UNIVERSITY OF PIRAEUS

DEPARTMENT OF BANKING AND FINANCIAL MANAGEMENT

‘*Performance of mutual funds in European countries*’

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Acknowledgements

During my MSc in Financial Analysis for Executives I was given the opportunity to examine how and to which extent the global financial crisis of 2008 along with the European sovereign debt crisis affected the performance of certain investments. Being especially attracted by mutual funds, I decided to focus on the performance analysis of mutual funds domiciled in European countries, investing in domestic securities and compare them with the performance of their countries of domicile.

Prior to proceeding with the analysis of my paper, I would like to thank my professor Mr. Diacogiannis George for his assistance in choosing this topic and for his guidance in this attempt. Moreover, special thanks to my parents, my family and my friends for their encouragement and support throughout the completion of my MSc.

Abstract

In this paper, the performance of 220 open-end domestic equity mutual funds of European countries (from 'weak' and 'strong' economies) is analyzed for an eight-year period from 1st January 2004 until 31st December 2011, which is then split in two four-year sub periods in order to examine their performance prior to the global financial crisis and after its burst in 2008. In order to compare the mutual funds' performance to that of each country's market, we used as benchmarks the countries' main stock indices. We used weekly net asset values (NAV) to calculate logarithmic returns and then we applied the following performance measures: Sharpe ratio, Treynor ratio, Jensen's alpha, Treynor and Mazuy model, Information ratio, risk-adjusted performance measure (RAP), market risk-adjusted performance measure (MRAP) and Sortino ratio. Based on the Sharpe and the Treynor ratio, most mutual funds underperformed the market after the burst of the crisis. No mutual fund reported abnormal returns and for approximately half of them, fund managers did not report timing abilities while even when they did they negatively affected the funds' returns. Information ratio indicated that only Italian fund managers had stock picking abilities. Finally, RAP, MRAP and Sortino ratio indicated deterioration of the funds' performance after the crisis.

Key words: mutual funds, performance, European countries, crisis, Sharpe ratio, Treynor ratio, Sortino ratio, Jensen's alpha

1. INTRODUCTION

The main idea of the paper is to examine how the performance of European mutual funds was affected by the burst of the global financial crisis in 2008 followed by the European sovereign debt crisis. Based on this, the purpose of our analysis is to examine whether European domestic mutual funds managed to outperform or underperform the market prior to and after the burst of the crisis in 2008 and distinguish the depth of the crisis' impact in 'weak' and 'strong' European economies.

Based on this, we focused only on equity mutual funds and in order to be comparable with the market, we used as benchmark the main stock index of each country. As 'weak' countries we used Portugal, Italy, Greece and Spain (PIGS) and the 'strong' ones were Germany, Netherlands, Norway and Switzerland.

We used weekly net asset values obtained by the Bloomberg database for 220 open-end equity mutual funds in total, for the period from 1st January 2004 until 31st December 2011 which was then split in two sub periods in order to facilitate the comparison of the results obtained. We calculated the logarithmic returns for each mutual fund and then we calculate eight performance measures, Sharpe ratio, Treynor ratio, Jensen's alpha, Treynor and Mazuy model, Information ratio, risk-adjusted performance measure (RAP), market risk-adjusted performance measure (MRAP) and Sortino ratio.

The results acquired from each measure were used both in absolute terms so as to determine whether the fund over/underperformed the market and for comparison purposes by ranking the funds of each country in order to find the outperformers.

The paper is split in the following sections: in Chapter 2 we mention the theoretical background of portfolio analysis, performance evaluation and an introduction to mutual funds and their performance measures, in Chapter 3 we present a review of academic papers, in Chapter 4 we present the data we use and the methodology we follow, in Chapter 5 we analyze the results of our study in detail and in Chapter 6 the conclusions of our results are stated.

2. PORTFOLIO THEORY, MODELS, PERFORMANCE EVALUATION, MUTUAL FUNDS

2.1. INTRODUCTION TO SECURITIES AND PORTFOLIO THEORY

2.1.1. SECURITIES AND THEIR CHARACTERISTICS

The reason someone invests in a security or asset, is the return he anticipates to receive in exchange for the risk he undertakes. Every investment in an individual security has a risk and an expected return which are measured by the standard deviation and the mean respectively. The reason we use the standard deviation and the mean as risk and return measures is because we assume that asset returns follow normal distribution.

The *return of a security (R_{it})* is given by the following type:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \quad (2.1.1)$$

where R_{it}= the return of security 'i' at the end of period 't', P_{it}= the price of security 'i' at the end of period 't' and P_{it-1}= the price of security 'i' at the end of period 't-1'.

The *expected return of a security ($E(R_i)$),* measures the expected profit from the investment, while the *standard deviation of a security's return ($\sigma(R_i)$),* measures the dispersion of the returns around the expected return and are calculated as follows:

$$E(R_i) = \sum_{k=1}^{N} p_k R_{ik} \quad (2.1.2)$$

$$\sigma(R_i) = \sqrt{\sum_{k=1}^{N} p_k (R_{ik} - E(R_i))^2} \quad (2.1.3)$$

where R_{ik}= the possible return of security 'i', p_k= the probability that the specific return will appear and N= the number of securities.

Apart from the above characteristics, there are two other measures, which reflect the relation between different assets' returns. The first one is the *coefficient of variance (CV),* which measures the dispersion of the distribution and the other is the *covariance (Cov),* which shows the direction in which securities are moving and are calculated as follows:

$$CV_i = \frac{\sigma(R_i)}{E(R_i)} \quad (2.1.4)$$

$$Cov(R_i R_j) = E\left[(R_i - E(R_i))(R_j - E(R_j))\right] \quad (2.1.5)$$

where R_i= the return of security 'i', R_j= the return of security 'j', $\sigma(R_i)$= the standard deviation of the return of security 'i', $E(R_i)$= the expected return of security 'i' and $E(R_j)$= the expected return of security 'j'.

2.1.2. PORTFOLIOS AND THEIR CHARACTERISTICS

Portfolio theory is related to the uncertainty of future returns and risks that investments entail. Under certainty, an individual accepts an investment, if it offers a rate of return greater than the market rate of return, or alternatively if it has a positive net present value. Amid uncertainty, the situation is more complicated; thus, portfolio theory comes to identify a combination of assets/securities which minimizes the risk and maximizes the expected return.

A portfolio is a combination of many securities with a main objective to reduce potential total risk. The fact that a portfolio consists of many securities ensures that diversification is achieved, which aims to the reduction of a portfolio's total risk. Risk is typically considered as the difference between the actual return of the portfolio and its expected return.

The *return of a portfolio (R_{pt})* is the weighted average of the returns of its component securities and is given by the following types interchangeably:

$$R_{pt} = \frac{P_{pt} - P_{pt-1}}{P_{pt-1}} \quad (2.1.6) \quad \text{or}$$

$$R_p = \sum_{k=1}^{N} x_i R_i \quad (2.1.7)$$

where R_{pt}= the return of portfolio 'p' at the end of period 't', P_{pt}= the price of portfolio 'p' at the end of period 't', P_{pt-1}= the price of portfolio 'p' at the end of period 't-1', x_i= the weight of each security as a percentage in the total portfolio and R_i= the return of security 'i'.

Uncertainty is expressed by assigning probabilities in each expected rate of return of the portfolio. In this way, a probability distribution is created including all possible outcomes of portfolio's returns and the possibilities of their realization. The assumption that asset returns follow normal distribution entails that when assets are combined to form a portfolio, the portfolio's returns are also considered to follow normal distribution.

In the normal distribution of the portfolio returns, *the mean* measures the expected return of the portfolio (*$E(R_p)$*) while *the standard deviation* of the portfolio's return *($\sigma(R_p)$)* measures the portfolio's risk, calculated by the following types:

$$E(R_p) = \sum_{i=1}^{N} x_i E(R_i) \quad (2.1.8)$$

$$\sigma(R_p) = \sqrt{\sum_{i=1}^{N} x_i{}^2 \sigma_i^2 + \sum_{i=1}^{N} \sum_{j=1}^{N} x_i x_j Cov(R_i, R_j)} \quad (2.1.9) \text{ where: } i \neq j$$

where $E(R_i)$= the expected return of security 'i', x_i= the weight of each security as a percentage in the total portfolio, σ_i= the standard deviation of the return of security 'i', $Cov(R_i,R_j)$= the covariance between the returns of two securities 'i' and 'j' and N= the number of securities.

Another important measure which is useful when choosing among more than one portfolio is the *coefficient of variance (CV),* which is preferable to be small since it measures the dispersion, and is calculated as follows:

$$CV_i = \frac{\sigma(R_p)}{E(R_p)} \quad (2.1.10)$$

where $\sigma(R_p)$= the standard deviation of the return of portfolio 'p' and $E(R_p)$= the expected return of portfolio 'p'.

As we have previously mentioned, diversification can be considered as a method of risk reduction. The risk of the portfolio depends on the correlation of returns amongst its underlying securities.

The existence of correlation between the returns of two securities is measured through the *correlation coefficient (ρ)*, which shows the direction of their relationship, as well as how intense the relationship is and is calculated as follows:

$$\rho = \frac{Cov(R_i R_j)}{\sigma(R_i)\sigma(R_j)} \quad (2.1.11)$$

where $Cov(R_iR_j)$= the covariance between the returns of securities 'i' and 'j', $\sigma(R_i)$= the standard deviation of the return of security 'i' and $\sigma(R_j)$= the standard deviation of the return of security 'j'.

The correlation coefficient, lies between -1 and 1. The direction of the relationship is shown by its sign, with a positive value to indicate a positive relationship between two assets and a negative value to depict a negative relationship between them. The intensity of the relationship is indicated by the value of the correlation coefficient itself. A correlation coefficient close to one, in absolute terms, shows a strong correlation, while when it is close to zero, it shows a weak correlation.

A correlation coefficient of 1 indicates a perfect positive correlation, which means that two securities move in the same direction in the same manner, while a correlation coefficient of -1 indicates a perfect negative correlation and it means that two securities move in the same manner again but in the opposite direction. When it is zero, it means that there is no relationship between the securities.

2.1.3. DIVERSIFICATION AND CORRELATION COEFFICIENT

In the previous section (2.1.2) we mentioned that a portfolio consists of a combination of securities, which ensures diversification is achieved, with a main objective to reduce portfolio's potential total risk. Therefore, diversification is considered as a method of risk reduction and since the risk of a portfolio is related to the correlation among its components, diversification and correlation coefficient are somehow related.

Suppose we have a portfolio which consists of two securities, and we calculate the correlation coefficient between them.

If the value of the correlation coefficient is equal to 1 (perfect positive correlation) this indicates that the securities move in the same direction in the same manner, which entails that the risk undertaken when investing in the portfolio is the same as investing in the underlying securities separately; diversification is not effected at all.

On the other hand, if the value of the correlation coefficient is -1 (perfect negative correlation) this indicates that the securities move in the same manner but in the opposite direction, which entails that the risk of one asset offsets the risk of the other, resulting in a portfolio with no risk at all; diversification is successfully effected.

2.1.4. BETA COEFFICIENT

One of the most widely known and used measures of the risk, that plays a very important role in portfolio theory is the *beta coefficient (b)*, which represents the risk of an individual security relative to the risk of the whole portfolio. The beta coefficient is a measure of the volatility of the security's return to portfolio's return and is calculated as follows:

$$b_i = \frac{Cov(R_i R_p)}{\sigma^2(R_p)} \quad (2.1.12)$$

where $Cov(R_iR_p)$= the covariance between the returns of security 'i' and portfolio 'p' and $\sigma^2(R_p)$= the variance of the portfolio's 'p' return.

Based on the value of the beta coefficient the following apply:

a) If b>1, this entails that $Cov(R_iR_p) > \sigma^2(R_p)$ which means that the security will be more volatile than the portfolio. A security with b>1 is called "aggressive".
b) If b<1, this entails that $Cov(R_iR_p) < \sigma^2(R_p)$ which means that the security will be less volatile than the portfolio. A security with b<1 is called "defensive".
c) If b=1, this entails that $Cov(R_iR_p) = \sigma^2(R_p)$ which means that the security will move with the portfolio.

2.1.5. NUMBER OF ASSETS IN A PORTFOLIO – IMPACT ON SYSTEMATIC AND UNSYSTEMATIC RISK

When we have N number of assets in a portfolio, the risk is measured by the formula in equation (2.1.9). When we have N variances, we have N(N-1)/2 covariances. As the number of N increases to infinity, the covariance term approaches the average covariance. This enables us to diversify away the risk of individual securities, but the total risk caused by the covariance terms can not be diversified

away. As the number of securities increases, the risk decreases rapidly at first and then very slowly until it remains stable.

Combining securities in portfolios, reduces part of the risk, thus it should be clarified that the total risk of a portfolio as it appears in equation (2.1.9) consists of two types of risks: an unsystematic risk (the first sum term under the square root) and a systematic risk (the second sum term under the square root).

The *systematic risk* (also called market risk) is the common risk attributed to the market and cannot be diversified away since the factors that lie behind it affect all securities. Systematic risk can be measure by the beta coefficient.

The *unsystematic risk* (also called diversifiable risk) on the other hand, is a specific risk related to a company or industry, uncorrelated to the market returns, and can be eliminated through diversification.

2.1.6. MEASURING THE RISK OF AN INDIVIDUAL ASSET IN A PORTFOLIO

In order to show how the risk of an individual asset is measured in relation to a portfolio, we assume that the market portfolio M consists of two securities A and B.

The risk of the market portfolio is measured by its variance and based on equation (2.1.9) it is calculated as:

$$\sigma_M^2 = w_A^2\sigma_A^2 + w_B\sigma_B^2 + 2w_A w_B\sigma_{AB} \quad (2.1.13)$$

where w_A= the weight of security 'A' in portfolio 'M', w_B= the weight of security 'B' in portfolio 'M', σ^2_A= the variance of security's 'A' return, σ^2_B= the variance of security's 'B' return, σ_{AB}= the covariance between securities 'A' and 'B'.

The covariance between security 'A' and the market portfolio 'M' and the covariance between security 'B' and the market portfolio 'M' derive from equation (2.1.13) and both are given by the following equations:

$$\sigma_{AM} = w_A\sigma_A^2 + w_B\sigma_{AB}^2 \quad (2.1.14)$$

$$\sigma_{BM} = w_B\sigma_B^2 + w_A\sigma_{AB}^2 \quad (2.1.15)$$

where w_A= the weight of security 'A' in portfolio 'M', w_B= the weight of security 'B' in portfolio 'M', σ^2_A= the variance of security's 'A' return, σ^2_B= the variance of security's 'B' return, σ_{AB}= the covariance between securities 'A' and 'B'.

Thus the variance of the market portfolio can be re-written as a weighted average of the covariances of the two securities with the market portfolio as follows:

$$\sigma_M^2 = w_A\sigma_{AM} + w_B\sigma_{BM} \quad (2.1.16)$$

The contribution of each security to the standard deviation of the market portfolio will be:

$$\frac{\partial\sigma_M^2}{\partial w_i} = \sigma_{iM} \quad (2.1.17)$$

where i= securities 'A' or 'B' and w_i= the weight of each security 'A' or 'B' to the market portfolio 'M'.

From the above, we come to the conclusion that the relevant risk of a security in the market portfolio is equal to its covariance with the market portfolio, σ_{iM}. This means that securities with large values of σ_{iM}, will add more risk to the market portfolio.

2.2. MODERN PORTFOLIO THEORY (MPT) BY HARRY MARKOWITZ AND EFFICIENT PORTFOLIOS

2.2.1. MODERN PORTFOLIO THEORY (MPT) - ASSUMPTIONS

Modern portfolio theory (henceforth, MPT) or portfolio theory was introduced by Harry Markowitz in 1952 with his paper 'Portfolio Selection', published in *Journal of Finance*[1] and later in 1959 with his book 'Portfolio Selection: Efficient Diversification of Investments'[2].

Modern portfolio theory (MPT) is a strategy followed in order to construct the optimal portfolio by taking into consideration the relationship of risk versus returns. The portfolio theory is based on the fact that the securities should not be considered as individual investments thus the investors should not focus on the risk of a specific security, but should care about the relation between the price of a certain security and its correlation to the price of the market portfolio. MPT suggests that for a given level of risk an investor is willing to undertake, a specific portfolio can be constructed in order to maximize the expected return and vice versa.

MPT is based on the assumption that investors are risk averse; they like returns and dislike risk. Based on this assumption, an investor who has to choose among alternative portfolios follows the below rules:

a) Between two portfolios with the same risk (standard deviation), and different expected returns (mean), the investor will choose the one with the higher expected return.
b) Between two portfolios with the same expected returns (mean), and different levels of risk (standard deviation), the investor will choose the one with the lower risk.
c) Investors always choose the portfolio which offers the lower risk and the higher expected returns.

2.2.2. INDIFFERENCE CURVES

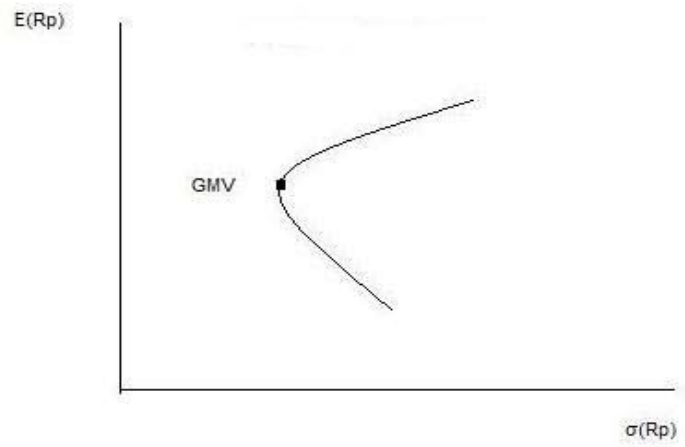
An indifference curve depicts all portfolios which are equivalent for the investor which means that for every point on the curve the investor has no preference or else they offer the same utility to the investor. Such curve, divides the region of all portfolios in two categories. The area above the curve contains portfolios the investor prefers to those that are on the curve while the area below the curve contains portfolios for which the investor is indifferent about. As long as an investor is risk averse and wants high returns and low risks, the slope of the curve will be upward, and will be steeper as both of them increase. The higher the curve, the more desirable is from the investor.

2.2.3. PORTFOLIOS OF RISKY ASSETS - GLOBAL MINIMUM VARIANCE PORTFOLIO (GMV) – EFFICIENT FRONTIER

Each portfolio has an expected return and a standard deviation. Although every portfolio can be described by a point in a $E(R_p)$, $\sigma(R_p)$ diagram, only some of them will be feasible depending on the constraints placed by each investor. Instead of plotting a portfolio on a feasible $E(R_p)$, $\sigma(R_p)$ region, the portfolio can be represented by a point indicating its expected return $E(R_p)$, and its variance of return $V(R_p)$. The $E(R_p)$, $V(R_p)$ border will have more curvature since $V(R_p)= \sigma^2(R_p)$. This indicates that even if the $E(R_p)$, $\sigma(R_p)$ border is linear, the $E(R_p)$, $V(R_p)$ border will increase at a decreasing rate.

For a given level of risk, investors prefer portfolios with higher expected returns and for a given expected return, portfolios with lower risk. Based on this, we can define the *minimum variance set*, as a set that for a given level of expected return, the portfolio on this set will have the lowest standard deviation therefore, the lowest variance.

Figure 2.2.1 *Global Minimum Variance Portfolio (GMV)-Efficient frontier with risky assets*



In the diagram above (Figure 2.2.1), we notice that all individual assets are located to the right side of the frontier. The point of the minimum variance set where the standard deviation is at its lowest level, is called the *global minimum variance portfolio (GMV)*. All portfolios that are above GMV give investors the higher returns at the lowest risk and these are possible combinations for the optimal portfolio. These portfolios are called *efficient set (frontier)* and in order to be on the efficient frontier they should provide the highest expected return for a given level of standard deviation.

Efficient frontier is the part of the minimum variance frontier that offers the highest expected return for each level of standard deviation. The shape of the efficient frontier depends on the correlation of the underlying securities. If the returns of the portfolios are perfectly positively correlated the efficient frontier will be a straight line. If they are uncorrelated, it will be on the left of the straight line connecting the two points. If they are perfectly negatively correlated, the efficient frontier consists of two lines connecting the portfolio with zero variance with the two assets in the $E(R_p)$, $\sigma(R_p)$ diagram.

The efficient frontier must be concave since the correlation coefficient between two assets lies between -1 and 1, but it never takes the two extreme values.

2.2.4. PORTFOLIOS OF RISKY ASSETS AND RISK-FREE ASSETS - EFFICIENT FRONTIER

In the previous section we focused on portfolios with risky assets, however investors sometimes choose to combine risky assets with risk-free ones. A risk-free asset is not something definite or determined in absolute terms, since there is no asset in real world which is totally risk-free. However, in finance an asset is characterized as risk-free when it has the lowest risk among all other assets; it is risk-free relative to other assets. The risk-free rate is considered as the rate of return of a risk-free investment.

Usually, as a risk-free asset we consider short-term Government bonds (treasury bills) of countries with no real possibility of default risk such as those of USA (in US dollars) or Germany (in Euro currency).

When a risk-free asset is added in a risky portfolio the portfolio analysis is simplified. There are two types of investment in risk-free assets: borrowing at the risk-free rate in order to short sell and lending at the risk-free rate by buying short-term Government bonds.

Assume that an investor chooses to invest in a portfolio 'p' that consists of a risky asset 'a' and a risk-free one 'f' with $w_f+w_a=1$, where w_i= the weight of each asset in the portfolio.

The expected return of the portfolio 'p', based on equation (2.1.8), is a weighted averaged of the returns of the risky asset and the risk-free one, as shown below:

$$E(R_p)=\sum_{i=1}^{N} x_i E(R_i)=w_a E(R_a)+w_f r_f = r_f + w_a\left[E(R_a)-r_f\right] \quad (2.2.1)$$

where $E(R_\alpha)$= the expected return of the risky asset 'a', w_α= the weight of the risky asset 'a' in the portfolio, w_f= the weight of the risk-free asset 'f' in the portfolio and r_f=the risk-free rate.

The variance of the portfolio 'p', based on equation (2.1.9), is not exactly a weighted average of the variances of the risky asset and the risk-free one, but is calculated as follows:

$$\sigma^2(R_p) = w_a{}^2\sigma^2(R_a) + (1-w_a)^2\sigma^2(r_f) + 2w_a(1-w_f)\sigma_{af} \quad (2.2.2)$$

where $\sigma^2(R_\alpha)$= the variance of the risky asset 'a', $\sigma^2(r_f)$= the variance of the risk-free asset 'f', $\sigma_{\alpha f}$= the covariance of the risky asset 'a' with the risk-free asset 'f', w_α= the weight of the risky asset 'a' in the portfolio and w_f= the weight of the risk-free asset 'f' in the portfolio.

Based on the assumptions that for the risk-free asset $\sigma_{rf}=0$ and $\sigma_{af}=0$, equation (2.2.2) is equal to:

$$\sigma^2\left(R_p\right) = w_a{}^2\sigma^2\left(R_a\right) \quad (2.2.3)$$

From equation (2.2.3) we obtain the weight of the risky asset 'a' as follows:

$$w_a = \frac{\sigma\left(R_p\right)}{\sigma\left(R_a\right)} \quad (2.2.4)$$

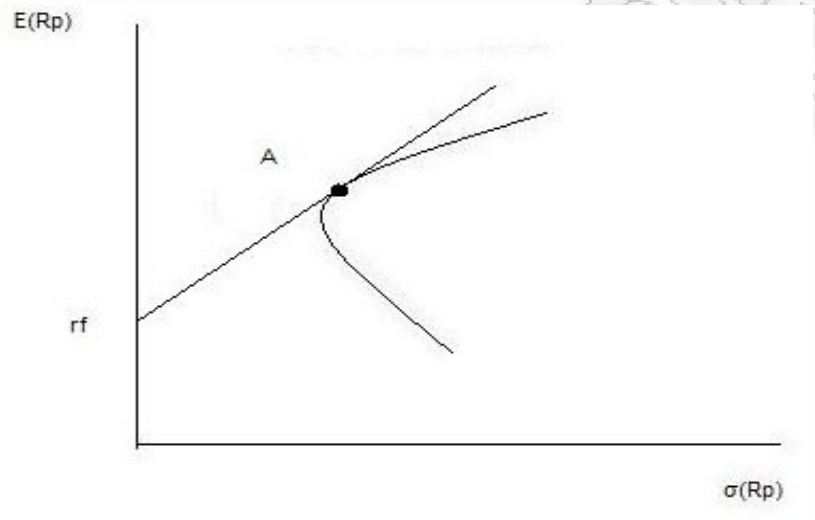
By replacing equation (2.2.4) into equation (2.2.1) we conclude to the following:

$$E\left(R_p\right) = r_f + \frac{\left(E\left(R_a\right) - r_f\right)}{\sigma\left(R_a\right)}\sigma\left(R_p\right) \quad (2.2.5)$$

The above equation shows that all combinations of riskless lending and borrowing with asset 'a' lie on a straight line in a space of expected return $E(R_p)$ and standard deviation $\sigma(R_\alpha)$ while the intercept of the line is r_f and the slope is $(E(R_\alpha)-r_f)/\sigma(R_\alpha)$.

When risk-free borrowing and lending is included in a portfolio, the *efficient frontier is a straight line* from point 'A' onwards (as indicated in the diagram below) tangent to the concave, risky assets, efficient frontier.

Figure 2.2.2 *Efficient frontier with risk-free assets*



In Figure 2.2.2 portfolio 'A' is the portfolio of risky assets held by all investors. Moreover, more risk averse investors who lend money, will choose a portfolio which lies on the line r_fA, while less risk averse investors who borrow money would choose to invest their money on a risky portfolio 'A'. Efficient portfolios combine the risk-free asset and the tangent risky portfolio.

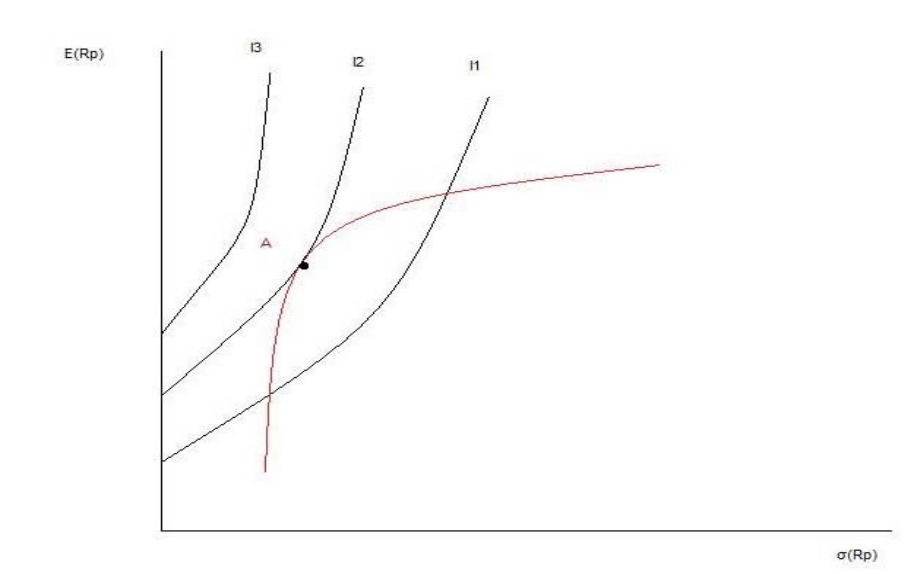
2.2.5. PORTFOLIO SELECTION

Since a portfolio is a combination of assets there are many steps involved in the decision with regard to the construction of the portfolio and its components. The major reason an investor forms or chooses to invest in a portfolio is the diversification it offers. An investor chooses to invest in a portfolio in order to minimize the risk undertaken by achieving certain level of returns and to maximize achieved returns for certain levels of risk.

There are four steps followed in the portfolio selection:

1) *Security analysis:* This is the first step followed at which all risks and returns of the securities in question are required. Security analysis categorizes securities to over-valued and under-valued ones.
2) *Portfolio analysis:* A combination of individual securities is effected in order to form all possible combinations of portfolios for which risks and returns are again calculated for further analysis.
3) *Efficient portfolio:* From all possible combinations created during the portfolio analysis, those portfolios with the minimum risk and the maximum return are considered as 'efficient' and constitute the efficient frontier.
4) *Portfolio selection:* From the portfolios which lie on the efficient frontier, the investor chooses the one that satisfies his personal preferences namely the one that crosses his indifference curve.

Figure 2.2.3 *Portfolio Selection*



In Figure 2.2.3 after performing security analysis and portfolio analysis, the portfolios with the minimum risk and maximum returns constitute the efficient frontier which is denoted with the red line. The lines indicated with 'I_n' are the investors' indifference curves therefore point 'A' is the portfolio that investors with indifference curve I_2 would choose.

2.3. CAPITAL MARKET THEORY, CAPITAL MARKET LINE (CML), SECURITY MARKET LINE (SML), CAPITAL ASSET PRICING MODEL (CAPM)

2.3.1. CAPITAL MARKET THEORY

The capital market theory tries to explain the relationship between expected return and risk in efficient portfolios, the relationship between expected return and risk for single securities or portfolios (efficient or not efficient) and to define the appropriate risk measure for shares in portfolios. It is built on the Markowitz portfolio model and its main assumptions are the following:

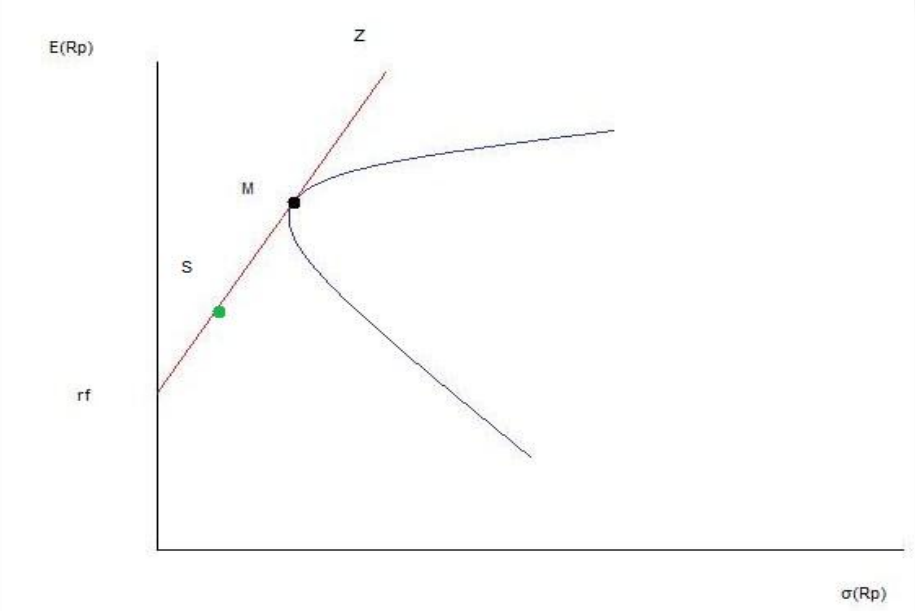
1. All investors are efficient; they follow the Markowitz theory and choose the portfolios which lie on the efficient frontier.
2. Investors can borrow or lend money at the risk-free rate.
3. Investors have the same time horizon.
4. All investors have the same and complete information for securities.
5. There is no inflation.
6. No transaction costs or taxes exist.
7. No investors can affect securities' prices.
8. All assets are infinitely divisible.
9. The markets are efficient and no mispricing exists.

2.3.2. MARKET PORTFOLIO - CAPITAL MARKET LINE (CML)

Based on the assumptions of the capital market theory, due to the fact that every investor makes the same predictions and can borrow or lend money at the same risk fee rate, each investor will face the same efficient frontier. In equilibrium the optimal portfolio is the one that includes all securities that exist in the market, therefore portfolio 'M' is the *market portfolio*. The market portfolio consists of the combination of all risky assets and the risk-free asset.

Consider an investor who based on his predictions for the market and a given risk-free rate (r_f) at which he may either lend or borrow money, he chooses to invest in a portfolio which lies on the efficient frontier. In the diagram below, line r_fMZ provides the investor a combination of borrowing/lending money at risk-free rate and investing in a risky portfolio 'M' which is optimal.

Figure 2.3.1 *Capital Market Line (CML)*



In Figure 2.3.1, the line r_fMZ is called the *Capital Market Line (CML)* and transforms the Markowitz efficient frontier to a new efficient frontier which is now a straight line. The Capital Market Line includes only efficient portfolios while all other portfolios will lie below it and unlike Markowitz' efficient frontier which did not include the risk-free asset, the Capital Market Line does and as such the frontier is extended to the risk-free rate as illustrated above.

The equation of the capital market line (CML) is:

$$E(R_s) = r_f + \frac{E(R_M) - r_f}{\sigma_M} * \sigma_S \quad (2.3.1)$$

where $E(R_S)$= the expected return of portfolio 'S', $E(R_M)$= the expected return of the market portfolio 'M', σ_M= the standard deviation of the market portfolio 'M', σ_S= the standard deviation of portfolio 'S' and r_f= the risk-free rate.

The above equation indicates the Capital Market Line's two characteristics:

a) The vertical intercept is the risk-free rate and

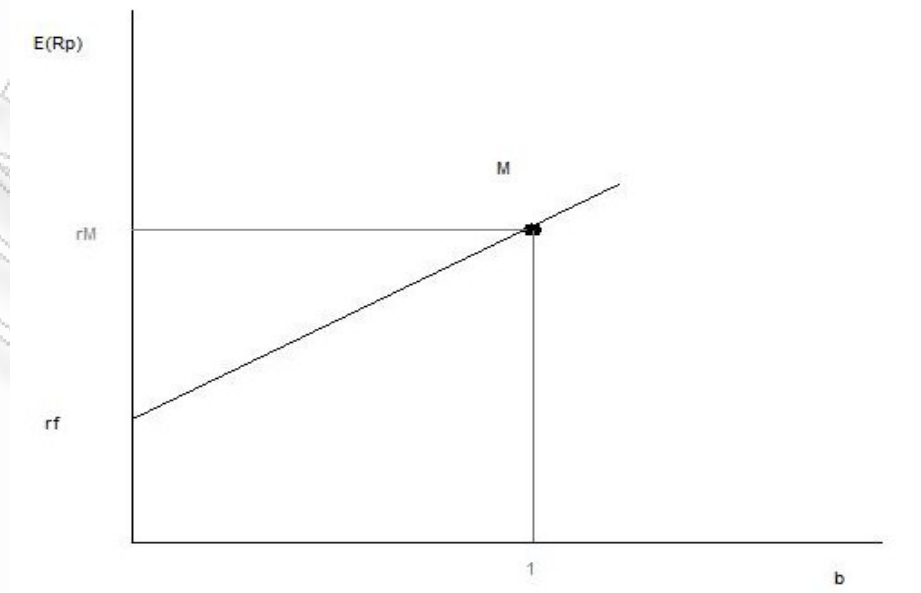
b) Its slope depicts the risk premium that is required from the investor if additional risk is accepted (based on the assumption that he is risk averse) and it is always positive, thus the Capital Market Line will be upward sloping.

Therefore, the Capital Market Line shows the relationship between expected return and risk only for efficient portfolios and the standard deviation of return is used as a risk measure. If a standard deviation of an efficient portfolio is known, the Capital Market Line enables an investor to determine the required rate of return on that portfolio.

2.3.3. SECURITY MARKET LINE (SML)

The portfolio's risk, as previously mentioned, is measured by the standard deviation of its rate of return. There are times though when investors are interested in determining the required rate of return on an individual security, when the relationship for efficient portfolios does not hold. Here comes the *Security Market Line (SML)* to determine the relationship between the expected return and the systematic risk of both individual securities and portfolios.

Figure 2.3.2 *Security Market Line (SML)*



The equation of the security market line (SML) is:

$$E(Ri) = r_f + \frac{E(R_M) - r_f}{\sigma_M^2} * \sigma_{iM} \quad (2.3.2)$$

where $E(R_i)$= the expected return of security 'i', $E(R_M)$= the expected return of the market portfolio 'M', σ_{iM}= the covariance of a security 'i' with the market portfolio 'M', σ_M^2= the variance of portfolio 'M' and r_f= the risk-free rate.

By taking into consideration that σ_{iM} is the covariance of a security 'i' with the market portfolio M, the term of σ_{iM}/σ^2_M is the beta coefficient of security 'i'.

The above equation (2.3.2) can now be re-stated as:

$$E(Ri) - r_f = \left[E(R_M) - r_f\right] * b_i \quad (2.3.3)$$

All securities and portfolios in the equilibrium, regardless of whether they are efficient or not, lie on the SML. Therefore, efficient portfolios lie on the CML and SML while inefficient ones lie on the SML but below CML.

2.3.4. THE STANDARD CAPITAL ASSET PRICING MODEL (CAPM)

There are several equilibrium models all over literature which allow us to determine the risk of an individual asset and its relationship with its expected rate of return. The simplest equilibrium model is the *one-factor capital asset pricing model (CAPM)*. The CAPM is used to determine an asset's appropriate rate of return if it is going to be added to a well-diversified portfolio. It was developed by Jack Treynor, William Sharpe, John Lintner, and Jan Mossin in 1964 and as every other model it requires simplifying assumptions.

The *one-factor capital asset pricing model (CAPM*) is based on the following assumptions:

1) There are no transaction costs in the purchase or sale of assets and inflation.
2) There are no personal taxes: this does not affect investors' preferences with regard the form they receive returns (dividend or capital gains).
3) There is at least one risk-free asset at which investors can borrow and lend money.
4) All investors have the same investment horizon during which they seek to maximize expected utility by choosing among portfolios which lie on the efficient frontier.
5) All investors have the access to the same information at the same time.
6) No individual investor can affect assets' prices: all investors are price takers.
7) Investors are interested about the expected values and the variance of the portfolios' returns: investors have homogeneous expectations.
8) Assets are infinitely divisible: investors can buy or sell any size of the asset.
9) All assets are tradable: they are highly liquid.
10) Unlimited short-shelling is allowed.

In the presence of the risk-free asset and under the assumptions that all investors have the same preferences and expectations, efficient portfolios will combine the risk-free asset and the tangent risky portfolio. The aforementioned assumptions will result in the convergence of investors' choices to the same risky portfolio, which lies on the efficient frontier; in equilibrium this would be the market portfolio 'M', which is a well diversified portfolio. The range of the risk aversion affects only the investment's allocation between risk-free and risky assets.

Therefore, all investors will invest in the same combination of risky assets but the amount they will borrow/lend depends on their risk aversion. This is called the *Tobin's 'Separation Theorem'*[3]. According to Tobin's Separation theorem investors first choose the optimal portfolio of risky assets and then they decide which amount of cash they will borrow or lend. It states that if CAMP holds, we can determine the optimal combination of risky assets without knowing the preferences of the investor's required risk and return levels. In addition, it states that there can not be zero investment in risky assets.

The CAPM model is used for pricing individual securities or portfolios in general (which may not be efficient). Since, as described earlier, CML is applicable only for efficient portfolios, in order to price individual securities or portfolios in general we use SML.

From the diagram of the SML we see that the beta coefficient of portfolio M is equal to one since:

$$b_M = \frac{Cov(R_M, R_M)}{\sigma^2 R_M} = \frac{\sigma^2 R_M}{\sigma^2 R_M} = 1.$$

The equation of the CAPM is:

$$E(R_p) = r_f + \left[E(R_M) - r_f\right] * b_p \quad (2.3.4)$$

where $E(R_P)$= the expected return of portfolio/security 'p', $E(R_M)$= the expected return of the market portfolio 'M', b_p= the beta coefficient of portfolio/security 'p' and r_f= the risk-free rate.

If portfolio/security 'p' is an optimal one, the CML would apply and from equations (2.3.1) and (2.3.4) we conclude that:

$$b_p = \frac{\sigma_P}{\sigma_M} \quad (2.3.5)$$

The differences between the Capital Market Line (CML) and Capital Asset Pricing Model (CAPM) are the following:

1. CAPM measures risk with the beta coefficient, while CML with the standard deviation.
2. The risk premium of CAPM is equal to $\left[E(R_M)-r_f\right]*b_p$ while that of CML is equal to $\frac{E(R_M)-r_f}{\sigma_M}*\sigma_S$.

The Capital Market Line is only applicable to efficient portfolios while the Capital Asset Pricing Model applies to individual securities and portfolios in general.

2.4. SINGLE INDEX MODEL (SIM) FOR PORTFOLIO SELECTION

The *single index model (SIM)* is used to measure the risk and the rate of return of a single security. For simplification purposes, it is assumed that the return of an individual security 'i' is linearly related to the return of an index. We will use as an index the market portfolio 'M'.

Since the relation between the two returns is not perfect we can represent this relationship with the following equation:

$$R_i = a_i + b_i R_M + e_i \quad (2.4.1)$$

where a_i= a constant term and represents the unsystematic expected value of security's return, b_i= the beta coefficient of the security and shows that the security's return is affected by the market's return, R_i= the return of a security 'i', R_M= the return of the market portfolio 'M', and e_i= an error term which incorporates any unexpected factors which influence security's return.

From equation (2.4.1), the return of security 'i' is divided in two parts:

1) Systematic return: $b_i R_M$
2) Unsystematic return: $a_i + e_i$

As previously explained in the section of systematic/unsystematic risk, the systematic return is affected by the return of the market portfolio, while the unsystematic return concerns the company itself and has nothing to do with the market.

We assume that the actual R_M is uncertain so we will use its expected value and its standard deviation instead. Moreover, since e_i is also uncertain we assume that its expected value is zero, namely $E(e_i)=0$. Furthermore, in order to ensure that the only factor that affects the securities' returns is the return of the market portfolio we assume that the covariance between the market portfolio and the error term is zero, namely $Cov(R_M, e_i)=0$,

The expected return of security 'i' is calculated by the following equation:

$$E(R_i) = E(a_i + b_i R_M + e_i) = a_i + b_i E(R_M) \quad (2.4.2)\ *$$

*$E(a_i) = a_i$, because a_i is a constant term, $E(b_i) = b_i$ because b_i is a constant term and $E(e_i)=0$ as previously assumed.

where a_i= a constant term, b_i= the beta coefficient of security 'i' and $E(R_M)$= the expected return of the market portfolio 'M'.

The expected return of security 'i' is also divided in two parts:

1) Systematic expected value of return: $b_i\, E(R_M)$
2) Unsystematic expected value of return: a_i

The variance of the rate of return security 'i' is calculated as:

$$\sigma^2(R_i) = \sigma^2(a_i + b_i R_M + e_i) = \sigma^2(b_i R_M) + \sigma^2 e_i = b_i^2 \sigma^2(R_M) + \sigma^2(e_i) \quad (2.4.3)*$$

*$\sigma^2(a_i) = 0$ because a_i is a constant term.

where b_i= the beta coefficient of security 'i' , $\sigma^2(R_M)$=the variance of return of portfolio 'M' and $\sigma^2(e_i)$=the variance of the error term.

The total risk $\sigma^2(R_i)$, is also divided in two parts:

1) Systematic expected value of return: $b_i^2\ \sigma^2(R_M)$
2) Unsystematic expected value of return: $\sigma^2(e_i)$

We first calculate the $Cov(R_i, R_M)$ as follows:

$$Cov(R_i R_M) = Cov(a_i + b_i R_M + e_i, R_M) = Cov(a_i, R_M) + Cov(b_i R_M, R_M) + Cov(e_i, R_M) = b_i Cov(R_M, R_M) = b_i \sigma^2 R_M \quad (2.4.4)$$

where b_i= the beta coefficient of security 'i' and $\sigma^2(R_M)$=the variance of return of portfolio 'M'.

From equation (2.4.4) we can now calculate the beta coefficient (b_i):

$$b_i = \frac{Cov(R_i, R_M)}{\sigma^2 R_M} \quad (2.4.5)$$

Moreover, the alpha coefficient 'a_i' is calculated based on equation (2.4.1) as follows:

$$a_i = E(R_i) - b_i E(R_M) \quad (2.4.6)$$

Based on the single index model, if we anticipate that the market will be bullish we will choose securities with beta coefficient higher than one (aggressive securities) wile if we anticipate that it will be bearish we will choose those with beta coefficient smaller than one (defensive securities).

2.5. INTRODUCTION TO MUTUAL FUNDS AND THEIR CHARACTERISTICS

2.5.1. INTRODUCTION TO MUTUAL FUNDS

A *mutual fund* is an investment scheme managed by professionals, collecting money from a group of investors into a pool and then investing the funds in securities (stocks, bonds and other types of securities). The fund manager is responsible for buying/selling the mutual fund's assets according to the fund's style.

The first mutual fund was created in Netherlands in 1774, while the first one outside Netherlands, the Foreign & Colonial Government Trust, appeared in London in 1868 and outside Europe the first mutual fund was established in the United States in 1890, all of which were close-end funds. After a couple of years, in 1924, they became quite popular and due to the higher demand for this type of investment the first open-end funds appeared. Following the crash in the stock market in 1929, mutual funds' publicity declined, while around 1950 they started again to become widely traded. Within 20 years, the mutual fund market boosted dramatically which continued until late 1990s.

The mutual fund industry noticed a considerable deterioration of their total assets in 2008 due to the financial crisis in subprime loans and stock markets. In order to point out their wide presence in the market, at the end of 2010 the total assets of 7.581 mutual funds in the United States were around USD11.8 trillion, while the worldwide assets were around USD24.7 trillion according to the Investment Company Institute (ICI).

Their popularity also is remarkable, since according to the Investment Company Institute (ICI)[4], in 2011 45% of U.S. households owned shares of mutual funds corresponding to an estimated 53.4 million households and 92.3 million investors.

2.5.2. TYPES AND CATEGORIES OF MUTUAL FUNDS

Each mutual fund established has a specific investment goal (achieve income or ensure long-term appreciation) and strategy (local or international investment) to follow, based on which the managers' investment choices are made.

According to the main type of underlying securities held, mutual finds are categorized to stock funds, bond funds, sector funds, money market funds, growth funds, emerging markets funds, balanced funds e.t.c. Moreover, according to the type of investment, they are separated into actively-managed funds and passively-managed funds with the first ones aiming to outperform an index benchmark and the latter simply trying to replicate the returns of a market index.

Mutual funds are subject to extensive regulation set by the Securities and Exchange Commission (SEC) which monitors their compliance with the Investment Company Act of 1940, according to which there are the below basic types of registered investment companies:

- *Open-end funds:* Shares can be issued or sold back to the fund at the end of each day at the net asset value per share. There is no limit to the number of shares issued. Investors who wish to buy or redeem their shares can proceed with it any time.

- *Close-end funds:* They issue shares to the public only at their creation via an Initial Public Offering (IPO), so an investor who wishes to sell his shares has to find another investor who wishes to buy them, and not sell them directly to the fund. The price usually differs from the net asset value and might be either at premium or at discount. Their shares are listing to trading in an organised exchange.

- *Unit investment trusts (UIT):* They combine characteristics from the close-end funds and the open-end funds as well. Although, they issue shares to the public only at their creation, investors can redeem their shares directly

with the fund or in the market. No professional management takes place since the portfolio does not change during its whole life.

- *Exchange traded funds (ETF):* They also combine characteristics of both closed-end funds and open-end funds. They are listed on a stock exchange and their price is formed by the market, however, it is usually close to the net asset value. In order for their price to be kept at levels close to the net asset value, ETFs issue and redeem large parts of their shares.

2.5.3. ADVANTAGES - DISADVANTAGES OF MUTUAL FUNDS

Mutual funds became increasingly popular to investors due to some advantages they offer which can not be attained in other types of investments. Since the advantages offered override the high paid fees included in a mutual fund investment, mutual funds gain more and more fans and are widely used not only by individuals but also by pension funds as a long-term investment.

The main *advantages* mutual funds offer are mentioned below:

a) Great level of diversification: It could be quite costly and risky for a single investor to achieve the same returns.
b) Professional management: Most investors do not have the resources, access and extensive knowledge.
c) Access to sources of investment that are not publicly available: By investing a small amount of money an investor obtains units of mutual funds which invest in securities available only to specific investment funds
d) Transparency: The holdings and returns of mutual funds are publicly available.
e) Daily liquidity: The proceeds from selling the mutual fund are available immediately.

In order for investors to enjoy the aforementioned advantages, they are subject to paying high fees and resigning from the opportunity to actively manage their portfolio. Moreover, some mutual funds depending on their type have some *disadvantages* such as:

a) High fees and expenses: In order to obtain professional management and high returns, an investor is subject to paying high fees.
b) No investors' participation to investment decisions: Investors can not make any investment choice if they do not agree with the fund manager's decisions.

2.5.4. FEES AND EXPENSES OF MUTUAL FUNDS

Since the fees play a very important role when deciding to invest in a mutual fund we will explain in detail the main fees included in a mutual fund investment. These are categorised into distribution charges, shareholder fees and operating fees.

The *distribution charges* are the amount paid to the brokers for the distribution and marketing of the shares.

The *shareholder fees* include: i) a front-end load or sale charge which is the commission paid to the broker when shares are purchased and ii) a back-end load which is the amount paid by the investor when shares are redeemed. Both expenses are deducted directly from the investor's account and are incorporated in the final prices.

Each mutual fund has to cover its *operating fees* (or else expense ratio) which includes management fees and 12b-1 fees. Management fees are paid to the fund managers, vary from fund to fund ranging from 0.10% to more than 2% and are paid as an annual fee of the total net asset value of the mutual fund. The 12b-1 fees, stipulated in SEC Rule 12b-1, are paid to brokers in order to cover marketing and distribution costs, set to 1%.

The fees are not the same for all mutual funds and for this reason there are different classes of mutual funds available, with the most common ones being Class A, Class B and Class C with different amounts of fund fees and expenses.

Class A shares usually have a front-end sales charge (or else 'load') paid to the advisor, while there is no limit set by the Securities and Exchange Commission for this charge. They also have management fees and a 12b-1 fee of 25%.

Class B shares on the contrary do not have a front-end sales charge, but include a Contingent Deferred Sales Charge (CDSC) that after some years declines. They also include a 12b-1 fee of 1% and an upfront commission to the advisor up to 4%. Class B shares are usually converted to Class A shares after a certain period of time.

Class C shares have a CDSC of 1% for one year, they carry a 12b-1 fee of 1% while they do not have any upfront commission and they are not converted into any other class.

2.5.5. CONCLUSIONS

Portfolio analysis includes the selection of the portfolio that combines maximum return with the minimum risk that best fits the investor's preferences. Mutual funds in addition to the portfolio analysis emphasize on achieving great levels of diversification along with finding mispriced securities. As such, mutual funds focus on evaluating the interrelationships among securities and the selection of the portfolio that represents the desired risk level. The majority of mutual funds hold well diversified portfolios, which entails that their performance is highly correlated with the market's performance, as a whole.

2.6. MEASURES OF MUTUAL FUNDS PERFORMANCE

In the past years, investors used to consider the returns portfolios offered as the most important criterion in their decision making disregarding the risk undertaken to receive such returns. As a result there were many measures of portfolios' past performances which totally ignored the risk and were based mainly in their returns.

Following the wide expansion of mutual funds, investors needed more information in order to understand if managers achieved their goals, and if the results achieved were attributed merely to lack or to managers' skills in making successful investment choices. Since the returns of the portfolios alone are not able to provide such information, more complex measures were created combining the return a portfolio offers with the risk the investor undertakes in order to measure the portfolio's performance.

Most initially developed performance measures derived from modern portfolio theory (MPT). Indicatively, Sharpe introduced Sharpe ratio in 1966 using the standard deviation as a risk measure, then Treynor and Black presented information ratio in 1973 while Treynor followed in 1965 by using Treynor ratio which is similar to Sharpe ratio though using beta as a risk measure. Jensen in 1969 examined abnormal performance through his Jensen alpha measure.

All these traditional measures of performance use risk measures of single parameter. The most widely used risk measure is standard deviation which has however some disadvantages. The first one is related to the assumption that all investors consider the same risk level in each investment, which is not true since there are investors who are willing to undertake more risk and others who are not. The second one is related to the assumption that returns are normally distributed, which is not always possible, since if returns do not follow a normal distribution, using standard deviation as a risk measure will lead to misleading results. Finally, standard deviation does not take into consideration skewness since it assumes returns are normally distributed.

The most common type of performance measures used in investments' ranking are the risk-adjusted performance measures, which are also classified in absolute risk-adjusted performance measures, relative risk-adjusted performance measures, performance measures based on downside risk.

2.6.1. ABSOLUTE RISK-ADJUSTED PERFORMANCE MEASURES

The absolute risk-adjusted performance measures, measure the mutual funds' performance with no reference to any benchmark.

2.6.1.1. SHARPE RATIO

The *Sharpe ratio* (or else reward-to-variability ratio) was introduced by William F. Sharpe in 1966[5]. It is based on the Capital Market Line (CML) and it is equal to the slope of portfolio 'p' on CML:

$$\frac{E(R_p)-r_f}{\sigma_p} \quad (2.6.1)$$

where $E(R_p)$= the expected rate of return of portfolio 'p', r_f= the risk-free rate and σ_p= the standard deviation of the portfolio 'p'.

The Sharpe ratio measures the excess return of portfolio 'p' over the risk-free rate per unit of total risk and it is used to determine how well a specific investment compensates the investor for the undertaken risk. Since it uses total portfolio risk (measured by its standard deviation) it evaluates the portfolio with regard to both the rate of return and diversification. The larger the Sharpe ratio, the higher the portfolio's risk-adjusted performance will be.

The Sharpe ratio is used for comparison reasons and not as a standalone measure, in terms of risk-adjusted return. It is widely used in ranking portfolios when it comes to investment decisions, but since it uses standard deviation as a measure of total risk, its application is restrictive to data with normally distributed returns. When

the distributions of returns are not normal, the Sharpe ratio is not the appropriate measure to be used since it may provide misleading results as the standard deviation does not have the same effectiveness when kurtosis, skewness or fatter tails appear in the distribution of the returns.

The Sharpe ratio can also be used to compare any portfolio with the market portfolio, and if the Sharpe ratio of the portfolio is greater than that of the market, then the portfolio is said to out-perform the market. If a security/ portfolio has a negative Sharpe ratio this indicates that a risk-free asset would perform better than the security/portfolio itself.

2.6.1.2. TREYNOR RATIO

The *Treynor ratio* (or else reward-to-volatility ratio) was developed by Jack Treynor, it is based on the Capital Asset Pricing Model (CAPM) and is calculated as follows:

$$\frac{E(R_p) - r_f}{b_p} \quad (2.6.2)$$

where $E(R_p)$= the expected rate of return of portfolio 'p', r_f= the risk-free rate and b_p= the beta coefficient of portfolio 'p'.

It is a measure of the excess return of portfolio 'p' over the risk-free rate per unit of market risk. It is similar to the Sharpe ratio, with the only difference being the fact that it uses market risk (measured by the beta coefficient) instead of using total risk (measured by the standard deviation). The larger the Treynor ratio, the higher the portfolio's performance will be.

Due to the fact that this ratio uses systematic risk (or else market risk), it is assumed that the investor has a diversified portfolio and, therefore, unsystematic risk (or else diversifiable risk) is not taken into consideration. As a result, Treynor ratio is preferable to be used by investors who hold diversified portfolios. Moreover, since the

measure uses the beta coefficient it is useful in ranking portfolios that have the same market risk.

The Treynor ratio, like Sharpe ratio too, can also be used to compare any portfolio with the market portfolio, and if the Treynor ratio of the portfolio is greater than that of the market, then the portfolio is said to out-perform the market.

A negative value of the Treynor ratio can not be interpreted without any additional information. There are two possible cases which can result in a negative value: i) the portfolio return is less than the risk-free rate, and the beta is positive and ii) the portfolio return is higher than the risk-free rate, and the beta is negative. Based on each case the conclusions are different, in the first case we conclude that the portfolio manager is not performing well while in latter the portfolio manager is performing well.

2.6.1.3. MEASURE BASED ON THE VALUE AT RISK (VAR)

The Value-at-Risk (VAR) measures the maximum loss in a portfolio for a specific time period with a specific probability (confidence level). This risk *measure based on the VaR* is used to calculate a risk-adjusted return performance measure as follows:

$$\frac{E(R_p)-r_f}{\frac{VaR_p}{V_p}} \quad (2.6.3)$$

where $E(R_p)$= the expected rate of return of portfolio 'p', r_f= the risk-free rate, VaR_p= the value-at-risk of portfolio 'p' and V_p = the initial value of portfolio 'p'.

The denominator indicates a percentage loss compared to the total value of the portfolio. The aforementioned measure based on the VaR, is a measure of the excess return of portfolio 'p' over the risk-free rate per unit of percentage loss. The only drawback is that the above ratio can be used to compare portfolios for the same confidence level.

2.6.2. RELATIVE RISK-ADJUSTED PERFORMANCE MEASURES

Apart from the absolute risk-adjusted performance measures there are also some relative risk-adjusted performance measures used, which measure the mutual funds' performance in reference to a benchmark.

2.6.2.1. JENSEN'S ALPHA

Jensen's alpha was developed by Michael Jensen in 1968[6] and is used to measure the abnormal return of a portfolio over the theoretical expected rate of return. It is based on the empirical form of the Capital Asset Pricing Model (CAPM) as expressed earlier in equation (2.3.4) and based on that, the Jensen's alpha is calculated as:

$$a_p = E(R_p) - [r_f + b_p * (E(R_M) - r_f)] \quad (2.6.4)$$

where $E(R_P)$= the expected return of portfolio 'p', $E(R_M)$= the expected return of the market portfolio 'M', b_p= the beta coefficient of portfolio 'p' and r_f= the risk-free rate.

A positive Jensen's alpha indicates that portfolio 'p' performs better than the market, and is said to have abnormal returns; thus investors are seeking investments with high alphas. A negative value on the other hand indicates that portfolio 'p' performs worse than the market. By definition the Jensen's alpha of the market portfolio is zero.

The term $b_p(E(R_M)-r_f)$ measures the portfolio's return as forecasted by the market model, therefore a_p measures the additional return that is attributed to manager's decisions. Jensen's alpha calculates risk premium based on the systematic risk, therefore it assumes that the portfolio is diversified (like Treynor ratio). Unlike Sharpe and Treynor ratios Jensen's alpha contains the benchmark.

Due to its inability to be used for the comparison of portfolios of different levels of risk, in order to be able to compare such portfolios the Black-Treynor ratio can be used defined as:

$$\frac{a_p}{b_p} \quad (2.6.5)$$

2.6.2.2. THE TREYNOR AND MAZUY MEASURE

The Jensen's alpha is based on the assumption that portfolio risk is stable which is not always feasible. The *Treynor and Mazuy model* introduced in 1966[7] by Jack Treynor and Kay Mazuy enables us to measure the Jensen's alpha and assess if it is attributed to fund managers' timing ability or merely to luck.

The Treynor and Mazuy model is defined by the following equation:

$$R_p - r_f = a_p + b_p * (R_M - r_f) + c_p * (R_M - r_f)^2 + e_P \quad (2.6.6)$$

where R_P= the return of portfolio 'p', R_M= the return of the market portfolio 'M', r_f= the risk-free rate, a_p= Jensen's alpha, b_p= the beta coefficient and c_p = the coefficient of timing ability.

If managers anticipate a bear market they will lower portfolio's beta, resulting in the portfolio's depreciation less than the market. If they estimate a bull market, they will choose to increase portfolio's beta in order to ensure returns higher than the market's.

Coefficient c_p explains if the fund manager has timing ability or not. If it is positive we reach the conclusion that the manager has successfully predicted the market. If it is zero, then the fund manager has no timing ability at all.

2.6.2.3. INFORMATION RATIO

The *information ratio* (also called appraisal ratio) is another measure of risk-adjusted return presented by W.F. Sharpe in 1994 as a generalization of the Sharpe ratio, by replacing the risk-free asset with a benchmark portfolio. It is defined as the expected value of the active return (difference between the returns of portfolio 'p' and of a benchmark portfolio 'b') divided by the standard deviation of the active return:

$$IR = \frac{E(R_P - R_B)}{\sigma(R_P - R_B)} \quad (2.6.7)$$

where R_P= the return of portfolio 'p', R_B= the return of a benchmark portfolio and R_P-R_B= the active return.

The numerator, $E(R_P-R_B)$ depicts that part of the return that is not attributed to the benchmark portfolio and it is related to the manager's choices while the denominator, $\sigma(R_P-R_B)$ measures the tracking error of the portfolio.

The information ratio measures the manager's ability to achieve excess returns relative to a benchmark and relates the excess returns achieved to the risk the manager has to undertake in order to generate them. Managers try to achieve high values of the information ratio by maximizing the expected value of the active return and minimizing the tracking error of the active return. The information ratio is used to explain if the additional risk undertaken by the manager on the risk-free rate is rewarded, and also to analyze the manager's available information other than the public information.

A high value of the information ratio indicates a better manager's stock picking ability since for a given level of risk the manager achieved higher returns, with a value around 0.5 being quite usual for top investment managers. A negative value although indicates underperformance can be misleading and should not be used for ranking purposes. It should be highlighted that information ratio does not use portfolio's systematic risk therefore it is not appropriate for the comparison of portfolios performances which have different levels of diversification.

2.6.2.4. MODIGLIANI AND MODIGLIANI (M^2) MEASURE OR MODIGLIANI RISK-ADJUSTED PERFORMANCE (RAP) MEASURE

In 1997, Nobel-prize winner Franco Modigliani and Leah Modigliani[8] developed a measure of the risk-adjusted returns on a portfolio, called the *Modigliani-Modigliani measure (M^2)* or *Modigliani risk-adjusted performance* measure *(RAP)* defined as:

$$RAP_P = \frac{\sigma_M}{\sigma_P}(R_P - r_f) + r_f \quad (2.6.8)$$

where R_p= the return of portfolio 'p', r_f= the risk-free rate, σ_M= the standard deviation of the benchmark portfolio 'M' returns and σ_p= the standard deviation of portfolio 'p' returns.

The RAP measure is based on the fact that any portfolio with a standard deviation σ_i can be transformed into another portfolio with different level of risk $\sigma_{p,}$ by levering or unlevering the original portfolio at the risk-free rate. Unlevering the portfolio, means selling a part of it and investing the proceeds at the risk-free rate. This reduces the risk as well as the expected return by d_i%. Levering the portfolio means borrowing money at the risk-free rate and increasing it. This increases the risk as well as the expected return by d_i%. The RAP is expressed in percentage terms.

The RAP measure, is the return of a portfolio, levered by an amount d_i (positive or negative) where d_i is defined as the amount of leverage required to make a portfolio's risk equal to the market risk. For any portfolio, the RAP is the return the portfolio would have achieved if its risk was equal to the market risk. The RAP allows the comparison of a portfolio to the market and the higher its value the better performance the portfolio has.

This measure is derived from the Capital Market Line (CML) and is similar to the Sharpe ratio since it can be defined as the Sharpe ratio multiplied by the standard deviation of the benchmark portfolio so they both produce the same rankings.

2.6.2.5. MARKET RISK-ADJUSTED PERFORMANCE (MRAP) MEASURE

We have previously presented two risk-adjusted performance measures which use the market risk in order to rank portfolios, Treynor ratio and Jensen's Alpha. Treynor ratio on the one hand, is not appropriate for analyzing differential returns and therefore it is not easy for investors to understand its results. Jensen's alpha on the other hand, may provide misleading results since the investors can manipulate the results by choosing the appropriate combination of funds and investments at risk-free rate. As a result of the above mentioned drawbacks of both measures and based on the RAP measure developed by Modigliani and Modigliani in 1997 which was based on the total risk (measured by the standard deviation), Scholz and Wilkens[9] presented in 2005 the *market risk-adjusted performance* measure *(MRAP)*. This new measure uses market risk (measured by the beta coefficient); it applies to investors who hold portfolios which consist of a fund and other assets, too. Moreover, since the investors' portfolios are considered to be diversified, it disregards unsystematic risk.

The marker risk-adjusted performance measure (MRAP) was based on the fact that funds should be compared on a common measure of market risk, which could be the beta coefficient of the market portfolio, where b_M=1. Therefore, the MRAP for a fund is derived from levering/ delevering a fund in order to reach a beta coefficient equal to 1. If the beta coefficient of fund 'i' is higher than the market portfolio's one, the investor may sell part of the fund and invest the funds at the risk-free rate in order to decrease the fund's beta. If the beta coefficient of fund 'i' is lower than that of the market portfolio, the investor may borrow at the risk-free rate in order to expand his position in the fund end increase the fund's beta. A fund outperforms the market portfolio, when its MRAP exceeds the market portfolio's return.

Based on these, the marker risk-adjusted performance (MRAP) is defined as:

$$MRAP_i = \frac{1}{b_i}\left(\mu_i - r_f\right) + r_f \quad (2.6.9)$$

Where μ_i= the average rate of return of fund 'i', r_f= the risk-free rate, and b_i= the beta coefficient of fund 'i'.

2.6.3. PERFORMANCE MEASURES BASED ON DOWNSIDE RISK

These measures were created in order to measure the performance measures, of the mutual funds' with regard only to potential losses. The main difference between downside risk and standard deviation is the use of a reference rate against the mean return, which is set based on the investor's preference function. Since personal preferences are included in the risk, these measures are valid only for individuals who have the same reference rate.

2.6.3.1. SORTINO RATIO

The *Sortino ratio* was introduced in 1991 by Sortino F.A., van der Meer R. and Plantinga A.[10] in order to measure the downside risk of a portfolio. It is similar to the Sharpe ratio, however while the Sharpe ratio takes into consideration volatility of returns by using standard deviation, the Sortino ratio focuses on returns which are lower than the mean return, therefore it uses semi variance. Semi variance is a skewed risk measure and it is used by investors who are interested only to a downward movement of returns, resulting in losses of their portfolio value, by measuring the dispersion of the observations which are below their mean.

Sortino ratio is defined on the same basis as the Sharpe ratio by replacing the risk-free rate with the target return which can be either a return below which the investor does not wish to drop (minimum acceptable return) or again a risk-free rate and the standard deviation of the returns with the standard deviation of the returns that are below the minimum acceptable return.

With these replacements in the Sharpe ratio, Sortino ratio is calculated as follows:

$$SR = \frac{E(R_p) - MAR}{\sqrt{\frac{1}{T}\sum_{\substack{t=0 \\ R_p<MAR}} \left(R_{pt} - MAR\right)^2}} \quad (2.6.10)$$

where R_{pt}= the rate of return of portfolio 'p' at time 't', $E(R_p)$= the target rate of return of portfolio 'p' , MAR= the minimum acceptable return and T= is the number of sub periods. The denominator is equal to the semi variance.

The lower the Sortino ratio, the more prone the investment to large losses therefore investments with low values in Sortino ratios should be avoided. A negative value indicates that the portfolio has not achieved the minimum acceptable return.

2.6.3.2 UPSIDE POTENTIAL RATIO

The Sortino ratio previously presented is based on the use of expected return and downside risk. The expected return depicts the reward an investor is granted for the risk undertaken in an investment. Instead of using the expected return, the *upside potential ratio*, developed by Sortino F.A., van der Meer R. and Plantinga A. in 1999.[11] It is defined as the probability-weighted average of returns above the reference rate and is equal to:

$$UPR = \frac{\sum_{t=1}^{T} \iota^{+} \frac{1}{T}\left(R_t - MAR\right)}{\left[\sum_{t=1}^{T} \iota^{-} \frac{1}{T}\left(R_t - MAR\right)^2\right]^{1/2}} \quad (2.6.11)$$

where R_t= the rate of return in period 't', MAR= the minimum acceptable return, T= is the number of sub periods and 'ι' is regarded as dummy variable which measures the difference between R_t and MAR, taking values 0 or 1. More specifically, if R_t>MAR then ι^{+}=1 and if $R_t \leq$MAR then ι^{+}=0. Similarly, if $R_t \leq$MAR then ι^{-}=1 and if R_t>MAR then ι^{-}=0.

The numerator of equation (2.6.11) is the expected return above the MAR and concerns potential profits, while the denominator measures downside risk and concerns potential losses. The Sortino ratio stated earlier, measures potential losses deriving from a downward movement of the returns. Therefore, the main advantage of the upside potential ratio is the use of the reference rate for evaluating both profits and losses.

2.6.4. PERFORMANCE MEASURES INDEPENDENT FROM THE MARKET MODEL

Due to the wide criticism on performance measures based on the market portfolio, additional measures have been developed independent from the market model which are particularly used to measure a manager's market timing strategy.

2.6.4.1. POSITIVE PERIOD WEIGHTING MEASURE

The Jensen's alpha has been widely criticized since it may assign negative performances to a market timer due to the fact that it is based on an upwardly biased estimate of systematic risk An alternative measure to the Jensen's alpha, is the *positive period weighting measure*, which evaluates correctly informed investors and market timers. It was developed by Grinblatt M. and Titman S. in 1989 [12] at an attempt to overcome the main drawback of Jensen's alpha and it is easier to calculate since it does not require information of the portfolio weights.

The basic idea of the 'period weighting' measures is that they are weighted sums of the portfolio returns calculated period-by-period. The weights in Jensen's alpha could be negative, resulting in negative performances. In order to ensure the appearance of positive performances in the existence of market-timing abilities, positive weights are attributed to the sub period returns, resulting in the weighted average of the excess returns of the reference rate over the risk-free rate to be null. This ensures that uninformed investors will be attributed a null performance. Based on the above, the positive period weighting measure, is defined by:

$$PPWM = \sum_{t=1}^{T} w_t \left(R_{Pt} - R_{Ft} \right) \quad (2.6.12)$$

$$\text{with } \sum_{t=1}^{T} w_t = 1 \text{ and } \sum_{t=1}^{T} w_t \left(R_{Bt} - R_{Ft} \right) = 1$$

where R_{Pt}=the return of portfolio 'p' for period 't', R_{Bt}= the return of the reference portfolio for period 't', R_{Ft}= the risk-free rate for period 't' and w_t= the weight for period 't'. When the positive period weighting measure has a positive value, then the manager is said to have correctly forecasted the market.

3. RESEARCH REVIEW

3.1. MUTUAL FUND PERFORMANCE, William F. Sharpe, Journal of Business, January 1966

William F. Sharpe, in his paper published in January 1966, prompted by Jack Treynor's paper 'How to rate Management of Investment Funds' published one year earlier, aimed to extend Treynor's work by subjecting Treynor's proposed measure to empirical test as well as to create alternative models of mutual fund performance based on recent developments in capital theory, which would be subjected to empirical test.

The recent developments in capital theory to which William F. Sharpe based his analysis concerned the following fields: a) portfolio analysis theory: A mutual fund involves the security analyst's task which is to provide predictions of security performance and the portfolio analyst's task which is to translate security's predictions to portfolio's predictions and select the efficient portfolios. A mutual fund cannot determine the preferences of investors therefore the fund manager should select a specific level of risk and return and invite investors with similar preferences to invest in it. However, there is no pattern in security prices or fund managers' skills, b) behavior of stock-market prices: Due to important evidence supporting the theory of random walks it seemed that the fund manager's task to select incorrectly priced securities may be difficult. As a result emphasis was then given to the correlation between securities, and c) theory of capital-asset prices under conditions of risk: If all investors can borrow/lend money at risk-free rate, and they want to invest in a risky portfolio, provided that they share the same predictions then based on Tobin's relationship, they can reach any point in the line described by the capital market model:

$$E = p + \frac{(E_i - p)}{\sigma_i} * \sigma \quad (3.1.1)$$

The capital market model is based on predictions (ex ante measures) of future performance. However, ex post values must be used, thus A_i= expected rate of return and V_i= actual standard deviation of return. The above implies that if all funds invest in well diversified portfolios and spend money for analysis and management, they should provide A_i and V_i.

In order to verify the above implications an initial sample of 34 open-end mutual funds was used during a nine-year period from 1954 until 1963. First the annual rate of returns were calculated which are considered as a measure of net performance. Funds with high average rate of returns had also high variability. Since differences in efficiency were noticed Tobin's relationship with ex post values was used with risk-free rate equal to 3%. The slope of the line in the capital market model was considered to provide a useful measure of performance, measuring the reward per unit of variability and it was defined as reward-to-variability ratio:

$$R/V = \frac{(A_i - p)}{V_i} \quad (3.1.2)$$

The larger it was the higher the performance. The range of R/V values from 0.43 to 0.78 implied that the differences were either transitory or due to excessive expenses.

In order to test whether the above performance differences were persistent, William F. Sharpe used data from 1944 until 1953 in order to forecast performance from 1954 until 1963. The R/V ratios were calculated again for the period from 1944 until 1953, and by plotting them along with those for the period from 1954 until 1963, he concluded that funds with low R/V ratios in the first period tended to keep the low ratios in the second period and similarly with those with high ratios. Moreover, if an investor had chosen 1 of the 17 best or worst funds in the first period he would have 11:6 chances that his fund would be in the same ranking in the second period. These show that difference in performance can be somehow predicted although imperfectly.

The Treynor's index was then used, which embedded volatility instead of variability:

$$TI = \frac{(A_i - p)}{\mathrm{B_i}} \quad (3.1.3)$$

since in perfect market where no securities are mispriced, fund managers would only deal with diversification. Since the funds used in our dada hold well diversified portfolios, the rankings of TI and R/V for the period from 1954 until 1963 were quite close. TI is inferior to R/V for measuring past performances but superior for predicting future performances. This was confirmed by comparing the rankings of TI from 1944 until 1953, calculated to predict rankings in the future, with R/V rankings from 1954 until 1963 which showed that if an investor had chosen 1 of the 17 best or worst funds in the first period he would have 15:2 chances that his fund would be in the same ranking in the second period.

Differences in performance were attributed either to management's skills to find incorrectly priced securities or to mutual fund expenses. If market is efficient (no incorrectly priced securities exist) funds with lower expenses have higher performance. If it is inefficient, funds with higher management costs may offset high expenses and attain high performance. The size of the fund is of high importance also. By examining the relationship between expenses and performance, William F. Sharpe noticed that high performance was achieved with low expense ratios (expenses divided by net assets).

Another strategy followed to compare the previous results reached, was to invest in the Dow-Jones Industrial portfolio. The average R/V ratio of the 34 mutual funds was 0.633 while for the Dow-Jones Industrial portfolio the R/V ratio was 0.667, indicating Dow-Jones' slightly better performance. Moreover, from the sample of 34 open-end mutual funds only 11 of them did better than the Dow-Jones portfolio, while 23 did worse. This is consistent with the conclusion that, ceteris paribus, the smaller the expense ratio the higher the performance.

The purpose of this paper was to test some of the recent development in capital theory and the behavior of stock prices. It was shown that performance could be measured considering average return and risk. However there were still differences among funds which did not appear to be solely transitory but also attributed to expense ratios. This supported more the opinion that the capital market is efficient and that fund managers focus on diversification spending less money in finding incorrectly priced securities. According to the author, further work was required before the results of this paper can be properly evaluated.

3.2. THE PERFORMANCE OF MUTUAL FUNDS IN THE PERIOD 1945-1964, Michael C. Jensen, May 1968

Michael C. Jensen used 115 open –end mutual funds for the period of 1945-1964 to measure the fund managers' predictive ability; to earn returns higher than those expected for a given risk level. In contrast to past analyses whose proposed measures were used mainly for ranking purposes (relative measures of performance), M. C. Jensen used an absolute measure of performance only with regard to managers' forecasting abilities.

The model M. Jensen proposed is based on the Capital Asset Pricing Model (CAPM) expressed by:

$$E(R_j) = R_F + b_j\left[E(R_M) - R_F\right] \quad (3.2.1)$$

which describes the expected return of an asset or portfolio for a given level of systematic risk (b_j). Based on M. Jensen, if a portfolio manager is able to predict future prices, he will be able to earn higher returns therefore he tried to adapt and extend the above equation in order to estimate the forecasting ability in question.

M. Jensen transformed the CAPM equation for multiple time intervals as follows:

$$E(R_{jt}) = R_{Ft} + b_j\left[E(R_{Mt}) - R_{Ft}\right] \quad (3.2.2)$$

where the beta coefficient was calculated based on the Single Index Model which is given by the following equation:

$$R_{jt} = E(R_{jt}) + b_j\pi_t + e_{jt} \quad (3.2.3)$$

and that market return was approximately equal to:

$$R_{Mt} = E(R_{Mt}) + \pi_t \quad (3.2.4)$$

From equations (3.2.4) and (3.2.2.) and by adding in both sides the term $b_j r_{\pi t} + e_{jt}$ he reached the following:

$$E(R_{jt}) + b_j\pi_t + e_{jt} = R_{Ft} + b_j\left[R_{Mt} - \pi_t - R_{Ft}\right] + b_j\pi_t + e_{jt} \quad (3.2.5)$$

Equation (3.2.5) from (3.2.3) is equal to:

$$R_{jt} - R_{Ft} = b_j\left[R_{Mt} - R_{Ft}\right] + e_{jt} \quad (3.2.6)$$

For managed portfolios however, equation (3.2.6) was amended to:

$$R_{jt} - R_{Ft} = a_j + b_j\left[R_{Mt} - R_{Ft}\right] + u_{jt} \quad (3.2.7)$$

which included a non-zero constant term (α_j) which indicates the average rate of return on the portfolio attributed to the manager's ability to forecast security prices. The intercept α_j was used as a measure of performance in managed portfolios, with a positive value to indicate that the portfolio manager has an ability to forecast security prices, while a negative value to depict the manager's random selection. Due to the

fact that a positive intercept is usual to appear in sample returns, it is not clear whether a positive intercept is due to the manager's forecasting ability or due to simple chance. In order to clarify that, the Least Squares Method provides an estimate of the intercept and a t-statistic based on which the statistical significance of the estimated α_j was derived.

Based on the assumption that, if the CAPM is valid, the behavior of π_t has no effect on the measure of performance, M. Jensen concluded that the measure of performance (α_j) can be implemented for funds of different risk levels and time periods. The manager's forecasting ability consists of the ability to forecast individual securities' price movements and/or the ability to forecast the general behavior of security prices.

The above model was used to measure manager's forecasting ability provided that the manager attempted to attain an average risk level equal to:

$$\ddot{b}_j = b_j + \ddot{e}_{jt} \quad (3.2.8)$$

where b_j is a target risk level. The random variable e_{jt} was considered as the mean through which the manager would take his decisions based on his predictions for π_t.

If the manager expected a positive π_t, he would be able to increase his portfolio returns by increasing its risk and having a positive e_{jt} while if he anticipated a negative π_t, he would prefer to have a negative e_{jt}, described by $e_{jt} = a_j \pi_t + w_{jt}$. While α_j is positive, only if the manager can also forecast $\pi_{t,,}$ its size will depend on manager's willingness to bet on his forecasts.

By substituting equation (3.2.8) in (3.2.7) the following was obtained:

$$R_{jt} - R_{Ft} = a_j + (b_j + \ddot{e}_{jt})[R_{Mt} - R_{Ft}] + u_{jt} \quad (3.2.9)$$

Provided that the estimator of b_j is unbiased the same would apply for the estimator of α_j. The expected value of the estimator of b_j was calculated as:

$$E(\hat{b}) = b_j - a_j E(R_M) \quad (3.2.10)$$

which indicates that the estimator of the risk is biased downward by an amount of $a_j E(R_M)$ where α_j can be either positive, if manager has forecasting ability or zero if he has no forecasting ability. Based on the above analysis, if the manager has no forecasting ability, an unbiased estimate of his ability to increase returns by choosing undervalued securities is obtained, while since α_j will be positive the estimator of the risk will be biased downward which entails an upward bias in the estimator of α_j. M. Jensen resulted that α_j will be positive because of a) the extra returns earned on the portfolio due to the manager's ability and b) the positive bias in the estimate of α_j resulting from the negative bias in the estimator of b_j.

Annual data were gathered for the period of 1955-1964 for all 115 funds and as many observations as possible were collected for those in the period 1945-1954 for which, complete data were obtained only for 56 funds. According to regressions for all 115 funds for 1945-1964 the below estimates of the parameters of equation (3.2.7) were obtained with a mean value for α_j of -0.111 and for b_j of 0.840 which indicated that the funds tended to hold portfolios which were less risky than the market portfolio. Based on that, any attempt to compare average returns on these funds to those of the market portfolio would be biased since they have different risk levels.

In order to obtain information on the forecasting ability of fund managers equation (3.2.7) was estimated twice, using returns of funds before deduction of fund expenses and after deduction of fund expenses, providing two different estimators of α_j. Based on the estimation of α_j after the deduction of fund expenses, the average value was -0.011 (on average the funds earned 1.1% less than expected) while out of 115 funds, 76 had negative α_j and 39 had positive α_j. These entail that the funds were not able to forecast prices in order to recover research and commission expenses as well as management fees. Based on the estimation of α_j before the deduction of fund expenses, the average value was -0.004 (on average the funds earned 0.4% less than

expected) while out of 115 funds, 67 had negative α_j and 48 had positive α_j which meant that the funds were not able to increase their returns in order to recover their brokerage commissions.

In order to avoid difficulties with the estimates of expenses before 1955 (since expenses prior to 1955 were assumed to be equal to those in 1955) the measures were estimated for 115 funds using only the gross returns for the period 1955-1964. The average value of the estimation of α_j was -0.001 while out of 115 funds, 55 had negative α_j and 60 had positive α_j. What is crucial to be examined prior to concluding to any results is the statistical significance of the estimated α_j, by calculating the t-statistic. Based on the frequency distribution of the t-statistic for all 115 funds estimated from gross returns for the period 1955-1964, the range of t-statistic values was from -2.84 to 2.17, which entails that there was little evidence that any of the funds has forecasting ability.

M. Jensen based on the above evidence, concluded that the 115 mutual funds, did not manage, on average, to predict security prices and also that there was little evidence that any individual fund would do significantly better than expected from selection by chance. Therefore, the funds were not quite successful to recover even their brokerage expenses.

3.3. PERFORMANCE EVALUATION OF INDIAN MUTUAL FUNDS, Dr Narayan Rao Sapar and Madava Ravindran, October 2003, India

Dr Narayan Rao Sapar and Madava Ravindran in their paper published in October 2003 analysed the performance of Indian mutual funds in a four-year bearish period from September 1998 until April 2002. The main purpose of the paper was to evaluate the performance of Indian mutual funds in the aforementioned time period, in order to identify the out-performers by using the following measures: Relative Performance Index, risk-return analysis, Treynor's ratio, Sharpe's ratio, Sharpe's measure, Jensen's measure and Fama's measure.

The total number of Indian mutual funds on March 2002 was 433 out of which 311 were open-end funds, 87 close-end funds (excluded from the study since only 4

were active) and 35 funds of assured returns (also excluded due to Securities and Exchange Board of India (SEBI) regulations). The initial sample used 269 open-end funds (those with existence of at least 1 year) out of 311, for which monthly closing NAVs were obtained from the Association of Mutual Funds in India (AMFI).

The first step was to calculate the *Relative Performance Index (RPI)* for each fund. Funds which did not offer returns equal to the risk-free rate were excluded form the initial sample. In order to avoid negative values of RPI they used the adjusted RPI of the NAV changes relative to a benchmark (for Indian mutual funds this is the Bombay Stock Exchange Sensitive Index or Sensex), using –X% to indicate the actual change in the Sensex:

$$RPI = \frac{\%ChangeinSchemeNAV + 2X\%ChangeinSensex}{+ X\%ChangeinSensex} \quad (3.3.1)$$

The expected return of each fund was then expressed by multiplying the RPI with the market return. With the risk-free rate to be equal to 8.4%, the mean monthly market return 1.68% annualised, and the fact that funds with returns less to the risk-free rate were excluded, only those with RPI>5 were kept for further analysis resulting in an amended sample of 58 funds. Based on the RPI ranking on 269 open-end funds, 49 were under-performers, 102 par performers and 118 out-performers. The best performers were the Medium Term Debt Funds since all of them outperformed the market, while half of them provided returns equal to or above 8.5%. Moreover, some equity diversified funds managed to diversify risk and achieve high returns during the bearish period examined.

For the remaining 58 funds a risk-return analysis was performed. With regard to the returns, the *monthly log returns of mutual funds* and the *mean monthly log return of the market portfolio* (BSE Sensex) were calculated respectively:

$$r_i = \ln(endingNAV / beginingNAV) \quad (3.3.2)$$

$$r_m = \ln(endingSensex / beginingSensex) \quad (3.3.3)$$

Based on the log returns 12 out of 48 funds, had negative returns and 36 had positive returns.

From a risk perspective, two measures were used. First, the *variance* was calculated as a measure of the asset's total risk given by the following equation:

$$Var(r) = \frac{1}{n}\sum_{i=1}^{n}[r_i - r_{am}] \quad (3.3.4)$$

Moreover, the *beta coefficient* was used as a measure of the systematic risk obtained by applying the market model and running regressions between the monthly market return (r_m) with the monthly mutual fund return (r_p):

$$r_p = a + b * r_m + e_p \quad (3.3.5)$$

Based on the variances, from the 58 funds, 31 of them were of high risk and 19 of low risk, while only 8 were around average risk levels. Based on the beta coefficients out of 58 funds, 37 were of low risk, 11 below average risk and 10 of average risk.

Based on a total ranking for all 58 funds, they concluded that in average all of them provided mean monthly returns of 0.59% at a risk of 7.1% while the market provided 0.14% at a risk of 8.57%, which means that the average mutual fund out-performed the market. Moreover, among all funds, Medium Term Debt Funds, Equity Diversified funds and Balanced Funds out-performed the market which is anticipated in a bear period.

Based on the above, the *Treynor ratio* and the *Sharpe ratio* were calculated respectively:

$$T_p = \frac{r_p - r_f}{b_p} \quad (3.3.6)$$

$$S_p = \frac{r_p - r_f}{\sigma_p} \quad (3.3.7)$$

The first measure indicates the excess return over the risk-free rate (risk premium) per unit of systematic risk while the second one measures the risk premium per unit of total risk. Since the beta of the market portfolio is equal to 1, its Treynor ratio is equal to the risk premium. If the mutual fund's T_p or S_p is greater than the market portfolio's T_p or S_p respectively, then the mutual fund out-performs the market. Based on the calculations from 58 funds, 30 had positive Sharpe ratio while the limitation of low σ was noticed in 2 funds and 32 had positive Treynor ratio while the limitation of negative betas was encountered in 4 funds. These results show that the fund managers have to improve diversification.

Based on the *Sharpe's* Single Index Model:

$$r_p = a + b * r_m + e_p \quad (3.3.8)$$

the *unsystematic risk* was given by:

$$\sigma^2(R_i) - b_i^2\sigma^2(\mathrm{R_M}) \quad (3.3.9)$$

A well diversified fund was expected to have low unsystematic risk.

The calculation of the *Jensen's measure* was also implemented:

$$J_\mathrm{p} = r_p - \left[r_f + b_p * (r_m - r_f)\right] \quad (3.3.10)$$

according to which if J_p was positive the mutual fund had higher returns than the CAPM return and would lie above SML, whereas a negative value would entail the opposite. The unsystematic risk was very high due to low betas and low correlation with the market, while 35 funds had positive Jensen measure against 30 which provided excess reruns over the risk-free rates due to the fact that $r_m < r_f$.

The last measure applied was *Fama's measure* as per which the performance is measured in terms of excess returns over expected returns based on the premium required for total risk:

$$F_p = (r_p - r_f) - \frac{\sigma_p}{\sigma_m} * (r_m - r_f) \quad (3.3.11)$$

If F_p is positive, the fund provides higher returns that the market and lies above CML, while if it is negative the opposite happens. Positive Fama's were observed in 46 funds.

The study of Dr Narayan and M. Ravindran was subject to certain limitations though, since the NAVs used were obtained by AMFI's website but were not all calculated in the same manner, risk-free rate may not be accurate, some mutual funds not linked to the stock market are not correlated to BSE sensex, their analysis is limited to non-identical time periods and unequal sample observations and they do not take into consideration the effects caused by the import and export of mutual funds.

The conclusion of the above analysis is that 58 out of 269 open-end funds provided returns higher that the market return during the bear period of September 1998 – April 2002 with some of them to owe it in the premium required both for systematic and total risk.

3.4. ON MARKET TIMING AND INVESTMENT PERFORMANCE. II. STATISTICAL PROCEDURES FOR EVALUATING FORECASTING SKILLS, Roy D. Henriksson and Robert C. Merton, October 1981

Based on Merton's model presented in 1981, considered as Part I, the authors in this paper presented two models, a parametric and a non parametric, to evaluate the market timing ability of managers. The non parametric model is used when manager's forecasts are observable and no further assumptions are required with regard to the distribution of returns. The parametric model is used when manager's forecasts are unobservable where in this case additional assumptions of a CAPM are required. The

main difference of their models from others is that they can identify which part of the manager's forecasting ability constitutes micro-forecasting (forecasting the movement in stock prices with regard to stocks in general) and which constitutes macro-forecasting (forecasting the movement in the stock market with regard to fixed income).

They first presented the non parametric model which is based on conditional probabilities where $p_1(t)$= the conditional probability of an accurate forecast given than $Z_M(t) \leq R(t)$ and $p_2(t)$= the conditional probability of an accurate forecast given than $Z_M(t) > R(t)$. In Part I, it was shown that the sum of the conditional probabilities was a sufficient measure of forecasting ability since they do not depend on the distribution of returns. More specifically, if $p_1(t) + p_2(t) = 1$ this entailed that the forecasting predictions have no value, therefore a necessary condition for market-timing abilities to have a positive value would be that $p_1(t) + p_2(t) > 1$. The values of $p_1(t)$ and $p_2(t)$ are usually not observable, therefore they should first be estimated and then test the null hypothesis:

$$H_0 : p_1(t) + p_2(t) = 1 \quad (3.4.1)$$

They defined the conditional probabilities as $p_1=E(n_1/N_1)$ and $p_2=E(n_2/N_2)$ and the Null hypothesis turned to:

$$H_0 : p_1 = E(n_1/N_1) = E(n_2/N_2) = 1 - p_2 \Rightarrow E\left[\frac{n_1 + n_2}{N_1 + N_2}\right] = E(n/N) = p_1 = p \quad (3.4.2)$$

where N_1= observations for which $Z_M \leq R$, N_2= observations for which $Z_M > R$, n_1= number of accurate predictions given that $Z_M \leq R$, n_2= number of accurate predictions given that $Z_M > R$.

From equation (3.4.2) we see that only one probability has to be estimated. Moreover, n_1 and n_2 follow binomial distributions therefore the probability that n_i=x, from a sample on N_i observations is:

$$p(n_i = x|N_i, p) = \left(\frac{N_i}{x}\right)p^x(1-p)^{N_i-x}; i = 1,2 \quad (3.4.3)$$

From this and from Bayes's Theorem, they calculated the probability that the manager accurately forecasts that $Z_M \leq R$ (event B; he is correct x times) given that the total number of forecast that $Z_M \leq R$ is m (event A) as:

$$P(B|A) = \binom{N_1}{x}\binom{N_2}{m-x} \Big/ \binom{N}{m} \quad (3.4.4)$$

which indicated that the probability of the accurate forecasts given the total number of forecasts was independent of both p_1 and p_2, thus it was not required to estimate any of the conditional probabilities to test the null hypothesis.

All variables required are known and for a one-tail test with a confidence level of c, the null hypothesis is rejected if $n_1 \geq x^*(c)$, where $x^*(c)$ is the solution to:

$$\sum_{x=x^*}^{\bar{n}_1} \binom{N_1}{x}\binom{N_2}{m-x} \Big/ \binom{N}{m} = 1-c \quad (3.4.5)$$

The above procedure, involved that the manager may not have the same forecasting abilities for up and down market moves, which means that equation (3.4.1), may not always hold. If the manager indeed had the same prediction for both moves then, $p_1(t) = p_2(t) = p(t)$, where the unconditional frequency for a correct forecast has to be measured with the null hypothesis of no forecasting skills being $p(t) = 0.5$. The unconditional probability of a correct forecast can not be generalized as a measure of market timing ability.

In the event that only the returns are available while the manager's forecasts are not known, the parametric model is used in order to test the market-timing ability. As previously stated, additional assumptions of the CAPM were required based on which the parametric model was presented as:

$$Z_p(t) - R(t) = a + \beta x(t) + \varepsilon(t) \quad (3.4.6)$$

where $Z_p(t)$= the realized return of portfolio, $x(t)=Z_M(t)-R(t)$= the realized excess return on the market and $\varepsilon(t)$= the error term. Micro-forecasting can be tested by estimating equation (3.4.6) with the Method of Least Squares.

Based on the assumption that the manager used different levels of systematic risk, this entails that the manager has one target beta (η_1) for a down-market forecast $Z_M \leq R$ and another target beta (η_2) for an up-market forecast $Z_M > R$. They defined the random variable $\theta(t)$ as:

$$\theta(t) = (\beta(t) - b) \quad (3.4.7)$$

where b is the expected value of $\beta(t)$, as an unanticipated part of beta.

The return on the portfolio per period could then be written as:

$$Z_p(t) = R(t) + (b + \theta(t))x(t) + \lambda + \varepsilon(t) \quad (3.4.8)$$

where λ= the expected increment from micro-forecasting.

By setting, $y(t)=\max[0,R(t)- Z_M(t)]=\max[0,x(t)]$ the model was re-written as:

$$Z_p(t) - R(t) = a + \beta_1 x(t) + \beta_2 x(t) + \varepsilon(t) \quad (3.4.9)$$

which enables us to identify the separate components of performance which are attributed to micro-forecasting and macro-forecasting through a simple regression.

The results of the regression provide us with estimates of the coefficients α, β_1 and β_2. The coefficient β_2 expresses the manager's market timing ability, and its true value will be zero for two reasons: if the manager has no timing ability, i.e. $p_1(t) + p_2(t) = 1$ or if he does not take any action on his forecasts, i.e. $\eta_1=\eta_2$. A negative value of the estimate of coefficient indicates a negative value of market-timing while a negative true value violates the assumptions $p_1(t)+ p_2(t)\geq 1$ and $\eta_1\geq\eta_2$.

Both models, parametric and non parametric, are applicable if the manager forecasts the direction of the market movement and not the exact range. When the forecasts are observable, the non parametric model is used which is not restricted to a specific distribution of returns. When the forecasts are not observable, the parametric model is used which allows the distinction between the macro-forecasting and micro-forecasting effects. The parametric model also applies to cases when the manager has two different target of beta.

Both models are valid for portfolios that included more than one category of assets, with different levels of risk, for which the composition of the portfolio can be adjusted based on estimations about their performance.

3.5. EUROPEAN MUTUAL FUNDS PERFORMANCE, Roger Otten and Dennis Bams, April 2000, Netherlands

The authors combined a performance analysis in 506 European mutual funds by using the Carhart 4-factor asset pricing model with the examination of the existence of European fund managers' performance persistence (also called, the 'effect of hot hands') as well as the impact of management fees on the fund's performance.

The data used in the analysis derived from the top 5 European countries which manage more than 85% of the total assets held by European funds. The funds were restricted to those which invested only in local market with a minimum number of available observations of 24 months, concluding in an initial sample of 506 open-end equity mutual funds (dead and surviving) for the period from January 1991 until

December 1998. Funds were categorized based on their investment style and returns were initially net of management fees.

In order to tackle with the survivorship bias, which arises when databases contain data only for funds available for the whole period examined altering funds' actual performance, they used Datastream in order to also include dead funds from the commencement of their analysis, which at some time later disappeared and the portfolios were then re-weighted accordingly. The percentage of funds that disappeared during the analysis ranged from around 5% in Germany up to 25% in the United Kingdom. The width of its impact in the mean returns was significant when the mean returns of all funds (dead and surviving) are compared with the mean returns of surviving funds only. If the data used was restricted only to surviving funds this would have lead to an overestimation of mean returns by 0.11% to Netherlands to 0.45% to Italy.

Prior to proceeding with the estimation of the Carhart 4-factor model the required indices were first calculated. The benchmark portfolio was the total number of stocks included in the Worldscope universe that were larger than $25 million. In order to determine the SMB factor, all stocks were ranked based on market capitalization and bottom 20% of them was the 'small portfolio' while the remaining was the 'large portfolio'. SMB was then calculated as the difference of returns between small and large portfolios. Similarly, for determining HML, all stocks were ranked based on their book-to-market value, with the top 30% being the "high portfolio" and the bottom 30% being the "low portfolio". HML was then defined by subtracting the low from the high one. The momentum was determined by ranking all stocks based on their returns 6 months ago, with the difference between the top 30% and bottom 30% of market capitalization being the PR6m factor returns.

Some important notes with regard to the calculated factors are that the SMB factor has negative values in all countries examined and the momentum factor indicates that momentum strategies add value in 3 countries out of 5 examined. Moreover, since the cross-correlations between factors are quite low, multicollinearity does not seem to affect the results.

They proceeded with the estimation of the Carhart 4-factor model at a country level as a whole (including all funds) and then based on the investment style of each fund, separately for each style per country which is defined as:

$$R_{it} - R_{fi} = \alpha_{\mathrm{i}} + \beta_{0\mathrm{i}}\left(\mathrm{Rm}_{\mathrm{t}} - \mathrm{Rf}_{\mathrm{t}}\right) + \beta_{1\mathrm{i}}\mathrm{SMB}_{\mathrm{t}} + \beta_{2\mathrm{i}}\mathrm{HML}_{\mathrm{t}} + \beta_{3\mathrm{i}}\mathrm{PR6m}_{\mathrm{t}} + \varepsilon_{\mathrm{it}} \quad (3.5.1)$$

The results of the regressions indicate that the majority of funds, except for French funds, had slightly positive SMB estimates, which indicated that returns of funds were significantly driven by small stocks. The HML estimates did not provide a clear result, while the momentum factor appeared significant in half cases with the majority of them having negative values entailing contrarian strategies. With regard to the 'α' coefficient, Germany has negative values while the United Kingdom is the only one with high positive values of 'α'. On the level of the fund's investment style, funds investing in small companies show outstanding performances in most countries. Based on the results above, European fund managers seemed to prefer small stocks with high book-to-market ratios, and they did not use simple momentum strategies since there were indications of using contrarian strategies. In the 4-factor model, alphas were calculated based on a fixed beta for the whole period examined which is not reliable if expected returns and risk vary over time. In this case a conditional 4-factor model was used with time-varying betas.

In the 4-factor model, the returns used were net of management fees, namely the management fees were already deducted from the fund's return. In order to examine how they affect the performance of European mutual funds they calculated conditional and unconditional alphas prior and after management fees. When management fees are added, most funds have positive alphas, apart from German funds. Moreover, based on the unconditional model, there is an increase in the number of funds that outperform the market by 5% for Italy and the United Kingdom and by 10% for Netherlands and France, whilst based on the conditional model 4 out of 5 countries out-perform. The aforementioned analysis with regard to management fees entails that European mutual funds are sufficient in adopting successfully new information to offset their expenses and add value.

The last thing examined, was the persistence of funds' performance. For this purpose, all funds were ranked within each country based on their past 12 month returns. Those funds with the highest past 12-month returns constitute a portfolio which is kept for 1 year and then it is rebalanced based on their latest 12-month returns. This is repeated for the whole period under examination. For all funds a decreasing excess return was noticed from the high to the low past performance portfolio, with the only noticeable spread in the United Kingdom which reached 6.08% per year.

Moreover, despite to what mutual fund managers often claim, there is a negative relationship between management expenses and risk-adjusted performance (alpha) in three out of four European countries. Based on the above analysis, European mutual funds, and especially small cap funds are able to add value, as indicated by their positive alphas net of management fees while when management fees are included 4 out of 5 countries exhibit significant out-performance. Most European funds provided weak persistence except for funds in the United Kingdom where the strategy of buying last years winners and selling last years losers yields a return of 6.08% per year, which cannot be explained by common factors in stock returns.

3.6. MUTUAL FUND PERFORMANCE: AN ANALYSIS OF QUARTERLY PORTFOLIO HOLDINGS, Mark Grinblatt and Sheridan Titman, July 1989, USA

M. Grinblatt and S. Titman based their study on the fact that many performance measures use actual returns resulting in either negative performance or no performance for an average mutual fund. In order to overcome this drawback, they used gross returns in order to observe abnormal performance.

Abnormal returns of active and passive investment strategies were compared, both with and without transaction costs, fees and expenses. The authors used quarterly holdings of equity mutual funds for the period from 1975 to 1984 to calculate the theoretical returns an investor would have realized and do not include management

fees, expenses or any transaction costs. Moreover, the sample in question does not include only surviving funds.

Their research focused on examining whether mutual fund managers have superior selection abilities that produce abnormal returns. Passively managed portfolios offer no abnormal performance, while actively managed portfolios show positive abnormal performance due to the fact that the manager is actively involved in buying or selling securities based on superior information. For this reason the Jensen measure was calculated based on four different benchmarks: a) the monthly rebalanced equally weighted portfolio of all CRSP securities (EW), b) the CRSP value-weighted index, (VW), c) the 10 Lehman-Modest factor portfolios (F10) and d) the eight portfolio benchmark (P8).

Two samples were created based on the same data, from 31 December 1974 until 31 December 1984, one with cash-distribution adjusted monthly return net of transaction costs but not sales charges and another with the composition of equity mutual funds registered with the SEC in a given quarter which is also not subject to survivorship bias. The monthly stock returns were used to form hypothetical monthly mutual funds returns, constructed from the weights of mutual funds in the portfolio. Excess returns were calculated by subtracting the return of the risk free rate (1 month US t-bill) from the return of the mutual fund in question.

The hypothetical returns were calculated for five samples: a) an equally weighed portfolio of all 578 funds in the quarterly data set, b) an equally weighted portfolio of 274 mutual funds that existed on 31 December 1974 and c) an equally weighted portfolio of 157 mutual funds that were available in the quarterly holdings and the data set of monthly returns. The actual returns were also calculated for a) an equally weighted portfolio of 157 mutual funds and b) an equally weighted portfolio of 279 funds in the data set of actual monthly returns. Based on the above five samples, the average excess returns were calculated. Moreover for each of the five samples the Jensen measures were calculated for all different benchmarks (i.e. EW, VW, F10, P8).

The difference between the compositions of the actual and hypothetical portfolios results in the difference of between transactions costs which range from 1% (EW benchmark) to 2.5% (P8 benchmark) depending on the benchmark used. The estimations of transaction costs using the benchmarks of F10 and EW are biased downward while those using the benchmarks of P8 and VW are upwardly biased

The survivorship bias is calculated by subtracting the Jensen measures of the sample of the hypothetical returns of 274 funds which are not subject to survivorship bias and the sample of the hypothetical returns of 157 funds which are subject to survivorship bias. The positive bias proved to be small ranging from 0.01% to 0.04% depending on the benchmark used.

The hypothetical returns show negative performance with the F10 and EW benchmarks and positive performance with the P8 and VW benchmarks. Since fund managers will not use superior information to achieve negative performance it depicts the inefficiency of F10 and EW benchmarks. Positive performances can be achieved through the use of superior information therefore this can not be attributed to possible inefficiency of the benchmarks. The sample of hypothetical returns without survivorship bias had slightly positive performance which is not adequate though to exceed the transactions costs and expenses.

Mutual funds were then categorized based on their investment objective where in all categories transactions costs seem to be substantial. Survivorship bias had a small impact in all classifications, while the abnormal performance in aggressive-growth funds reached approximately 3%. Based on the analysis per category, the authors reached the conclusion that superior investment talent exists within categories.

Finally in order to examine the effect of fund size, they formed five portfolios by ranking them based on their Net Asset Values (NAV) at the end of 1974. The F-Statistic calculated to test whether all Jensen measures are equal to each other, indicated that transaction costs and survivorship bias differ depending of the fund size, with the fund with the smaller size to have the higher transaction costs, the larger survivorship bias and the higher performance.

The analysis differs from others since it is based in samples of fund returns constructed with mutual funds' gross returns and the different benchmarks used. They concluded that superior performance may exist in growth and aggressive-growth funds with small net asset values. These funds also have high expenses which can not be covered by the fund's actual returns resulting in the non existence of abnormal performance. As a result investors can not take advantage of the superior abilities of portfolio managers by purchasing units of their mutual funds.

3.7. PERFORMANCE AND CHARACTERISTICS OF SWEDISH MUTUAL FUND, Magnus Dahlquist, Stefan Engström, Paul Söderlind, September 2000, USA

This paper focuses on the relationship between the performance of mutual funds in Sweden as estimated by the Jensen's alpha on different benchmarks and their characteristics such as flows, trading activity, size and expenses. The specific analysis is based on two incentives, first by analyzing a different market than usual, they provided out-of sample evidence and second since the data was quite comprehensive it enabled the authors to proceed with very interesting hypotheses. Moreover, since data for all funds was available for any time prior to the sample period examined no survivorship bias seemed to exist.

The sample used in the analysis included 210 open end domestic funds from 1992 until 1997. The 210 mutual funds used, were classified based on their investment objective in the following four categories according to the classification of the Swedish Financial Supervising Authority: a) 80 regular equity funds, b) 46 funds allemansonder; part of public savings program and offer tax benefits, c) 42 bond funds; invest in mortgage and government bonds and d) 42 money market funds. Funds that invest in foreign markets are excluded from the study since in order to tackle foreign risks more benchmarks should be taken into consideration. Although, domestic mutual funds cover around 20% of all funds, the sample data covers around 65% of equity funds in net asset value terms.

Net asset values were used to calculate weekly returns and fund characteristics, such as size, net flows, administrative fees, exit and loading fees, turnover and commission were also gathered and then computed on an annual basis. More specifically, the size was equal to the total net asset value of the fund while the quarterly net flows were expressed as the change in the fund's assets apart from reinvested dividends and capital gains. Net flow in a fund is calculated as:

$$F_{iT} = TNA_{iT} - TNA_{iT-1} * NAV_{iT} / NAV_{iT-1} \quad (3.7.1.)$$

where NAV_{iT} = the net asset value of the fund 'i' at time t, NAV_{iT-1} = the net asset value of the fund 'i' at time t-1, TNA_{iT} = the total net asset value of the fund 'i' at time t and TNA_{iT-1} = the total net asset value of the fund 'i' at time t -1.

Administrative fees and exit and loading fees are all expressed as a percentage of the fund's assets. Turnover is considered as the minimum of sales and purchases over yearly average assets. Finally commission is expressed as a percentage of the fund's assets. Returns were net of administrative fees and commissions but before exit and loading fees.

Several benchmarks were used in order to capture developments both in stock market and in bond market. For the equity market two equity indices were used: a general stock market index which is a value-weighted index with reinvested dividends and a small firm index constructed by the authors based on the Carnegie Small Cap Index. For the bond market two equity indices were used: a total bond index with duration of 4 years and a money market index consisting of 180 days T-bills. As a risk free rate, a seven day interbank rate (STIBOR) was used. Conditional information variables were used, such as the lagged market return and the level of the yield curve.

An unconditional model and a conditional one were estimated the first one by keeping stable the beta coefficients used, and the latter by allowing time variation in betas. The alphas obtained from the models through the least squares method were used as a measure of the fund's performance. Since the hypothesis of no time variation in betas is rejected for 53% as per Wald statistics, they focused on the results

obtained from the conditional model. Based on these results, regular equity funds had an alpha of 0.5% per year indicating that they outperformed the market. Administrative fees were on average 1.4% per year, affecting the funds' returns. Allemansonder funds underperformed the market by having an alpha of -1% per year with the administrative fees reaching 1.5%. Their weak performance was partially attributed to the fact that due to the tax advantages they offered there was low competition. Finally the bond funds and the money market funds both underperformed the market by having on average an alpha of -0.5% and -0.9% respectively.

The above results were not subject to any survivorship bias. However, since an upward bias is likely when funds with poor performance are merged or liquidated, the authors estimated the survivorship biases. A measure of bias is based on the difference between the return on an equally-weighted portfolio of all the funds in existence each week and that of the funds that exist at the end of the sample period. They concluded that dead funds perform less well than surviving funds with the estimate bias being higher in regular equity funds.

Then the performance of funds was compared using cross-sectional fund characteristics by running panel-data regressions as follows:

$$\hat{\alpha}_{iT} - \overline{\hat{\alpha}}_T = \gamma_0 + \gamma_1 (x_{iT} - \bar{x}_T) + \xi_{iT} \quad (3.7.2)$$

Where $\hat{\alpha}_{iT}$ = the estimated alpha of fund 'i' at time t, x_{iT} =a characteristic of the fund. They allowed for fixed effects by using $\overline{\hat{\alpha}}_T$ and $\bar{x}_T$ = the mean values. Since the alphas included errors the weighted least squares method was used. A second method they followed was to measure the performance of trading strategies based on fund characteristics. Trading strategies involve the construction of a zero-cost portfolio by buying a high portfolio financed through a short selling of a low portfolio. The zero-cost portfolio is kept one year and then a restructure is effected.

Based on the cross sectional analysis of alphas and characteristics calculated in both ways; single panel regression and performance of trading strategies, the

following results were reached. Size has little positive or negative effect on regular equity funds while in allemansonder funds there is a strong negative relation between the size and their performance. Moreover, bond and money market funds indicated that size has a weak positive relation to their performance. Administrative fee has a negative relation to the performance of regular equity and money market funds, a weak negative relation to allemansonder funds and no significant relation to bond funds. Commission and turnover showed a positive relation to the performance of regular equity funs while for allemansonder funds no relation seemed to exist. Moreover, little evidence was found of a relation between lagged flow and performance. In addition, a strong persistence in performance was found in money market funds but not in other categories.

3.8. THE PERFORMANCE OF JAPANESE MUTUAL FUNDS Cai Jun, Chan K. C. and Takeshi Yamada , Hong Kong, 1997

The authors analysed the performance of open-end funds in Japan for the period from 1981 until 1992 and they concluded that regardless of the measure used in order to calculate the performance of a mutual fund, the majority of the Japanese funds underperformed the benchmarks used from 3.6% to 10.8% annually. They then tried to detect possible reasons of this underperformance which according to the research at first sight it is not explained by the fact that the funds selected invest in stocks with low book-to-market ratios. A potential reason of the funds' underperformance is the dilution effect caused by inflows of funds since when an investor enters an open-end fund he pays the after-tax value of the net asset value.

The data used for the research consisted of 800 open-end mutual funds, managed by nine fund management companies, from January 1981 until December 1992, including all funds that existed during the period in order to avoid survivorship bias. Based on the adjusted net asset values of the funds they calculated compounded monthly returns with dividend payments. For the individual fund analysis they also used 64 funds from January 1981 until December 1992 (those with more that 97 observations) although this may bias the average return upwardly. Two samples were created, one with 800 funds and another with 64 funds. For both samples two portfolios were created, one value-weighted portfolio (vw) and one equal-weighted

portfolio (ew). Moreover, they constructed a sub-sample of funds which invest in well-diversified equities consisting of 190 funds out of 800 and 13 funds out of 64. The benchmarks used were a) a value-weighted index that includes all stocks listed on the Tokyo Stock Exchange (TSE), all government bonds and corporate bonds (maturity>1 year) and b) a three-factor benchmark consisting of the value-weighted index, a mimicking factor related to the size effect and a mimicking factor related to the book-to-market ratio.

Based on the first benchmark, they found that for the whole period under examination, the mutual funds significantly underperformed the market. The returns of the aggregate sample of 800 funds were 1.73% and 2.41% for the vw800 and ew800 respectively on an annual basis with the 190 well-diversified funds performing worse, with vw190 to reach -0.127% and ew190 to reach 1.26%, while the value-weighted index reached 8.91%. Well-diversified funds performed worse on an individual basis, than the average of all funds. From the 64 funds the performance ranged from -8.87% to 11.29% while the 13 well-diversified funds' performance varied from -2.98% to 11.29% on an annual basis.

The first measure used for the performance was the Jensen measure which is the alpha estimated by the following regression:

$$r_{j,t+1} = a_j + \beta_j r_{m,t+1} + \varepsilon_{j,t+1} \quad (3.8.1)$$

with a positive alpha indicating a manager's stock picking ability. They also applied the positive performance weighting measure to overcome a negative value on Jensen measure given by the following equation:

$$a_j = \sum_t w_t r_{j,t} \quad (3.8.2)$$

Finally they calculated the conditional Jensen measure by conditioning on time-varying economic variables. This was effected by considering that the beta coefficient a linear function of public information.

Based on the Jensen measure calculated for the sample, it was confirmed that open-end mutual funds underperform market. On the aggregate level of 800 mutual funds, all Jensen alphas were negative and statistically significant ranging from -6% to -8% annually with the performance of well-diversified funds being worse with alphas from -8% to -9.5%. On an individual basis the results are similar, since the majority of 64 funds had negative alphas and statistically significant.

The positive period weighted measure led to similar results with the Jensen measure on the aggregate level and on an individual basis. Moreover, the conditional Jensen measure does not show better results than the unconditional one, while both of them are skewed left.

The beta coefficients from the unconditional model, ranges from 0.835 to 0.958 for both samples of 800 and 64 mutual funds, and from 1.020 to 1.156 for their sub-samples of 190 and 13 well-diversified funds. The betas from the conditional model are larger which indicates that they may be biased and managers may adjust their portfolios to economic changes.

Another thing examined, was the performance during the bull marker period from 1981 until the end of 1989 and a subsequent bear market where the Jensen measure in both period for both samples (all funds and well-diversified funds) was negative with smaller differences though in the well-diversified funds. Furthermore, by examining whether the overall performance is attributed to the poor performance of specific companies they resulted that even the company with the best performance seemed to underperform the market by 5.9%. In addition to this, little persistence was noticed in the performance among companies.

The authors also investigated the passive strategies. For this purpose, they constructed 36 value-weighted passive portfolios from all stocks in the TSE, 25 of which were constructed based on size and B/M ratios, 6 on the E/P and the rest 5 on the ratio BA/ME. All portfolios are rebalanced once a year and then their excess returns were regressed on the excess returns of the market portfolio. The results showed inefficiency of the value-weighted market portfolio.

With regard to the existence of timing and selectivity abilities, they applied the Treynor and Mazuy model, based on which they reached that the funds showed negative timing coefficients. Finally, they explained the dilution effect. When an investor sells a share of funds, the sale price is the after tax price while when an investors buys a share of funds he pays the after tax NAV which is the amount existing holders would receive after tax if they sold heir shares. As a result an inflow causes dilution of the NAV whereas an outflow does not affect it. Based on bootstrap experiments, they found that dilution explains 3% per year of the underperformance with a probability of 50%.

Table 3

Summary of papers' review

No	Author, date, country	Purpose of paper	Data and methodology followed	Conclusions
1	William F. Sharpe, Jan. 1966, USA	To extend Treynor's work by subjecting it to empirical test and develop further measures of mutual fund performance.	34 open end funds (1954-1963), using annual rates of return. R/V ratio was calculated for 1954-1963. Treynor ratio was used for period 1944-1953 to test its forecasting ability for period 1954-1963. Expense ratio was calculated to test how expenses affect mutual funds' performance.	Performance was measured using R/V and TI, however differences in funds' performance did not appear to be solely transitory but also attributed to expense ratios.
2	Michael C. Jensen, May 1968	To measure the fund managers' predictive ability; to earn returns higher than those expected for a given risk level.	115 open end funds (1945-1964) were used. An extension of the CAPM model was used in order to estimate a performance measure αj through regressions of the aforementioned model. The performance measure αj was used to evaluate the manager's forecasting ability.	The 115 mutual funds, did not manage, on average, to predict security prices and also there was little evidence that any individual fund would do significantly better than expected from selection by chance.
3	Dr Narayan Rao Sapar and Madava Ravindran, Oct. 2003, India	To evaluate the performance of Indian mutual funds in order to identify out-performers.	269 open end funds in India were used (bear period of September 1998 – April 2002) with monthly NAV values. The sample was adjusted to the funds with RPI >5 and then the following measures were calculated: risk-return analysis, Treynor's ratio, Sharpe's ratio, Sharpe's measure, Jensen's measure and Fama's measure.	58 out of 269 open-end funds provided returns higher that the market return during the bear period of September 1998 – April 2002 with some of them to owe it in the premium required both for systematic and total risk.
4	Roy D. Henriksson and Robert C. Merton, October 1981	To measure the fund manager's market timing ability.	Two models were used in order to measure market timing ability of fund managers. When the forecasts are observable, the non parametric model is used which is not restricted to a specific distribution of returns. When the forecasts are not observable, the parametric model is used which allows the distinction between the macro-forecasting and micro-forecasting effects. The parametric model also applies to cases when the manager has two different target of beta.	Both models are valid for portfolios that included more than one category of assets, with different levels of risk, for which the composition of the portfolio can be adjusted based on estimations about their performance.

5	Roger Otten and Dennis Bams, April 2000, Netherlands	To measure European mutual funds' performance using both unconditional and conditional models, examining the existence of performance persistence as well as the effect of management fees on the fund's performance.	506 open end equity mutual funds from 5 European countries were used (from January 1991 until December 1998) with monthly logarithmic returns. The Carhart 4-factor model was used to estimate its factors and analyze mutual funds' performance, performance persistence and a conditional version of the model was also used to analyzed the impact of management fees on the fund's performance.	European mutual funds, and especially small cap funds are able to add value, as indicated by their positive alphas net of management fees while when management fees are included 4 out of 5 countries exhibit significant out-performance. Most European funds provided weak persistence except for funds in the United Kingdom where the strategy of buying last years winners and selling last years losers yields a return of 6.08% per year, which cannot be explained by common factors in stock returns.
6	Mark Grinblatt and Sheridan Titman, July 1989, USA	To examine whether mutual fund managers have superior selection abilities that produce abnormal returns. Moreover, they examined how survivorship bias, transactions costs and the fund's size affect abnormal performances.	Two samples were created based on the same data, from 31 December 1974 until 31 December 1984, one with cash-distribution adjusted monthly return net of transaction costs but not sales charges and another with the composition of equity mutual funds registered with the SEC in a given quarter which is also not subject to survivorship bias. The Jensen measure was calculated based on four different benchmarks: a) the monthly rebalanced equally weighted portfolio of all CRSP securities (EW), b) the CRSP value-weighted index, (VW), c) the 10 Lehman-Modest factor portfolios (F10) and d) the eight portfolio benchmark (P8).	The estimations of transaction costs using the benchmarks of F10 and EW are biased downward while those using the benchmarks of P8 and VW are upwardly biased. The positive survivorship bias proved to be small ranging from 0.01% to 0.04% depending on the benchmark used. The hypothetical returns show negative performance with the F10 and EW benchmarks and positive performance with the P8 and VW benchmarks. As a result investors can not take advantage of the superior abilities of portfolio managers by purchasing units of their mutual funds.
7	Magnus Dahlquist, Stefan Engström, Paul Söderlind Mark Grinblatt and Sheridan Titman, September 2000, USA	It focuses on the relationship between the performance of mutual funds in Sweden as estimated by the Jensen's alpha on different benchmarks and their characteristics such as flows, trading activity, size and expenses.	210 open end domestic funds domiciled in Sweden were used by calculating weekly returns based on their NAVs from 1992 until 1997. First the Jensen's alpha is estimated through regressions and then cross sectional analysis of alphas and characteristics is effected by running panel data regressions.	The estimation of Jensen's alpha suggested that only regular equity funds slightly outperformed the market whereas all other categories underperformed. Based on the cross sectional analysis larger equity funds performed poorer than smaller equity funds while bond funds vice versa. Second, measured performance was negatively related to fees. Third, there was evidence suggesting that actively managed funds perform better than more passively managed funds. Fourth, a positive relation between lagged performance and current flows was indicated. Finally, evidence of persistence in performance was found only for money market funds.
8	Cai Jun, Chan K. C. and Takeshi Yamada , Hong Kong, 1997	To analyse the performance of Japanese open-end mutual funds and explain how the dilution effect caused by inflows of funds may affect the funds' performance.	800 open end mutual funds in Japan from January 1981 until December 1992. A sub-sample was also created with 64 funds (with more than 97 observations) and subsamples in both were calculated including only well-diversified funds. They applied the Jensen measure, the positive period weighted measure and a conditional alpha measure. They also examined the dilution effect.	For the period examined, the value-weighted and equal-weighted portfolios of the 800 funds underperformed the market index by approximately 7.0% and 6.0% respectively while the subsamples of well-diversified funds performed even worse. Persistence in the negative performance was noticed across all companies both in bull and bear market. Moreover, dilution explains 3% per year of the underperformance with a probability of 50%.

4. DATA AND METHODOLOGY

4.1. SELECTION OF MUTUAL FUNDS DATA AND BENCHMARKS

The global financial crisis caused by the bubble in the subprime mortgage market in the United States in 2008, resulted in the bailout of large banks and financial institutions and the collapse in the stock markets all over the world. Then in 2009 with the burst of the European sovereign debt crisis along with the downgrade of several European countries, concerns became more intense and it was made difficult for Portugal, Italy, Greece and Spain (PIGS) to re-finance their debt.

Based on the above, and since the purpose of our analysis is to measure the performance of mutual funds in European countries, we focus on the performance of certain European mutual funds prior to the global financial crisis and after its breakout in 2008 until nowadays. More especially we compare how the funds of a European country which invest in domestic securities performed, relative to the country itself both prior and after the crisis. Moreover, in order also to investigate how the global financial crisis and the European sovereign debt crisis affected the performance of many funds, we compare the performances between mutual funds in weak and stronger European economies.

The crisis is considered to begun in 2008, therefore in order to be able to compare the performance of the funds prior and after the crisis, we use four years prior and after 2008, setting the initial period under examination from 1st January 2004 until 31st December 2011, which is then split for the purpose of our analysis in two four-year sub periods. The first sub period from 1st January 2004 until 31st December 2007 is the period prior to the global financial crisis, while the second sub period from 1st January 2008 until 31st December 2011 is the period after the commencement of the global financial crisis. We examine how the mutual funds performed relative to the country itself, in each sub period, and how their performance was affected by the global financial crisis.

Two kinds of countries were included in our analysis, ‘weak’ and ‘strong’ Europeans economies. As ‘weak’ economies, we used the countries widely known as PIGS, namely Portugal, Italy, Greece and Spain which have the highest financial problems in Euro zone and similar economic environments. On the other side of ‘strong’ economies, Germany, Netherlands, Norway and Switzerland were chosen. Germany and Netherlands were used since they are members of the Euro zone as well as PIGS are, in order to have a same reference in our comparison while Norway and Switzerland although they are in Europe, they are not members of the Euro zone and have their own currency enabling them to remain partially unaffected by the European sovereign debt crisis.

Moreover, for the comparison of a country’s mutual funds’ performance to the country’s performance itself, we used only equity open end funds, which invested in domestic equities, in order to compare them with the general stock market index of the county.

For each of the eight countries (Portugal, Italy, Greece, Spain, Germany, Netherlands, Norway and Switzerland) the mutual funds used in our analysis as our sample were obtained by Bloomberg database by filling the following criteria, separately for each country:

a) Fund type: open-end funds
b) Country of domicile: The country under examination
c) Geographic focus: The country under examination
d) Asset class: Equity

The above criteria result in some restrictions and problems for our analysis. First of all, the data obtained by Bloomberg database include only ‘survivor’ funds and not ‘dead’ funds, which constitute a survivorship bias. More especially, survivorship bias is caused because the Bloomberg database does not include mutual funds that do not exist now. What happens usually is that mutual fund management companies drop mutual funds with poor performance resulting in the overestimation of the performance of the mutual funds; survivorship bias is usually considered to violate upwardly the returns.

Based on the above criteria, we obtained several mutual funds for each country, but we kept only those for which net asset values were available for the period under examination. As a result we used in total 220 open-end domestic equity mutual funds; 8 from Portugal, 28 from Italy, 31 from Greece, 43 from Spain, 37 from Germany, 11 from Netherlands, 38 from Norway and 24 from Switzerland (Appendix, Table 4.A). For all these funds weekly net asset values were obtained directly from the Bloomberg database.

Mutual funds in Portugal, Italy, Greece, Spain, Germany and Netherlands are traded in Euro currency (EUR) while the mutual funds in Switzerland are traded in Swiss franc (CHF) and in Norway in Norwegian crone (NOK). Exchange rates for the Swiss franc and the Norwegian crone against the Euro were used in order to denominate these funds in Euro currency and proceed with the comparison of all funds on the same basis.

Two benchmarks were used in our analysis, a risk-free rate and the market portfolio, which had to be determined. Ideally, we would pick each country's 1 year government bond (similar to the US treasury bills) in order to set the risk-free rate equal to the government bond's yield. Due to the inadvertent financial conditions which led to the downgrade of the PIGS, resulting in extremely high yields of their government bonds, and their probabilities of default reaching record highs, their government bonds can not be considered as risk-free investments. As a result, and since all mutual funds are domiciled in European countries, we decided to set the risk-free rate in a common reference and more specifically we used the 3 month Euribor rate.

With regard now to the market portfolio for each country, each country's main stock market index was used. Moreover, since our purpose was to compare the performance of a country's mutual funds with the country's performance itself, we used equity mutual funds so as to be comparable to the stock market indices.

The main stock market indices chosen per country (Appendix, Table 4.B) are listed below:

1. ***Portugal***

   PSI General Index (BVLX: it includes all shares listed on the Main Market apart from the non-voting preferred shares.

2. ***Italy***

   FTSE Italia All-Share Index (ITLMS:) it is a capitalization weighted index that consists of all of the constituents in the FTSE MIB, FTSE Italia Mid Cap and FTSE Italia Small Cap indices.

3. ***Greece***

   Athens Stock Exchange Total Return Index Main (ASESAGD): it calculates the total performance of the General Index Main presupposing the reinvestment of the dividend of shares.

4. ***Spain***

   Madrid Stock Exchange General Index (MADX:) it is a capitalization-weighted index that measures the performance of a selected number of Continuous Market stocks.

5. ***Germany***

   Deutsche Borse AG Composite DAX CDAX Index (CDAX): it includes the shares of all domestic companies listed in Prime and General Standard.

6. ***Netherlands***

   Euronext Amsterdam All Share Index (AAX): it is a weighted index based on the prices of all shares listed on Euronext Amsterdam.

7. ***Norway***

   Oslo Stock Exchange All Share Index (OSEAX): it is a market capitalization weighted index that tracks the stock performance of all listed shares.

8. ***Switzerland***

   Swiss Exchange Swiss Performance Index (SPI): it is a total rate of return index of more than 300 stocks issued by Swiss companies whose shares are traded on the Electronic Bourse System.

Since the indices of Switzerland and Norway are denominated in the countries' local currencies, Swiss franc (CHF) and Norwegian crone (NOK) respectively, we also used the exchange rates for Swiss franc and Norwegian crone the against the Euro in order to transform the indices in Euro equivalents.

Finally, for our analysis we used weekly data resulting in 418 observations for each mutual fund for the whole eight-year period under examination, entailing that each four-year sub period we have 209 observations per mutual fund for further analysis. We used weekly data, first of all in order to avoid the 'noise' that exists in daily data and because monthly data would not give us an adequate sample since for the eight years under examination we would not have many observations to analyze (96 observations would be available per fund).

Therefore, we obtained from the Bloomberg database for the period from 1st January 2004 until 31st December 2011 a) weekly net asset values (NAV) for each mutual fund under examination, b) weekly closing prices for each country's main stock market index, c) weekly prices of the Euribor 3 month interest rate and d) weekly prices for the exchange rates of CHF/EUR and NOK/EUR.

4.2. CALCULATION OF WEEKLY RETURNS, STATISTICS OF WEEKLY RETURNS, ESTIMATION OF BETA COEFFICIENTS (THROUGH SIM) AND MISSPECIFICATION TESTING

Certain amendments/ transformations had to be made at the initial data prior to their further process. First, the mutual funds' net asset values and the general indices of Norway (denominated in Norwegian crone - NOK) and Switzerland (denominated in Swiss franc - CHF) were amended to the equivalent Euro amounts based on the exchange rates of EUR/NOK and EUR/ CHF for the period under examination.

Moreover, the weekly prices of the Euribor 3 month interest rate obtained from the Bloomberg database were annualized and they had to be transformed to weekly rates, therefore they were amended from annual to weekly based on the following type:

$$\left(1 + Eur3M\right)^{1/52} - 1 \quad (4.2.1)$$

Having proceeded with the above transformations, we input our data separately for each country in the program we used (E-views) for further process. The data imported were the weekly net asset values of mutual funds in Euro currency, the weekly prices of the country's general index in Euro currency and the weekly risk-free rate (Euribor 3M), from 1st January 2004 until 31st December 2011. The initial sample was then split in two sub periods, one from 1st January 2004 until 31st December 2007 and another from 1st January 2008 until 31st December 2011, in order to obtain separate results for each period for comparison purposes. Therefore all calculations were henceforth made for both samples.

For each country and for both sub periods we calculated *weekly logarithmic returns* for both mutual funds and the country's general index respectively:

$$\ln_{mfi,t} = \ln \frac{NAV_{mfi,t}}{NAV_{mfi,t-1}} \quad (4.2.2)$$

$$\ln_{index,t} = \ln \frac{P_{index,t}}{P_{index,t-1}} \quad (4.2.3)$$

where mfi=mutual fund 'i', $NAV_{mfi,t}$= the net asset value (NAV) of mutual fund 'i' at time 't', $NAV_{mfi,t-1}$= the net asset value (NAV) of mutual fund 'i' at time 't-1', $P_{index,t}$= the price of the country's index at time 't', $P_{index,t-1}$= the price of the country's index at time 't-1', $ln_{mfi,t}$= the logarithmic return of mutual fund 'i' and $ln_{index,t}$= the logarithmic return of the index.

We calculated the logarithmic returns and not simple returns, because the logarithm makes the distribution of returns more 'normal' and more 'continuous', however both returns are quite close, with the logarithmic one to be a little smaller than the simple return, though.

We also examined some main statistics of the mutual fund returns and the index returns, such as the mean return, the standard deviation of the returns, the kurtosis and the skewness in order to infer some basic results regarding the returns' distribution and made a first comparison between the returns prior and after the crisis and their deviations from the mean.

The mean return of a mutual fund/index is the average anticipated value of all likely returns. The standard deviation of the returns measures the volatility of returns and high valued indicated larger variations in the mutual fund's performance. The kurtosis of the distribution measures its peak and the width of its tails. A normal distribution has a kurtosis equal to 3. A distribution with kurtosis less than 3 is called 'platykurtic'; it is less peaked and with thinner tails than the normal one. A distribution with kurtosis higher than 3 is called 'leptokurtic'; it is peaked with 'fat' tails. The skewness of the distribution of returns measures the asymmetry of the observations. The normal distribution has zero skewness and the data are symmetric. A negative value for skewness indicates that the left tail is longer than the right side of the distribution which entails that the majority of observations lie to the right side of the median. A positive value on the other hand, entails that the majority of observations lie to the left side of the median.

Having calculated the logarithmic returns for all mutual funds and countries' indices per country for both sub periods, we estimated the beta coefficients for each mutual fund by running a regression between the returns of each mutual fund with the returns of the country's index by *estimating the Single Index Model (SIM)*:

$$R_{mfi} = a_i + b_i R_{index} + u_i \quad (4.2.4)$$

where a_i= a constant term and represents the unsystematic expected value of the mutual fund's return, b_i= the beta coefficient of the mutual fund and shows that the mutual fund's return is affected by the index return, R_{mfi}= the return of the mutual fund 'i', R_{index}= the return of the country's index and u_i= an error term which incorporates any unexpected factors which influence security's return.

Prior to estimating the model, we made the following assumptions for the error term:

a) Zero mean; $E(u_t)=0$
b) Homoskedasticity; $Var(u_t)=\sigma^2$
c) No serial correlation; $Corr(u_t, u_{t-1})=0$
d) Normality; $u_t \sim N(0, \sigma^2)$

We estimated the Single Index Model by running regressions using the least-squares method between each mutual fund's return and the country's index, and from each regression we obtained an estimate of the alpha, of each mutual fund's beta and the residuals which approximates the error term of the model. Prior to using the estimated betas in the calculation of several performance measures, we had to perform the *misspecification testing on the residuals*, by checking if the aforesaid assumptions hold.

For the first assumption, we assumed that since we had at least one constant term in our model, the residuals have a zero mean.

For the second assumption, we checked each regression for the existence of homoskedasticity by using the ARCH Lagrange Multiplier test for 4 time lags (p=4):

$$\hat{u}_t^2 = a_0 + \sum_{i=1}^{p} a_i u_{t-i}^2 + \varepsilon_t \quad (4.2.5)$$

$$H_0 = a_1 = a_2 = ... = a_p = 0$$

thus, if we accept the null hypothesis, we accept homoskedasticity.

For the third assumption, we checked each regression for the existence of no serial correlation by using the Lagrange Multiplier test for 4 time lags (p=4):

$$\hat{u}_t^2 = a_0 + \sum_{i=1}^{k} a_i X_{k,t} \sum_{j=1}^{p} \rho_j u_{t-j} + \varepsilon_t \quad (4.2.6)$$

$$H_0 = \rho_1 = \rho_2 = ... = \rho_p = 0$$

thus, if we accept the null hypothesis, we accept no serial correlation.

For the fourth assumption, we assumed that since we had more than 200 observations in each sample, the returns were asymptotically normally distributed therefore we did not perform the Jarque-Bera test to check normality in the residuals.

In case any of the above assumptions does exist our model has to be re-specified. Since the first and fourth assumptions were valid we focused on the other two. When heteroskedasticity and/ or correlation is/are present our estimates remain unbiased but we fail to estimate correctly the variance of the estimators, therefore we can not make valid statistical inference. Where only heteroskedasticity was detected we corrected it by re-estimating our model using the White method, while if correlation was detected with or without heteroskedasticity, we corrected its/ their existence by re-estimating our model using the Newey-West method.

Having re-specified the models needed, we had a final picture of the beta coefficients which could then be used in the calculation of performance measures.

4.3. CALCULATION OF PERFORMANCE MEASURES

4.3.1. ABSOLUTE RISK-ADJUSTED PERFORMANCE MEASURES

Absolute risk-adjusted performance measures use no benchmark as a reference.

4.3.1.1. SHARPE RATIO

The *Sharpe ratio* (or else reward-to-variability ratio) was calculated for each mutual fund and stock market index according to the following types:

$$\frac{E(R_{mfi}) - E(r_f)}{\sigma_{Rmfi}} \quad (4.3.1)$$

$$\frac{E(R_{index}) - E(r_f)}{\sigma_{Rindex}} \quad (4.3.2)$$

where $E(R_{mfi})$= the expected rate of return of mutual fund 'i', $E(R_{index})$= the expected rate of return of the index, $E(r_f)$= the expected rate of return of the risk-free rate (Euribor 3m), σ_{Rmfi}= the standard deviation of return of mutual fund 'i' and σ_{Rindex}= the standard deviation of return of the index.

The Sharpe ratio measures the excess return of the mutual fund 'i'/ index over the risk-free rate per unit of total risk. The larger it is, the higher the mutual fund's/index risk-adjusted performance will be. A negative Sharpe ratio indicates that a risk-free asset performs better than the mutual fund/index itself. Moreover, the Sharpe ratio is used for ranking purposes as well as to compare each mutual fund with the market index, therefore if the Sharpe ratio of the mutual fund is greater than that of the index, the mutual fund it is said to out-perform the market.

4.3.1.2. TREYNOR RATIO

The *Treynor ratio* (or else reward-to-volatility ratio) was calculated for each mutual fund and market index according to the following types:

$$\frac{E(R_{mfi}) - E(r_f)}{b_{mfi}} \quad (4.3.3)$$

$$\frac{E(R_{index}) - E(r_f)}{b_{index}} \quad (4.3.4)$$

where $E(R_{mfi})$= the expected rate of return of the mutual fund 'i', $E(R_{index})$= the expected rate of return of the index, $E(r_f)$= the expected rate of return of the risk-free rate (Euribor 3m), b_{mfi}= the beta coefficient of the mutual fund 'i' and b_{index}= the beta coefficient of the index.

The Treynor ratio measures the excess return of the mutual fund 'i'/index over the risk-free rate per unit of market risk (measured by the beta coefficient). The larger it is, the higher the mutual fund's/index performance will be. The beta coefficient of the index is equal to 1, since is represents the market portfolio. Therefore the Treynor measure of the index is equal to the excess returns of the index over the risk-free rate.

The Treynor ratio is useful in ranking portfolios that have the same market risk; therefore it can be used to rank the mutual funds in each country since they have the same market risk which is equal to the beta coefficient of the country's stock market index (equal to 1). If the Treynor ratio of the mutual fund is greater than that of the index, then the mutual fund is said to out-perform the market.

A negative value of the Treynor ratio can be attributed either to the poor performance of a portfolio manager (when the mutual fund's return is less than the risk-free rate, and the beta is positive) or a manager's good performance (when the mutual fund's return is higher than the risk-free rate, and the beta is negative).

4.3.2. RELATIVE RISK-ADJUSTED PERFORMANCE MEASURES

Relative risk-adjusted performance measures, measure the mutual fund's performance in reference to a benchmark.

4.3.2.1. JENSEN'S ALPHA

Jensen's alpha is used to measure the abnormal return of the mutual fund over the theoretical expected rate of return and is calculated as:

$$a_{mfi} = E(R_{mfi}) - \lfloor r_f + b_{mfi} * (E(R_{index}) - r_f) \rfloor \quad (4.3.5)$$

where $E(R_{mfi})$= the expected rate of return of the mutual fund 'i', $E(R_{index})$= the expected return of the market index, b_{mfi}= the beta coefficient of the mutual fund 'i' and r_f= the expected rate of return risk-free rate (Euribor 3m).

In order to estimate the Jensen's alpha for each mutual fund we first calculated the excess returns of the mutual funds over the risk-free rate, and the excess return of the index over the risk-free rate. We then estimated the following equation, by running a regression using the least squares method:

$$a_{mf} = \lfloor E(R_{mf}) - r_f \rfloor - \lfloor E(R_{index}) - r_f \rfloor * b_{mf} \Leftrightarrow E(R_{mf}) - r_f = a_{mf} + b_{mf} * \lfloor E(R_{index}) - r_f \rfloor \quad (4.3.6)$$

A positive Jensen's alpha indicates that the mutual fund performs better than the market index, and is said to have abnormal returns while a negative value indicates that the mutual fund performs worse than the market. Prior to estimating the model, we made the following assumptions for the error term:

- Zero mean; $E(u_t)=0$
- Homoskedasticity; $Var(u_t)=\sigma^2$
- No serial correlation; $Corr(u_t, u_{t-1})=0$
- Normality; $u_t \sim N(0, \sigma^2)$

The estimated alphas can not be used for further analysis before we perform a misspecification testing on the residuals, in order to check if the aforesaid assumptions hold. As previously explained, respective corrections with regard to the presence of heteroskedasticity and/ or correlation were made using the White method or the Newey-West method. Having re-specified our model, the alphas were used in order to examine and interpret the performance of the mutual funds.

4.3.2.2. THE TREYNOR AND MAZUY MEASURE

The *Treynor and Mazuy model* enables us not only to measure the Jensen's alpha but also to assess if it is attributed to fund managers' timing ability or merely to luck and is defined by the following equation:

$$R_{mfi} - r_f = \mathrm{a}_{\mathrm{mfi}} + b_{mfi} * \left(R_{index} - r_f\right) + c_{\mathrm{mfi}} * \left(R_{index} - r_f\right)^2 \quad (4.3.7)$$

where R_{mfi}= the return of the mutual fund 'i', R_{index}= the return of the market index, r_f= the risk-free rate (Euribor 3m), a_{mfi}= Jensen's alpha b_{mfi}= the beta coefficient and c_{mfi} = the coefficient of timing ability.

Fund managers with superior timing ability are able to predict the market and adjust their portfolios respectively by choosing securities/assets with higher betas if they anticipated a bull market and lower betas if they anticipate a bear market.

In order to estimate the coefficients, a_{mfi}, b_{mfi} and c_{mfi} for each mutual fund we first calculated the excess returns of the mutual funds over the risk-free rate (R_{mfi}- r_f) and the excess returns of the index over the risk-free rate (R_{index} - r_f). We then estimated the above equation, by running a regression using the least squares method. Prior to estimating the model, we made the following assumptions for the error term:

- Zero mean; $E(u_t)=0$
- Homoskedasticity; $Var(u_t)=\sigma^2$
- No serial correlation; $Corr(u_t, u_{t-1})=0$
- Normality; $u_t \sim N(0, \sigma^2)$

The estimated coefficients could no be directly used to explain the performance of the mutual funds since misspecification testing on the residuals should first be performed to check if the aforesaid assumptions hold. Respective corrections with regard to the presence of heteroskedasticity and/ or correlation were made using the White method or the Newey-West method. Having re-specified our model, the coefficients were ready to be used in analyzing the performance of the mutual funds.

The 'a' coefficient is the Jensen's alpha and measures the abnormal returns of the mutual fund over the expected rate of return. The 'b' coefficient shows the intensity of the co-movement of the mutual fund's performance with the performance of the market as a whole, therefore if the fund manager anticipates a bear market he/she will lower the mutual fund's beta while if he/she estimates a bull market he/she will increase the mutual fund's beta in order to ensure returns higher than the market's. Coefficient 'c', explains the fund manager's timing ability with a positive value to entail that the manager has successfully predicted the market and a zero or negative value entailing that the fund manager has no timing ability at all.

4.3.2.3. INFORMATION RATIO

The *information ratio* (also called appraisal ratio) is defined as the expected value of the active return (difference between the returns of mutual fund 'i' and of the stock market index) divided by the standard deviation of the active return:

$$IR = \frac{E\left(R_{mfi} - R_{index}\right)}{\sigma\left(R_{mfi} - R_{index}\right)} \quad (4.3.8)$$

where R_{mfi}= the return of the mutual fund 'i', R_{index}= the return of the market index and R_{mfi}-R_{index}= the active return.

In order to calculate the information ratio for each mutual fund, we first calculated the active return for each mutual fund and then we divided the mean of each active return with the standard deviation of each active return.

The numerator, $E(R_{mfi}-R_{index})$ depicts the part of the return that is not attributed to the market index and it is related to the manager's choices while the denominator, $\sigma(R_{mfi}-R_{index})$ measures the tracking error of the portfolio.

The information ratio is used to explain if the additional risk undertaken by the manager on the risk-free rate is rewarded, and also to analyze the manager's available information other than the public information.

A high value of the information ratio indicates that the mutual fund manager has stock picking ability while a negative value indicates underperformance but since it can also be misleading it should not be used for ranking purposes.

4.3.2.4. MODIGLIANI AND MODIGLIANI (M^2) MEASURE OR MODIGLIANI RISK-ADJUSTED PERFORMANCE (RAP) MEASURE

The *Modigliani-Modigliani measure (M^2)* or *Modigliani risk-adjusted performance* measure *(RAP)* measures the risk-adjusted return on a mutual fund based on the following calculation:

$$RAP_{mfi} = \frac{\sigma_{index}}{\sigma_{\mathrm{mfi}}} E(\mathrm{R}_{\mathrm{mfi}} - r_f) + r_f \quad (4.3.9)$$

where R_{mfi}= the return of the mutual fund 'i', r_f= the risk-free rate, σ_{index}= the standard deviation of the market index returns and σ_{mfi}= the standard deviation of the mutual fund 'i' returns and $E(R_{mfi} - r_f)$ is the mean of the excess returns of each mutual fund over the risk-free rate.

In order to find the RAP for each mutual fund we calculated the excess returns of the mutual funds over the risk-free rate and then used their means. We also used the standard deviation of the returns of each mutual fund 'i', the standard deviation of the returns of the market index and the mean risk-free rate (Euribor 3m).

The RAP measure is based on levering or unlevering the original mutual fund at the risk-free rate and is the return the mutual fund would have achieved if its risk was equal to the market risk. The RAP allows the comparison of a mutual fund to the market and the higher its value the better the performance of the mutual fund. It is expressed in percentage terms. Since it is similar to the Sharpe ratio both measures should result in the same rankings.

4.3.2.5. MARKET RISK-ADJUSTED PERFORMANCE (MRAP) MEASURE

The *market risk-adjusted performance* measure *(MRAP)* uses market risk (measured by the beta coefficient) instead of the risk-adjusted performance measure (RAP) which uses total risk. It is based on the fact that mutual funds should be compared on a common measure of market risk, which could be the beta coefficient of the market index, where $b_{index}=1$. Therefore, the MRAP for a mutual fund derives from levering/ unlevering the fund in order to reach a beta coefficient equal to 1.

The marker risk-adjusted performance (MRAP) is defined as:

$$MRAP_{mfi} = \frac{1}{b_{mfi}} E\left(R_{mfi} - r_f\right) + r_f \quad (4.3.10)$$

where R_{mfi}= the return of the mutual fund 'i', r_f= the risk-free rate, $b_{index}=1$= the beta coefficient of the market index and b_{mfi}= the beta coefficient of the mutual fund 'i' and $E(R_{mfi} - r_f)$ is the mean of the excess returns of each mutual fund over the risk-free rate.

A mutual fund is said to outperform the market index, when its MRAP exceeds the market index return.

4.3.3. PERFORMANCE MEASURES BASED ON DOWNSIDE RISK

The performance measures which are based on the downside risk measure the performance of the mutual funds with regard only to potential losses.

4.3.3.1. SORTINO RATIO

The *Sortino ratio* is used to measure the downside risk of a mutual fund. It is similar to the Sharpe ratio, but it uses semi variance instead, since it focuses on returns which are lower than the mean return.

Sortino ratio uses a target return which can be either a return below which the investor does not wish to drop (minimum acceptable return) or a risk-free rate. For simplification purposes we assume that the minimum acceptable return is equal to the risk-free rate (Euribor 3m). Moreover, the semi variance used is the standard deviation of the returns that are below the minimum acceptable return.

Sortino ratio is calculated as follows:

$$SR = \frac{E(R_{mfi}) - MAR}{\sqrt{\frac{1}{T}\sum_{\substack{t=0 \\ R_{mfi}<MAR}} \left(R_{mfit} - MAR\right)^2}} \quad (4.3.11)$$

where R_{mfit}= the rate of return of mutual fund 'i' at time 't', $E(R_{mfi})$= the target rate of return of mutual fund 'i', MAR= the minimum acceptable return and T= is the number of sub periods.

In order to calculate the Sortino ratio we firstly calculated the excess returns of each mutual fund over the minimum acceptable return (risk-free rate). Based on the excess returns we only used the negative excess returns and for each value of positive excess return we replaced it with a value of zero. Then we took the square root of the squared sum of the negative excess returns divided by the number of sub periods used; this equals the downside risk. Finally, in order to calculate the Sortino ratio we divided the average value of the excess returns with the downside risk. The lower the Sortino ratio, the worse the mutual funds performed. A negative value indicates that the mutual fund has not achieved the minimum acceptable return.

5. RESULTS AND ANALYSIS OF THE RESULTS

5.1. INTRODUCTION

As we extensively described in chapter 4, we used 220 open-end equity mutual funds of European Countries (Portugal, Italy, Greece, Spain, Germany, Netherlands, Norway and Switzerland) for eight years from 1st January 2004 until 31st December 2011 and we then split our sample in two sub periods in order to examine the performance of each mutual fund prior to and after the global financial crisis and the European sovereign debt crisis.

Our analysis of the mutual funds performance included the calculation of eight different performance measures, Sharpe ratio, Treynor ratio, Jensen's alpha, Treynor and Mazuy model, Information ratio, risk-adjusted performance (RAP), market risk-adjusted performance (MRAP) and Sortino ratio. Prior to the presentation of the results of each measure we will take a look at the main statistics of the mutual funds' returns, such as the mean return, the standard deviation of returns, the kurtosis and the skewness of the returns' distribution and then we will focus on the measures' results.

5.2. MAIN STATISTICS OF MUTUAL FUNDS AND MAIN MARKET INDICES

Having calculated the logarithmic returns of each mutual fund and each country's main index we compare the main statistics (the mean return, the standard deviation of returns, the kurtosis and the skewness of the returns' distribution) of each mutual fund with its benchmark, namely the country's main stock index, both prior the crisis and after it.

First we present the overall performance of all mutual funds and we compare their performance with their benchmark's performance, the country's main stock market index, (Appendix, Table 5.A) for both sub periods. In absolute terms, prior to the crisis, all 220 mutual funds reported positive mean returns, except for one Dutch mutual fund named 'TRIODOS GROENFONDS' which reported a negative mean

return of -1.42%. The average performance of the mutual funds examined per country ranged from 18.19% in Italy to 53.13% in Norway. With regard to the benchmark indices, all 8 reported positive mean returns ranging from 16.82% of the Italian index to 57.74% of the Norwegian index.

After the burst of the crisis however, the majority of the mutual funds reported negative mean returns with the exception of one mutual fund in Spain, one in Netherlands, two in Norway and 8 in Switzerland which reported slightly positive mean returns. The average performance of the mutual funds examined per country ranged from -77.97% in Greece to -1.28% in Switzerland. With regard to the benchmark indices it is remarkable that despite the fact that the benchmark indices of all countries had negative mean returns, ranging from -91.54% the Greek market index to -9.94% the Norwegian market index, the Swiss market index was the only one with positive mean return of 3,68%.

The deviation of the mutual funds' mean returns prior to the crisis and after it, is quite intense in all countries since in Portugal mean returns turned in approximate from 36% to -39%, in Italy from 18% to -27%, in Greece from 35% to -78%, in Spain from 31% to -17%, in Germany from 29% to -16%, in Netherlands from 21% to -21%, in Norway from 53% to -8% and in Switzerland from 28% to -1%.

In Table 5.1 below we present the number of mutual funds per country out of the total number of mutual funds which outperform/underperform the market based on their mean returns and which are more/less risky than the market.

Based on the results presented, prior to the crisis 155 out of 220 of mutual funds underperformed the market. Greece was the only country with no mutual fund to do better than the market while in Germany only one mutual fund outperformed the market. In Portugal the results were mixed, whereas in Italy most funds did better than the Italian market. After the crisis, surprisingly the results were the opposite with 137 out of 220 mutual funds to outperform the market and especially all mutual funds under examination in Italy, Spain and Greece (apart from one). On the other hand, mutual funds in Portugal and Switzerland underperformed their markets, as expected, while for Germany and Norway the results were mixed.

In terms of 'weak' and 'strong' economies we notice that prior to the crisis 44 out of 110 mutual funds of 'weak' countries outperformed the market whereas after the crisis they increased to 101. The respective number of mutual funds in 'strong' economies increased slightly from 21 to 36 after the crisis. This indicates that after the crisis more mutual funds of 'weak' economies managed to outperform the market than those of the 'strong' economies.

Furthermore, since the standard deviation measures the risk of the returns we see that almost half of the funds' returns under examination have a standard deviation higher than that of the market prior to the crisis, while the number of funds slightly decreases after its burst in 2008. This means that a great number of funds is riskier than the market itself during the whole eight year period.

Table 5.1
Comparison of mutual funds' to their benchmark.

COUNTRY	STATISTICS PRIOR CRISIS							STATISTICS AFTER CRISIS						
	Index mean and standard deviation	Number of MFs with mean return > Index mean return	Number of MFs with mean return < Index mean return	Total number of MFs	Number of MFs with st. dev of return > Index st. dev of return	Number of MFs with st. dev of return < Index st. dev of return	Total number of MFs	***Index*** mean and standard deviation	Number of MFs with mean return > Index mean return	Number of MFs with mean return < Index mean return	Total number of MFs	Number of MFs with st. dev of return > Index st. dev of return	Number of MFs with st. dev of return < Index st. dev of return	Total number of MFs
PORTUGAL	Mean=0,3690 St.Dev=0,0144	4	4	*8*	7	1	*8*	Mean=-0,2933 St.Dev=0,0342	0	8	*8*	5	3	*8*
ITALY	Mean=0,1682 St.Dev=0,0157	24	4	*28*	2	26	*28*	Mean=-0,4156 St.Dev=0,0448	28	0	*28*	0	28	*28*
GREECE	Mean=0,4406 St.Dev=0,0216	0	31	*31*	6	25	*31*	Mean=-0,9154 St.Dev=0,0491	30	1	*31*	0	31	*31*
SPAIN	Mean=0,3325 St.Dev=0,0166	16	27	*43*	23	20	*43*	Mean=-0,2942 St.Dev=0,0438	43	0	*43*	7	36	*43*
	1ST SUBTOTAL	**44**	**66**	***110***	**38**	**72**	***110***	***1ST SUBTOTAL***	**101**	**9**	***110***	**12**	**98**	***110***
GERMANY	Mean=0,3450 St.Dev=0,0198	1	36	*37*	26	11	*37*	Mean=-0,1368 St.Dev=0,0414	10	27	*37*	26	11	*37*
NETHERLANDS	Mean=0,2241 St.Dev=0,0180	2	9	*11*	10	1	*11*	Mean=-0,2137 St.Dev=0,0412	2	9	*11*	0	11	*11*
NORWAY	Mean=0,5774 St.Dev=0,0271	7	31	*38*	6	32	*38*	Mean=-0,0994 St.Dev=0,0502	23	15	*38*	28	10	*38*
SWITZERLAND	Mean=0,2391 St.Dev=0,0144	11	13	*24*	21	3	*24*	Mean=0,368 St.Dev=0,0326	1	23	*24*	8	16	*24*
	2ND SUBTOTAL	**21**	**89**	***110***	**63**	**47**	***110***	***2ND SUBTOTAL***	**36**	**74**	***110***	**62**	**48**	***110***
TOTAL		**65**	**155**	***220***	**101**	**119**	***220***		**137**	**83**	***220***	**74**	**146**	***220***

The number quoted in the cells is the number of mutual funds in each category.

Moreover, in Table 5.A (Appendix) the kurtosis and skewness coefficients' values are reported for each mutual fund's distribution.

With regard to the kurtosis of the distributions of the mutual fund returns, we notice that the distributions of all 220 mutual funds returns have kurtosis higher than 3. This means that all distributions are peaked with 'fat' tails and they are called 'leptokurtic'. Leptokurtic distributions are quite common in finance.

Finally, as far as skewness is concerned, all distributions of 220 mutual funds, with the exception of two mutual funds, are negatively skewed which entails that the majority of observations lie to the right side of the median.

5.3. BETA COEFFICIENTS OF MUTUAL FUNDS

We applied the Single Index Model for each mutual fund and we ran a regression between each mutual fund and its benchmark in order to obtain the beta coefficient of the fund. It has to be noted that all coefficients, expect one of a mutual fund in Netherlands, are statistically significant at 95% confidence level which means that all mutual funds are somehow related to their benchmark, others more and other less intensively. This is clearly depicted in Table 5.B (Appendix) where all beta coefficients are included along with their t-statistics. Since all absolute values of the t-statistics are higher than 1.96 (the critical value for 95% confidence level) all beta coefficients are statistically significant (with the exception of the mutual fund named 'TRIODOS GROENFONDS' which has an insignificant beta prior to the crisis). Moreover, the same fund is the only fund which after the crisis presented a negative beta which is interpreted as moving at the opposite direction of the Dutch market.

In Table 5.2 below we present how many mutual funds out of the total sample have beta coefficient equal to, higher, or less than 1 in each sub period in order to interpret how their exposure changed after the crisis. We notice that prior to the crisis, the majority of mutual funds, namely 177 out of 220, in all countries had a beta coefficient less than 1, which means that they were less volatile to their benchmark's movements. As a result most mutual funds during this period seemed to follow the market movements but not by 100%; only 17 did so which has a beta equal to 1.

There were also certain of them with beta coefficients higher than 1, indicating that these funds were moving more than the market. After the crisis, the trend remained the same since 161 out of 220 mutual funds had a beta coefficient less than 1. The only country with most of its funds having a beta coefficient higher than one was Norway which depicts that most of the Norwegian mutual fund managers chose to be more volatile than their country's stock market index movements.

Moreover, we notice that in Norway the fund managers decided to increase the beta of the mutual funds since in the period prior to the crisis there was only one mutual fund with beta>1 while after its burst there were 20 mutual funds with beta>1 indicating that probably the fund managers were anticipating a bull market in the Norwegian market. Similarly but not at the same extent, the fund managers in Germany increased their exposure by increasing the number of mutual funds with beta>1 from 4 to 11. On the contrary, Spanish fund managers obviously anticipated a bear market and decrease their beta exposure from 27 mutual funds having beta<1 to 33 of them. In Greece, no noticeable changes were affected since the fund managers were defensive in the whole eight year period with no mutual fund having a beta>1.

Table 5.2
Mutual funds' beta coefficients.

COUNTRY	PRIOR CRISIS				AFTER CRISIS			
	Number of MFs with beta coef>1	Number of MFs with beta coef<1	Number of MFs with beta coef=1	Total number of MFs	Number of MFs with beta coef>1	Number of MFs with beta coef<1	Number of MFs with beta coef=1	Total number of MFs
PORTUGAL	2	6	0	*8*	2	5	1	*8*
ITALY	0	28	0	*28*	0	28	0	*28*
GREECE	0	29	2	*31*	0	31	0	*31*
SPAIN	12	27	4	*43*	6	33	4	*43*
GERMANY	4	29	4	*37*	11	24	2	*37*
NETHERLANDS	0	11	0	*11*	0	11	0	*11*
NORWAY	1	35	2	*38*	20	11	7	*38*
SWITZERLAND	7	12	5	*24*	5	18	1	*24*
TOTAL	**26**	**177**	**17**	***220***	**44**	**161**	**15**	***220***

The number quoted in the cells is the number of mutual funds in each category.

5.4. ANALYSIS OF MEASURES' RESULTS

5.4.1. SHARPE RATIO

Based on theory, the Sharpe ratio measures the excess return of the mutual fund 'i'/ index over the risk-free rate per unit of total risk and is preferably used for to rank mutual funds for comparison reasons. We calculated the Sharpe ratio for each mutual fund and for each benchmark in order to compare the performance of a country's mutual funds relative to the country's main index (benchmark). We should mention however, that the results obtained by the Sharpe ratio may be misleading since all distributions of the funds' returns are not normal, but are leptokurtic and negatively-skewed, as stated previously.

In Table 5.D (Appendix) we show the absolute values of the Sharpe ratio per mutual fund. The first thing to be noted is that all mutual funds and all benchmark indices have negative values of Sharpe ratio in both sub periods. This normally indicates that a risk-free asset would perform better than the mutual fund or the stock market itself. The mutual fund's Sharpe ratio value when compared to the Sharpe ratio of the benchmark provide a measure of a mutual fund's over/under performance. With regard to this, the results are not the same all over the countries. More specifically, in Portugal, Spain, Netherlands and Switzerland most of the mutual funds outperformed the market prior to the crisis while after the crisis most of them underperformed the market index. On the contrary, more mutual funds in Germany and Norway outperformed the market after the crisis relative to those who did so prior to the crisis. The mutual funds examined in Greece and Italy underperformed the market both prior to and after the crisis. The number of mutual funds of 'weak' countries that underperformed the market increased after the burst of the crisis, while we noticed an increase in the number of mutual funds in Germany and Norway from the 'strong' economies which managed to outperform the market.

However, the main usage of the Sharpe ratio is for ranking purposes, thus in Table 5.C (Appendix) the ranking of all mutual funds is presented for both periods. We can point out some funds whose ranking remained almost the same in both sub-periods like in Portugal where the 2nd best performer (number 4) and the worst

performer(number 8) prior to the crisis remained at the same rank after it. Moreover, in Greece and Germany three out of the six best performers in the prior to the crisis period remained in the top 6 after the burst of the crisis in 2008.

5.4.2. TREYNOR RATIO

The Treynor ratio measures the excess return of the mutual fund 'i'/index over the risk-free rate per unit of market risk. As a stand-alone measure, the larger its value, the higher the mutual fund's performance will be. A mutual fund is said to outperform the market, when its Treynor ratio exceeds the market's one. Similarly to the Sharpe ratio, it can also be used for ranking purposes.

If we consider the values of the Treynor ratio presented in Table 5.D (Appendix) as a stand-alone measure of performance we find out that all mutual funds and benchmarks had negative values, in both sub periods, which can be attributed either to a poor performance of the fund managers (when mutual fund's returns are less than the risk-free and beta is positive) or to a good fund managers' performance in the existence of a negative beta. Moreover, by comparing the Treynor ratios of the mutual funds with their benchmark, all mutual funds underperformed their benchmarks, in both sub periods, which means that all mutual funds underperformed the market the past 8 years. The sole exception to this is the Dutch fund named 'TRIODOS GROENFONDS' which both prior and after the crisis outperformed the Dutch market. This derives from the fact that, as mentioned in section 5.2, it has a negative beta.

In absolute values, both the Sharpe ratio and the Treynor ratio indicated that all 220 mutual funds had poor performance in the whole 8 year period.

The rankings based on the Treynor ratio are presented in Table 5.C (Appendix) where we identify that in Portugal the best top 4 mutual funds and the worst 4 prior to the crisis remain in the same groups but in different positions after the crisis, while in Greece 4 out of the 7 top performers in the first sub period remain in the top 7 in the second one. Similarly in Germany 4 out of the 6 best performers prior to the crisis remain in the top 6 after it.

5.4.3. JENSEN'S ALPHA

The Jensen's alpha, measures the excess returns of a mutual fund over the expected rate of return or else it measures the additional return a mutual fund achieves that is attributed to the fund manager's decisions.

The estimate of the Jensen' alpha is obtained by a regression; therefore all estimated alphas have to be checked for their significance prior to being used further. In our analysis, we consider a confidence level of 95% therefore if the absolute value of the t-statistic is higher than 1.96 (the critical value for 95% confidence level) then the Jensen's alpha is statistically significant.

The results in Table 5.D (Appendix), show that not all Jensen alphas are statistically significant and even those which are significant have alpha values equal to zero. The significant zero values reported in both sub periods examined, indicate that no mutual fund achieved abnormal returns and that the returns achieved were similar to the market's benchmark.

Both prior to the crisis and after it we see that all mutual funds earned a return adequate for the specific risk undertaken but did not achieve higher returns related to their fund management. The Jensen's model is not capable to explain the variation in the mutual funds' performance as a measurable ability to over/under perform the market.

5.4.4. TREYNOR AND MAZUY MODEL

Similarly to the Jensen's alpha we also estimated the Treynor and Mazuy model in order to further examine not only the existence of Jensen's alpha but also to the fund manager's timing ability. By estimating the model we obtained estimated values for three coefficients, a_{mfi} = Jensen's alpha, b_{mfi} = the beta coefficient and c_{mfi} = the coefficient of timing ability. We consider again a confidence level of 95% so we focus only on the statistically significant coefficients.

In Table 5.D (Appendix) we present all estimated values of the coefficients a_{mfi}, b_{mfi} and c_{mfi} along with their t-statistics. The results for the alpha coefficient

(a_{mfi}), are similar to those obtained by the Jensen's alpha measure, since in both sub periods not all of them are statistically significant and even those which are significant have values equal to zero. This indicates that both prior to the crisis and after it, no mutual fund achieved abnormal returns at all.

In Table 5.3 we present in detail how the fund managers changed the beta coefficients of the mutual funds, and more specific the number of mutual funds that increased/decreased their beta after the crisis as well as the number of mutual funds that had statistically positive or negative 'c_{mfi}' and those which had values that were not significant.

With regard to the beta coefficient, we observe that fund managers in Portugal, Germany and Norway decided to increase the beta of all mutual funds which entails that probably they anticipated a bull market in these countries and their target was to expand the mutual funds' volatility relative to the market. On the other hand, in Italy, Greece, Spain and Netherlands the exposure of the mutual funds to the market movements was eliminated.

By taking a closer look at the c_{mfi} coefficient, we observe that more than half of the total number of funds under examination has values which are statistically not significant. More specifically, 130 out of 220 mutual funds prior to the crisis and 128 out of 220 after the crisis are not significantly different from zero, indicating that in half of the mutual funds the fund managers did not have market timing abilities. This is less intense prior to the crisis in Portugal (1 out of 8) and Switzerland (11 out of 24) while after the crisis in mainly Germany (10 out of 37).

Moreover, it is obvious that in those funds that market timing ability exists, it does not always positively affect their performance. In the first sub period prior to the crisis out of the 90 funds which have significant values, only 12 of them reported positive c_{mfi} coefficients while the rest reported negative values. This indicates that although the fund managers may have market timing abilities, these may be so poor that may affect negatively the returns of the funds. In the second sub period however, after the burst of the crisis, we notice that out of 92 funds with significant values, 40

of them reported positive values which entails that the fund managers slightly improved their skills and they successfully predicted the market.

Table 5.3
Treynor and Mazuy estimated coefficients prior and after crisis.

COUNTRY	b after **lower than** b prior	b after **higher than** b prior	**Significant** negative c prior crisis	**Significant** positive c prior crisis	**Significant** negative c after crisis	**Significant** positive c after crisis	Total number of MFs	Number of MFs with **statistically not significant** values prior crisis	Number of MFs with **statistically not significant** values after crisis
PORTUGAL	0	8	7	0	1	0	8	1	7
ITALY	14	14	10	0	4	2	28	18	22
GREECE	21	10	10	0	12	3	31	21	16
SPAIN	32	11	7	6	19	2	43	30	22
GERMANY	1	36	22	0	16	11	37	15	10
NETHERLANDS	7	4	2	2	0	3	11	7	8
NORWAY	0	38	9	2	0	18	38	27	20
SWITZERLAND	6	18	11	2	0	1	24	11	23
TOTAL			**78**	**12**	**52**	**40**	**220**	**130**	**128**

The number quoted in the cells is the number of mutual funds in each category.

5.4.5. INFORMATION RATIO

The information ratio measures the ability of the fund manager to achieve excess returns relative to the market benchmark and explains if the additional risk undertaken by the fund manager on the risk-free rate is rewarded.

The calculated values for each mutual fund are reported in Table 5.D (Appendix) while in Table 5.4 below we present the average values per country prior to and after the crisis. Italian mutual funds reported a positive average information ratio in both sub periods, which entails that Italian fund managers had stock picking abilities for the whole 8 year period and they managed to handle the crisis. Greece, Spain and Norway managed to turn their negative performance to positive despite the advent of the crisis while Portuguese and Swiss mutual fund performance deteriorated after the crisis.

Table 5.4
Average information ratio per country prior and after crisis.

COUNTRY	AVERAGE INFORMATION RATIO	
	PRIOR CRISIS	AFTER CRISIS
PORTUGAL	0,00	-0,09
ITALY	0,03	0,11
GREECE	-0,15	0,09
SPAIN	-0,03	0,15
GERMANY	-0,06	-0,01
NETHERLANDS	-0,01	0,00
NORWAY	-0,05	0,02
SWITZERLAND	-0,01	-0,06

In Table 5.5 we present an aggregate view of the number of mutual funds with positive or negative information ratios per period. In the period prior to the crisis, 156 out of 220 mutual funds reported negative values which indicate that all these funds underperformed the market. The mutual funds of Greece, Germany, Netherlands and Norway were those which had the worst performances, while Italian and Swiss mutual funds managed to outperform the market in their majority since 24 out of 28 and 11 out of 13 mutual funds respectively reported positive Information ratios. After the burst of the crisis, we observe that only the mutual fund managers of Norway did not manage to improve the good performance in their mutual funds since 9 out of 11 reported negatives information ratios in both sub periods. The performance of Portuguese and Norwegian mutual funds was also not good since all funds under examination reported negative values after the crisis, although some of them performed better prior to the crisis. The fund managers of Italy, Greece and Spain seemed to have a stock picking ability since almost all funds reported positive information ratios even after the crisis.

Table 5.5
Information ratio prior and after crisis.

COUNTRY	PRIOR CRISIS		AFTER CRISIS		Total number of MFs
	Number of MFs with positive Information ratio	Number of MFs with negative Information ratio	Number of MFs with positive Information ratio	Number of MFs with negative Information ratio	
PORTUGAL	3	5	0	8	8
ITALY	24	4	28	0	28
GREECE	0	31	29	2	31
SPAIN	16	27	41	2	43
GERMANY	1	36	9	28	37
NETHERLANDS	2	9	2	9	11
NORWAY	7	31	23	15	38
SWITZERLAND	11	13	1	23	24
TOTAL	**64**	**156**	**133**	**87**	**220**

The number quoted in the cells is the number of mutual funds in each category.

5.4.6. RISK-ADJUSTED PERFORMANCE (RAP) MEASURE AND MARKET RISK-ADJUSTED PERFORMANCE (MRAP) MEASURE

The RAP measures the risk-adjusted returns of a mutual fund relative to the market benchmark. It is used to define how well a mutual fund's returns reward the manager for the undertaken risk relative to the risk of the market benchmark. The higher its value the better the performance of the mutual fund is. Its main advantage is that it is expressed in percentage units and can be directly used for comparison reasons

Similarly, the MRAP is used in order to compare funds on a common measure of market risk. It is also expressed in percentage and a mutual fund outperforms or underperforms the market if its MRAP is higher or lower than the market benchmark return.

In Table 5.D (Appendix) the RAP/MRAP values are stated per mutual fund for both sub periods, while in Table 5.6 we present the average RAP/MRAP values for all mutual funds used in our sample per country in order to compare the mutual funds' performance prior to and after the crisis. Based on the average values, we observe than the mutual funds in Portugal and Germany although in the period prior to the crisis performed quite well, after the burst of the crisis they performed quite poor with the change in the performance being more intense in Portugal where the RAP/MRAP turned from 0.58%/0.10% to -0.33&/-0.46% respectively. In Italy also, although the mutual funds underperformed on average, their underperformance was enhanced after the crisis reaching approximately -1%. It should be highlighted however, that these two measures indicate different performance in both periods in Netherlands, where according to the RAP measure the Dutch funds on average underperformed the market in the whole 8 year period but according to the MRAP measures they reported positive performance for the same period under examination.

The common conclusion is that both measures indicated that mutual funds performed worse after the burst of the crisis than previously.

Table 5.6
Average RAP and MRAP prior and after crisis.

COUNTRY	AVERAGE RAP/MRAP			
	AVERAGE RAP PRIOR CRISIS	AVERAGE MRAP PRIOR CRISIS	AVERAGE RAP AFTER CRISIS	AVERAGE MRAP AFTER CRISIS
PORTUGAL	0,58%	0,10%	-0,33%	-0,46%
ITALY	-0,19%	-0,46%	-0,90%	-0,97%
GREECE	0,16%	-0,01%	-1,36%	-1,51%
SPAIN	0,05%	-0,18%	-0,55%	-0,65%
GERMANY	0,38%	0,06%	-0,10%	-0,30%
NETHERLANDS	-0,28%	8,28%	-1,92%	6,01%
NORWAY	0,29%	0,08%	-0,05%	-0,12%
SWITZERLAND	0,38%	-0,10%	-0,04%	-0,24%

5.4.7. SORTINO RATIO

The Sortino ratio measures the downside risk of a mutual fund and focuses on the downward movement of returns, resulting in losses of the mutual funds' value. The lower it is, the most keen on losses the fund is, therefore the worst the mutual fund's performance will be.

In Table 5.D (Appendix) the Sortino ratios per mutual fund are presented for both sub periods. In Portugal, Greece, Italy, Germany, Netherlands and Switzerland, all mutual funds reported negative Sortino ratios in both sub periods which indicates that no mutual fund achieved the minimum acceptable return. In Spain, the Sortino ratios of all mutual funds prior to the crisis were positive, while after it they turned all negative. Finally, in Norway although there were some funds which performed better in the first four year period (positive Sortino ratio) they performed worse after.

In Table 5.7 we present the average Sortino ratios per country both prior to and after the crisis. The only good performance reported is for Spanish mutual funds in the period prior to the burst of the crisis, which reach an average Sortino of 0.11 while all other countries' mutual funds reported negative ratios. We also observe that in all countries the average negative Sortino ratio slightly improved after the crisis except for Norway and Switzerland where the performance was not improved.

Table 5.7
Average Sortino ratio prior and after crisis.

COUNTRY	SORTINO RATIO	
	PRIOR CRISIS	AFTER CRISIS
PORTUGAL	-0,81	-0,55
ITALY	-0,86	-0,53
GREECE	-0,75	-0,56
SPAIN	0,11	-0,04
GERMANY	-0,75	-0,45
NETHERLANDS	-0,59	-0,55
NORWAY	-0,16	-0,51
SWITZERLAND	-0,82	-0,83

5.5. ANALYSIS OF RANKINGS

In Table 5.C (Appendix) we present the ranking of all 220 mutual funds per country for the two sub periods using Sharpe ratio, Treynor ratio, Information ratio, RAP, MRAP and Sortino ratio.

In Portugal, we notice that in both periods the Sharpe ratio, the RAP and the Sortino give identical rankings as well as the Treynor ratio and the MRAP. Moreover, in the period prior to the crisis all measures except for the Information ratio give the same top 2 performers. We also notice that mutual fund with number 4 is in the top 2 performers by all measures in both sub periods (expect for the ranking based on the Information ratio after the crisis)

In Italy, we notice that in both periods the Sharpe ratio and the RAP give identical rankings while the ranking based on the Sortino is quite close with a few discrepancies. The same happens with the Treynor ratio and the MRAP. Mutual fund number 18 is according to the Treynor ratio, the Information ratio and the MRAP prior to the crisis and according to all measures after crisis in the top 2 performers.

In Greece, in the period prior to the crisis, the Sharpe ratio, the RAP and the Sortino give similar rankings as well as the Treynor ratio and the MRAP do so. In the second period we notice that for the top 12 performers all measures apart from the Information ratio give similar rankings. The number 2 mutual funds is according to 5 measures in the top 2 Greek mutual funds performers for the whole period.

In Spain, the Treynor ratio and the MRAP give almost identical rankings prior to the crisis and after it as well as Sharpe ratio and RAP only in the period prior to the crisis. In Spain we notice that all measures do not lead to the same top performers and give different rankings.

In Germany, in the period prior to the crisis, the Sharpe ratio, the RAP and the Sortino give the same rankings as well as the Treynor ratio and the MRAP do so. In the period after, the Sharpe ratio and the RAP give the same rankings while the Sortino results are quite close, and the Treynor ratio and the MRAP give also the

same results. We also notice that all measures do not lead to the same top performers and give different rankings.

In Netherlands, in both periods, the Sharpe ratio and the RAP give identical rankings as well as the Treynor ratio and the MRAP do so, however each pair of measures gives different top 3 performers.

In Norway, again in both periods, the Sharpe ratio and the RAP give identical rankings as well as the Treynor ratio and the MRAP do so. However, again there is no unanimous indication of the top performers.

Finally, in Switzerland in both periods the Sharpe ratio and the RAP give identical rankings as well as the Treynor ratio and the MRAP do so. There is no unanimous indication of top performers either since they provide different combinations.

6. CONCLUSIONS

The purpose of our analysis was to measure the performance of European mutual funds and also examine how the financial crisis of 2008 affected their performance. The data used included the net asset values of 220 open-end equity mutual funds of 8 European countries (Portugal, Italy, Greece, Spain, Germany, Netherlands, Norway and Switzerland) for an eight year period from 1st January 2004 until 31st December 2011 and we then split our sample in two sub periods, one prior to the crisis and another after it.

First we calculated the logarithmic returns of the mutual funds, and we observed that the distribution of all returns were leptokurtic and negatively skewed. By analyzing the results of the returns, we noticed that the majority of the mutual funds under examination, namely 155 out of 220, underperformed the market prior to the crisis while 137 out of 220 outperformed the market after the burst of the crisis. Moreover, after the crisis more mutual funds of 'weak' economies managed to outperform the market than those of the 'strong' economies.

We then estimated the Single Index Model to acquire the beta coefficients and interpret the sensitivity of the mutual funds' returns relative to their benchmarks. We observed that both prior to and after the crisis the majority of the fund managers were more 'defensive' since the mutual funds reported beta coefficients were less than one, entailing that were less volatile than the market itself.

The first measure calculated was the Sharpe ratio which, since the distributions of our returns are leptokurtic and negatively skewed, may lead to misleading results and we should not firmly take into consideration its rankings. The Sharpe ratios for all 220 mutual funds in both sub periods were negative, indicating a poor performance of all funds under examination. Despite the negative values, most of the mutual funds in Portugal, Spain, Netherlands and Switzerland outperformed the market prior to the crisis and underperformed afterwards. In Germany and Norway more funds outperformed the market after the crisis relative to those which did so prior to it. The mutual funds examined in Greece and Italy underperformed the market

during the whole period examined. The number of mutual funds of 'weak' countries that underperformed the market increased after the burst of the crisis, while we noticed an increase in the number of mutual funds in Germany and Norway from the 'strong' economies which managed to outperform the market. Similar to the Sharpe ratio, was the Treynor ratio, for which the values calculated for all mutual funds were again negative and also according to the Treynor ratios all mutual funds underperformed the markets except for one Dutch mutual fund which outperformed the market due to its negative beta.

In order to identify possible abnormal returns, we estimated the Jensen's alpha and we focused on the statistically significant values only. The fact that all values in 220 mutual funds for both sub periods under examination were equal to zero indicates that all mutual funds earned a return adequate for the undertaken risk and they did not achieve higher returns attributed to the fund manager's decisions. Similarly to this, we also estimated the Treynor and Mazuy model which although indicated some significant values of the alpha coefficient, they were equal to zero. With regard to the estimated beta coefficients we noticed that the fund managers of Portugal, Germany and Norway increased the beta coefficients after the crisis which entails that they anticipated a bull market in these countries, while in Italy, Greece, Spain and Netherlands the exposure of the mutual funds to the market movements was eliminated. Based on the estimations of the c_{mfi} coefficient, in half of the mutual funds in both sub periods the fund managers did not have any market timing abilities, while in the rest funds where market timing ability was noticed, most of them affected negatively the funds' returns.

We then calculated the Information ratio for each mutual fund, according to which the Italian mutual funds reported a positive average Information ratio in both sub periods which indicates that Italian fund managers have stock picking abilities. Greek, Spanish and Norwegian fund managers proved to have stock picking abilities after the burst of the crisis, while in Portugal, Germany Netherlands and Switzerland the fund managers reported no stock picking abilities at all.

Based on the average RAP and the MRAP calculations, the mutual funds in Portugal and Germany performed well prior to the crisis while they deteriorated after

the crisis. In Italy their performance was poor in both sub periods. Conflicting results appeared in the Dutch funds where according to the RAP they underperformed the market in the whole eight year period whereas according to the MRAP they outperformed for the same period.

Finally, by applying the Sortino ratio we noticed that in Spain all mutual funds performed well prior to the crisis and worse after it, in Norway some funds gave the same results, while in the rest countries the Sortino values were negative in both sub periods which indicates that no fund achieved the minimum acceptable rate.

With regard to the rankings of the mutual funds' performance using Sharpe ratio, Treynor ratio, Information ratio, RAP, MRAP and Sortino ratio we reached the following conclusions: The Sharpe ratio and the RAP give identical rankings with the Sortino ratio to also provide rankings quite close to them. Similarly, the Treynor ratio and the MRAP give identical rankings while the Information ratio gives different rankings from all other measures. The similarity in the ranking results between the Sharpe ratio and the RAP is attributed to the fact that they both use the standard deviation as a measure of risk. Similarly, the Treynor ratio and the MRAP give identical rankings since they both use the beta coefficient as a risk measure.

APPENDIX

Table 4.A
All mutual funds used in our analysis

PORTUGAL					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	CAIXACC PL	POSTAL ACCOES	Growth	Equity	Portugal
2	BPIPORT PL	BPI PORTUGAL	Growth	Equity	Portugal
3	ESPTACC PL	ESPIRITO SANTO PTL ACCOES	Growth	Equity	Portugal
4	SANACPL PL	SANTANDER ACCOES PORTUGAL	Growth	Equity	Portugal
5	BANIACC PL	BANIF ACCOES PORTUGAL	Growth	Equity	Portugal
6	CAXACPT PL	CAIXAGEST ACCOES PORTUGAL	Growth	Equity	Portugal
7	ARMEMPO PL	ALVES RIBEIRO MEDIAS EMP POR	Growth Mid-Cap	Equity	Portugal
8	RAPACCS PL	RAIZ POUPANCA ACCOES	Growth and Income	Equity	Portugal
ITALY					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	BPVIITA IM	PACTO AZIONARIO ITALIA-A	Growth	Equity	Italy
2	AZMTRIT IM	AZIMUT-TREND ITALIA	Growth	Equity	Italy
3	SPAFAZI IM	EURIZON AZIONI AREA EURO	Growth	Equity	Italy
4	FDSITAL IM	FONDERSEL ITALIA	Growth Large-Cap	Equity	Italy
5	MEDRICR IM	MEDIOLANUM FLESSIBLE ITALIA	Growth	Equity	Italy
6	BIMAZI IM	SYMPHONIA AZIONARIO ITALIA	Growth	Equity	Italy
7	GSEAFND IM	GESTIELLE OBIETTIVO ITALIA-A	Growth Large-Cap	Equity	Italy
8	BPBAZIT IM	UBI PRAMERICA AZIONI ITALIA	Growth	Equity	Italy
9	GESITAL IM	ANM ITALIA	Growth Large-Cap	Equity	Italy
10	ARCAZIT IM	ARCA AZIONI ITALIA	Growth Large-Cap	Equity	Italy
11	DUCAZIT IM	PRIMA GEO ITALIA-A	Growth	Equity	Italy
12	GEPIAZA IM	GESTNORD AZIONI ITALIA	Growth	Equity	Italy
13	BNAZITL IM	EURIZON AZIONI ITALIA	Growth Large-Cap	Equity	Italy
14	GESALRE IM	ALBOINO RE	Sector Fund technology	Equity	Italy
15	EURMAZI IM	EUROMOBILIARE AZIONI ITALIAN	Growth	Equity	Italy
16	AURPREV IM	AUREO AZIONI ITALIA	Growth Large-Cap	Equity	Italy

17	INVAZIO IM	BNL AZIONI ITALIA	Growth	Equity	Italy
18	FIDIMIT IM	FIDEURAM ITALIA	Growth Large-Cap	Equity	Italy
19	VEGAZIT IM	NORVEGA AZIONARIO ITALIA-A	Growth Large-Cap	Equity	Italy
20	ARTAZIT IM	BNL AZIONI ITALIA PMI	Growth Small-Cap	Equity	Italy
21	SAIGALI IM	ACOMEA ITALIA-A1	Growth	Equity	Italy
22	UNIACRE IM	PIONEER AZIONAR CRESCITA-A	Growth	Equity	Italy
23	COMSMCP IM	EURIZON AZIONI PMI ITALIA	Growth	Equity	Italy
24	ZENAZIO IM	ZENIT AZIONARIO-R	Growth	Equity	Italy
25	FDSINDU IM	FONDERSEL PMI	Growth	Equity	Italy
26	OPTAZIO IM	OPTIMA AZIONARIO ITALIA	Growth	Equity	Italy
27	OPTSMCP IM	OPTIMA SMALL CAPS ITALIA	Growth	Equity	Italy
28	LEOSMCP IM	LEONARDO ITALIAN OPPORTUNITY	Growth	Equity	Italy
GREECE					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	HSBCGGE GA	HSBC GREEK EQUITY FUND	Growth and Income	Equity	Greece
2	IOATIDX GA	ALPHA ATHENS INDEX DOM EQUIT	Index-Fund Large-Cap	Equity	Greece
3	PIDEDCF GA	PIRAEUS DOMESTIC EQ DYN COM	Growth	Equity	Greece
4	KYPDEQF GA	KYPROU DOMEST GREEK EQUI FND	Growth Large-Cap	Equity	Greece
5	ATEDEMS GA	ATE DOMESTIC EQUITY M&S	Growth Small-Cap	Equity	Greece
6	DELBCDE GA	DELOS BLUE CHIPS - GREEK EQ	Growth Large-Cap	Equity	Greece
7	INTDDEF GA	INT/CAN DYNAMIC DOMEST EQF-€	Growth Large-Cap	Equity	Greece
8	ERMDYNA GA	ERMIS DYNAMIC FUND-GREEK EQ	Growth	Equity	Greece
9	ATEDSTK GA	ATE DOMESTIC EQUITY FUND	Growth	Equity	Greece
10	PIRDOEF GA	PIRAEUS DOMESTIC EQUITY FUND	Growth	Equity	Greece
11	ALPGDEI GA	ALPHA BLUE CHIPS DOMESTIC EQ	Growth	Equity	Greece
12	NOVBCDE GA	MILLENNIUM BLUE CHIPS DOM EQ	Income equity	Equity	Greece
13	EUBVIDE GA	EUROBANK GRK EQTIES DOM EQ-€	Growth	Equity	Greece
14	ALZAGSI GA	ALLIANZ AGGRESIVE STRATEGY	Growth Mid-Cap	Equity	Greece
15	ALSTDOM GA	ALPHA AGG STRAT DOMESTIC EQ	Growth	Equity	Greece
16	AKTDEQY GA	ATTIKI DOMESTIC EQUITY	Growth	Equity	Greece
17	ABNBLCE GA	AAAB DOMESTIC SELECTED EQUIT	Growth	Equity	Greece

18	INTGDEF GA	INT/CAN GROWTH DOM EQTY FD-€	Growth	Equity	Greece
19	ALZHEQI GA	ALLIANZ DOMESTIC EQUITIES	Growth and Income	Equity	Greece
20	NOVMCDE GA	MILLENNIUM MID CAP DOMEST EQ	Growth	Equity	Greece
21	INGDOEF GA	ING DOMESTIC EQUITY FUND	Growth	Equity	Greece
22	ALTNEEN GA	ALPHA TRUST NEW ENTERPRISES	Growth	Equity	Greece
23	DELSCDE GA	DELOS SMALL-CAP GREEK EQUIT	Growth Small-Cap	Equity	Greece
24	EGNODEG GA	MARFIN OLYMPIA DOMESTIC EQUI	Growth	Equity	Greece
25	DELT30E GA	DELOS TOP-30 GREEK EQUITIES	Growth Large-Cap	Equity	Greece
26	INTDEQY GA	INTERNATIONAL DOMESTIC EQTY	Market-neutral equity	Equity	Greece
27	EGNAGDE GA	MARFIN ATHENA DYN DOM EQT	Growth	Equity	Greece
28	ALTGROW GA	ALPHA TRUST GROWTH DOM FUND	Growth	Equity	Greece
29	ALIMISC GA	ALICO MID & SMALL CAP FUND	Growth Small-Cap	Equity	Greece
30	ALEUGRE GA	ALICO GREEK EQUITY FUND	Sector Fund-Undefined equity	Equity	Greece
31	CITFEQU GA	CITIFUND EQUITY MUTUAL FUND	Growth	Equity	Greece
		SPAIN			
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	BESTFON SM	BESTINFOND	Growth	Equity	Spain
2	FONHISL SM	ESPIRITO SANTO ESPANA BOLSA	Growth	Equity	Spain
3	PATRFON SM	GESCONSULT CRECIMIENTO	Growth	Equity	Spain
4	BARBOL2 SM	BARCLAYS BOLSA ESPANA SELECC	Growth	Equity	Spain
5	BANCJRV SM	BANKIA BOLSA ESPANOLA	Growth	Equity	Spain
6	SAESBOL SM	SABADELL BS ESPANA BOLSA FI	Growth	Equity	Spain
7	BOLSPAS SM	ESAF 70	Growth	Equity	Spain
8	FGACCIO SM	GESCONSULT RENTA VARIABLE FI	Growth	Equity	Spain
9	METAVAL SM	METAVALOR	Growth	Equity	Spain
10	EDMINVE SM	EDM INVERSION	Growth	Equity	Spain
11	CARTVAR SM	CARTERA VARIABLE FI	Growth Large-Cap	Equity	Spain
12	CSBOLSA SM	CREDIT SUISSE BOLSA	Growth	Equity	Spain
13	EURVAL4 SM	EUROVALOR BOLSA	Growth	Equity	Spain
14	ARGPOSB SM	BBVA BOLSA	Growth Large-Cap	Equity	Spain
15	GESTNBP SM	BBVA BOLSA PLUS	Growth	Equity	Spain
16	ASTUBOL SM	LIBERBANK RV ESPANA	Growth	Equity	Spain

17	CIBBKVA SM	BK BOLSA ESPANA	Growth	Equity	Spain
18	MRCHVAL SM	MARCH VALORES FI	Growth	Equity	Spain
19	FONPBOR SM	FONPENEDES BORSA	Growth	Equity	Spain
20	LLOBOLS SM	LLOYDS BOLSA FI	Growth	Equity	Spain
21	FINVERB SM	CAMINOS BOLSA OPORTUNIDADES	Growth Large-Cap	Equity	Spain
22	FONFINI SM	FON FINECO I	Growth	Equity	Spain
23	AHCOACC SM	AC ACCIONES	Growth	Equity	Spain
24	NAVINDI SM	BANCA CIVICA ACCIONES	Growth	Equity	Spain
25	EURBOLE SM	EUROVALOR BOLSA ESPANOLA	Growth	Equity	Spain
26	CAJBBOL SM	CAJABURGOS BOLSA	Growth	Equity	Spain
27	CAISARV SM	CAIXASABADELL 7 RV	Growth	Equity	Spain
28	FNBOLSA SM	BANKIA SMALL & MID CAPS ESP	Growth	Equity	Spain
29	VENGEGL SM	MIRABAUD FUNDS EQUITIES SPN	Growth	Equity	Spain
30	FNPSRV SM	ESAF RENTA VARIABLE	Sector Fund-Undefined equity	Equity	Spain
31	ALLIVAR SM	ALLIANZ BOLSA FI	Growth	Equity	Spain
32	GESADIP SM	SABADELL BS ESPANA DIVIDENDO	Growth	Equity	Spain
33	CHABOPL SM	BNP PARIBAS BOLSA ESPANOLA	Growth	Equity	Spain
34	FONVM75 SM	FONDO VALENCIA RENTA VARIABL	Growth	Equity	Spain
35	IBEBOPL SM	PBP BOLSA ESPANA FI	Growth	Equity	Spain
36	BKFTIBX SM	BANKINTER FUTURO IBEX	Growth	Equity	Spain
37	SCHGRVA SM	OPENBANK IBEX 35	Growth Large-Cap	Equity	Spain
38	SANINDI SM	SANTANDER INDICE ESPANA	Index-Fund Large-Cap	Equity	Spain
39	FESBOLS SM	FONDESPANA BOLSA	Index-Fund Large-Cap	Equity	Spain
40	FIBINDI SM	MEDIOLANUM ESPANA R.V. FI-S	Growth	Equity	Spain
41	BUPRECA SM	PREMIUM BOLSA ESPANA	Growth Large-Cap	Equity	Spain
42	BKFOMIX SM	BK MIXTO ESPANA 50	Growth	Equity	Spain
43	FONVMED SM	CAM BOLSA INDICE FI	Index-Fund Large-Cap	Equity	Spain
GERMANY					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	FK8P GR	LBBW EXPORTSTRATEGIE DTSCHLD	Country Fund-Germany	Equity	Germany
2	HJUE GR	DWS DEUTSCHLAND	Growth Large-Cap	Equity	Germany
3	UIB1 GR	UBS D EQTY FD-MID CAPS GER	Country Fund-Germany	Equity	Germany
4	DWSDCHL GR	DWS DEUTSCHLAND	Growth Large-Cap	Equity	Germany

5	LGTOPSD GR	LBBW EXPORTSTRATEGIE DTSCHLD	Country Fund-Germany	Equity	Germany
6	SMHMIDC GR	UBS D EQTY FD-MID CAPS GER	Country Fund-Germany	Equity	Germany
7	HJU7 GR	DWS SELECT-INVEST	Country Fund-Germany	Equity	Germany
8	INVESTA GR	DWS INVESTA	Growth Large-Cap	Equity	Germany
9	FMUC GR	MEAG PROINVEST	Index-Fund Large-Cap	Equity	Germany
10	HMTPINV GR	MEAG PROINVEST	Index-Fund Large-Cap	Equity	Germany
11	DVGSELI GR	DWS SELECT-INVEST	Country Fund-Germany	Equity	Germany
12	OG7T GR	DEKAFONDS-CF	Growth	Equity	Germany
13	HJUL GR	DWS INVESTA	Growth Large-Cap	Equity	Germany
14	IWMI GR	AXA DEUTSCHLAND	Country Fund-Germany	Equity	Germany
15	DJFA GR	ALLIANZ VERMOEGENSBILD DEU-A	Country Fund-Germany	Equity	Germany
16	U1ID GR	UNIFONDS	Growth	Equity	Germany
17	BFGINVA GR	SEB AKTIENFONDS	Growth Large-Cap	Equity	Germany
18	FSPRUNF GR	MORGEN DEUTSCH AKT UNIVERS-F	Country Fund-Germany	Equity	Germany
19	DWSDAKO GR	DWS GERMAN EQUITIES TYP O	Growth Large-Cap	Equity	Germany
20	FONDAKI GR	FONDAK-A	Growth and Income	Equity	Germany
21	DTVERMG GR	ALLIANZ VERMOEGENSBILD DEU-A	Country Fund-Germany	Equity	Germany
22	DI7U GR	CONCENTRA-A	Growth	Equity	Germany
23	LH4A GR	AL TRUST AKTIEN DEUTSCHLAND	Country Fund-Germany	Equity	Germany
24	HJVD GR	FONDAK-A	Growth and Income	Equity	Germany
25	U1IF GR	BBV-INVEST-UNION	Growth	Equity	Germany
26	UI4M GR	UNIFONDS -NET-	Growth	Equity	Germany
27	CONCENT GR	CONCENTRA-A	Growth	Equity	Germany
28	M3AG GR	MONEGA GERMANY	Index-Fund Large-Cap	Equity	Germany
29	BBVINVU GR	BBV-INVEST-UNION	Growth	Equity	Germany
30	FHUH GR	LBBW AKTIEN DEUTSCHLAND	Country Fund-Germany	Equity	Germany
31	HG4X GR	PIONEER GERMAN EQUITY-A ND	Country Fund-Germany	Equity	Germany
32	DWSAKDE GR	DWS AKTIEN STRAT DEUTSCHLAND	Country Fund-Germany	Equity	Germany
33	NORINRK GR	AXA DEUTSCHLAND	Country Fund-Germany	Equity	Germany
34	UNIFDSN GR	UNIFONDS -NET-	Growth	Equity	Germany

35	HG4Z GR	PIONEER AKTIEN DEUTSCHLAND-A	Index Fund	Equity	Germany
36	DWWE GR	DWS GERMAN EQUITIES TYP O	Growth Large-Cap	Equity	Germany
37	DEKAFND GR	DEKAFONDS-CF	Growth	Equity	Germany
NETHERLANDS					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	DDF NA	DELTA LLOYD DEELNEMINGEN FON	Value	Equity	Netherlands
2	ORAN NA	KEMPEN ORANGE FUND NV	Growth Small-Cap	Equity	Netherlands
3	DELLNEA NA	DELTA LLOYD NEDERLAND FND NV	Value	Equity	Netherlands
4	OREUHDI NA	KEMPEN EUROPEAN HIGH DIVIDEN	Growth Large-Cap	Equity	Netherlands
5	NMB NA	ING DUTCH FUND	Growth Large-Cap	Equity	Netherlands
6	HOLFU NA	ALLIANZ HOLLAND FUND	Index Fund	Equity	Netherlands
7	RGHB NA	ROBECO HOLLANDS BEZIT	Growth	Equity	Netherlands
8	SNSNEAD NA	SNS NEDERLANDS AANDELENFONDS	Growth	Equity	Netherlands
9	EOE/D NA	BNP PARIBAS AEX INDEX FUND	Index Fund-Large Cap	Equity	Netherlands
10	AMRN NA	BNP PARIBAS NETHERLANDS FUND	Growth	Equity	Netherlands
11	TRIO NA	TRIODOS GROENFONDS	Sector Fund-Undefined equity	Equity	Netherlands
NORWAY					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	DISMB NO	DNB SMB	Growth	Equity	Norway
2	NORSMB1 NO	NORDEA SMB	Growth	Equity	Norway
3	NFPLUSS NO	TERRA SMB	Growth and Income	Equity	Norway
4	ORFINF NO	OMEGA INVESTMENT FUND	Growth	Equity	Norway
5	FONSPAR NO	FONDSFINANS SPAR	Value	Equity	Norway
6	HANONOK NO	HANDELSBANKEN NORGEFOND-NOK	Growth	Equity	Norway
7	SUNOVER NO	WARRENWICKLUND NORGE	Income equity	Equity	Norway
8	NFAKSJE NO	NB-AKSJEFOND	Growth and Income	Equity	Norway
9	TFNORGE NO	TERRA NORGE	Value	Equity	Norway
10	HONORGE NO	HOLBERG NORGE	Growth and Income	Equity	Norway
11	POAKTIV NO	PARETO AKSJE NORGE	Growth and Income	Equity	Norway
12	KLPAKNO NO	KLP AKSJENORGE	Index Fund	Equity	Norway
13	WWKNORD NO	WARRENWICKLUND NORDEN	Growth	Equity	Norway
14	AIAKTIV NO	ALFRED BERG AKTIV	Growth	Equity	Norway

15	FFNORG2 NO	DANSKE INVEST-NORGE II	Growth Large-Cap	Equity	Norway
16	FFNORGE NO	DANSKE INVEST-NORGE I	Growth Large-Cap	Equity	Norway
17	SPNORGE NO	STOREBRAND NORGE FUND	Growth and Income	Equity	Norway
18	DCDFNAI NO	DANSKE INV NORSK AKSJ INST I	Value	Equity	Norway
19	NORVEKS NO	NORDEA VEKST	Growth	Equity	Norway
20	NORKAP1 NO	NORDEA KAPITAL	Growth	Equity	Norway
21	ABNORET NO	ALFRED BERG NORGE ETISK	Sector Fund-Socially resp	Equity	Norway
22	NORAVKA NO	NORDEA AVKASTNING	Growth	Equity	Norway
23	AINORG NO	ALFRED BERG NORGE	Region fund-Geo focused	Equity	Norway
24	FOPLIDX NO	AKSJEFOND PLUSS MARKEDSVERDI	Growth and Income	Equity	Norway
25	FFSMBFD NO	DANSKE INVEST-NORGE VEKST	Growth	Equity	Norway
26	FOPLAKS NO	PLUSS AKSJE FUND	Growth	Equity	Norway
27	CAAKSJE NO	CARNEGIE AKSJE NORGE	Region fund-Geo focused	Equity	Norway
28	SPAKSIN NO	STOREBRAND AKSJE INNLAND	Growth and Income	Equity	Norway
29	SPVERDI NO	STOREBRAND VERDI FUND	Growth and Income	Equity	Norway
30	AFNOAK2 NO	DNB NORGE SELEKTIV III	Growth	Equity	Norway
31	AFGNNOA NO	DNB NORGE SELEKTIV II	Region fund-Geo focused	Equity	Norway
32	DINOIII NO	DNB NORGE IV	Region fund-Geo focused	Equity	Norway
33	DINORGE NO	DNB NORGE III	Region fund-Geo focused	Equity	Norway
34	DI20FND NO	DNB NORGE SELEKTIV I	Region fund-Geo focused	Equity	Norway
35	PVAKSJE NO	DNB NORGE	Growth	Equity	Norway
36	NONORVE NO	NORDEA NORGE VERDI	Value	Equity	Norway
37	FOPLOBX NO	AKSJEFOND PLUSS INDEKS FUND	Growth and Income	Equity	Norway
38	CAOBX NO	CARNEGIE NORGE INDEKS	Index Fund	Equity	Norway
SWITZERLAND					
A/A	**BLOOMBERG TICKER**	**NAME**	**OBJECTIVE**	**ASSET CLASS FOCUS**	**GEOGRAPHIC FOCUS**
1	ASLSMCS SW	ASSELSA SMALL & MID CAPS SW	Value-mid Cap	Equity	Switzerland
2	DWSHELV SW	DWS (CH)-HELVETIA AKTIEN	Growth Large-Cap	Equity	Switzerland
3	UBSSMCI SW	UBS (CH) EQUITY-MID CAPS SWI	Growth and Income	Equity	Switzerland
4	VRFSWST SW	RAIFFSN FUTURA SWISS STOCK	Sector Fund-Socially resp	Equity	Switzerland
5	SPRIFSE SW	SARAPRO INST SWISS	Index-Fund Mid-	Equity	Switzerland

		EQUITIES	Cap		
6	BHSWSMS SW	CL (CH) SWISS SMALL CAP EF	Growth	Equity	Switzerland
7	PICSMSP SW	PICTET CH-SW MID/SM CP-PDYSF	Country Fund-Switzerland	Equity	Switzerland
8	UBSSMSB SW	UBS (CH) IF-S&M C EQ CH I-B	Country Fund-Switzerland	Equity	Switzerland
9	UBSSMSX SW	UBS (CH) IF-S&M C EQ CH I-X	Country Fund-Switzerland	Equity	Switzerland
10	VONTSWS SW	VONTOBEL SWISS SMALL CMPS-A	Growth Small-Cap	Equity	Switzerland
11	SWCSMCP SW	SWISSCANTO SMALL & MID CAP-A	Growth	Equity	Switzerland
12	PICSWIS SW	PICTET-CH SWISS EQUITIES-P	Country Fund-Switzerland	Equity	Switzerland
13	COOPMSA SW	SWISSCANTO EQ VALUE SWITZERL	Value	Equity	Switzerland
14	CSSPSMS SW	CSSP SMALL & MID SWITZERLAND	Income equity	Equity	Switzerland
15	PISWEQJ SW	PICTET CH INSTIT-SWISS-JDYSF	Growth and Income	Equity	Switzerland
16	PISWEQI SW	PICTET CH INST-SWISS E-IDYSF	Growth and Income	Equity	Switzerland
17	PISWEQP SW	PICTET CH INSTIT-SWISS-PDYSF	Growth and Income	Equity	Switzerland
18	UBSSCSI SW	UBS CH EQUITY-SML CAPS SWITZ	Growth and Income	Equity	Switzerland
19	SYNSWST SW	BCGE SYNCHRONY SWISS EQUITY	Index Fund	Equity	Switzerland
20	UBSEQSX SW	UBS (CH) IF-EQUITIES CH I-X	Country Fund-Switzerland	Equity	Switzerland
21	UBSEQSB SW	UBS (CH) IF-EQUITIES CH I-B	Country Fund-Switzerland	Equity	Switzerland
22	UBSEQSA SW	UBS (CH) IF-EQUITIES CH I-A1	Country Fund-Switzerland	Equity	Switzerland
23	BBGTACA SW	BBGI TACT SWIT	Growth and Income	Equity	Switzerland
24	BSCSARI SW	SARASIN SUSTAINABLE EQ SWITZ	Growth Large-Cap	Equity	Switzerland

Table 4.B
Main stock-market indices per country.

COUNTRY	MAIN INDEX	NAME	DESCRIPTION
PORTUGAL	**BVLX**	**PSI General Index**	The PSI Geral (General) Index is the all-share market index. It includes all shares listed on the Main Market apart from the non-voting preferred shares. The index reproduces the total return of the main Portuguese market.
ITALY	**ITLMS**	**FTSE Italia All-Share Index**	The FTSE Italia All-Share Index is a free float capitalization weighted index that comprises all of the constituents in the FTSE MIB, FTSE Italia Mid Cap and FTSE Italia Small Cap indices.
GREECE	**ASESAGD**	**Athens Stock Exchange Total Return Index Main**	The Athens Stock Exchange General Total Return Index calculates the total performance of the General Index Main presupposing the reinvestment of the dividend of shares participating in the General Index Main on the date of dividend cut off.
SPAIN	**MADX**	**Madrid Stock Exchange General Index**	The Madrid Stock Exchange General Index is a capitalization-weighted index that measures the performance of a selected number of Continuous Market stocks.
GERMANY	**CDAX**	**Deutsche Borse AG Composite DAX CDAX Index**	The CDAX Performance Index includes the shares of all domestic companies listed in Prime Standard and General Standard. The index represents the German equity market in its entirety, namely all companies listed on the Frankfurt Stock Exchange.
NETHERLANDS	**AAX**	**Euronext Amsterdam All Share Index**	The Amsterdam All-Share index is a weighted index based on the prices of shares of all eligible companies listed on Euronext Amsterdam. It consists exclusively of shares which are issued by companies that have been admitted to listing on Eurolist by Euronext in Amsterdam.
NORWAY	**OSEAX**	**Oslo Stock Exchange All Share Index**	Oslo All-Share Index is a market capitalization weighted index that tracks the stock performance of all shares listed on the Exchange in its respective sectors.
SWITZERLAND	**SPI**	**Swiss Exchange Swiss Performance Index**	The Swiss Performance Index is a total rate of return index of more than 300 stocks issued by Swiss companies whose shares are traded on the Electronic Bourse System.

Table 5.A
Mutual funds' and stock market indices' main statistics per country prior and after crisis.

PORTUGAL								
	STATISTICS PRIOR CRISIS				STATISTICS AFTER CRISIS			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
POSTAL ACCOES	34,15%	0,0155	7,8274	-1,3720	-29,43%	0,0374	8,0564	-1,0806
BPI PORTUGAL	37,35%	0,0174	6,8938	-0,8091	-36,44%	0,0340	7,8092	-1,3002
ESPIRITO SANTO PTL ACCOES	36,12%	0,0166	12,2036	-1,6497	-40,67%	0,0356	8,1861	-1,1702
SANTANDER ACCOES PORTUGAL	41,29%	0,0171	6,0789	-0,6654	-39,37%	0,0372	8,8526	-1,4039
BANIF ACCOES PORTUGAL	37,22%	0,0161	6,2747	-0,1742	-42,60%	0,0367	13,7961	-1,8673
CAIXAGEST ACCOES PORTUGAL	33,00%	0,0169	17,9044	-2,3236	-47,27%	0,0337	6,5536	-1,0937
ALVES RIBEIRO MEDIAS EMP POR	35,41%	0,0147	5,8112	-0,5617	-49,43%	0,0365	9,4200	-1,2642
RAIZ POUPANCA ACCOES	38,42%	0,0138	6,0151	-0,8390	-29,54%	0,0307	9,6398	-1,4248
Average	***36,62%***				***-39,34%***			
PSI GENERAL INDEX	***36,90%***	***0,0144***	***4,7463***	***-0,2911***	***-29,33%***	***0,0342***	***8,8892***	***-1,3501***
ITALY								
	STATISTICS PRIOR CRISIS				STATISTICS AFTER CRISIS			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
PACTO AZIONARIO ITALIA-A	21,04%	0,0126	4,2421	-0,7354	-29,00%	0,0349	6,2732	-1,0260
AZIMUT-TREND ITALIA	21,51%	0,0132	4,0472	-0,6944	-30,34%	0,0374	8,3040	-1,2423
EURIZON AZIONI AREA EURO	17,18%	0,0130	4,1576	-0,7305	-25,61%	0,0369	7,7219	-1,0348
FONDERSEL ITALIA	18,02%	0,0135	4,2652	-0,7790	-30,29%	0,0418	7,1146	-1,2002
MEDIOLANUM FLESSIBLE ITALIA	17,58%	0,0133	4,4327	-0,7879	-23,07%	0,0334	7,2478	-1,1278
SYMPHONIA AZIONARIO ITALIA	17,43%	0,0129	3,9562	-0,7030	-27,92%	0,0339	6,2303	-0,9773
GESTIELLE OBIETTIVO ITALIA-A	15,96%	0,0145	4,7862	-0,8969	-28,79%	0,0351	7,4421	-1,1550
UBI PRAMERICA AZIONI ITALIA	19,65%	0,0136	3,4140	-0,5325	-27,82%	0,0353	6,4844	-1,0318
ANM ITALIA	20,17%	0,0132	4,1867	-0,7357	-28,74%	0,0365	7,2031	-1,2109
ARCA AZIONI ITALIA	17,89%	0,0129	4,2140	-0,7467	-26,43%	0,0363	6,8825	-1,1331
PRIMA GEO ITALIA-A	20,00%	0,0136	4,8720	-0,5021	-25,64%	0,0354	7,7382	-1,2444
GESTNORD AZIONI ITALIA	17,88%	0,0136	4,2242	-0,5637	-24,90%	0,0351	6,4350	-1,0473
EURIZON AZIONI ITALIA	19,24%	0,0132	4,0759	-0,7166	-28,35%	0,0370	7,0977	-1,1781
ALBOINO RE	9,96%	0,0130	4,1035	-0,8080	-34,45%	0,0325	4,9211	-0,7912
EUROMOBILIARE AZIONI ITALIAN	13,87%	0,0140	4,8207	-0,8927	-26,29%	0,0342	7,0655	-1,1832
AUREO AZIONI ITALIA	17,22%	0,0130	4,4701	-0,8531	-25,29%	0,0309	9,0841	-1,4512
BNL AZIONI ITALIA	16,02%	0,0136	4,3408	-0,8167	-28,65%	0,0368	7,5283	-1,2143
FIDEURAM ITALIA	21,88%	0,0138	4,3806	-0,8376	-24,48%	0,0377	6,5653	-1,0922

NORVEGA AZIONARIO ITALIA-A	16,85%	0,0131	3,9533	-0,5584	-25,06%	0,0333	7,3587	-1,1913
BNL AZIONI ITALIA PMI	17,66%	0,0142	5,0917	-1,1392	-31,41%	0,0331	6,9099	-1,2238
ACOMEA ITALIA-A1	17,42%	0,0165	18,7441	-1,8677	-35,83%	0,0352	6,0582	-1,0488
PIONEER AZIONAR CRESCITA-A	20,71%	0,0140	4,4437	-0,7467	-32,39%	0,0347	6,8885	-1,1650
EURIZON AZIONI PMI ITALIA	19,59%	0,0142	4,8524	-1,0154	-28,40%	0,0315	7,6299	-1,2422
ZENIT AZIONARIO-R	17,16%	0,0131	4,9689	-0,9814	-29,21%	0,0364	9,7628	-1,4804
FONDERSEL PMI	20,47%	0,0147	5,2862	-1,0612	-24,37%	0,0350	9,4275	-1,5132
OPTIMA AZIONARIO ITALIA	17,99%	0,0134	4,5477	-0,5013	-25,26%	0,0356	7,0955	-1,1698
OPTIMA SMALL CAPS ITALIA	20,39%	0,0175	14,0562	0,1011	-25,27%	0,0294	7,6661	-1,3266
LEONARDO ITALIAN OPPORTUNITY	18,53%	0,0129	5,2596	-1,1341	-26,25%	0,0351	7,2379	-1,1216
Average	***18,19%***				***-27,84%***			
FTSE ITALIA-ALL SHARE INDEX	***16,82%***	***0,0157***	***3,7602***	***-0,6515***	***-41,56%***	***0,0448***	***6,9071***	***-1,1572***
GREECE								
	STATISTICS PRIOR CRISIS				**STATISTICS AFTER CRISIS**			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
HSBC GREEK EQUITY FUND	38,17%	0,0188	4,7912	-0,7366	-60,20%	0,0333	4,3631	-0,6075
ALPHA ATHENS INDEX DOM EQUIT	41,35%	0,0219	4,5587	-0,6060	-91,39%	0,0486	4,3305	-0,2903
PIRAEUS DOMESTIC EQ DYN COM	37,67%	0,0216	4,3627	-0,7398	-79,61%	0,0404	4,9236	-0,5575
KYPROU DOMEST GREEK EQUI FND	28,81%	0,0202	5,0837	-0,7791	-74,29%	0,0378	3,3392	-0,1103
ATE DOMESTIC EQUITY M&S	30,31%	0,0212	4,5960	-0,6463	-61,83%	0,0352	6,5636	-0,8465
DELOS BLUE CHIPS - GREEK EQ	36,81%	0,0198	5,3945	-0,8644	-88,06%	0,0438	4,1699	-0,4249
INT/CAN DYNAMIC DOMEST EQF-€	36,74%	0,0201	4,9718	-0,7479	-82,49%	0,0413	3,6896	-0,3071
ERMIS DYNAMIC FUND-GREEK EQ	35,63%	0,0202	5,3122	-0,7388	-79,55%	0,0397	3,4570	-0,2084
ATE DOMESTIC EQUITY FUND	27,04%	0,0181	4,6530	-0,6268	-75,52%	0,0381	4,2680	-0,1835
PIRAEUS DOMESTIC EQUITY FUND	32,84%	0,0191	5,1946	-0,7468	-92,41%	0,0480	3,8216	-0,2079
ALPHA BLUE CHIPS DOMESTIC EQ	38,16%	0,0192	4,7860	-0,6599	-78,36%	0,0424	5,6082	-0,4340
MILLENNIUM BLUE CHIPS DOM EQ	34,42%	0,0201	4,7472	-0,6522	-89,20%	0,0448	4,2371	-0,2232
EUROBANK GRK EQTIES DOM EQ-€	34,15%	0,0222	4,6759	-0,5588	-91,39%	0,0470	5,5878	-0,3874
ALLIANZ AGGRESIVE STRATEGY	37,99%	0,0209	4,8776	-0,8058	-69,90%	0,0385	6,2406	-0,8323
ALPHA AGG STRAT DOMESTIC EQ	43,97%	0,0209	4,8458	-0,6918	-74,62%	0,0442	4,9155	-0,2748
ATTIKI DOMESTIC EQUITY	24,49%	0,0180	6,0913	-0,9123	-71,82%	0,0362	3,2468	-0,1389
AAAB DOMESTIC SELECTED EQUIT	34,85%	0,0203	4,4055	-0,6361	-85,95%	0,0387	3,7877	-0,3341

INT/CAN GROWTH DOM EQTY FD-€	33,76%	0,0218	4,8288	-0,8584	-80,54%	0,0396	5,1387	-0,6115
ALLIANZ DOMESTIC EQUITIES	38,94%	0,0207	4,8128	-0,7961	-79,05%	0,0411	4,1163	-0,5205
MILLENNIUM MID CAP DOMEST EQ	39,02%	0,0225	4,1873	-0,6786	-83,20%	0,0398	5,3767	-0,7336
ING DOMESTIC EQUITY FUND	33,05%	0,0194	5,4935	-0,8156	-76,35%	0,0426	4,3276	-0,3635
ALPHA TRUST NEW ENTERPRISES	38,87%	0,0173	6,0537	-0,8625	-58,52%	0,0324	3,9640	-0,3814
DELOS SMALL-CAP GREEK EQUIT	35,77%	0,0201	4,5618	-0,8504	-82,85%	0,0386	4,7252	-0,6169
MARFIN OLYMPIA DOMESTIC EQUI	32,41%	0,0193	4,2054	-0,5564	-76,30%	0,0426	4,7698	-0,1929
DELOS TOP-30 GREEK EQUITIES	36,05%	0,0192	5,0634	-0,7332	-83,75%	0,0471	3,5065	-0,2663
INTERNATIONAL DOMESTIC EQTY	26,25%	0,0188	4,3597	-0,6813	-83,56%	0,0371	3,4560	-0,3463
MARFIN ATHENA DYN DOM EQT	37,45%	0,0204	3,6931	-0,4204	-64,65%	0,0385	5,9107	-0,5519
ALPHA TRUST GROWTH DOM FUND	38,14%	0,0164	5,2308	-0,5239	-58,27%	0,0313	4,0039	-0,3095
ALICO MID & SMALL CAP FUND	32,60%	0,0218	4,8084	-0,9201	-80,44%	0,0432	6,6435	-0,8600
ALICO GREEK EQUITY FUND	32,95%	0,0200	4,9920	-0,7686	-82,48%	0,0460	4,4430	-0,3354
CITIFUND EQUITY MUTUAL FUND	36,11%	0,0209	4,6210	-0,6566	-80,42%	0,0451	4,3976	-0,3401
Average	***34,99%***				***-77,97%***			
ATHENS STOCK EXCHANGE TOTAL RETURN INDEX MAIN	***44,06%***	***0,0216***	***4,8994***	***-0,7040***	***-91,54%***	***0,0491***	***4,3389***	***-0,2933***

SPAIN

	STATISTICS PRIOR CRISIS				**STATISTICS AFTER CRISIS**			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
BESTINFOND	34,72%	0,0130	5,0296	-1,0780	1,36%	0,0296	6,5567	-1,2116
ESPIRITO SANTO ESPANA BOLSA	31,29%	0,0162	3,7546	-0,4844	-22,67%	0,0455	7,0992	-1,0380
GESCONSULT CRECIMIENTO	37,66%	0,0151	3,8961	-0,7064	-17,10%	0,0304	9,7368	-1,3979
BARCLAYS BOLSA ESPANA SELECC	39,96%	0,0157	4,1097	-0,8134	-26,06%	0,0426	21,7855	-2,5561
BANKIA BOLSA ESPANOLA	34,93%	0,0159	3,6093	-0,6076	-14,04%	0,0434	6,7556	-0,9208
SABADELL BS ESPANA BOLSA FI	32,41%	0,0172	3,6831	-0,5768	-16,27%	0,0430	7,1377	-0,9857
ESAF 70	24,19%	0,0113	3,5460	-0,5828	-11,16%	0,0247	6,7567	-0,9100
GESCONSULT RENTA VARIABLE FI	38,08%	0,0157	3,9156	-0,7111	-15,87%	0,0305	8,5828	-1,2632
METAVALOR	42,19%	0,0167	4,1963	-0,7048	-14,86%	0,0368	7,1684	-1,0545
EDM INVERSION	36,01%	0,0151	3,6862	-0,5542	-16,28%	0,0331	8,5585	-1,3136
CARTERA VARIABLE FI	30,13%	0,0163	3,4425	-0,4308	-26,35%	0,0389	8,5680	-1,2580
CREDIT SUISSE BOLSA	30,01%	0,0172	4,0139	-0,7823	-7,41%	0,0387	10,8759	-1,5366
EUROVALOR BOLSA	32,43%	0,0176	3,6940	-0,5444	-21,45%	0,0408	6,9893	-0,9915
BBVA BOLSA	32,24%	0,0172	3,7127	-0,5453	-22,83%	0,0456	8,3173	-1,2108

BBVA BOLSA PLUS	36,17%	0,0173	3,6318	-0,5492	-23,30%	0,0452	8,5376	-1,2704
LIBERBANK RV ESPANA	30,35%	0,0167	3,8621	-0,5489	-18,38%	0,0416	8,8933	-1,2354
BK BOLSA ESPANA	30,39%	0,0168	3,2883	-0,3590	-21,07%	0,0384	6,2320	-0,6715
MARCH VALORES FI	30,22%	0,0158	3,6887	-0,7029	-15,71%	0,0337	9,4026	-1,2517
FONPENEDES BORSA	31,47%	0,0170	3,5769	-0,5824	-20,28%	0,0388	10,0989	-1,4495
LLOYDS BOLSA FI	31,98%	0,0167	3,8923	-0,6533	-15,18%	0,0387	6,7894	-0,9262
CAMINOS BOLSA OPORTUNIDADES	18,38%	0,0124	4,3789	-0,2464	-28,98%	0,0354	8,7758	-1,3124
FON FINECO I	11,16%	0,0092	3,5600	-0,3200	-12,43%	0,0227	11,3475	-1,3965
AC ACCIONES	32,29%	0,0170	3,6920	-0,5370	-19,89%	0,0447	6,9036	-0,9593
BANCA CIVICA ACCIONES	34,20%	0,0179	3,5353	-0,5083	-20,28%	0,0441	6,9732	-0,9657
EUROVALOR BOLSA ESPANOLA	36,13%	0,0171	3,9326	-0,5996	-17,41%	0,0399	7,5998	-1,0976
CAJABURGOS BOLSA	31,69%	0,0170	3,6955	-0,5347	-20,32%	0,0446	6,9167	-0,9572
CAIXASABADELL 7 RV	30,80%	0,0160	3,7085	-0,5246	-18,15%	0,0408	7,4494	-1,0417
BANKIA SMALL & MID CAPS ESP	31,17%	0,0170	3,7124	-0,5815	-21,46%	0,0361	11,0528	-1,5421
MIRABAUD FUNDS EQUITIES SPN	31,37%	0,0156	3,8217	-0,5660	-10,39%	0,0365	10,9705	-1,4237
ESAF RENTA VARIABLE	31,91%	0,0162	3,9299	-0,6593	-16,61%	0,0382	5,2396	-0,6682
ALLIANZ BOLSA FI	31,80%	0,0156	3,7817	-0,5284	-11,82%	0,0389	6,2105	-0,8092
SABADELL BS ESPANA DIVIDENDO	41,49%	0,0153	3,7015	-0,6315	-17,68%	0,0380	6,1037	-0,8479
BNP PARIBAS BOLSA ESPANOLA	26,11%	0,0175	3,8478	-0,5218	-20,68%	0,0402	9,8872	-1,4084
FONDO VALENCIA RENTA VARIABL	34,27%	0,0157	3,5348	-0,6247	-12,11%	0,0414	7,3871	-0,9950
PBP BOLSA ESPANA FI	29,15%	0,0170	4,2107	-0,7610	-18,65%	0,0431	8,2186	-1,1235
BANKINTER FUTURO IBEX	34,89%	0,0175	3,8426	-0,5719	-17,48%	0,0438	6,9727	-0,9810
OPENBANK IBEX 35	34,55%	0,0173	3,8169	-0,5535	-17,04%	0,0437	6,7752	-0,9386
SANTANDER INDICE ESPANA	35,05%	0,0173	3,7710	-0,5921	-18,15%	0,0438	6,8489	-0,9546
FONDESPANA BOLSA	33,70%	0,0174	3,7158	-0,5537	-19,05%	0,0437	7,0008	-0,9862
MEDIOLANUM ESPANA R.V. FI-S	32,44%	0,0168	3,7167	-0,5340	-18,19%	0,0424	6,9449	-0,9723
PREMIUM BOLSA ESPANA	4,98%	0,0065	8,7787	-0,7525	-28,24%	0,0300	8,0692	-0,8228
BK MIXTO ESPANA 50	14,94%	0,0083	3,1883	-0,4251	-8,52%	0,0181	6,1636	-0,6732
CAM BOLSA INDICE FI	29,64%	0,0178	4,4610	-0,8168	-18,64%	0,0422	7,4821	-1,0060
Average	***31,14%***				***-17,61%***			
MADRID STOCK EXCHANGE GENERAL INDEX	***33,25%***	***0,0166***	***3,9002***	***-0,6281***	***-29,42%***	***0,0438***	***6,8620***	***-0,9793***
GERMANY								
	STATISTICS PRIOR CRISIS				**STATISTICS AFTER CRISIS**			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
LBBW EXPORTSTRATEGIE DTSCHLD	25,57%	0,0192	4,3796	-0,7657	-11,26%	0,0485	17,3836	-2,1033
DWS DEUTSCHLAND	30,99%	0,0231	4,7310	-0,7759	-5,10%	0,0459	5,7127	-0,2811
UBS D EQTY FD-MID CAPS GER	32,30%	0,0235	5,9410	-1,0063	-5,46%	0,0384	3,8797	-0,5556
DWS DEUTSCHLAND	31,51%	0,0227	5,3915	-0,9009	-5,38%	0,0478	8,5199	-1,1595
LBBW EXPORTSTRATEGIE DTSCHLD	25,57%	0,0190	4,4246	-0,7571	-11,17%	0,0479	18,2293	-2,2898

UBS D EQTY FD-MID CAPS GER	32,51%	0,0218	5,6836	-1,0612	-3,76%	0,0419	7,0386	-1,0026
DWS SELECT-INVEST	31,32%	0,0243	5,4366	-0,8478	-26,34%	0,0473	4,5706	-0,5903
DWS INVESTA	26,90%	0,0224	4,6004	-0,7680	-18,85%	0,0456	8,6886	-1,3146
MEAG PROINVEST	24,43%	0,0197	4,6892	-0,8723	-17,25%	0,0393	4,9466	-0,6089
MEAG PROINVEST	24,43%	0,0195	4,6489	-0,8718	-17,81%	0,0380	5,6762	-0,6058
DWS SELECT-INVEST	31,78%	0,0235	5,8048	-1,0751	-26,75%	0,0506	7,9602	-1,1694
DEKAFONDS-CF	29,01%	0,0210	4,0945	-0,6272	-21,56%	0,0478	14,9968	-1,6977
DWS INVESTA	26,41%	0,0235	4,3147	-0,6375	-18,29%	0,0441	5,0479	-0,5218
AXA DEUTSCHLAND	28,88%	0,0198	4,7531	-0,9010	-17,67%	0,0423	12,5570	-1,6388
ALLIANZ VERMOEGENSBILD DEU-A	33,44%	0,0213	4,7241	-0,8586	-16,71%	0,0429	12,9574	-1,7469
UNIFONDS	29,04%	0,0218	3,9531	-0,4469	-20,01%	0,0406	5,5825	-0,2222
SEB AKTIENFONDS	25,71%	0,0190	4,4667	-0,9638	-17,94%	0,0446	8,1198	-1,0486
MORGEN DEUTSCH AKT UNIVERS-F	24,07%	0,0202	4,9093	-0,9023	-17,00%	0,0352	5,0366	-0,8021
DWS GERMAN EQUITIES TYP O	31,51%	0,0211	4,7742	-0,8433	-16,50%	0,0463	8,3689	-1,1214
FONDAK-A	33,42%	0,0208	4,8106	-0,8215	-20,81%	0,0433	13,5692	-1,7525
ALLIANZ VERMOEGENSBILD DEU-A	33,44%	0,0215	4,8320	-0,8634	-16,86%	0,0436	12,3202	-1,5727
CONCENTRA-A	27,53%	0,0203	4,0629	-0,7391	-11,23%	0,0432	12,3138	-1,3628
AL TRUST AKTIEN DEUTSCHLAND	28,05%	0,0190	4,1039	-0,7012	-18,57%	0,0397	5,4237	-0,4246
FONDAK-A	33,42%	0,0209	4,6880	-0,8063	-20,57%	0,0436	13,1680	-1,6348
BBV-INVEST-UNION	21,93%	0,0173	4,2991	-0,5714	-16,41%	0,0332	5,4431	-0,4136
UNIFONDS -NET-	28,93%	0,0213	3,5137	-0,3774	-19,15%	0,0382	4,4830	-0,2835
CONCENTRA-A	27,53%	0,0202	4,0818	-0,7444	-11,36%	0,0428	12,4685	-1,5821
MONEGA GERMANY	30,97%	0,0198	4,1043	-0,7335	-18,53%	0,0445	10,8001	-0,8484
BBV-INVEST-UNION	21,97%	0,0156	3,8131	-0,6198	-16,45%	0,0332	8,5028	-1,0437
LBBW AKTIEN DEUTSCHLAND	25,61%	0,0195	3,5939	-0,6863	-18,76%	0,0402	5,2298	-0,6447
PIONEER GERMAN EQUITY-A ND	24,78%	0,0190	4,5424	-0,8241	-3,75%	0,0436	11,3835	0,7848
DWS AKTIEN STRAT DEUTSCHLAND	38,55%	0,0226	5,4981	-1,0515	-12,75%	0,0478	11,0339	-1,5566
AXA DEUTSCHLAND	28,69%	0,0198	4,8417	-0,9388	-17,60%	0,0418	12,8579	-1,5539
UNIFONDS -NET-	29,50%	0,0208	3,5210	-0,4508	-18,63%	0,0413	7,4319	-0,7760
PIONEER AKTIEN DEUTSCHLAND-A	31,34%	0,0199	4,1960	-0,6700	-15,06%	0,0430	6,2904	-0,0760
DWS GERMAN EQUITIES TYP O	30,58%	0,0219	4,2758	-0,5038	-16,18%	0,0443	4,8867	-0,4129
DEKAFONDS-CF	29,01%	0,0209	4,0939	-0,6221	-21,53%	0,0463	15,8186	-1,9882
Average	***28,94%***				***-15,92%***			
DEUTSCHE BORSE AG COMPOSITE DAX CDAX INDEX	***34,50%***	***0,0198***	***3,6589***	***-0,4701***	***-13,68%***	***0,0414***	***8,8146***	***-1,0518***
NETHERLANDS								
	STATISTICS PRIOR CRISIS				**STATISTICS AFTER CRISIS**			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
DELTA LLOYD DEELNEMINGEN FON	37,05%	0,0195	4,9573	-0,7632	-22,52%	0,0348	5,5008	-1,0141

KEMPEN ORANGE FUND NV	37,96%	0,0221	4,5329	-0,7669	-13,26%	0,0339	5,0611	-0,8942
DELTA LLOYD NEDERLAND FND NV	22,19%	0,0260	31,8724	-3,6742	-21,85%	0,0370	6,4452	-0,9086
KEMPEN EUROPEAN HIGH DIVIDEN	15,96%	0,0198	3,8367	-0,4273	-23,29%	0,0299	5,3310	-0,7419
ING DUTCH FUND	19,80%	0,0193	3,7120	-0,3526	-27,55%	0,0380	5,2570	-0,6970
ALLIANZ HOLLAND FUND	20,12%	0,0198	3,6507	-0,3926	-26,56%	0,0398	5,8399	-1,0315
ROBECO HOLLANDS BEZIT	21,09%	0,0182	3,9983	-0,4675	-21,67%	0,0366	5,0225	-0,7074
SNS NEDERLANDS AANDELENFONDS	19,09%	0,0201	4,4847	-0,6904	-26,00%	0,0394	6,1059	-0,7899
BNP PARIBAS AEX INDEX FUND	19,84%	0,0185	3,9148	-0,5503	-23,11%	0,0378	5,4618	-0,7343
BNP PARIBAS NETHERLANDS FUND	21,36%	0,0195	3,9570	-0,5744	-27,78%	0,0367	6,4673	-0,9678
TRIODOS GROENFONDS	-1,42%	0,0045	9,8621	-1,5789	1,12%	0,0044	14,7278	-2,4545
Average	***21,19%***				***-21,13%***			
EURONEXT AMSTERDAM ALL SHARE INDEX	***22,41%***	***0,0180***	***3,6582***	***-0,3620***	***-21,37%***	***0,0412***	***11,5040***	***-1,4441***

NORWAY

	STATISTICS PRIOR CRISIS				STATISTICS AFTER CRISIS			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
DNB SMB	71,90%	0,0265	5,0041	-1,1213	-18,41%	0,0478	5,9286	-0,9413
NORDEA SMB	63,77%	0,0239	4,3898	-0,9327	-24,13%	0,0454	6,3728	-1,1000
TERRA SMB	42,71%	0,0224	4,4421	-0,9707	-8,19%	0,0442	6,9510	-1,0187
OMEGA INVESTMENT FUND	47,94%	0,0249	5,2548	-1,1492	-11,60%	0,0548	6,2790	-0,5919
FONDSFINANS SPAR	58,65%	0,0248	6,7023	-1,2237	-0,63%	0,0552	6,5120	-0,5439
HANDELSBANKEN NORGEFOND-NOK	55,83%	0,0274	6,5134	-1,4242	-18,38%	0,0551	6,0965	-0,7444
WARRENWICKLUND NORGE	60,61%	0,0230	5,1402	-0,8547	-15,91%	0,0515	6,8225	-0,7759
NB-AKSJEFOND	46,90%	0,0230	5,8824	-1,2494	-19,53%	0,0513	6,6362	-0,8241
TERRA NORGE	49,74%	0,0244	6,3599	-1,2781	-9,02%	0,0544	7,1922	-0,8120
HOLBERG NORGE	61,04%	0,0222	4,4725	-0,9143	-14,29%	0,0454	5,6101	-0,5967
PARETO AKSJE NORGE	60,33%	0,0243	5,6598	-1,0192	-6,01%	0,0445	6,1989	-0,9483
KLP AKSJENORGE	56,52%	0,0241	5,5373	-1,1343	-9,12%	0,0538	6,2982	-0,5680
WARRENWICKLUND NORDEN	42,22%	0,0174	4,2407	-0,7605	-8,99%	0,0444	8,4160	-0,9618
ALFRED BERG AKTIV	49,74%	0,0277	4,7210	-1,0409	-14,72%	0,0516	5,8554	-0,6940
DANSKE INVEST-NORGE II	52,22%	0,0243	5,5105	-1,2121	-2,08%	0,0514	6,9672	-0,8962
DANSKE INVEST-NORGE I	51,03%	0,0242	5,4889	-1,2034	-4,14%	0,0514	6,9330	-0,9024
STOREBRAND NORGE FUND	37,76%	0,0175	4,7734	-0,2608	4,65%	0,0445	13,1178	-1,0026
DANSKE INV NORSK AKSJ INST I	55,36%	0,0245	5,2450	-1,1362	-3,34%	0,0516	7,0805	-0,9427
NORDEA VEKST	45,64%	0,0265	6,6199	-1,3111	-11,74%	0,0528	6,6044	-0,7554
NORDEA KAPITAL	52,73%	0,0248	5,8832	-1,2016	-8,13%	0,0532	6,5482	-0,7147
ALFRED BERG NORGE ETISK	49,51%	0,0251	5,1180	-1,1430	-12,86%	0,0548	6,5281	-0,7443
NORDEA AVKASTNING	51,24%	0,0250	5,9769	-1,2196	-10,60%	0,0533	6,6457	-0,7477
ALFRED BERG NORGE	57,21%	0,0260	5,4260	-1,2379	-10,68%	0,0514	6,0051	-0,7463
AKSJEFOND PLUSS MARKEDSVERDI	48,67%	0,0237	5,6364	-1,2539	-2,15%	0,0508	6,4927	-0,8201
DANSKE INVEST-NORGE VEKST	52,06%	0,0225	5,1203	-1,1461	-7,67%	0,0459	5,2755	-0,7231

PLUSS AKSJE FUND	46,02%	0,0238	5,5788	-1,2210	1,16%	0,0486	6,4284	-0,8390
CARNEGIE AKSJE NORGE	57,17%	0,0284	7,4724	-1,4956	-11,71%	0,0553	5,9562	-0,6095
STOREBRAND AKSJE INNLAND	50,52%	0,0271	6,0119	-1,2798	-13,03%	0,0540	7,3655	-0,9227
STOREBRAND VERDI FUND	59,42%	0,0282	5,8837	-1,1307	-11,47%	0,0547	7,0841	-0,8341
DNB NORGE SELEKTIV III	56,57%	0,0266	5,3679	-1,1799	-2,68%	0,0534	6,3488	-0,7254
DNB NORGE SELEKTIV II	56,67%	0,0263	5,6056	-1,2368	-2,98%	0,0531	6,3766	-0,7258
DNB NORGE IV	55,01%	0,0267	5,6838	-1,2188	-5,16%	0,0528	6,4893	-0,7674
DNB NORGE III	54,29%	0,0267	5,7189	-1,2238	-5,65%	0,0527	6,5025	-0,7693
DNB NORGE SELEKTIV I	54,87%	0,0267	5,4219	-1,2327	-5,09%	0,0533	6,4050	-0,7346
DNB NORGE	52,81%	0,0267	5,7278	-1,2246	-7,11%	0,0527	6,5033	-0,7682
NORDEA NORGE VERDI	51,41%	0,0187	3,9793	-0,7610	-6,23%	0,0427	7,6331	-0,9110
AKSJEFOND PLUSS INDEKS FUND	51,63%	0,0262	5,7559	-1,2439	-5,86%	0,0535	6,9416	-0,8625
CARNEGIE NORGE INDEKS	51,39%	0,0277	6,7326	-1,2999	-7,13%	0,0549	6,7741	-0,7883
Average	***53,13%***				***-8,70%***			
OSLO STOCK EXCHANGE ALL SHARE INDEX	***57,74%***	***0,0271***	***5,7028***	***-1,1524***	***-9,94%***	***0,0502***	***7,1803***	***-0,9490***

SWITZERLAND

	STATISTICS PRIOR CRISIS				**STATISTICS AFTER CRISIS**			
MUTUAL FUND/INDEX	Mean return	Standard deviation of return	Kurtosis	Skewness	Mean return	Standard deviation of return	Kurtosis	Skewness
ASSELSA SMALL & MID CAPS SW	27,77%	0,0193	5,3169	-1,0510	-16,09%	0,0343	6,6348	-1,2113
DWS (CH)-HELVETIA AKTIEN	22,24%	0,0154	6,4862	-1,1982	2,42%	0,0321	5,9939	-0,7329
UBS (CH) EQUITY-MID CAPS SWI	33,52%	0,0178	6,1895	-1,0589	-0,54%	0,0317	5,8523	-1,0475
RAIFFSN FUTURA SWISS STOCK	37,75%	0,0177	5,2953	-0,9424	-1,80%	0,0326	10,0917	-1,4744
SARAPRO INST SWISS EQUITIES	19,71%	0,0153	4,1468	-0,3564	1,78%	0,0316	14,4650	-1,7151
CL (CH) SWISS SMALL CAP EF	43,30%	0,0169	6,8809	-1,2673	-5,08%	0,0325	9,0296	-1,5536
PICTET CH-SW MID/SM CP-PDYSF	40,14%	0,0173	6,0445	-1,0076	-0,65%	0,0310	6,7096	-1,2093
UBS (CH) IF-S&M C EQ CH I-B	36,05%	0,0173	5,9754	-1,0771	3,11%	0,0308	6,2224	-1,1458
UBS (CH) IF-S&M C EQ CH I-X	36,07%	0,0173	5,9596	-1,0739	3,09%	0,0309	6,2295	-1,1475
VONTOBEL SWISS SMALL CMPS-A	42,92%	0,0172	6,0096	-1,1559	-10,14%	0,0333	8,1020	-1,4438
SWISSCANTO SMALL & MID CAP-A	36,56%	0,0166	6,4290	-1,2448	-0,34%	0,0300	6,7384	-1,2234
PICTET-CH SWISS EQUITIES-P	23,87%	0,0150	4,3379	-0,2264	-0,66%	0,0325	12,8336	-1,5299
SWISSCANTO EQ VALUE SWITZERL	18,14%	0,0138	3,8655	-0,3541	0,31%	0,0337	15,5250	-1,6939
CSSP SMALL & MID SWITZERLAND	36,35%	0,0186	5,6200	-0,9716	-3,51%	0,0323	7,0286	-1,2976
PICTET CH INSTIT-SWISS-JDYSF	23,86%	0,0147	4,1778	-0,2448	-1,55%	0,0315	13,2276	-1,5513
PICTET CH INST-SWISS E-IDYSF	23,83%	0,0145	4,2650	-0,3032	-1,53%	0,0315	13,2405	-1,5537
PICTET CH INSTIT-SWISS-PDYSF	23,77%	0,0147	4,1767	-0,2448	-1,50%	0,0315	13,2645	-1,5583
UBS CH EQUITY-SML CAPS SWITZ	36,77%	0,0146	5,8732	-1,2178	1,25%	0,0324	5,9834	-1,0208

BCGE SYNCHRONY SWISS EQUITY	21,15%	0,0144	4,3324	-0,2277	-2,55%	0,0332	13,3204	-1,5046
UBS (CH) IF-EQUITIES CH I-X	20,01%	0,0148	4,1630	-0,1810	-0,09%	0,0333	13,9574	-1,6144
UBS (CH) IF-EQUITIES CH I-B	19,98%	0,0148	4,1684	-0,1805	-0,08%	0,0333	13,9794	-1,6148
UBS (CH) IF-EQUITIES CH I-A1	19,74%	0,0148	4,2187	-0,1782	0,13%	0,0331	14,1940	-1,6206
BBGI TACT SWIT	8,34%	0,0074	5,7658	0,8331	4,62%	0,0285	9,2307	-0,3745
SARASIN SUSTAINABLE EQ SWITZ	18,78%	0,0150	4,2532	-0,2838	-1,28%	0,0325	14,2676	-1,6613
Average	***27,94%***				***-1,28%***			
SWISS EXCHANGE SWISS PERFORMANCE INDEX	***23,91%***	***0,0144***	***4,3046***	***-0,2474***	***3,68%***	***0,0326***	***14,6559***	***-1,6426***

With red color are the negative values and with black the positive values.

Table 5.B
Mutual funds' beta coefficients and their t-statistics.

PORTUGAL		PRIOR CRISIS		AFTER CRISIS	
A/A	NAME	b	t-stat (b)	b	t-stat (b)
1	POSTAL ACCOES	0,67	6,10	0,93	20,84
2	BPI PORTUGAL	1,09	19,44	0,96	53,65
3	ESPIRITO SANTO PTL ACCOES	0,91	10,90	0,98	36,51
4	SANTANDER ACCOES PORTUGAL	1,07	21,91	1,05	44,25
5	BANIF ACCOES PORTUGAL	0,95	17,17	1,03	19,39
6	CAIXAGEST ACCOES PORTUGAL	0,84	7,79	0,92	26,70
7	ALVES RIBEIRO MEDIAS EMP POR	0,88	15,23	1,00	29,16
8	RAIZ POUPANCA ACCOES	0,89	36,41	0,87	43,38
ITALY		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	NAME	b	t-stat (b)	b	t-stat (b)
1	PACTO AZIONARIO ITALIA-A	0,77	43,44	0,77	53,71
2	AZIMUT-TREND ITALIA	0,79	33,47	0,82	29,54
3	EURIZON AZIONI AREA EURO	0,81	58,23	0,79	24,09
4	FONDERSEL ITALIA	0,83	40,85	0,92	69,66
5	MEDIOLANUM FLESSIBLE ITALIA	0,81	39,40	0,73	32,45
6	SYMPHONIA AZIONARIO ITALIA	0,79	52,83	0,74	69,96
7	GESTIELLE OBIETTIVO ITALIA-A	0,87	41,10	0,77	52,66
8	UBI PRAMERICA AZIONI ITALIA	0,82	44,09	0,77	40,09
9	ANM ITALIA	0,82	48,22	0,81	100,42
10	ARCA AZIONI ITALIA	0,80	57,05	0,80	111,14
11	PRIMA GEO ITALIA-A	0,81	32,02	0,78	93,95
12	GESTNORD AZIONI ITALIA	0,83	45,72	0,78	98,88
13	EURIZON AZIONI ITALIA	0,82	59,54	0,82	110,32
14	ALBOINO RE	0,60	15,11	0,69	19,08
15	EUROMOBILIARE AZIONI ITALIAN	0,86	36,81	0,76	102,95
16	AUREO AZIONI ITALIA	0,81	47,78	0,68	73,68
17	BNL AZIONI ITALIA	0,84	56,28	0,81	76,84
18	FIDEURAM ITALIA	0,86	50,92	0,83	97,99
19	NORVEGA AZIONARIO ITALIA-A	0,80	35,62	0,73	78,17
20	BNL AZIONI ITALIA PMI	0,73	19,82	0,69	38,95
21	ACOMEA ITALIA-A1	0,81	19,78	0,77	46,27
22	PIONEER AZIONAR CRESCITA-A	0,84	33,50	0,77	94,37
23	EURIZON AZIONI PMI ITALIA	0,71	15,12	0,66	31,08
24	ZENIT AZIONARIO-R	0,77	34,98	0,79	58,25
25	FONDERSEL PMI	0,79	22,62	0,74	24,61
26	OPTIMA AZIONARIO ITALIA	0,81	41,29	0,79	110,95
27	OPTIMA SMALL CAPS ITALIA	0,80	13,26	0,62	30,39
28	LEONARDO ITALIAN OPPORTUNITY	0,72	26,80	0,76	64,64
GREECE		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	NAME	b	t-stat (b)	b	t-stat (b)
1	HSBC GREEK EQUITY FUND	0,80	29,52	0,62	21,89
2	ALPHA ATHENS INDEX DOM EQUIT	0,99	90,39	0,99	934,69

3	PIRAEUS DOMESTIC EQ DYN COM	0,85	24,51	0,76	32,61
4	KYPROU DOMEST GREEK EQUI FND	0,90	52,14	0,75	35,70
5	ATE DOMESTIC EQUITY M&S	0,84	24,16	0,65	23,73
6	DELOS BLUE CHIPS - GREEK EQ	0,90	68,14	0,88	76,31
7	INT/CAN DYNAMIC DOMEST EQF-€	0,92	96,80	0,83	51,89
8	ERMIS DYNAMIC FUND-GREEK EQ	0,93	62,09	0,80	36,10
9	ATE DOMESTIC EQUITY FUND	0,81	58,62	0,76	52,38
10	PIRAEUS DOMESTIC EQUITY FUND	0,87	68,88	0,96	73,56
11	ALPHA BLUE CHIPS DOMESTIC EQ	0,86	59,65	0,85	40,41
12	MILLENNIUM BLUE CHIPS DOM EQ	0,91	64,65	0,89	34,86
13	EUROBANK GRK EQTIES DOM EQ-€	1,00	50,71	0,94	48,40
14	ALLIANZ AGGRESIVE STRATEGY	0,93	49,44	0,75	24,51
15	ALPHA AGG STRAT DOMESTIC EQ	0,92	43,93	0,88	59,08
16	ATTIKI DOMESTIC EQUITY	0,79	28,43	0,68	17,79
17	AAAB DOMESTIC SELECTED EQUIT	0,91	51,35	0,77	38,87
18	INT/CAN GROWTH DOM EQTY FD-€	0,87	22,16	0,74	31,01
19	ALLIANZ DOMESTIC EQUITIES	0,92	50,06	0,81	31,82
20	MILLENNIUM MID CAP DOMEST EQ	0,87	21,63	0,74	28,80
21	ING DOMESTIC EQUITY FUND	0,88	69,39	0,86	67,25
22	ALPHA TRUST NEW ENTERPRISES	0,72	29,86	0,61	28,98
23	DELOS SMALL-CAP GREEK EQUIT	0,82	27,13	0,74	36,77
24	MARFIN OLYMPIA DOMESTIC EQUI	0,84	41,77	0,84	46,32
25	DELOS TOP-30 GREEK EQUITIES	0,88	80,94	0,94	45,85
26	INTERNATIONAL DOMESTIC EQTY	0,84	57,51	0,72	23,49
27	MARFIN ATHENA DYN DOM EQT	0,77	20,41	0,71	25,96
28	ALPHA TRUST GROWTH DOM FUND	0,71	35,68	0,60	36,18
29	ALICO MID & SMALL CAP FUND	0,84	21,61	0,80	20,15
30	ALICO GREEK EQUITY FUND	0,91	81,33	0,92	49,83
31	CITIFUND EQUITY MUTUAL FUND	0,94	51,81	0,90	60,90
SPAIN		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	**NAME**	**b**	**t-stat (b)**	**b**	**t-stat (b)**
1	BESTINFOND	0,58	12,70	0,56	19,12
2	ESPIRITO SANTO ESPANA BOLSA	0,95	52,67	1,02	71,86
3	GESCONSULT CRECIMIENTO	0,84	35,72	0,65	25,19
4	BARCLAYS BOLSA ESPANA SELECC	0,83	25,15	0,89	32,11
5	BANKIA BOLSA ESPANOLA	0,93	43,51	0,98	92,49
6	SABADELL BS ESPANA BOLSA FI	1,02	67,54	0,97	108,99
7	ESAF 70	0,66	55,34	0,55	39,38
8	GESCONSULT RENTA VARIABLE FI	0,90	42,61	0,66	30,92
9	METAVALOR	0,95	42,66	0,82	61,78
10	EDM INVERSION	0,83	31,78	0,70	26,05
11	CARTERA VARIABLE FI	0,95	52,32	0,87	46,46
12	CREDIT SUISSE BOLSA	0,86	21,18	0,84	21,90
13	EUROVALOR BOLSA	1,04	69,63	0,93	142,37
14	BBVA BOLSA	1,03	94,52	1,03	115,03
15	BBVA BOLSA PLUS	1,03	99,57	1,02	100,11
16	LIBERBANK RV ESPANA	0,98	63,94	0,94	49,68
17	BK BOLSA ESPANA	0,96	30,07	0,86	72,70
18	MARCH VALORES FI	0,90	47,09	0,74	33,99
19	FONPENEDES BORSA	0,98	56,67	0,85	23,24
20	LLOYDS BOLSA FI	1,00	79,24	0,88	85,47
21	CAMINOS BOLSA OPORTUNIDADES	0,66	27,49	0,79	40,37

22	FON FINECO I	0,44	15,25	0,46	14,23
23	AC ACCIONES	1,02	116,76	1,02	137,81
24	BANCA CIVICA ACCIONES	1,04	80,52	1,00	140,57
25	EUROVALOR BOLSA ESPANOLA	1,00	91,67	0,90	83,25
26	CAJABURGOS BOLSA	1,02	117,23	1,01	139,31
27	CAIXASABADELL 7 RV	0,95	116,15	0,93	148,46
28	BANKIA SMALL & MID CAPS ESP	1,00	78,58	0,78	19,51
29	MIRABAUD FUNDS EQUITIES SPN	0,85	24,53	0,78	18,25
30	ESAF RENTA VARIABLE	0,96	79,70	0,85	26,42
31	ALLIANZ BOLSA FI	0,91	64,12	0,88	93,08
32	SABADELL BS ESPANA DIVIDENDO	0,86	39,22	0,85	57,56
33	BNP PARIBAS BOLSA ESPANOLA	1,02	35,71	0,90	33,23
34	FONDO VALENCIA RENTA VARIABL	0,91	43,61	0,93	60,24
35	PBP BOLSA ESPANA FI	1,00	75,23	0,97	51,16
36	BANKINTER FUTURO IBEX	1,04	96,21	1,00	188,59
37	OPENBANK IBEX 35	1,03	115,08	1,00	238,89
38	SANTANDER INDICE ESPANA	1,03	96,11	1,00	234,08
39	FONDESPANA BOLSA	1,04	108,03	1,00	209,75
40	MEDIOLANUM ESPANA R.V. FI-S	1,00	97,39	0,96	204,46
41	PREMIUM BOLSA ESPANA	0,26	8,96	0,55	10,25
42	BK MIXTO ESPANA 50	0,48	35,76	0,40	35,99
43	CAM BOLSA INDICE FI	0,84	18,94	0,94	36,23
GERMANY		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	**NAME**	**b**	**t-stat (b)**	**b**	**t-stat (b)**
1	LBBW EXPORTSTRATEGIE DTSCHLD	0,86	23,53	1,03	13,03
2	DWS DEUTSCHLAND	1,04	21,18	1,00	10,78
3	UBS D EQTY FD-MID CAPS GER	0,92	11,62	0,76	12,35
4	DWS DEUTSCHLAND	1,02	20,09	1,07	35,34
5	LBBW EXPORTSTRATEGIE DTSCHLD	0,84	23,04	1,02	13,82
6	UBS D EQTY FD-MID CAPS GER	0,90	15,57	0,94	29,59
7	DWS SELECT-INVEST	1,00	16,01	0,98	9,09
8	DWS INVESTA	1,00	23,48	1,02	28,41
9	MEAG PROINVEST	0,87	21,81	0,83	14,19
10	MEAG PROINVEST	0,88	21,89	0,77	14,74
11	DWS SELECT-INVEST	0,99	16,79	1,12	24,01
12	DEKAFONDS-CF	0,94	24,54	1,08	21,71
13	DWS INVESTA	1,05	26,26	0,95	9,80
14	AXA DEUTSCHLAND	0,90	22,77	0,96	24,39
15	ALLIANZ VERMOEGENSBILD DEU-A	0,95	22,69	0,97	19,53
16	UNIFONDS	0,95	23,39	0,89	15,42
17	SEB AKTIENFONDS	0,76	18,14	1,05	34,23
18	MORGEN DEUTSCH AKT UNIVERS-F	0,89	21,05	0,77	18,64
19	DWS GERMAN EQUITIES TYP O	0,95	24,20	1,04	36,47
20	FONDAK-A	0,94	25,21	0,96	17,53
21	ALLIANZ VERMOEGENSBILD DEU-A	0,96	22,57	0,96	18,43
22	CONCENTRA-A	0,92	25,67	0,98	29,27
23	AL TRUST AKTIEN DEUTSCHLAND	0,85	26,17	0,86	13,92
24	FONDAK-A	0,95	25,40	0,99	21,14
25	BBV-INVEST-UNION	0,69	15,12	0,70	9,98
26	UNIFONDS -NET-	0,95	29,43	0,84	12,69
27	CONCENTRA-A	0,91	25,79	0,94	19,57
28	MONEGA GERMANY	0,89	24,80	1,03	32,13

29	BBV-INVEST-UNION	0,71	19,14	0,77	19,97
30	LBBW AKTIEN DEUTSCHLAND	0,88	23,98	0,88	16,31
31	PIONEER GERMAN EQUITY-A ND	0,87	19,15	0,95	13,80
32	DWS AKTIEN STRAT DEUTSCHLAND	0,97	17,92	1,06	24,79
33	AXA DEUTSCHLAND	0,89	22,32	0,92	22,84
34	UNIFONDS -NET-	1,01	57,88	0,99	45,82
35	PIONEER AKTIEN DEUTSCHLAND-A	0,92	29,45	0,96	12,88
36	DWS GERMAN EQUITIES TYP O	0,99	27,41	0,92	8,45
37	DEKAFONDS-CF	0,93	24,59	1,03	17,53
NETHERLANDS		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	**NAME**	**b**	**t-stat (b)**	**b**	**t-stat (b)**
1	DELTA LLOYD DEELNEMINGEN FON	0,63	9,22	0,65	13,74
2	KEMPEN ORANGE FUND NV	0,82	11,35	0,62	12,32
3	DELTA LLOYD NEDERLAND FND NV	0,59	6,44	0,75	21,62
4	KEMPEN EUROPEAN HIGH DIVIDEN	0,84	18,03	0,60	22,07
5	ING DUTCH FUND	0,93	24,14	0,75	16,94
6	ALLIANZ HOLLAND FUND	0,90	17,11	0,79	15,04
7	ROBECO HOLLANDS BEZIT	0,89	30,77	0,71	14,43
8	SNS NEDERLANDS AANDELENFONDS	0,92	19,82	0,78	20,13
9	BNP PARIBAS AEX INDEX FUND	0,92	28,88	0,75	17,14
10	BNP PARIBAS NETHERLANDS FUND	0,98	27,44	0,72	23,05
11	TRIODOS GROENFONDS	-0,03	-1,66	-0,03	-3,48
NORWAY		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	**NAME**	**b**	**t-stat (b)**	**b**	**t-stat (b)**
1	DNB SMB	0,84	23,71	0,87	31,55
2	NORDEA SMB	0,74	22,40	0,83	32,48
3	TERRA SMB	0,70	23,16	0,82	36,11
4	OMEGA INVESTMENT FUND	0,84	32,06	1,06	39,49
5	FONDSFINANS SPAR	0,85	30,44	1,07	39,07
6	HANDELSBANKEN NORGEFOND-NOK	0,97	39,75	1,06	36,69
7	WARRENWICKLUND NORGE	0,75	27,24	1,00	58,80
8	NB-AKSJEFOND	0,80	42,62	0,98	49,85
9	TERRA NORGE	0,86	46,54	1,06	45,55
10	HOLBERG NORGE	0,72	26,74	0,87	30,36
11	PARETO AKSJE NORGE	0,83	34,24	0,84	30,81
12	KLP AKSJENORGE	0,84	42,72	1,05	43,73
13	WARRENWICKLUND NORDEN	0,48	16,45	0,83	38,72
14	ALFRED BERG AKTIV	0,94	34,43	1,00	42,01
15	DANSKE INVEST-NORGE II	0,86	50,50	1,00	40,93
16	DANSKE INVEST-NORGE I	0,86	50,12	1,00	40,83
17	STOREBRAND NORGE FUND	0,45	14,26	0,74	22,17
18	DANSKE INV NORSK AKSJ INST I	0,87	52,63	1,00	42,99
19	NORDEA VEKST	0,92	38,70	1,04	62,57
20	NORDEA KAPITAL	0,88	57,24	1,05	56,92
21	ALFRED BERG NORGE ETISK	0,88	41,57	1,07	71,25
22	NORDEA AVKASTNING	0,89	56,14	1,05	88,30
23	ALFRED BERG NORGE	0,93	68,83	1,00	70,33
24	AKSJEFOND PLUSS MARKEDSVERDI	0,83	41,24	1,00	73,92
25	DANSKE INVEST-NORGE VEKST	0,72	25,30	0,88	32,03
26	PLUSS AKSJE FUND	0,82	37,45	0,95	71,38
27	CARNEGIE AKSJE NORGE	1,01	35,91	1,08	65,50
28	STOREBRAND AKSJE INNLAND	0,96	40,30	1,06	43,85

29	STOREBRAND VERDI FUND	1,00	51,92	1,07	45,81
30	DNB NORGE SELEKTIV III	0,94	50,64	1,06	126,84
31	DNB NORGE SELEKTIV II	0,95	65,91	1,05	126,31
32	DNB NORGE IV	0,97	77,48	1,05	158,56
33	DNB NORGE III	0,97	76,45	1,04	159,16
34	DNB NORGE SELEKTIV I	0,96	58,41	1,05	127,31
35	DNB NORGE	0,97	77,29	1,05	158,71
36	NORDEA NORGE VERDI	0,63	30,16	0,81	32,37
37	AKSJEFOND PLUSS INDEKS FUND	0,93	51,40	1,06	101,69
38	CARNEGIE NORGE INDEKS	1,00	71,93	1,09	111,04
SWITZERLAND		**PRIOR CRISIS**		**AFTER CRISIS**	
A/A	**NAME**	**b**	**t-stat (b)**	**b**	**t-stat (b)**
1	ASSELSA SMALL & MID CAPS SW	0,77	8,15	0,82	9,08
2	DWS (CH)-HELVETIA AKTIEN	0,86	17,49	0,75	7,40
3	UBS (CH) EQUITY-MID CAPS SWI	1,00	19,39	0,83	14,29
4	RAIFFSN FUTURA SWISS STOCK	1,00	19,65	0,93	22,20
5	SARAPRO INST SWISS EQUITIES	1,05	83,19	0,96	127,22
6	CL (CH) SWISS SMALL CAP EF	0,85	10,83	0,86	14,19
7	PICTET CH-SW MID/SM CP-PDYSF	0,92	16,99	0,81	10,26
8	UBS (CH) IF-S&M C EQ CH I-B	0,96	15,03	0,82	14,37
9	UBS (CH) IF-S&M C EQ CH I-X	0,96	15,04	0,82	14,36
10	VONTOBEL SWISS SMALL CMPS-A	0,88	11,02	0,87	12,79
11	SWISSCANTO SMALL & MID CAP-A	0,88	12,58	0,80	15,37
12	PICTET-CH SWISS EQUITIES-P	1,02	78,30	0,98	123,41
13	SWISSCANTO EQ VALUE SWITZERL	0,93	55,08	1,02	109,05
14	CSSP SMALL & MID SWITZERLAND	1,03	15,04	0,86	15,91
15	PICTET CH INSTIT-SWISS-JDYSF	1,00	52,70	0,96	98,43
16	PICTET CH INST-SWISS E-IDYSF	0,98	59,62	0,96	100,49
17	PICTET CH INSTIT-SWISS-PDYSF	1,00	53,65	0,96	104,63
18	UBS CH EQUITY-SML CAPS SWITZ	0,72	10,74	0,81	9,28
19	BCGE SYNCHRONY SWISS EQUITY	1,00	132,47	1,01	117,92
20	UBS (CH) IF-EQUITIES CH I-X	1,02	93,00	1,01	107,09
21	UBS (CH) IF-EQUITIES CH I-B	1,02	94,97	1,01	108,98
22	UBS (CH) IF-EQUITIES CH I-A1	1,02	119,47	1,01	131,51
23	BBGI TACT SWIT	0,30	6,35	0,73	5,39
24	SARASIN SUSTAINABLE EQ SWITZ	1,03	155,83	1,00	159,54

Table 5.C.
Mutual funds' rankings in descending order prior and after crisis.

PORTUGAL													
A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	POSTAL ACCOES	2	2	4	2	2	2	1	4	1	1	4	1
2	BPI PORTUGAL	4	4	8	4	4	4	4	5	8	4	5	4
3	ESPIRITO SANTO PTL ACCOES	6	5	2	3	5	6	5	3	2	5	3	5
4	SANTANDER ACCOES PORTUGAL	3	3	5	6	3	3	3	2	3	3	2	3
5	BANIF ACCOES PORTUGAL	5	8	3	5	8	5	7	1	4	7	1	7
6	CAIXAGEST ACCOES PORTUGAL	1	7	7	1	7	1	2	7	5	2	7	2
7	ALVES RIBEIRO MEDIAS EMP POR	7	6	1	7	6	7	6	8	6	6	8	6
8	RAIZ POUPANCA ACCOES	8	1	6	8	1	8	8	6	7	8	6	8
ITALY													
A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	PACTO AZIONARIO ITALIA-A	27	18	18	27	18	27	4	4	18	4	4	4
2	AZIMUT-TREND ITALIA	21	7	1	21	7	21	18	18	26	18	18	18
3	EURIZON AZIONI AREA EURO	25	22	2	25	22	25	3	13	10	3	13	3
4	FONDERSEL ITALIA	7	15	9	7	15	23	2	10	12	2	10	13
5	MEDIOLANUM FLESSIBLE ITALIA	23	17	22	23	12	7	13	2	11	13	2	24
6	SYMPHONIA AZIONARIO ITALIA	22	12	13	22	17	20	17	17	13	17	17	17
7	GESTIELLE OBIETTIVO ITALIA-A	20	4	11	20	4	22	10	9	5	10	9	2
8	UBI PRAMERICA AZIONI ITALIA	18	8	8	18	8	18	9	26	15	9	26	10
9	ANM ITALIA	15	9	25	15	9	15	24	3	9	24	3	9
10	ARCA AZIONI ITALIA	11	13	27	11	13	8	26	11	19	26	11	25
11	PRIMA GEO ITALIA-A	8	11	23	8	11	17	11	12	4	11	12	26
12	GESTNORD AZIONI ITALIA	12	27	4	12	21	11	12	24	17	12	24	11
13	EURIZON AZIONI ITALIA	17	21	10	4	27	12	25	8	28	25	8	12
14	ALBOINO RE	4	26	28	17	3	4	8	28	8	8	7	8
15	EUROMOBILIARE AZIONI ITALIAN	26	5	26	26	5	9	28	7	3	28	28	28
16	AUREO AZIONI ITALIA	2	3	12	2	26	5	7	1	7	7	1	7

17	BNL AZIONI ITALIA	9	16	5	9	2	2	1	15	16	1	15	15
18	FIDEURAM ITALIA	5	10	6	5	10	26	15	5	1	15	5	1
19	NORVEGA AZIONARIO ITALIA-A	13	2	16	13	16	24	5	22	25	5	22	5
20	BNL AZIONI ITALIA PMI	19	25	20	19	19	13	21	25	6	21	25	22
21	ACOMEA ITALIA-A1	24	19	3	24	25	28	22	21	24	22	21	21
22	PIONEER AZIONAR CRESCITA-A	3	6	21	3	6	19	6	6	2	6	6	19
23	EURIZON AZIONI PMI ITALIA	16	1	24	16	1	3	19	19	27	19	19	6
24	ZENIT AZIONARIO-R	28	24	19	28	24	16	20	16	22	20	16	20
25	FONDERSEL PMI	10	20	7	10	20	10	14	20	23	14	20	23
26	OPTIMA AZIONARIO ITALIA	6	28	17	6	28	6	23	14	20	23	14	16
27	OPTIMA SMALL CAPS ITALIA	1	23	14	1	23	1	16	23	21	16	23	14
28	LEONARDO ITALIAN OPPORTUNITY	14	14	15	14	14	14	27	27	14	27	27	27

GREECE

A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	HSBC GREEK EQUITY FUND	20	2	15	20	2	20	2	2	15	2	2	2
2	ALPHA ATHENS INDEX DOM EQUIT	2	13	20	2	13	2	25	25	21	25	25	25
3	PIRAEUS DOMESTIC EQ DYN COM	13	15	27	13	15	13	10	10	28	10	10	30
4	KYPROU DOMEST GREEK EQUI FND	3	31	3	3	14	3	30	30	22	30	30	10
5	ATE DOMESTIC EQUITY M&S	15	14	22	15	31	15	15	15	1	13	13	13
6	DELOS BLUE CHIPS - GREEK EQ	18	19	28	18	19	18	13	13	11	15	15	15
7	INT/CAN DYNAMIC DOMEST EQF-€	29	8	1	29	8	29	31	31	5	31	31	31
8	ERMIS DYNAMIC FUND-GREEK EQ	14	7	2	14	7	14	12	21	14	12	21	29
9	ATE DOMESTIC EQUITY FUND	31	12	23	31	12	31	21	12	27	21	12	21
10	PIRAEUS DOMESTIC EQUITY FUND	19	17	19	19	17	19	24	6	24	24	6	11
11	ALPHA BLUE CHIPS DOMESTIC EQ	5	6	18	5	6	5	29	11	4	29	11	6
12	MILLENNIUM BLUE CHIPS DOM EQ	27	30	29	27	30	27	11	24	9	6	24	12
13	EUROBANK GRK EQTIES DOM EQ-€	8	20	14	7	20	7	6	7	31	11	7	24
14	ALLIANZ AGGRESIVE STRATEGY	7	25	11	8	25	8	19	19	8	19	19	19
15	ALPHA AGG STRAT DOMESTIC EQ	17	4	5	17	4	17	7	8	16	7	8	7
16	ATTIKI DOMESTIC EQUITY	23	11	31	23	11	12	27	29	30	27	29	27
17	AAAB DOMESTIC SELECTED EQUIT	12	21	6	12	21	6	3	14	19	3	14	3
18	INT/CAN GROWTH DOM EQTY FD-€	6	18	24	6	18	23	14	9	25	14	4	14
19	ALLIANZ DOMESTIC EQUITIES	30	3	17	30	3	30	8	4	7	8	9	18

20	MILLENNIUM MID CAP DOMEST EQ	4	10	25	4	10	4	18	3	3	18	3	20
21	ING DOMESTIC EQUITY FUND	11	24	7	11	24	11	20	27	18	20	27	8
22	ALPHA TRUST NEW ENTERPRISES	25	29	13	25	29	25	9	17	29	9	17	5
23	DELOS SMALL-CAP GREEK EQUIT	21	5	12	21	5	21	4	18	23	4	18	23
24	MARFIN OLYMPIA DOMESTIC EQUI	1	23	21	1	23	24	23	20	26	23	20	9
25	DELOS TOP-30 GREEK EQUITIES	24	26	10	24	26	10	17	23	20	17	23	4
26	INTERNATIONAL DOMESTIC EQTY	10	1	4	10	1	1	5	26	6	5	26	17
27	MARFIN ATHENA DYN DOM EQT	26	9	8	26	9	26	16	16	17	16	16	16
28	ALPHA TRUST GROWTH DOM FUND	22	27	16	22	27	22	26	5	12	26	5	26
29	ALICO MID & SMALL CAP FUND	9	16	30	9	16	9	1	1	2	1	1	1
30	ALICO GREEK EQUITY FUND	16	22	9	16	22	16	22	22	13	22	22	22
31	CITIFUND EQUITY MUTUAL FUND	28	28	26	28	28	28	28	28	10	28	28	28

SPAIN

A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	BESTINFOND	24	36	9	24	36	32	14	14	37	2	14	1
2	ESPIRITO SANTO ESPANA BOLSA	36	15	32	13	15	9	2	23	36	14	23	12
3	GESCONSULT CRECIMIENTO	13	24	15	36	24	4	23	26	39	5	2	29
4	BARCLAYS BOLSA ESPANA SELECC	15	38	8	15	13	8	5	37	38	23	26	34
5	BANKIA BOLSA ESPANOLA	43	39	25	43	38	3	15	2	40	15	37	31
6	SABADELL BS ESPANA BOLSA FI	38	13	4	9	39	10	26	36	6	26	5	42
7	ESAF 70	9	37	38	38	37	1	37	5	5	36	15	5
8	GESCONSULT RENTA VARIABLE FI	39	14	3	39	6	25	36	38	27	37	36	7
9	METAVALOR	37	6	36	37	14	15	38	15	31	38	38	6
10	EDM INVERSION	25	25	37	25	25	5	24	39	34	24	24	20
11	CARTERA VARIABLE FI	6	23	10	6	23	34	39	24	24	6	39	9
12	CREDIT SUISSE BOLSA	14	26	5	14	26	38	6	6	23	39	6	37
13	EUROVALOR BOLSA	33	28	34	12	28	36	35	35	26	35	35	22
14	BBVA BOLSA	23	40	24	23	35	37	34	40	16	34	40	36
15	BBVA BOLSA PLUS	12	35	39	33	40	24	40	34	20	40	34	38
16	LIBERBANK RV ESPANA	26	20	1	26	9	39	43	16	25	43	16	30
17	BK BOLSA ESPANA	19	9	13	19	20	40	16	43	35	16	43	25
18	MARCH VALORES FI	28	33	29	28	19	31	4	27	12	4	27	40
19	FONPENEDES BORSA	40	19	6	40	33	30	27	13	13	12	13	8

20	LLOYDS BOLSA FI	35	16	43	35	16	23	12	25	30	27	25	16
21	CAMINOS BOLSA OPORTUNIDADES	20	17	40	20	17	29	13	31	9	13	31	35
22	FON FINECO I	17	30	12	17	30	6	31	33	1	25	12	18
23	AC ACCIONES	16	27	14	16	27	14	25	20	29	31	20	27
24	BANCA CIVICA ACCIONES	4	2	31	4	2	20	33	12	32	33	33	39
25	EUROVALOR BOLSA ESPANOLA	30	11	30	30	11	13	20	30	43	20	30	43
26	CAJABURGOS BOLSA	8	5	19	2	5	2	30	4	14	19	4	24
27	CAIXASABADELL 7 RV	11	34	23	8	8	26	19	32	33	30	32	23
28	BANKIA SMALL & MID CAPS ESP	2	8	20	11	34	19	32	17	18	32	17	19
29	MIRABAUD FUNDS EQUITIES SPN	5	31	2	5	31	27	17	11	15	17	11	10
30	ESAF RENTA VARIABLE	32	18	17	27	18	28	29	19	7	29	19	32
31	ALLIANZ BOLSA FI	27	32	18	32	32	18	11	9	17	11	9	26
32	SABADELL BS ESPANA DIVIDENDO	34	4	28	34	4	16	9	29	2	9	29	3
33	BNP PARIBAS BOLSA ESPANOLA	18	12	26	18	12	11	28	28	42	28	28	2
34	FONDO VALENCIA RENTA VARIABL	29	3	16	29	3	17	18	18	8	18	18	14
35	PBP BOLSA ESPANA FI	31	10	11	31	10	12	21	21	10	21	21	33
36	BANKINTER FUTURO IBEX	3	29	27	3	29	43	10	10	19	10	10	15
37	OPENBANK IBEX 35	10	43	7	10	43	35	1	8	3	1	8	13
38	SANTANDER INDICE ESPANA	1	7	33	1	7	7	8	3	22	8	3	17
39	FONDESPANA BOLSA	21	21	35	21	21	33	3	1	28	3	1	28
40	MEDIOLANUM ESPANA R.V. FI-S	7	1	21	7	1	21	41	7	11	41	7	4
41	PREMIUM BOLSA ESPANA	22	42	22	22	42	42	7	41	4	7	41	11
42	BK MIXTO ESPANA 50	42	22	42	42	22	22	22	22	41	22	22	21
43	CAM BOLSA INDICE FI	41	41	41	41	41	41	42	42	21	42	42	41

GERMANY

A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	LBBW EXPORTSTRATEGIE DTSCHLD	7	2	32	7	2	7	4	4	6	4	4	1
2	DWS DEUTSCHLAND	3	13	15	3	13	3	1	32	31	1	32	5
3	UBS D EQTY FD-MID CAPS GER	11	4	21	11	4	11	5	11	4	5	11	4
4	DWS DEUTSCHLAND	32	34	24	32	34	32	32	1	2	2	1	32
5	LBBW EXPORTSTRATEGIE DTSCHLD	2	32	20	2	32	2	2	2	3	32	2	11
6	UBS D EQTY FD-MID CAPS GER	13	11	3	13	11	13	11	12	22	11	5	2
7	DWS SELECT-INVEST	4	7	6	4	7	4	12	5	27	12	12	12

8	DWS INVESTA	8	36	11	6	36	6	31	19	5	31	19	19
9	MEAG PROINVEST	6	8	7	8	8	8	19	17	1	19	17	37
10	MEAG PROINVEST	36	21	4	36	21	21	37	28	32	7	28	8
11	DWS SELECT-INVEST	21	15	19	16	15	15	7	31	35	37	31	6
12	DEKAFONDS-CF	16	24	2	21	24	36	8	22	36	8	8	7
13	DWS INVESTA	15	20	35	15	19	16	6	8	25	6	22	17
14	AXA DEUTSCHLAND	24	19	28	24	20	24	36	37	19	17	37	27
15	ALLIANZ VERMOEGENSBILD DEU-A	26	16	36	26	16	20	22	6	9	22	6	22
16	UNIFONDS	19	26	16	19	26	19	17	34	21	36	34	21
17	SEB AKTIENFONDS	20	12	37	20	12	26	28	24	10	28	24	36
18	MORGEN DEUTSCH AKT UNIVERS-F	12	37	26	12	37	12	27	15	18	27	15	15
19	DWS GERMAN EQUITIES TYP O	37	3	12	37	3	37	13	35	15	13	35	24
20	FONDAK-A	34	35	33	34	35	34	21	27	29	21	27	20
21	ALLIANZ VERMOEGENSBILD DEU-A	22	22	14	22	6	22	35	21	33	35	21	13
22	CONCENTRA-A	35	6	17	27	22	27	15	14	13	15	14	28
23	AL TRUST AKTIEN DEUTSCHLAND	27	27	23	35	27	35	24	20	23	24	13	31
24	FONDAK-A	28	28	13	28	28	28	20	13	14	20	20	14
25	BBV-INVEST-UNION	33	14	8	14	14	18	14	7	30	14	7	33
26	UNIFONDS -NET-	14	33	27	18	33	33	33	36	8	33	36	35
27	CONCENTRA-A	18	18	22	33	18	14	34	33	26	34	33	3
28	MONEGA GERMANY	9	30	34	9	30	9	3	16	16	3	16	34
29	BBV-INVEST-UNION	30	10	5	30	10	30	16	30	28	16	30	30
30	LBBW AKTIEN DEUTSCHLAND	10	9	1	10	9	10	30	23	17	30	23	9
31	PIONEER GERMAN EQUITY-A ND	23	31	30	23	31	23	23	26	20	23	26	16
32	DWS AKTIEN STRAT DEUTSCHLAND	1	23	9	1	23	1	9	9	37	9	9	23
33	AXA DEUTSCHLAND	17	1	25	17	1	17	26	3	12	10	3	10
34	UNIFONDS -NET-	5	5	18	5	5	31	10	18	24	26	18	26
35	PIONEER AKTIEN DEUTSCHLAND-A	31	17	10	31	17	5	18	29	7	18	29	18
36	DWS GERMAN EQUITIES TYP O	25	29	31	25	29	25	25	10	11	25	10	29
37	DEKAFONDS-CF	29	25	29	29	25	29	29	25	34	29	25	25

NETHERLANDS

A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	DELTA LLOYD DEELNEMINGEN FON	3	11	2	3	11	2	6	11	11	6	11	2

2	KEMPEN ORANGE FUND NV	2	10	1	2	10	3	8	6	2	8	6	6
3	DELTA LLOYD NEDERLAND FND NV	1	5	3	1	5	8	9	8	7	9	8	1
4	KEMPEN EUROPEAN HIGH DIVIDEN	8	8	10	8	8	4	5	3	3	3	3	10
5	ING DUTCH FUND	6	9	7	6	9	9	3	9	1	5	9	8
6	ALLIANZ HOLLAND FUND	10	6	6	10	6	5	7	5	9	7	5	9
7	ROBECO HOLLANDS BEZIT	4	7	5	4	7	10	10	7	4	10	7	5
8	SNS NEDERLANDS AANDELENFONDS	5	2	8	5	2	6	2	10	8	2	10	7
9	BNP PARIBAS AEX INDEX FUND	9	4	9	9	4	7	1	1	6	1	1	3
10	BNP PARIBAS NETHERLANDS FUND	7	1	4	7	1	1	4	2	5	4	2	4
11	TRIODOS GROENFONDS	11	3	11	11	3	11	11	4	10	11	4	11

NORWAY

A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	DNB SMB	1	29	1	1	29	11	5	5	26	5	5	12
2	NORDEA SMB	29	27	2	29	27	3	38	38	30	30	38	17
3	TERRA SMB	27	38	10	27	38	8	30	30	31	38	30	1
4	OMEGA INVESTMENT FUND	6	6	29	6	6	7	31	31	32	27	31	2
5	FONDSFINANS SPAR	38	32	11	38	32	2	27	34	33	31	34	14
6	HANDELSBANKEN NORGEFOND-NOK	14	33	7	14	33	12	9	37	24	9	37	25
7	WARRENWICKLUND NORGE	30	35	5	30	35	25	37	32	34	34	32	29
8	NB-AKSJEFOND	34	34	23	34	31	14	34	27	5	37	27	21
9	TERRA NORGE	32	31	27	32	34	29	4	33	15	4	33	28
10	HOLBERG NORGE	33	30	12	33	30	30	29	9	18	29	9	23
11	PARETO AKSJE NORGE	28	23	30	28	23	31	32	29	37	12	29	11
12	KLP AKSJENORGE	31	28	31	31	28	9	12	35	35	21	35	6
13	WARRENWICKLUND NORDEN	35	14	6	35	14	32	21	4	17	32	4	5
14	ALFRED BERG AKTIV	23	37	18	23	1	34	33	20	16	20	12	19
15	DANSKE INVEST-NORGE II	37	1	25	37	37	33	20	21	38	33	20	15
16	DANSKE INVEST-NORGE I	19	19	34	19	19	38	15	12	11	15	21	16
17	STOREBRAND NORGE FUND	5	18	36	5	18	5	35	22	36	18	22	10
18	DANSKE INV NORSK AKSJ INST I	11	22	32	2	20	35	18	28	20	35	28	37
19	NORDEA VEKST	2	20	20	11	22	4	28	18	25	22	15	24
20	NORDEA KAPITAL	18	5	33	18	5	37	22	15	3	28	18	8
21	ALFRED BERG NORGE ETISK	22	21	15	20	21	1	16	24	9	6	24	38

22	NORDEA AVKASTNING	20	15	14	22	11	23	6	19	12	16	16	32
23	ALFRED BERG NORGE	21	12	37	21	12	21	24	16	13	24	19	18
24	AKSJEFOND PLUSS MARKEDSVERDI	12	11	13	12	15	28	19	6	23	19	6	33
25	DANSKE INVEST-NORGE VEKST	4	16	16	4	16	6	26	26	22	26	26	22
26	PLUSS AKSJE FUND	15	9	4	15	9	15	23	23	4	23	23	20
27	CARNEGIE AKSJE NORGE	9	4	22	9	4	16	14	14	29	14	14	35
28	STOREBRAND AKSJE INNLAND	16	24	28	16	24	24	7	7	27	7	7	7
29	STOREBRAND VERDI FUND	7	26	9	7	26	22	8	8	19	8	8	27
30	DNB NORGE SELEKTIV III	24	2	24	24	2	19	17	25	21	17	25	30
31	DNB NORGE SELEKTIV II	10	8	35	10	8	10	25	11	10	25	11	31
32	DNB NORGE IV	26	7	21	26	7	27	1	10	28	1	10	4
33	DNB NORGE III	25	10	17	8	10	18	11	13	14	11	1	34
34	DNB NORGE SELEKTIV I	8	25	3	25	25	20	13	1	1	13	13	3
35	DNB NORGE	3	3	26	3	3	36	3	36	7	3	3	26
36	NORDEA NORGE VERDI	36	36	8	36	36	26	10	3	6	10	36	9
37	AKSJEFOND PLUSS INDEKS FUND	13	13	38	13	13	13	36	17	2	36	17	36
38	CARNEGIE NORGE INDEKS	17	17	19	17	17	17	2	2	8	2	2	13

SWITZERLAND

A/A	MUTUAL FUND/INDEX	RANKINGS PRIOR CRISIS						RANKINGS AFTER CRISIS					
		Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Information ratio	RAP	MRAP	Sortino ratio
1	ASSELSA SMALL & MID CAPS SW	14	14	6	14	14	6	13	13	23	13	13	18
2	DWS (CH)-HELVETIA AKTIEN	1	4	10	1	4	1	20	20	8	20	20	2
3	UBS (CH) EQUITY-MID CAPS SWI	10	3	7	4	3	14	21	21	9	21	21	10
4	RAIFFSN FUTURA SWISS STOCK	4	5	4	10	5	10	22	22	2	22	22	3
5	SARAPRO INST SWISS EQUITIES	7	12	11	3	12	4	19	19	18	19	19	9
6	CL (CH) SWISS SMALL CAP EF	3	24	18	7	24	2	18	12	3	18	12	8
7	PICTET CH-SW MID/SM CP-PDYSF	6	9	9	6	8	11	2	24	7	2	24	6
8	UBS (CH) IF-S&M C EQ CH I-B	9	8	8	8	9	7	12	5	11	4	5	11
9	UBS (CH) IF-S&M C EQ CH I-X	8	20	14	9	20	3	4	17	14	12	15	13
10	VONTOBEL SWISS SMALL CMPS-A	11	21	3	11	21	18	24	16	4	24	16	20
11	SWISSCANTO SMALL & MID CAP-A	18	22	1	18	22	9	5	15	5	5	17	21
12	PICTET-CH SWISS EQUITIES-P	2	17	12	2	15	8	14	4	6	1	4	14
13	SWISSCANTO EQ VALUE SWITZERL	5	15	15	5	17	15	6	14	13	3	14	4
14	CSSP SMALL & MID SWITZERLAND	12	16	16	12	16	17	1	6	10	6	6	22

15	**PICTET CH INSTIT-SWISS-JDYSF**	17	7	17	15	7	16	3	9	20	14	8	1
16	**PICTET CH INST-SWISS E-IDYSF**	15	19	2	17	19	5	10	8	21	10	9	24
17	**PICTET CH INSTIT-SWISS-PDYSF**	24	10	23	24	10	12	9	3	1	8	3	19
18	**UBS CH EQUITY-SML CAPS SWITZ**	20	11	5	20	6	24	8	10	22	9	10	7
19	**BCGE SYNCHRONY SWISS EQUITY**	21	6	13	21	11	20	15	18	15	15	7	23
20	**UBS (CH) IF-EQUITIES CH I-X**	22	13	20	16	13	21	16	7	16	16	18	15
21	**UBS (CH) IF-EQUITIES CH I-B**	16	2	19	22	2	22	17	11	17	17	11	16
22	**UBS (CH) IF-EQUITIES CH I-A1**	19	1	21	19	1	19	7	2	12	7	2	17
23	**BBGI TACT SWIT**	13	18	22	13	18	13	11	1	24	11	1	5
24	**SARASIN SUSTAINABLE EQ SWITZ**	23	23	24	23	23	23	23	23	19	23	23	12

Table 5.D
Results of all measures per mutual fund.

PORTUGAL																				
		MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
A/A	MUTUAL FUND/INDEX	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio
1	POSTAL ACCOES	-1,46	-0,03	-0,01 (-4,43)	-0,01 (-6,02)	0,27 (2,23)	-7,79 (-3,96)	-0,02	0,50%	-0,77%	-0,82	-0,59	-0,02	0 (-0,82)	0 (-0,87)	0,92 (16,5)	-0,26 (-0,61)	0,00	-0,10%	-0,46%	-0,51
2	BPI PORTUGAL	-1,28	-0,02	0 (2,24)	0 (-1,23)	0,72 (9,9)	-6,59 (-5,61)	0,01	0,76%	0,55%	-0,78	-0,67	-0,02	0 (-2,23)	0 (-2,2)	0,96 (38,9)	0,03 (0,14)	-0,08	-0,37%	-0,45%	-0,55
3	ESPIRITO SANTO PTL ACCOES	-1,35	-0,02	0 (-1,31)	-0,01 (-3,63)	0,53 (5,2)	-7,17 (-4,4)	-0,01	0,66%	0,13%	-0,80	-0,65	-0,02	0 (-1,65)	0 (-1,67)	0,97 (29,8)	-0,09 (-0,36)	-0,10	-0,31%	-0,43%	-0,55
4	SANTANDER ACCOES PORTUGAL	-1,29	-0,02	0 (2,15)	0 (-0,52)	0,8 (10,7)	-4,91 (-4,13)	0,06	0,75%	0,55%	-0,79	-0,62	-0,02	0 (-0,09)	0 (-0,16)	1,02 (37,6)	-0,19 (-0,9)	-0,10	-0,20%	-0,28%	-0,53
5	BANIF ACCOES PORTUGAL	-1,39	-0,02	0 (-0,65)	0 (-1,65)	0,82 (9,39)	-2,72 (-1,95)	0,00	0,60%	0,25%	-0,81	-0,64	-0,02	0 (-0,95)	0 (-1,44)	0,92 (33,4)	-1,07 (-5,11)	-0,13	-0,26%	-0,35%	-0,53
6	CAIXAGEST ACCOES PORTUGAL	-1,35	-0,03	0 (-2,17)	-0,01 (-4,31)	0,42 (3,62)	-8,08 (-4,3)	-0,03	0,66%	-0,10%	-0,79	-0,71	-0,03	0 (-3,31)	0 (-3,19)	0,97 (29,4)	0,34 (1,36)	-0,15	-0,50%	-0,66%	-0,57
7	ALVES RIBEIRO MEDIAS EMP POR	-1,53	-0,03	0 (-2,41)	0 (-3,39)	0,74 (9,77)	-2,96 (-2,43)	-0,02	0,40%	0,05%	-0,83	-0,66	-0,02	0 (-1,93)	0 (-1,99)	0,99 (29,5)	-0,21 (-0,83)	-0,17	-0,34%	-0,46%	-0,55
8	RAIZ POUPANCA ACCOES	-1,61	-0,02	0 (-2,89)	0 (-5,26)	0,69 (13,7)	-3,92 (-4,84)	0,03	0,29%	0,12%	-0,84	-0,72	-0,03	0 (-4,37)	0 (-4,43)	0,87 (43,2)	-0,15 (-0,96)	0,00	-0,54%	-0,61%	-0,57
	PSI GENERAL INDEX	***-1,55***	***-0,02***									***-0,65***	***-0,02***								
ITALY																					
A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									

		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio
1	PACTO AZIONARIO ITALIA-A	-1,90	-0,03	0 (-10,7)	0 (-8,63)	0,77 (20,5)	-0,39 (-0,7)	0,09	-0,38%	-0,49%	-0,87	-0,64	-0,03	0 (-7,9)	0 (-8)	0,79 (59)	0,14 (1,48)	0,10	-0,91%	-0,95%	-0,53
2	AZIMUT-TREND ITALIA	-1,82	-0,03	0 (-7,65)	0 (-5,56)	0,83 (17)	0,3 (0,41)	0,09	-0,25%	-0,42%	-0,86	-0,60	-0,03	0 (-4,6)	0 (-4,54)	0,81 (45,5)	-0,12 (-0,96)	0,10	-0,73%	-0,80%	-0,52
3	EURIZON AZIONI AREA EURO	-1,87	-0,03	0 (-11,4)	0 (-9,46)	0,79 (24,6)	-0,58 (-1,21)	0,01	-0,33%	-0,40%	-0,87	-0,59	-0,03	0 (-3,47)	0 (-3,47)	0,81 (33,5)	0,05 (0,28)	0,11	-0,71%	-0,84%	-0,51
4	FONDERSEL ITALIA	-1,80	-0,03	0 (-8,29)	0 (-6,76)	0,82 (20,7)	-0,4 (-0,69)	0,03	-0,23%	-0,33%	-0,86	-0,53	-0,02	0 (-1,15)	0 (-1,09)	0,91 (50,1)	-0,1 (-0,79)	0,12	-0,45%	-0,50%	-0,48
5	MEDIOLANUM FLESSIBLE ITALIA	-1,83	-0,03	0 (-7,97)	0 (-7,09)	0,77 (17,4)	-1 (-1,53)	0,02	-0,27%	-0,40%	-0,86	-0,64	-0,03	0 (-7,45)	0 (-7,44)	0,76 (51,8)	0,03 (0,3)	0,14	-0,95%	-1,00%	-0,54
6	SYMPHONIA AZIONARIO ITALIA	-1,89	-0,03	0 (-10,5)	0 (-8,27)	0,8 (20,8)	-0,24 (-0,43)	0,01	-0,37%	-0,47%	-0,87	-0,65	-0,03	0 (-7,57)	0 (-7,78)	0,79 (51)	0,25 (2,36)	0,10	-0,98%	-1,04%	-0,54
7	GESTIELLE OBIETTIVO ITALIA-A	-1,69	-0,03	0 (-4,77)	0 (-4,96)	0,79 (15,1)	-1,54 (-1,99)	-0,02	-0,05%	-0,21%	-0,85	-0,63	-0,03	0 (-7,09)	0 (-7,03)	0,78 (53,3)	-0,06 (-0,57)	0,11	-0,88%	-0,93%	-0,53
8	UBI PRAMERICA AZIONI ITALIA	-1,78	-0,03	0 (-6,70)	0 (-4,29)	0,9 (18,9)	0,91 (1,3)	0,06	-0,19%	-0,34%	-0,86	-0,62	-0,03	0 (-6,13)	0 (-6,18)	0,8 (50,7)	0,1 (0,95)	0,11	-0,86%	-0,91%	-0,53
9	ANM ITALIA	-1,82	-0,03	0 (-8,83)	0 (-7,07)	0,82 (22,7)	-0,28 (-0,52)	0,08	-0,26%	-0,34%	-0,86	-0,61	-0,03	0 (-6,86)	0 (-6,8)	0,81 (69,1)	-0,05 (-0,58)	0,13	-0,78%	-0,81%	-0,52
10	ARCA AZIONI ITALIA	-1,88	-0,03	0 (-12,4)	0 (-10,7)	0,77 (25,8)	-0,77 (-1,74)	0,03	-0,36%	-0,42%	-0,87	-0,60	-0,03	0 (-7,18)	0 (-7,19)	0,82 (76,8)	0,04 (0,5)	0,15	-0,77%	-0,79%	-0,52
11	PRIMA GEO ITALIA-A	-1,77	-0,03	0 (-6,66)	0 (-5,03)	0,83 (15,7)	0,05 (0,06)	0,06	-0,18%	-0,37%	-0,86	-0,62	-0,03	0 (-7)	0 (-6,92)	0,79 (63,4)	-0,09 (-1,07)	0,14	-0,82%	-0,86%	-0,52
12	GESTNORD AZIONI ITALIA	-1,79	-0,03	0 (-7,65)	0 (-5,93)	0,84 (19,5)	-0,1 (-0,16)	0,02	-0,20%	-0,32%	-0,86	-0,62	-0,03	0 (-7,67)	0 (-7,77)	0,8 (69,2)	0,12 (1,5)	0,15	-0,84%	-0,87%	-0,53
13	EURIZON AZIONI ITALIA	-1,83	-0,03	0 (-10,3)	0 (-8,37)	0,81 (24,8)	-0,41 (-0,85)	0,06	-0,28%	-0,35%	-0,86	-0,60	-0,03	0 (-6,7)	0 (-6,66)	0,83 (76,1)	-0,01 (-0,18)	0,14	-0,74%	-0,76%	-0,51
14	ALBOINO RE	-1,93	-0,04	-0,01 (-8,1)	-0,01 (-8,19)	0,38 (3,86)	-4,3 (-2,94)	-0,06	-0,43%	-1,58%	-0,87	-0,70	-0,03	-0,01 (-7,22)	-0,01 (-7,76)	0,78 (34,2)	0,68 (4,28)	0,04	-1,19%	-1,37%	-0,57
15	EUROMOBILIARE AZIONI ITALIAN	-1,76	-0,03	0 (-6,78)	0 (-7,28)	0,75 (17,2)	-2 (-3,1)	-0,06	-0,16%	-0,28%	-0,86	-0,64	-0,03	0 (-9,32)	0 (-9,25)	0,77 (68,3)	-0,07 (-0,86)	0,13	-0,93%	-0,96%	-0,53
16	AUREO AZIONI ITALIA	-1,88	-0,03	0 (-11,8)	-0,01 (-11,1)	0,74 (24,6)	-1,35 (-3)	0,01	-0,35%	-0,42%	-0,87	-0,70	-0,03	-0,01 (-10,2)	-0,01 (-10,4)	0,66 (47,2)	-0,42 (-4,39)	0,10	-1,22%	-1,28%	-0,56

17	BNL AZIONI ITALIA	-1,80	-0,03	0 (-8,41)	0 (-8,15)	0,77 (20,6)	-1,41 (-2,56)	-0,02	-0,23%	-0,32%	-0,86	-0,60	-0,03	0 (-5,24)	0 (-5,19)	0,82 (54)	-0,04 (-0,39)	0,12	-0,75%	-0,80%	-0,52
18	FIDEURAM ITALIA	-1,73	-0,03	0 (-6,45)	0 (-6,46)	0,8 (22,8)	-1,19 (-2,3)	0,13	-0,11%	-0,18%	-0,85	-0,58	-0,03	0 (-4,33)	0 (-4,37)	0,85 (69,2)	0,08 (0,94)	0,18	-0,65%	-0,67%	-0,50
19	NORVEGA AZIONARIO ITALIA-A	-1,86	-0,03	0 (-9,45)	0 (-7,12)	0,82 (19,9)	0,07 (0,12)	0,00	-0,31%	-0,44%	-0,87	-0,65	-0,03	0 (-8,41)	0 (-8,35)	0,75 (53,7)	-0,03 (-0,35)	0,12	-0,99%	-1,04%	-0,54
20	BNL AZIONI ITALIA PMI	-1,72	-0,03	-0,01 (-5,26)	-0,01 (-6,03)	0,52 (5,71)	-4,04 (-3)	0,01	-0,09%	-0,73%	-0,85	-0,68	-0,03	-0,01 (-6)	-0,01 (-5,96)	0,71 (27,7)	-0,04 (-0,23)	0,06	-1,09%	-1,29%	-0,55
21	ACOMEA ITALIA-A1	-1,47	-0,03	0 (-3,09)	0 (-2,5)	0,81 (7,03)	-0,41 (-0,24)	0,01	0,29%	-0,39%	-0,82	-0,65	-0,03	0 (-8,43)	0 (-8,54)	0,8 (56,2)	0,16 (1,57)	0,05	-0,97%	-1,02%	-0,54
22	PIONEER AZIONAR CRESCITA-A	-1,71	-0,03	0 (-5,37)	0 (-4,65)	0,81 (15,2)	-0,68 (-0,86)	0,07	-0,08%	-0,26%	-0,85	-0,65	-0,03	0 (-9,23)	0 (-9,2)	0,78 (62,8)	0 (0,04)	0,08	-0,97%	-1,00%	-0,54
23	EURIZON AZIONI PMI ITALIA	-1,70	-0,03	-0,01 (-4,87)	-0,01 (-5,6)	0,51 (5,27)	-4,06 (-2,82)	0,03	-0,07%	-0,79%	-0,84	-0,70	-0,03	-0,01 (-6,85)	-0,01 (-6,77)	0,66 (27,8)	-0,23 (-1,37)	0,07	-1,20%	-1,39%	-0,56
24	ZENIT AZIONARIO-R	-1,86	-0,03	0 (-7,49)	-0,01 (-6,99)	0,7 (12,6)	-1,58 (-1,91)	0,01	-0,32%	-0,55%	-0,86	-0,61	-0,03	0 (-4,59)	0 (-4,51)	0,75 (39,8)	-0,53 (-4,05)	0,10	-0,79%	-0,87%	-0,51
25	FONDERSEL PMI	-1,63	-0,03	0 (-4,12)	-0,01 (-4,76)	0,63 (7,28)	-3,09 (-2,43)	0,04	0,04%	-0,44%	-0,84	-0,62	-0,03	0 (-4,11)	0 (-4)	0,7 (27,2)	-0,56 (-3,09)	0,10	-0,84%	-1,01%	-0,52
26	OPTIMA AZIONARIO ITALIA	-1,81	-0,03	0 (-7,68)	0 (-5,89)	0,82 (17,4)	-0,05 (-0,07)	0,02	-0,24%	-0,40%	-0,86	-0,61	-0,03	0 (-7,76)	0 (-7,72)	0,8 (75)	-0,01 (-0,15)	0,16	-0,81%	-0,83%	-0,52
27	OPTIMA SMALL CAPS ITALIA	-1,37	-0,03	0 (-2,31)	0 (-2,49)	0,7 (5,27)	-2,23 (-1,13)	0,03	0,45%	-0,39%	-0,81	-0,74	-0,04	-0,01 (-7,74)	-0,01 (-7,66)	0,61 (25,6)	-0,35 (-2,11)	0,08	-1,38%	-1,60%	-0,58
28	LEONARDO ITALIAN OPPORTUNITY	-1,88	-0,03	-0,01 (-7,34)	-0,01 (-7,69)	0,57 (8,44)	-3,05 (-3,06)	0,02	-0,35%	-0,75%	-0,87	-0,62	-0,03	0 (-5,99)	0 (-5,94)	0,77 (46)	-0,05 (-0,42)	0,12	-0,86%	-0,93%	-0,53
	FTSE ITALIA-ALL SHARE INDEX	***-1,55***	***-0,02***									***-0,52***	***-0,02***								

GREECE

A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio
1	HSBC GREEK EQUITY FUND	-1,18	-0,03	0 (-6,69)	0 (-6,57)	0,79 (19,2)	-0,2 (-0,36)	-0,07	0,05%	-0,19%	-0,77	-0,76	-0,04	-0,01 (-6,45)	-0,01 (-5,93)	0,6 (23,8)	-0,36 (-1,69)	0,13	-1,79%	-2,17%	-0,60
2	ALPHA ATHENS INDEX DOM EQUIT	-1,00	-0,02	0 (-0,84)	0 (-0,53)	1,02 (47,2)	0,35 (1,16)	-0,07	0,44%	0,41%	-0,71	-0,58	-0,03	0 (-5,03)	0 (-4,79)	0,99 (863)	0 (-0,45)	0,02	-0,94%	-0,94%	-0,52

3	PIRAEUS DOMESTIC EQ DYN COM	-1,03	-0,03	0 (-3,46)	0 (-3,8)	0,76 (12,4)	-1,52 (-1,78)	-0,05	0,37%	-0,02%	-0,72	-0,67	-0,04	-0,01 (-4,05)	0 (-3,45)	0,73 (25,1)	-0,58 (-2,38)	0,06	-1,38%	-1,67%	-0,56
4	KYPROU DOMEST GREEK EQUI FND	-1,15	-0,03	0 (-6,92)	0 (-7,23)	0,85 (28,3)	-0,82 (-1,97)	-0,25	0,13%	0,03%	-0,75	-0,71	-0,04	0 (-7,64)	-0,01 (-8,68)	0,8 (56,9)	0,5 (4,18)	0,12	-1,53%	-1,61%	-0,58
5	ATE DOMESTIC EQUITY M&S	-1,09	-0,03	0 (-4,4)	-0,01 (-4,68)	0,77 (13,1)	-1,31 (-1,61)	-0,12	0,26%	-0,12%	-0,74	-0,72	-0,04	-0,01 (-5,02)	-0,01 (-4,18)	0,61 (22,5)	-0,89 (-3,89)	0,13	-1,61%	-1,97%	-0,58
6	DELOS BLUE CHIPS - GREEK EQ	-1,13	-0,02	0 (-7,19)	0 (-7,83)	0,85 (38,7)	-0,91 (-3)	-0,16	0,16%	0,11%	-0,75	-0,64	-0,03	0 (-5,49)	0 (-4,93)	0,87 (75,6)	-0,2 (-2,01)	0,04	-1,21%	-1,25%	-0,55
7	INT/CAN DYNAMIC DOMEST EQF-€	-1,11	-0,02	0 (-7,65)	0 (-7,89)	0,9 (51,1)	-0,43 (-1,77)	-0,20	0,20%	0,17%	-0,74	-0,67	-0,03	0 (-5,79)	0 (-5,6)	0,84 (58)	-0,01 (-0,12)	0,08	-1,34%	-1,40%	-0,56
8	ERMIS DYNAMIC FUND-GREEK EQ	-1,11	-0,02	0 (-8,64)	0 (-8,84)	0,91 (58,6)	-0,37 (-1,74)	-0,26	0,20%	0,18%	-0,74	-0,68	-0,03	0 (-8,41)	0 (-8,69)	0,82 (72,8)	0,19 (1,97)	0,10	-1,43%	-1,47%	-0,57
9	ATE DOMESTIC EQUITY FUND	-1,29	-0,03	-0,01 (-13,1)	-0,01 (-12,8)	0,81 (34,1)	-0,16 (-0,49)	-0,29	-0,18%	-0,27%	-0,79	-0,70	-0,04	0 (-7,12)	-0,01 (-7,08)	0,78 (49,3)	0,09 (0,69)	0,11	-1,52%	-1,61%	-0,58
10	PIRAEUS DOMESTIC EQUITY FUND	-1,19	-0,03	0 (-10,6)	0 (-10,6)	0,85 (41,6)	-0,38 (-1,33)	-0,24	0,02%	-0,03%	-0,76	-0,59	-0,03	0 (-1,77)	0 (-2,12)	0,98 (66,6)	0,21 (1,72)	-0,01	-0,98%	-1,03%	-0,53
11	ALPHA BLUE CHIPS DOMESTIC EQ	-1,16	-0,03	0 (-7,82)	0 (-7,56)	0,87 (34,9)	0,03 (0,08)	-0,11	0,10%	0,02%	-0,76	-0,64	-0,03	0 (-4,57)	0 (-3,86)	0,84 (66,5)	-0,32 (-3,03)	0,13	-1,21%	-1,25%	-0,55
12	MILLENNIUM BLUE CHIPS DOM EQ	-1,13	-0,02	0 (-7,57)	0 (-7,51)	0,9 (44,1)	-0,2 (-0,72)	-0,23	0,17%	0,12%	-0,75	-0,63	-0,03	0 (-3,76)	0 (-3,99)	0,91 (52)	0,21 (1,43)	0,02	-1,16%	-1,23%	-0,55
13	EUROBANK GRK EQTIES DOM EQ-€	-1,02	-0,02	0 (-2,05)	0 (-1,9)	1,01 (37,2)	0,13 (0,33)	-0,20	0,40%	0,34%	-0,72	-0,60	-0,03	0 (-2,14)	0 (-1,46)	0,92 (59,6)	-0,38 (-2,94)	0,00	-1,04%	-1,09%	-0,53
14	ALLIANZ AGGRESIVE STRATEGY	-1,07	-0,02	0 (-3,69)	0 (-4,11)	0,88 (27,9)	-0,91 (-2,1)	-0,10	0,30%	0,21%	-0,73	-0,68	-0,04	0 (-4,74)	0 (-3,82)	0,71 (34,3)	-0,77 (-4,45)	0,13	-1,42%	-1,58%	-0,56
15	ALPHA AGG STRAT DOMESTIC EQ	-1,04	-0,02	0 (-2,8)	0 (-2,8)	0,91 (25,7)	-0,19 (-0,39)	0,00	0,36%	0,24%	-0,72	-0,60	-0,03	0 (-2,21)	0 (-2,18)	0,89 (60,3)	0,02 (0,13)	0,17	-1,04%	-1,09%	-0,53
16	ATTIKI DOMESTIC EQUITY	-1,31	-0,03	-0,01 (-11,6)	-0,01 (-12,5)	0,7 (23,4)	-1,52 (-3,66)	-0,27	-0,24%	-0,39%	-0,79	-0,73	-0,04	-0,01 (-6,07)	-0,01 (-6,39)	0,73 (30,1)	0,39 (1,92)	0,10	-1,66%	-1,93%	-0,60
17	AAAB DOMESTIC SELECTED EQUIT	-1,12	-0,02	0 (-5,7)	0 (-5,54)	0,91 (33,1)	-0,03 (-0,08)	-0,17	0,19%	0,12%	-0,74	-0,72	-0,04	-0,01 (-7,89)	-0,01 (-7,54)	0,77 (47,7)	-0,08 (-0,62)	0,04	-1,60%	-1,69%	-0,59
18	INT/CAN GROWTH DOM EQTY FD-€	-1,04	-0,03	0 (-3,64)	0 (-4,07)	0,77 (13)	-1,73 (-2,13)	-0,09	0,35%	0,00%	-0,73	-0,69	-0,04	-0,01 (-4,43)	-0,01 (-3,8)	0,71 (24,5)	-0,62 (-2,52)	0,05	-1,46%	-1,77%	-0,57
19	ALLIANZ DOMESTIC EQUITIES	-1,07	-0,02	0 (-4,08)	0 (-4,43)	0,87 (28,4)	-0,79 (-1,86)	-0,09	0,28%	0,19%	-0,73	-0,66	-0,03	0 (-4,56)	0 (-4,02)	0,79 (41,9)	-0,33 (-2,06)	0,09	-1,31%	-1,42%	-0,56
20	MILLENNIUM MID CAP DOMEST EQ	-0,98	-0,03	0 (-2,73)	0 (-3,12)	0,77 (11,4)	-1,76 (-1,89)	-0,04	0,48%	0,05%	-0,71	-0,69	-0,04	-0,01 (-4,69)	0 (-3,9)	0,69 (24,6)	-0,83 (-3,48)	0,04	-1,47%	-1,77%	-0,57

21	ING DOMESTIC EQUITY FUND	-1,17	-0,03	0 (-9,48)	0 (-9,97)	0,84 (39,6)	-0,77 (-2,64)	-0,23	0,07%	0,01%	-0,76	-0,63	-0,03	0 (-4,1)	0 (-3,77)	0,86 (66,3)	-0,11 (-1,02)	0,15	-1,17%	-1,21%	-0,54
22	ALPHA TRUST NEW ENTERPRISES	-1,28	-0,03	-0,01 (-8,62)	-0,01 (-9,49)	0,61 (15,4)	-2,02 (-3,65)	-0,05	-0,16%	-0,47%	-0,79	-0,77	-0,04	-0,01 (-6,89)	-0,01 (-6,59)	0,62 (26,4)	-0,1 (-0,49)	0,14	-1,87%	-2,19%	-0,61
23	DELOS SMALL-CAP GREEK EQUIT	-1,12	-0,03	0 (-5,22)	-0,01 (-5,66)	0,73 (14,5)	-1,57 (-2,26)	-0,08	0,18%	-0,14%	-0,75	-0,71	-0,04	-0,01 (-5,62)	-0,01 (-4,9)	0,71 (29,9)	-0,6 (-3,01)	0,05	-1,57%	-1,79%	-0,58
24	MARFIN OLYMPIA DOMESTIC EQUI	-1,18	-0,03	0 (-7,34)	0 (-7,12)	0,85 (24,8)	-0,02 (-0,05)	-0,16	0,05%	-0,10%	-0,76	-0,63	-0,03	0 (-3,66)	0 (-3,85)	0,86 (50,2)	0,18 (1,24)	0,12	-1,17%	-1,25%	-0,55
25	DELOS TOP-30 GREEK EQUITIES	-1,17	-0,03	0 (-10,4)	0 (-10,4)	0,86 (47,1)	-0,34 (-1,35)	-0,19	0,08%	0,04%	-0,76	-0,59	-0,03	0 (-1,22)	0 (-1,52)	0,96 (58)	0,2 (1,46)	0,08	-0,95%	-1,00%	-0,53
26	INTERNATIONAL DOMESTIC EQTY	-1,25	-0,03	-0,01 (-11,6)	-0,01 (-11,4)	0,83 (33,7)	-0,24 (-0,7)	-0,31	-0,09%	-0,18%	-0,78	-0,74	-0,04	-0,01 (-7)	-0,01 (-6,79)	0,73 (33,3)	-0,01 (-0,05)	0,04	-1,72%	-1,92%	-0,60
27	MARFIN ATHENA DYN DOM EQT	-1,09	-0,03	-0,01 (-4,88)	-0,01 (-4,9)	0,74 (11,6)	-0,6 (-0,68)	-0,05	0,24%	-0,28%	-0,74	-0,67	-0,04	0 (-3,83)	0 (-3,27)	0,69 (23,9)	-0,53 (-2,2)	0,13	-1,35%	-1,67%	-0,56
28	ALPHA TRUST GROWTH DOM FUND	-1,35	-0,03	-0,01 (-11,4)	-0,01 (-11,4)	0,68 (20,4)	-0,58 (-1,26)	-0,07	-0,32%	-0,55%	-0,80	-0,80	-0,04	-0,01 (-8,46)	-0,01 (-8,27)	0,62 (30,6)	0,03 (0,19)	0,15	-2,00%	-2,26%	-0,62
29	ALICO MID & SMALL CAP FUND	-1,04	-0,03	0 (-4)	-0,01 (-4,51)	0,71 (11)	-2,14 (-2,4)	-0,09	0,35%	-0,10%	-0,73	-0,63	-0,03	0 (-2,83)	0 (-1,98)	0,73 (22,9)	-1,04 (-3,83)	0,05	-1,17%	-1,49%	-0,54
30	ALICO GREEK EQUITY FUND	-1,14	-0,03	0 (-8,93)	0 (-9,21)	0,88 (46,8)	-0,52 (-1,99)	-0,28	0,14%	0,10%	-0,75	-0,60	-0,03	0 (-1,86)	0 (-1,64)	0,91 (57,8)	-0,1 (-0,75)	0,09	-1,01%	-1,06%	-0,53
31	CITIFUND EQUITY MUTUAL FUND	-1,07	-0,02	0 (-4,01)	0 (-3,82)	0,95 (34,2)	0,09 (0,24)	-0,15	0,29%	0,21%	-0,73	-0,61	-0,03	0 (-2,23)	0 (-2)	0,89 (52,6)	-0,11 (-0,79)	0,10	-1,04%	-1,11%	-0,53
	ATHENS STOCK EXCHANGE TOTAL RETURN INDEX MAIN	***-1,00***	***-0,02***									***-0,58***	***-0,03***								

SPAIN

A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio
1	BESTINFOND	-1,74	-0,04	-0,01 (-7,53)	-0,01 (-7,31)	0,49 (5,57)	-2,51 (-1,86)	0,01	-0,29%	-1,30%	0,13	-0,64	-0,03	-0,01 (-4,16)	-0,01 (-3,95)	0,54 (14,9)	-0,65 (-2,49)	0,12	-0,89%	-1,47%	0,00
2	ESPIRITO SANTO ESPANA BOLSA	-1,42	-0,02	0 (-3,15)	0 (-1,85)	0,99 (29,9)	0,69 (1,36)	-0,06	0,25%	0,19%	0,11	-0,47	-0,02	0 (1,77)	0 (1,84)	1,01 (60,1)	-0,1 (-0,82)	0,08	-0,14%	-0,17%	-0,05
3	GESCONSULT CRECIMIENTO	-1,48	-0,03	0 (-4,17)	0 (-5,05)	0,71 (12,4)	-2,41 (-2,75)	0,07	0,15%	-0,07%	0,14	-0,69	-0,03	-0,01 (-6,85)	-0,01 (-6,66)	0,63 (28,6)	-0,51 (-3,2)	0,07	-1,09%	-1,27%	-0,05

4	BARCLAYS BOLSA ESPANA SELECC	-1,40	-0,03	0 (-3,03)	0 (-3,88)	0,69 (9,37)	-2,69 (-2,38)	0,08	0,28%	-0,06%	0,14	-0,51	-0,02	0 (-1,31)	0 (-0,76)	0,75 (23)	-1,67 (-7,07)	0,02	-0,32%	-0,53%	-0,06
5	BANKIA BOLSA ESPANOLA	-1,42	-0,02	0 (-3,33)	0 (-3,21)	0,9 (23,6)	-0,47 (-0,81)	0,04	0,24%	0,16%	0,13	-0,48	-0,02	0 (2,09)	0 (1,97)	0,99 (72,1)	0,12 (1,26)	0,23	-0,15%	-0,18%	-0,03
6	SABADELL BS ESPANA BOLSA FI	-1,32	-0,02	0 (1,52)	0 (2,42)	1,08 (39,7)	0,85 (2,05)	-0,03	0,41%	0,38%	0,11	-0,48	-0,02	0 (1,88)	0 (1,94)	0,97 (83,1)	-0,06 (-0,76)	0,23	-0,19%	-0,21%	-0,04
7	ESAF 70	-2,09	-0,04	-0,01 (-22,6)	-0,01 (-18,6)	0,69 (23,4)	0,06 (0,12)	-0,15	-0,86%	-0,97%	0,09	-0,83	-0,04	-0,01 (-13,1)	-0,01 (-13)	0,57 (36,7)	-0,02 (-0,14)	0,09	-1,68%	-1,80%	-0,04
8	GESCONSULT RENTA VARIABLE FI	-1,42	-0,02	0 (-2,93)	0 (-3,76)	0,8 (16,8)	-1,7 (-2,33)	0,09	0,25%	0,13%	0,14	-0,68	-0,03	-0,01 (-6,95)	-0,01 (-6,77)	0,65 (30,7)	-0,39 (-2,51)	0,08	-1,05%	-1,21%	-0,04
9	METAVALOR	-1,31	-0,02	0 (0,39)	0 (-0,73)	0,88 (16,6)	-1,52 (-1,87)	0,16	0,44%	0,31%	0,15	-0,56	-0,03	0 (-3,44)	0 (-3,27)	0,81 (45,9)	-0,22 (-1,68)	0,13	-0,54%	-0,60%	-0,04
10	EDM INVERSION	-1,49	-0,03	0 (-4,21)	0 (-3,92)	0,82 (14)	-0,71 (-0,8)	0,04	0,13%	-0,09%	0,13	-0,63	-0,03	0 (-4,92)	0 (-4,7)	0,67 (26,2)	-0,57 (-3,1)	0,07	-0,83%	-1,04%	-0,05
11	CARTERA VARIABLE FI	-1,42	-0,02	0 (-3,51)	0 (-1,61)	1,02 (28,2)	1,31 (2,35)	-0,08	0,25%	0,18%	0,11	-0,56	-0,03	0 (-4,16)	0 (-3,9)	0,83 (58,4)	-0,49 (-4,76)	0,03	-0,53%	-0,57%	-0,06
12	CREDIT SUISSE BOLSA	-1,34	-0,03	0 (-2,9)	-0,01 (-4,25)	0,62 (6,93)	-4,35 (-3,19)	-0,03	0,38%	-0,06%	0,10	-0,52	-0,02	0 (-1,17)	0 (-0,82)	0,79 (33,6)	-0,68 (-3,99)	0,16	-0,33%	-0,44%	-0,02
13	EUROVALOR BOLSA	-1,29	-0,02	0 (2,07)	0 (2,13)	1,06 (33,6)	0,36 (0,75)	-0,02	0,46%	0,42%	0,11	-0,52	-0,02	0 (-2,3)	0 (-2,23)	0,93 (108)	-0,03 (-0,49)	0,15	-0,36%	-0,38%	-0,05
14	BBVA BOLSA	-1,33	-0,02	0 (1,03)	0 (1,55)	1,05 (42)	0,47 (1,23)	-0,04	0,40%	0,38%	0,11	-0,47	-0,02	0 (3,11)	0 (3,65)	1 (89)	-0,36 (-4,41)	0,11	-0,14%	-0,15%	-0,05
15	BBVA BOLSA PLUS	-1,30	-0,02	0 (2,91)	0 (3,09)	1,05 (43,9)	0,44 (1,21)	0,12	0,45%	0,43%	0,13	-0,48	-0,02	0 (2,12)	0 (2,69)	0,98 (77,5)	-0,44 (-4,85)	0,09	-0,16%	-0,18%	-0,05
16	LIBERBANK RV ESPANA	-1,38	-0,02	0 (-2,41)	0 (-2,45)	0,94 (27,1)	-0,43 (-0,81)	-0,08	0,31%	0,26%	0,11	-0,51	-0,02	0 (-0,23)	0 (0,26)	0,91 (91,7)	-0,37 (-5,12)	0,20	-0,29%	-0,30%	-0,04
17	BK BOLSA ESPANA	-1,37	-0,02	0 (-2,03)	0 (0,21)	1,11 (23,7)	2,45 (3,43)	-0,06	0,32%	0,21%	0,11	-0,56	-0,02	0 (-3,56)	0 (-3,83)	0,89 (58,1)	0,27 (2,46)	0,09	-0,50%	-0,55%	-0,05
18	MARCH VALORES FI	-1,46	-0,03	0 (-3,79)	0 (-3,97)	0,86 (19,4)	-1 (-1,47)	-0,06	0,18%	0,07%	0,11	-0,62	-0,03	0 (-5,76)	0 (-5,55)	0,72 (40,8)	-0,41 (-3,18)	0,10	-0,77%	-0,86%	-0,04
19	FONPENEDES BORSA	-1,35	-0,02	0 (-1)	0 (-1,2)	0,96 (23,9)	-0,41 (-0,67)	-0,04	0,36%	0,29%	0,11	-0,55	-0,03	0 (-2,29)	0 (-1,97)	0,8 (33,8)	-0,69 (-4,01)	0,07	-0,47%	-0,58%	-0,05
20	LLOYDS BOLSA FI	-1,37	-0,02	0 (-0,96)	0 (-1,43)	0,97 (41,6)	-0,4 (-1,13)	-0,05	0,33%	0,31%	0,11	-0,54	-0,02	0 (-2,95)	0 (-2,96)	0,89 (85)	0,02 (0,32)	0,19	-0,42%	-0,44%	-0,04
21	CAMINOS BOLSA OPORTUNIDADES	-1,95	-0,04	-0,01 (-13,2)	-0,01 (-11,4)	0,63 (11,3)	-0,84 (-0,98)	-0,19	-0,63%	-1,05%	0,07	-0,63	-0,03	0 (-6,68)	0 (-6,5)	0,76 (45,4)	-0,49 (-4,1)	0,00	-0,81%	-0,88%	-0,07

22	FON FINECO I	-2,70	-0,06	-0,01 (-19,6)	-0,01 (-15,4)	0,57 (9,71)	1,36 (1,51)	-0,21	-1,89%	-3,01%	0,04	-0,90	-0,04	-0,01 (-10,2)	-0,01 (-10)	0,45 (18,5)	-0,56 (-3,19)	0,07	-2,02%	-2,51%	-0,04
23	AC ACCIONES	-1,34	-0,02	0 (0,84)	0 (1,84)	1,05 (52,8)	0,62 (2,03)	-0,05	0,38%	0,36%	0,11	-0,47	-0,02	0 (3,47)	0 (3,4)	1,02 (105)	0,03 (0,48)	0,20	-0,15%	-0,16%	-0,05
24	BANCA CIVICA ACCIONES	-1,27	-0,02	0 (1,59)	0 (1,63)	1,06 (23,8)	0,38 (0,57)	0,02	0,50%	0,43%	0,12	-0,48	-0,02	0 (2,64)	0 (2,6)	1 (108)	0,01 (0,2)	0,20	-0,18%	-0,19%	-0,04
25	EUROVALOR BOLSA ESPANOLA	-1,32	-0,02	0 (1,02)	0 (0,16)	0,97 (29,6)	-0,61 (-1,22)	0,08	0,42%	0,37%	0,13	-0,53	-0,02	0 (-1,99)	0 (-1,79)	0,9 (88,6)	-0,16 (-2,22)	0,19	-0,37%	-0,39%	-0,04
26	CAJABURGOS BOLSA	-1,35	-0,02	0 (0,5)	0 (1,61)	1,05 (53,2)	0,64 (2,11)	-0,07	0,37%	0,35%	0,11	-0,48	-0,02	0 (3,15)	0 (3,08)	1,01 (107)	0,03 (0,5)	0,20	-0,16%	-0,17%	-0,05
27	CAIXASABADELL 7 RV	-1,44	-0,02	0 (-5,77)	0 (-3,63)	0,99 (53,6)	0,59 (2,1)	-0,12	0,22%	0,20%	0,11	-0,52	-0,02	0 (-1,31)	0 (-1,13)	0,92 (113)	-0,11 (-1,9)	0,22	-0,33%	-0,34%	-0,04
28	BANKIA SMALL & MID CAPS ESP	-1,35	-0,02	0 (-0,86)	0 (-0,55)	1 (34,2)	0,13 (0,28)	-0,07	0,36%	0,32%	0,11	-0,59	-0,03	0 (-4,06)	0 (-3,79)	0,72 (31,9)	-0,89 (-5,5)	0,05	-0,66%	-0,80%	-0,05
29	MIRABAUD FUNDS EQUITIES SPN	-1,47	-0,03	0 (-4,74)	0 (-5,42)	0,71 (11,4)	-2,44 (-2,57)	-0,03	0,17%	-0,09%	0,11	-0,56	-0,03	0 (-2,62)	0 (-2,37)	0,75 (28,9)	-0,55 (-2,94)	0,12	-0,50%	-0,66%	-0,03
30	ESAF RENTA VARIABLE	-1,42	-0,02	0 (-3,19)	0 (-3,24)	0,93 (31,1)	-0,48 (-1,06)	-0,04	0,26%	0,21%	0,11	-0,55	-0,02	0 (-2,93)	0 (-3,4)	0,9 (58,4)	0,44 (3,96)	0,13	-0,47%	-0,51%	-0,04
31	ALLIANZ BOLSA FI	-1,47	-0,03	0 (-4,71)	0 (-3,73)	0,93 (28,2)	0,14 (0,28)	-0,04	0,16%	0,10%	0,11	-0,52	-0,02	0 (-1,76)	0 (-1,91)	0,9 (72,9)	0,14 (1,55)	0,22	-0,37%	-0,39%	-0,03
32	SABADELL BS ESPANA DIVIDENDO	-1,44	-0,03	0 (-2,77)	0 (-2,52)	0,87 (16,8)	-0,33 (-0,42)	0,14	0,22%	0,06%	0,15	-0,55	-0,02	0 (-3,04)	0 (-3,16)	0,88 (53)	0,16 (1,32)	0,12	-0,49%	-0,54%	-0,05
33	BNP PARIBAS BOLSA ESPANOLA	-1,34	-0,02	0 (-0,6)	0 (-0,31)	1,03 (22,8)	0,22 (0,32)	-0,15	0,38%	0,29%	0,09	-0,53	-0,02	0 (-1,77)	0 (-1,33)	0,85 (56,7)	-0,65 (-5,94)	0,10	-0,39%	-0,44%	-0,05
34	FONDO VALENCIA RENTA VARIABL	-1,44	-0,02	0 (-3,85)	0 (-3,86)	0,88 (22,6)	-0, (-1,19)	0,02	0,21%	0,13%	0,12	-0,49	-0,02	0 (0,44)	0 (0,45)	0,93 (59)	-0,02 (-0,17)	0,21	-0,23%	-0,27%	-0,03
35	PBP BOLSA ESPANA FI	-1,36	-0,02	0 (-0,52)	0 (-2,18)	0,95 (41,6)	-1,08 (-3,09)	-0,17	0,34%	0,32%	0,10	-0,49	-0,02	0 (1,28)	0 (1,68)	0,95 (83,5)	-0,31 (-3,76)	0,19	-0,22%	-0,23%	-0,04
36	BANKINTER FUTURO IBEX	-1,29	-0,02	0 (3,45)	0 (3,14)	1,05 (45,7)	0,18 (0,52)	0,07	0,46%	0,44%	0,12	-0,48	-0,02	0 (4,3)	0 (4,32)	0,99 (144)	-0,02 (-0,48)	0,36	-0,17%	-0,18%	-0,04
37	OPENBANK IBEX 35	-1,31	-0,02	0 (2,87)	0 (3,03)	1,05 (50,6)	0,37 (1,16)	0,06	0,43%	0,41%	0,12	-0,48	-0,02	0 (4,41)	0 (4,32)	1 (144)	0,03 (0,63)	0,37	-0,17%	-0,17%	-0,04
38	SANTANDER INDICE ESPANA	-1,30	-0,02	0 (2,92)	0 (2,68)	1,04 (46,2)	0,17 (0,48)	0,08	0,44%	0,42%	0,12	-0,48	-0,02	0 (4,24)	0 (4,19)	1 (145)	0,01 (0,2)	0,34	-0,17%	-0,18%	-0,04
39	FONDESPANA BOLSA	-1,31	-0,02	0 (2,87)	0 (3,18)	1,06 (49)	0,47 (1,43)	0,02	0,44%	0,42%	0,12	-0,48	-0,02	0 (4,18)	0 (4,22)	0,99 (161)	-0,03 (-0,74)	0,35	-0,19%	-0,19%	-0,04

40	MEDIOLANUM ESPANA R.V. FI-S	-1,36	-0,02	0 (-0,68)	0 (0,11)	1,02 (43)	0,43 (1,2)	-0,03	0,35%	0,32%	0,11	-0,50	-0,02	0 (1,66)	0 (1,7)	0,96 (156)	-0,02 (-0,5)	0,34	-0,25%	-0,25%	-0,04
41	PREMIUM BOLSA ESPANA	-3,96	-0,10	-0,02 (-28,7)	-0,02 (-26,9)	0,12 (2,42)	-3,22 (-4,08)	-0,22	-3,97%	-7,07%	0,02	-0,74	-0,04	-0,01 (-6,57)	-0,01 (-6,57)	0,58 (15,3)	0,12 (0,42)	0,00	-1,29%	-2,10%	-0,08
42	BK MIXTO ESPANA 50	-2,98	-0,05	-0,01 (-37,8)	-0,01 (-30,5)	0,56 (19,8)	0,75 (1,73)	-0,21	-2,35%	-2,52%	0,06	-1,11	-0,05	-0,01 (-18,3)	-0,01 (-18,3)	0,44 (29)	0,07 (0,61)	0,08	-2,92%	-3,11%	-0,03
43	CAM BOLSA INDICE FI	-1,30	-0,03	0 (-2,88)	0 (-3,1)	0,73 (6,99)	-2,04 (-1,27)	-0,03	0,45%	-0,14%	0,10	-0,50	-0,02	0 (-0,22)	0 (-0,2)	0,94 (49,6)	-0,02 (-0,16)	0,11	-0,26%	-0,31%	-0,04
	MADRID STOCK EXCHANGE GENERAL INDEX	***-1,37***	***-0,02***									***-0,51***	***-0,02***								

GERMANY

A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Informatio n ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Informatio n ratio	RAP	MRAP	Sortino ratio
1	LBBW EXPORTSTRATEGIE DTSCHLD	-1,23	-0,03	0 (-4,13)	0 (-4,58)	0,76 (12,2)	-1,88 (-1,95)	-0,10	0,18%	-0,13%	-0,77	-0,42	-0,02	0 (0,58)	0 (1,08)	0,85 (18,8)	-2 (-6,39)	0,01	0,19%	-0,04%	-0,40
2	DWS DEUTSCHLAND	-0,99	-0,02	0 (0,52)	0 (-0,85)	0,8 (11,3)	-4,2 (-3,83)	-0,03	0,64%	0,41%	-0,71	-0,43	-0,02	0 (0,53)	0 (0,23)	1,12 (27,7)	1,32 (4,69)	0,04	0,15%	-0,05%	-0,42
3	UBS D EQTY FD-MID CAPS GER	-0,97	-0,02	0 (-1,02)	0 (-2,06)	0,66 (6,33)	-4,92 (-3,06)	-0,01	0,69%	0,11%	-0,70	-0,52	-0,03	0 (-2,02)	0 (-2,09)	0,83 (17,5)	0,36 (1,1)	0,03	-0,20%	-0,66%	-0,47
4	DWS DEUTSCHLAND	-1,01	-0,02	0 (0,13)	0 (-1,35)	0,76 (10,9)	-4,51 (-4,18)	-0,03	0,61%	0,36%	-0,72	-0,41	-0,02	0 (1,44)	0 (1,52)	1,03 (26,2)	-0,33 (-1,22)	0,04	0,22%	0,08%	-0,40
5	LBBW EXPORTSTRATEGIE DTSCHLD	-1,24	-0,03	0 (-4,43)	0 (-4,79)	0,76 (11,9)	-1,74 (-1,78)	-0,09	0,15%	-0,18%	-0,78	-0,42	-0,02	0 (0,54)	0 (1,03)	0,85 (19,4)	-1,95 (-6,46)	0,01	0,17%	-0,06%	-0,40
6	UBS D EQTY FD-MID CAPS GER	-1,05	-0,03	0 (-1,47)	0 (-2,88)	0,62 (7,17)	-5,43 (-4,11)	-0,02	0,54%	0,07%	-0,72	-0,47	-0,02	0 (-0,04)	0 (-0,01)	0,94 (27,9)	-0,1 (-0,45)	0,06	0,00%	-0,16%	-0,44
7	DWS SELECT-INVEST	-0,94	-0,02	0 (-0,28)	0 (-1,52)	0,69 (6,97)	-5,4 (-3,54)	-0,02	0,74%	0,29%	-0,69	-0,46	-0,02	0 (-0,82)	0 (-1,04)	1,09 (21,3)	1,05 (2,97)	-0,05	0,02%	-0,30%	-0,44
8	DWS INVESTA	-1,04	-0,02	0 (-0,57)	0 (-1,52)	0,83 (11,6)	-3,07 (-2,78)	-0,07	0,54%	0,28%	-0,73	-0,46	-0,02	0 (-0,08)	0 (0,06)	0,97 (26,4)	-0,5 (-1,97)	-0,03	0,01%	-0,14%	-0,43
9	MEAG PROINVEST	-1,20	-0,03	0 (-3,85)	0 (-4,65)	0,72 (10,9)	-2,83 (-2,8)	-0,10	0,23%	-0,10%	-0,77	-0,53	-0,03	0 (-2,38)	0 (-2,52)	0,89 (21,7)	0,54 (1,88)	-0,02	-0,28%	-0,61%	-0,48
10	MEAG PROINVEST	-1,21	-0,03	0 (-3,98)	0 (-4,76)	0,73 (11,6)	-2,67 (-2,77)	-0,11	0,21%	-0,09%	-0,77	-0,55	-0,03	0 (-2,91)	0 (-2,99)	0,83 (18,6)	0,37 (1,21)	-0,02	-0,36%	-0,80%	-0,49

11	DWS SELECT-INVEST	-0,97	-0,02	0 (-0,25)	0 (-1,67)	0,69 (7,82)	-5,45 (-4,02)	-0,02	0,68%	0,30%	-0,70	-0,43	-0,02	0 (0,61)	0 (0,7)	1,07 (24,4)	-0,4 (-1,3)	-0,06	0,14%	-0,03%	-0,42
12	DEKAFONDS-CF	-1,10	-0,02	0 (-1,82)	0 (-2,32)	0,84 (12,3)	-1,81 (-1,71)	-0,06	0,43%	0,14%	-0,74	-0,45	-0,02	0 (0,56)	0 (0,81)	0,99 (27,8)	-0,85 (-3,44)	-0,05	0,08%	-0,06%	-0,43
13	DWS INVESTA	-1,00	-0,02	0 (0,22)	0 (-0,33)	0,94 (12,2)	-1,82 (-1,52)	-0,07	0,63%	0,37%	-0,71	-0,48	-0,02	0 (-0,9)	0 (-1,19)	1,06 (25,3)	1,11 (3,82)	-0,02	-0,05%	-0,29%	-0,45
14	AXA DEUTSCHLAND	-1,17	-0,03	0 (-3,05)	0 (-4,01)	0,74 (12,2)	-2,9 (-3,11)	-0,06	0,29%	0,02%	-0,76	-0,50	-0,02	0 (-1,07)	0 (-0,88)	0,9 (28,8)	-0,64 (-2,95)	-0,03	-0,12%	-0,27%	-0,46
15	ALLIANZ VERMOEGENSBILD DEU-A	-1,07	-0,02	0 (-1,01)	0 (-1,89)	0,8 (11,4)	-2,83 (-2,63)	-0,01	0,50%	0,22%	-0,73	-0,49	-0,02	0 (-0,74)	0 (-0,51)	0,89 (27,7)	-0,82 (-3,66)	-0,02	-0,09%	-0,23%	-0,45
16	UNIFONDS	-1,06	-0,02	0 (-1,38)	0 (-1,41)	0,93 (11,9)	-0,41 (-0,34)	-0,05	0,51%	0,17%	-0,73	-0,52	-0,02	0 (-2,04)	0 (-2,42)	1 (28,3)	1,07 (4,35)	-0,04	-0,23%	-0,46%	-0,48
17	SEB AKTIENFONDS	-1,24	-0,03	-0,01 (-5,01)	-0,01 (-5,38)	0,63 (7,62)	-2,38 (-1,87)	-0,07	0,16%	-0,51%	-0,78	-0,47	-0,02	0 (0,64)	0 (0,66)	1,04 (46,4)	-0,05 (-0,34)	-0,04	-0,02%	-0,08%	-0,44
18	MORGEN DEUTSCH AKT UNIVERS-F	-1,17	-0,03	0 (-3,2)	0 (-4,29)	0,7 (10,4)	-3,59 (-3,45)	-0,10	0,29%	-0,04%	-0,76	-0,60	-0,03	0 (-4,04)	0 (-4,09)	0,81 (26)	0,21 (0,98)	-0,02	-0,53%	-0,77%	-0,51
19	DWS GERMAN EQUITIES TYP O	-1,09	-0,02	0 (-1,45)	0 (-2,47)	0,77 (11,7)	-3,14 (-3,09)	-0,03	0,45%	0,19%	-0,74	-0,45	-0,02	0 (0,46)	0 (0,54)	1,01 (28,5)	-0,29 (-1,17)	-0,02	0,06%	-0,07%	-0,43
20	FONDAK-A	-1,10	-0,02	0 (-1,28)	0 (-2,31)	0,78 (12,3)	-3 (-3,07)	-0,01	0,44%	0,19%	-0,74	-0,49	-0,02	0 (-1,01)	0 (-0,73)	0,86 (24,6)	-1,14 (-4,66)	-0,04	-0,11%	-0,29%	-0,45
21	ALLIANZ VERMOEGENSBILD DEU-A	-1,06	-0,02	0 (-0,87)	0 (-1,78)	0,8 (11,4)	-2,9 (-2,68)	-0,01	0,51%	0,23%	-0,73	-0,48	-0,02	0 (-0,76)	0 (-0,56)	0,88 (23,1)	-0,83 (-3,13)	-0,02	-0,06%	-0,26%	-0,45
22	CONCENTRA-A	-1,15	-0,03	0 (-2,61)	0 (-3,21)	0,81 (12,8)	-2,05 (-2,11)	-0,08	0,33%	0,07%	-0,76	-0,47	-0,02	0 (-0,02)	0 (0,12)	0,94 (30,8)	-0,45 (-2,12)	0,02	-0,02%	-0,14%	-0,44
23	AL TRUST AKTIEN DEUTSCHLAND	-1,22	-0,03	0 (-4,16)	0 (-4,54)	0,77 (12,5)	-1,67 (-1,77)	-0,07	0,19%	-0,12%	-0,77	-0,53	-0,02	0 (-2,27)	0 (-2,49)	0,94 (25,3)	0,7 (2,73)	-0,03	-0,27%	-0,52%	-0,48
24	FONDAK-A	-1,09	-0,02	0 (-1,13)	0 (-2,11)	0,79 (12,3)	-2,92 (-2,94)	-0,01	0,46%	0,21%	-0,74	-0,49	-0,02	0 (-0,65)	0 (-0,38)	0,91 (29,6)	-0,92 (-4,33)	-0,05	-0,09%	-0,22%	-0,45
25	BBV-INVEST-UNION	-1,38	-0,03	-0,01 (-7,03)	-0,01 (-7,11)	0,62 (8,27)	-1,68 (-1,46)	-0,10	-0,13%	-0,84%	-0,81	-0,63	-0,03	-0,01 (-4,74)	-0,01 (-5,12)	0,8 (23,7)	0,85 (3,63)	-0,01	-0,67%	-1,05%	-0,54
26	UNIFONDS -NET-	-1,09	-0,02	0 (-1,55)	0 (-1,38)	0,96 (13,7)	0,18 (0,17)	-0,06	0,46%	0,17%	-0,74	-0,55	-0,03	0 (-2,86)	0 (-3,29)	0,95 (29,3)	1,01 (4,49)	-0,03	-0,36%	-0,58%	-0,50
27	CONCENTRA-A	-1,15	-0,03	0 (-2,72)	0 (-3,28)	0,8 (12,6)	-1,99 (-2,03)	-0,08	0,33%	0,05%	-0,76	-0,48	-0,02	0 (-0,65)	0 (-0,43)	0,86 (22,5)	-0,89 (-3,35)	0,01	-0,04%	-0,25%	-0,44
28	MONEGA GERMANY	-1,16	-0,03	0 (-2,89)	0 (-3,39)	0,79 (12,4)	-1,85 (-1,89)	-0,04	0,31%	0,03%	-0,76	-0,47	-0,02	0 (0)	0 (0,02)	1,02 (36,5)	-0,06 (-0,31)	-0,04	-0,03%	-0,12%	-0,45

29	BBV-INVEST-UNION	-1,54	-0,03	-0,01 (-10,3)	-0,01 (-9,34)	0,76 (15,6)	0,58 (0,77)	-0,14	-0,43%	-0,76%	-0,83	-0,63	-0,03	0 (-6,32)	0 (-6,24)	0,77 (37,2)	-0,13 (-0,91)	-0,02	-0,67%	-0,79%	-0,53
30	LBBW AKTIEN DEUTSCHLAND	-1,21	-0,03	0 (-3,7)	0 (-3,83)	0,83 (13,7)	-1 (-1,06)	-0,10	0,22%	-0,06%	-0,77	-0,53	-0,02	0 (-2,05)	0 (-2,23)	0,95 (25,9)	0,59 (2,32)	-0,03	-0,24%	-0,47%	-0,48
31	PIONEER GERMAN EQUITY-A ND	-1,24	-0,03	0 (-4,41)	0 (-5,38)	0,71 (12,6)	-2,86 (-3,27)	-0,11	0,15%	-0,11%	-0,78	-0,45	-0,02	0 (-0,01)	0 (-0,44)	1,1 (30)	1,57 (6,16)	0,05	0,07%	-0,13%	-0,45
32	DWS AKTIEN STRAT DEUTSCHLAND	-0,98	-0,02	0 (-0,11)	0 (-1,53)	0,69 (8,36)	-5,08 (-4,01)	0,03	0,66%	0,31%	-0,70	-0,43	-0,02	0 (0,93)	0 (1,2)	0,97 (24,9)	-0,94 (-3,46)	0,00	0,15%	0,00%	-0,41
33	AXA DEUTSCHLAND	-1,17	-0,03	0 (-3,14)	0 (-3,99)	0,73 (11,4)	-2,8 (-2,83)	-0,06	0,29%	-0,01%	-0,76	-0,50	-0,02	0 (-1,4)	0 (-1,21)	0,86 (23,9)	-0,74 (-2,95)	-0,02	-0,15%	-0,34%	-0,46
34	UNIFONDS -NET-	-1,11	-0,02	0 (-0,45)	0 (-0,64)	0,99 (25,3)	-0,38 (-0,63)	-0,09	0,41%	0,32%	-0,75	-0,51	-0,02	0 (-1,71)	0 (-2,05)	1,02 (92,1)	0,32 (4,11)	-0,09	-0,18%	-0,20%	-0,47
35	PIONEER AKTIEN DEUTSCHLAND-A	-1,15	-0,03	0 (-2,53)	0 (-3,24)	0,8 (13,9)	-2,12 (-2,4)	-0,04	0,33%	0,10%	-0,76	-0,48	-0,02	0 (-0,76)	0 (-1,24)	1,09 (33)	1,37 (6)	-0,01	-0,06%	-0,24%	-0,46
36	DWS GERMAN EQUITIES TYP O	-1,05	-0,02	0 (-0,54)	0 (-0,81)	0,94 (13,8)	-0,9 (-0,85)	-0,04	0,53%	0,29%	-0,73	-0,47	-0,02	0 (-0,92)	0 (-1,17)	1,04 (22,3)	1,07 (3,33)	-0,01	-0,02%	-0,32%	-0,45
37	DEKAFONDS-CF	-1,11	-0,02	0 (-1,97)	0 (-2,37)	0,84 (12,1)	-1,59 (-1,47)	-0,05	0,42%	0,12%	-0,74	-0,46	-0,02	0 (-0,14)	0 (0,2)	0,91 (24,1)	-1,29 (-4,93)	-0,04	0,02%	-0,15%	-0,43
	DEUTSCHE BORSE AG COMPOSITE DAX CDAX INDEX	***-1,15***	***-0,02***									***-0,50***	***-0,02***								

NETHERLANDS

A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Informatio n ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Informatio n ratio	RAP	MRAP	Sortino ratio
1	DELTA LLOYD DEELNEMINGEN FON	-1,15	-0,04	-0,01 (-3,44)	-0,01 (-4,26)	0,38 (2,92)	-5,18 (-2,55)	0,09	0,54%	-0,94%	-0,70	-0,62	-0,03	-0,01 (-3,87)	-0,01 (-3,86)	0,69 (14,1)	0,03 (0,09)	0,00	-0,61%	-1,36%	-0,46
2	KEMPEN ORANGE FUND NV	-1,01	-0,03	0 (-0,92)	0 (-2,21)	0,5 (3,81)	-6,27 (-3,04)	0,09	0,79%	-0,10%	-0,35	-0,61	-0,03	-0,01 (-3,59)	-0,01 (-3,59)	0,69 (13,9)	0,24 (0,8)	0,03	-0,57%	-1,38%	-0,28
3	DELTA LLOYD NEDERLAND FND NV	-0,92	-0,04	-0,01 (-3,41)	-0,01 (-3,63)	0,39 (2,01)	-3,93 (-1,29)	0,00	0,96%	-1,43%	-0,44	-0,58	-0,03	0 (-3)	0 (-3)	0,8 (17,8)	0,25 (0,92)	0,00	-0,45%	-0,93%	-0,56
4	KEMPEN EUROPEAN HIGH DIVIDEN	-1,23	-0,03	0 (-2,71)	0 (-2,22)	0,9 (8,52)	0,71 (0,43)	-0,05	0,38%	-0,31%	-0,49	-0,72	-0,04	-0,01 (-5,73)	-0,01 (-5,73)	0,67 (17,5)	0,28 (1,22)	-0,01	-1,04%	-1,67%	-0,60

5	ING DUTCH FUND	-1,25	-0,03	0 (-1,67)	0 (-0,49)	1,09 (14,1)	2,69 (2,24)	-0,03	0,36%	0,02%	-0,52	-0,58	-0,03	-0,01 (-3,08)	-0,01 (-3,09)	0,85 (17,8)	0,6 (2,08)	-0,03	-0,45%	-0,98%	-0,55
6	ALLIANZ HOLLAND FUND	-1,22	-0,03	0 (-1,72)	0 (-0,4)	1,13 (12,2)	3,64 (2,55)	-0,02	0,42%	-0,06%	-0,56	-0,55	-0,03	0 (-2,5)	0 (-2,5)	0,86 (17,1)	0,38 (1,24)	-0,02	-0,34%	-0,84%	-0,45
7	ROBECO HOLLANDS BEZIT	-1,32	-0,03	0 (-2,71)	0 (-2,17)	0,93 (13)	0,59 (0,53)	-0,01	0,23%	-0,09%	-0,60	-0,58	-0,03	-0,01 (-3,21)	-0,01 (-3,23)	0,81 (16,9)	0,61 (2,1)	0,00	-0,48%	-1,08%	-0,55
8	SNS NEDERLANDS AANDELENFONDS	-1,20	-0,03	0 (-1,64)	0 (-1,31)	0,95 (10,3)	0,47 (0,32)	-0,03	0,44%	-0,01%	-0,46	-0,55	-0,03	0 (-2,59)	0 (-2,59)	0,86 (17,4)	0,43 (1,45)	-0,02	-0,35%	-0,86%	-0,52
9	BNP PARIBAS AEX INDEX FUND	-1,30	-0,03	0 (-2,21)	0 (-1,45)	0,99 (14,7)	1,2 (1,14)	-0,03	0,26%	-0,02%	-0,50	-0,57	-0,03	0 (-2,89)	0 (-2,9)	0,84 (17,6)	0,57 (1,98)	-0,01	-0,42%	-0,96%	-0,55
10	BNP PARIBAS NETHERLANDS FUND	-1,23	-0,02	0 (-0,52)	0 (-0,29)	1,01 (14,5)	0,43 (0,4)	-0,01	0,40%	0,15%	-0,56	-0,60	-0,03	-0,01 (-3,48)	-0,01 (-3,47)	0,79 (16,6)	0,29 (1,03)	-0,03	-0,54%	-1,12%	-0,50
11	TRIODOS GROENFONDS	-5,82	0,91	-0,03 (-35,3)	-0,03 (-32,1)	-0,02 (-0,36)	-0,98 (-1,21)	-0,13	-7,87%	93,87%	-1,33	-4,32	0,76	-0,02 (-24,4)	-0,02 (-24,4)	0,05 (2,36)	-0,04 (-0,31)	0,05	-15,82%	77,27%	-1,01
	EURONEXT AMSTERDAM ALL SHARE INDEX	***-1,32***	***-0,02***									***-0,52***	***-0,02***								

NORWAY

A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio
1	DNB SMB	-0,71	-0,02	0 (-1,4)	0 (-1,67)	0,76 (12,8)	-1,17 (-1,73)	0,10	0,67%	0,35%	-0,16	-0,44	-0,02	0 (-2,16)	0 (-2,13)	0,88 (25,2)	0,01 (0,03)	-0,04	-0,28%	-0,50%	-0,37
2	NORDEA SMB	-0,82	-0,03	0 (-3,76)	0 (-3,89)	0,71 (12,4)	-0,73 (-1,13)	0,04	0,37%	-0,05%	0,07	-0,48	-0,03	0 (-3,32)	0 (-3,16)	0,83 (25,6)	-0,12 (-0,58)	-0,07	-0,46%	-0,69%	-0,40
3	TERRA SMB	-0,97	-0,03	-0,01 (-7,01)	-0,01 (-7)	0,69 (13,3)	-0,34 (-0,58)	-0,11	-0,04%	-0,50%	0,12	-0,45	-0,02	0 (-2,53)	0 (-2,37)	0,82 (28,3)	-0,14 (-0,74)	0,01	-0,35%	-0,52%	-0,58
4	OMEGA INVESTMENT FUND	-0,85	-0,03	0 (-4,74)	0 (-4,98)	0,78 (17,7)	-0,86 (-1,72)	-0,09	0,29%	0,07%	-0,15	-0,37	-0,02	0 (1,18)	0 (0,67)	1,1 (53,5)	0,4 (3)	-0,01	0,06%	0,01%	-0,57
5	FONDSFINANS SPAR	-0,82	-0,02	0 (-3,74)	0 (-3,97)	0,8 (19,9)	-0,75 (-1,65)	0,01	0,39%	0,22%	-0,14	-0,35	-0,02	0 (2,21)	0 (1,71)	1,11 (48,8)	0,44 (2,98)	0,07	0,18%	0,12%	-0,49
6	HANDELSBANKEN NORGEFOND-NOK	-0,75	-0,02	0 (-1,4)	0 (-2,01)	0,86 (25,9)	-1,38 (-3,66)	-0,02	0,58%	0,49%	-0,18	-0,38	-0,02	0 (0,24)	0 (-0,09)	1,09 (41,6)	0,33 (1,91)	-0,06	0,01%	-0,07%	-0,48

7	WARRENWICKLUND NORGE	-0,87	-0,03	0 (-5)	0 (-4,93)	0,76 (16,1)	-0,03 (-0,06)	0,02	0,24%	-0,07%	0,08	-0,40	-0,02	0 (-0,65)	0 (-0,83)	1,02 (47,5)	0,15 (1,09)	-0,05	-0,10%	-0,16%	-0,55
8	NB-AKSJEFOND	-0,93	-0,03	0 (-7,76)	-0,01 (-8,05)	0,76 (23,7)	-0,74 (-2,05)	-0,12	0,09%	-0,05%	0,11	-0,41	-0,02	0 (-1,15)	0 (-1,22)	1 (44,5)	0,08 (0,51)	-0,07	-0,14%	-0,21%	-0,54
9	TERRA NORGE	-0,86	-0,02	0 (-5,59)	0 (-5,98)	0,81 (25,8)	-0,86 (-2,42)	-0,10	0,26%	0,15%	-0,14	-0,37	-0,02	0 (1,37)	0 (1,23)	1,06 (52)	0,1 (0,73)	0,01	0,07%	0,03%	-0,61
10	HOLBERG NORGE	-0,90	-0,03	0 (-5,35)	-0,01 (-5,38)	0,71 (15,2)	-0,38 (-0,71)	0,03	0,17%	-0,16%	-0,21	-0,46	-0,02	0 (-3,03)	0 (-3,65)	0,93 (41,6)	0,5 (3,43)	-0,03	-0,35%	-0,45%	-0,52
11	PARETO AKSJE NORGE	-0,82	-0,02	0 (-3,68)	0 (-3,75)	0,81 (19,6)	-0,35 (-0,74)	0,02	0,37%	0,18%	0,29	-0,45	-0,02	0 (-2,35)	0 (-2,17)	0,84 (31,9)	-0,13 (-0,79)	0,02	-0,31%	-0,44%	-0,47
12	KLP AKSJENORGE	-0,85	-0,02	0 (-4,79)	0 (-4,91)	0,82 (24,4)	-0,42 (-1,1)	-0,01	0,31%	0,18%	-0,02	-0,37	-0,02	0 (1,27)	0 (0,67)	1,09 (57,3)	0,45 (3,6)	0,01	0,05%	0,01%	-0,21
13	WARRENWICKLUND NORDEN	-1,26	-0,05	-0,01 (-11,7)	-0,01 (-11,8)	0,46 (9,02)	-0,62 (-1,09)	-0,09	-0,80%	-1,92%	-0,62	-0,45	-0,02	0 (-2,7)	0 (-2,45)	0,82 (30,2)	-0,21 (-1,21)	0,01	-0,34%	-0,50%	-0,79
14	ALFRED BERG AKTIV	-0,76	-0,02	0 (-2,2)	0 (-2,33)	0,9 (19,5)	-0,52 (-1)	-0,07	0,54%	0,36%	-0,06	-0,40	-0,02	0 (-0,46)	0 (-0,91)	1,04 (50)	0,36 (2,64)	-0,04	-0,08%	-0,14%	-0,43
15	DANSKE INVEST-NORGE II	-0,86	-0,02	0 (-5,77)	0 (-5,95)	0,83 (28,8)	-0,48 (-1,48)	-0,07	0,28%	0,18%	-0,19	-0,38	-0,02	0 (0,81)	0 (0,73)	1 (47,9)	0,05 (0,37)	0,07	0,03%	-0,02%	-0,52
16	DANSKE INVEST-NORGE I	-0,87	-0,02	0 (-6,04)	0 (-6,21)	0,83 (28,6)	-0,47 (-1,45)	-0,09	0,26%	0,16%	-0,19	-0,38	-0,02	0 (0,6)	0 (0,52)	1 (47,8)	0,05 (0,37)	0,05	0,01%	-0,04%	-0,52
17	STOREBRAND NORGE FUND	-1,27	-0,05	-0,01 (-11,1)	-0,01 (-10,9)	0,74 (14,3)	3,59 (6,07)	-0,10	-0,85%	-2,30%	-0,93	-0,42	-0,03	0 (-1,85)	0 (-1,68)	0,74 (17,3)	-0,23 (-0,81)	0,05	-0,18%	-0,59%	-0,31
18	DANSKE INV NORSK AKSJ INST I	-0,84	-0,02	0 (-5,04)	0 (-5,12)	0,85 (30,4)	-0,29 (-0,9)	-0,03	0,33%	0,25%	-0,23	-0,38	-0,02	0 (0,96)	0 (0,95)	1 (53,6)	0 (-0,02)	0,06	0,03%	-0,02%	-0,54
19	NORDEA VEKST	-0,81	-0,02	0 (-3,47)	0 (-3,85)	0,85 (21,2)	-1,08 (-2,4)	-0,13	0,41%	0,26%	-0,21	-0,39	-0,02	0 (0,84)	0 (0,35)	1,07 (67,4)	0,29 (2,83)	-0,02	-0,01%	-0,04%	-0,51
20	NORDEA KAPITAL	-0,84	-0,02	0 (-5,01)	0 (-5,25)	0,84 (29,2)	-0,57 (-1,75)	-0,07	0,33%	0,24%	-0,23	-0,38	-0,02	0 (1,67)	0 (1,1)	1,08 (72,6)	0,33 (3,39)	0,02	0,04%	0,01%	-0,54
21	ALFRED BERG NORGE ETISK	-0,84	-0,02	0 (-5)	0 (-5,16)	0,85 (26,8)	-0,49 (-1,35)	-0,10	0,32%	0,22%	-0,16	-0,37	-0,02	0 (1,32)	0 (0,94)	1,09 (58,4)	0,27 (2,18)	-0,03	0,05%	0,01%	-0,46
22	NORDEA AVKASTNING	-0,84	-0,02	0 (-5,02)	0 (-5,29)	0,85 (29,2)	-0,62 (-1,89)	-0,09	0,33%	0,24%	-0,20	-0,38	-0,02	0 (1,39)	0 (0,88)	1,08 (73,6)	0,29 (3,01)	-0,01	0,02%	-0,01%	-0,54
23	ALFRED BERG NORGE	-0,78	-0,02	0 (-2,74)	0 (-3,02)	0,89 (31,8)	-0,58 (-1,83)	-0,01	0,48%	0,41%	-0,16	-0,40	-0,02	0 (0,1)	0 (-0,37)	1,04 (58,7)	0,31 (2,7)	-0,01	-0,05%	-0,09%	-0,46
24	AKSJEFOND PLUSS MARKEDSVERDI	-0,89	-0,03	0 (-6,39)	0 (-6,55)	0,79 (23,3)	-0,55 (-1,42)	-0,10	0,18%	0,04%	-0,20	-0,38	-0,02	0 (0,91)	0 (0,6)	1,01 (60,1)	0,19 (1,74)	0,08	0,01%	-0,03%	-0,52

25	DANSKE INVEST-NORGE VEKST	-0,93	-0,03	-0,01 (-5,97)	-0,01 (-6,17)	0,68 (13,8)	-0,89 (-1,59)	-0,04	0,09%	-0,29%	-0,04	-0,44	-0,02	0 (-2,01)	0 (-2,31)	0,92 (41,6)	0,27 (1,85)	0,02	-0,25%	-0,34%	-0,44
26	PLUSS AKSJE FUND	-0,90	-0,03	0 (-6,42)	0 (-6,53)	0,79 (21,2)	-0,51 (-1,2)	-0,12	0,15%	-0,02%	-0,39	-0,39	-0,02	0 (0,2)	0 (0,02)	0,96 (57,5)	0,11 (1,04)	0,11	-0,04%	-0,08%	-0,60
27	CARNEGIE AKSJE NORGE	-0,72	-0,02	0 (0,17)	0 (-0,52)	0,9 (29,3)	-1,49 (-4,29)	-0,01	0,66%	0,59%	-0,22	-0,37	-0,02	0 (1,69)	0 (1,02)	1,12 (61,9)	0,48 (4,08)	-0,02	0,08%	0,04%	-0,55
28	STOREBRAND AKSJE INNLAND	-0,78	-0,02	0 (-2,39)	0 (-2,76)	0,89 (26,2)	-0,88 (-2,29)	-0,09	0,50%	0,41%	-0,16	-0,38	-0,02	0 (1,18)	0 (1,14)	1,06 (64,7)	0,01 (0,12)	-0,03	0,02%	-0,01%	-0,46
29	STOREBRAND VERDI FUND	-0,71	-0,02	0 (0,52)	0 (0,29)	0,97 (33,5)	-0,45 (-1,37)	0,03	0,67%	0,61%	-0,10	-0,37	-0,02	0 (1,42)	0 (1,36)	1,06 (58,2)	0,02 (0,21)	-0,01	0,06%	0,02%	-0,45
30	DNB NORGE SELEKTIV III	-0,77	-0,02	0 (-2,04)	0 (-2,25)	0,91 (28,8)	-0,5 (-1,39)	-0,02	0,52%	0,44%	-0,13	-0,37	-0,02	0 (3,96)	0 (3,3)	1,08 (107)	0,3 (4,56)	0,11	0,10%	0,08%	-0,57
31	DNB NORGE SELEKTIV II	-0,78	-0,02	0 (-2,47)	0 (-2,77)	0,91 (37,6)	-0,53 (-1,94)	-0,02	0,50%	0,45%	-0,13	-0,37	-0,02	0 (3,68)	0 (3,02)	1,08 (107)	0,3 (4,5)	0,11	0,08%	0,07%	-0,57
32	DNB NORGE IV	-0,77	-0,02	0 (-2,32)	0 (-2,62)	0,93 (44,4)	-0,47 (-1,96)	-0,06	0,51%	0,48%	-0,14	-0,37	-0,02	0 (3,83)	0 (3,16)	1,07 (134)	0,24 (4,66)	0,09	0,05%	0,05%	-0,54
33	DNB NORGE III	-0,77	-0,02	0 (-2,47)	0 (-2,77)	0,93 (43,8)	-0,47 (-1,97)	-0,07	0,51%	0,47%	-0,14	-0,38	-0,02	0 (3,57)	0 (2,9)	1,07 (134)	0,24 (4,62)	0,08	0,04%	0,04%	-0,54
34	DNB NORGE SELEKTIV I	-0,77	-0,02	0 (-2,17)	0 (-2,39)	0,92 (33,3)	-0,47 (-1,51)	-0,04	0,52%	0,45%	-0,14	-0,37	-0,02	0 (3,38)	0 (2,72)	1,08 (107)	0,28 (4,34)	0,07	0,07%	0,06%	-0,57
35	DNB NORGE	-0,78	-0,02	0 (-2,81)	0 (-3,12)	0,93 (44,3)	-0,48 (-2,03)	-0,10	0,49%	0,46%	-0,14	-0,38	-0,02	0 (3,17)	0 (2,48)	1,07 (134)	0,24 (4,64)	0,05	0,03%	0,02%	-0,54
36	NORDEA NORGE VERDI	-1,12	-0,03	-0,01 (-11,2)	-0,01 (-10,9)	0,7 (19,9)	0,83 (2,08)	-0,05	-0,43%	-0,74%	-0,23	-0,46	-0,02	0 (-3,07)	0 (-3,05)	0,83 (35,7)	0,03 (0,19)	0,02	-0,40%	-0,52%	-0,71
37	AKSJEFOND PLUSS INDEKS FUND	-0,80	-0,02	0 (-3,37)	0 (-3,59)	0,89 (28,7)	-0,56 (-1,6)	-0,08	0,44%	0,35%	-0,15	-0,37	-0,02	0 (3,03)	0 (2,78)	1,06 (91,7)	0,09 (1,24)	0,06	0,07%	0,06%	-0,52
38	CARNEGIE NORGE INDEKS	-0,76	-0,02	0 (-1,39)	0 (-1,93)	0,94 (44,1)	-0,79 (-3,25)	-0,13	0,56%	0,52%	-0,14	-0,36	-0,02	0 (4,72)	0 (4,21)	1,1 (118)	0,19 (3,17)	0,04	0,10%	0,10%	-0,54
	OSLO STOCK EXCHANGE ALL SHARE INDEX	***-0,75***	***-0,02***									***-0,40***	***-0,02***								

SWITZERLAND

A/A	MUTUAL FUND/INDEX	MEASURES PRIOR CRISIS										MEASURES AFTER CRISIS									
		Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio	Sharpe ratio	Treynor ratio	Jensen's alpha (t stat)	Treynor& Mazuy a (t stat)	Treynor& Mazuy b (t stat)	Treynor& Mazuy c (t stat)	Information ratio	RAP	MRAP	Sortino ratio

1	ASSELSA SMALL & MID CAPS SW	-1,21	-0,03	0 (-2)	-0,01 (-3,57)	0,34 (2,2)	-8,83 (-3,46)	0,02	0,86%	-0,41%	-0,37	-0,61	-0,03	0 (-2,8)	0 (-2,89)	0,81 (13,3)	-0,42 (-1,03)	-0,09	-0,05%	-0,62%	-0,84
2	DWS (CH)-HELVETIA AKTIEN	-1,55	-0,03	0 (-2,65)	0 (-3,49)	0,69 (7,65)	-3,46 (-2,31)	-0,02	0,37%	-0,17%	-0,66	-0,59	-0,03	0 (-2,54)	0 (-2,51)	0,79 (13,5)	0,05 (0,14)	-0,01	0,00%	-0,60%	-0,62
3	UBS (CH) EQUITY-MID CAPS SWI	-1,28	-0,02	0 (0,45)	0 (-1,22)	0,7 (6,75)	-5,26 (-3,05)	0,09	0,77%	0,32%	-0,72	-0,61	-0,02	0 (-2,22)	0 (-2,14)	0,89 (19,2)	0,21 (0,68)	-0,02	-0,05%	-0,38%	-0,80
4	RAIFFSN FUTURA SWISS STOCK	-1,26	-0,02	0 (0,66)	0 (-0,75)	0,75 (7,28)	-4,26 (-2,5)	0,13	0,78%	0,35%	-0,61	-0,60	-0,02	0 (-1,52)	0 (-1,54)	0,95 (28,3)	-0,07 (-0,3)	-0,05	-0,01%	-0,15%	-0,83
5	SARAPRO INST SWISS EQUITIES	-1,57	-0,02	0 (1,81)	0 (1,09)	1,02 (39,3)	-0,37 (-0,85)	-0,16	0,34%	0,30%	-0,96	-0,60	-0,02	0 (-2,64)	0 (-2,69)	0,96 (96,5)	-0,05 (-0,77)	-0,05	-0,04%	-0,05%	-0,95
6	CL (CH) SWISS SMALL CAP EF	-1,28	-0,03	0 (-0,92)	0 (-2,75)	0,49 (4,33)	-6,91 (-3,69)	0,16	0,76%	0,06%	-0,28	-0,61	-0,02	0 (-2,07)	0 (-2,16)	0,86 (18,7)	-0,36 (-1,16)	-0,05	-0,05%	-0,36%	-0,81
7	PICTET CH-SW MID/SM CP-PDYSF	-1,28	-0,02	0 (-0,32)	0 (-1,6)	0,67 (6,05)	-4,58 (-2,51)	0,14	0,77%	0,20%	-0,70	-0,62	-0,02	0 (-2,53)	0 (-2,51)	0,85 (18,7)	0,02 (0,07)	-0,03	-0,10%	-0,44%	-0,90
8	UBS (CH) IF-S&M C EQ CH I-B	-1,30	-0,02	0 (0,08)	0 (-1,58)	0,67 (6,52)	-5,31 (-3,13)	0,12	0,74%	0,26%	-0,74	-0,61	-0,02	0 (-2,21)	0 (-2,12)	0,89 (20,6)	0,27 (0,93)	0,00	-0,07%	-0,37%	-0,81
9	UBS (CH) IF-S&M C EQ CH I-X	-1,30	-0,02	0 (0,08)	0 (-1,58)	0,67 (6,53)	-5,29 (-3,12)	0,12	0,74%	0,26%	-0,74	-0,61	-0,02	0 (-2,21)	0 (-2,11)	0,89 (20,6)	0,27 (0,93)	0,00	-0,07%	-0,37%	-0,81
10	VONTOBEL SWISS SMALL CMPS-A	-1,26	-0,02	0 (-0,61)	0 (-2,35)	0,53 (4,62)	-6,55 (-3,46)	0,16	0,78%	0,12%	-0,59	-0,61	-0,02	0 (-2,27)	0 (-2,37)	0,87 (17,7)	-0,37 (-1,14)	-0,08	-0,06%	-0,40%	-0,74
11	SWISSCANTO SMALL & MID CAP-A	-1,35	-0,03	0 (-1,01)	0 (-2,86)	0,54 (5,26)	-6,42 (-3,75)	0,12	0,66%	0,06%	-0,70	-0,64	-0,02	0 (-2,92)	0 (-2,87)	0,85 (20,5)	0,1 (0,37)	-0,03	-0,17%	-0,47%	-0,82
12	PICTET-CH SWISS EQUITIES-P	-1,58	-0,02	0 (1,33)	0 (0,95)	1,01 (37,2)	-0,15 (-0,34)	0,00	0,33%	0,29%	-0,96	-0,59	-0,02	0 (-1,97)	0 (-1,83)	1 (96,3)	0,1 (1,46)	-0,12	-0,01%	-0,02%	-0,95
13	SWISSCANTO EQ VALUE SWITZERL	-1,75	-0,03	0 (-4,06)	0 (-4,23)	0,9 (25,5)	-0,86 (-1,47)	-0,16	0,08%	-0,01%	-1,10	-0,57	-0,02	0 (0,09)	0 (0)	1,01 (82,6)	-0,08 (-0,97)	-0,08	0,07%	0,05%	-0,82
14	CSSP SMALL & MID SWITZERLAND	-1,20	-0,02	0 (1,15)	0 (-0,79)	0,69 (6,28)	-6,15 (-3,4)	0,11	0,87%	0,44%	-0,58	-0,61	-0,02	0 (-2,1)	0 (-2,08)	0,9 (20)	0 (0,02)	-0,04	-0,05%	-0,34%	-0,83
15	PICTET CH INSTIT-SWISS-JDYSF	-1,61	-0,02	0 (-0,48)	0 (-1,13)	0,95 (28,6)	-0,75 (-1,36)	0,00	0,28%	0,22%	-0,94	-0,62	-0,02	0 (-3,4)	0 (-3,31)	0,97 (76,1)	0,07 (0,79)	-0,11	-0,08%	-0,10%	-0,93
16	PICTET CH INST-SWISS E-IDYSF	-1,63	-0,02	0 (-0,9)	0 (-1,64)	0,95 (34,4)	-0,75 (-1,65)	0,00	0,25%	0,21%	-0,94	-0,62	-0,02	0 (-3,46)	0 (-3,37)	0,97 (77,6)	0,07 (0,8)	-0,11	-0,08%	-0,10%	-0,93
17	PICTET CH INSTIT-SWISS-PDYSF	-1,61	-0,02	0 (-0,41)	0 (-1,09)	0,95 (29,3)	-0,75 (-1,4)	0,00	0,28%	0,22%	-0,94	-0,62	-0,02	0 (-3,57)	0 (-3,47)	0,97 (80,8)	0,07 (0,83)	-0,11	-0,08%	-0,10%	-0,93
18	UBS CH EQUITY-SML CAPS SWITZ	-1,54	-0,03	0 (-3,35)	-0,01 (-5,11)	0,4 (3,99)	-6,74 (-4,09)	0,12	0,39%	-0,50%	-0,73	-0,59	-0,02	0 (-2,06)	0 (-2,01)	0,86 (16)	0,16 (0,44)	-0,01	0,01%	-0,44%	-0,60

19	**BCGE SYNCHRONY SWISS EQUITY**	-1,67	-0,02	0 (-2,26)	0 (-1,48)	1 (63)	0,22 (0,84)	-0,17	0,20%	0,19%	-1,03	-0,59	-0,02	0 (-1,48)	0 (-1,33)	1,02 (91,9)	0,12 (1,6)	-0,15	0,02%	0,00%	-0,88
20	**UBS (CH) IF-EQUITIES CH I-X**	-1,62	-0,02	0 (-0,26)	0 (0,53)	1,04 (46,1)	0,53 (1,42)	-0,17	0,26%	0,24%	-1,01	-0,58	-0,02	0 (-0,52)	0 (-0,46)	1,02 (82,3)	0,05 (0,55)	-0,08	0,05%	0,03%	-0,83
21	**UBS (CH) IF-EQUITIES CH I-B**	-1,63	-0,02	0 (-0,27)	0 (0,52)	1,04 (47,1)	0,53 (1,44)	-0,18	0,26%	0,24%	-1,01	-0,58	-0,02	0 (-0,54)	0 (-0,48)	1,01 (83,8)	0,04 (0,55)	-0,09	0,05%	0,03%	-0,83
22	**UBS (CH) IF-EQUITIES CH I-A1**	-1,63	-0,02	0 (-0,41)	0 (0,52)	1,04 (59,2)	0,48 (1,65)	-0,23	0,25%	0,23%	-1,02	-0,58	-0,02	0 (-0,71)	0 (-0,66)	1,01 (101)	0,03 (0,47)	-0,10	0,04%	0,03%	-0,83
23	**BBGI TACT SWIT**	-3,39	-0,08	-0,02 (-19,3)	-0,01 (-15)	0,58 (8,95)	3,88 (3,59)	-0,13	-2,29%	-5,88%	-1,25	-0,66	-0,03	0 (-3,71)	0 (-3,47)	0,86 (20,2)	1,05 (3,7)	0,01	-0,22%	-0,64%	-0,91
24	**SARASIN SUSTAINABLE EQ SWITZ**	-1,62	-0,02	0 (1,15)	0 (0,64)	1,02 (75,2)	-0,15 (-0,65)	-0,36	0,28%	0,27%	-1,01	-0,60	-0,02	0 (-2,32)	0 (-2,33)	0,99 (104)	-0,02 (-0,27)	-0,14	-0,01%	-0,02%	-0,84
	SWISS EXCHANGE SWISS PERFORMANCE INDEX	***-1,64***	***-0,02***									***-0,58***	***-0,02***								

Notes: The negative values are in red color and the positive ones in black. The number in parenthesis is the reported t-statistic value at 95% confidence level. The cells painted in blue are the statistically significant ones at 95% confidence level (critical value is 1.96)

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