAG	-0,0005		-0,15	0,80	+	10,87	0,52	118,26	+

CAEM	-0,0058	-	-3,37	0,99	+	38,19	0,95	1458,22	+
CAJ	-0,0038		-1,20	0,76	+	13,04	0,59	169,98	+
CAO	0,0009		0,34	0,74	+	17,13	0,71	293,47	+
ESME	-0,0029	(---)	-1,91	1,02	+	44,82	0,94	2009,20	+
ESAG	-0,0032	(--)	-2,01	1,00	+	29,64	0,88	878,50	+
FAI	-0,0027		-0,94	1,20	+	19,17	0,76	367,51	+
MAJ	-0,0043		-1,38	0,71	+	12,14	0,56	147,43	+
MME	-0,0034		-0,75	0,55	+	11,10	0,51	123,29	+
MAM	-0,0043	-	-3,55	0,99	+	38,29	0,93	1465,99	+
Mean	**-0,0023**			**0,85**			**0,72**		
Number of Funds	**αp > 0**		**3**						

Totals of the Sample					
	αp		**β1p**		**R2**
Mean	-0,0020		0,92		0,82
Number of funds	**αp > 0**	11			
	Rejects αp=0:	7- 6-- 4(---)	Rejects β1p=0:	51+	
		2++			
- (--) (---)	Negative significant estimates at a 1% (5%) and (10%) significance level				
+ (++) (+++)	Positive significant estimates at a 1% (5%) and (10%) significance level				

By comparing the five Equity Funds groups, the high Systematic risk levels are due to the high levels of investments in the equities along with a good performance of the equity market during 2004-2007. The high values of Beta coefficient are reflected on the values of the coefficient of determination levels (R^2), which also exhibits high values and are statistically significant at 1.0% significance level. The regression explains about 82.0% of the fund returns where in the first two groups (Domestic Equity Funds and European Union, Norway and Switzerland Equity Funds) the R^2 is much higher comparing to the rest of the groups. This might be due to the selection of the benchmark (equity index).

Within the five groups of funds the best performer fund was the BPI Reestruturações and the worst performers were Caixagest Gestão EUA and BPI Tecnologias funds.

5.7.2 Merton and Henriksson equation (1981)

According to the empirical results obtained through the Merton and Henriksson equation (1981), equation 4.6, from the fifty one Portuguese Equity Funds analyzed, sixteen funds had positive selectivity coefficient. Out of the sixteen positive coefficients only four funds are significant at 5.0% significant level (Montepio Euro Telcos, Santander Euro Futuro Acções Defensivo, Santander Euro Acções Cíclico and BPI Reestruturações). On the other hand, there are thirty five funds that had negative coefficient, six of which are found to be

statistically significant at 5.0% significant level (Caixagest Acções Europa, Caixagest Gestão Euroacções, Montepio Acções Europa, Caixagest Acções Emergentes, Caixagest Acções Japão and Millennium Acções Japão).

From the five groups of funds analyzed only the fourth group, the Sector Equity Funds showed some capacity for selectivity with an average of 0.11%, whereas the other four groups showed negative averages.

Analyzing each fund individually, the best performer was BPI Reestruturações which is consistent with the Jensen Equation´s (1968) conclusion and the worst performance were exhibited by the funds Millennium Acções Japão and Caixagest Acções Japão.

Regarding the systematic risk, the 5 groups showed high values of coefficient and all of them are statistically significant at 1.0% significance level. It is important to note that the Beta1 estimate is higher when the timing ability is ignored: 0.9200 when applying the Jensen equation (1968) and 0.9000 when applying the Merton and Henriksson equation (1981). Inversely, the estimates of the Alpha estimate are more negative when applying the Jensen equation (1968) with a negative average value of 0.0020 and when applying the Merton and Henriksson equation (1981) with a negative average value of 0.0016.

Therefore, it can be noted that the Jensen equation (1968) tends to underestimate the contribution of the selectivity ability on the overall performance; however it reflects the negative value of the market timing estimate when applying the Henriksson and Merton equation (1981).

Regarding the market timing ability, about two fifths of the funds had positive estimate which represents the Beta2 coefficient with a negative average value of 0.0243. From the Funds with positive Beta2 coefficients only two funds are statistically significant at 1.0% significant level: Caixagest Acções Japão and Millennium Acções Japão. About seven funds appeared to have negative coefficients with a statistically significant level of 10.0% (BBVA Bolsa Euro, Popular Acções, Millennium Eurocarteira, Caixagest Gestão EUA, Montepio Euro Telcos, Santander Euro Futuro Acções Defensivo and BPI Reestruturações). The worst group was the North American funds with a negative value of the market timing ability of 0.1360.

Curiously, in individual terms, the funds that had the best timing ability were the funds that had the worst performance regarding the selectivity ability: the fund Millennium Acções Japão and the fund Caixagest Acções Japão. Caixagest Gestão EUA fund had the worst timing coefficient amongst the total number of the funds.

With regards to the r-squared, all funds showed to have high values with a statistically significance level of 1.0%, representing an average of 0,8200 which means that the applied regression properly explained the fund´s returns.

Table 7 - Henriksson and Merton (1981), (Equation 4.6): parametric tests for the period of January of 2001 to December 2010.

The following tables demonstrate the coefficients estimates obtained through the linear regression: $R_{p,t} - R_{f,t} = \alpha_p + \beta_{1p}x_t + \beta_{2p}y_t + \varepsilon_{p,t}$ for the period between January 2001 to December 2010.

1. Domestic Equity Funds												
	αp		**t-stat**	**β1p**		**t-stat**	**β2p**		**t-stat**	**R2**	**F-stat**	
BAP	-0,0019		-0,70	1,04	+	14,46	0,09		0,89	0,89	490,56	+
BPAP	0,0002		0,08	0,99	+	16,93	-0,03		-0,40	0,93	785,33	+
BPIP	-0,0004		-0,12	0,95	+	12,12	0,06		0,52	0,86	357,35	+
CAP	-0,0029		-1,09	1,01	+	14,79	0,03		0,31	0,90	553,27	+
CGL	0,0012		0,33	0,90	+	8,55	-0,02		-0,10	0,88	197,54	+
ESPA	-0,0034		-1,42	1,07	+	17,16	0,14		1,59	0,92	651,18	+
MAP	-0,00137		-0,56	1,04	+	16,40	0,10		1,13	0,91	622,23	+
SAP	-0,00004		-0,02	1,06	+	15,41	0,05		0,53	0,91	586,00	+
Mean	**-0,0011**			**1,0077**			**0,0525**			**0,9013**		
Number of Funds	**αp > 0**		2				**β2p > 0**		6			
ρ(α,β) = -0,76												

2. European Union, Switzerland and Norway Equity Funds												
	αp		**t-stat**	**β1p**		**t-stat**	**β2p**		**t-stat**	**R2**	**F-stat**	
BEA	-0,0014		-0,65	0,97	+	18,67	-0,11		-1,46	0,95	1064,77	+
BBVABE	0,0021		0,73	0,90	+	12,99	-0,17	(---)	-1,67	0,91	528,11	+
BPIEGC	0,0002		0,07	0,82	+	12,02	-0,02		-0,21	0,87	396,89	+
PPA	0,0002		0,15	0,91	+	28,82	-0,08	(---)	-1,80	0,98	2329,70	+
ME	-0,0018		-1,20	0,99	+	23,51	-0,11	(---)	-1,74	0,97	1618,61	+
BPNAE	0,0019		0,40	0,94	+	7,12	-0,02		-0,12	0,85	147,56	+
FC	-0,0024		-0,77	0,57	+	11,39	0,01		0,11	0,87	307,03	+
MA	-0,0014		-1,17	1,04	+	30,32	0,05		1,07	0,98	2520,00	+
ESAE	-0,0010		-0,40	0,86	+	11,50	0,02		0,15	0,84	312,96	+
RE	-0,0032		-1,20	0,85	+	10,95	0,00		-0,03	0,83	292,17	+
SAE	-0,0027		-1,18	1,20	+	18,48	-0,02		-0,19	0,94	843,33	+
BPIEV	-0,0006		-0,19	0,91	+	9,75	-0,04		-0,30	0,82	263,40	+
CAE	-0,0059	-	-3,53	1,08	+	22,65	0,08		1,12	0,95	1228,68	+
CGE	-0,0085	-	-3,87	1,09	+	16,73	0,09		0,94	0,97	758,80	+
MAE	-0,0038	(--)	-2,06	1,10	+	20,70	0,10		1,29	0,94	1000,78	+
PSA	0,0034		0,88	0,80	+	7,36	-0,20		-1,26	0,76	189,84	+
Mean	**-0,0016**			**0,9395**			**-0,0268**			**0,9016**		
Number of Funds	**αp > 0**		**5**				**β2p > 0**		**6**			
ρ(α,β) = -0,80												

3. North American Equity Funds												
	αp		**t-stat**	**β1p**		**t-stat**	**β2p**		**t-stat**	**R2**	**F-stat**	
BPIA	-0,0038		-0,81	0,68	+	4,90	-0,13		-0,63	0,56	75,95	+
CAEUA	-0,0036		-0,69	0,71	+	4,51	-0,07		-0,29	0,50	56,38	+
CGEUA	0,0010		0,15	0,70	+	3,09	-0,68	(--)	-1,99	0,70	56,46	+
ESAA	-0,0031		-1,01	0,90	+	9,69	0,00		0,00	0,80	238,23	+
MAA	-0,0047		-1,04	0,80	+	5,96	-0,07		-0,35	0,63	99,90	+
SAA	-0,0047		-0,88	0,61	+	3,72	0,03		0,13	0,46	32,42	+
SAUSA	-0,0010		-0,58	0,86	+	16,70	-0,04		-0,59	0,95	742,73	+
Mean	**-0,0028**			**0,75**			**-0,14**			**0,66**		
Number of Funds	**αp > 0**		1				**β2p > 0**		2			
ρ(α,β) = -0,78												

4. Sector Equity Funds												
	αp		**t-stat**	**β1p**		**t-stat**	**β2p**		**t-stat**	**R2**	**F-stat**	
BPIT	-0,0051		-0,66	1,28	+	5,11	-0,20		-0,55	0,59	81,84	+
MEF	-0,0021		-1,08	1,06	+	27,16	-0,02		-0,41	0,97	1623,93	+
MGU	-0,0021		-0,85	1,04	+	10,81	0,13		0,93	0,86	345,81	+
MET	0,0082	+	2,91	0,63	+	7,57	-0,39	-	-2,97	0,88	251,38	+
MEU	-0,0028		-1,05	0,88	+	13,09	0,10		0,96	0,94	476,45	+
SEFAD	0,0067	(++)	2,35	0,35	+	4,04	-0,28	(--)	-2,32	0,65	108,74	+
SEFC	0,0071	(++)	2,25	0,85	+	8,80	-0,14		-1,01	0,82	271,65	+
SEFBS	-0,0010		-0,66	0,95	+	35,41	0,00		0,12	0,98	2502,49	+
SEFT	0,0012		0,32	0,92	+	10,25	-0,11		-0,91	0,84	298,10	+
Mean	**0,0011**			**0,88**			**-0,10**			**0,84**		
Number of Funds	**αp > 0**		4				**β2p > 0**		3			
ρ(α,β) = -0,79												

5. Other International Equity Funds												
	αp		**t-stat**	**β1p**		**t-stat**	**β2p**		**t-stat**	**R2**	**F-stat**	
BPIR	0,0102	+	2,81	0,43	+	3,55	-0,30	(--)	-1,78	0,58	80,66	+
BPNAG	-0,0001		-0,03	0,79	+	4,72	-0,02		-0,09	0,52	58,59	+
CAEM	-0,0076	-	-2,80	1,03	+	19,36	0,07		0,86	0,95	726,91	+
CAJ	-0,0179	-	-3,76	1,18	+	9,51	0,70	+	3,80	0,64	101,90	+
CAO	0,0008		0,20	0,74	+	8,14	0,00		0,03	0,71	145,49	+
ESME	0,0003		0,12	0,96	+	19,62	-0,12		-1,58	0,95	1018,69	+
ESAG	-0,0004		-0,16	0,90	+	10,87	-0,16		-1,40	0,88	443,84	+
FAI	-0,0011		-0,24	1,14	+	7,70	-0,09		-0,43	0,76	182,58	+
MAJ	-0,0200	-	-4,20	1,17	+	9,49	0,76	+	4,19	0,62	92,95	+
MME	0,0007		0,10	0,49	+	4,94	-0,12		-0,77	0,51	61,73	+
MAM	-0,0029		-1,52	0,93	+	14,83	-0,08		-0,92	0,93	732,31	+
Mean	**-0,0035**			**0,8864**			**0,0584**			**0,7320**		
Number of Funds	**αp > 0**		4				**β2p > 0**		4			
ρ(α,β) = -0,78												

Totals of the Sample								
	αp		**β1p**		**β2p**		**R2**	
Mean	-0,0016		0,9030		-0,0243		0,82	
Number of funds	**αp > 0**	16			**β2p > 0**	22		
	Rejects αp=0:	5- 1--	Rejects β1p=0:	51 +	Rejects β2p=0:	1- 2-- 4-- -	Rejects β1p=β2p=0:	51 +
		2+ 2++				2+		
ρ(α,β) = -0,78								
- (--) (---)	Negative significant estimates at a 1% (5%) and (10%) significance level							
+ (++) (+++)	Positive significant estimates at a 1% (5%) and (10%) significance level							

To conclude, on the review of Merton and Henriksson (1981), equation 4.6, it is important to observe the correlation between the selectivity and market timing abilities. On the table 8, the 5 groups of Equity Funds exhibits negative correlation with a negative average value of 0,7800. This means that the fund's managers are not able to have positive contributions simultaneously. The negative correlation is more negative in the group of funds with an international portfolio such as the groups 2 to 5. The result of negative correlation between the two abilities were also verified by previous studies like Henriksson (1984), Armada (1992), Cortez and Armada (1997), Romacho (2004) and Afonso (2010).

Table 8 - Resume of the correlation between selectivity and market timing

The following table shows the coefficient of correlation between the two abilities for the Henriksson and Merton (1981) model, equation 4.6, from January 2011 to December 2010.

Portuguese Equity Funds	ρ(α,β)
1. Domestic Equity Funds	- 0,76
2. European Union, Switzerland and Norway Equity Funds	- 0,80
3. North American Funds	- 0,78
4. Sector Equity Funds	- 0,79
5. Other International Equity Funds	- 0,78

5.7.3 Merton and Henriksson equation (1981) – Linear Transformation

Besides the equation 4.6, Merton and Henriksson (1981) also suggested an alternative implementation of the model through a linear transformation, by using equation 4.10 to measure the selectivity and market timing abilities. Table 9 demonstrates the results of applying the alternative method.

The estimates for Beta1 parameter explains the level of systematic risk taken by the managers for bear market and Beta2 parameter explains the level of systematic risk assumed for the bull market.

By using the equation 4.10 the inexistence of significant market timing ability by the managers becomes more evident. Although 21 Funds had a Beta for the Bull market greater than a Beta for the Bear market (Beta2 - Beta1 > 0), which implies a positive market timing ability by the managers, only 2 funds presents a positive significant difference at 1% significant level which is in accordance with the application of the equation 4.6: Caixagest Acções Japão and Millennium Acções Japão.

Table 9 - Henriksson and Merton (1981) parametric tests, (equation 4.10), from of January of 2001 to December 2010 (alternative regression).

The following tables demonstrate the estimates for the coefficients obtained through the linear regression $R_{p,t} - R_{f,t} = \alpha`_p + \beta`_{1p}x_{1,t} + \beta`_{2p}x_{2,t} + \varepsilon`_{p,t}$ between January 2001 and December 2010.

1. Domestic Equity Funds										
	αp		**t-stat**	**β1´p**	**t-stat**	**β2´p**	**t-stat**	**β2´p - β1´p**		**Chi-square**
BAP	-0,0019		-0,70	0,95	19,75	1,04	14,46	0,09		0,79
BPAP	0,0002		0,08	1,02	26,16	0,99	16,93	-0,03		0,16
BPIP	-0,0004		-0,12	0,89	17,05	0,95	12,12	0,06		0,27
CAP	-0,0029		-1,09	0,98	21,47	1,01	14,79	0,03		0,10
CGL	0,0012		0,33	0,92	12,74	0,90	8,55	-0,02		0,01
ESPA	-0,0034		-1,42	0,93	22,32	1,07	17,16	0,14		2,53
MAP	-0,0014		-0,56	0,94	22,15	1,04	16,40	0,10		1,28
SAP	-0,00004		-0,02	1,01	21,93	1,06	15,41	0,05		0,28
Mean	**-0,0011**			**0,96**		**1,01**		**0,05**		
Number of Funds	**αp > 0**		**2**			**β2´p - β1´p > 0**		**6**		

2. European Union, Switzerland and Norway Equity Funds										
	αp		**t-stat**	**β1´p**	**t-stat**	**β2´p**	**t-stat**	**β2´p - β1´p**		**Chi-square**
BEA	-0,0014		-0,65	1,08	30,18	0,97	18,67	-0,11		2,13
BBVABE	0,0021		0,73	1,07	22,01	0,90	12,99	-0,17	(---)	2,79
BPIEGC	0,0002		0,07	0,84	17,90	0,82	12,02	-0,02		0,04
PPA	0,0002		0,15	0,99	44,67	0,91	28,82	-0,08	(---)	3,25
ME	-0,0018		-1,20	1,10	36,68	0,99	23,51	-0,11	(---)	3,03
BPNAE	0,0019		0,40	0,96	10,95	0,94	7,12	-0,02		0,01
FC	-0,0024		-0,77	0,56	15,48	0,57	11,39	0,01		0,01
MA	-0,0014		-1,17	0,99	43,86	1,04	30,32	0,05		1,14
ESAE	-0,0010		-0,40	0,84	15,59	0,86	11,50	0,02		0,02
RE	-0,0032		-1,20	0,85	15,20	0,85	10,95	0,00		0,00
SAE	-0,0027		-1,18	1,22	25,93	1,20	18,48	-0,02		0,04
BPIEV	-0,0006		-0,19	0,95	14,54	0,91	9,75	-0,04		0,09
CAE	-0,0059	-	-3,53	1,00	30,02	1,08	22,65	0,08		1,25

CGE	-0,0085	-	-3,87	1,00	23,74	1,09	16,73	0,09		0,88
MAE	-0,0038	(--)	-2,06	1,00	26,87	1,10	20,70	0,10		1,66
PSA	0,0034		0,88	1,00	13,11	0,80	7,36	-0,20		1,60
Mean	**-0,0016**			**0,97**		**0,94**		**-0,03**		
Number of Funds	**αp > 0**		**5**			**β2´p - β1´p> 0**		**6**		

3. North American Funds										
	αp		**t-stat**	**β1´p**	**t-stat**	**β2´p**	**t-stat**	**β2´p - β1´p**		**Chi-square**
BPIA	-0,0038		-0,81	0,81	8,25	0,68	4,90	-0,13		0,39
CAEUA	-0,0036		-0,69	0,77	6,94	0,71	4,51	-0,07		0,09
CGEUA	0,0010		0,15	1,38	7,86	0,70	3,09	-0,68	(--)	3,98
ESAA	-0,0031		-1,01	0,90	13,77	0,90	9,69	0,00		0,00
MAA	-0,0047		-1,04	0,87	9,19	0,80	5,96	-0,07		0,12
SAA	-0,0047		-0,88	0,58	5,12	0,61	3,72	0,03		0,02
SAUSA	-0,0010		-0,58	0,90	25,43	0,86	16,70	-0,04		0,35
Mean	**-0,0028**			**0,89**		**0,75**		**-0,14**		
Number of Funds	**αp > 0**		**1**			**β2´p - β1´p > 0**		**2**		

4. Sector Equity Funds										
	αp		**t-stat**	**β1´p**	**t-stat**	**β2´p**	**t-stat**	**β2´p - β1´p**		**Chi-square**
BPIT	-0,0051		-0,66	1,48	8,47	1,28	5,11	-0,20		0,30
MEF	-0,0021		-1,08	1,08	37,12	1,06	27,16	-0,02		0,17
MGU	-0,0021		-0,85	0,91	15,66	1,04	10,81	0,13		0,87
MET	0,0082	+	2,91	1,02	14,74	0,63	7,57	-0,39	-	8,82
MEU	-0,0028		-1,05	0,79	16,96	0,88	13,09	0,10		0,93
SEFAD	0,0067	(++)	2,35	0,63	10,98	0,35	4,04	-0,28	-	5,37
SEFC	0,0071	(++)	2,25	0,98	15,56	0,85	8,80	-0,14		1,02
SEFBS	-0,0010		-0,66	0,95	46,87	0,95	35,41	0,00		0,01
SEFT	0,0012		0,32	1,03	17,07	0,92	10,25	-0,11		0,84
Mean	**0,0011**			**0,99**		**0,88**		**-0,10**		
Number of Funds	**αp > 0**		**4**			**β2´p - β1´p > 0**		**3**		

5. Other International Equity Funds										
	αp		**t-stat**	**β1´p**	**t-stat**	**β2´p**	**t-stat**	**β2´p - β1´p**		**Chi-square**
BPIR	0,0102	+	2,81	0,73	9,42	0,43	3,55	-0,30	(---)	3,16
BPNAG	-0,0001		-0,03	0,81	6,88	0,79	4,72	-0,02		0,01
CAEM	-0,0076	-	-2,80	0,96	22,30	1,03	19,36	0,07		0,75
CAJ	-0,0179	-	-3,76	0,49	5,37	1,18	9,51	0,70	+	14,45
CAO	0,0008		0,20	0,73	10,98	0,74	8,14	0,00		0,00
ESME	0,0003		0,12	1,07	27,12	0,96	19,62	-0,12		2,51
ESAG	-0,0004		-0,16	1,06	20,21	0,90	10,87	-0,16		1,97
FAI	-0,0011		-0,24	1,23	12,31	1,14	7,70	-0,09		0,19

MAJ	-0,0200	-	-4,20	0,41	4,54	1,17	9,49	0,76	+	17,58
MME	0,0007		0,10	0,60	7,28	0,49	4,94	-0,12		0,59
MAM	-0,0029		-1,52	1,02	25,28	0,93	14,83	-0,08		0,84
Mean	**-0,0035**			**0,83**		**0,89**		**0,06**		
Number of Funds	**αp > 0**		**4**			**β2´p - β1´p > 0**		**4**		

Totals of the Sample								
	αp		**β1´p**		**β2´p**		**β2´p - β1´p**	
Mean	0,00		0,93		0,90		-0,02	
Number of funds	**αp > 0**	16			**β2´p > β1´0**	21		
	Rejects αp=0:	5- 1-- 2+ 2++	Rejects β1p=0:	51+	Rejects β2p=0:	2- 1-- 4-- - 2+	Rejects β1´p=β2´p:	51+
- (--) (---)	Denotes number of funds with negative estimates at 1% (5%) and (10%) significance level							
+ (++) (+++)	Denotes number of funds with positive estimates at 1% (5%) and (10%) significance level							

The case of "perverse timing" is defined when the risk assumed by the fund managers for the bear market is greater than the risk assumed for the bull market and this is evident for 30 Funds. From which 7 funds have a negative significant difference at 10% significance level (BBVA Bolsa Euro, Popular Acções, Millennium Eurocarteira, Caixagest Gestão EUA, Montepio Euro Telcos, Santander Euro Futuro Acções Defensivo and BPI Reestruturações). Similar results of "perverse timing" were also highlighted in the Henriksson (1984), Chang and Lewellen (1984), Romacho (2004) and Afonso (2010) studies.

Overall, the Beta for the bear market (0.9300) is greater than the Beta for the bull market (0.9000) and the biggest negative difference is verified in the North American Equity Funds group (-0.1400).

5.7.4 Estimates with correction

As funds mentioned on the table 10 violate the homoscedasticity property, funds mentioned on table 11 have the problem of autocorrelation of the errors while the funds on the table 12 show both violations. According to their specific violation, the parameters of the selectivity and market timing abilities were estimated again by taking into consideration the correction of the violations. The tables 10, 11 and 12 demonstrate the ability´s estimates after the correction.

White Heteroscedasticity Test (1980) to correct the heteroscedasticity								
	αp	**t-stat**	**β1p**	**t-stat**	**β2p**	**t-stat**	**R2**	**F-stat**
BPAP	0,0002	0,08	0,99	16,56	-0,03	-0,35	0,93	785,33
BPIP	-0,0004	-0,11	0,95	11,59	0,06	0,40	0,86	357,35
ESPA	-0,0034	-1,48	1,07	14,82	0,14	1,26	0,92	651,18

MAP	-0,0014	-0,61	1,04	19,97	0,10	1,09	0,91	622,23
SAP	0,0000	-0,02	1,06	15,59	0,05	0,45	0,91	586,00
BEA	-0,0014	-0,54	0,97	18,52	-0,11	-0,92	0,95	1064,77
PPA	0,0002	0,17	0,91	34,46	-0,08	-1,58	0,98	2329,70
MEF	-0,0018	-1,33	0,99	31,46	-0,11	-1,18	0,97	1618,61
ESAE	-0,0010	-0,47	0,86	15,48	0,02	0,15	0,84	312,96
MAE	-0,0038	-2,08	1,10	21,42	0,10	1,19	0,94	1000,78
BPIA	-0,0038	-0,73	0,68	4,61	-0,13	-0,51	0,56	75,95
CAEUA	-0,0036	-0,60	0,71	4,22	-0,07	-0,19	0,50	56,38
MAA	-0,0047	-1,03	0,80	5,98	-0,07	-0,29	0,63	99,90
ME	-0,0021	-1,10	1,06	19,79	-0,02	-0,27	0,97	1623,93
MGU	-0,0021	-0,89	1,04	11,08	0,13	0,86	0,86	345,81
SEFAD	0,0067	2,58	0,35	3,80	-0,28	-1,93	0,65	108,74
SEFC	0,0071	2,31	0,85	7,95	-0,14	-0,85	0,82	271,65
SEFBS	-0,0010	-0,69	0,95	22,57	0,00	0,09	0,98	2502,49
BPNAG	-0,0001	-0,03	0,79	6,11	-0,02	-0,09	0,52	58,59
CAO	0,0008	0,21	0,74	8,04	0,00	0,03	0,71	145,49
ESAG	-0,0004	-0,17	0,90	10,80	-0,16	-1,10	0,88	443,84
FAI	-0,0011	-0,28	1,14	8,53	-0,09	-0,38	0,76	182,58
MAJ	-0,0200	-3,87	1,17	8,51	0,76	3,14	0,62	92,95

Table 10 - Parametric Test – Equation 4.6 with correction of the heteroscedasticity - White Heteroscedasticity Test (1980)

Cochrane-Orcutt method (1949) to solve the first order auto-correlation of the errors								
	αp	t-stat	β1p	t-stat	β2p	t-stat	R2	F-stat
BBVABE	0,0007	0,30	0,95	15,76	-0,10	-1,13	0,92	395,12
BPNAE	0,0008	0,21	1,00	8,09	0,04	0,24	0,86	109,61
FC	-0,0011	-0,43	0,55	12,25	-0,04	-0,59	0,89	237,15
Raiz Europa	**-0,0046**	**-1,90**	**0,90**	**11,72**	**0,07**	**0,66**	**0,84**	**208,59**
CAE	-0,0054	-3,42	1,06	22,25	0,05	0,74	0,96	829,07
ESAA	-0,0022	-0,80	0,87	9,86	-0,06	-0,46	0,81	163,57
CAJ	-0,0187	-4,21	1,22	10,11	0,74	4,12	0,65	69,79

Table 11 - Parametric Test - Equation 4.6 with correction of the first order auto-correlation of the errors – Cochrane-Orcutt (1949) Method

Correction of the auto-correlation of the errors and the heteroscedasticity problem using Newey-West method (1987)								
	αp	**t-stat**	**β1p**	**t-stat**	**β2p**	**t-stat**	**R2**	**F-stat**
BPIEGC	0,0002	0,07	0,82	12,24	-0,02	-0,17	0,87	396,89
SAE	-0,0027	-1,13	1,20	17,36	-0,02	-0,17	0,94	843,33
BPIEV	-0,0006	-0,25	0,91	12,20	-0,04	-0,33	0,82	263,40
BPIT	-0,0051	-0,59	1,28	4,16	-0,20	-0,47	0,59	81,84
ESME	0,0003	0,16	0,96	21,53	-0,12	-1,58	0,95	1018,69

Table 12 - Parametric Test - Equation 4.6 with correction of the heteroscedasticity and the first order auto-correlation of the errors - Newey-West Test

Taking in consideration the corrections made, there were no significant changes on the significance of the estimates. The Raiz Europa fund is the only fund that showed a significant change. After the correction of the first order auto correlation of the errors, the negative selectivity estimate of the Raiz Europa fund became significant at a significance level of 10%.

Chapter 6 - Conclusion and suggestions for further research

This study examined the performance of 51 Portuguese Equity Funds in terms of selectivity and market timing abilities by using monthly data over the period of January 2001 to December 2010. The sample is exhaustive for all funds that existed for at least four years and two months in that period of time. These abilities were analyzed within the framework suggested by Henriksson and Merton (1981) and Jensen (1968). Additionally the problem of heteroscedasticity and the first order autocorrelation of the errors were also taken into account by using the method of White (1980), the method of Newey-West (1987) and the method of Cochrane-Orcutt (1949).

The empirical findings when applying the Henriksson and Merton (1981) methodology and using the Ordinary Least Square method showed that, over the period in question, there is neither clever selectivity (security selection) nor skillful market timing abilities evidence in the majority of the Equity Funds returns. Therefore, one can conclude that there are no forecasting abilities in Portuguese Equity Funds managers. As from the 51 Equity Funds analyzed, only 4 funds (Montepio Euro Telcos, Santander Euro Futuro Acções Defensivo, Santander Euro Futuro Cíclico and BPI Reestruturações) showed positive significance selectivity ability and for the market timing ability only 2 funds presented a positive significant parameter (Caixagest Acções Japão and Millennium Acções Japão). After taking into account the corrections of the heteroscedasticity and the first order autocorrelation of the errors, no significant changes of the estimates were obtained. These results became clearer when the linear transformation of the principal equation was applied, where the "perverse timing" phenomenon is evident. In addition, it was also found that a negative correlation exists between the selectivity and market timing abilities.

The inexistence of the selectivity ability among the Portuguese funds and the negative correlation between the two abilities are consistent with most of the prior studies which supports the market efficiency hypothesis. Amongst many, these are some of the studies that obtained similar results that can be highlighted: Henriksson (1984), Romacho (2004), Lhabitant (2001), Casaccia (2009), Afonso (2010) and Murhadi (2010).

The reasons behind the negative parameters of the Alpha and Beta2 could be explained by some stocks´ Betas having a random coefficient changes (Fabozzi and Francis (1978)) or due to manager's incapability to foresee changes in market condition (Fabozzi and Francis (1979)). However, even if fund managers are able to correctly anticipate the direction of the market, the cost of changing the fund´s target Beta is not justified given the expected value of the gain from revising the portfolio´s Beta. This is related to the legal restrictions that the managers have to follow (Casaccia (2009)); according to the funds prospectus, a minimum regarding the percentage to invest in Equity stocks is established (66.67%) and this leads to a reduction of the independence by the managers.

In addition, the most important decisions are made by investors when deciding on the type of funds to buy (Rao (2001)) and, if the efficient market is verified, ending up with returns above

the market return will be a matter of luck and not skill. It is important to note that taxes are not taken into account by the Index returns, only by the Mutual Funds returns (Romacho (2004)). According to Romacho (2004) and Rao (2001) a consistent attitude by the investors is to follow the market through index funds as, besides incurring lower costs than most fund managers, index funds ensure better results by offering the diversification that investors are seeking for.

Moreover, the specification used in the parametric tests must be questioned because of the persistence of a negative correlation between Alpha and Beta2 which raises the validity of using the CAPM. Henriksson (1984), while analyzing 116 Mutual Funds, also found negative correlation and decided to extent the model to the Arbitrage Pricing Theory (APT), adding a mutual fund factor to the model. With this, it was found to be significant for 64 of the 116 funds in the sample. Romacho (2004), while applying the APT, did not find substantial changes in the results besides that the poor specification of the market portfolio and the omission of important factors in the Henriksson and Merton (1981) model might be an explanation for these results.

With respect to the existence of the negative correlation between the selectivity and market timing abilities, which is more evident in the international groups of funds, support the view held by Bello e Janjigian (1997). According to these authors, the activities of specialization of the funds could be the reason for the strong relation between the two abilities that leads to a difficult separation and consequently for their evaluation.

For further research it is suggested to apply the Henriksson and Merton (1981) model in an APT context or by using a multi-factor model, such as four-factor model developed by Carhart (1997) which has been used by many researchers, namely Sehgal (2008). This is a way to check if the current results are in accordance with the Carhart (1997) model. Other suggestion could be to apply this model using daily data. Bollen and Busse (2001) points out that using bigger frequency of data may generate evidence of market timing ability in a significant number of funds.

Another attractive subject that is currently being pursued is regarding the conditional models that use public information related with economic conditions (Ferson and Schadt (1996)) and allow a better evaluation of market timing ability by the managers. An example of this is the recent study developed by Afonso (2010) regarding the Portuguese Equity Funds.

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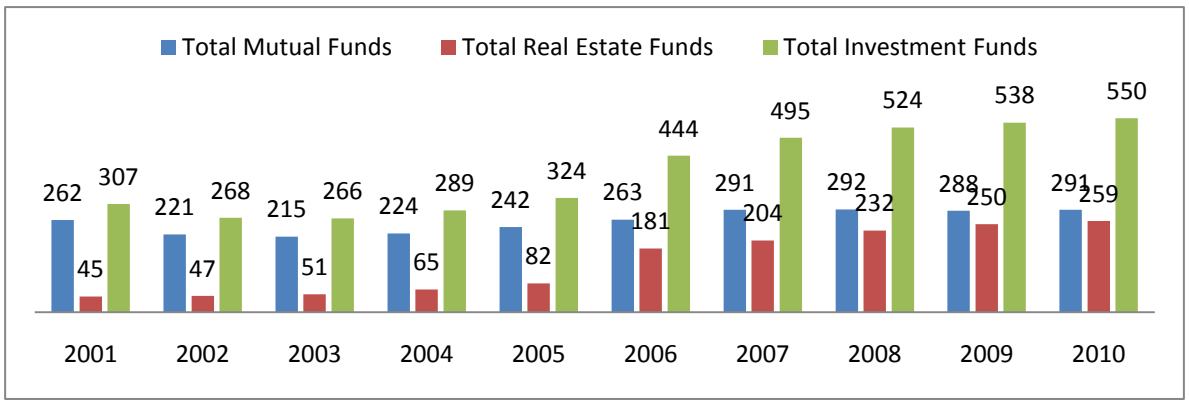
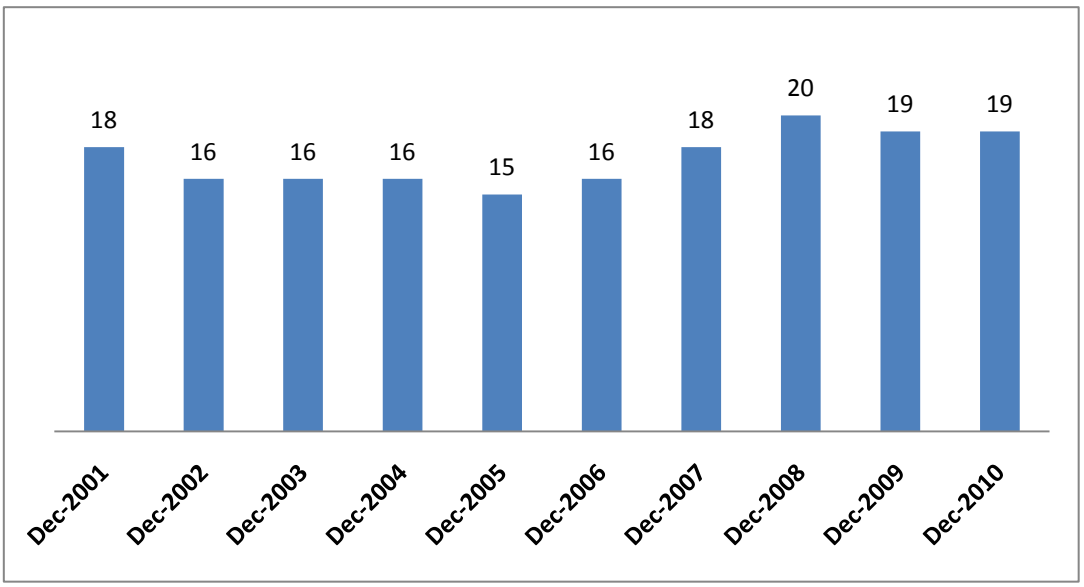
Appendix

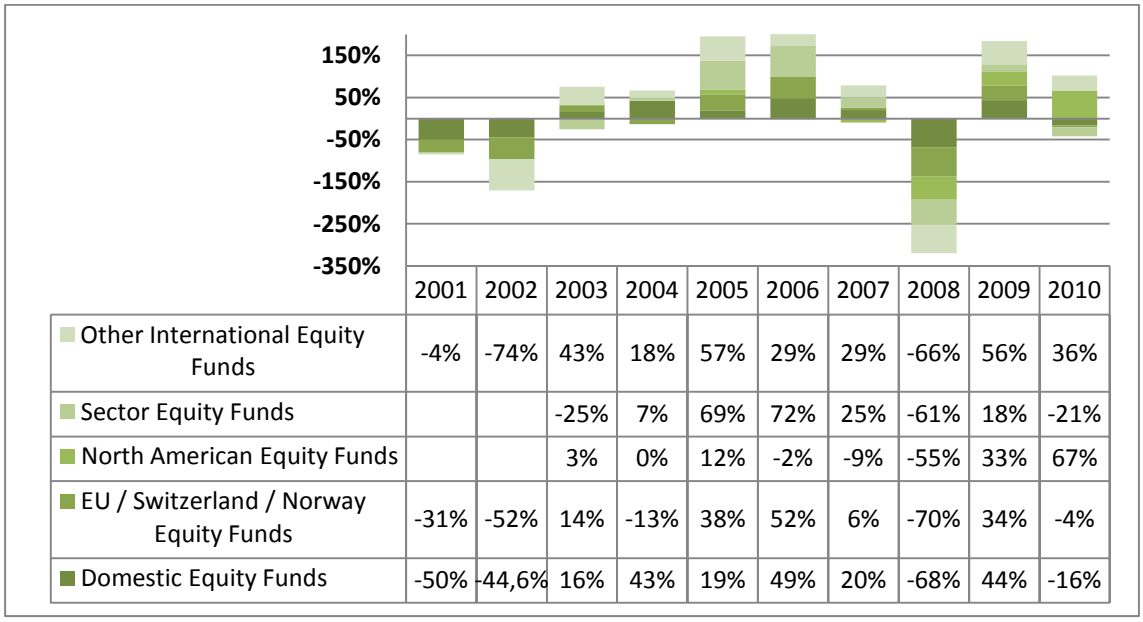
Appendix



Appendix 1 - Evolution of the number of Investment Funds (2001-2010). **Source**: Reports from the period 2001-2010, APFIPP

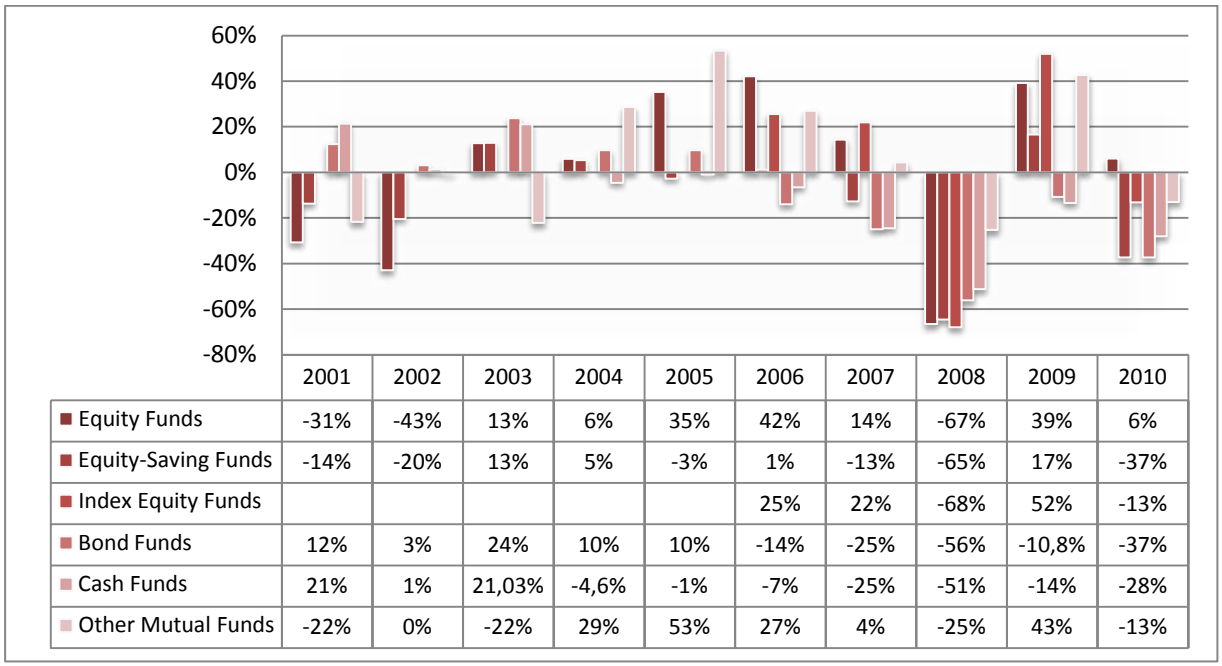


Appendix 2 - Evolution of the number of Mutual Fund Management Companies. **Source:** Reports from the period 2001-2010, APFIPP



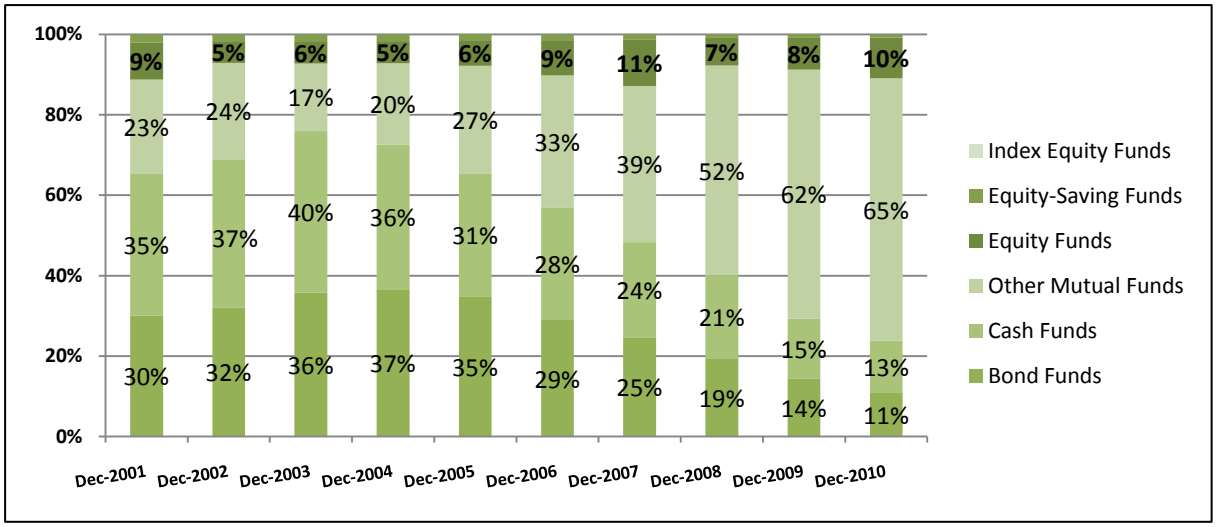
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Other International Equity Funds	-4%	-74%	43%	18%	57%	29%	29%	-66%	56%	36%
Sector Equity Funds			-25%	7%	69%	72%	25%	-61%	18%	-21%
North American Equity Funds			3%	0%	12%	-2%	-9%	-55%	33%	67%
EU / Switzerland / Norway Equity Funds	-31%	-52%	14%	-13%	38%	52%	6%	-70%	34%	-4%
Domestic Equity Funds	-50%	-44,6%	16%	43%	19%	49%	20%	-68%	44%	-16%

Appendix 3 - Evolution of the Growth of Equity Funds in Portugal (2001-2010). **Source:** Reports from the period 2001-2010, APFIPP



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Equity Funds	-31%	-43%	13%	6%	35%	42%	14%	-67%	39%	6%
Equity-Saving Funds	-14%	-20%	13%	5%	-3%	1%	-13%	-65%	17%	-37%
Index Equity Funds						25%	22%	-68%	52%	-13%
Bond Funds	12%	3%	24%	10%	10%	-14%	-25%	-56%	-10,8%	-37%
Cash Funds	21%	1%	21,03%	-4,6%	-1%	-7%	-25%	-51%	-14%	-28%
Other Mutual Funds	-22%	0%	-22%	29%	53%	27%	4%	-25%	43%	-13%

Appendix 4 - Evolution of the growth of the Mutual Funds in Portugal (2001-2010). **Source:** Reports from the period 2001-2010, APFIPP



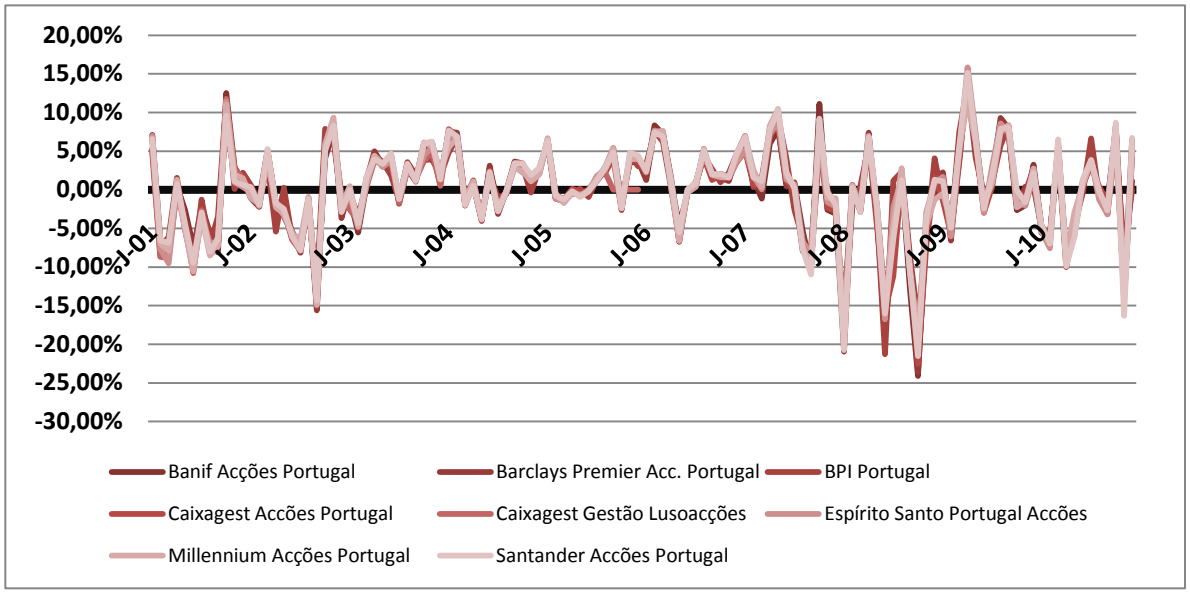
Appendix 5 - Evolution of the weights of amount invested by category (2001-2010). **Source:** Annual Reports from the period 2001-2010, APFIPP

APFIPP Associates
Banif Gestão de Activos
Barclays Wealth Managers Portugal
BBVA Gest
BPI Gestão de Activos
BPN Gestão Activos
Caixagest
Crédito Agrícola Gest
ESAF
Finivalor
Gerfundos
Millennium BCP
Montepio Gestão de Activos
Orey Gestão de Activos
Santander Asset Management
Valor Alternativo

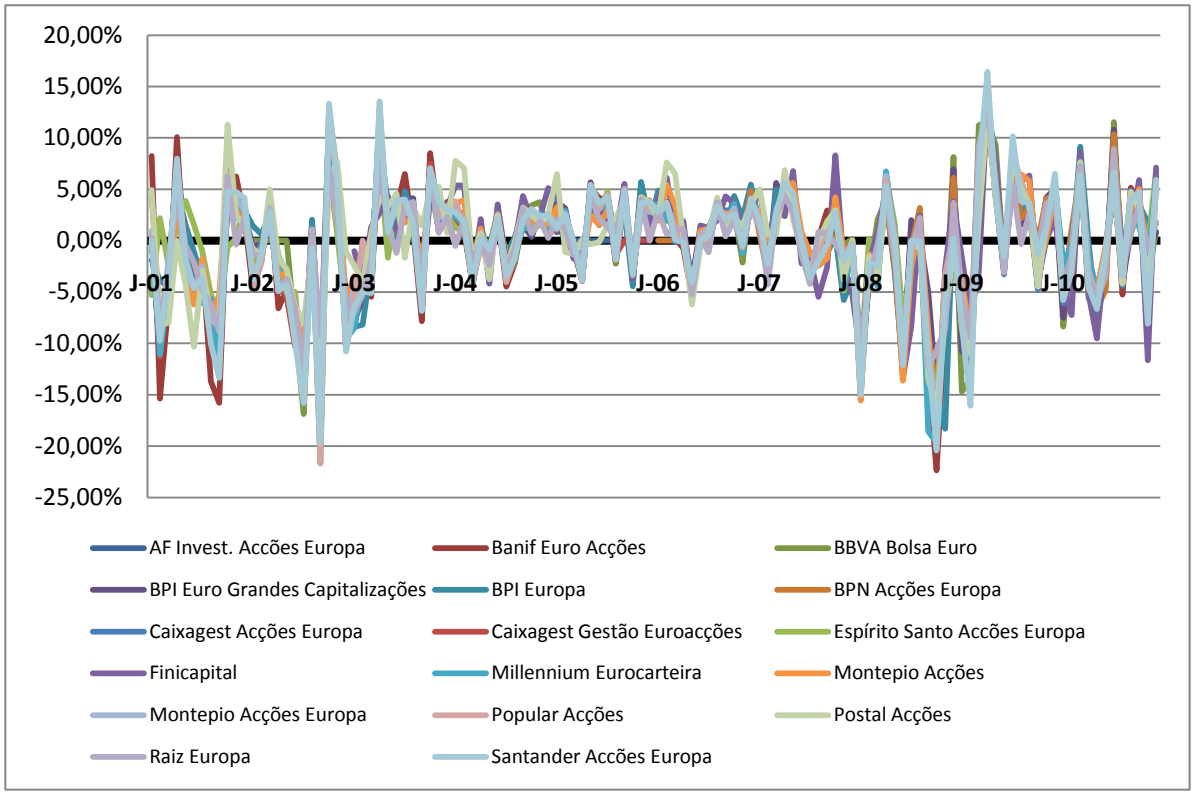
Appendix 6 - APFIPP Associates. **Source:** Reports from the period 2001-2010, APFIPP

Equity Index annually returns	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
PSI20	-26,97%	-26,79%	18,16%	14,81%	15,95%	29,32%	18,06%	-68,59%	32,94%	-6,81%
Eurostoxx50	-21,25%	-44,80%	16,91%	8,97%	21,75%	16,59%	9,16%	-55,16%	22,83%	-2,85%
FT Europe	-16,81%	-35,54%	14,99%	11,85%	23,75%	18,80%	3,55%	-56,44%	28,56%	11,02%
MSCI Europe	-19,59%	-36,91%	15,31%	9,01%	19,59%	14,79%	3,28%	-52,65%	21,01%	3,82%
IBEX_PSI_Eurostoxx50	-2,64%	-4,67%	3,04%	2,11%	2,50%	3,90%	1,76%	-8,57%	4,17%	-1,68%
PSI_Stoxx600	-1,82%	-2,66%	1,40%	1,10%	1,65%	2,01%	0,85%	-5,26%	2,54%	0,17%
Stoxx Large 200	-17,93%	-37,98%	13,74%	9,82%	22,99%	16,91%	4,03%	-56,39%	25,93%	8,82%
Stoxx 600	-16,83%	-37,12%	15,53%	11,51%	23,69%	18,89%	2,34%	-57,57%	28,06%	10,99%
SP500TR	-13,05%	-25,47%	24,68%	9,72%	4,24%	14,10%	4,78%	-46,92%	22,76%	13,43%
Nasdaq + ECB	-1,87%	-1,24%	2,44%	0,73%	-0,54%	0,73%	1,18%	-2,50%	1,93%	0,42%
Dow Jones FS, Banks and Inssurance	-1,65%	-3,93%	1,41%	1,26%	2,25%	2,15%	-1,02%	-6,56%	2,38%	0,32%
MSCI Utilities	-19,30%	-33,22%	7,79%	18,22%	26,64%	20,58%	10,07%	-29,60%	4,51%	6,99%
Stoxx 600 Telecommunications	-36,19%	-49,09%	17,35%	11,36%	-1,92%	15,62%	13,61%	-45,38%	10,67%	2,96%
Eurostoxx Utilities	-9,24%	-36,67%	21,32%	26,26%	26,19%	32,92%	23,96%	-44,52%	4,03%	-11,67%
MSPE Index	-19,29%	-39,77%	10,19%	7,56%	20,02%	14,22%	1,31%	-59,34%	22,84%	6,14%
Dow Jones Banks and Inssurance	-1,76%	-4,08%	1,49%	0,94%	2,14%	1,60%	-1,05%	-6,55%	2,36%	-0,23%
MSCI World	-14,34%	-40,07%	8,46%	4,60%	21,47%	5,36%	-3,47%	-49,56%	20,72%	15,84%
MSCI World Total Return	-12,76%	-38,17%	10,69%	6,72%	23,73%	7,63%	-1,19%	-46,59%	23,68%	18,35%
MSCI Emerging Markets	2,90%	-22,62%	26,25%	15,60%	43,85%	17,06%	23,17%	-70,84%	55,07%	24,28%
FTSE Japan JPY	-20,87%	-19,66%	21,12%	10,10%	36,42%	6,42%	-11,34%	-54,56%	8,30%	0,52%
MSCI Pacific X Japan (USD)	-12,97%	-9,44%	34,54%	22,02%	9,74%	24,71%	24,03%	-73,84%	50,62%	11,93%
MSCI World Local Currency	-16,54%	-29,03%	20,50%	9,06%	12,87%	12,68%	2,79%	-51,26%	20,56%	7,54%
MSCI Emerging Markets (USD) + ECB	-0,65%	0,93%	5,27%	2,55%	1,27%	3,27%	3,72%	-6,79%	5,14%	0,84%

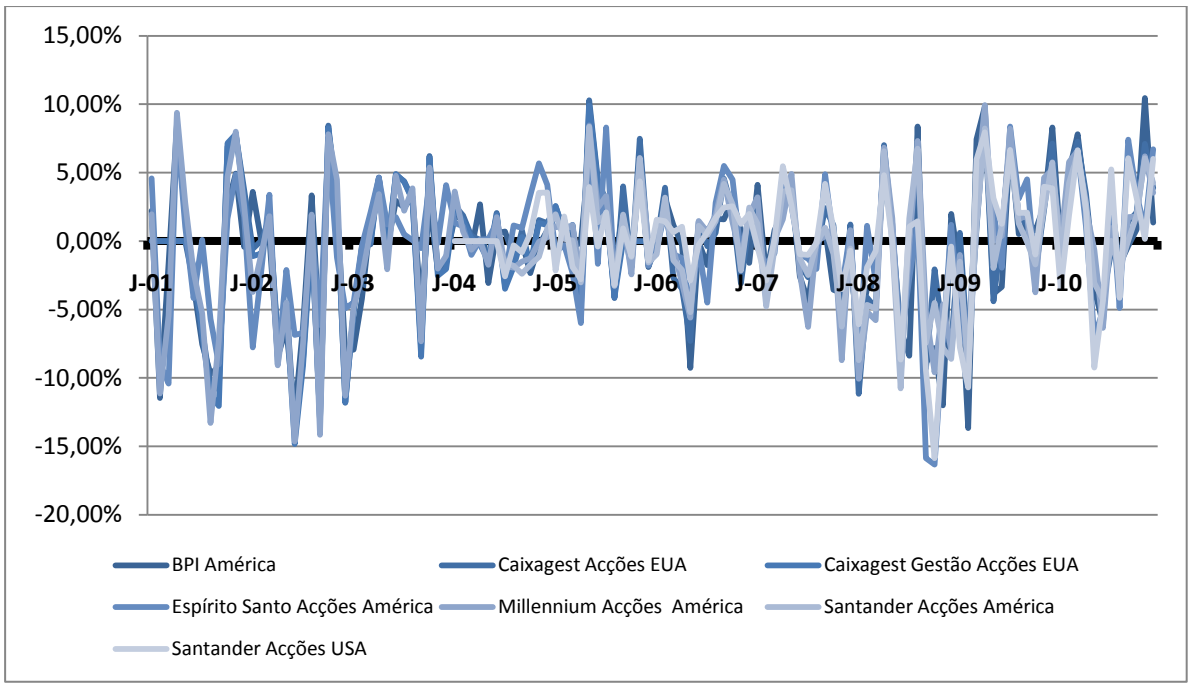
Appendix 7 - Equity Index annually returns. **Source:** Bloomberg



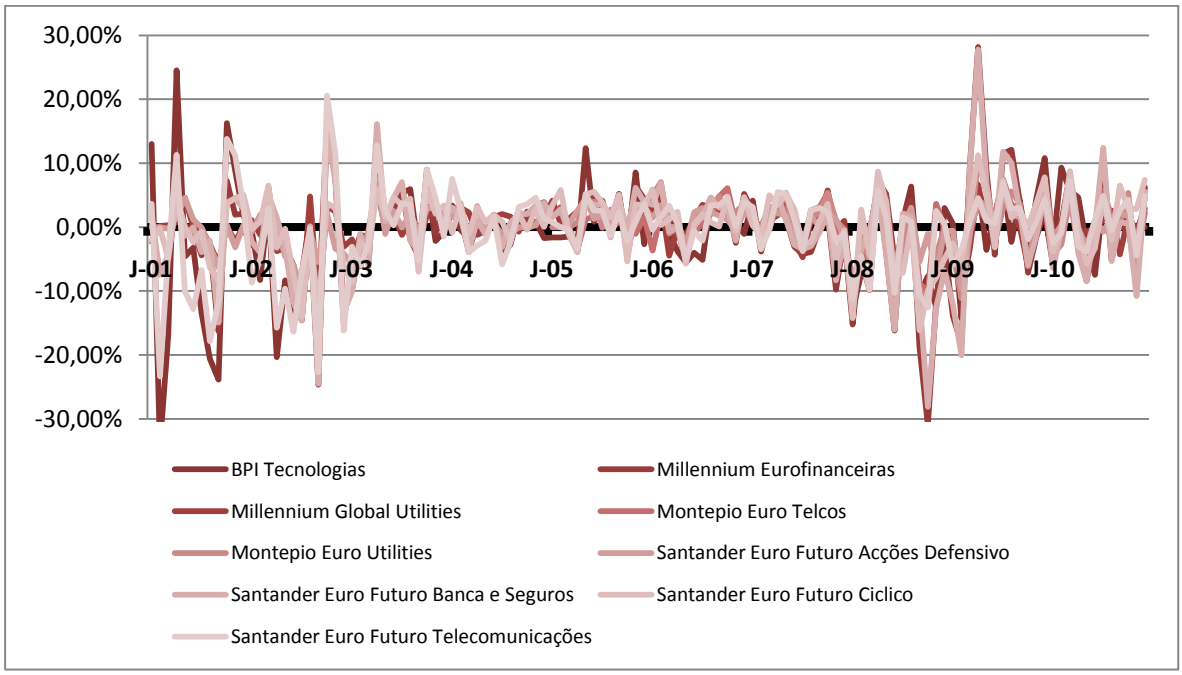
Appendix 8 - Domestic Equity Funds - Monthly Returns (2001-2010). **Source:** APFIPP



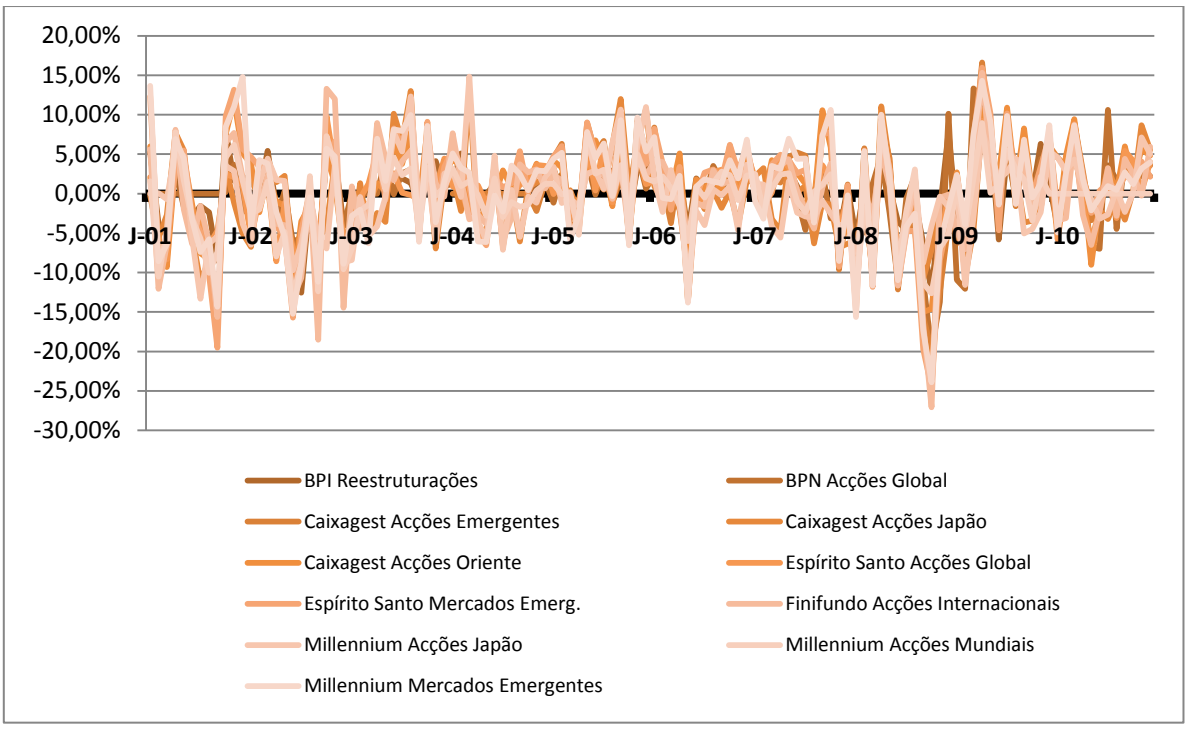
Appendix 9 - European Union, Switzerland and Norway Equity Funds - Monthly Returns (2001-2010). **Source:** APFIPP



Appendix 10 - North American Equity Funds **-** Monthly Returns (2001-2010). **Source:** APFIPP



Appendix 11 - Sector Equity Funds **-** Monthly Returns (2001-2010). **Source:** APFIPP



Appendix 12 - Other International Equity Funds **-** Monthly Returns (2001-2010). **Source:** APFIPP