ICADE BUSINESS SCHOOL

MASTER IN FINANCE

A methodology to select an appropriate asset allocation considering a moderate risk profile portfolio

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1. INTRODUCTION

1.1. Main purpose of the research

The purpose of this research is trying to explain how to choose a right asset allocation considering a moderate risk profile portfolio. In order to do so, we will analysis different methods, ideas and approaches to identify the best combination of all these factors to choose a proper assets allocation.

We will study the profile of our client by considering the maximum risk in which he / she is able to enforce. Due the risk tolerance, the current capital situation and thanks to the investments strategies, macro and micro analysis and after applying the theory, that we are going to explain, we will able to build the best possible assets allocation's combination to improve as much as possible the return of our portfolio.

1.2. What are the reasons why

Different reasons justified why I decided to research about this topic. First, trying to identify a methodology that suits best the criteria explained by the theory of the Americans writers such as Brison, Hood and Beebower, in their masterpiece the "Determinants of Portfolio Performance", in which they research a scientific reason to the success or failure of a portfolio (Brison, Hood, Beebower, 1994).

We will go over the conclusion they reached in their book. They support the idea that the portfolio's performance depends mainly from a good asset allocation (93.6%), a smaller part from the stock picking (4.8%) and just a small part from the market timing (1.8%).

On the other hand, we will try to apply both the technical analysis, the study of the trend of financial market prices over time, and the fundamental analysis, a study which affirms that the correct price of a financial instruments is based on the intrinsic economic and financial characteristics of a company, in order to forecast future trends (Steven Achelis, 2000) (Benjamin Graham, 1949).

Looking at current world situation, with this work, we want to provide a guide and steps to follow during the asset allocation's choice. In fact, we have to take into account problems such as, the current complex political situation in Europe and the distortion of the markets around the world, due the commercial war between USA and China.

1.3. Methodology

In order to be more precise, on the followed research, the hypothetical investor would be a European investor with a moderate risk profile.

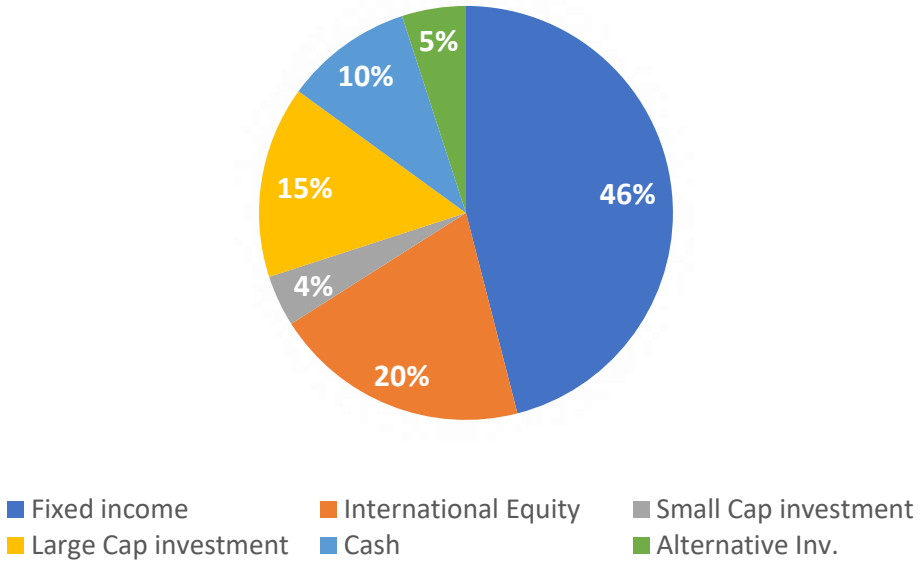
We will consider the client as "moderate", which means that he / she has a low to moderate risk tolerance and want reasonable, but relatively stable, returns and capital growth.

In the image below, it is explained the asset allocation. It represents our hypothetical portfolio.

It will be invested 46% in fixed income, 10% in cash, 5% in alternative investment, 15% in large capitalization equity, 4% in small capitalization equity and the 20% remaining in international equity. We decide to invest on these assets and with these percentages after a deeply analysis, that we will see in the following chapters, of the single characteristics of the assets.

Summarising the research, that will be explained in the following pages, we can briefly say that:

- Fixed income supports and offsets potential volatility anomalies that could influence the portfolio and low correlation with the equity asset;
- Equities help us to increase the return of the portfolio;
- Cash protects us from potential return reductions;
- Alternative investments helps us to keep a low risk reduction in the portfolio due to the low correlation with the rest of the asset.



Source: own elaborated data

Finally, its time horizon is long term. It is because, that allows us to adapt our strategy following the market situation and so modified properly the view asset allocation in a different one through a tactical asset allocation.

After defining the mentioned asset allocation, we will mainly use a qualitative approach, which means studying the macro market variables, which can influence the assets allocation that we want to use, with the help of a quantitative one, by using some statistical models.

1.4. Structure

The thesis will start with a review of what a portfolio is, with all the consequences arising from it, such as the portfolio management and the differences between active and passive management.

Then, we will review some concepts related with the expected return and the consequent risk, CAPM and an explanation of what diversification is and based on.

We will continue briefly describing the different possible asset classes, and give a quickly explanation of all the different characteristics that bend them together.

Then, we will go to analyse the data that it was obtained from the portfolio and comparing with the benchmark in order to take a look of the possible advantage that we obtained following the approach, that we will speak during the entire thesis, to build the portfolio.

At the end, we will explain the conclusions gather trough the research.

2. Theoretical Framework

2.1. What is the definition of a portfolio

A portfolio is a group of financial assets that trades and combines all those assets together in all the different types, close-end and open-end.

Financial assets, according to the definition from the International Financial Reporting Standards (IFRS), may include cash, equity instruments of another equity (a share certificate, for example), a contractual right to receive a financial asset from another entity (receivables), a contractual right to exchange financial assets or liabilities with another entity under favourable conditions or a contract that will settle in an entity's own equity instruments. (International Financial Reporting Standards, IFRS 9).

However, a financial asset represents all kind of tangible and intangible liquid assets that get their value from a contractual claim. For instance, public equity (small medium and large cap), fixed income, commodities, currencies and cash equivalent, and all the funds related with those assets.

Many of the investment products, that we mentioned above, are not one single product traded but are instead a collection of individual products. Those are funds.

Mutual funds are open-end investment companies, corporations, or trusts whose sole business is to make investments on behalf of individuals and institutions sharing a common investment goal. A fund's aim is investing and managing the investments of the participant, better than individual investors could do for themselves. It is made up of the capital contributed by different investors or participants who invest jointly through a manager who decides which assets to buy, both financial and non-financial, from a wide range. Mutual fund can invest in a wide range of financial products ranging from stock, bonds, derivatives, currencies, but also in non-financial products such as real estate. The investment portfolios of mutual funds typically are managed by separate entities known as "investment advisers". (Sharpe, 1966).

Continuing to clarifying some important concept, an open-end fund is a mutual fund that issues unlimited shares of investments in stocks and/or bonds.

Open-funds do not have restrictions on the amount of shares the fund can issue, so they have unlimited shares issued by the fund. Investors simply buy shares from and liquidate the investment through the investment company at NAV at the trading ends date; in the case of these funds the sale of shares takes them out of circulation and buying shares creates new ones.

Shares in these funds are redeemable when investors want to cash out their shares, they sell them back to the funds at NAV, the fund may sell some of its investments to pay the investor. The shares in these funds do not trade in a secondary market or on any organized exchange; instead, investors purchase shares from the company. (Luenberg, D., 2013)

Closed-end funds (CEFs) may look similar to the previous one, but they have actually very different features that differentiates them. First, the latter is launched through an IPO in order to raise money and then traded in the open market; it could remind stocks or ETF. To resume, it only issues a set amount of shares, their value is also based on the NAV as in the open-end funds.

A portfolio may consist, as we previously highlight, on different investments, which are generally divided between traditional and alternative investments. Traditional assets are: equity, fixed income and monetary assets. Alternative investments are those assets that are grouped in private equity, real estate, hedge funds, structured products, commodities.

Portfolio construction requires several inputs: the current portfolio, beta, covariance estimates, transactions cost estimates, and an active risk aversion and so on. We are going to explain all these different variables in the following chapters. The problem behind a correct portfolio construction and behind the perfect distribution of asset is that, we can measure only the current portfolio with near certainty.

An important part of the portfolio construction is the asset allocation. It is the process of deciding how to distribute an investor's capital among different asset classes and different countries for investment purposes. An asset class is composed by securities that have similar characteristics, attributes, and similar risk / return relationships. A large asset class, for instance "Fixed Income," can be divided into smaller asset classes, such as Treasury bonds, corporate bonds, and high-yield bonds. The asset allocation decision is not an isolated choice but, together with all the process and elements that we are going to see, it represents a component of a portfolio management process.

It is a comprehensive, coherent, top-down, strategic approach to investing that has well-established science and years of real-life superior investment results to back it up. In other words, it's bona fide, and when it comes to investing, nothing consistently beats it. (Perrucci, Miccolis, 2009).

2.1.1. Portfolio management

The process of managing an investment portfolio never stops. Once the funds are initially invested, according to the plan previously contracted, the real work begins by monitoring and updating continuously the status of the portfolio and meeting the investor's needs.

Usually the portfolio management process is divided in four-step.

The first step in the process is to develop an investment policy statement, or plan, that will guide the manger to all the eventual future decisions.

In the second step of the portfolio management process, the manager should have to study regularly the financial and economic conditions and forecast future trends. The investor's needs, as reflected in the policy, statement and financial market expectations will mutually determine the investment strategy. In an active strategy, which considers that economies are dynamic and that they are affected by numerous industry struggles, and changing in politics, demographics and sociality, the portfolio will require, as said before, constant monitoring and updating to reflect changes in financial market.

The third step of the portfolio management process is to construct the portfolio itself. With the investor's policy statement and financial market forecasts as input, the manager implements the investment strategy and determines how to allocate the available capital amount across the different asset classes, and securities and in eventual different countries. This step will minimize the investor's risks while meeting the needs specified in the policy statement.

The fourth step in the portfolio management process is the ongoing monitoring of the investor's needs and capital market conditions and, when necessary, in an active strategy (it will be discussed

in the following paragraph) updating the policy statement. Based upon all of this, the investment strategy is being constantly reviewed to best adapt it. An important component of the monitoring process is to evaluate a portfolio's performance and to compare the relative results to the expectations and the requirements listed in the policy statement. (Frank K. Reilly, Keith C. Brown, 2002).

2.1.2. Passive and active management

As previously mentioned, there are different types of portfolio management. The most used are: passive management and active management.

The passive strategy is typical used by those who consider that the market is efficient, even if not in a perfect way. It replicates a benchmark and tries to do exactly what the specific benchmark does. The rule of this strategy is to mix the securities in order to obtain the desired combination of risk-return, avoid the effort to beat the market by trying to identify stocks below and overvalued, follow in principle the policy of buy and hold that minimizes management costs and costs for transactions. In its pure and simple form, the passive management strategy determines the purchase of all the shares with weights corresponding to their market share capitalization. (Grinold, R. and Kahn, R., 1999).

Technically the portfolio, thus constructed, must be maintained for medium to long periods, without trading activities, with a view to a return similar to that of the entire market and exposed to the same risk. Passive management also requires the intervention of the manager but the way it operates is different from the classic way of active portfolio management.

The Passive portfolio manager's investment policy is usually influenced almost just by the performance of a benchmark, whereby the manager does not behave "actively", he / she does not make a decision on which shares or bonds or other financial instruments to buy. The manager replicates a benchmark, a reference index.

In the case of passive management, the changes in the portfolio will be due exclusively to transactions upstream of the index, such as for example the change in the composition of the index itself.

On the other hand, the active strategy is typical of those who reject the hypothesis of the efficiency of the market. This strategy is based on the concept that, there are undervalued and overvalued prices and it is possible to identify them through an accurate analysis. The main idea bases its foundation on the gap between market price and intrinsic value that is not maintained. In fact, transactions are frequent in an attempt to anticipate the movement of market securities. Active management consists of holding a portfolio with a different composition than that characterizing passive management. Diversity is linked to projections and estimates of the future. (Grinold, R. and Kahn, R., 1999).

The active policy is based on an antithetical assumption to the theory of market efficiency. The market prices of financial instruments do not constitute the best estimate of the intrinsic value and consequently, uses a careful market analysis and a careful research analysis of misprices.

In addition to this, it uses a strategy of a constant investment and disinvestment, depending on the different upward and downward phases of the prices, makes possible to beat the market.

2.2. Credit Risk

Credit risk is the possibility of a loss resulting from a borrower's failure to repay a loan or meet contractual obligations.

Credit risk is a common component of some assets classes, and considering this, it affects the investment choices of all the different members such as banks, financial intermediaries and investors, in particular, in bond securities.

As a general rule, it is noted that the higher the credit risk, the higher the interest rate required by the purchaser of the licence as compensation for the greater exposure to this high risk.

The main reasons that influence the credit risk are the economic cycle and events linked to the debtor (in this case, issuer risk or specific risk). General speaking, we can assume that the credit risk is reduced in periods of economic expansion, while it increases in periods of recession.

In the event, that the issuer is not able to repay the contracted debt (repayment) or to pay the accrued interest, the rating agencies, that we will see better later, shall reduce the rating given to the issuer. Obviously, the bonds issued by companies that are riskier from the point of view of solvency and with a consequently low rating, are those that offer the highest yields, because investors are willing to take a high risk only in return of high return / remuneration.

A) Credit risk assessment.

In case of bonds, a credit risk measure consists on the rating assigned to the issuer and the securities by the debt assessment agencies. In the case of bank loans, the credit risk assessment is represented by the Class of merit assigned by the lending bank to the person who requested the loan and the loan transaction.

Another measure of credit risk is represented by the risk premium (also called credit spreads). As a general rule, the short-term securities issued by the US Treasury in U.S.A. or Germany (German Bund) in Europe are considered to be risk-free assets (in fact virtually nothing is the probability that the US Treasury or Germany will not fulfil their contractual obligations). The credit spreads is the difference between the quoted interest rate of a security and the one T-Bill issued by the US Treasury issued with similar characteristics in terms of maturity, liquidity, taxation and others. Note that premiums for credit risk tend to increase when the economy is slowing down and reducing when the economy is in the process of expanding.

B) How to manage credit risk.

Banks are protecting themselves against credit risk through a precise assessment of the solvency and reliability of those applying for a loan, or by granting loans assisted by collateral, or by constituting debt collection funds.

Investors, who intend to cover themselves from credit risk, may in particular use the diversification of their portfolio, investing in both risky securities and securities with less exposure to risk; we will deeply speak in the following chapters. A valid alternative option, both for banks and investors, to be used to efficiently manage credit risk, is the use of particular derivatives called credit derivatives.

A credit derivative is a derivative security that has a payoff, which is conditioned on the occurrence of a credit event. The credit event is defined with respect to a reference credit, and the reference

credit asset(s) issued by the reference credit. If the credit event has occurred, the default payment has to be made by one of the counterparties. (Schönbucher P. J. , 2002).

The financial crises of some companies and countries in the recent years have brought attention to the assessment of the creditworthiness of issuers. The investor, in fact as we highlight different times, should choose securities with a risk profile in line with their goals.

As previously said, a tool available to every investor is the assessment given by the independent rating agencies. It allows to obtain an immediate perception of the risk linked to the purchase of a security is the rating. In fact, it expresses a synthetic judgment on the reliability of an issuer.

The most important rating agencies, born at the beginning of the last century, are Standard & Poor's, Moody's and Fitch.

The rating given by the main agencies of an issue is an assessment of the creditworthiness of an issuer - government agency, supranational entity or company - against a specific financial obligation or class of financial obligations. The rating expresses the ability of an issuer to repay and meet the payment commitments (interest and repayment of the principal) at the contracted deadlines. The characteristics of each different loan also influence the rating judgment: the duration, the type of coupon (fixed, variable and indexed) and the possible presence of guarantees. It is common practice for the rating assigned to ordinary bonds to be identified as the rating of the issuer.

The issuers, asking independently for the assignment of a rating, decide to submit to the scrutiny of the market, offering investors an objective and recognized instrument for assessing creditworthiness. As mentioned, both institutional investors (insurance companies, banks, mutual funds) and individual investors use the rating. The ever-increasing number of listed instruments and the possibility of purchasing bonds from issuers, of which there is often insufficient information, must be accompanied by a high level of information on the products. In this sense, the rating allows and helps the investors to know immediately and undoubtedly the creditworthiness of certain given bond. The rating of an issue is expressed rigidly following an analysis and mainly focusing on:

- Ability of the issuer to meet the financial commitments made in the agreed terms;
- Nature of the financial commitment and ancillary guarantees;
- Rights of the obligation with respect to other issues of the same company.

2.2.1. Expected return and risk

To better understand what we previously said, it is a good idea starting with a simple but often ignored concept considering the building of a portfolio: the expected return.

The investor expects a return from any financial asset for one main reason, briefly because it deprives itself of the availability of its money for a certain period during which it cannot spend them. So, the compensation coming from the investment, it will go to compensate the investor for his initially sacrifice of deprive from the capital.

However, the longer the investor loses the availability of his money the higher should be the remuneration that he will receive from the issuer. This is why generally longer are the financial assets more profitability they are and vice versa with the short-term maturities instruments.

In addition to what just said, if the investor risks to do not being able to regain possession of his money or to be able to regain possession of only a part of it, then, the expected reward for his renouncement will be even greater. This is the reason why the certain securities, of less reliable issuers, have higher returns than those issued by bodies considered more solid.

When we talk about risk, we have to keep in mind that very often we are referring to something very precise that ordinary savers, who go to invest their own money, don't know. Risk is suggested in terms of the idea of a “set of triplets”. The definition is extended to include uncertainty and completeness, and the use of Bayes' theorem is described in this connection. The definition is used to discuss the notions of “relative risk”, “relativity of risk”, and “acceptability of risk”. (Kaplan, S., Garrick, B. J., 1981)

Generally, we could say that risk, in finance, expresses the probability of obtaining a different return than expected. Therefore, this return could be higher than the expectation or even negative. Using an example, we can say that if we invest €1000 in a risky investment that gives me a return, for example, 5%, the risk is that by making this investment it may have arrive to a negative return. This adverse event can occur for several reasons, each of which identifies a type of risk. The principle is very simple and easy to keep in mind: the higher the risk, the higher the yield must be.

What is the risk? And how can it be measured? Risk implies future uncertainty about deviation from expected earnings or expected outcome. Risk measures the uncertainty that an investor is willing to take to realize a gain from an investment. From a general point of view, the risk could be defined as the probability that in a certain period of time the yield may diverge from the expected return. (Economic Times).

The risk can be detected analytically or synthetic. The "analytical" risk is the variability of the results explained a priori by the intrinsic characteristics of the titles examined; for example, for bonds it is the rating or the Duration. The "synthetic" risk is the variability of the results explained a posteriori by the interaction of various market factors (equity and debt securities, specific and generic risk, issuer risk, interest rate risk, effects of diversification, liquidity, exchange rate); it is also called market risk.

The generic (or systematic) risk cannot be eliminated and it is measured by the Beta coefficient; by definition the market Beta is set equal to one. The specific risk can be eliminated and is measured by the Alfa coefficient; this is the part of volatility explained by the particular characteristics of the security and/or of the economic sector under consideration. (Reilly, F. K., Brown, K. C., 2002)

An investor typically is not completely certain of the income to be received or when it will be received. Investments can range in uncertainty from risk-free securities, such as T-bills, to highly speculative investments, such as the common stock of small companies engaged in high-risk enterprises. Usually, investors expect to be properly compensated for risk they undertake in the form of a risk premium, or additional returns above the rate of return on a risk-free investment such as U.S. government-issued securities. This increase in the required rate of return is the risk premium (RP). The required risk premium represents a composite of all uncertainty; it is possible to consider several fundamental sources of uncertainty. In this section, we identify and discuss briefly the major sources of uncertainty, including: business risk, financial risk (leverage), liquidity risk, exchange rate risk, and country (political) risk. (Reilly, F. K., Brown, K. C., 2002).

It depends everything on the level of the return-risk that the managers or investors want. Managers can also using the different correlation of the different asset to minimize as much as possible the

risk of the portfolio trough the diversification. Many different types and combination can be used to diversify the portfolio. The mainly is a quantitative approach using the macro difference and correlation between all the different kinds of financial instruments. For instance, liquid monetary reduced the correlation with fixed income securities and equities; hedge funds is low correlated with all the traditional assets that we mentioned before; commodities in general assure a positive risk reduction in portfolio due to low correlation with the rest of the assets.

2.3. CAPM

Risk and expected return are, in this way, the key players in the round of active management. Related to this, a significant hypothesis and idea is played by the CAPM model.

The CAPM is not the only possible forecast of expected returns, but it is, arguably, one of the most complete that, makes it one of the best. As it will show in the accompanying pages, the CAPM has withstood numerous thorough and reasonable tests since its proposition.

One option is to use historical average returns, i.e., the average return back to the stock over some past period. This is certifiably not a smart thought, for two primary reasons. To begin with, the historical returns contain a lot of simple error. Second, the universe for instance of stocks changes after some time: new stocks become accessible, and old stocks terminate or merge. The stocks themselves change after some time: profit change, capital structure may change, and the volatility of the stock may change. Historical averages are a poor option in contrast to accord conjectures.

One option that is more second renowned or hypothesis for giving expected returns is the arbitrage pricing theory (APT). It is an intriguing tool for the active manager. The arbitrage pricing theory (APT) is a multi-factor asset-pricing model depending on the possibility that, an asset's returns can be anticipated utilizing the linear relationship between the asset's expected return and various macroeconomic factors that, catch systematic risk. It is a helpful tool for breaking down portfolios from a value investing contributing point of view, in order to identify securities that might be briefly mispriced. (Investopedia)

Getting back talking about CAPM, it has an especially significant task to carry out while choosing portfolios as per mean / variance preferences. On the off chance that we use CAPM forecasts of expected returns and build optimal mean / variance portfolios, those portfolios will comprise essentially of positions in the market and the risk–free asset (with extents relying upon risk tolerance).

In other words, optimal mean/variance portfolios will contrast from the market portfolio and cash if and just if the forecast excess returns vary from the CAPM accord excess returns.

The CAPM depends on two develops, first the possibility of a market portfolio M, and second the idea of beta, β, which connects any stock or portfolio to the market. In principle, the market portfolio incorporates all sort of assets whereof spoken beforehand: such us English stocks or Japanese securities bond or currencies, etc.

Let's consider now any portfolio P with excess returns r_P and the market portfolio M with excess returns r_m. Recall that excess returns are total returns less the total return on a risk-free asset over the same time period. We define the beta of portfolio P as:

$$\beta_p = \frac{Cov(r_p, r_m)}{Var(r_m)}$$

Beta is proportional to the covariance between the portfolio's return and the market's return. It is a forecast of the future. Beta is a way of separating risk and return into two parts. If we know a portfolio's beta, we can break the excess return on that portfolio into a market component and a residual component:

$$r_p = \beta_p r_m + \theta_p$$

In addition, the residual return θ_P will be uncorrelated with the market return r_M, and so the variance of portfolio P is:

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \omega_p^2$$

where ω^2 is the residual variance of portfolio P, i.e., the variance of θ_P.

So far, no CAPM. Absolutely no theory or assumptions are needed to get to this point. We can always separate a portfolio's return into a component that is perfectly correlated with the market and a component that is uncorrelated with the market. It is not even necessary to have the market portfolio M play any special role. The CAPM focuses on the market and says something special about the returns that are residual to the market.

The CAPM states that the expected residual return on all stocks and any portfolio is equal to zero, i.e., that $E\{\theta_P\} = 0$. This means that the expected excess return on the portfolio, $E\{r_P\} = \mu_P$, is determined entirely by the expected excess return on the market, $E\{r_M\} = \mu_M$, and the portfolio's beta, β_P. The relationship is simple:

$$E(r_P) = \beta_p E(r_M) = \beta_P \mu_M$$

Implicit here is the CAPM assumption that all investors have the same expectations, and differ only in their tolerance for risk.

Notice that the CAPM result must hold for the market portfolio. If we sum (on a value-weighted basis) the returns of all the stocks, we get the market return, and so the value-weighted sum of the residual returns has to be exactly zero. However, the CAPM goes much further and says that the expected residual return of each stock is zero.

The idea behind the CAPM's assertion is that investors are compensated for taking necessary risks, but not for taking unnecessary risks. The risk in the market portfolio is necessary: market risk is inescapable. The market is the ''hot potato'' of risk that must be borne by investors in aggregate. Residual risk, on the other hand, is self-imposed. All investors can avoid residual risk.

Before we continue, we have to clarify a theory related to the market, the efficient market theory (Fama, 1965).

A market in which prices always “fully reflect” available information is called “efficient”. However as Fama demonstrated, the market is never perfectly working. In fact, it can be divided, concerning to the information reflected, in:

- Weak form, market reflect all information regarding historical prices. Technical analysis does not work.
- Semi-strong form, market reflect also all public information regarding the company. Fundamental analysis does not work.
- Strong form, market reflect all information. There are no insiders.

We can conclude that the market is not perfect and it is unpredictable; that the reason in which behind we can find the explanation of arbitrage[1].

The CAPM makes similar statements, although perhaps from a slightly different perspective. For any investor whose portfolio does not match the market, there must (effectively) be another investor with exactly the opposite deviations from the market. So, as long as there are no "greater fools," we should not expect either of those investors to outperform the market. Efficient markets theory argues that there are no "greater fools" because market prices reflect all useful information.

The CAPM is about expectations. If we plot the CAPM-derived expected return on any collection of stocks or portfolios against the betas of those stocks and portfolios, we find that they lie on a straight line with an intercept equal to the risk-free rate of interest i_F and a slope equal to the expected excess return on the market μ_M. That line is called the security market line.

After all the ability to decompose return and risk into market and residual components depends on our ability to forecast betas. The CAPM goes one step further and says that the expected residual return on every stock (and therefore every portfolio) is zero.

However, the active manager's goal is to beat the market. The CAPM states that every asset's expected return is just proportional to its beta, with expected residual returns equal to zero. Thus, the CAPM appears to be gloomy news for the active manager. A CAPM disciple would give successful active management only a 50-50 chance. A CAPM disciple would not be an active manager or, more significantly, would not hire an active manager. The CAPM can help the active manager. The CAPM is a theory, and like any theory in the social sciences, it is based on assumptions that are not quite accurate. In particular, market players have differential information and thus different expectations. Superior information offers managers superior opportunities. We need not despair. There is an opportunity to succeed, and the CAPM provides some help.

The CAPM also helps active managers by distinguishing between the market and the residual component of return. Recall that this decomposition of return does not require any theory. It requires only good forecasts of beta. This can assist the manager's effort to control market risk; many active managers feel that they cannot accurately time the market and would prefer to maintain a portfolio beta close to 1. The decomposition of risk allows these managers to avoid taking active market positions.

The CAPM forecasts of expected return will be only as good as the forecasts of beta. There are multitude procedures for forecasting beta. The simplest involves using historical beta derived from an analysis of past returns. A slightly more complicated procedure invokes a Bayesian adjustment to these historical betas. Going on we will discuss a more adaptive and forward-looking approach to forecasting risk in general and beta in particular.

As previously said few will focus on the risk. Risk is an abstract concept. An economist considers risk to be expressed in a person's preferences. What an individual investor perceives as risky may not be perceived as risky by a different one.

Moving forward, we need a symmetric view of risk. Institutional money managers are judged relative to a benchmark or relative to their peers. The money manager who does not hold a stock that goes up suffers as much as one who holds a larger than average amount of a stock that goes down.

[1] Arbitrage is to take advantage of the situation and get a gain without risk. It occurs when a security or any other instruments are purchased in one market and simultaneously sold in another market at a higher price, thus considered to be risk-free profit for the trader.

To begin with, all definitions of risk arise fundamentally from the probability distributions of possible returns. This distribution describes the probability that the return will be between 1 and 1.01 percent, the probability of a return between 1.01 and 1.02 percent, etc.

The distribution of returns describes the probabilities of all possible outcomes. As a result, it is complicated and full of detail. It can answer all questions about returns and probabilities. It can be a forecast or a summary of realized returns. Conceptually, it applies to every fund type: equity, bond, or other. Unfortunately, the distribution of returns is too complicated and detailed in its entirety

Hence, all our risk measure choices will attempt to capture in a single number the essentials of risk that are fully described in the complete distribution. Because of this simplification, each definition of risk will have at least some shortcomings. By assuming a normal distribution, we can calculate all these risk measures as mathematical translations of the mean and standard deviation. Firs,t we will discuss these alternatives without that assumption.

The standard deviation measures the spread of the distribution about its mean. Investors commonly refer to the standard deviation as the volatility. The variance is the square of the standard deviation.

Standard deviation was Harry Markowitz's definition of risk, and it has been the standard in the institutional investment community ever since. It is a very well understood and unambiguous statistic. Knowing just asset standard deviations and correlations, we can calculate portfolio standard deviations. Standard deviations tend to be relatively stable over time (especially compared to mean returns and other moments of the distribution), and financial economists have developed very powerful tools for accurately forecasting standard deviations.

The standard deviation has some interesting characteristics. In particular, it does not have the portfolio property. The standard deviation of a portfolio is not the weighted average of the standard deviations of the constituents. This is the key to portfolio diversification. (“Richard Grinold, Ronald Kahn, 1999”).

2.4. Types of asset allocation: strategic and tactical

The strategic asset allocation is more oriented to obtaining returns in the long term, while the tactical asset allocation is more oriented in the short and medium term, seeking and adapting to changes of the financial markets.

The tactical approach consists in changing investments in different assets according to the market situation at each moment. It is based on strategic allocation, which means that strategic asset allocation will first take place, and once we have clear with what weights and in what types of assets we are going to invest (always considering the client's profile), we will proceed to carry out the Tactical asset allocation. (Reilly F. K., Brown K. C., 2002).

2.4.1. Keys for profitability

The keys to obtain a greater return on our investments would be:

1) Adjust to the customer profile;
2) Diversification;
3) Momentum;

4) Control.

This does not mean that if we do all of them we will have a positive return with total certainty, but with much greater probability than if we invest without considering this procedure. For this reason, I will explain in more detail each of them.

1) Adjust to the customer profile: it would be to adjust based on the characteristics of the saver and it could change all the times.

It may seem simple but, in practice, it is not like that. First of all, financial plans and investment needs are as different as each individual. Investment needs change over a person's life cycle. How individuals' structure their financial plan is related to their age, financial status, future plans, risk aversion characteristics, and needs.

To understand it better we can assume a general rule, the older the investor is, more he should aim for an investment portfolio that consists largely of low to medium risks investments, since his investment portfolio is likely to be larger than someone who is younger. Furthermore, he will also not be able to take in as much risk as younger counterparts due to your responsibility to his eventually family and life.

In managing savings for private investors, the financial managers must be able to find well-balanced solutions between protections and potential for returns, between short-term availability and medium-long term profitability; it is necessary to know how to interpret the market, follow its evolution, create realistic expectations for its customers in a perspective of assistance and continuous consultancy.

Regarding this issue, a very broad study could be done and there are very diverse opinions and all of them personally have their point of reason. If managers charge in relation to the benefits that they are able to return to their client, there is a risk that the manager may be tempted to incur a greater risk of investment thanks to which he can obtain a greater bonus but breaking the risk profile of the client.

On the other hand, if a fixed monthly percentage is paid, the manager may relax and not be involved in the same way as if he is fully involved and actively present on the portfolio managing due the amount that he would obtain more if the portfolio return were raising.

2) Diversification: diversification is the ideal distribution of our assets to reduce our systemic risk when investing. As we will see in the following paragraph, it is a very important factor to take into account.

A portfolio is said to be diversified when within it there are various asset classes or financial assets, in such numbers in such a way as to distribute and reduce the risk of the portfolio. It consists basically on mixing different types of investments within the portfolio to reduce the absolute impact of each individual investment on the performance of the portfolio, reducing the portfolio risk by avoiding the concentration of all the capital on a too low number of investments. To measure portfolio diversification, we can take a look the beta and volatility of the portfolio.

We can affirm that, from a theoretical point of view, the portfolio selection problem with a cardinality constraint can be regarded as Knapsack Problem (KP)[2]. The KP in its simplest version

[2] The knapsack problem or rucksack problem is a problem in combinatorial optimization: given a set of items, each with a weight and a value, determine the number of each item to include in a collection so that the total

deals with selecting some of the available goods by maximizing the overall value of the resulting combination (objective function) without exceeding the capacity of the knapsack (constraint). (Dietmar G. Maringer, 2015).

The target of this research is to reduce the non-systemic risk. It consists in the possibility of compensating the losses of certain investments, with the gains in others (as we will see later this is strictly related to the beta, volatility and diversification concepts).

The diversification should be by:

- Invest in different asset categories.
- Geography, developed countries, not developed.
- Sectors, depending on the stage of the economic cycle in which we are the strategy of the investment will change, nowadays it's better to invest more in asset which are part of technology, pharmaceutical, construction, electrical, etc.
- Time horizon, short, medium or long term.

In our study, we will focus on the diversification around three asset classes. Later, we will explain and focus on our different investments. Then, we will give the reasons why we have chosen each asset and why we have not decided to invest in other possible asset combinations.

3) Momentum: it refers to choosing the right moment both for buying and selling assets (identify the best timing). The basic and simplest investment rule is to buy cheap and sell expensive.

In its least complex terms, momentum alludes to purchasing stocks, which display past over-performance. Research demonstrates that stocks, which have shown solid execution over some characterized historical period, tend to keep on displaying solid execution for some number of future periods. It implies that financial specialists can possibly hitch a ride on solid force stocks.

Explained in easy words, if there is more demand (buyer) than supply (sellers) after some time for a specific stock, cost tends to rise higher than the normal period. In the event that there is a balance among demand and supply price will be directionless or move sideways. In the event that there is more supply than demand, at that point cost tends to drift lower.

The ideal moment of purchase will be when it is quoting at low values, and when our expectations of growth of the company are optimistic, since it may be due to their being undervalued. On the other hand, the best time to sell will be when the price will be at maximum, after having been able to collect all that price increases.

The key will be in guessing the best price of purchase and sale the greater number of times. This is the theory and it would be the perfect solution, but it is not so simple. We must keep in mind that the market does not always return to the average.

4) Control: control is of vital importance, since as we know in many cases there are market abuses.

If we go back to history, in 1995 with the case of Nick Leeson that caused the collapse of the British bank Barings to lose about 1300 million dollars by investing in Japan's Nikkei index. Like this throughout history, we have more examples of imprudence and bad investments, such as Bernard Madoff with one of the biggest Ponzi scheme of all the history, and so on.

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weight is less than or equal to a given limit and the total value is as large as possible. It derives its name from the problem faced by someone who is constrained by a fixed-size knapsack and must fill it with the most valuable items.

It is very important to know how and when keeping or ending positions on time, the good portfolio manager is one who knows how to undo positions and avoid in time a bad investment.

2.5. Macroeconomic Analysis

Now we are going to define the two most common methods used when considering fundamental analysis:

- Top - down analysis (from top to bottom).
- Bottom - up analysis (from bottom to top).

2.5.1. Top - down analysis

This analysis method obtains data by beginning to examine the most worldwide, going through more general, until the most specific variables. It centres at first around the examination and investigation of macroeconomic or political factors, which will start first by completing a political and macroeconomic investigation. Then, it must be done a sectorial examination. Lastly we touch base at the company being referred to explaining a business analysis, which drives us to estimate a theoretical value at which the company should be quoted.

2.5.2. Bottom - up analysis

The bottom - up analysis goes precisely in the inverse order than the previous one. That is, it focuses around the investigation of factors that go from the most specific one to the most generic one. This implies we are searching for a company that calls our attention and after from that point we will begin to think about it in depth.

Essentially, two basic elements for decision-making are included:

- The business, consisting on understanding in what the company is devoted, how it works and the business philosophy.
- Risk, inside the risk that we incur we can separate between two kinds:
    - Business or specific: it alludes to the value of the specific risks of the Company that we will investigate; they can be type of business, financial situation, capacity to increase profits, possible future synergies, possibility to increase its dividend, risk in countries where it operates.
    - Stock or market: it puts more accentuation on the volatility and liquidity of the stock. To put it plainly, the share of a company helps us as an indicator to check whether the organization is overcrossing the market risk.

The decision of selecting one of these methods relies upon the manager choices but also on the type of organization that we are analysing.

As an example, in the case of companies from emerging countries, the top - down method will be more useful because in this case are the macroeconomic variables are the ones that really drive the market. However, the bottom-up method will be used more frequently in developed countries and economies, since macroeconomic variables are better controlled, or at least they do not represent a risk in the short term thanks to the economic stability of the countries

2.6. Fundamental analysis and technical analysis

There are two other methods of analysis, fundamental analysis and technical analysis. Sometimes it seems that there are two types of analysis confronting each other, but on the real way, they should be two analyses that support and complement each other. Below I will explain these each individual analyses in more detail.

2.6.1. Fundamental analysis

It is based on fundamental variables, consisting on analysing all the information we can obtain from the company we are analysing, of its sectorial and macroeconomic part. It is everything about developing a very deep analysis of all business work and understanding the operation of the business itself. After this analysis, we will obtain our own value from that company, which we think is worth the company, which we call theoretical value or objective price. This type of analysis is more oriented to investments in the medium and long term. (Mateu Gordon, 2015).

Once the theoretical value is obtained, it will be compared with the market price of the shares of the company and if our estimation price is greater than the market one, we will obtain that the company is undervalued, so our recommendation will be to purchase. On the other hand, if our theoretical value is lower than the one given by the market, we will obtain that the company is overvalued, our recommendation will be to sell.

The fundamental analysis is widely accepted by most professionals and investors, and it is a method with universal validity. Although, to be as efficient and accurate as possible, it requires all kinds of possible information that we can get from the company, and as we can easily understand sometimes this process it is not as easy as it may seem.

2.6.2. Phases of the fundamental analysis process

We will start with a political and macroeconomic analysis, followed by a sectoral analysis and finally a business analysis of the company that we have reached as an option.

- Political and macroeconomic analysis: in this type of analysis we will take into account variables such as the GDP of the country in which we are investing, evolution of the consumer price index (CPI) or inflation, exchange rate in the case of investing in another currency different from the one we are using, fiscal policy and the public deficit of the country in question.

- Sector analysis: we will study variables such as the existence of entry and exit barriers to the sector, the margins of sector, the importance of the sector, the concentration's degree.
- Business analysis: using this specific study we would look at the company's financial economic situation, company financing policy, dividend policy, analysis different ratios, products and prices applied.

2.6.3. Technical analysis

It is based on the study of the prices' evolution of a security, over a specific period of time. The most common way used to achieve it, it is to work by interpreting charts. In this way you can predict the future value, and depending on this recommend buying when we project that the price will rise and recommending selling when projects that the company's price will go down. (Mateu Gordon, 2015)

This type of analysis used historical quotes and volumes of the operations, using mathematical procedures, statistics and econometric models. Thus helps us to eliminate the personal point of view that it can be created by the graphics' interpretation that could affect our forecast.

2.6.4. Differences between fundamental analysis and technical analysis

The technical analysis is relatively simple to use compared to the fundamental analysis discussed previous, which is mainly used by economists or professionals in financial markets. The reason is the easy way to obtain the data and access to the information that are public.

The technical analyst proceed to the observation of many companies of all sectors, without paying attention to their fundamentals. The important thing in this kind of analysis is the evolution of the price as opposed to what the fundamental analyst does, proceeding to the observation of few and very select companies.

The technical analysis allows an adaptation to the time horizon that we want, both in the short, medium and long term; this is not useful in a fundamental analysis approach that is best for medium and long-term investments.

2.7. Asset classes

In this chapter, we are going to see in detail the different classes of asset in which we are going to invest to build a moderate risk portfolio. We will better understand the different characteristics, the return, the risk and the consequential correlation among all these asset groups. We will start to speak about one of the most safe (the Fixed income) to end up with a different and unusual group (Alternative investments).

1) Fixed income: in fixed income we will invest 40% of my portfolio, thus complying with what it was said earlier about a conservative profile. Fixed income is a debt instrument normally issued by the States or by public and private entities. Fixed income is a type of investment security that pays

investors fixed interest payments until its maturity date. At maturity, investors are repaid the principal amount they had invested. (Investopedia)

Thanks to this instrument, the companies can diversify their funding sources, since in the past practically all the debt that the companies had were loans with banks, running the risk that if a banking crisis occurred, the company probably would declare bankruptcy.

Speaking about fixed income, we have to highlight a particular group: the High Yield Bond.

In general, high yield bonds or junk bonds are defined as an instrument characterized by a high yield and with high levels of risk. Usually their rating is identifiable from BB + down. It is an instrument for those investors who are looking for higher returns. (Brister B. M., Kennedy R. E., Liu P., 1994).

Unlike equities, high quality fixed income securities can serve as an all-weather foundation for a portfolio. This advantage can be seen even when looking at medium-term rolling returns for bonds or bond funds with capital preservation as their chief objective.

Although, losses can occur over short-term time horizons, history shows that high-quality fixed income investments can offer a measure of stability over time. Historically, they have demonstrated a very strong record of accomplishment of protecting capital. Short-term periods of losses have tended to be minor in comparison with declines in equities or a bond sector like high yield.

Through fixed income, you can benefit from:

- Interests, called coupons: these coupons are payable on a fixed or variable interest.
- Selling before maturity: when the rates fall, the price of a bond will be higher, so you will be attracted to sell and refinance cheaper, but less profitable. (In the case that interest rates fall down to 9% from 10%, we will be in better position, our bond is more attractive for new investors, so we can sell it cause it gives a 10% profitability to a value above the nominal. In addition, vice versa if the interest rate goes up).

Fixed income also has investment risks. The various risks to which the fixed income faces are:

- Risk of interest: the interest rate behaves inversely with the price of the bond, as previous said.
- Investment risk: when the end of the investment comes and I want to reinvest, if the rates have gone down, I will be investing at lower profitability and at more expensive prices which is good for the company but not for investors.
- Risk of inflation: inflation will rise more than our profitability. In this case, we would be incurring year after year in losses of my purchasing power.
- Exchange rate risk: This risk will only be those investors in foreign currency. Possible currency variations may have an impact on the final profitability of the bond.

The advantages of fixed-income investment include:

- Investments without or with a low risk. Whenever we talk about countries like USA, Germany, or consolidated companies with high ratings, the probability of failing will be almost zero.
- Collect coupons, which will report you a fixed monthly income.
- It is a liquid instrument in the market.

2) Shares equity: we will invest in Large and Small-Medium capitalization. Here the target would be to diversify this group of asset investing depending on the geographical area and the sector in which the company operates.

The shares can be defined as the percentage of the company that allow the investor to benefit of the distribution and dividend of the company.

Using the shares the investor can generally earn through two different way:

- Via dividends: certain companies have dividend policies, which consist to distribute fixed benefits at the end of the year, quarterly or four-monthly basis. It's an annual fixed income that does not depend at all from what our action does and so in this way we could earning money even if the price of our stock falls.
- Via revaluation of the action: the investor, once did his studies, both analytical and fundamental, he will wait till the action increases its value. At the moment that it increase he will obtaining benefits by selling the shares in the secondary market.

As advantages of investing on equities it is appropriate to highlight:

- High liquidity in the secondary market
- Possibility of dividend sharing
- Possibility of obtaining high returns

As disadvantages, it can be mentioned:

- High volatility, is a market that must be followed daily cause it is a very speculative one.
- Unpredictable returns, not like the fixed income
- High taxation

3) Money Market: it is the trade of short-term assets. Common features for all these assets are high liquidity and low risk. They are characterized by their safety, high liquidity and flexibility. This markets' profitability is usually positive but not very high due to its short maturity period.

The most common money market assets are euro dollar deposits, negotiable certificates of deposit (CDs), banker's acceptances, U.S. Treasury bills, euro commercial paper (ECP), commercial paper, municipal notes, federal funds and repurchase agreements (repos).

4) An alternative investment can be defined as any financial asset that does not fall into one of the conventional investment categories, previously described. Most alternative investment assets are held by institutional investors or accredited high-net-worth individuals because of their complex nature, lack of regulation, and degree of risk.

Alternative investments mainly include private equity, hedge funds and commodities. Real estate is also often classified as an alternative investment.

One of the most important feature of an alternative investment is precisely the low correlation with the trend of the financial market.

As general rule, many alternative investments have a rally high minimum investments and fee structures. Alternative assets are illiquid and they may have high initial minimums and upfront investment fees but transaction costs are typically lower than those of conventional assets, thanks to lower levels of turnover.

3. Literature Review

The whole thesis is based on some main theory. As in the previously chapter discussed, the theories that support us are: the “modern portfolio theory” by Markowitz; “the efficient market theory” by Fama, “the arbitrage pricing theory” by Ross and the technical and fundamental analysis by Gordon.

The basic principle that governs Markowitz's theory is that in order to build an efficient portfolio it is necessary to identify a combination of securities in order to minimize the risk and maximize the overall return. To make this happen, the securities that make up the portfolio must be uncorrelated or, rather, not perfectly correlated.

The basic assumptions of portfolio theory according to Markowitz are as follows:

1. Investors intend to maximize final wealth and are risk averse.
2. The investment period is unique.
3. Transaction costs and taxes are null, the activities are divisible.
4. The expected value and the standard deviation are the only parameters that guide the choice.
5. The market is perfectly competitive.

The return on a financial asset is defined as the ratio between the initial capital and the profits produced by investment or purchase transactions over a specified period. Risk can be defined as the degree of uncertainty that the market expresses about the actual realization of expected returns. Both the return and the risk can be measured ex-ante or are ex-post. (Markowitz, “Modern Portfolio Theory”).

The efficient market hypothesis states that a stock market is "informationally efficient" when competition between the different participants involved in it leads to a situation of equilibrium in which the market price of a security is a good estimate of its theoretical or intrinsic price. Put another way, the prices of the debt securities (such as stocks) that are traded in an efficient financial market reflect all existing information and adjust fully and quickly to new data that may arise. If all the securities are perfectly valued, investors will obtain a return on their investment that will be appropriate for the level of risk assumed, regardless of the titles acquired. That is, in an efficient market all securities will be perfectly valued, so there will be no over or undervalued securities. The price of the assets traded in the financial markets reflects, in that situation, all the information known by the market members and all the beliefs of the investors about the future.

This hypothesis implies that it is not possible to consistently surpass the results of the market except through luck or privileged information and that the time, money and effort spent in the analysis of the intrinsic value of the securities will be useless.

Theory does not imply that investors behave rationally. The hypothesis allows some investors to overreact to the news and others to underreact. All it requires is that the reactions of investors are sufficiently random that it is not possible to obtain a profit that exceeds the market. It is possible, therefore, that the market behaves irrationally for a long period. Crash, bubbles and depressions are compatible with the hypothesis whenever this behaviour is not predictable. According to this theory, at any moment there are thousands, even millions of people in search of a small information that allows them to accurately forecast the future prices of the shares. In response to any

information that seems useful, they try to buy at low prices and sell at higher prices. The result is that all publicly available information, usable to forecast the prices of the shares, will be taken into account by those who have access to information, knowledge and the ability to process it without losing opportunity of predictable profitability. Because there are thousands of individuals involved, this process occurs very quickly. In fact, there is evidence that all the information that reaches the market is fully incorporated into stock prices in less than a minute after its arrival. (Fama, "The Efficient Market Theory")

The Arbitrage Pricing Theory (APT) is a model based on which the return of a stock is expressed as a function of the returns of a series of risk factors (i.e. factors linked to macroeconomic variables such as the price of oil or the GDP, but also factors of different nature). More strictly, in the APT the expected return of a financial asset is expressed as a linear function of a series of factors, plus a specific component of risk. The sensitivity of the expected return to changes in economic factors is known as factor loading, and is the counterpart in the APT of the beta coefficient of the capital asset pricing model (CAPM). (Stephen Ross, "The Arbitrage Pricing Theory").

In short, the CAPM establishes a relationship between the yield of a security and its riskiness, measured by a single risk factor, called beta. The beta measures how much the stock value moves in line with the market. Mathematically, the beta is proportional to the covariance between the return on the stock and the market trend; this report is summarized through the security market line.

The Technical analysis (AT) is the study of the trend of financial market prices over time, in order to forecast future trends, mainly through graphic and statistical methods. In a broad sense it is that theory of analysis (or set of principles and tools) according to which it is possible to predict the future trend of the price of a listed asset (real or financial), studying its history.

In other words, the technical analysis aims to analyse and understand, through the analysis of the graph, the price trend, which in turn reflects the decisions of the investors; moreover it is based on the fundamental assumption that, since the behaviour of the investors is repeated over time, when certain graph it conditions occur, the prices will also move accordingly. (Mateu Gordon, "Technical Analysis").

The fundamental analysis says that the correct price of a security is based on the intrinsic economic-financial characteristics of the company to which it refers. The fundamental analysis assesses the financial soundness and profitability of a company, determining the intrinsic value (or fair value) of the company. It studies all the micro and macroeconomic events that have some impact on the society under consideration. It is therefore necessary to have an overall view of the markets, of the sector in which the company operates, of its industrial plan and of its management, but above all it is necessary to have an in-depth knowledge of its financial statements, which is the primary instrument used in the fundamental analysis. (Mateau Gordon, "Fundamental Analysis").

4. Methodology and data analysis

To carry out this profitability - risk study of the asset allocation different from each other, we have used Excel as a tool, analysed and compared all the different asset classes with the most similar indices that we can obtain from the free source websites Yahoo Finance and Investing.com.

First, we have obtained all historical data from the data 31/03/2014 until 29/03/2019. We have taken 5 years of historical data to see a more representative and the most real evolution of the prices of the different indices. We consider that the bigger the sample, the closer we will get to its real evolution and the better we will get to the idea of its behaviour with respect to the market. In this way, taking a wide range of years, we are taking into account historical data of all possible phases of the economic cycle. We did not take into account the period before the 2014 because we considered that it was altered from the biggest crisis of the last century.

On the other hand, we have taken them in a daily base for different reason. First, because we decided to invest in modern and Technology Company that entered in the market only in the 2014; second analysis made by us was that considering the new business and the market volatility of those company is better to compare and to see the variation of the prices in a daily data. Thanks to the daily valuation, we were able to better measure the average of the prices' variation, since there are days when for different reason connected to the country in which the stock market does not open.

We will go to explain the reason why we decided to invest more in an asset classes instead of another one and once explained why the logic of our decision we will quickly define the indices that we want to compare with and giving some historical evolution performance in different graphs.

4.1. Investor Profile and Portfolio composition

For the portfolio investment profile, as previously announced, we shall consider a moderate risk profile investor. This implies the following hypothesis set:

Major reliance on equities, but this implies staying away from high yield companies and invest just a little amount in specific emerging markets. We decide to invest in international company which implies using different currency (USD) and so, taking the currency risk of the Dollar against the Euro, which in this period is almost stable.

In the graph below, we can see how in the last semester the trend was practically stable.

Source: Yahoo finance (23/05/2019)

Fixed income securities shall be accounted in a secondary position, playing a side position in the investment strategy, supporting and offsetting potential volatility anomalies that could influence the portfolio. I decided to invest in fixed income thanks to the low correlation with the equity asset.

Cash will keep maintained our investments in case there are potential reductions for the returns in the assets invested. It allows us to reduce the correlation with the fixed income securities and with the equities.

Alternative investments helps us to keep a low risk reduction in the portfolio due to the low correlation with the rest of the asset. This subtle entrance into alternative investments is what allows maintaining a moderate position and operating in these types of assets simultaneously.

Equity: Including international stocks provides access to a broader opportunity set via exposure to different economic conditions, demographics, and currency movements. Including international stocks within a diversified portfolio may remain appropriate longer-term and investors may see mean reversion of investment performance shorter-term as well.

- Apple: this company is the leader in the phone technology sector and during the last year increased its reserve for share. With a healthy and strong cash flows and balance sheet. The logical conclusion it is that the company would increase value for its shareholders by improving earnings per share. More importantly, thanks to its position in the market it provides a valuable protection mechanism for stock volatility.
- Morgan Stanley: The firm has seen solid earnings over the past month. The suggesting analysts are becoming a bit positive in both the short and long term. It is not only the leader in its industry currently, but it is seeing solid estimate revisions as of late, all of this suggest that it could be a very interesting choice considering Morgan Stanley stocks to have so a good pick dividends.
- Vanguard Global Equity Fund Investor Shares: The fund employs an active management strategy and so it meets our policy and it seeks to achieve its investment objective by investing primarily in equity securities of companies located anywhere in the world, this factor allows us to diversify and to don't be dependent of just a country's economy.
- Mediaset España: it is one of the major Spanish communication groups and has a high potential for growth given the significant expansion of recent years. As portfolio manager thanks to a fundamental analysis, we believe that Mediaset shares will rise in the following years studying and looking at its balance sheet. This is the main reason why we buy and we do not have intention to sell them in the following years and keep them long term until the end of the life of the portfolio.
- Ferrari: a first element, of why invest on it, is that of the brand itself; Ferrari over the years has expanded its market to many sectors, which range a lot from the original one of cars. Ferrari is history, it is technology and tradition, quality and prestige. The main reason why it was decided to invest in Ferrari shares is that the brand itself is known and renowned throughout the world. This shows positive forecasts in most cases. What can be deduced, in fact, from an analysis of the trends of the last years, is that the company appears solid and in continuous expansion on the global market. There is an excellent potential for stability and return to significantly higher levels consider is young life in the stock market.
- Eni S.p.A.: Eni shares closed the year 2018 down slightly, but since the beginning of 2019, prices have been characterized by a growth trend. Currently the trend is constant. Recent it

was signed two concession agreements on Egyptian offshore sites in the Mediterranean Sea. At the end of 2018 an oil purchase contract was signed with the National Iranian Oil Company, thanks to the resumption of commercial relations between Italy and Iran blocked before by international sanctions. This purchase agreement has a positive and long-lasting impact (let think that the estimations say the negotiations are for 100 thousand barrels of oil).

- Autogrill S.p.A: it is the world leader in the traveling catering sector. Autogrill is present with over 4200 points of sale spread across 30 countries. Investing in Autogrill shares means trying to make profits from a company that operates through concessions not only from the highway networks but also in airports, railway stations and in important museums. It means invest in the expansion of different sectors just buy shares of a single company.

LARGE CAP EQUITY: Why more in Large then in small capitalization equity? Large-cap and mega-cap stocks tend to be less volatile than mid-cap and small-cap stocks and therefore less risky. While they may not be huge wealth creators such as small / mid-cap funds, from an asset allocation perspective, large-cap funds add an element of stability to portfolios so, less return but really less risk.

Given the current situation of economy and the future expectations, large cap companies replicate the Market's Beta and the consequently positive trends of the markets. In a case of negative trends we believe the only 5% of investments in Small and Medium Cap. It will help us to mitigate the loss coming from the large cap investment.

SMALL CAP EQUITY: Small-cap equity companies offer investors more chances for growth but also confer greater risk and volatility than large-cap companies. So, investing in stocks of Smaller Companies may entail greater price volatility and less liquidity. The reason is that Smaller companies are often less-experienced executives, and limited access to capital. This makes their prospects less certain than those of blue-chip companies that everyone has confidence in and knows well.

FIXED INCOME : It is good to invest in fixed income asset because, it is an investing approach focused on preservation of capital and income. Compared to the uncertain returns and high risk come from equities both small and large, the regular return from fixed-income asset can be used to efficiently diversify our conservative allocation strategy. Fixed income will help us under different aspects: diversification from equities, capital preservation, income and inflation protection.

Funds that provide diversification from equities are optimal because they build blocks to help dampen volatility and create durable portfolios. These strategies often have had a low correlation to equities because they invest in higher quality bonds that tend to hold up well when stocks suffer losses.

- iShares 7-10 Year Treasury Bond ETF: The iShares 7-10 Year Treasury Bond ETF (the "Fund") seeks to track the investment results of an index composed of U.S. Treasury bonds with remaining maturities between seven and ten years. The Fund is subject to certain risks, including the principal risks that we previously spoke, such as trading price, yield, total return.
- iShares Core U.S. Aggregate Bond ETF: The iShares Bond "Fund" seeks to track the investment results of an index composed of the total U.S. investment-grade bond market.

- iShares Short-Term Corporate Bond ETF: The iShares Short-Term Bond Fund seeks to track the investment results of an index composed of U.S. dollar-denominated, investment-grade corporate bonds with remaining maturities between one and five years.
- Vanguard Short-Term Bond Index Fund ETF Shares: The investment seeks to track the performance of Bloomberg Barclays U.S. 1-5 Year Government / Credit Float Adjusted Index. Bloomberg Barclays U.S. 1-5 Year Government / Credit Float Adjusted Index includes all medium and larger issues of U.S. government, investment-grade corporate, and investment-grade international dollar - denominated bonds that have maturities between 1 and 5 years and are publicly issued.

CASH: Cash investment helps provide liquidity and lower the volatility of a portfolio. When investment markets (i.e. equities) become volatile, the volatility of our portfolio is tempered thanks to the cash reserves which are the EUR, the German bunds and T-Bills. The right amount of cash held in a portfolio differs depending on investment objectives and risk tolerance, but a cushion of cash may also provide peace of mind, which can reduce the chances of panic-based selling when markets get volatile. Access to cash in the portfolio during a downturn may also preclude the need the sell stocks or bonds in the event of an emergency or unplanned expense. All of these are the factors that convince me to use a 10% in the portfolio diversifying through the three main classes in the money market.

4.2. Benchmark

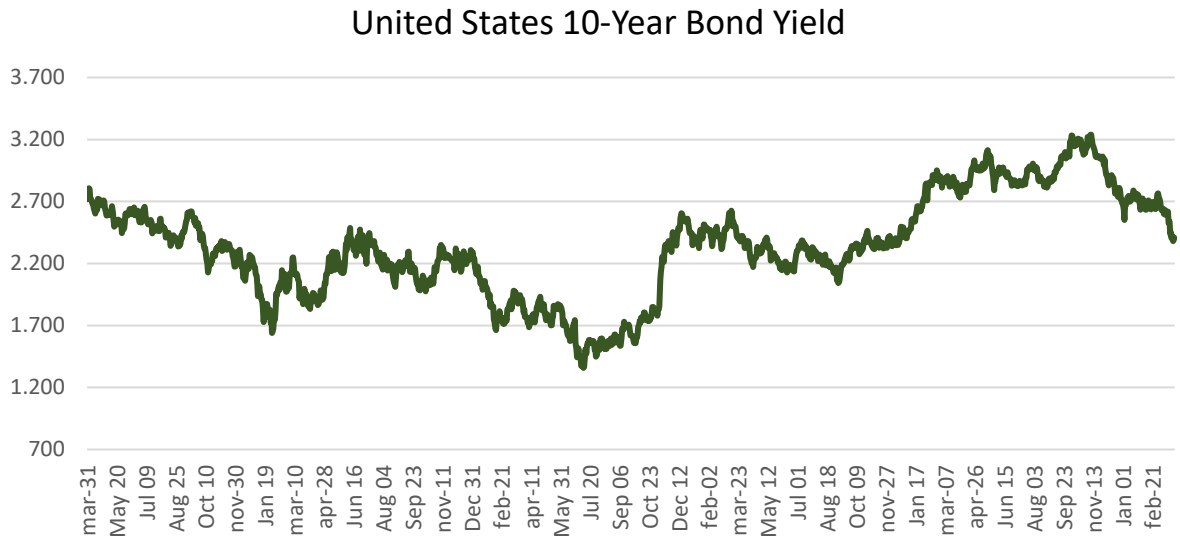
We will start considering as the benchmark to follow the Euro Stoxx 50. The Euro Stoxx 50 is the stock index of the main Eurozone companies and includes a representation of the main industrial sectors in the area. It consists of 50 titles from the 11 Eurozone countries.

We decided to use it and not an individual index for each country in the Euro Zone because we believe that, it represents the best alternative and the best solution to show the actual situation of all the main company in Europe. Considering that, all the economy in the zone are influenced by the trend of the euro the most logical decision was to compare the European equities which compose the portfolio with the index showed below.

Source: own elaborated data.

Regarding the fixed income part, we decided to use the trend of the United States 10-Year Bond Yield. It has been consider the best possible option because, all the funds, we decided to invest on, invest mainly in US bonds.

As made for the Euro Stoxx 50 index, we took the data of the United States 10-Year Bond Yield from 3/03/2017 to 29/03/2019.



Source: own elaborated data.

4.3. Data analysis

Continuing on the research, we downloaded the daily prices of the single asset that composed the portfolio and ordered them from the 31/03/2014 on, by using Excel as a tool. Once obtain the prices we calculated the daily return by using the following simple formula:

$$Return = \frac{Price_1 + Price_0}{Price_0}$$

After calculating all the returns for all the period, we decided to annualize the daily return due the simplicity and the better possibility to represent graphically. The annually profitability has been calculated using different passages.

The first passage is finding the total return of each assent during the whole time horizon previously defined.

Secondly, to calculate the day we invest on and we obtained 1259 days.

The third passage is to divided the number of the day, we invest, and divided them by 252 (they represent the possible day to invest in a year), the result represent the year that we invest and they are 4,99 years.

The last passage is to calculate the annual return of the singe asset and it has been used the following formula:

$$Annual\ return = ((1 + Total\ Return)^{\frac{1}{Years}}) - 1$$

Next, we have calculated the volatility of the assets by using the "standard deviation". This give us the volatility for the all period so that means it is necessary to transform into an annualized volatility. To do this we elevated to one divided by the years.

Observing the returns and the standard deviations of the different index, we can already getting some possible results. Below in the graph we can see in detail the annualized return and its corresponding annualized volatility for each of the assets we consider to invest on.

First of all, we can immediately see how the annualized volatility of the indices made by the fixed income, 7-10 Treasury bonds, U.S. aggregate bonds and short term corporate bonds, have really low volatilities near to zero and always below their obtained returns. Highlight the behaviour of the different assets we can notice that higher is the probability to obtain an high return (and so a high loss too) higher is the volatility related with the asset. A clear example of what we just affirmed is the return of the international equity asset "Vanguard Global Equity Fund Investor Shares" with its volatility that represents the highest between all the assets. As before said we can prove now that generally the equity class has a higher volatility compering with the fixed income class. However, the reason behind why an equilibrate investment between fixed income and equity represent the best combination possible for a moderate risk profile's portfolio that has the objective to keep sustainable losses with a medium return.

	Annual return	**Annual Volatility**
Apple	-25,82%	60,90%
Eni Spa	-3,13%	24,56%
Eli Lilly and Company	-14,34%	41,47%
FERRARI	-9,27%	42,02%
iShares 7-10 Year Treasury Bond ETF	0,95%	5,15%
iShares Core U.S. Aggregate Bond ETF	0,21%	3,13%
iShares Short-Term Corporate Bond ETF	0,03%	1,10%
Mediaset España	-4,15%	28,39%
Morgan Stanley	6,25%	26,04%
Autogrill S.p.A.	0,48%	27,92%
Vanguard Global Equity Fund Investor Shares	20,01%	47,74%
Vanguard Short-Term Bond Index Fund ETF Shares	-0,13%	1,48%
Vanguard Global ex-U.S. Real Estate ETF	-10%	46,77%

Source: own elaborated data.

Once the annualized returns and volatilities obtained, we decided to create different possible scenario with different possible percentage to allocate in different portfolio. The reason behind this choice is to show that as Brinson, Hood and Beebower demonstrate in their masterpiece, the step that most influence the trend of a portfolio is the asset allocation.

We obtain three scenario different from the one described at the beginning, that we are going to call "scenario 4".

		Scenario 1	Scenario 2	Scenario 3	Scenario 4
FI	iShares 7-10 Year Treasury Bond ETF	10%	10%	5%	11,5%
	iShares Core U.S. Aggregate Bond ETF	10%	10%	5%	11,5%
	iShares Short-Term Corporate Bond ETF	10%	10%	5%	11,5%
	Vanguard Short-Term Bond Index Fund ETF Shares	10%	0%	5%	11,5%
Int. Eq.	Apple	4%	8%	8%	4%
	Eli Lilly and Company	4%	8%	8%	4%
	Morgan Stanley	2%	4%	4%	2%
	Vanguard Global Equity Fund Investor Shares	10%	10%	10%	10%
Large Eq.	Mediaset España	5%	5%	5%	5%
	FERRARI	5%	5%	5%	5%
	Eni S.p.A.	5%	5%	5%	5%
Small Eq.	Autogrill S.p.A.	5%	10%	20%	4%
Alt. Inv.	Vanguard Global ex-U.S. Real Estate ETF	10%	10%	10%	5%
	Cash	10%	5%	5%	10%

Source: own elaborated data.

The different scenario consider different risk profile, conservative, moderate and aggressive and we decide to add a different moderate risk profile's portfolio.

Once we obtain the different percentage of allocation of the different classes we calculate for the different scenario the return and the volatility of each portfolio.

	Annual Return	Annual Risk
Scenario 1	4,69%	0,39779%
Scenario 2	3,28%	0,62715%
Scenario 3	15,63%	0,70423%
Scenario 4	5,37%	0,30641%

Source: own elaborated data.

As we can see above and as we could aspect, to a higher return corresponds an higher risk.

Looking at the result, we understand that the best application and the best solution possible of different asset allocation is the Scenario 4, which corresponds to the portfolio in which we invested on.

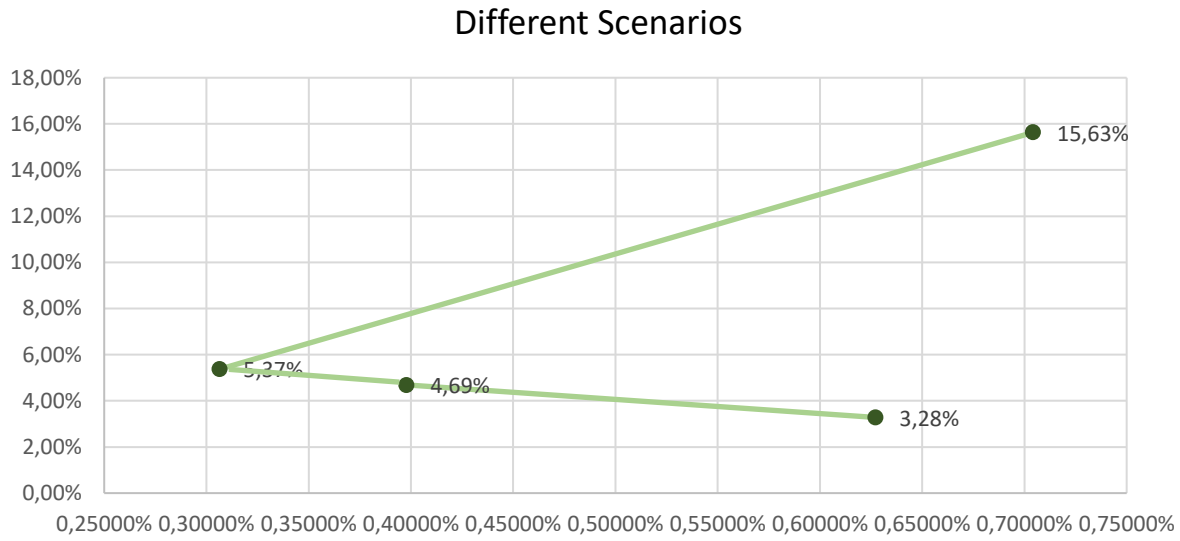
4.3.1. Markowitz model, efficient frontier

Lastly, we have calculated Markowitz's efficient frontier, to see graphically how the different scenario of the portfolios are distributed according to their profitability and risk.

Remembering, briefly, what Markowitz said. "Markowitz develops his model based on the rational behaviour of the investor. That is, the investor wants profitability and rejects risk. Therefore, for him/her a portfolio will be efficient if it provides the maximum possible return for a given risk, or equivalently, if it presents the lowest possible risk for a given level of profitability. (Zubeldia, Zubiaurre, Miera, 2002)

Efficient Frontier, also referred to as Markowitz Efficient Frontier, is a key concept of MPT (Efficient frontier/Money Terms, n.d.). It represents the best combination of securities (those producing the maximum expected return for a given risk level) within an investment portfolio (Efficient Frontier, 2010).

In the graph above, we are going to show the different scenarios of the portfolio. In the horizontal asset it is represented the risk, in the vertical one it is represented the return.



Source: own elaborated data.

Looking at the graph above, it is easy to understand that both the “scenario 1” and “scenario 2” do not represent the best option. The reason is intuitive. It is because for a higher return correspond a lower risk, represented by the “scenario 4”. To the “scenario 3” corresponds a high return with the highest risk, this is not a possible portfolio to consider because, it do not represent the moderate risk profile of the investor.

Accordingly, to what just said, the best option, considering the risk profile we described, is the “scenario 4”.

5. Conclusion

5.1. What we learned

With this work, we have put into practice many knowledge learned in the master and in the respective classes with the different professors. During the writing of the thesis, we have learned to search and select reliable and useful information, to summarize and analyse it, to manage work times in an efficient and effective way and to reach conclusions with clarity. It has also allowed us to expand our financial knowledge, and to improve our knowledge about the Excel tool and on the other hand the using of the free available source Yahoo Finance and Investing.com, unknown to me so far.

5.2. Which conclusions we obtained

We understand how is the process of choosing the different assets among all the different classes and the different factors and theories we have to consider when we decide to invest. It is worth noting that, as a conclusion, we would like to point out two main ideas:

- First, that diversification at the time of investing is important and most remarkable way when we invest in the long term. Not just the diversification, but also those we have to take into account the fundamental and technical analysis. We see how the return of our portfolio is positive in the course of the 5 years we invest thanks to the correct decision of the asset at the beginning. The key point is that asset allocation, as it was said, represents the 93.9% of the result of the portfolios trend.
- Secondly, an active managing combined with a tactical strategy of the portfolio is necessary if the market go through a period of uncertainty. The strategic asset allocation is important if we have a long vision period. As a result, we can affirm that the combination between the two strategies is the best to manage a portfolio in a long period considering the macro and micro factors, which influence the market.

6. Future research

Future research continuing from this work would be looking a different risk profile portfolio to study and to analyse if thanks to the different asset allocation, market timing and asset picking the results are the same.

We cannot take into account all the different authors with the different theory we just considered in this work because thanks to them we know in which direction we can move to work on the thesis. However, we may recommend the use of this conceptual framework for future research.

For a next future research, we may suggest to change the location of the investor. Considering for example an American investor who may invest in European equity as International Equity or to invest in German bunds as cash position.

Examining constructs (or variables) that were included in our conceptual framework (or theoretical model) but were not focused. Looking at a particular relationship aspect we do not consider and adding new construct to our theoretical model we set out.

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