ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

ΤΜΗΜΑ ΛΟΓΙΣΤΙΚΗΣ & ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ

ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ

INVESTMENT STRATEGY: QUALITY MINUS JUNK STOCKS

ΕΥΣΤΡΑΤΙΟΥ ΑΝΝΑ Α.Μ. 122258

Εργασία υποβληθείσα στο

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Μεταπτυχιακού Διπλώματος Ειδίκευσης

Αθήνα

{Ιούλιος, 2014}

Εγκρίνουμε την εργασία της

ΕΥΣΤΡΑΤΙΟΥ ΑΝΝΑΣ

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ΒΕΒΑΙΩΣΗ ΕΚΠΟΝΗΣΗΣ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

«Δηλώνω υπεύθυνα ότι η συγκεκριμένη πτυχιακή εργασία για τη λήψη του Μεταπτυχιακού Διπλώματος Ειδίκευσης στη Λογιστική και Χρηματοοικονομική έχει συγγραφεί από εμένα προσωπικά και δεν έχει υποβληθεί ούτε έχει εγκριθεί στο πλαίσιο κάποιου άλλου μεταπτυχιακού ή προπτυχιακού τίτλου σπουδών, στην Ελλάδα ή στο εξωτερικό. Η εργασία αυτή έχοντας εκπονηθεί από εμένα, αντιπροσωπεύει τις προσωπικές μου απόψεις επί του θέματος. Οι πηγές στις οποίες ανέτρεξα για την εκπόνηση της συγκεκριμένης διπλωματικής αναφέρονται στο σύνολό τους, δίνοντας πλήρεις αναφορές στους συγγραφείς, συμπεριλαμβανομένων και των πηγών που ενδεχομένως χρησιμοποιήθηκαν από το διαδίκτυο».

[ΟΝΟΜΑΤΕΠΩΝΥΜΟ ΦΟΙΤΗΤΗ/ΤΡΙΑΣ] **[ΥΠΟΓΡΑΦΗ]**

ΕΥΣΤΡΑΤΙΟΥ ΑΝΝΑ

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Με την παράδοση αυτής της διπλωματικής οφείλω να ευχαριστήσω θερμά τον επιβλέποντα καθηγητή μου, κ. Γιαμουρίδη Δανιήλ για την πολύτιμη βοήθειά του, τις γνώσεις που αποκόμισα και την συνεχή υποστήριξή του στην επίβλεψη αυτής της εργασίας. Επιπρόσθετα ευχαριστώ όλους τους καθηγητές του Μεταπτυχιακού Προγράμματος στη Λογιστική και Χρηματοοικονομική για τις γνώσεις που μου προσέφεραν αυτά τα δύο χρόνιας της φοίτησής μου.

Τέλος, θα ήθελα να ευχαριστήσω την οικογένειά μου για την ηθική στήριξη που μου παρείχε σε όλη αυτή την προσπάθεια που κατέβαλα και να αφιερώσω την εργασία στην αγέννητη κορούλα μου.

CONTENT

PURPOSE OF THE THESIS

In this thesis our purpose is to construct a Quality minus Junk portfolio in accordance with the methodology of Fama and French (1993) and Asness and Frazzini (2013). In our effort, we use the sixty shares, which are included to index Athex-Composite Athens Stock Exchange, which would be our benchmark, for the period between January 2000 and December 2013. We defined as ‘quality’ a factor, which consists of four components profitability, growth, safety and payout, based on Gordon’s Model. Each one of these components is composed of ratios that we created for the purposes of the paper. Then we classify our shares in quality and junk stocks, depending on the factor quality that we created and then we constructed six portfolios. The first which goes long the 30% of quality stocks, the second which goes long the 20% of quality stocks, the third which goes 30% of quality stocks and shorts the 30% of junk stocks, the forth which goes long the 20% of quality stocks and shorts the 20% of junk stocks, the fifth which goes long the 30% of quality shares and shorts the whole index and the sixth portfolio which goes long the 20% of quality shares and shorts the whole index. Quality minus Junk strategy is very different from the standard value strategy HML. Quality minus Junk strategy is buying and selling stocks, based on quality characteristics irrespective of stock prices.

On the following pages of the paper we refer to the literature that is relevant to the matter that we have under consideration and to the characteristics we defined as components of quality.

Then, based on an empirical study, we conducted statistical and financial analysis based on portfolio theory and asset management theory, so as to evaluate the results and decide which one of the six portfolios we examine has the desired results. We quote the monthly portfolio’s return and descriptive statistics for this performance and for each component of the factor ‘quality’. Furthermore, we conduct CAPM regression for each one of the portfolios to assess the relationship between risk and return and the statistical significance of the coefficients of the CAPM. Finally we calculate the Sharpe ratio for each portfolio in our attempt to compare it to each other and to the benchmark (index Athex-Composite).

Based on all the above, we try to prove that Quality minus Junk strategy, which has the best odds for the reporting period, can hedge our risk by selling the junk stocks. Finally, we conclude that we gain profit from the short selling of these junk stocks.

1. INTRODUCTION

We can classify institutional investors into two broad categories: those that must meet contractually specified liabilities and those that do not. Furthermore, we can classify those in the first category as institutions with "liability-driven objectives" and those in the second category as institutions with "non-liability driven objectives".

In this way, we point that an active portfolio strategy uses available information and forecasting techniques to seek a better performance than a portfolio that is simply diversified broadly. On the other hand, passive portfolio strategy involves minimal expectational input, and instead relies on diversification to match the performance of some market index. Consequently, a passive strategy assumes that market prices impound all available information. However, it is known that between the two extreme strategies, there are several other strategies.

Portfolio management consists of constructing portfolios and then making them evolve in order to reach the return objectives defined by the investor, while respecting the investor's constraints in terms of risk and asset allocation. The investment methods used to reach the objectives range from quantitative investment, which originated in modern portfolio theory to more traditional methods of financial analysis.

In portfolio investment theory, it is of primary importance the Asset allocation management. In essence, the asset allocation consists of choosing the spread of different asset classes within the portfolio. The asset classes can be the major categories of assets (stocks, bonds and money market instruments), industrial sectors for a portfolio of national equities, or countries for a portfolio of international equities. At the outset, investors define the categories of assets that they wish to include in the portfolio, depending on their objectives and constraints. The asset allocation methods may depend on the nature of the assets, but, in all cases, asset allocation is carried out in two stages. We first define the long-term allocation, based on the risk and return estimations for each asset class. This is strategic allocation. We can then carry out adjustments based on short-term anticipations. This is tactical allocation. Part of asset allocation is the dynamic allocation. In this way, Dynamic allocation is a strategy that consists of continuously readjusting the portfolio allocation so as to take into account the evolution of the market. The best known example of dynamic allocation is portfolio insurance. Portfolio insurance brings together strategies that enable the risk of a portfolio losing value to be eliminated, or at least limited. Portfolio insurance can be implemented through techniques that use option replication, by combining an investment in the option's underlying instrument and an investment in cash at the risk-free rate, and continuously adjusting the allocation between the above two techniques. Furthermore, market timing is a technique that has long been practiced. In recent years, and in the area of defining the investment management process as we present it here, it has become more usual to speak of tactical allocation.

A large number of financial investments have been done in the name of quality, something that made these investments a whole science. People from all over the world are interested in investing in stocks that will have abnormal returns in the future. However, these investments involve a lot of risk, because when we talk about stocks nobody can guarantee the gain of the investment. This paper investigates the performance of portfolios which consisted of shares from the Athex-Composite Index, and includes the outcome of different portfolios with shares listed from Athens stock exchange. These portfolios are compared to each other, in order to identify their performance during the same time period.

All the data were collected and analyzed for the time period from January 2000 to December 2013. The aim of this research is to find the best way and the most profitable strategy to manage the portfolio, after its construction, according to the portfolio theories, in order to gain profit.

This is exactly the purpose of this research and in the following chapters all this process will be presented and further explained. Before this, it is wise to define what is quality investing, since this would be the 'key' of our research. Quality investing is an investment strategy based on a set of clearly defined fundamental criteria that seeks to identify companies with outstanding quality characteristics. The quality assessment is made based on soft (e.g. management credibility) and hard criteria (e.g. balance sheet stability). Quality Investing supports best overall rather than best-in-class approach. The idea for quality investing originated in the bond and real estate investing, where both the quality and price of potential investments are determined by ratings and expert attestations. Later the concept was applied to investments in enterprises in equity markets. Benjamin Graham, the founding father of value investing, was the first to recognize the quality problem among equities back in the 1930s. Graham classified stocks as either quality or low quality. He also observed that the greatest losses result not from buying quality at an excessively high price, but from buying low quality at a price that seems good value. The quality issue in a corporate context attracted particular attention in the management economics literature following the development of the BCG matrix in 1970. Using the two specific dimensions of life cycle and the experience curve concept, the matrix allocates a company's products – and even companies themselves – to one of two quality classes (Cash Cows and Stars) or two Non-quality classes (question Marks and Dogs). We define a quality stock as one that has characteristics that an investor should be willing to pay a higher price for stocks that are safe, profitable, growing and well-managed.

Trying to develop a strategy in constructing a portfolio, which would perform in a way that could satisfy the expectations of clients, the concept of a more practical pattern was very attractive. That’s why no one of the previous mentioned methods were applied. A different methodology inspired the reason of this research.

In this thesis we will try to create a Quality minus Junk (QMJ) factor that goes long high quality stocks and short low quality stocks, in order to prove that significant risk-adjusted returns would be earned. On average, high quality stocks do have higher prices, but not by a very large margin. Gordon’s growth model can help us to express the natural quality characteristics as follows:

$$P/B = \text{profitability} * \text{payout-ratio} / \text{required return-growth}$$

Based on this model we will describe our research. For each quality characteristic, we have created several measures, so as to have a robust analysis and ensure that the explanatory power of quality on price is not driven by a specific measurement choice:

- **Profitability.** Profitability is the profits per unit of book value. In this way, it is obvious that more profitable companies should command a higher stock price.
- **Growth.** The Basic investor's strategy is to pay a higher price for stocks with growing profits. In this way we assume the growth as the prior three-year growth in each of our profitability measures
- **Safety.** Investors should also pay, all-else-equal, a higher price for a stock with a lower required return, that is, a safer stock.
- **Payout.** The payout ratio is the fraction of profits paid out to shareholders. In this way it is a measure of shareholder friendliness.

All the above would be the components of Quality minus Junk.

2. LITERATURE REVIEW

Our research is relevant to a large literature. There are a huge number of papers, which have studied return based anomalies and portfolio investment theories. According to Markowirtz theory, risk-averse investors can construct portfolios to optimize or maximize expected return based on a given level of market risk, emphasizing that risk is an inherent part of higher reward (1952).

Novy-Marx (2013) with the paper 'The quality dimension of value investing' concluded that the real benefits of value investing accrue to investors that pay attention to both price and quality. Attention to quality, especially measured by gross profitability, helps traditional value investors distinguish bargain stocks (i.e., those that are undervalued) from value traps (i.e., those that are cheap for good reasons). Price signals help quality investors avoid good firms that are already fully priced. Trading on both signals brings the double benefit of increasing expected returns while decreasing volatility and drawdowns. Cheap, profitable firms tend to outperform firms that are just cheap or just profitable. Whereas, with the paper 'The Other Side of Value' (2012) support that buying profitable firms and selling unprofitable firms, where profitability is measured by the difference between a firm's total revenues and the costs of the goods or services sold, yields a significant gross profitability premium (2012).

Frazzini and Pedersen (2013) found evidence consistent with each of the following predictions. Because constrained investors bid up high-beta assets, high beta is associated with low alpha, as we find empirically for US equities, 20 international equity markets, Treasury bonds, corporate bonds, and futures, a betting against beta (BAB) factor, which is long leveraged low-beta assets and short high-beta assets, produces significant positive risk- adjusted returns, when funding constraints tighten, the return of the BAB factor is low, increased funding liquidity risk compresses betas toward one, more constrained investors hold riskier assets. Additionally, they have found empirically that portfolios of high-beta assets have lower alphas and Sharpe ratios than portfolios of low-beta assets. The security market line is not only flatter than predicted by the standard CAPM for US equities (as reported by Black, Jensen, and Scholes (1972)), but they have also found this relative flatness in Treasury markets, for corporate bonds sorted by maturity and by rating, and in futures markets.

Additionally, Baker and Wurgler (2002) proved that firms are more likely to issue equity when their market value are high, relative to book and past market values, and to repurchase equity when their market value are low and that low-leverage firms tend to be those that raise funds when their valuation were high and conversely high-leverage firms tend to be those that raised funds when their valuation were low. They believe that capital structure is largely the cumulative outcome of past attempts to time the equity market. In their theory, there is no optimal capture structure, so market timing financing decisions just accumulate over time into the capital structure outcome. The simple market timing theory of capital structure appears to have substantial explanatory power.

Pontiff and Woodgate (2008) supplementary with their research found that long-run returns are associated with share repurchase announcements, seasoned equity offerings, and stock mergers. They support that share issuance exhibits a strong cross-sectional ability to predict stock returns. This predictive ability is more statistically significant than the individual predictive ability of size, book-to-market, or momentum.

McLean, Pontiff and Watanabe (2009) prove that Share issuance predicts cross-sectional returns in a non-U.S. sample of stocks from 41 different countries. Issuance predictability has greater statistical significance than either size or momentum, and is similar to book-to-market. As in the U.S., the international issuance effect is robust across both small and large firms. Unlike the U.S., the effect is driven more by low returns after share creation rather than positive returns following share repurchases. Issuance return predictability is stronger in countries with greater issuance activity, greater stock market development, and stronger investor protection. The results suggest that the share issuance effect is related to the ease with which firms can issue and repurchase their shares.

Campbell, Hilscher and Szilagyi (2008) have shown that their measure of financial distress generates underperformance among distressed stocks in all quintiles of the size and value distributions, but the underperformance is more dramatic among small stocks. Perhaps the most obvious explanation is that stock market investors under react to negative information about company prospects. Firms with higher leverage, lower profitability, lower market capitalization, lower past stock returns, more volatile past stock returns, lower cash holdings, higher market-book ratios, and lower prices per share are more likely to file for bankruptcy. Their measure of financial distress generates underperformance among distressed stocks in all quintiles of the size and value distributions, but the underperformance is more dramatic among small stocks.

Furthermore, George and Hwang (2010) with their paper supported that firms with high costs choose low leverage to avoid distress, but retain exposure to the systematic risk of bearing such costs in low states. They found that return premiums to low leverage and low distress are significant in raw returns, and even stronger in risk-adjusted returns. When in distress, low leverage firms suffer more than high leverage firms as measured by deterioration in accounting operating performance and heightened exposure to systematic risk.

Richardson, Sloan, Soliman and Tuna (2005) construct a model showing that less reliable accruals lead to lower earnings persistence. With their empirical tests confirm that less reliable categories of accruals lead to lower earnings persistence and that investors do not anticipate the lower persistence, leading to significant security mispricing.

According to Penmann and Zhu (2012) the empirical results indicate that many accounting anomaly variables forecast forward earnings and growth, and in the same direction in which they forecast returns. Without an agreed-upon asset pricing model for required returns, one cannot be definitive, but their paper does provide a framework, supported by empirical results, that indicate that the observed “anomalous” returns associated with accounting numbers are consistent with the rational pricing.

On the other hand, our research is relevant to a literature that considers how the price to book predicts futures returns and future fundamentals based on the present value relationship. Cohen, Polk and Vuolteenaho (2009) with their empirical results, suggest that cash flow betas essentially explain the prices of the long-horizon returns on price-to-book sorted portfolios, with a premium consistent with the theory.

Finally, Fama and French’s (2006) paper says that controlling for expected profitability and investment, firms with higher book to market equity have higher expected stock returns, given Bt/Mt and expected investment, higher expected profitability also implies higher expected returns, and given Bt/Mt and expected profitability, faster expected rates of investment are associated with lower expected returns. Existing evidence also says that more profitable firms have higher expected returns (for example, Haugen and Baker 1996), and firms that invest more have lower average returns (for example, Fairfield, Whisenant, and Yohn 2003).

3. DATA AND METHODOLOGY

In this section we describe our data sources and the methodology that we follow in order to construct our quality measures and to estimate their results.

DATA SOURCES

We conduct the research for the Athens Stock Exchange with the purpose to examine if the Quality minus Junk strategy applies. Our sample consists of sixty stocks (Appendix 1), which compose the Athex-Composite Index, between January 2000 and December 2013. All the data were found in DataStream International Services and were classified in a monthly basis. The monthly return for each stock was calculated from the monthly price of each stock with the formula:

$$RETURN= \ln (PRICE_{t+}1/ PRICE_{t})$$

All returns are in EUR and the excess return is above the German Benchmark Bond 10 Yr.

QUALITY SCORE

We use a variety of quality measures. Our effort is to use stocks of profitable, stable, safe and high payout companies. In order to avoid data mining, we create a broad set of measures for each aspect of quality and average them to calculate the four proxies: Profitability, Growth, Safety and Payout. Then, we sum all these components to create single quality score. Combining the above factors according to our methodology as previously mentioned, we have results that are qualitatively robust. By multiplying these measures of quality, our findings become more valuable and reliable.

Our quality measures are constructed as follows. The definition of our variables are based on Altman (1968), Ohlson (1980), Ang, Hodrick, Xing, andZhang (2006), Danile and Titman (2006), Penman, Richardson, and Tuna (2007), Campbell,Hilscher, and Szilagyi (2008), Chen, Novy-Marx and Zhang (2011), Novy-Marx (2012), Frazzini and Pedersen (2013) and Asness and Frazzini (2013).

PROFITABILITY

We measure profitability by gross profits over assets (GPOA), which is equal to revenue minus costs of goods sold divided by total assets. Return on equity (ROE) is net income divided by book equity. Return on assets (ROA) is net income divided by total assets. Cash flow over assets (CFOA) is net income plus depreciation minus changes in working capital and capital expenditure divided by total assets. Gross margin (GMAR) is revenue minus costs of goods sold divided by total assets.

In order to put each measure on equal footing and combine them, each month we convert each variable into ranks and standardize to obtain a z-score. More formally, let x be the variable of interest and r be the vector of ranks r_i = rank (x_i). Then the z-score of x is given by $z(x) = z_x = (r-\mu_r) / \sigma_r$, where μ_r and σ_r are the cross sectional mean and standard deviation of r. For the above calculation, we use the function 'Standardize' from formulas of Microsoft Excel worksheets. Our Profitability score is the average of the individual z-scores. More specifically:

$$\text{Profitability} = z\,(z_{gpoa} + z_{roe} + z_{roa} + z_{cfoa} + z_{gmar})$$

GROWTH

Similarly, we measure growth as the three-year prior growth in profitability, averaged across over measures of profitability:

$$\text{Growth} = z\,(z_{\Delta gpoa} + z_{\Delta roe} + z_{\Delta roa} + z_{\Delta cfoa} + z_{\Delta gmar})$$

Where, Δ denotes three-year growth. Specifically, for each profitability measure, we define three year growth as the change in the numerator (e.g. profits) divided by the lagged denominator (e.g. assets).

SAFETY

We define safe securities as companies with low beta (BAB) which is equal to minus market beta –b. In order to calculate this, we use excel function ‘Slope’ with return as dependent variable and market as the independent variable. Low idiosyncratic volatility (IVOL) is equal to minus a stock’s idiosyncratic volatility $-\sigma^i$. To calculate this we use excel function ‘Steyx’ with return as dependent variable and market as the independent variable too. Low leverage (LEV) is equal to minus total debt over total assets. Low bankruptcy risk (Altman’s Z-Score) is calculated as the sum of 1.2* working capital + 1.3* retained earnings + 3.3* earnings before interest and taxes + 0.6* market equity and sales divided by total assets. And low ROE volatility (EVOL) is the standard deviation of annually ROE over the past three years. As we describe above with the excel function ‘Standardize’, we calculate the scores and our Safety score is the average of the individual z-scores.

$$\text{Safety} = z\,(z_{bab} + z_{ivol} + z_{lev} + z_{z} + z_{evol})$$

PAYOUT

We define our payout score using net equity issuance (EISS) which is equal to minus one-year percent change in split-adjusted number of shares outstanding. Net issuance (DISS) is minus one-year percent change in total debt. And total net payout over profits (NPOP) is equal to the sum of total net payout over the past three years divided by total profits over the past three years. With the excel function ‘Standardize’, we calculate the scores and our Payout score is the average of the individual z-scores.

$$\text{Payout} = z\,(z_{eiss} + z_{diss} + z_{npop})$$

Finally, we combine the four measures into a single quality score, in order to construct our portfolios:

$$\text{Quality} = (\text{Profitability} + \text{Growth} + \text{Safety} + \text{Payout})$$

After calculating the quality of each share on a monthly basis, then from year 2000 until 2005 we decided to convert our data on a yearly basis, because of the implementation of the International Standards of Audit in year 2005, and from then until 2013 on quarterly basis, in order to separate the shares into quality and junk stocks. Using the function “Rank” from the Excel, we rank the stocks according to their Quality score. With the function “Percentile”, we calculate the number of stocks, which should be chosen in order to construct our portfolios, by separating them at the same time in four categories, which are those of 30 % and 20 % of top quality ranked value and those of 30 % and 20 % of bottom quality ranked value. Following the above process, we choose the specific stocks, based on the quality category that they have been ranked, and we construct our six portfolios. Afterwards, we calculate the return of each portfolio for each month based on the return of each chosen stock. Finally, we calculate the average return of each one portfolio for the whole period of our research.

Portfolios

In this section we explain the six portfolios we create under the conduct of this research. We select to evaluate six portfolios in order to conduct the appropriate conclusions about the strategy Quality minus Junk we examine in this paper.

Portfolios are value-weighted, refreshed every year for the first five years and then every three months, but rebalanced every calendar month to maintain value weights since returns are computed in a monthly basis.

Our portfolios analysis counts on three sets of factors: quality sorted portfolios, quality minus junk factors and quality minus the index returns so as to hedge our risk. The strategy dictates that the first portfolio goes long the 30% of top stocks. The second goes long the 20% of top stocks. The third goes long the 30% of top stocks and short the 30% of bottom stocks. The fourth goes long the 20% of top stocks and short the 20% of bottom stocks. The fifth goes long the 30% of top stocks and short the market index. And finally, the sixth portfolio goes long the 20% of the top stocks and short the market index.

In our effort to evaluate portfolios created, we calculate various measures, which are presented below.

Arithmetic mean: is the simplest calculation involves computing the arithmetic mean of the returns for the subperiods. Arithmetic mean is equal to:

$$\bar{R}_{\mathrm{a}} = \frac{1}{T} \sum_{t=1}^{T} R_{it}$$

Geometric mean: The geometric mean (or compound geometric rate of return) allows us to link the arithmetic rates of return for the different periods, in order to obtain the real growth rate of the investment over the whole period. The calculation assumes that intermediate income is reinvested. The mean rate for the period is given by the following expression:

$$\bar{R}_{\mathrm{g}} = \left[\prod_{t=1}^{T} (1 + R_{it}) \right]^{1/T} - 1$$

Standard deviation: measures the amount of variation or dispersion from the average. A low standard deviation indicates that the data points tend to be very close to the mean (also called expected value); a high standard deviation indicates that the data points are spread out over a large range of values.

$$s = \sqrt{\frac{\sum_{i=1}^{N} (x_i - \bar{x})^2}{N}}$$

Median: is one type of average, found by arranging the values in order and then selecting the one in the middle. If the total number of values in the sample is even, then the median is the mean of the two middle numbers. The median is a useful number in cases where the distribution has very large extreme values which would otherwise skew the data.

$$M_d = L + \left(\frac{N/2 - n_b}{n_w} \right) i$$

Skewness: can be mathematically defined as the averaged cubed deviation from the mean divided by the standard deviation cubed. If the result of the computation is greater than zero, the distribution is positively skewed. If it's less than zero, it's negatively skewed and equal to zero means it's symmetric. For interpretation and analysis, focus on downside risk. Negatively skewed distributions have what statisticians call a long left tail, which for investors can mean a greater chance of extremely negative outcomes. Positive skew would mean frequent small negative outcomes, and extremely bad scenarios are not as likely.

$$\gamma_1 = \sum_{i=1}^{i=n} \left(\frac{x_i - \bar{x}}{s} \right)^3$$

Kurtosis: refers to the degree of peak in a distribution. More peak than normal (leptokurtic) means that a distribution also has fatter tails and that there are lesser chances of extreme outcomes compared to a normal distribution. The kurtosis formula measures the degree of peak. Kurtosis equals three for a normal distribution; excess kurtosis calculates and expresses kurtosis above or below 3.

$$\gamma_2 = \sum_{i=1}^{i=n}\left(\frac{x_i - \bar{x}}{s}\right)^4$$

Sharpe ratio: The Sharpe Ratio or the Reward – to – Variability ratio is a measure of risk adjusted performance that uses a benchmark portfolio based on the ex post capital market line (CML). It measures returns relative to the total risk of the portfolio, where total risk is the standard deviation of portfolio returns. First of all, there is a need to determine the location of the ex post capital market line. This line goes through two points on a graph that measures the average return on the vertical axis and the standard deviation on the horizontal axis. The first point is the vertical intercept of the line and corresponds to the average risk free rate during the specific period determined from the portfolio manager and the second point corresponds to the location of the market portfolio, meaning that its coordinates are the average return and standard deviation of return for the market portfolio during the evaluation same period. Additionally, Sharpe ratio classifies the shares based on the amount of the actual yield minus the risk free rate per unit of total risk. When ranking based on Sharpe ratio is attempted, does not distinguish whether the efficiency due to market fluctuations and the ability of management to select appropriate in securities or the degree of diversification of the portfolio. This ratio is a pure number as the numerator and denominator are expressed in percentages. A portfolio with a higher Sharpe ratio is more effective than another low rate. As expressed by the excess return per unit of total risk, the Sharpe ratio depends on market fluctuations. In this way the Sharpe Radio is equal to:

$$\text{Sharpe ratio} = \frac{\text{Portfolio return} - \text{Risk-free rate}}{\text{Standard deviation of the portfolio return}}$$

CAPM: CAPM model developed by Sharpe (1964), Lintner (1965) and Mossin (1966) gives the general relationship between risk and return performance of portfolios or individual securities and the market portfolio. CAPM is based on the logic that the minimum return that an investor seeks contains two components, the guaranteed return that contains a security or investment in general without risk plus an additional return for the risk which undertake by having specific security. As follows from the mathematical formulation of the model, shown below, the expected return of a stock over the performance of the risk-free asset is linearly related to the non-diversified risk (systemic risk), as counted by the coefficient beta of the share and it is the only type of risk affects performance. The mathematical model illustrating the above formulation is the following:

$$\overline{r_a} = r_f + \beta_a (\overline{r_m} - r_f)$$

Where:

r_f = Risk free rate

β_a = Beta of the security

$\overline{r_m}$ = Expected market return

CAPM model is applied to securities analysis for the evaluation of the performance / risk investment. The basic assumptions of the model are as follows:

- Investors are risk-aversed. They invest in minimizing the risk for each level of expected return on an investment or maximize expected return for each level of risk of an investment. The investment risk is measured by the variance or standard deviation of return.
- Investors have the same estimates for the expected values, variances and covariances yields of all shares in an economy.
- Investors are able to borrow or lend at the risk free rate of an investment.
- Investors can not by themselves affect stock prices.
- The quantities of shares are fixed, each share may be sold, without any cost on acquisition or sale and there are no restrictions on transactions to buy or sell shares.
- Investors have homogeneous expectations.

Then, we regress CAPM model for each portfolio in order to estimate alpha and beta ratio, to examine their statistical significance and decide if portfolios are well diversified with the R^2 or else the coefficient of determination. Using the regression analysis, the R^2 gives the degree of diversification. The perfectly diversified portfolios have R^2 that approaches one ($R^2 = 1$).

4. DATA ANALYSIS

In order to define what is quality and try to calculate it, we construct some components, as we describe above in our paper according to Gordon's Model. These components are Profitability, Growth, Safety and Payout. In the table below there are descriptive statistics that help us conduct some conclusions. Descriptive statistics is the term given to the analysis of data that helps describe, show or summarize data in a meaningful way such that, for example, patterns might emerge from the data. These statistics do not, however, allow us to make conclusions beyond the data we have analyzed or reach conclusions regarding any hypotheses we might have made. They are simply a way to describe our data. Descriptive statistics are very important, because if we simply present our raw data it would be hard to visualize and explain what the data are showing, especially if there is a large amount of information presented in the research.

TABLE 1

	COMPONENTS				
STATISTICS	**QUALITY**	**PROFITABILITY**	**GROWTH**	**SAFETY**	**PAYOUT**
Mean	-0,519093379	-0,014514978	-0,757527868	0,121690485	-0,032459081
Min	-15,26496858	-0,073118622	-15,59539143	-0,005482891	-0,349678402
Percentile 25%	-0,602627562	-0,023778381	-1,036223272	7,61918E-18	-0,018492748
Percentile 50%	-0,035085681	-0,013223939	-0,17902046	0,078925177	-0,005595005
Percentile 75%	0,662423307	-0,001119591	1,015980848	0,161554943	0,002808929
Max	23,66791085	0,038686653	27,6753742	0,780491192	0,009058909
Standard deviation	3,874937754	0,022737411	4,591449197	0,182860936	0,080262273
Kurtosis	14,31482495	0,690234203	14,00960219	3,441886918	8,491801988
Skewness	-0,506463304	0,150398862	0,321320032	2,008606722	-3,107271754

Table 1 shows the descriptive statistics of the four components for all the time period, from January 2000 to December 2013, which includes 168 monthly observations. In this table, we can measure the effect of each component on the Quality of each stock. As we can note the average (mean) value of the Safety is the greater and the average (mean) value of Growth is the lower among all the other measures. Also, the lower min value is measured for the component Growth whereas the greater one for the component Safety. The lower max value is measured for the component Payout and the greater max value in this analysis for the component Growth. With respect to standard deviation of the values, we conduct that Growth has the greater, which indicates that data points tend to be very close to mean, whereas Profitability the lower, which indicates that data points are spread out over a large range of values. About kurtosis, all measures have positive kurtosis, which implies leptokurtic distribution, a more acute peak around the mean and fatter tails. Finally, we notice that only Payout has negative skewness, which implies a left-skewed distribution, whereas the other three components have positive skewness, which indicates that the tails on the right side is longer or fatter than the left side.

5. PORTFOLIOS PERFORMANCE EVALUATION

Although the portfolio performance evaluation is the last stage of the investment management process, it can also be viewed as simply part of a continuing operation. Especially, it can be viewed as a feedback and control mechanism that can make the investment management process more effective. A manager by evaluating his performance can identify sources of strength or weakness. Superior performance in the past may have resulted from good luck, which means that this performance should not be expected to continue in the future. The first task in performance evaluation is to try to determine whether past performance was superior or inferior. Once that task has been done, the second task is to try to determine whether such performance was due to luck or due to the strategy that was followed. Our purpose, in this section of the paper, is to evaluate our portfolios in order to decide if the strategy Quality minus Junk we construct is effective and profitable.

After the calculation of the quality score of each stock, according to the methodology that was described in previous section, using the sum of z-scores of the four components of quality (profitability, growth, safety and payout) and the excel function 'Rank', we classify the stocks in two categories, one with high quality characteristics and the other of low quality characteristics called junk stocks. Moreover, using the function 'Percentile' we calculate the desired percentages of stocks of every portfolio and we construct our portfolios.

As a result, the monthly returns of our six portfolios are presented in the table 2 below, in order to begin our evaluation.

TABLE 2

	PORTFOLIO 1	PORTFOLIO 2	PORTFOLIO 3	PORTFOLIO 4	PORTFOLIO 5	PORTFOLIO 6
Date	LONG TOP 30%	LONG TOP 20%	LONG TOP 30%-SHORT BOTTOM 30%	LONG TOP 20%-SHORT BOTTOM 20%	LONG TOP 30%-MARKET RETURN	LONG TOP 20%-MARKET RETURN
1/1/2000						
1/2/2000	-0,049249331	-0,024413796	0,059697712	0,084772816	0,044252602	0,069088136
1/3/2000	-0,061428865	-0,035999681	0,108042828	0,109408610	-0,040903525	-0,015474340
1/4/2000	-0,052396940	-0,051666425	0,051333389	0,042483122	0,002866486	0,003597001
1/5/2000	-0,116177852	-0,083157280	0,053597914	0,110526077	0,011370887	0,044391459
1/6/2000	0,149979774	0,103672794	0,014615652	-0,025950285	0,087585942	0,041278962
1/7/2000	-0,093037561	-0,081278003	0,059219158	0,083977079	0,026052292	0,037811849
1/8/2000	0,014271665	0,019275419	0,042721067	0,048624569	0,021149273	0,026153027
1/9/2000	-0,091608387	-0,076528165	0,005484439	0,019780395	0,014116218	0,029196440
1/10/2000	0,036395188	0,028326561	-0,038226923	-0,050185593	-0,107219118	-0,115287745
1/11/2000	-0,105535576	-0,082545413	-0,022052187	0,005278385	-0,031375921	-0,008385759
1/12/2000	-0,066966420	-0,081358273	0,022378579	0,034319752	0,068251439	0,053859586
1/1/2001	-0,029244367	-0,035070720	-0,013991978	-0,006045330	-0,024669236	-0,030495589
1/2/2001	-0,129270888	-0,138174191	0,023223037	0,015762412	-0,086776703	-0,095680006
1/3/2001	0,078723901	0,083277795	0,022533671	0,042040081	0,121910879	0,126464773
1/4/2001	0,043944374	0,056411285	0,085536728	0,115116657	0,069507940	0,081974851
1/5/2001	0,024614679	0,018784686	0,004868439	-0,016316014	-0,056011362	-0,061841356
1/6/2001	-0,078103976	-0,055144713	0,035686300	0,043837140	0,009734499	0,032693761
1/7/2001	-0,082204707	-0,088468547	0,023868550	0,014547106	0,013458989	0,007195150
1/8/2001	0,030056958	0,016676279	0,009349183	0,011338128	0,028263753	0,014883074
1/9/2001	0,033523271	0,023425998	0,044186987	0,028142884	0,036201481	0,026104207
1/10/2001	-0,193780123	-0,208225449	0,071806234	0,057638127	0,023386608	0,008941282
1/11/2001	0,117070855	0,142455391	-0,006001635	0,021249515	-0,032484241	-0,007099704
1/12/2001	0,102328163	0,094858728	-0,035050418	-0,054871385	0,054506862	0,047037427
1/1/2002	-0,017965638	-0,007408796	0,056925139	0,084764773	0,015471736	0,026028578
1/2/2002	0,022913462	0,023993563	0,011040965	0,017574962	0,021313391	0,022393492
1/3/2002	-0,042265386	-0,034177268	0,071472864	0,081407605	0,050385477	0,058473596
1/4/2002	-0,054840847	-0,057225504	-0,019350037	-0,005732912	-0,018122811	-0,020507468
1/5/2002	-0,006719149	0,014073733	0,034877451	0,069107797	0,021008358	0,041801240
1/6/2002	0,014475359	0,009069469	-0,015927067	-0,012181800	-0,012717085	-0,018122975
1/7/2002	-0,047062477	-0,039327877	-0,008494503	-0,005388062	-0,020153988	-0,012419387
1/8/2002	-0,058949510	-0,042171056	0,022251073	0,062835132	-0,015339508	0,001438946
1/9/2002	-0,017385204	-0,005161714	0,047226879	0,053295148	-0,005675374	0,006548116
1/10/2002	-0,158973230	-0,147712923	0,048342289	0,078609094	-0,023183033	-0,011922726
1/11/2002	-0,003439507	0,013523058	0,012864863	0,036736121	0,028241438	0,045204004
1/12/2002	0,093851026	0,091461454	-0,019108090	-0,042046717	0,030061035	0,027671463
1/1/2003	-0,126580800	-0,184875067	0,030996119	0,003222128	-0,047246675	-0,105540942
1/2/2003	-0,057401594	-0,087555929	0,126427451	0,063457780	-0,016005583	-0,046159919
1/3/2003	-0,042944112	-0,062575669	0,028140941	0,004564881	-0,003084633	-0,022716190

	PORTFOLIO 1	PORTFOLIO 2	PORTFOLIO 3	PORTFOLIO 4	PORTFOLIO 5	PORTFOLIO 6
Date	LONG TOP 30%	LONG TOP 20%	LONG TOP 30%-SHORT BOTTOM 30%	LONG TOP 20%-SHORT BOTTOM 20%	LONG TOP 30%-MARKET RETURN	LONG TOP 20%-MARKET RETURN
1/4/2003	-0,035132684	-0,055885804	0,032009390	-0,002749598	0,053903676	0,033150556
1/5/2003	0,103808432	0,177761162	-0,123683512	-0,037818807	-0,033398428	0,040554303
1/6/2003	0,050072880	0,070285946	-0,085274751	-0,105830955	0,005370795	0,025583861
1/7/2003	0,006290171	0,009164040	-0,062317667	-0,049627721	-0,048136125	-0,045262256
1/8/2003	0,110375012	0,168215454	-0,120772959	-0,104394853	-0,041985091	0,015855351
1/9/2003	-0,038557069	-0,024984722	-0,003496835	0,014000647	-0,048506535	-0,034934188
1/10/2003	-0,111836253	-0,127290687	0,048244387	0,022728356	-0,023969603	-0,039424036
1/11/2003	0,070296366	0,077837047	-0,042410898	-0,073391922	-0,002084163	0,005456518
1/12/2003	-0,018860731	-0,027130949	0,023432371	0,031912899	-0,019207382	-0,027477601
1/1/2004	0,015209131	0,013617226	-0,018931274	-0,017353821	-0,029812486	-0,031404392
1/2/2004	0,068091296	0,045610675	-0,021138394	-0,054540489	-0,004953003	-0,027433624
1/3/2004	-0,044642944	-0,043472112	0,031087640	0,037284347	-0,049170462	-0,047999630
1/4/2004	-0,107457019	-0,084330672	-0,025913890	-0,013754304	-0,071446636	-0,048320289
1/5/2004	0,040619112	0,053285198	0,019241435	0,034826623	-0,034931743	-0,022265657
1/6/2004	-0,056611064	-0,050142943	-0,051499082	-0,057418520	0,000988944	0,007457065
1/7/2004	-0,098240995	-0,068014633	-0,019790780	-0,000529432	-0,070661975	-0,040435613
1/8/2004	-0,011348155	0,015282908	0,086090826	0,143243955	0,000614272	0,027245335
1/9/2004	-0,007578358	-0,010217042	0,004726439	-0,012951452	-0,015755329	-0,018394012
1/10/2004	-0,013360562	-0,007017161	0,027305009	0,035580765	-0,023811728	-0,017468327
1/11/2004	-0,001358382	0,003734968	-0,041821467	-0,023953742	-0,061750449	-0,056657099
1/12/2004	0,079712634	0,066979921	0,009829441	0,001528187	0,018848898	0,006116184
1/1/2005	0,014871519	0,000953348	0,017836766	0,021435296	-0,046717618	-0,060635790
1/2/2005	0,034495962	0,049777629	-0,052552181	-0,044626064	0,003748656	0,019030323
1/3/2005	0,054121161	0,055454588	0,055148755	0,086931836	-0,014149824	-0,012816397
1/4/2005	-0,059771380	-0,060481723	0,043347354	0,076626518	0,015302951	0,014592608
1/5/2005	-0,028597603	-0,033216291	0,009908487	0,010094323	-0,020033913	-0,024652601
1/6/2005	-0,012764435	-0,016507359	-0,022752190	-0,027198388	-0,047285178	-0,051028101
1/7/2005	0,028613518	0,045943156	0,000623026	0,001536268	-0,005956453	0,011373185
1/8/2005	0,034358562	0,029771472	-0,124885263	-0,133709590	-0,028262845	-0,032849934
1/9/2005	0,016576582	0,022473460	0,037337465	0,071943496	0,013912261	0,019809140
1/10/2005	0,022292311	0,023886165	-0,053415520	-0,047550537	-0,014399006	-0,012805153
1/11/2005	-0,008750158	0,001169679	-0,010951143	-0,022768533	0,013003001	0,022922838
1/12/2005	0,033256065	0,046719062	0,002401830	0,012669498	-0,010939786	0,002523211
1/1/2006	0,066852658	0,051601296	-0,033820114	-0,068328604	0,015767810	0,000516448
1/2/2006	0,104412574	0,120134341	-0,074236480	-0,049672726	0,014649509	0,030371276
1/3/2006	0,028220977	0,010882277	-0,009446649	0,000568776	-0,001783387	-0,019122087
1/4/2006	0,013706825	0,001934633	0,024032655	0,027126586	0,011781045	0,000008852
1/5/2006	-0,002746281	-0,002577505	-0,032540995	-0,021981540	-0,003372087	-0,003203311
1/6/2006	-0,050642652	-0,044133204	0,070199830	0,057778442	0,067987067	0,074496515
1/7/2006	-0,011500515	-0,006533527	-0,028702058	-0,033886473	-0,015894074	-0,010927087
1/8/2006	0,001729588	-0,003042573	-0,007271384	-0,015806985	-0,017475340	-0,022247502
1/9/2006	0,041284165	0,033893557	-0,051090057	-0,073039572	0,001309248	-0,006081360

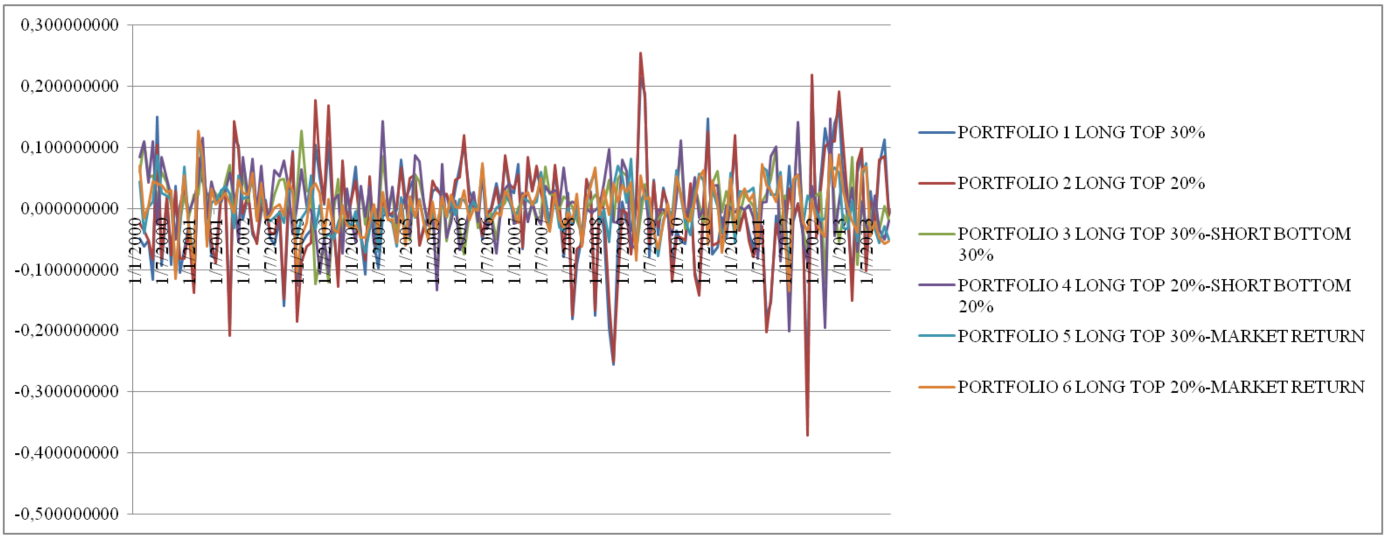
	PORTFOLIO 1	PORTFOLIO 2	PORTFOLIO 3	PORTFOLIO 4	PORTFOLIO 5	PORTFOLIO 6
Date	LONG TOP 30%	LONG TOP 20%	LONG TOP 30%-SHORT BOTTOM 30%	LONG TOP 20%-SHORT BOTTOM 20%	LONG TOP 30%-MARKET RETURN	LONG TOP 20%-MARKET RETURN
1/10/2006	0,007225421	-0,011776609	-0,000628642	-0,003486361	0,007342829	-0,011659201
1/11/2006	0,080495209	0,086738977	0,009273531	0,033157963	0,021829972	0,028073740
1/12/2006	0,032024212	0,039377407	0,040233039	0,040472391	0,011251867	0,018605062
1/1/2007	0,025808911	0,032406336	-0,024266532	-0,024031469	-0,009510662	-0,002913237
1/2/2007	0,072380960	0,054939596	0,001731050	-0,022333000	-0,006348470	-0,023789834
1/3/2007	-0,065855461	-0,063487503	0,013581094	0,024990406	0,018373655	0,020741612
1/4/2007	0,070040602	0,083886735	-0,015158037	-0,022164148	0,013158986	0,027005119
1/5/2007	0,029813555	0,028793527	0,007890752	0,010367697	0,006096910	0,005076882
1/6/2007	0,059297499	0,070239164	-0,019110488	-0,012580456	0,010600128	0,021541793
1/7/2007	0,036885952	0,026952664	-0,011649388	-0,026396206	0,059921252	0,049987963
1/8/2007	0,018549991	-0,009219976	0,068234763	0,036486934	0,013601309	-0,014168658
1/9/2007	-0,028035656	-0,032842593	0,023657401	0,026060427	-0,032226230	-0,037033167
1/10/2007	0,064585902	0,070756974	0,021555452	0,029124055	0,018735893	0,024906965
1/11/2007	-0,004949524	0,008040441	0,000215920	0,004867223	-0,029956116	-0,016966151
1/12/2007	-0,078638893	-0,072049779	0,019138776	0,066365853	-0,037638494	-0,031049380
1/1/2008	0,025688381	0,018563375	0,013695702	0,006686527	0,001134883	-0,005990123
1/2/2008	-0,181272673	-0,175288188	0,002412938	0,011746569	-0,026527731	-0,020543246
1/3/2008	-0,091706188	-0,066657187	-0,018981227	0,006612057	-0,001344119	0,023704882
1/4/2008	-0,044864559	-0,059443457	-0,041187258	-0,059253669	-0,047533050	-0,062111949
1/5/2008	0,040614126	0,048751033	-0,001254785	-0,000485470	0,004304486	0,012441392
1/6/2008	0,027427439	0,022618882	0,011557168	-0,005487897	0,042027495	0,037218938
1/7/2008	-0,174381080	-0,167098782	0,022482193	-0,003929573	0,059545573	0,066827871
1/8/2008	0,005908220	0,017096226	0,013250763	0,004152012	-0,021466826	-0,010278820
1/9/2008	-0,034389605	-0,002368718	0,005430062	0,041459827	-0,001550640	0,030470247
1/10/2008	-0,196063530	-0,152213842	0,046456046	0,096889178	-0,054410951	-0,010561264
1/11/2008	-0,255142367	-0,251154078	-0,022387294	-0,022344291	0,036895056	0,040883345
1/12/2008	-0,060337771	-0,119027722	0,048132257	-0,022993565	0,069710243	0,011020293
1/1/2009	0,011562830	-0,002192878	0,060019573	0,079497764	0,052020473	0,038264765
1/2/2009	-0,023893122	-0,006978883	0,054017974	0,061139339	0,010095099	0,027009337
1/3/2009	-0,035511182	-0,074479201	0,010010466	-0,059027953	0,081700154	0,042732135
1/4/2009	0,017693944	0,003712103	-0,068699308	-0,065854239	-0,071273214	-0,085255054
1/5/2009	0,214573201	0,255076532	-0,013402335	0,042410990	0,012942278	0,053445609
1/6/2009	0,187775860	0,178850959	0,039900435	0,028061283	0,024907142	0,015982241
1/7/2009	-0,078602644	-0,059589082	-0,019392348	-0,032391613	-0,001198146	0,017815416
1/8/2009	0,046308163	0,043291101	-0,020345809	-0,036660601	-0,033967661	-0,036984723
1/9/2009	-0,043199993	-0,030940997	-0,017141743	-0,001130405	-0,077888927	-0,065629930
1/10/2009	0,034456410	0,030081638	-0,005804484	-0,002038552	-0,019275611	-0,023650383
1/11/2009	0,000763657	0,006862493	-0,011679315	-0,011278827	0,001447412	0,007546248
1/12/2009	-0,098933737	-0,119700737	-0,015651496	-0,042754583	-0,011662610	-0,032429610
1/1/2010	-0,036806674	-0,046123248	0,034391082	0,017432076	0,062351582	0,053035009
1/2/2010	-0,052759167	-0,048321012	0,103343914	0,111562066	0,019336126	0,023774282
1/3/2010	-0,057194008	-0,051468856	-0,032742941	-0,010942657	-0,020343392	-0,014618240

	PORTFOLIO 1	PORTFOLIO 2	PORTFOLIO 3	PORTFOLIO 4	PORTFOLIO 5	PORTFOLIO 6
Date	LONG TOP 30%	LONG TOP 20%	LONG TOP 30%-SHORT BOTTOM 30%	LONG TOP 20%-SHORT BOTTOM 20%	LONG TOP 30%-MARKET RETURN	LONG TOP 20%-MARKET RETURN
1/4/2010	0,019147649	0,041170549	-0,012577753	0,003524445	-0,042650979	-0,020628080
1/5/2010	-0,104152035	-0,109623115	0,035515512	0,051407015	0,018308345	0,012837265
1/6/2010	-0,136809019	-0,142016592	0,007112769	-0,015216310	0,056595823	0,051388250
1/7/2010	-0,005470247	0,012533565	-0,022560977	-0,000634200	0,045196185	0,063199997
1/8/2010	0,146908022	0,126271683	-0,022385672	-0,015965084	-0,037800277	-0,058436616
1/9/2010	-0,074973052	-0,060708926	0,041336466	0,036572498	0,030977950	0,045242077
1/10/2010	-0,063257021	-0,056379896	0,061785529	0,037637236	0,004276629	0,011153754
1/11/2010	-0,014959133	-0,048177592	-0,005861615	-0,040705562	-0,038985181	-0,072203641
1/12/2010	-0,049594193	-0,036962886	0,027695843	0,005781234	-0,029530268	-0,016898961
1/1/2011	0,020566839	0,012520264	0,001804786	0,000559590	0,058366647	0,050320073
1/2/2011	0,102439702	0,120506831	-0,047807340	-0,005775397	-0,056126821	-0,038059691
1/3/2011	-0,022742444	-0,035712389	-0,013651666	0,002637304	0,028911579	0,015941634
1/4/2011	-0,006941149	-0,001950949	0,023369901	-0,002406374	0,027345717	0,032335916
1/5/2011	-0,038439608	-0,053686571	0,013507700	0,005503227	0,027544562	0,012297599
1/6/2011	-0,068916690	-0,078775564	0,003567810	-0,014912838	0,033507714	0,023648840
1/7/2011	-0,018137391	-0,047017233	-0,045298917	-0,081315116	-0,032369083	-0,061248925
1/8/2011	-0,032554217	-0,028952729	0,010528630	0,009597231	0,068461251	0,072062739
1/9/2011	-0,179673987	-0,202807475	0,024624490	0,010493824	0,061973955	0,038840467
1/10/2011	-0,152873923	-0,146006977	0,047602245	0,086220176	0,022700857	0,029567802
1/11/2011	-0,011854094	-0,024019797	0,098183488	0,101418031	0,022928842	0,010763140
1/12/2011	-0,054187065	-0,062107844	-0,038840669	-0,086283443	0,060003481	0,052082702
1/1/2012	-0,026558726	-0,040328572	0,020703156	0,013044775	-0,029948711	-0,043718557
1/2/2012	0,070194830	0,032568704	-0,180407637	-0,200804042	-0,096730224	-0,134356351
1/3/2012	-0,018479608	-0,014315338	0,010494302	0,000429154	0,044042775	0,048207045
1/4/2012	0,008158740	0,008452759	0,137356852	0,141008448	0,054954505	0,055248524
1/5/2012	-0,044126700	-0,040590937	-0,036006703	-0,057073288	-0,024671797	-0,021136034
1/6/2012	-0,311275655	-0,371194238	-0,072190654	-0,086446560	0,021275203	-0,038643380
1/7/2012	0,210728194	0,219106290	0,022861512	0,036134925	0,006742887	0,015120983
1/8/2012	-0,033190465	-0,047897853	0,020786006	-0,000896415	-0,006433071	-0,021140459
1/9/2012	0,050351051	0,031748588	0,027368776	-0,025252740	-0,019184601	-0,037787064
1/10/2012	0,131737089	0,100927327	-0,122231318	-0,195382224	-0,015703841	-0,046513603
1/11/2012	0,081561476	0,110209026	0,116170475	0,147382317	0,059218185	0,087865735
1/12/2012	0,140469479	0,109461132	0,001623461	-0,044970465	0,066858001	0,035849653
1/1/2013	0,160827153	0,191394934	-0,055219559	0,010942523	0,058253073	0,088820854
1/2/2013	0,041195981	0,100438139	-0,011047605	0,060339615	-0,032432749	0,026809409
1/3/2013	-0,019332222	0,012596991	-0,022766864	-0,005270715	-0,032698347	-0,000769134
1/4/2013	-0,118012521	-0,150947608	0,084087942	0,034639652	0,012554831	-0,020380256
1/5/2013	0,060422185	0,074610041	-0,092502298	-0,071105645	-0,053519773	-0,039331918
1/6/2013	0,087944550	0,098617762	0,013047841	0,011077526	0,052168475	0,062841688
1/7/2013	-0,096307709	-0,101971333	-0,034383938	-0,027433428	0,074066524	0,068402900
1/8/2013	0,028772443	0,011134883	-0,016765363	-0,040299947	-0,026850101	-0,044487661
1/9/2013	-0,033770800	-0,023370813	0,012798370	0,020538483	-0,032737070	-0,022337084

	PORTFOLIO 1	PORTFOLIO 2	PORTFOLIO 3	PORTFOLIO 4	PORTFOLIO 5	PORTFOLIO 6
Date	LONG TOP 30%	LONG TOP 20%	LONG TOP 30%-SHORT BOTTOM 30%	LONG TOP 20%-SHORT BOTTOM 20%	LONG TOP 30%-MARKET RETURN	LONG TOP 20%-MARKET RETURN
1/10/2013	0,071704095	0,080392809	-0,035983285	-0,034957863	-0,056122603	-0,047433890
1/11/2013	0,112285426	0,084854058	0,004201926	-0,050855765	-0,029712180	-0,057143548
1/12/2013	-0,009131022	-0,011492851	-0,019510419	-0,020542206	-0,051141747	-0,053503576

In the graph 1 below, the monthly returns for the whole period of our research for each portfolio are depicted.

GRAPH 1



According to the above monthly results we show the following table 3 with descriptive statistics about the returns of our six portfolios for the period of time (1/2000-12/2013) that we examine.

TABLE 3

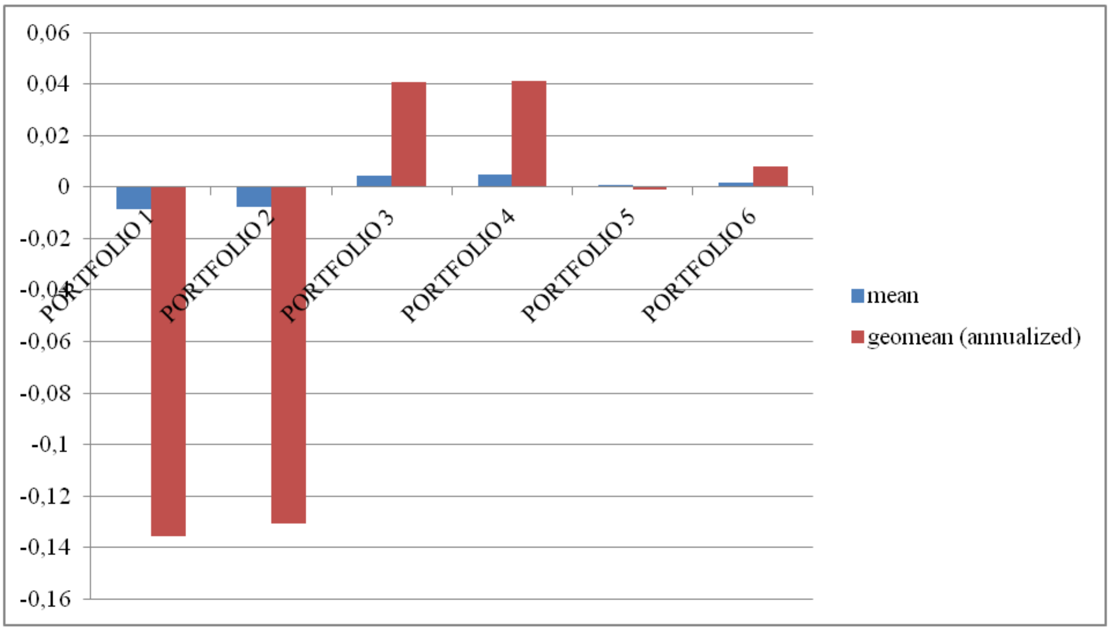
STATISTICS	**PORTFOLIO 1**	**PORTFOLIO 2**	**PORTFOLIO 3**	**PORTFOLIO 4**	**PORTFOLIO 5**	**PORTFOLIO 6**
Mean	-0,008591836	-0,007739119	0,004466258	0,004880198	0,000697957	0,001550674
geomean (annualized)	-0,135460875	-0,130669503	0,040859747	0,041384007	-0,001030486	0,008124881
standard deviation	0,081923075	0,086145834	0,047250520	0,054500129	0,039741768	0,041825855
Kurtosis	1,281828088	2,100582461	1,835951499	1,818582662	-0,041080812	0,424997900
Skewness	-0,289815926	-0,337474459	-0,386703298	-0,310509016	0,099614647	-0,240994529
median return	-0,007578358	-0,002577505	0,005484439	0,003222128	0,000988944	0,005456518

From this table we are informed that Quality minus Junk portfolios (portfolio 3 and portfolio 4) have the greater value not only according to the mean that is 0.004466258 and 0.004880198 respectively, but also according to geomean which is presented annualized. We observe that these two portfolios have a return of 4.0859747 % and 4.1384007 % which are the greater compared to the geomean return calculated for the portfolios.

Additionally, portfolio 1 and portfolio 2 have the greater standard deviation, showing that the risk of not having the specific average return is greater for these two portfolios than the other portfolios. All constructed portfolios have positive kurtosis except from portfolio 5 which has negative kurtosis. This implies leptokurtic distribution, which means fatter tails and lesser risk of extreme outcomes, whereas portfolio 5 has platykurtic distribution. In addition the greater kurtosis is calculated for portfolio 2 and the lower for portfolio 5 compared with the other results. As we notice all portfolios have negative skewness, which implies left-skewed distribution, except for portfolio 5 that has positive skewness, which implies right-skewed distribution.

Finally, in the following graph, the first two statistics, mean and geomean, are depicted for our six portfolios, so as the results of our research to be clear to the reader.

GRAPH 2



In order to continue our evaluation, we run CAPM regression for every of our six portfolios so as to examine R^2 which is a statistical measure on how close the data are to the fitted regression line. It is also known as the coefficient of determination and it is the percentage of the response variable variation that is explained by a linear model. Then we try to conduct conclusions about alpha and beta, the coefficients of regression, how they can affect the return of our portfolio and their statistical significance.

Portfolio 1

SUMMARY OUTPUT

Regression Statistics	
R Squared	0,808253599
Adjusted R Squared	0,807091500
S.E. of Regression	0,035981721
Observations	167

ANOVA

	df	*SS*	*MS*	*F-Statistic*	*Significance F*
Regression	1	0,900467876	0,900467876	695,511590	4,60413E-61
Residual	165	0,213622895	0,001294684		
Total	166	1,114090771			

	Coefficients	*Standard Error*	*t-Statistic*	*P-Value*	*Lower 95%*	*Upper 95%*
Intercept (a CAPM)	**0,001370867**	0,002809859	0,487877614	0,626284188	-0,004177047	0,006918781
Beta	**0,811722292**	0,030779055	26,372553725	4,60413E-61	0,750950722	0,872493863

From this CAPM regression we note that R^2= 0.8071 which means that 80.71 % of portfolio performance can be explained by its risk exposure, as measured by beta. Additionally, alpha, the vertical intercept tell us how much better the portfolio did than CAPM predicted, here is 0.001371 positive so portfolio did better. Finally, beta, the slope, shows that if we note a change of one unit in excess return (r_m-r_f) then our portfolio's return will raise by 0.8117. It is clear that there is positive correlation between return and risk, and beta is statistical significant since t-statistic= 26.3725>2

Portfolio 2.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,889088553
R Squared	0,790478456
Adjusted R Squared	0,789208628
S.E. of Regression	0,039551294
Observations	167

ANOVA

	df	*SS*	*MS*	*F-Statistic*	*Significance F*
Regression	1	0,973793089	0,973793089	622,5085132	6,98675E-58
Residual	165	0,258110301	0,001564305		
Total	166	1,231903390			

	Coefficients	*Standard Error*	*t-Statistic*	*P-Value*	*Lower 95%*	*Upper 95%*
Intercept (a CAPM)	**0,002621279**	0,003088612	0,848691774	0,397282402	-0,003477017	0,008719575
Beta	**0,844124888**	0,033832497	24,950120506	0,000000000	0,777324463	0,910925313

From this portfolio the results show that R^2= 0.7905 which means that 79.05 % of portfolio performance can be explained by its risk exposure, as measured by beta. Additionally, alpha, the vertical intercept tell us how much better the portfolio did than CAPM predicted, here is 0.002621 also positive so portfolio did better. According to beta, if we note a change of one unit in excess return (r_m-r_f) then our portfolio's return will raise by 0.8441. It is clear that there is positive correlation between return and risk, and beta is statistical significant since t-statistic= 24.9501>2.

Portfolio 3

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,396576372
R Squared	0,157272819
Adjusted R Squared	0,152165382
S.E. of Regression	0,043507303
Observations	167

ANOVA

	df	SS	MS	F-Statistic	Significance F
Regression	1	0,058287436	0,058287436	30,79290162	1,12310E-07
Residual	165	0,312326100	0,001892885		
Total	166	0,370613536			

	Coefficients	Standard Error	t-Statistic	P-Value	Lower 95%	Upper 95%
Intercept (a CAPM)	**0,001931535**	0,003397542	0,568509430	0,570462036	-0,004776727	0,008639796
Beta	**-0,206519391**	0,037216500	-5,549135213	1,1231E-07	-0,280001345	-0,133037436

The CAPM regression for this portfolio, which is of one of the two Quality minus Junk portfolios, results R^2=0.1522 which means that only 15.22 % of portfolio performance can be explained by its risk exposure, as measured by beta. Additionally, alpha, the vertical intercept tell us how much better the portfolio did than CAPM predicted, here is 0.001932 also positive so portfolio did better. Beta coefficient here informs us that a change of one unit in excess return (r_m-r_f) then our portfolio's return will decrease by 0.2065. It is obvious that there is negative correlation between return and risk, and beta is statistical significant since t-statistic= - 5.5491< -2.

Portfolio 4

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,309352907
R Squared	0,095699221
Adjusted R Squared	0,090218610
S.E. of Regression	0,051983564
Observations	167

ANOVA

	df	*SS*	*MS*	*F-Statistic*	*Significance F*
Regression	1	0,047185825	0,047185825	17,461415335	4,74318E-05
Residual	165	0,445878010	0,002702291		
Total	166	0,493063835			

	Coefficients	*Standard Error*	*t-Statistic*	*P-Value*	*Lower 95%*	*Upper 95%*
Intercept (a CAPM)	**0,002599599**	0,004059464	0,640379942	0,522813921	-0,005415591	0,010614790
Beta	**-0,185814302**	0,044467162	-4,178685838	4,74318E-05	-0,273612294	-0,098016309

The CAPM regression for the second Quality minus Junk portfolio, results R^2=0.0902 which means that only 9.02% of portfolio performance can be explained by its risk exposure, as measured by beta. The intercept coefficient, Alpha, here is 0.002599 also positive so portfolio did better. For the Beta coefficient we note that a change of one unit in excess return (r_m-r_f) then our portfolio's return will decrease by 0.1858.Cconsequently, we can say that there is negative correlation between return and risk and beta is statistical significant since t-statistic= -4.1787 < -2.

Portfolio 5

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,427435765
R Squared	0,182701333
Adjusted R Squared	0,177748008
S.E. of Regression	0,036037085
Observations	167

ANOVA

	df	SS	MS	F-Statistic	Significance F
Regression	1	0,047900956	0,047900956	36,88458234	8,35863E-09
Residual	165	0,214280799	0,001298672		
Total	166	0,262181755			

	Coefficients	Standard Error	t-Statistic	P-Value	Lower 95%	Upper 95%
Intercept (a CAPM)	**-0,001599859**	0,002814183	-0,568498588	0,570469378	-0,007156309	0,003956592
Beta	**-0,187217074**	0,030826415	-6,073267847	8,35863E-09	-0,248082152	-0,126351995

The CAPM regression for this portfolio show that R^2= 0.1777, which means that 17.77% of portfolio performance can be explained by its risk exposure, as measured by beta. The intercept coefficient, Alpha, here is -0.001599 negative so portfolio did worse than CAPM predicted. For the Beta coefficient we note that a change of one unit in excess return (r_m-r_f) then our portfolio's return will decrease by 0.1872.In this way, we can conduct that there is negative correlation between return and risk, and beta is statistical significant since t-statistic= -6.0733 < -2.

Portfolio 6

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,335845353
R Squared	0,112792101
Adjusted R Squared	0,107415083
S.E. of Regression	0,039515692
Observations	167

ANOVA

	df	*SS*	*MS*	*F-Statistic*	*Significance F*
Regression	1	0,032754911	0,032754911	20,976703043	9,12017E-06
Residual	165	0,257645841	0,001561490		
Total	166	0,290400752			

	Coefficients	*Standard Error*	*t-Statistic*	*P-Value*	*Lower 95%*	*Upper 95%*
Intercept (a CAPM)	**-0,000349447**	0,003085832	-0,113242357	0,909976079	-0,006442254	0,005743360
Beta	**-0,154814478**	0,033802044	-4,580033083	9,12017E-06	-0,221554774	-0,088074182

The CAPM regression for the last of our six portfolios inform us that R^2= 0.1074 which means that 10.74% of portfolio performance can be explained by its risk exposure, as measured by beta. The Alpha coefficient here is -0.000349, negative so portfolio did worse than CAPM predicted. And last but not least, for the Beta coefficient we note that a change of one unit in excess return (r_m-r_f) then our portfolio's return will decrease by 0.1548. So, we can conduct that there is negative correlation between return and risk, and beta is statistical significant since t-statistic= 4.58 >2.

Having calculated all those measures in table 2 (descriptive statistics), for each portfolio the risk adjusted measures of performance it is easier to be evaluated. The Sharpe Ratio of portfolios is calculated by dividing the excess return of each portfolio with the standard deviation of the portfolio. Sharpe ratio is annualized. Then this ratio has to be compared with the Sharpe Ratio of the Benchmark, which is Athex-Composite Index. The results for both benchmark and the portfolios are shown in table 4.

TABLE 4

	Sharpe ratio (annualized)
PORTFOLIO 1	-0,488810762
PORTFOLIO 2	-0,430841592
PORTFOLIO 3	0,327437059
PORTFOLIO 4	0,310191961
PORTFOLIO 5	0,060837592
PORTFOLIO 6	0,128429982
MARKET INDEX (BENCHMARK)	-0,469001355

The above results confirm that the portfolio 3, portfolio 4, portfolio 5 and portfolio 6 have positive Sharpe ratio, whereas portfolio 1, portfolio 2 and the Market portfolio have negative Sharpe ratio. Furthermore, Quality minus Junk portfolios (portfolios 3 and portfolios 4), performed very well due to the fact that the Sharpe Ratio of the portfolios are much greater than the Sharpe Ratio of market index and of the other portfolios too. The results seem to be promising about our strategy.

6. CONCLUSION

With the above research we constructed a Quality score for each stock included in Athex-Composite Index for the period January 2000 to December 2013. Following the Gordon Growth Model, quality stocks are profitable, safe, growing and have high payout ratio. We created definitions for these four components, which are robust, and we calculated the Quality score so as to examine the hypothesis that high quality stocks have higher prices. Then based on this Quality score, we constructed six portfolios and we calculated their monthly returns, in order to test if the Quality minus Junk portfolios have the greater returns compared to all the other portfolios for the whole period of research.

According to the portfolios evaluation that was followed during our research, we concluded that Quality minus Junk portfolios that go long high quality stocks and short junk stocks, earn significant risk - adjusted returns. Furthermore, the estimated Sharpe ratio shows the same results since for Quality minus Junk portfolios the ratio was greater not only among the other portfolios, but also comparing to the benchmark. In general, the whole evaluation that occurred in the paper above proves that the strategy we followed has the desired results and confirms our research.

To sum up, the main conclusion is that portfolios, which go long high-quality stocks and short junk stocks, earn significant risk adjusted returns and provide to the potential investors a way to hedge the risk they face. Finally, the most importance evidence from the research is that the profit that we can gain from Quality minus Junk portfolios is due to the fact that we sell the junk stocks.

In our effort to apply our strategy in Athens Stock Exchange, the problem that we have to deal with is that the short selling of stocks is not permitted. However, this can be solved with the following strategy. The way to hedge our investing risk is to sell futures over the junk stocks, instead of short selling these junk stocks that we have selected from our strategy.

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APPENDIX

The whole work that was done in this research was based on portfolio and asset management. The total amount of the securities analyzed in this research is stocks of the Athex - Composite Index. The following table shows the names of the stocks that are tested and included in the research.

	NAME	STOCK EXCHANGES
1	PIRAEUS BANK	Athens
2	TL BANK OF GREECE	Athens
3	ALPHA BANK A.E.	Athens
4	HELLENIC TELECOM ORG	Athens
5	OPAP S.A.	Athens
6	HELLENIC PETROLEUM	Athens
7	PUBLIC POWER CORP	Athens
8	TITAN CEMENT CO.	Athens
9	FOLLI FOLLIE COMM	Athens
10	JUMBO S.A.	Athens
11	MOTOR OIL SA	Athens
12	AEGEAN AIRLINES S.A.	Athens
13	ATHENS WATER SUPPLY	Athens
14	ATTICA BANK S.A.	Athens
15	ELLAKTOR S.A.	Athens
16	HELLENIC EXCHANGES	Athens
17	METKA S.A.	Athens
18	MYTILINEOS HOLDING	Athens
19	ATHENS MEDICAL CNTR	Athens
20	AUTOHELLAS	Athens
21	CENTRIC HOLDINGS S.A.	Athens
22	PLASTIKA KRITIS S.A.	Athens
23	DIAGNOSTIC	Athens
24	DROMEAS S.A.	Athens
25	ELTON S.A.	Athens
26	ELVAL - HELLENIC	Athens
27	EUROPEAN RELIANCE CO	Athens
28	FOURLIS S.A.	Athens
29	FRIGOGLASS S.A.	Athens
30	GEK TER HOLDING	Athens
31	GR. SARANTIS S.A.	Athens
32	HALCOR METAL WORKS	Athens
33	IASO S.A.	Athens
34	IKTINOS HELLAS S.A.	Athens
35	INTRACOM CONST	Athens
36	INTRACOM HOLDINGS	Athens
37	INTRALOT S.A.	Athens
38	J & P AVAX S.A.	Athens
39	KLEEMAN HELLAS S.A.	Athens
40	KLOUKIS LAPPAS S.A.	Athens
41	KORRES TURAL	Athens

	NAME	STOCK EXCHANGES
42	KRI KRI MILK IND S.A.	Athens
43	LAMDA DEVELOPMENT	Athens
44	LOULIS MILLS S.A.	Athens
45	MARFIN INVESTMENT	Athens
46	MLS MULTIMEDIA S.A.	Athens
47	NIREFS AQUACULTURE	Athens
48	PAPOUTSANIS INDS	Athens
49	PIRAEUS PORT AUTH	Athens
50	QUEST HOLDINGS S.A.	Athens
51	REVOIL S.A.	Athens
52	SELECTED TEXTILE IND	Athens
53	SIDENOR S.A.	Athens
54	TECHNICAL OLYMPIC S.A.	Athens
55	TER ENERGY	Athens
56	THESSALONIKI PORT	Athens
57	THESSALONIKI WATE	Athens
58	THRACE PLASTICS S.A.	Athens
59	TRASTOR REAL ESTATE	Athens
60	COCA COLA HBC AG	Athens