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Risk Management on Internationally Diversified Portfolio

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Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, May 2018 Signature

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Abstract

This thesis focuses on portfolio performance on internationally diversified portfolio. We constructed simulated a portfolio, where diversified into two advanced markets and two emerging markets. We also discuss risk management and portfolio management essentials in these papers. Simulated portfolio is equally weighted over the four countries namely Eurozone, United States, Brazil and South-Africa by including their indices such as. The sample has been chosen over a period of five years: from the begging of 2013 to end of 2017. The goal of the simulation is to express performance of international diversified portfolio with strategies with or without hedging foreign currency exposure with forward contracts by eurozone investor point of view. We additionally mentioned correlations and its influences over portfolio, monthly behaviour performances of indices and currency indexes respect to risk and return perfective, as well as hedging strategies and regret ratio over it. We have simulated performances from the portfolios with sharpe ratio that we build with those mentioned indices under four cases such as, domestic investment, diversified but not hedged, diversifies and %50 hedge, and diversified %100 hedge portfolio.

Key words: risk management, portfolio management, portfolio construction theory, diversification, investment strategies.

JEL classification

Table of Contents

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1 Introduction

These days it is nearly impossible to find investor who doesn't recognize globalization effect on portfolio construction, hence, seeking for possibilities of gains or consequences correlated with risk management of internationally diversified portfolio is not a surprise. Whereas, whether you are responsible for a portfolio of a multinational organization or are responsible for all capital projects across the entire enterprise, consistency in how you identify, analyse, control, monitor, improve and report on risks is critical. However, when we think about internationally diversified portfolio there are many risk associated with our investment when we compare domestic wealth allocation only.

We know that by diversifying over non-positively correlated assets, one can eliminate the non-systematic risk. According to CAPM model the residual risk, i.e. the systematic risk, will be remunerated by the market, under the form of premium. Likewise; globally, by diversifying a portfolio over different non-correlated markets (countries) one will reduce significantly the volatility of his/her portfolio and realise a larger return from portfolio.

In my Master diploma thesis, I would like to study management of risk on internationally diversified portfolio by testing different scenarios in terms of markets correlations, asset allocations and risk management theories and comparing the risks and returns with correlations of markets through fully domestic portfolio to internationally diversified portfolio. Firstly, I would like to examine risk associated with global portfolio, describe and examine to overcome that uncertainties. After the understanding risk, my aim is finding methodology among portfolio management theories in terms of for creating simulation to test if investors are better-off by construct international diversified portfolio and observe different cases or possible portfolios and associate the results for efficient portfolio management. Consequently, I researched some articles and books related to portfolio theories and risk management on portfolio construction on both global and domestic markets.

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2 Literature review

2.1 Theoretical review

Wenlee Tin focuses on primary guide for risk management on international business considering the affects globalization in his book named Multinational Risk Assessment and Management (1988). He starts with international risk analyse intensively on two main categories such as policy instability which refers to the uncertainties surrounding the host government's policies and *exchange rate instability* which refers to the firm's exposure to the various effect of foreign exchange functions. Intended for identifying international political risk, the author suggests two frameworks for instance Simon's risk classification framework where this framework proposal for scheme is called 'early warning system' and according to this model, policy risk could be macro or micro based. Moreover, second framework that author suggests is one of the earlier decision-based approaches as well as Bayesian's profitability model termed Robert Stobaugh's probability framework which argues about most accepted approach for international risk evolution is cash-flow adjustment method. When it comes to exchange rate instability, author states that it could be either political or market related risk.

According to Tin, while economic exposure could have positive impact on Free Cash Flow of firm's subsidiary resulting from an unexpected variation in a country's exchange rates, whereas, transactional exposure refers to accounting procedures of converting the financial statements with taking into settlement of international transactions and could be negative or positive effects. Furthermore, if we are talking about intended for investment valuation considering risk analysis of international investment, we need be fruitful on modifying and adjusting cash flows in NPV or IRR analyses, starting from determination of cash flow through break-even probability analysis to adjusting for exchange risks. Additionally, Tin also ideas benefit of risk-

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rating services such as [1] ICRG's risk rating scheme and Sullivan's system for international risk management.

While we are directing on investment analysis we must try to understand modern portfolio theory as well which based on Harry Markowitz in his paper "Portfolio Selection," published in 1952 by the Journal of Finance. Brown, Gruber, Goetzman and Elton points on this topic with more recent view on their book termed Modern Portfolio Theory and Investment Analysis (2003) with as expected they stars on mean-variance theory through to efficient frontier and utility analysis to models of equilibrium on guidance for dynamics of assets(stocks) and markets(indeces) while creating portfolio. [2]MPT shows that a stakeholder can construct a portfolio of multiple assets that will maximize returns for a given level of risk. Similarly, given a chosen level of expected return, an investor could paradigm a portfolio with the lowest conceivable risk. Author states that reasonableness of international diversified portfolio depends on correlation coefficient across markets.

Low correlations theory suggests that international portfolio could be answer for reduce the risk of return from mentioned portfolio subsequently returns comes from internal diversification and split of return could be beneficial if we set against home market and changes in exchange rate. Return on universal portfolio can be different than domestic if we put market movements into account. Elimination changes according to how we formulate our portfolio and correlation between markets. Nevertheless, it can also differ on domicile of purchaser mainly demanding on exchange rate. Likewise, as we can see foreign exchange rate risk main risk on international portfolio.

[1] http://epub.prsgroup.com/products/international-country-risk-guide-icrg

[2] http://education.howthemarketworks.com/glossary/modern-portfolio-theory-mpt/

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Thirdly, we examine a book by Felsenheimer, Gisdakis and Zaiser namely Active Credit Portfolio Management (2006). Nevertheless, authors' principally focus is credit portfolio, the book gives us guide into risk management with portfolio strategies. They start with portfolio creation by explaining from basic of financial instruments and their valuation methods, go on types of risk that these instruments encompass. They divided risk into three categories such as finance, business and government. After these basic information, they discuss about portfolio management and portfolio modelling. Return relates to indices, spread and correlation between those as they argue correspondingly they state portfolios have chiefly faces two risks i.e. default risk that is default correlation is main factor of prices and sensitiveness change of tranches and spread risk is the difference in yield between two instruments of similar maturity but different credit quality. They also mention, basket model[3] and homogenous large portfolio model[4].

When it comes to portfolio management, asset allocation plays crucial role for success. Hence, we should consider four main elements such as individual risk aversion, regulatory framework, general structure and yield requirements. This goal could be achieved risk budgeting technic which can explain as calculation of risk case on each asset classes by considering expected return and return volatility and return correlation patterns. This model may be done thru bottom up or top-down allocation strategies.

Following phase is building blocks for successful portfolio management where they listed steps must be taken while creating portfolio such as investment targets, risk factors, economic variables, forecasting assessment, sensitiveness, portfolio optimization analysis, portfolio adjustments and performance analysis. Consequently, the book suggests key principles of portfolio management pyramid as a framework for this. Besides, authors pointed at optimal degree of diversification is a key of effective portfolio. Furthermore, they perform pragmatic research on portfolio allocation where they focus on indices which is linked to comprehend of portfolio theories and explain

[3] https://www.algodepth.com/single-post/2017/07/03/A-Basket-and-Risk-Approach-to-Portfolio-Management

[4] https://link.springer.com/content/pdf/bbm%3A978-3-642-29721-2%2F1.pdf

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why we focus on them deeply by using [5]IBoxx Euro Index dynamics and compare this index with [6]RDAX index regarding to calculations, standards and compositions. Book also mentioned Markowitz's based portfolio analysis to express historical risk structure concerning credit and curve specific allocation for sector analysis as well as suggesting hedging solutions by correlation matrix. Mentioned correlation matrix is uncertain since optimal allocation is not constant overtime where discourses strategic hedging on portfolio management. Moreover, book indicates performance measure methods namely, Tracking error, Sharpe ratio, Information ratio and Treynor ratio. Lastly, authors focus on final stage - performance analysis that return concept shows how to aggregate total returns and how those returns can be split into performance gears return attribution, henceforward, authors submit using analysis tool i.e. curve return, credit return and time value component.

Since we are focusing on portfolio construction we cannot avoid looking deeply into essentials of investing strategies. The book 'Fundamentals of Investing' by Gitman, Joehnk and Smart (2011-11th ed.) discusses types of markets and globally indexes in terms of internationally investment perspective. Before construction portfolio we must understand the market, averages and indexes which are two different concept since average reflects arithmetic average price behaviour of stocks in giving point in time while index measured by current price behaviour of a stocks in relation to base value set at an earlier point of time.

When it comes to risk of investment, it directly related to its rate of return like wisely assessing risk for our portfolio is one of the core of successful investing. Risk can be cause by many sources combination such as: business risk, financial risk, purchasing power risk, interest rate risk, liquidity risk, tax risk, market risk and event risk. Furthermore, Authors opinions portfolio could be income-oriented or growth-oriented by means of investors choice and primarily goal is having efficient portfolio where highest return for a given level of risk. Required return is rate of return grounded

[5] https://ihsmarkit.com/products/iboxx.html#factsheets
[6] https://www.finanzen.net/zinsen/RDAX-Performance-Index

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on risk assessment of investment. Historical data often provides us meaningfully basis for future expectation but not always so reliable since markets are not stabilize. We could reach efficient portfolio by using Modern portfolio theory (MPT). Hence, proceeding international diversified portfolio, we must consider exchange risk other than domestic portfolios. Authors arguments solution such as like if this risk could be hedged with contrast currency forwards, futures and options. Internationally diversified portfolio could be achieved in different way. As an example, if we think that we are US based investor we could go for 1-) foreign currency investment, 2-) US domestic investment where we can buy stock of foreign companies listed in U.S. exchanges or 3-) Investing in portfolio of US based multinational firms. Moreover, they argue that investor could go for mutual funds and hedge funds as an alternative of these ways.

Additionally, Investors must be careful while managing their own portfolios and must consider current income needs, capital reservations, capital growth, tax consideration and risk as well as asset allocation which is one of the most crucial decision while generating portfolio.

Another work *Strategic Risk Management by David Iverson (2013)* follows the idea that for efficient portfolio management its essential to understand risk of portfolio clearly and appropriately managed it beforehand. Consequently, strategic risk could be classified into seven groups like governance risk, asset-allocation risk, timing risk, asset class structural risk, manager risk, implementation risk and monitoring risk. Besides if we look most critical risks allocated with portfolio, governance risk related to management skill for creating efficient funds. Fund purpose must be clear as well as we must have investment beliefs which means consistent way of thinking about market and we should consider it because of low discipline of finance, limited data access and expected return to risk ratios. When it comes to strategic asset allocation, there are key steps that we should follow such as; making the capital market assumption (1), identifying candidate portfolio (2), modelling assets and liabilities (3), choosing a suitable portfolio (4). Still, if we want to have actively global equities structure, we have four key risk namely, active risk, style risk, management structure and market

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extensions. On Active risk and return three points marked such as index (no alpha[7]), enhanced index (low risk), fully active (high risk), while management structure, multimanager companies' equities are trustier. Whereas style risk contains choosing equity according to value, growth, market oriented or small capitalization as well as taking position index based or asset based.

According to study, we must also check global equities on market extensions. Author suggests that emerging market equity could be solution of risk since diversification benefits and greater potential for excess return. Also, the book is answering the question of why we should invest internationally as many companies influenced after shifting and development on global markets and currently global manatees more attractivity and have suitable management structures such as Apple, Samsung and Starbucks. Therefore, for catching global standards and being successful on stock market we should invest globally in other words we can call it global rivalry.

Bernd Scherer covers comprehensive alternative portfolio construction techniques from traditional methods in his book 'Construction and Risk Budgeting Portfolio (2015). This method based on mean-variance and lower particle moments approaches through Bayesian techniques to more recent developments such as portfolio resampling where it contends basis of portfolio theory and risk management for portfolios. It maintains that cornerstone of modern asset management lays on theory of mean-variance based portfolio[8] where risk measured as variance.

The book ideas successful portfolio may change in different scenarios (e.g. risk aversion) thus, utility of portfolio is constructed on efficient frontier. Efficient portfolio could be ensured by maximizing expected return for given variance or minimizing variance for given expected return. Still; author points toward substantial impact of investment universe on portfolio construction. Benefits of diversification is proven however, investors must think of how to allocate international assets. Most common

[7] https://www.forbes.com/sites/rickferri/2011/10/07/no-alpha-from-alternative-index-funds/#3ceb0a376c66
[8] https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781118182635.efm0003

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way for this is CAPM model. Typically, investors believe capitalisation weighted market portfolio is inseparably linked to the validity of the CAPM which is not true as stated in recent works. Indeed, according to book, for efficient portfolio, investors should hold the market portfolio irrespective of whether we live in single factor or multifactor world.

2.2 Experimental review

Primarily, we cannot avoid looking deeply fundamentals that one of the most famous portfolio management tool that bring author to Nobel prize which is modern portfolio theory by Markowitz's (1952). According to him, portfolio selection consists two stages. First stage starts with observation and experience, goes through relevant beliefs about future performance. Following, second stage starts with beliefs about future performance and ends with choice of portfolio. Article illustrates geometrically relations between beliefs and choice of portfolio according to the "expected returns-variance of returns" rule. Modern portfolio theory (MPT) build on this rule where, investors must have following idea which either gaining expected return by taking on variance or reduce variance by giving up expected return. Similar, the rule applies on investor should diversify his funds among all those securities which give maximum expected return. We could name this condition as expected returns-variance of returns (E-V) rule and all statistic which performed built on this condition. For fixed probability beliefs the investor has a choice of various combinations of E and V depending on his choice of portfolio**.** Suppose that the set of all obtainable (E, V) combinations where they give us reasonable portfolio choices namely as efficient in frontier.

Intensely, Next step is defining an ***isomean*** curve to be the set of all points (portfolios) with a given expected return. Similarly, an ***isovariance*** line is defined to be the set of all points (portfolios) with a given variance of return. After doing little more complex statistic, Authors confirm that we can confirm the contention that the

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isovariance lines form a family of concentric ellipses. [9]The "center" of the system is the point which minimizes V. We will label this point X. Its expected return and variance we will label E and V. Variance increases as you move away from X. The segment of the critical line from X to the point where the critical line crosses the boundary of the attainable set is part of the efficient set. Additionally, authors also support to idea of diversification after his finding about E-V rule where he believes It is necessary to avoid investing in securities with high covariances among themselves investors should diversify across industries and countries, precisely the ones have lower covariances.

Annaert had and research paper called Estimation Risk & International Bond Portfolio selection (1995) where he argues result from Jorion papers[10] (1985) exchange rate is main source of estimation risk. Hence, on this article, determinate exchange rate risk by monitoring performance of expected return estimators planned to ease estimate on risk of internationally bond is the main goal because exchange rate will more affected on bond since its less volatile than stock market.

As an empirical work Annaert tests historical mean vector, James-stein estimator and Bayes-Stein estimator with government bonds indices constructed by DataStream in close cooperation with EFFAS. The data are total return indicates rather than price indices. The series starts in 1985 and cover markets in Austria (ATS), Belgium (BEE), Denmark (DKK), France(FRF), Germany(DEM), Italy(ITL), Japan(JPY), Ireland(EEP), The Netherlands(NLG), USA(USD), UK(GBP), Sweden(SEK), Spain(ESP), Norway(NOK) and Switzerland(CHF). The local currency indices were converted to the three currencies; US dollar, German mark and Japanese yen. Firstly, author checks mean and standard deviation of bonds return from different viewpoints (e.g. USD, DEM and JPY) and looks into exchange rate fluctuations with cross-correlation and generate formula for portfolio strategy. As investment strategy, they formed TP using either ML(max likelihood), JS(James-Stein), BS(Bayes-Stein) and

[9] http://www.ftsmodules.com/public/texts/capmtutor/chp55.4.htm

[10] Predicting Volatility in the Foreign Exchange Market by Philippe Jorion - Journal of Finance, 1995, vol. 50, issue 2, 507-28

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MVP(min variance portfolio)[11]. TP is derivate from efficient frontier by using the critical line algorithm of Markowitz mean-variance theory. Meanwhile they are challenging these 4 strategy such as; 1-) usual TP estimator (by using historical data), and hedged counterparty, 2-) MVP estimator and hedged counterparty. 3-) JS estimator and hedged 4-) BS estimator and computed hedged TP. All these strategies compared with domestic and index to be able to concede whether go international or not as well as texting hedging strategies. Also, diversification is world while and all asset considered are given equal weight.

As a conclusion, all this research showed that advantages of different estimators are very situation depended, however performance of estimation risk adjusted estimators seems to be strongly influence by exchange rate fluctuations. As a result of tested investment with hedging and without hedging, author finds that hedging is not always good for investors due to empirical research its very different on different currency based investors. Disappointed result was that as long as no superior estimator available, imposing several restrictions on optimal portfolio solutions might be appreciate way to reduce risk.

Another empirical study on international diversified portfolio is papers called Assessing the Benefits of International Portfolio Diversification In Bonds And Stocks by De Saints and Sarro (2008). The aim of these papers was quantifying the degree of co-movements across assets and cross countries including the effects arising form exchange rate dynamics. Thus, they propose simple methodology to identify those countries whose assets are strongly correlated, thereby preventing gains from international diversification. They use standard equity and bond benchmark price indices which are comparable across time and countries. Risk-arbitrage relationship termed uncovered equity return parity by [12]Cappiello and Santis (2007). As a model, generalized method of moments(GMM) estimator used with monthly data over 1991-

[1111] http://statweb.stanford.edu/~ckirby/brad/LSI/chapter1.pdf

[12] WORKING PAPER SERIES NO 812 / SEPTEMBER 2007-THE UNCOVERED RETURN PARITY CONDITION 1 by Lorenzo Cappiello and Roberto A. De Santis

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2007 sample period for 18 major economies vis-a-vis the US (investor's country of residence), they identify countries' asset strongly correlated with US assets.

As a result which support their hypothesis, might yield lower diversification gains. For this hypothesis first, they use simple factor pricing model to find equilibrium for exchange rate, stocks and bonds then apply GMM estimator. Risk premia was estimated by BEKK GARCH[13] model for compute conditional covariance matrixes. When we look deeply to empirical result, we see that full diversification might be suboptimal in that diversified global portfolio cannot be achieved by using this portfolio with small number of countries only.

As market become financially integrated cross-countries correlations cross assets classes are expected to rise thus benefits of international portfolio diversification would be fall. However according to test results, there are still scope of diversification gains a for US investors. Investors are better off in constructing selected portfolio assets from such countries whose assets do not pass the co-movement test. Still, diversification do not require enormous number of countries.

Lastly papers from Thierno Mouctar Bah (2009) named Risk Management in Internationally Diversified Portfolio's studies on simulated a portfolio, which is diversified over two advanced markets and two emerging markets which equally weighted over the four countries such as; USA, UK, Mexico and South-Africa from the perspective of a Eurozone investor. The goal of the simulation is to look at the effect of using yearly rolled over forward contracts to hedge the investor's foreign currency exposure.

Before starting the simulation, the paper examines the reason behind the international diversification and argue that we could increase our portfolio's expected return and decrease volatility by adding foreign non-correlated asset. Also, it looks deeply risk related to this possible portfolio i.e.; country based risk (political decision, difficulties of capital flow transformation and different management and operational

[13] MULTIVARIATE GARCH MODELS by Eduardo Rossi - University of Pavia 2012

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activity within corporation at foreign country), industrial risk (in terms of volatility difference of each sector), world-based risk (globalization world market import that markets have been starting to correlated thus for benefits of international diversification, investor must consider non-correlated markets) and currency risk (primary risk of international portfolio due to exchange rate fluctuations). Furthermore, we must consider hedge ratio influenced by not only risk-aversion but risk-regret which means responsibility of wrong decision has been made and disappointment associated with it. (according to Solnik and Michenaud 2008[14]).

For empirical results, author tests 12 months buy and hold investment in ten years data used from 1999 to the end of 2008 by using indexes S&P 500, FTSE 100, Mexico IPC, FTSE/JSE indexes for USA, UK, Mexico and South Africa respectively. As well as checking the correlation coefficient between stock pairs, mean returns and variance (1), monthly exchange rate (2) correlation between indexes and exchange returns (3) risk premia (4). They use portfolio approach by Larsen and Resnick with hedging ratio calculated by ordinary least square (OLS)[15]. Simulation had four scenarios for portfolio such as; no diversified, diversified but not hedged, diversified and %50 hedged, diversified and %100 hedged. Also for the average performance result it had been used of Sharpe ratio theory. As conclusion; this simulated ex-post portfolio shows that investors are better off with international portfolio is more beneficial than domestic only one although ex-ante portfolio data country based elements are still important since we must consider invest into market which not correlated or low correlated due to result of CAPM researches. However, we should be careful on how considerable portfolio needed be hedge, therefore %100 hedge not always gives better results and hedge decision is related to correlation between stock exchange return and currency exchange return.

[14] Applying regret theory to investment choices: Currency hedging decisions by Sebastien Michenaud & Bruno Solnik - 2008

[15] https://www.encyclopedia.com/social-sciences/applied-and-social-sciences-magazines/ordinary-least-squares-regression

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2.3 Summary of Literature Review

In this segment, we will deliberate outcomes from literature review respecting theoretical part and empirical literature separately. For summing up what we imprisonment literature view, we could start with risk management tools and types of risk.

Firstly In theoretical part, several books were focusing on risk management on international portfolios *Multinational Risk Assessment (1998)* where author divides international risk intensively on two main categories such as policy instability which refers to the uncertainties surrounding the national policies and exchange rate instability which mentions to the firm's exposure to the various effect of foreign exchange functions. Following in *Strategic Risk Management (2013),* strategic classified into seven groups like governance risk, asset-allocation risk, timing risk, asset class structural risk, manager risk, implementation risk and monitoring risk with addition of suggestion that emerging market equity could be solution of risk since diversification benefits and greater potential for excess return. Whereas, in empirical part we see that study named *Risk Management in Internationally Diversified Portfolio (2009)* supports theoretical part and divided risk related to portfolio such as country based risk, industrial risk, world-based risk and currency risk. Hence in our studies we will focus on these risks and identify them detailed at next section. Correspondingly in article called *Estimation Risk & International Bond Portfolio selection (1985)* claims exchange rate is the main source of risk and suggest management polishes to outcome by testing government indices with James-stein estimator and Bayes-Stein estimator.

For investment strategies and portfolio construction, we preview various strategies based on modern portfolio theory, bayesian techniques, GMM estimator and performance measurements like sharpe ratio, information ratio, treynor ratio etc., both domestic and internationally investment perspective. Starting with theoretical literatures, *Modern Portfolio Theory and Investment Analysis (2003)* is following the idea of empirical research named *Modern Portfolio theory (1952)* and supporting the measurement of creating portfolio with mean-variance theory and efficient frontier

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model for dynamics of assets and markets. Both studies also declare low correlations theory suggests that international portfolio could be answer for reduce the risk.

Another theoretical work that suggest modern portfolio theory is that *Fundamentals of Investing (2011)* with discussing global portfolio construction while examine risks related to the market averages and indexes. The book named *Construction and Risk Budgeting Portfolio (2015).* was based on mean-variance and lower particle moments approaches through Bayesian techniques to more recent developments such as portfolio resampling where it contends basis of portfolio with discussing CAPM model findings. Additionally, *Estimation Risk & International Bond Portfolio selection (1995)* deliberates that main concern is to determinate exchange rate risk by monitoring performance of expected return estimators planned to ease estimate on risk of internationally. For rests historical mean vector, James-stein estimator and Bayes-Stein estimator with government bonds indices. As a result of tested investment with hedging and without hedging, author finds that hedging is not always good for investors due to empirical research its very different on different currency based investors.

Another empirical study on international diversified portfolio is papers called *Assessing the Benefits of International Portfolio Diversification in Bonds and Stocks (2008).* The aim was quantifying the degree of co-movements across assets and cross countries hence, as a model, generalized method of moments estimator used with monthly data sample for 18 major economies vis-a-vis the US and as a result which support their hypothesis reflecting also mentioned previous revisions, diversification might be beneficial for investors. Similarly, study named, *Active Credit Portfolio Management (2006)* mainly discuss credit portfolio management however, they also mention, basket model and homogenous large portfolio model and performance measure methods such as SHP ratio while mentioning importance of asset allocation. Hence, we should consider four main elements such as individual risk aversion, regulatory framework, general structure and yield requirements for portfolio management.

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3 Investment Analysis

At today's world, successful investment strategies are essential for any kind of investment both domestic or diversified with wider option of investment asset, globalization, highly volatility market dynamics as well as respect to integrated markets. Before we are starting to as well as observe risk management and portfolio construction, we must examine fundamentals of investment analysis and investment principles to achieve superior portfolio management. Thus, in this section we will discuss these two elements of investment and detect confident steps for efficient investment strategies.

3.1 Fundamentals of Investment Analysis

As we capture from literature review, investment analysis is a key for the successful portfolio management. There are common strategies harmonizing with portfolio construction rules, however before starting to create our portfolio we shall need to investigate individual performances of each investment.

Persistence to better comprehend what investment means, we must start with the definition of investment. An Investment is element assimilated with the aim of generating income or gratitude. Likewise, in finance, an investment is a monetary venture acquired for believing the idea that this venture could bring income in the future and/or investors would sold them at a premium price later for receiving profit. What we understand here is that investment could be defined as an asset to speculate profit in future by selling it or by holding it into period for acquit income. Thus, selection of investment or investment which refers to portfolio is primary apprehension for investors all around the world. Therefore, investment analysis is the tool for the procedure of evaluating an investment for effectiveness and risk. Widely, it has carrying out the decisive aim of measuring aspects of chosen investment with examine it for if it is good fit for a portfolio. Investment analysis could be used for single investment,

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portfolio that consists several investments or even for the selection and progression of possible project of corporates.

Investment analysis approaches commonly evaluate three (3) factors: risk, cash flows, and resale value. In other worlds. this tool requires to follow the steps for the process for income, threat, and profit that investment could generate in future. Whereas, in terms of assessing an investment with investment analysis tool, this three evolution factors are significant to any investor who is considering an investment, regardless of what kind of form investment is. Henceforth, for brief explanations we must consider these three factors and how to determine them. Below, we exasperated to clarify these influencers of investment analysis such as *risk, income* and *profit*.

Factor One: Risk

Risk is the first factor estimated in any investment analysis. The reason behind is very acquired by means of unsuccessful investment outcome with danger of greater loss if the risk of the investment is high. In this case, income and resale value are second gears to reflect whereas there is possibility of substantial risk and due to risk related to investment, likelihood of greater loss and decrease in value of investment occurs then inappropriately investment would worth nothing. To estimate risk, investors basically could use a distinction of this formula stated below:

***Rate of occurrence x the impact of the event* = Risk**

Even though, it is a very simplistic construal, yet helpful implement for beginner investors to capture following complicated steps in risk management. Additionally, to select investment has differs among every single investor since all investors has different risk aversion. Some of them would like to take greater risk, while others would try to avoid risk as much as possible. Thus, utility from investment strategies is highly demanded to risk aversion of investors.

Figure AA below illustrates wealth from investment and utility related to that expected wealth while examine into investors of three different risk preference. As we could interpret, a risk neutral investor is not affected by the degree of risk, so a risk

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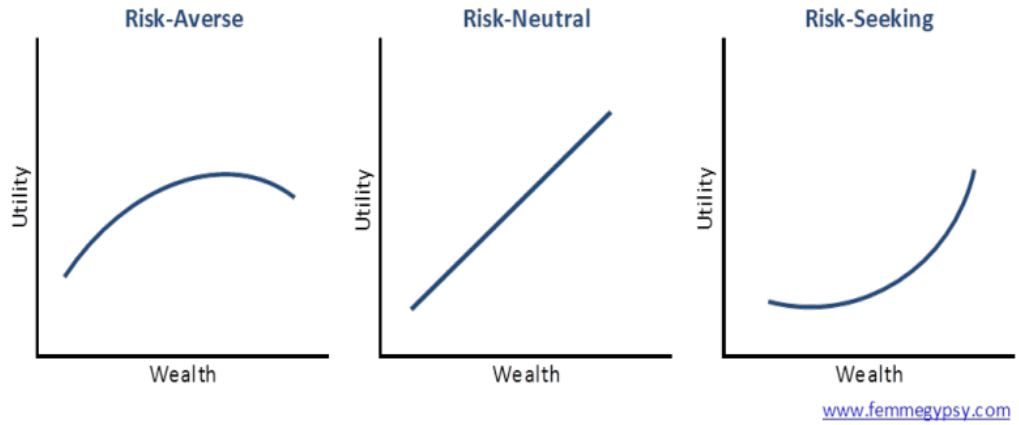
neutral party is indifferent between choices by means of if there are two investment opportunities, a risk-neutral investor would only aspects at the potential gains of investment, and ignores the potential risk. However, if you are a risk-averse investor, you will find yourself immediately leaning toward the guaranteed payment so you would be willing to avoid risk. If you are a risk-seeking investor, you would take greater risk to achieve superior gain from investment.

Figure 3A



Despite this, we should always keep in mind that the risk is not a certain factor. One must evaluate all the factors related to the investment: market, industry, governmental, company, and more. In this manner evaluating risk is as much of an art as a science. We will discuss it more widely in following sections how to calculate risk that portfolio barriers.

Factor Two: Income

The second factor of investment analysis is income analysis where we examine cash flows generated by investment for holding period. Cash flows can obtain several ways such as: interest payments on a chosen investment, dividends from a publicly traded stock, or free cash flow that generated from project within corporation. We call this cash flows that investment generated as income from investment. These several types of possible incomes are one of the methods of compensation on an investment. Therefore, it is essential for all investors to appraise cash flows to understand if the

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investment would repay them while also recompensing the expected value related to risk on the investment. As well, if investment repays, how much would be the repayments and how long would does investment would take to generate gain as return on investment.

There are many methods exist for measuring income from asset by using technic of discounted cash flow analysis. As account these methods we must recall learnings from corporate finance studies. Consequently, we could have categorized them as *average return on investment (ROI), net present value (NPV)* where measured by the difference between the present value of cash inflows and the present value of cash outflows over a period, *net present value ratio* calculated as discounted net cash generated over the discounted cash outlays, *annual annuity equivalent (EAA)* calculates the persistent annual cash flow generated by an investment over its lifecycle if it was an annuity, and lastly *Internal rate of return (IRR)* where measured as rate of return is a discount rate that makes the net present value of all cash flows from a chosen investment equivalent to zero. With these methods derived from discounted cash flow, we could also analysis and compare different investment opportunities and select best one to fir our perspective.

Investment analysis cannot be done without evaluating income generated by investment. Ignorance the analysis of cash flows could lead to not have shelter against loss of investment, thus inefficient portfolio management. For achieving superior performance on portfolio or on a single asset, all investors should analysis income generated by investments.

Factor Three: Profit

The third factor of investment analysis is profit from an investment. Profit from resale is made over a gain in the market value of the investment in that period. Therefore, profit from selling an investment has occurred when the investment is sold to another investor for a value higher than the original purchase price. It is a one of the main component of studies on risk management on portfolios. Relatively it is a last factor but not a least since most of traders in stock markets, eventually would retail their

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investments to see higher expected return by their portfolio. Likewise, this profit from investment also called as rate of return, where it is calculated by multiplying potential outcomes regarding the chances of occurrences and then summing these results for finding expected return related to risk within an investment. One can simply could analysis return from investment with formula below:

Expected Return = SUM (Returni * Probabilityi),

where i indicates each known return and its respective probability in the series.

In the process of investment analysis, an investor will want to measure the expected rate of growth on the investment to examine that the potential profit from investment and any associated income are larger than the any loss of investment while considering the estimated value of the risk of the investment. Expected return is usually calculated based on historical data, however it is not guaranteed since it is simply a long-term weighted average of historical returns and prediction of future not always is the same with the past. As we mentioned before growth from investment can related to many extents such as market, industry, governance, governmental, global etc. Thus, these factors would lead uncertainties on future expected rate of return as the investment is characteristically subject to systematic and unsystematic risks. Therefore, at this point of investment analysis, we would interpret every result together for the greater performance and utility from investment considering what we had found related those three factors we mentioned such as: risk, income and profit that investment has.

All these factors measured of investment analysis are relevant to any investment strategies: stocks on the stock market, government bonds, credit and loans, the purchase and growth of a business, or even currency trading. Nevertheless, it is significant for all investment types and investors preference with respecting every step on investment analysis that investors are aware of potential risk related to their investments where that risk is worth the take regarding to expected return from selected investment.

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3.2 Essential Investing Principles

There are vital investing principles that apply to all investors regardless if we are choosing domestic or international investment strategies. Then, we must intensely analysis these significant principles to improve our decision-making process on investment selection and strategies. All these principles that we will discuss are inter-connected, hence we must consider each of them equally and pay attention every phase for sufficient investment outcome.

First principle is time management where as an investor we must choose investment time carefully. As mentioned before growth from investment is the powerful concept that makes time the most major influence to determine the return from your portfolio. If you choose to invest in longer period, you could gain greater profit since your portfolio would compounding over time and the investments would value more when you compare short-term investment. However, it is critical to choose investment period subsequently. If you hold your investment for a way longer time, there is a chance that you would lose to opportunities to sell in higher prices at previous period since investment could mislay efficiency over time due to life cycle theory.

Secondly, you must keep your expenses lower as much as possible to so better income from your investment. High expenses either on investment project or expensive stock purchase could damage to portfolio values. Picking the investment asset that fits you the most with help of investment analysis is the essential for keeping expenses low.

Thirdly, asset allocation is one of the major factor to determine return from investment. It is the most crucial decision you can make in investing. For recall the concept of time and cost efficiency, investors worse off if they tend to buy when prices are high and tend to sell when prices are low related to be mistaken by following other investors in market as well as bad asset allocation strategies. The value investor must learn to be comfortable as an individual, an individual who thinks differently than the majority. The control is fully on you if you purchase an investment asset. One should be conservative when valuations are high, better to not invest in that moment into that investment or wait until prices get lower. Also estimating risk is again here a key factor for allocate assets for investor since weight doesn’t necessary need to be same all the

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time. This idea leads us to diversification theory of portfolio. Investment diversification in low correlated small number of assets could deliver enormous profits. We could think that, why it is not better if we invest many numbers of asset. This can be explained by optimization theory whereas the marginal benefits of adding additional investments decreases as the numbers get larger with respecting greater volatility. In some cases, portfolio diversified with too many investments perform loss since there is a possibility that the costs become greater than the benefits. Hence, whether under diversification and over diversification portfolio construct, it is a common mistake in terms of portfolio management. One should carefully select the amount of investment, as well as examine how to allocate assets within portfolio.

Lastly, investor must have greater attention to risk control strategies. Taking risk could lead investor to achieve higher profit. Investor should avoid portfolio volatility yet, lean on market volatility. Since as we know from CAPM theory we can control portfolio volatility but we cannot control the inevitable volatility of investment markets. Therefore, investors should try to get advantages from this market risk. However, portfolio volatility is an investment return killer since if one cannot control risk over portfolio, he/she would suffer loss due to market movements. Examine risks and control them must be every investor primary concern on portfolio management. We will examine risk management in following section for clarifying how to be better off regarding both systematic and unsystematic risks.

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4 Risk Management on Portfolio

The potential for a risk to have a positive or negative effect is an important aspect of portfolio management. Portfolio risk management does not mean that investors are better off if they wouldn't perform volatile investments. Yet, it implies the well-informed investor to be aware possible. As we stated before, greater risk could lead investor to superior gain, yet also can cause massive loss. The risk management assistances to determination of issues and manage to treat them as forecasted since with risk management uncertainties would be already discussed. Thus, by detecting and supervision a portfolio risks could reduce hazard over investment. We could organize risk management into 5 steps such as:

Step 1: Identify the Risk.

Step 2: Analyze the risk.

Step 3: Evaluate the Risk

Step 4: Manage the Risk.

Step 5: Monitor and Review the risk.

These steps are essential for risk management. Whereas, we must know our likely risk in order to manage them capably. Efficient portfolio management could be only thru with excellent risk management strategies. In this section, we will discuss possible risk over internationally diversified portfolio and how to shelter against them to achieve improved portfolio construction.

4.1 Unsystematic risk and Systematic risk

Unsystematic risk means diversifiable uncertainty of investment that comes with the company or industry we invested in. This type of risk can be overcome with diversification strategy, thus if we invest in different sectors, countries and companies specific risk that one asset barriers would be reduced. Consequently, as an investor

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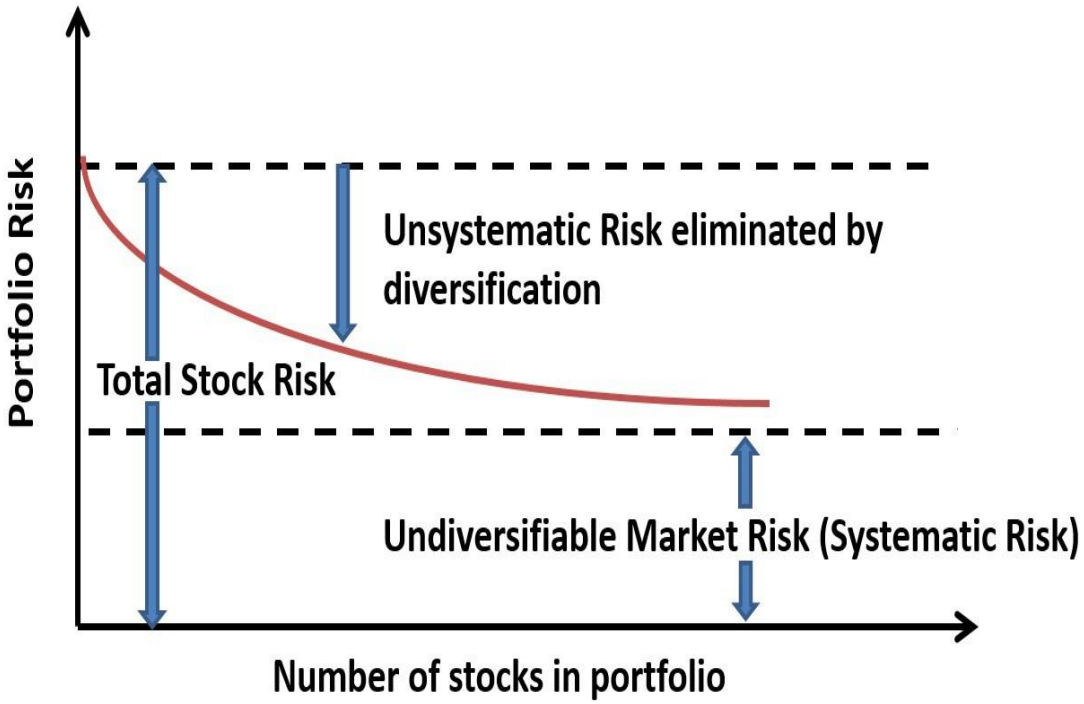
point of view for avoiding huge asset volatility we must examine all diversified risk related to investment. On the other hand, systematic risk is un-diversifiable uncertainty that market has where, the entire market would be influenced by. Similarly, within market volatility, systematic risk involves daily variations in a stock's price. In previous section we discussed that one can have benefits from market movement hence, volatility is essential for returns. The more unstable the investment the more chance that investors could obtain dramatic performance change either positively or negatively. Inflation, crisis, interest rates and wars are the sources of systematic risk. Since they affect the entire market and cannot be avoided through diversification, only hedging strategies might be helpful to overcome systematic risk.

The figure below (Figure BB) illustrates expected risk from portfolio related to systematic and unsystematic risk. As we could observe, with diversification unsystematic risk is reduced, however systematic risk in other words, market risk is stable for all the time.

Figure 4A



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Investors could obtain expected return with related risk from portfolio by usage of *Capital Asset Pricing Model (CAPM).* Elements of *CAPM* formula are:

$$Expected\ Return = r_f + \boldsymbol{\beta}(r_m - r_f)$$

$r_f = risk\ free\ rate$
$\boldsymbol{\beta} = Beta$
$r_m = return\ on\ the\ market$

The capital asset pricing model formula can be fragmented up into two parts: the risk-free rate and the risk premium of investment where risk premium is beta times the difference between the market return and a risk-free return. Beta reflects how risky an individual investment if we compared it to entire market risk and is a purpose of the volatility of the investment and the volatility in market with addition to the correlation between market and investment. Beta can be either positive or negative. Positive beta means, investment affected by uncertainty the same way with market, whereas negative beta means investment move towards opposite way with market respect to volatility.

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4.2 Types of Risk on International Portfolio

4.2.1 Country Risk

Even the securities that are traded in world markets they are not completely isolated from country related risk. We could classify country risk as political decision that might cause to increase certainty of nation, transfer level and unalike management styles and governance activity within corporation at foreign country. Country risk also includes default risk cause by any political or economic development within country.

Country risk could be explicated by any actions country would take in term of creating uncertainty for securities' possible return, such as any political chances or any decision that would affect trade rules or market movements. As an example, it could be tax rules, dividend policies and payment instructions which would affects probable outcome from gain on stocks or uncertainties cause by disagreements with rest of the world along with inside problems of country that would root to stock prices change dramatically with connection of transfer level could be defined as difficulties of capital flow alteration.

When generate internationally diversified portfolio, investors need to pay attention which country to choose regarding to minimize country risk that must examine very carefully as not only emerging markets, also as we can observe from recent crisis developed markets bear country risk as much as emerging markets.

4.2.2 Asset Allocation Risk

The consensus among most financial professionals is that asset allocation is one of the most important decisions that investors make. Though, there is no simple formula that can find the right asset allocation for every single stakeholder since all investors have different objectives and different risk aversion, over the long run, how investments are allocated is more important than individual investments, in determining overall performance for diversified portfolios.

Diverse types of assets carry various levels of risk and potential for return, and typically don't respond to market forces in the same way at the same time. For instance,

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when the return of one asset type is declining, the return of another may be growing. If you diversify by owning a variety of assets, a downturn in a single holding won't necessarily spell disaster for your entire portfolio.

On the surface, asset allocation may sound very similar to diversification. Indeed, the principles are closely related; both are designed to reduce risk in your portfolio. Asset allocation takes this principle one step further by diversifying your portfolio not just among different investments, but among different investment classes.

4.2.3 Business Risk

Corporate governance and ownership level of management is referring to business risk where the possibility of inadequate profits or even losses due to uncertainties e.g., preferences of consumers, strikes, increased competition, change in government policy, obsolescence etc. Business risk is significant consequence to securities potential outcome. Thus, we can say that financial risk is the general term for several types of risks include risks involving financial transactions such us company loans, and its exposure to loan default. It reflects an investor's uncertainty of collecting returns and the potential for monetary loss. Investors can use numerous financial risk ratios to assess an investment's prospects. For example, the capital expenditure ratio and proportion of debt are basic tools for identify a risky investment. The most common financial risks contain credit risk which can be explained as default risk of stock, liquidity risk, foreign investment risk which includes all related risk within country such as interest rate risk and currency risk.

4.2.4 Sector Based Risk

Different sectors of industry and business have dissimilar needs. Some sectors may typically be less volatile, which would demand to investors who are focused on predictability and capital defense. Meanwhile, other sectors that have more growth predictions and higher volatility may appeal to investors with a higher risk tolerance. Investors who invest only in one sector could face high default risk and financial loses

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regarding to whole market movements together. Thus; investors would be better off if they have less correlated industries inn their portfolio to avoid likely risk.

4.2.5 World Based Risk

We all know globalization is a fact in today's world. Globalized world markets can be defined as the integration of the different world markets, which has a double impact on the international portfolio management such as the creation of diversification opportunities around the world and butterfly effect that if somewhere in momentous markets financial crisis occur, it spreads all around the world and all countries suffer economically and financially even though, they haven't involved these crises.

In a non-globalized world, the investors diversification opportunities are limited to domestic assets. However as mentioned before it's a very important for investor to diversify his/her investment regarding to previous studies. As a positive effect of globalization, investors now could manage diversified portfolio, but for optimal success they must consider of correlations between those investments. In fact, correlation preferability differs among investors according to their risk tolerance, nevertheless positive correlation could bring us to massive gain or loss, on the other side combining negative correlated asset reduce the risk of lost but can cancel out return from portfolio. Whereas, low positive correlation between investments would lead us to form better international diversified portfolio since it wouldn't cut off return but still reduce risk, in other words if one investment fails, we can still get gain from others.

On the other hands, these correlation between markets can lead to negative can cause negative impacts as well explicitly, long-term global market correlation assembly between various periods in economy is not constant, when there is high volatility, all of them go together with high world market interdependency. In the management paradigm they call this phenomenon the "butterfly effect", the butterfly opens his wings on the other side of the world and causes a storm here. As an example, we can show the period of large crisis in 2007, 2011 and 2016. that influences all world economics. Thus, it's clear that nowadays finding low correlated markets could be challenging.

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4.2.6 Exchange Risk

Foreign exchange risk also called currency risk, is the financial risk of an investment's value changing due to the changes in currency exchange rates. One should pay significant attention on exchange risk hence it is the main risk of internationally diversified portfolio as we can observe from previous studies, the unpredictability of a foreign currency plays a key role in the return of an internationally diversified portfolio.

If investor choose to invest in different currencies, without controlling this currency risk, he/she might face big losses. An international portfolio considers financial risk to the degree that its market value is influenced by unexpected exchange rate fluctuations. Such exchange rate adjustments can severely affect the investment's market share position and the possible return from portfolio, and ultimately the firm's value. Therefore, hedging of exchange risk would be solution of this type of risk. [16]According to hedge ratio theory, currency hedging decision is based on doubt to hedge the currency exposure will be partly determined by regret. If one fully hedges his/her foreign currency exposure and the foreign currency appreciates against the domestic currency then one will lose the positive differences, on the other hand if one decides to be fully exposed and the foreign currency depreciates against the domestic currency, one will encounter a huge loss on his/her investment.

Regret from hedging can defined as disappointment level from invest securities that gives negative yields because of a lower performance than another alternative investment they could choose. Regret is highly allied with a sensitivity of concern for the choice that has been made. Thus; it leads us to question that how investor should use hedging strategy and how much portfolio outcomes would be impacted for both the unhedged and 100% hedged international investor. Though, some academic studies have supported a 50% hedge ratio could minimize loses on foreign exchange exposure.

[16] "Applying regret theory to investment choices by Bruno Solnik and Sébastien Michenaud

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5 Portfolio Management

Portfolio management is the science of determining investment strategies while considering selected investments to its aim and objectives. Essentially it focuses on asset allocation for investors and corresponding risk compared to performance. Portfolio management is all about defining strengths, weaknesses, opportunities and threats in the choice of style of portfolio such as domestic vs international, active vs passive and many other trade-offs for maximizing return at a given for risk.

Portfolio management is a continuous process, it endures after even creation of portfolio. A good portfolio of efficient investment strategies must fulfill the all objectives considering by portfolio manager and investor. Portfolio management activities could be categorized as five groups as we could see it below:

- **a)** Identification of the investor's unbiased, limitations and preferences.
- **b)** Examine of portfolio income, risk and possible profit while comparing with goals and achievement over the period.
- **c)** Making review in the portfolio.
- **d)** Monitoring the performance of selected portfolio by combining the latest market updates.
- **e)** Implementation of the new strategies if respect of investment aims.

In this segment of thesis, we will discuss objective of portfolio management, basics of portfolio construction and essential of portfolio management for understanding dynamics of creation and maintenance efficient portfolio.

5.1 Essential of Portfolio Management

The objective of portfolio management is to invest in different varieties of assets to reach in such a way that investor could maximizes his/her returns within given risk or minimize uncertainty of assets related to that selected portfolio while keeping rate of return stable in order to achieve investors' investment objective.

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An efficient portfolio must include several objectives. All these objectives must consider with some importance and investor must reach a balance among these objectives. Portfolio managers should aim to service investors with a greater income and the potential for profits, while considering portfolio liquidity and volatility. Also, portfolio manager must be aware of every investor must be treated differently since every investor have totally personal and different objectives, preferences and limitation. Accordingly, there are many possibilities to build portfolio and various strategies for management of portfolio that created according to investor objectives. Regardless of difference between investors aims, boundaries and predilections we will discuss below conceivable portfolio objectives.

First of all, safety of the investment is major element for successful portfolio management. As we stated in previous segments, the very first vital objective of a portfolio, investor must be sure that the investment is safe since if portfolio is not safe, there is a absolute lost and example of bad management of selection of investments. Other factors such as income and profit, only would be considering if the safety of your investment is guaranteed. This can be done with help of risk management tools. Consequently, investment safety or minimization of risks with given expected return is major objectives of portfolio management. However, as we should know that there is no such thing as a risk-free investment, yet even government bonds cannot be truly zero risk investment. Besides, as investment theory comparatively minimal risk assets would yield lower returns. The mail goal on this whether minimize the overall risk or take affordable risk to achieve balanced and efficient portfolio.

Secondly, a respectable portfolio should increase in value for protecting the investor from any hazard caused by market errors namely inflation. However, it is a systematic risk and cannot be easily avoid we must have been created our portfolio consistent assets that generate appreciation in the value portfolio's capital within selected investments. In terms of better understanding of this objective, we could determine as a well-balanced portfolio must involve of some type of certain investments, which have a tendency to appreciate in real value after adjusting for inflation. Another concept is that liquidity where it refers to capability of the portfolio that confirm there are enough reserves available at short notice to take care of the investor's liquidity requirements

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where we can also point here that it is different for every investor. Some of them would like to generate quick cash availability all the time, while some of them would like to have annual dividend or not generate any assets until the maturity. Liquidity preference needs to have funds necessary to participate in right matters, or for any other personal needs.

Following, we must focus on stable current return by means of the portfolio should yield a steady current income once investment risk and return is guaranteed. As we mentioned before, income is one of the main factor of investment analysis since we should not enter to portfolio strategies that we don't believe we would have gain in terms of cash flow. The existing returns should at least need to cover the opportunity cost from investment of the investor.

Marketability is another important objective of portfolio management. It refers that portfolio must consists of investments which can be traded without any difficulty. In other words, investor would be worst off and have some troubles in enclosing investment and trading them into market, if there are too many inactive assets in our portfolio. An effective portfolio requires to have some certain amount of investment that listed on major stock exchanges, which are actively traded or portfolio also could contain bonds and stocks that would be traded before maturities.

Lastly, efficient portfolio must focus also on diversification, time of investment and performance over period. According to various studies, investment opportunities in world markets both in emerging and developed countries could lead us to have finest portfolio selection by diversification. It helps to reduce risk of portfolio. We should efficiently have diversified across various industries on different company in different countries for having superior return from our portfolio. Also, as we mentioned before, time of investment in terms of when to invest and when to sell portfolio out is one of the key element for successful management of portfolio. Additionally, measuring performance of portfolio is essential and investors should generate superior long-term performance, focusing on total returns from investment and related risk.

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5.2 Basics of Portfolio Construction

Previously, we briefly pointed methods for construction portfolio. All these methods we captured from literature review is based on mean-variance theory. Thus, in this section we will examine this mean-variance theory and how to construct portfolio respecting to it. Additionally, we will deliberate necessary aspects that we must consider while construction portfolio in terms of efficient created portfolio. Major thing we must focus is the asset allocation and selection of portfolio series. We could classify professionals' primary role is to ensure of investment such as:

a) Selection of portfolio strategies regarding investor's objectives
b) Ensure optimization of asset allocation.
c) Monitoring portfolio with performance measurement tools time to time.

These aspects include looking at performance results relative to portfolio respective asset allocation. Assets are must be evaluated based on their risk and return characteristics and performance ratio comparative to investment types within portfolio. The performance evolution measures the success of the portfolio situations respected to indices and currencies indexes.

As Forbes magazine declares markets are volatile up or down a lot and historical movements prove that markets will also come down surprisingly. There is no such thing as achieving perfect performance through market timing or by only picking trending stocks. However, we can certainly build a efficient portfolio that allows you to gain and avoid the stress about market volatility. Before construction portfolio we should look deeply what are the alternatives we could pick and what aspects we should consider on processes of selection portfolio. Here we must recall objectives of portfolio and harmonize them with selection strategies and asset allocation.

We surely must be aware of investor's preference and commit to purpose of portfolio. Understanding of where are we starting and be realistic about preference for risk. Investor sometimes tend to take higher risk due to belief of market would always go up according to historical review, however as we mentioned before it is not correct. So, it is better to keep our risk level moderate than taking too much risk or too low risk.

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Also, we must consider cost of purchasing investment, thus we need to be sure if this investment would cover it cost in convenient time.

Investors should be carried quality more than quantity. Diversification is a good strategy only if we diversified our portfolio over not relatively high number of asset and we must examine asset wisely to accurate outcome. Next factors after we structure of portfolio by identifying purpose, achievement method to purpose and risk tolerance, we shall carefully pick investment period. Hence, waiting too short and too long would cause to reduce risk over portfolio. Additionally, we shall not obsess about the markets movement all the time since it could be daily changing, though doesn't mean portfolio is unsuccessful. Lastly, you should control your investment since there might be change in the risk such as political situation of country, governance of companies we invested etc. anything can be related to massive market movement. Likewise, determination of portfolio strategy and stick to your objectives and stay focused on your approaches to portfolio management.

5.3 Modern Portfolio Theory & Efficient Frontier

Since we learned essential of portfolio management, we can interpret construction models. We will discuss mean-variance theory and efficient frontier for to understand technically aspect of portfolio. Optimization is the key for accomplishment on portfolio construction. Return is the gain from investment that have been made in terms of appreciation of asset price or cash inflow and dividends. In general, risk measured by variance in other words, standard deviation. As we mentioned before, it is important to understand risk since there would be no expected return without risk. They are milestones of portfolio analysis and parameters of optimization.

In a practical application, most of the portfolio construction theories based on mean-variance relationship, hence the most common and significant one is modern portfolio theory (MPT) in another name *Markowitz Portfolio Theory*. According to findings of modern portfolio theory, diversification could significantly reduce the overall risk of a portfolio. If investments that are unconnected, they will also would have unrelated risk,

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consequently If two assets are very similar, then their prices will move in a very similar pattern. However, risk related to them would also move the same way. Correlation is measured on a scale of -1 to +1, where +1 means perfect positive correlation and -1 means negative correlation where the prices of these to assets will move in opposite directions. Therefore, to improve diversification of portfolio with low correlated would limit risk.

. Portfolio utility functions define it as the expected portfolio return over of risk. Investors are willing to take risk and, in theory, the higher risk should bring the higher possible return. Risk should be seen as a total risk related to all single risk factors. As we could understand from previous section risk is boost for superior return.

The expected return on a portfolio is measured as the weighted average of the expected returns of assets in portfolio. The formula follows:

$$E[R_p] = \sum_{i=1}^{N} w_i E[R_i]$$

The variance/standard deviation of a portfolio illustrates with including the view of if portfolio vary together. The covariance in other words measured risk that portfolio barriers related towards return. For simplicity on two asset portfolio covariance can be calculated using the following formula:

$$Cov(R_1, R_2) = \sigma_{12} = \sum_{i=1}^{N} p_i (R_{1i} - E[R_1])(R_{2i} - E[R_2])$$

The correlation coefficient between the returns on assets in portfolio. As modern theory implies, it is very important to know correlation between those investments since efficient portfolio could be composed only with low correlated assets or negatively correlated asset according to risk preference of investors. This correlation can be calculated using the formula below:

$$Corr(R_1, R_2) = \rho_{12} = \frac{\sigma_{12}}{\sigma_1 \sigma_2} = \frac{Cov(R_1, R_2)}{SD(R_1) SD(R_2)}$$

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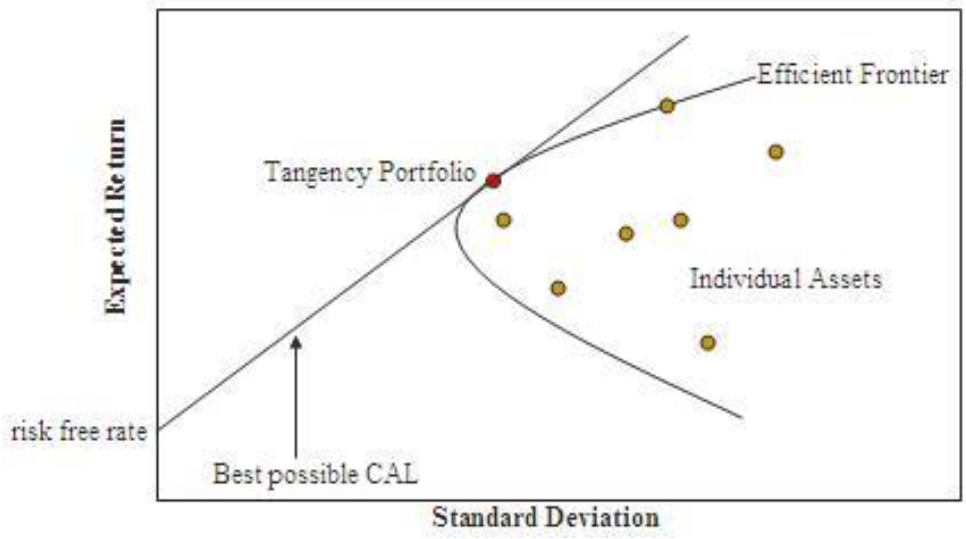
The portfolio optimization is specified as a controlled utility-maximization tool. It could be divided on two stages: *optimizing weights of asset* and *optimizing of pick to assets for portfolio* other words again it refers to achievement of superior asset allocation. Hence, optimization can be performed with either try to achieve best possible risk level to maximize return or try to achieve convenient expected return by minimising risk.

Concepts above lead us to one of the major theory of modern portfolio such as: Efficient frontier. The efficient frontier is the set of optimal portfolios that utilize performance while illustrate the highest expected return for a given level of risk or the lowest risk for a given return. If portfolio is outside of efficient frontier, that means that they are not optimal and not be chosen either related to high risk or low return respect to given variable namely, return and risk. Figure above (Figure 5A) showed us illustration of efficient frontier.

Figure 5A



As we could see, efficient frontier is curved, thus, a key conclusion of the theory is the benefit of diversification. Optimal portfolios that comprise the efficient frontier tend to have more diversification than the sub-optimal portfolios that are usually less diversified, where it support our idea that diversified portfolio is must for success on today's investment environment.

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6 Data & Sample

In order to successfully to find answer to how efficiently create internationally diversified portfolio, we should carefully analyse outcomes from all possible investment opportunities, although due to cross-sectional and cross-country differences we recognized that if we look it up all market indices that include many sectors.

Modern portfolio theory studies correlation amongst on each asset in a portfolio to help regulate the most efficient frontier. Therefore, for respect to previous segments outcome, low correlation between indices as well as optimal diversification is essential for effectual risk management and portfolios construction. In this paper, we will look into empirical researches in eyes of Eurozone investor. Examination will be done by checking settlement prices those indices and currency while focusing on correlation and return from investments.

First milestone was deciding which sector and country as well as how to make asset allocation between those markets. So, there were enormous number of sectors, indices and securities from many different markets in world. The limitation was considering the markets not so correlated and the choosing different sectors to reduce the risk. For this, we will use data from both equally both developed and emerging indices that include different variety of sectors due to have amended diversified portfolio across the world markets.

We chose US and EU stock market for our paper since they have highly advanced economy in the world and market was variety of the sectors and probability of the companies that would stay financially stable. Yet, for reducing to high correlation between markets we should also consider emerging markets. Following, we choose South Africa and Brazil for our portfolio subsequently their potential outcome since these new markets likely to show spectacular returns from investments rather than developed markets.

With the purpose of support our hypothesis, we decided to go tide and choose indices have variety of sector whereas include confidently enough number of

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companies. Thus, for US we select ***DOW 30*** that shows 30 large publicly owned companies based in the United States, for Brazil we choose ***IBRX 50*** that comprises the 50 most traded equities at BOVESPA and for South Africa we choose ***FTSE / JSE Africa Top 40*** that consisting of 40 of the main market capitalizations of the country.

For Eurozone investment, we decide to not pick only one country, but to indicate index that consist all top stocks within all eurozone countries. Thus; we choose ***STOXX Europe 50*** index that provides a blue-chip representation of super sector leaders in Europe covering almost 50% of the free-float market capitalization of the European stock market. In following section, we will try to discuss market correlations and backgrounds of each investment respecting to country of origin's economic situation as well as performance of indices based on historical data.

For empirical research, data will be providing from *Investing.com* and *ieconomics.com* databases. For calculating return for performance indicators belongs to each portfolio we shall check risk that selected portfolio barriers. Hence, we will follow the capital asset pricing model, therefore we will choose to identify expected return from investment regarding both systematic and unsystematic risk while try to determine the best possible risk-free rates avoiding to fact that emerging markets government bonds could be not truly risk-free since they are not AAA rating bonds. Our sample will cover 5 years monthly settlement including prices and changes from 1st January 2013 to 31st December 2017.

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7 Market Correlations & Background of Selected Investments

Nowadays with impact of globalization, international markets would also become highly correlated during the period of vast uncertainty. Since now we discussed what correlation through esteem to its influence on portfolio efficiency. Aimed at the recall of learnings, correlation is a measure that regulates relationship of investment's movement in relative to each other within portfolio. A perfect positive correlation between two assets has a construing of (+1) where a perfect negative correlation has a construing of (-1). However, mostly correlations would scale somewhere between (-1) and (+1). Correlation measurements is a necessary tool for portfolio management to degree of diversification between the investments comprise within the portfolio.

Correlation may vary over time, it means it is not sure. It can only be measured by historical performances. Investments that have usually have a high degree of correlation in the previous might convert uncorrelated occasionally. Yet, during periods of sharp volatility like world crisis, investments more likely have a habit of to develop closer correlation, no matter of their induvial risk that has been remain. Hence, due to tendency of the market to volatile together in every now and then, we cannot avoid market correlation while construction portfolio.

Rise of emerging markets cannot be evaded since they are surprisingly could bring comparable gain rather than advanced country's investment. However, they are riskier due to unstable political and economic situation. For our portfolio, we decided to have a balance and choose two advanced and two developed country to invest. We also paid attention to possibility of low correlation, thus decided to invest economics that we believe that they wouldn't respond each other's economical changes. In following part, we will discuss each nation's possible risk as well as we will observe chosen index historical performance to understand what outcome we could expect from the portfolio. Countries and indexes are followed as: Eurozone - EURO Stoxx 50, United States of America – DOW 30, Brazil – IBRX 50 and South Africa - FTSE / JSE Africa Top 40.

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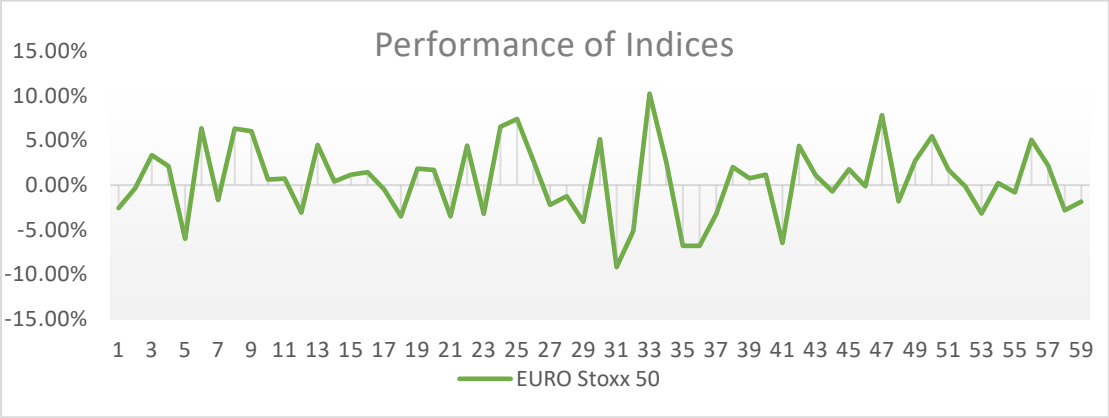
7.1 Economic Analysis of Eurozone

Eurozone economy is one of the biggest economic in the world. As a union, Europe have 28-member countries, 19 of them is participating in eurozone. With integration of monetary and partly fiscal policies, eurozone benefits from different comparative advantages of each member states and free movement of four factors of economics such as: capital, labor, service and goods. Yet, previous euro crisis as well as world crisis such influenced by US economics and Brexit affect eurozone badly recently. However, regarding to risk sharing issues, biggest economics as example of Germany losses his efficient. On the other hand, critical countries as example of Spain benefits from risk sharing policy. Together Eurozone succeed to achieve the one of stable and powerful economics in the worlds. Risk regarding to eurozone highly low in terms of country and business risk.

Yet, possibility of influenced by world based risk relatively high since it is the one of the important advanced market pointed on volatility issue that we discussed on previous segments. Additionally, since all these countries uses one currency, if there is a currency crisis in one government, it has butterfly effect to all members states economy.

Table 7A



The EURO STOXX 50 is a stock index of eurozone firm's stocks premeditated by STOXX. Index includes the largest 50 stocks from different industries in the Eurozone

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automatically chosen from by its own Index based on market capitalization. It is one of the most liquid indices for the Eurozone. Euro STOXX Index includes companies such as: Netherlands Austria, Ireland, Italy Belgium, Luxembourg, Finland, France, Germany, Portugal and Spain.

The table above (Table 7A) illustrates growth of EURO STOXX 50 Index among 1st of January 2013 until 31st December 2017. From 1 to 60 monthly changes are market for the period of 5 years as seen on table. Volatility of the index changes mostly in range between (-10%) and (-10%).As we can see during the economic crisis period stocks tend to show high fluctuations. Whereas, that index wouldn't reward much due to stable over last months. Hence it is an appropriate choice for risk averse investor, yet high-risk tolerance investor might gain more on other stocks.

7.2 Economic Analysis of United States of America

United States is a highly developed country as the world's largest economy by nominal GDP and second-largest economy by PPP with being the highest nations in several measures of socioeconomic performance such as average wage human development, per capita GDP, and productivity per person. Hence, stocks from this nation would be very trustworthy and we accept that all sectors would perform excellently due to advanced economics. Though, recent political changes and two big banking crises of nation showed us, this advanced economic would also fail. Moreover, due to behavior of market in high volatility, investment based on united states would affect immediately from massive economical changes around world.

The Dow Jones Industrial Average (DOW) is a stock market index that shows how 30 large, publicly owned companies of the United States. Calculations are not weighted arithmetic mean and does not represent its component companies' market capitalization, whereas relatively it is the sum of the per share price of each stock for each component company. As performance indicators, DOW 30 is the one of the efficient index that related to its low risk – high return behavior. It shows excellent growths as trend over past years.

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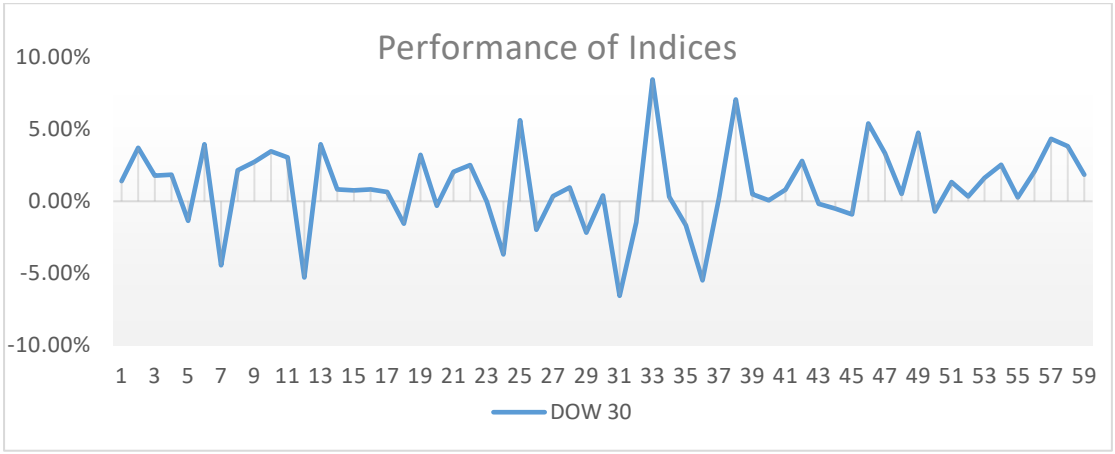
Table 7B



The table above (Table 7B) shows us monthly changes of DOW 30 Index from 1st of January 2013 until 31st December 2017. From 1 to 60 monthly changes are market for the period of 5 years as seen on table. Volatility of the index changes mostly in range between (-5%) and (5%). Respect to previous month prices. Thus, we could indicate that index has relatively insignificant risk than average market standards. However, as we could capture from eurozone index, DOW 30 also has a tendency to move together with markets during economic uncertainties. Consequently, investing into these indices could bring superior returns if we support our portfolio with non-correlated indexes such as indexes from emerging markets due to market volatility issue.

7.3 Economic Analysis of Brazil

Brazil, the world's eighth-largest country, with population more than 200 million. As an emerging market it also shows sharply increased growth over years. As well as it has the second-largest manufacturing sector in the Americas. Also, it has a diverse and very well-designed services industry as well. Brazil's economic performance increasing by every year with newly operating foreign investment and upgraded

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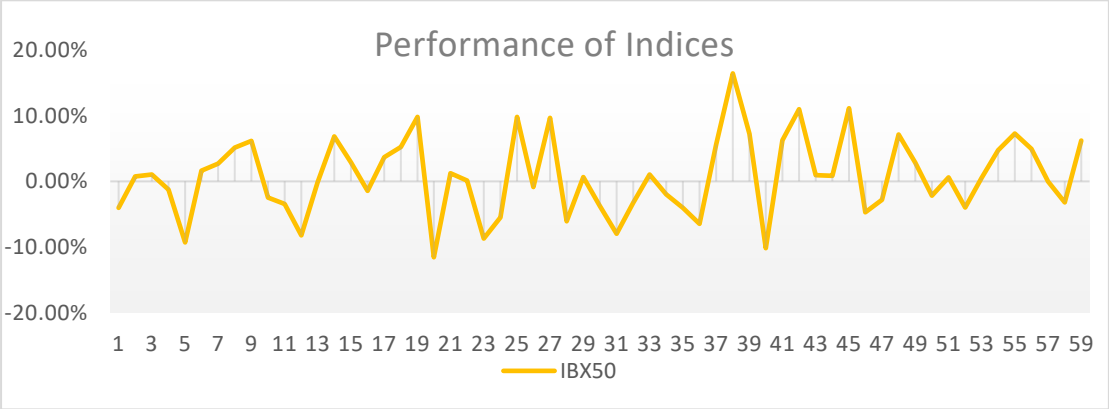
domestic countries situation. Hence, Rio de Janeiro became one of the culture and San Paulo became one of the financial capitals of the world. Though, county still have a huge corruption problem, especially related to elected officials, undermining the government's ability to implement policy without third parties or criminal interests and effects also private sector and its trustworthy respect to corporate governance. This economic and political uncertainties it directly effects risk on stocks of the nation.

Table 7C



The IBrX 50 is intended to measure average stock performance following changes in the prices of the 50 best demonstrative and most actively traded investments of the Brazilian market. It is operating by is a Stock Exchange named B3 formerly BM&FBOVESPA.

The table above (Table 7C) shows us monthly changes of IBrX 50 Index for the period of 5 years from 1st of January 2013 until 31st December 2017. Volatility of the index changes mostly in range between (-10%) and (10%). Whereas, the fluctuations are highly rapid, thus its prove for country's uncertainty and it effects on stocks. On the other hand, when we look recent performance, we could see index changed positively a lot respect to its starting period. One can benefit from diversified portfolio include IBrX 50, if he/she also invested assets that insignificantly correlated and less volatile.

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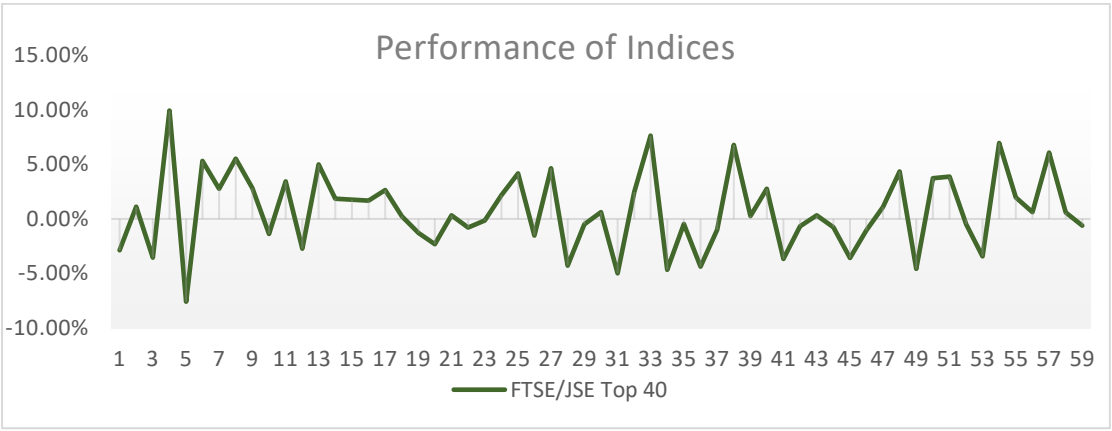
7.4 Economic Analysis of South Africa

The economy of South Africa is most industrialized one with being the second largest in Africa. Nation has a comparative advantage in the agriculture, mining and manufacturing products. Likewise, it has very strong banking sector. However, it is very challenging to do business as well as riskier investment due to reason of unproductive government organizations, political instability, and corruption. South Africa is nursing to show uncorrelated movements respect to advanced and emerging markets, where it could be suitable candidate for diversified portfolio. Even though, risk would be higher due to countries socioeconomically and governmental issues, we cannot avoid potential within the country.

Table 7D



The FTSE/JSE Africa Index is intended to emulate the performance of South African corporations. It offers inclusive and balancing set of indices from major capital and various industry segments of the South African market. The FTSE/JSE Top 40 Index contains of the largest 40 companies in term of market value in the FTSE/JSE All-Share Index. The index is calculated based on price and total return methodologies.

The table above (Table 7D) demonstrations the monthly fluctuations of FTSE/JSE Top 40 for the period of 5 years from 1st of January 2013 to 31st December 2017. Volatility of the index changes mostly in range between (-10%) and (10%). Whereas, sometimes uncertainty reduced to lower levels. Also, we could see that world based

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risk is not applying for South Africa like it does for other nations that we mentioned before. Hence, FTSE/JSE Top 40 produces us lower correlation within portfolio. Though, South African Index seems to be riskier investment, we certainly believe that it has potential due to its industrialized economics within Africa and mining sector comparative advantage.

After briefly discussing economical situation and potential of investments from each country or economic zone, we highly confident about choosing 4 indexes all around the world could be sufficient portfolio strategies due to different risk factors as well as growth aspects. For the investors from eurozone, the EURO Stoxx 50 index could remain as safe bet, where investment would have done domestically into national currency. However, diversification could widen us minimize volatility with greater return. Another advanced market index DOW 30 is the one of most stable stock index on the world with high likely to massive return, however this both advanced would affect same way of high market volatility. Brazil bring us new investment choice, IBrX 50 shows appreciable growth with respect to economical development within country. Similarly. South African Index, namely FTSE/JSE Top 40 is suitable investment regarding its low correlated performance with world market and potential of growth. Whereas, those countries have higher risk than developed countries in compression.

Following sections, we will perceive how we will examine performance of portfolio including mentioned indices. Empirical finding also would response our concerning about risk and return relationships as well as correlations between indices regarding to better understanding exchange risk and currencies effects on portfolio success.

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8 Hypothesis & Portfolio Construction Methodology

Our hypothesis is constructed based on papers that essential portfolio management tool which is *Modern Portfolio Theory* done by Markowitz's *(1952),* as well as on papers of *Estimation Risk & International Bond Portfolio selection (1995)* by Annaert. As an theoretical background we settle our hypothesis on book The book '*Fundamentals of Investing'* by Gitman, Joehnk and Smart (2011). Whereas, most importantly based on empirical study named *Risk Management in Internationally Diversified Portfolio* done by Thierno Mouctar Bah (2009) - *An investor is better off with international diversification. It also demonstrates that the level of the hedge ratio depends on the risk and regret avers of the investor, however the higher the negative outcome of the portfolio come along with increased level of the hedge ratio.*

These papers focus on how to generate efficient portfolio while considering risk and return levels of investors, therefore all of them based on mean-variance model which is directing to basis of modern portfolio theory. As from the literature overview section, the authors all agreed on an investor is better off to diversified portfolio inside of invest only one as CAPM theory suggest one can have maximum return if they invest in low correlated assets. Thus, same with internationally portfolio that one would have greater return within remain risk however as they stated the importance of risk in exchange rate volatility is the main risk on internationally diversified portfolio to compare with fully domestic investments. Therefore, we must use hedging for currency exposure with following to practical research of *Solnik and Michenaud (2008),* where investors would choose strategies between non-hedge, %50 hedge and fully hedge their investments with the forward contracts over the period and checking the forward premium if it would be beneficial for eurozone based investor to hedge regarding to exchange rate fluctuations.

The correlation between the movement of investments and the performance of a given index is very important feature in evolving a judicious investing strategy. Investors would be better off by meaning portfolio risk if they could involve assets that have low correlations into their portfolio as proven by modern portfolio theory. This

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concept helps to optimize expected return against a certain level of risk. By the choice of including assets that have a low correlation to each other helps to reduce the amount of overall risk for a portfolio.

In our research, based on the theory of the above-mentioned authors, we propose the following hypothesis:

H1: Investors are better off if they diversified their portfolio internationally than merely domestic diversification.

H2: Level of hedging strategies depending on the risk and regret avers of each investor, though the higher the hedge ratio is, the higher the negative performance of the portfolio will be.

As for the methodology, this hypothesis will be tested by the Sharpe Ratio (SHP) from studies of Willian Sharpe (1966) concerning to examine those 4 strategies introduced in the following lines:

S (x) = (rx - Rf) / StdDev (x)

Where: X is the investment

rx is the average rate of return of X

Rf is the best available rate of return of a risk-free security (i.e. T-bills)

StdDev(x) is the standard deviation of rx

Since we will go through possible investment strategies while performing portfolio construction we should firstly check risk and return from these four mentioned investments in both the Euro numeraire and in local currency terms, then we will inspect correlation between those indexes and currencies separately along with measures the pairwise correlations between the foreign exchange returns and the return of the indices. At that moment we will indicate performance of portfolios within 4 cases such as: *non-diversified (as eurozone investor we will invest in euro market), diversified but not hedged, diversified and % 50 hedge and diversified and fully hedge*. Still we expect to

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find out related results such as: if investors diversify its portfolio he/she will get grater return related to lower hedge ratios.

From bottom-top decrepitation, primarily we will study monthly behaviours of individual investments by mean-variance theory, correlations between markets and between currencies with checking forward premiums additionally. Moreover, we will measure pairwise correlation between market and currencies. Following we will examine the performance of those investments with Sharpe Ratio described above to see how portfolio acts regarding to those 4 strategies. Lastly, we will discuss hedge ratio to see regret ratio over the chosen investments.

In the model describe overhead and in line with the hypothesis, we expect the see diversified portfolio is more beneficial than domestic only investment. For the fully risk and regret avers investor the loss would have been bigger than the medium one, however, for non-risk and non-regret avers investor, the average realized return would have been positive with dreadfully higher volatility subsequently.

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9 Empirical Findings

As we definite in this paper, before, we deliberate the ex post effect of an investment strategy from the perspective of an investor from the eurozone. Principally, we focused on what would the effect be at the end of 5 years, if an investor would have decided to diversify his/her investment, by allocating it over advanced markets and emerging markets, specifically the United-State of America (US) the South-Africa (SA), Brazil (BR) and EUROZONE (EU) in the beginning of 2013 to end of 2017. The statement we consider on our study is that the investor chose to invest into selected stocks for 5 years with monthly settlements and he used 5Y forward contracts to hedge the currency exposure. We divided examination of empirical research into three groups such as correlation, monthly behaviour of currencies and indices and performance measures.

On correlation section, we will focus on examining the correlation between stocks, currencies and performance of currency indices and stock indices since as we know from CAPM theory low correlation is a significant for successful diversified portfolio. Additional, even though stocks are low correlated, we must also look deeply correlations among currencies meanwhile we are investing into foreign currency and changes might affect us both positively or negatively, as well as we shall look at correlation between indices and currency indexes. The reason behind it that there is possibilities while stocks are rising however currency index falling, thus we might think that we will have superior profit however in reality due to exchange rate factor we could be disappointed on gain of portfolio.

On monthly behaviour section, we will examine changes over indices prices and examine their monthly settlement. Also, we will check currency indexes acts over the period by calculating monthly movements. Hence, we will have likely picture of performance on our portfolio before we inspect outcomes.

On Performance Measurements section, we will evaluate outcomes from the portfolios. We will test our hypothesis with probable portfolios under four cases such as, **domestic investment** (*where eurozone investor would invest only in eurozone area*), **diversified but not hedged** (*where investor would diversified portfolio among*

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those four indices however choose to not protect himself/herself against exchange rate exposure), **diversifies and %50 hedge**(*due to risk of regret from hedging strategies, investor would hedge only half of his/her investment*) and **diversified %100 hedge portfolio** (*where investor would diversified and use hedging for outcome hazard from exchange rate exposure*)

After all these steps described above, we will discuss our empirical findings if it fulfils our hypothesis and if they respond like previous studies results.

9.1 Correlations

Low correlation is a success factor for superior performance from the portfolio management. We have been discussing importance of low correlation previous on this thesis before as well other mentioned studies, considering market recent situation one can have the best portfolio with help of diversification unless if that diversified investment would be low correlated.

For observing conceivable portfolio management, firstly we must discuss the different outputs of the correlation measurements. As you can see following tables below, we plaid the correlation between stocks, currencies and performance of currency indices and stock indices.

As we could detect from table below (TABLE 9A), firstly, we checked the the pairwise correlation coefficients between stock market pairs, the mean return and the standard deviation of national stock markets selectively, Euro Stoxx 50 for Europe, Dow 30 for US, IBX50 for Brazil and FTSE/JSE Top 40 for SA between the period of 1st of January 2013 to 31st December 2017. There is not a market pair of which the correlation is not above 0.50, hence from upshots, we can see that there is high correlation of U.S. market with rest of the world, accordingly it more likely reason of influence of U.S. economies on world market indexes.

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Table 9A

correlation matrix	STOXX 50	DOW 30	IBX50	FTSE/JSE 40
EURO STOXX 50	1.00			
DOW 30	0.72	1.00		
IBX50	0.45	0.82	1.00	
FTSE/JSE Top 40	0.81	0.82	0.51	1.00

Surprisingly, Brazil market doesn't show significant correlation with Europe and South Africa, yet it still highly correlated with U.S. market movements. South Africa market is highly correlated with developed markets, yet not casually correlated with other emerging market namely Brazil with 0.51. Lastly, market of eurozone, shows different correlations among other world markets. We can clearly see that there is certain correlation with South Africa, likewise little bit lower correlation with U.S. market. Though, there is not pair market correlation between Brazil and Europe.

The table below (TABLE 9B) shows us correlation coefficient between currency indices with the mean return and the standard deviation of national currencies. We calculated currency indices by way of having our own index for each currency while conniving changes of monthly movements between Euro (euro), US Dollar (USD), Brazilian real(BRL), South African rand(ZAR). Correlations show different varieties on each pair, yet they are not highly correlated.

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Table 9B

correlation matrix	EURO	USD	BRL	ZAR
EURO	1.00			
USD	0.40	1.00		
BRL	-0.52	-0.65	1.00	
ZAR	-0.48	-0.46	-0.18	1.00

We could see US dollars relatively is the most responsible one in terms of currency movements due to its key role of world economics. BRL has almost very low negative correlation such as -0.18 with ZAR, however shows comparatively higher negative correlation with USD specially – 0.65 and EURO – 0.52. Likewise, ZAR shows all negative correlation with all other currencies. In other words, when ZAR appreciate over on one currency, it also reflects some direction on other currencies most effectively on USD and EURO than on BRL, since these two-emerging markets don't impact each other's economics like advance market currencies does. EURO and USD is the only ones that has positive correlation with 0.40, thus it supports to theory that advance markets more likely to respond market changes together. However, Euro has negative correlation with BRL and ZAR.

Lastly, we will examine correlation between indices and indexes. Figure (Table 9C) below measures the pairwise correlations between the foreign exchange returns and the return of the indices. In this table, we see that all countries indices return has negatively correlated with exchange return with one expectation namely, Brazil. In other emerging markets South Africa, there is not a significant correlation namely, - 0.27. On the other hand, we notice that the interdependence between the indices and the foreign exchange returns are not high in the advanced market and unexpectedly its negatively correlated.

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In this case, hedge ratio would cover only Brazilian market since all other currency indexes negatively correlated.

Table 9C

correlation matrix	EURO	USD	BRL	ZAR
EURO STOXX 50	-0.23			
DOW 30		-0.30		
IBX50			0.42	
FTSE/JSE Top 40				-0.27

Next step after measuring the correlation is to see how interpedently indices and currencies perform. Since there is a very strong interdependence between advance markets, however lower correlations between emerging markets we believe that there might be a considerable impact of the different national currencies on the performance of the indices. Hence, we will also measure performances of national currencies indexes to see how dynamics would influence our portfolio when we invest in different currencies regarding to changes on currency indexes. In this section we will discuss the ex post performance of an indices with national currencies to understand better what we would expect from internationally diversified portfolio in these different markets while considering likely impact of exchange rate risk.

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9.2 Monthly Behaviour Of Currencies And Indices

Firstly, lets discuss monthly performance behaviours of national currencies. As we stated before indexes calculated as average performance of monthly changes over other currencies that includes EURO, USD, BRL and ZAR, with this technique we think it's better view for us to see clearly picture what could possible effect of currencies changes on return of our portfolio.

Table below (Table 9D) shows monthly changes on national currencies in percentages from the begging of 2013 to end of 2017. For better understanding to horizontal axis, the January 2013 is the 1st month and it goes numerically, so information is 12-month bases, first year of our data sample which is 2013, start from 1 t0 12, then second year which is 2014, the numeration starts from 13 and ends 23 from January to December. Likewise, the 60th month is December 2017. The varieties are giving as percentage and if its positive it means currencies appreciate over other currencies. As it shown, there are some points that currencies from advance and emerging markets tend to show appreciation and depreciation together respecting to market, though mostly we can say that there is not a big correlation between national currencies at all. We were expecting to emerging markets would be more volatile, thus Brazilian real support our theory with 0.0357 standard deviation and % 12.38 annually volatility, thus we could rely on hedging strategies might give us better outcome in future, therefore South African rand is less risky one among those currencies we mentioned even over the advanced markets surprisingly with 0.0203 standard deviation and % 7.03 annually volatility. Likewise, we could add its most likely to not effecting from world markets. About advance markets, we see that our home currencies USD is more volatility than EURO with 0.0244 and 0.0303 standard deviation s to 8.47% and 10.50% annually volatilities.

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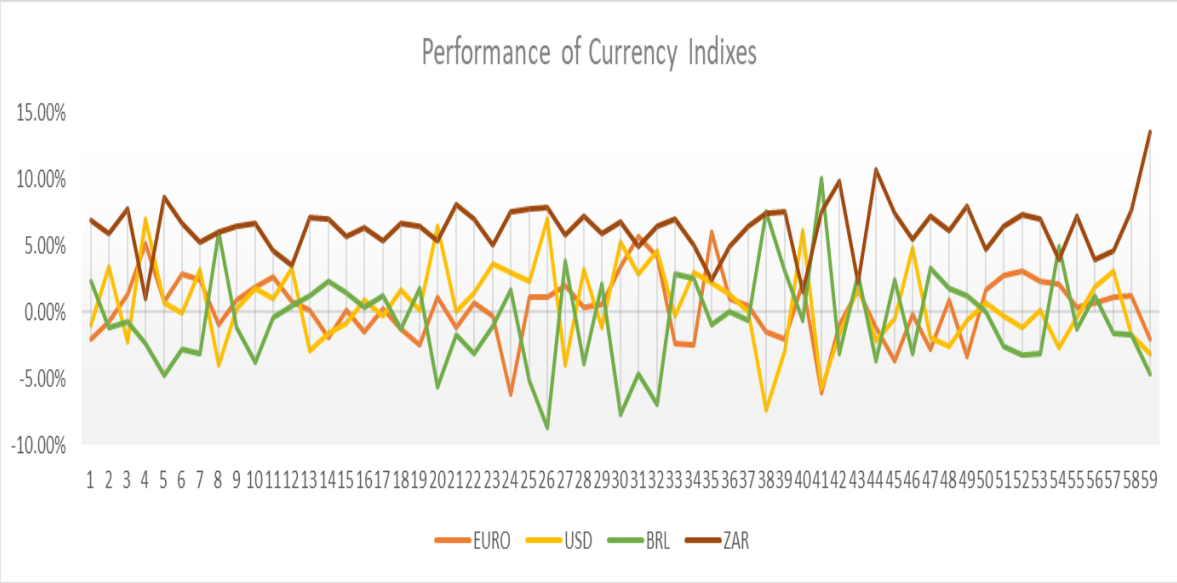
Table 9D



Next, we will deliberate monthly behaviours of indices we chose namely, Euro Stoxx 50 for Europe, Dow 30 for US, IBX50 for Brazil and FTSE/JSE Top 40 for SA. In the table above (Table (B) we can observe how their performance has been changed over the period of 5 years respect to price of indices in national currencies. It shows monthly changes on stocks in percentages from the begging of 2013 to end of 2017. For better understanding to horizontal axis, the January 2013 is the 1st month and it goes numerically, so information is 12-month bases, first year of our data sample which is 2013, start from 1 t0 12, then second year which is 2014, the numeration starts from 13 and ends 23 from January to December. Likewise, the 60th month is December 2017. From the overview, we could say indices are more responding than currency indexes on market changes. This graph gives us very important information: during market distress all the world markets are strongly correlated, which makes one wonder where diversification opportunity is, the minute you essential it the most. They also have significant correlations even on other periods with some expectation on emerging market viz. South Africa as we mentioned before. As we can perceive the graph, we can deduct that most volatile indices are IBX50, however other emerging market indices FTSE/JSE Top 40 is shows less unstable trend. In advanced market, DOW 30 shows more relievable performance than EURO Stoxx 50.

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Table 9E

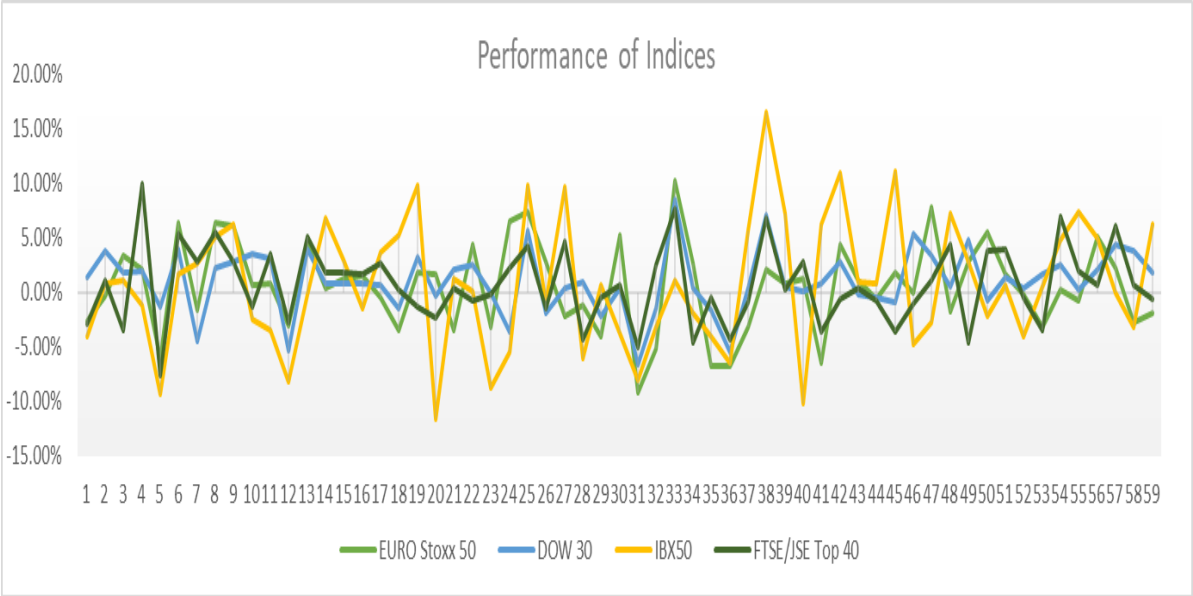

Table 9F

		Highest	Lowest	Mean	Return	STDDEV.	Volatility
EURO STOXX 50		3,697.38	2,602.59	3,188.67	29.63%	0.0408	14.15%
	DOW 30	24,719.22	13,860.58	17,879.86	78.34%	0.0288	9.99%
	IBX50	12,765.46	6,881.90	9,285.26	40.87%	0.0594	20.57%
FTSE/JSE Top 40		53,505	34,256	44,528.42	47.05%	0.0358	12.40%

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While measuring portfolio performances, we must examine deeply individual performances of portfolio components, thus following we will discuss performance of each indices. For this, we measured the mean, standard deviation respect to monthly changes, annually volatility and return from outlay with additional data that shows highest and lowest prices on national currencies from monthly settlement of indices in the period.

The table (Table 9F) above summarizes these mentioned variables on individual investments. We can see clearly that emerging markets display closer return on indices with %7.82 difference however Brazilian market shows much more volatility than South Africa with being respectively the riskiest market., though U.S. market is the most less risky investment with %9.99 volatility and have spectacular return such as % 78. 34. However Eurozone market shows smallest return where consequently gives us confident on our portfolio would be better off if we could internationally diversified than just rely on domestic portfolio since it has relatively worst performance when we compare its return and risk affiliation with higher volatility with %14.15.

9.3 Performance measures

In this segment, we will deliberate the performance results during the holding period, from the begging of 2013 until the end of 2017. The results presented in the table show the average portfolio expected return, the standard deviation calculated by monthly changes with volatility per year and the average Sharpe (SHP) measure of portfolio performance. For testing our hypothesis, we will examine possible portfolios under four cases such as, domestic investment, diversified but not hedged, diversifies and %50 hedge and diversified %100 hedge portfolio.

Before discoursing performance results, we must declare that how we use hedging strategies to overcome exchange rate exposure on our portfolio. As we mentioned in

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previous sections hedge ratio is theory related to regret and aversion considering if investor fully hedges or not hedges at all his/her foreign currency exposure and the foreign currency appreciates against the domestic currency then that investor would lose the positive differences and regret of his/her decision to come across a loss. Hence, for measuring what would happened if investor in eurozone invest with hedging fully (%100), partly (%50) and not hedging (%0) we will use 5 years forward rates. Forward rates are calculated by covered interest rate parity per period starting from January 2013 respecting national banks' interest rates.

In order to formulate Sharpe ratio, we will use best possible risk-free rates of each market namely government bond yields, yet we will ignore related country risk to risk free rate since in advanced markets government bonds are AAA rated, however in emerging markets government bonds are not rated AAA thus, cannot be truly risk free due to country risk. Returns are measured by individual in euros with or without hedged and formed equally for portfolio. For calculating portfolio standard deviation, we will use each national currency index and stock indices, measuring covariances for each market while forming them together equally. Later, we will calculate standard deviation of internationally diversified portfolio in respect of each market correspondingly.

Table 9G

	Case 1	Case 2	Case 3	Case 4
Expected return (x)	29.63%	35.93%	36.89%	37.85%
StdDEv	4.08%	2.54%	3.33%	2.06%
Volatility	70%	55%	63%	50%
Sharpe ratio	7.0784	12.5383	9.8500	16.3871

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The table (Table 9G) above indicates results from performance measures. From overall view we can deduct clearly that eurozone investor is much better off with diversified portfolio than not diversified investment. Where case 1 states for domestic investment in the view of eurozone investor, consequently investment made in EURO Stoxx 50 entirely. Case 2 states for diversified portfolio on mentioned stocks such EURO Stoxx 50, DOW 30, IBrX 50 and FTSE/JSE top 40 equally with no hedging strategies. Whereas, Case 3 states for diversified portfolio with %50 hedge with using forward hedge for half of the investment. Furthermore, Case 4 states diversified portfolio with %100 hedged with forward hedging strategies. Investor would take highest risk with %4.08 standard deviation and %70 annually volatility corresponding lowest return with % 26.63 if he/she would invest in only in EURO Stoxx 50. When it comes to internationally diversified portfolio, we could see that there is not significant difference between returns, however resemble varieties for risk exposure with a little bit bigger difference than returns.

For investor who would like to not avoid hedging strategies, return from portfolio is %35.93 with %2.54 standard deviation. Alternatively, for investor who would like to use %50 hedge for his/her exchange rate exposure, he/she has better outcome for return with % 36.89, yet with higher volatility on monthly basis such as %3.33. Hence, surprisingly the outcome we have according to our study on moderate risk averse and risk regret investor is that inside of cutting his/her volatility, risk related by this hedging strategies much bigger than fully hedged and not hedged one.

On the other side, for investor who would like to hedge his/her portfolio fully sees biggest return among other cases with %37.85, nevertheless would face bigger risk than % 50 hedged portfolio with %2.06 standard deviation which is less volatility then % 50 hedged strategy.

The table above (Table 9F) demonstrations more detailed picture trade-offs between volatility and returns among cases where we can see solely eurozone shows worst performance with high volatility, therefore %50 hedged portfolio follows to perform poorest among internationally diversified portfolios. The investor that choses not hedge

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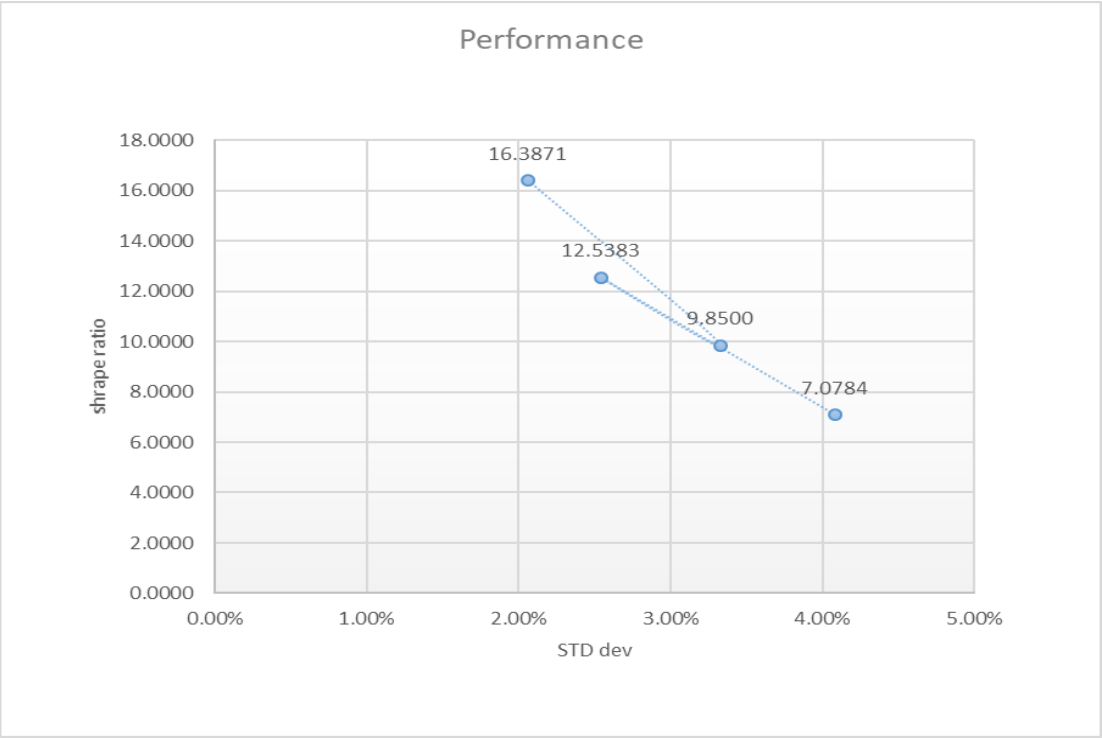
against exchange rate exposure is showing relatively higher performance, however when we compare with the portfolio that diversified and fully hedged it shows slightly less return and higher risk. Consequently, eurozone investor would aspect the best performance among all these four cases with investing into fully hedged diversified portfolio.

Table 9H



10 Conclusion

. Investor could result superior performances by knowing possible risks and sheltering based on your them. Therefore, risk management is a significant exercise for successful portfolio construction. Hence, in this paper, we assess investment essentials with portfolio construction basic and portfolio management objectives primary then we

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assisted to simulate portfolio construction regarding to modern portfolio theory. Lastly, we evaluate performance of selected portfolios.

The international portfolio diversification never has been primary choose of investors than lately. Investors could maximize his/her gain with low correlated assets as we have learned from modern portfolio theory. The correlation between the performance of a given index is very important feature in evolving a thoughtful investing policy. This concept helps to optimize expected return against a certain level of risk. By the choice of including assets that have a low correlation to each other helps to reduce the amount of overall risk for a portfolio.

The rise of emerging market lead investors to seek new possibilities for portfolio diversification options. Hence with these new opportunities, one can efficiency gain impact of international portfolio concerning of different type of risks respectively namely country risk, business risk, asset allocation risk, world risk and exchange risk. Internationally diversified portfolio has created portfolio diversification possibilities, nevertheless they also increased the interdependence between the different world market especially during high markets volatility, like in crisis periods. Even though there is an increase in markets correlation, that new emerging markets apparently still offer investment possibilities.

Investors would gain vast returns by meaning portfolio risk if they could involve stocks that have low correlations into their portfolio with respect to both market volatility and asset allocation. Regarding this we choose to invest two advanced and two emerging economic zone that we believe we could achieve low correlation criteria by diversified portfolio to result better income and profit. We deliberate simulation that if an investor from eurozone would invest into different negation with indices that has sufficient various sectors and confidential growth by assigning it over advanced markets and emerging markets, explicitly the United-State of America (US) the South-

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Africa (SA), Brazil (BR) and EUROZONE (EU) in the beginning of 2013 to end of 2017. Indices that we choose to simulate was, EURO Stoxx 50, DOW 30, IBrX 50 and FTSE/JSE top 40. Additionally, we also consider exchange risk into our portfolio and examine currencies indexes induvial as well as behaviours of each currencies respect to national indices.

We have simulated outcomes from the portfolios that we build with those mentioned indices. As we mentioned before, case 1 states for domestic investment in the view of eurozone investor, consequently investment made in EURO Stoxx 50 entirely. Case 2 states for diversified portfolio on mentioned stocks such EURO Stoxx 50, DOW 30, IBrX 50 and FTSE/JSE top 40 equally with no hedging strategies. Whereas, Case 3 states for diversified portfolio with %50 hedge with using forward hedge for half of the investment andcCase 4 states diversified portfolio with %100 hedged with forward hedging strategies**.** Regarding to these cases, hypothesis texted with portfolios under four cases such as, domestic investment, diversified but not hedged, diversifies and %50 hedge, and diversified %100 hedge portfolio. Consistent with our simulation- it is undoubtedly proven that an investor from eurozone is better off with international diversification than just to invest into national diversification indices. It also demonstrates that the level of the hedge ratio is a substantial element of portfolio construction.

Regarding to our findings, investor would have better performance outcome on fully hedged portfolio rather than non-hedged portfolio, nevertheless %50 hedged strategy doesn't seem convenient in terms of return neither reducing volatility for eurozone investor among hedging strategies. Wherever, it was dissimilar conclusion compare to previous studies. Performance measured by SHP ratio that is 7.08, 12.54, 9.85 and 16.38 about to not diversified, diversified but not hedged, diversified %50 hedged and diversified %100 hedged portfolios serially.

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11 Reference

i. Multinational Risk Assessment and Management (1988) by Wenlee Tin

ii. Portfolio Selection," (1952) by Harry Markowitz

iii. Modern Portfolio Theory and Investment Analysis (2003) by Brown, Gruber, Goetzman and Elton

iv. Active Credit Portfolio Management (2006) by Felsenheimer, Gisdakis and Zaiser

v. 'Fundamentals of Investing' by Gitman, Joehnk and Smart (2011-11th ed.)

vi. Strategic Risk Management by David Iverson (2013)

vii. Construction and Risk Budgeting Portfolio (2015) by Bernd Scherer

viii. Assessing the Benefits of International Portfolio Diversification In Bonds And Stocks by De Saints and Sarro (2008)

ix. Estimation Risk & International Bond Portfolio selection (1995) by Annaert

x. Risk Management in Internationally Diversified Portfolio by Thierno Mouctar Bah (2009)

xi. WORKING PAPER SERIES NO 812 / SEPTEMBER 2007-THE UNCOVERED RETURN PARITY CONDITION 1 by Lorenzo Cappiello and Roberto A. De Santis

xii. MULTIVARIATE GARCH MODELS by Eduardo Rossi - University of Pavia 2012

i. INTERNATIONAL MACRO-FINANCE by Anna Pavlova and Roberto Rigobon

ii. Evaluating "correlation breakdowns" during periods of market volatility by Mico Loretan and William B

o

i. State and group dynamics of world stock market byprincipal component analysis by Ashadun Nobi and Jae Woo Lee

ii. Applying regret theory to investment choices: Currency hedging decisions by Sebastien Michenaud & Bruno Solnik – 2008

iii. Predicting Volatility in the Foreign Exchange Market by Philippe Jorion - Journal of Finance, 1995, vol. 50, issue 2, 507-28

iv. www.Investing.com

v. www.ieconomics.com

vi. https://europa.eu/european-union/topics/economic-monetary-affairs_en

vii. http://www.ftsmodules.com/public/texts/capmtutor/chp55.4.htm

viii. http://epub.prsgroup.com/products/international-country-risk-guide-icrg

ix. https://www.algodepth.com/single-post/2017/07/03/A-Basket-and-Risk-Approach-to-Portfolio-Management

x. https://www.forbes.com/sites/rickferri/2011/10/07/no-alpha-from-alternative-index-funds/#3ceb0a376c66

xi. https://link.springer.com/content/pdf/bbm%3A978-3-642-29721-2%2F1.pdf

xii. https://www.finanzen.net/zinsen/RDAX-Performance-Index

xiii. http://topforeignstocks.com/indices/

xiv. https://seekingalpha.com

xv. http://www.effisols.com/basics/MVO.htm

xvi. https://www.brazil.org.za/economy.html

xvii. https://www.marketwatch.com/story/low-volatility-correlations-and-other-confounding-market-riddles-2017-09-28

o

xviii. http://www.bmfbovespa.com.br/en_us/products/indices/broad-indices/brazil-50-index-ibrx-50.htm

xix. https://www.forbes.com

xx. https://www.ways2wealth.com

xxi. http://www.zenwealth.com

xxii. https://strategiccfo.com/investment-analysis/

xxiii. http://www.peritusasset.com/investment-philosophy-and-products/investment-philosophy/

xxiv. https://www.economist.com/topics/us-economy

xxv. https://www.focus-economics.com/countries/united-states

xxvi. https://www.theguardian.com/business

xxvii. https://www.bloomberg.com/view/articles/2018-02-21/the-euro-zone-needs-more-risk-sharing-but-fewer-risks

xxviii. https://www.bloomberg.com/

xxix. https://www.ft.com/us-economy

xxx. http://money.cnn.com/data/dow30/

xxxi. http://www.bbc.com/news/uk-43073781

xxxii. https://www.investing.com/indices/

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APPENDIX

Monthly Changes of Indices and Currencies Indexes

	EURO	USD	BRL	ZAR		STOXX 50	DOW 30	IBX50	FTSE/JSE Top 40
DATE	VARIANTIES					VARIANTIES			
13-Feb	-1.98%	-0.96%	2.29%	6.92%		-2.57%	1.40%	-4.03%	-2.88%
13-Mar	-0.68%	3.43%	-1.14%	5.89%		-0.36%	3.73%	0.76%	1.12%
13-Apr	1.33%	-2.22%	-0.73%	7.72%		3.35%	1.79%	1.04%	-3.54%
13-May	5.17%	6.95%	-2.30%	1.02%		2.13%	1.86%	-1.25%	9.93%
13-Jun	0.77%	0.67%	-4.69%	8.67%		-6.03%	-1.36%	-9.30%	-7.58%
13-Jul	2.89%	-0.10%	-2.74%	6.68%		6.36%	3.96%	1.61%	5.31%
13-Aug	2.38%	3.19%	-3.07%	5.23%		-1.69%	-4.45%	2.69%	2.76%
13-Sep	-0.97%	-3.93%	6.01%	6.01%		6.31%	2.16%	5.11%	5.53%
13-Oct	0.86%	0.29%	-1.13%	6.44%		6.04%	2.75%	6.17%	2.82%
13-Nov	1.88%	1.82%	-3.71%	6.65%		0.61%	3.48%	-2.45%	-1.36%
13-Dec	2.59%	1.05%	-0.43%	4.57%		0.72%	3.05%	-3.45%	3.44%
14-Jan	0.77%	3.34%	0.47%	3.53%		-3.06%	-5.30%	-8.20%	-2.72%
14-Feb	0.17%	-2.88%	1.28%	7.11%		4.49%	3.97%	-0.14%	5.00%
14-Mar	-1.88%	-1.57%	2.27%	6.98%		0.39%	0.83%	6.84%	1.84%
14-Apr	0.10%	-0.83%	1.47%	5.70%		1.16%	0.75%	2.87%	1.77%
14-May	-1.44%	0.85%	0.39%	6.28%		1.44%	0.82%	-1.46%	1.68%
14-Jun	0.26%	-0.33%	1.25%	5.34%		-0.50%	0.65%	3.67%	2.64%
14-Jul	-1.27%	1.71%	-1.24%	6.63%		-3.49%	-1.56%	5.23%	0.23%
14-Aug	-2.44%	0.11%	1.78%	6.45%		1.83%	3.23%	9.83%	-1.28%
14-Sep	1.07%	6.40%	-5.62%	5.31%		1.68%	-0.32%	-11.54%	-2.31%
14-Oct	-1.14%	0.00%	-1.74%	8.09%		-3.49%	2.04%	1.24%	0.34%
14-Nov	0.71%	1.50%	-3.10%	7.03%		4.42%	2.52%	0.10%	-0.80%
14-Dec	-0.25%	3.64%	-1.09%	5.02%		-3.21%	-0.03%	-8.70%	-0.15%
15-Jan	-6.20%	2.92%	1.67%	7.58%		6.52%	-3.69%	-5.46%	2.17%
15-Feb	1.17%	2.28%	-5.21%	7.79%		7.39%	5.64%	9.81%	4.17%
15-Mar	1.14%	6.95%	-8.70%	7.89%		2.73%	-1.97%	-0.87%	-1.52%
15-Apr	2.00%	-3.95%	3.82%	5.76%		-2.21%	0.36%	9.67%	4.64%
15-May	0.34%	3.23%	-3.87%	7.18%		-1.24%	0.95%	-6.05%	-4.28%
15-Jun	0.59%	-1.21%	2.05%	5.95%		-4.10%	-2.17%	0.64%	-0.48%
15-Jul	3.39%	5.25%	-7.63%	6.81%		5.15%	0.40%	-3.76%	0.63%
15-Aug	5.65%	2.85%	-4.60%	4.96%		-9.19%	-6.57%	-7.98%	-4.99%
15-Sep	4.14%	4.60%	-6.92%	6.43%		-5.17%	-1.47%	-3.24%	2.47%
15-Oct	-2.38%	-0.34%	2.85%	7.04%		10.24%	8.47%	1.05%	7.64%
15-Nov	-2.45%	3.02%	2.57%	4.98%		2.58%	0.32%	-1.98%	-4.65%
15-Dec	6.04%	2.24%	-0.89%	2.38%		-6.81%	-1.66%	-4.04%	-0.46%
16-Jan	0.99%	1.29%	0.01%	4.95%		-6.81%	-5.50%	-6.46%	-4.37%
16-Feb	0.45%	0.00%	-0.63%	6.44%		-3.26%	0.30%	5.64%	-0.98%
16-Mar	-1.44%	-7.31%	7.55%	7.47%		2.01%	7.08%	16.42%	6.79%
16-Apr	-2.02%	-2.89%	3.11%	7.48%		0.77%	0.50%	7.24%	0.26%
16-May	2.19%	6.13%	-0.65%	1.60%		1.16%	0.08%	-10.18%	2.76%
16-Jun	-6.03%	-5.73%	10.06%	7.57%		-6.49%	0.80%	6.26%	-3.65%
16-Jul	-0.91%	-1.70%	-3.09%	9.78%		4.40%	2.80%	10.96%	-0.67%
16-Aug	1.66%	1.88%	2.83%	2.19%		1.08%	-0.17%	0.93%	0.32%
16-Sep	-1.17%	-2.19%	-3.62%	10.65%		-0.69%	-0.50%	0.85%	-0.76%
16-Oct	-3.61%	-0.55%	2.41%	7.39%		1.77%	-0.91%	11.10%	-3.56%
16-Nov	-0.14%	4.81%	-3.15%	5.44%		-0.12%	5.41%	-4.72%	-1.05%
16-Dec	-2.78%	-1.89%	3.34%	7.15%		7.83%	3.34%	-2.81%	1.09%
17-Jan	0.93%	-2.57%	1.73%	6.12%		-1.82%	0.51%	7.13%	4.34%
17-Feb	-3.32%	-0.60%	1.18%	8.01%		2.75%	4.77%	2.84%	-4.56%
17-Mar	1.62%	0.66%	0.05%	4.76%		5.46%	-0.72%	-2.17%	3.74%
17-Apr	2.74%	-0.31%	-2.55%	6.41%		1.68%	1.34%	0.60%	3.88%
17-May	3.05%	-1.15%	-3.18%	7.31%		-0.14%	0.33%	-3.99%	-0.49%
17-Jun	2.33%	0.16%	-3.11%	7.03%		-3.17%	1.62%	0.49%	-3.44%
17-Jul	2.08%	-2.67%	4.88%	3.91%		0.22%	2.54%	4.76%	6.97%
17-Aug	0.37%	-0.40%	-1.32%	7.20%		-0.81%	0.26%	7.28%	1.97%
17-Sep	0.74%	1.83%	1.24%	3.95%		5.07%	2.08%	4.95%	0.61%
17-Oct	1.12%	3.06%	-1.55%	4.56%		2.20%	4.34%	-0.01%	6.08%
17-Nov	1.18%	-1.74%	-1.74%	7.69%		-2.83%	3.83%	-3.21%	0.60%
17-Dec	-2.06%	-3.08%	-4.64%	13.49%		-1.85%	1.84%	6.20%	-0.62%

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Yearly Interest Rate of Each Currencies

Interest Rates	EUR	USD	BRL	ZAR
Jan-13	0.75%	0.25%	7.25%	5.00%
Dec-13	0.25%	0.25%	10.00%	5.00%
Dec-14	0.05%	0.25%	11.75%	5.75%
Dec-15	0.05%	0.25%	14.25%	6.25%
Dec-16	0.00%	0.75%	13.75%	7.00%
Dec-17	0.00%	1.50%	7.00%	6.75%

Yearly Spot Exchange Rates

Spot Price	EUR/USD	EUR/BRL	EUR/ZAR
Jan-13	1.3579	2.5875	12.1651
Dec-13	1.3746	3.247	14.4292
Dec-14	1.2098	3.2152	13.9992
Dec-15	1.0861	4.3017	16.8083
Dec-16	1.0516	3.4226	14.4475
Dec-17	1.1998	3.9743	14.8444

Yearly Forward Rates

Forward Rates	EUR/USD	EUR/USD	EUR/USD
Dec-13	***1.3746***	***2.9592***	***15.1163***
Dec-14	***1.2074***	***2.8843***	***14.7935***
Dec-15	***1.0839***	***3.7746***	***18.0739***
Dec-16	***1.0438***	***3.0314***	***15.3589***
Dec-17	***1.1821***	***3.7700***	***14.8792***

Government Bonds Rates

Best Possiable Risk Free Rates			
EUROZONE	**0.728%**	**Jan-13**	*5Y Government Bond Yield*
USA	**0.880%**	**Jan-13**	*5Y Government Bond Yield*
BRAZIL	**8.950%**	**Jan-13**	*5Y Government Bond Yield*
SOUTH AFRICA	**5.775%**	**Jan-13**	*5Y Government Bond Yield*

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Individual Returns on Stocks Reflecting To Portfolio Construction Cases.

Return from investment	Case 1	Case 2	Case 3	Case 4
EURO STOXX 50	29.63%	29.63%	29.63%	29.63%
DOW 30	N/A	101.84%	103.36%	104.87%
IBX50	N/A	-8.28%	-5.80%	-3.31%
FTSE/JSE Top 40	N/A	20.51%	20.37%	20.23%

Mean, Stddev, Volatility and Return From Each Investment

		Mean	Return	STDDEV.	Volatility
	EURO STOXX 50	3,188.67	29.63%	4.08%	14.15%
	DOW 30	17,879.86	78.34%	2.88%	9.99%
	BX50	9,285.26	40.87%	5.94%	20.57%
	FTSE/JSE Top 40	44,528.42	47.05%	3.58%	12.40%

Risk Based on Stocks and Currencies Together

Risk stocks & Currencies	USA	BRAZIL	SOUTH AMERICA
COVARIANCE	0.00009	-0.00103	0.00036
Standard Dev.	0.96%	3.21%	1.91%
Volatility	3.33%	11.11%	6.60%