

**RETURN AND CORRELATIONS OF MALAYSIAN SECTOR STOCK INDICES  
UNDER DIFFERENT MARKET CONDITIONS.**

By

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## **DEDICATION**

.....to all whom helped me so much in achieving this project.

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## **ABSTRAK**

Kajian ini ingin mengetahui potensi manfaat kepelbagaian melabur antara sektor dan indeks dalam Pasaran Malaysia. Tambahan, kajian ini mengkaji pulangan dan korelasi tujuh indeks sektor Malaysia dengan Indeks Komposit Kuala Lumpur (KLCI) pada keadaan pasaran yang berbeza dari Januari 2008 hingga Disember 2014. Data yang digunakan adalah 84 data sejarah bulanan. Tujuh sektor Bursa Malaysia yang diperiksa ialah kewangan (finance), barangan pengguna (consumer products), hartanah (properties), pembinaan (construction), perladangan (plantation), produk industri (industrial products) dan perdagangan & perkhidmatan (trading & services). Terdapat 3 bahagian dalam kajian ini, di mana bahagian pertama mengkaji korelasi dan t-statistik semua indeks sektor dengan KLCI. Bahagian kedua kajian ini mengkaji korelasi dan t-statistik sesama tujuh sektor. Akhirnya, hubungan antara semua sektor dan juga dengan KLCI akan diujikan lagi pada keadaan pasaran yang berbeza ("bull and bear market") untuk mengenalpasti ruang untuk menggunakan kepelbagaian dalam pelaburan. Keputusan menunjukkan bahawa pulangan bulanan bagi semua sektor adalah positif dikaitkan dengan pulangan bulanan KLCI dan semua sektor adalah berkait rapat antara satu sama lain pada tempoh Januari 2008 hingga Disember 2014. Semua sektor juga menunjukkan bahawa mereka berkait rapat sesama sektor lain, apabila kesemua-semuanya dianalisis secara berasingan pada keadaan pasaran yang berbeza. Pulangan sektor untuk tempoh keseluruhan, "bull market" dan "bear market" juga diuji dengan menggunakan analisis komponen utama dan memberi keputusan yang sama bahawa semua sektor berkait rapat antara satu sama lain tanpa mengira keadaan pasaran. Oleh yang demikian, kajian ini menyimpulkan bahawa

semua indeks sektor adalah berkait rapat tanpa mengira keadaan pasaran dan jangka masa pelaburan. Ruang kepelbagaian dalam Bursa Malaysia sahaja adalah sangat terhad.

## **ABSTRACT**

This study look at potential diversification benefits of investing between sectors and the index within Malaysian Market. In additional, this study examines returns and correlations of seven Malaysian sector indices along with Kuala Lumpur Composite Index (KLCI) under different market conditions from January 2008 to December 2014. Data used for this study are 84 monthly historical data. The seven Bursa Malaysia sectors examined are finance, consumer products, properties, constructions, plantation, industrial products and trading & services. There are 3 parts of the study, where first part is to examine the correlations and t-statistics of all sector indices with KLCI. Second part of the study examine the correlations and t-statistic among seven sectors. Finally, the relationship among all sectors and also with KLC are being tested under different market conditions (bull and bear market) to understand the room for diversification. The results showed that all sectors monthly returns are positively correlated with KLCI monthly returns and among each sector during January 2008 to December 2014. When the returns are being analyzed separately under bull and bear market conditions, all sectors also show that they are highly correlated with other sectors. The sector returns for overall period, bull and bear market also being tested using principal component analysis and give the give the same result that all sectors are highly correlated with each other regardless of market conditions. As a result, the study conclude that all sector indices and highly correlated regardless of market conditions and investment time frame. Thus, opportunities for diversification within Bursa Malaysia is extremely limited.

## Chapter 1

### INTRODUCTION

#### 1.1 Research Background

Numerous studies have examined the investment return and diversification to reduce the risk by allocating investments portfolio across various industries and sector. The final aim is about to maximize return by investing in different sectors that each react differently to similar market conditions. Goetzmann & Kumar, 2008, stated that any rational model of portfolio should hold diversified portfolios to reduce or eliminate non systematic risk. Asset pricing models posits that securities are priced by a diversified, marginal investor who demands little or no compensation for holding idiosyncratic risk. They also indicate that risk for carrying single stock representing one industry within any investment portfolio is always higher than carrying multiple stocks of different industries.

Diversification in general is about diverting risk within any economic environment. Hassan (2011) discussed that different market activities will result in different shocks in the relevant industry especially from the major economic events. Thus, sector indices became a significant indicator that provided good information for investors to understand the impact of any event across that particular industry. Roll (1992) stated that overall stock performance in the same industry can be explained significantly by the sector indices. As a result of the attractiveness of investing in sector indices, it has slowly become more popular for institutional or retail investors to switch their focus into sector investment rather than their regular stock investment (Ewing et al., 2003).

Studies have compared the benefits of investment on sector performance against stocks performances. Some researchers had enhanced their study to compare between one



sector to another sector, between sectors and overall market performance. One good example is the study done by Meric et al (2010) on the overall 10 different sector returns of the New York Stock Exchange between October 2002 to September 2007 (5-years period). Their finding show that investors do benefit from diversification activities by investing in a few sectors rather than investing on single sector. Another similar analysis been done by Patel (2008) that compares on the seven sector returns and its performance of NASDAQ Composite index over 10 years period from year 1998 to 2007. The study discovered that in certain time frame (relatively shorter time period of time) some sectors outperformed other sectors in percentage of return and will offer benefit for investors that invest through diversification strategy that is by re-allocating funds to the sectors that are less correlated with the remaining sectors. By using the same method over the long term investment perspective, Patel (2008) showed that none of NASDAQ sector indices generated statistically significant greater returns than NASDAQ Composite Index as a whole and investors did not benefit from investing only in specific NASDAQ sector on long term investment basis.

Country wise, Aked et al (2000) examined the importance between country factors and sector factors. They emphasized that the sector factors has become more and more important in determining stock market returns from year 1986 to year 1999. Their study also showed that investors do benefit from diversification by sectors as compared to diversification by countries. Tiang and Worthington (2005) also performed study that compare the performance of sector indices among different European countries of Finland, Belgium, Germany, France, Italy and Ireland. The results showed that there are

few sectors in different markets having relatively significant interrelationship, especially in Germany, Italy and France.

For sector performance and return, many researches focused their study on the sector returns among the same market or different market with different markets condition. The market condition being studied could be divided into two categories, which are bull markets and bear markets. According to Lai, Tan & Chong (2013), bull markets occurred in the condition, whereby there are major rise in stock prices, high economic growth and on increase of investor confident level. Meanwhile, bearish markets were defined as when there are major fall in stock prices, bad economic news, decreasing in investor confidence and also widespread pessimism that causes the negative sentiment to be self-sustaining.

Meric et al (2002) study showed that five countries stock market (United State, German, Japanese, United Kingdom and French) are closely correlated during the bear period from March, 2000 to April 2001 than the bull market period March 1999 to March 2000. Hence, they concluded that global investors do benefit through portfolio diversification during bear market than bull market. Worthington and Valadkhani (2005) also studied the impact of catastrophic shocks on 10 sectors of Australian Securities Exchange, ASX. The results showed that some sectors are badly affected by the natural disaster shocks than other sectors. Another impact of sector indices on different market condition as done by Ewing and Malik (2000) examined risk and return characteristics of 5 sector indices of the New York Stock Exchange (NYSE) before and after the bearish market of year 1987. They examined NYSE Market from year 1970 to 1997 and defined the pre-crash period from January 1970 through September 1987 and post-crash period

was defined from January 1988 through July 1997. They had then concluded that each sector volatility react differently relative to the overall market after major events. Other than that, Taluca et al. (2003) did the same analysis to compare volatility and correlations of returns between U.S. market and few major countries market after the Asian crisis (October 1997). They stated that high uncertainty in equity markets is one of the factor that lead to higher correlation and volatility in stock returns during the post crisis period . Thus, suggesting it is better for investors to invest domestically across sectors following the Asian crisis.

In additional, Conte (2013) emphasized that the timing of the bull and bear trends is extremely difficult to predict by any investors, no matter how smart and how experience an investor could be. Thus, the actual consistency of prediction is always a challenge for investors. As a result, although most investors followed many different ways in defining bull and bear markets, the general accepted concept was about the overall uptrend/downtrend of the market after any major economic events.

## **1.2 Problem Statement**

Bursa Malaysia formally known as Kuala Lumpur Stocks Exchange (KLSE) is an exchange holding company that offers public shares trading. It is one of the larger securities exchanges in Asia with around 1,000 listed companies (Bursa Malaysia, n.d.). All listed companies are categorized into by markets and then divided into different sectors (10 sectors in total) under Bursa Malaysia main board markets, which are construction, consumer products, finance, industrial products, mining, plantations, properties, Real Estate Investment Trust (REITS), technology and trading/services. The

movement of stocks on Bursa Malaysia is indicated by Kuala Lumpur Composite Index (KLCI) and reflects the performance of the market.

Generally, there are two types of investors in Malaysia, which are institutional investors and retail investors. Institutional investors are obviously different in the areas of overconfidence, liquidity preference, and price anchoring between these two distinct market trends (Malkiel, 2003). As for the retail investors, there were no obvious difference in investing behavior except in terms of liquidity preference and self-control (Lai, Tan & Chong, 2013). Among these groups of people, some of them trade only stocks and some of them focused on sector indices return and performance. These investors trading behavior and risk management do not show the actual efficient trading of risk and return situation of the entire sector of the equity market because single stock volatility do not only affect industry events but also on volatility of their financial performance, changes on the key members of top management and other factors. Any changes in single stock do not really tell the true story about the particular industry but only the performance of the company itself (King, 2008 and Baltussen & Post, 2011). This is especially true during bullish markets, where most investors traded based on rumors (Lai, Tan & Chong, 2013). Hence, sector indices become more and more popular among investors as an analytical tools to understand about the particular sector trend.

Recent year, Malaysian investor started to gain interest on the concept of understanding the sector stock investment. Most of the investors that follows this strategy will form their investment portfolio by picking different stocks from different sectors within Malaysian stock market. Nevertheless, throughout the years majority of them did not manage to outbid the market to gain abnormal returns (Bursa Malaysia, n.d.)

(Maybank Unit Trust, n.d.) (Public Mutual Fund, n.d.). The issue here is that does investor really able to outbid market by only constructing a fully diversify investment portfolio from the same market? The challenge of being a smart investor is to understand about the relationship of the movement among the sectors and also with the main composite index (KLCI) to achieve the objective of diversification. According to Patel (2008), Meric et. al. (2002) and Meucci (2010), diversification of an investment portfolio could only be achieve by applying on the stocks that are not correlated with each other. Hence, it is important to know the interrelationship of each of the sector indices and also with KLCI to avoid making wrong investment move.

In conjunction to the about issue, the study on Bursa Malaysia sector indices could be further investigated to examine the performance of sector indices and their correlations to the KLCI and among the indices. Key achievement from the result will be knowing the investors could really benefit by outbidding the market performance by applying diversify strategy in Malaysia stock market. Furthermore, this study would examined the impact on the correlations among the sectors during bull market and bear market. Fabozzi and Francis (1977) stated that it is important to note that different market condition will lead to different market trading behavior that will change the entire trading result. Therefore, the targeted year for investigation with both bull and bear trend, for this study is from year 2008 to year 2014. Year 2008 is a relevant year to examine sector performances and correlations because of the global financial crisis, which includes crash of financial services due to Lehman Brothers largest bankruptcy filing in U.S. history with Lehman holding over \$600 billion in total assets and this resulted big impact on global stock markets including Malaysia.

FTSE Bursa Malaysia KLCI (^KLSE) ★ Watchlist  
**1,718.20** +1.38(+0.08%) Kuala Lumpur Stock Exchange - As of 4:59AM EDT



Figure 1.1 The KLCI index in line chart form from year 2008 to year end of 2014 (Bursa Malaysia, n.d) & (Yahoo Finance, n.d.).

### 1.3 Research Question:

Research is being carried out to examine the performance of Bursa Malaysia sector returns and correlations under different market conditions. This research will focus on the major sectors that are key contributors to KLCI by collecting secondary data of the sector indices from year 2008 to year 2014. The data collected will be used to explore the following research questions:

1. Are the Malaysian sector indices correlated with KLCI?
2. Are the Malaysian sector indices correlated with each others?

3. Are there diversification benefits of the Malaysian Sector Indices under different market condition?

#### **1.4 Objectives of the Study**

In relation to the research questions, the purposes of the study are to:

1. Examine the correlation of Malaysian sector indices and KLCI.
2. Examine the correlations of Malaysian sector indices with each others.
3. Examine and analyze the correlation of the Malaysian sector indices during different market condition.

#### **1.5 Significance of Study**

The reasons why this study is significant can be explained from two aspects. First, this study would allow Malaysian investors to have more understanding on the return and correlations of Malaysia sector indices that will help investors in their investment strategy during portfolio building. Second, investors will know how significant and volatile are the sector returns at different market condition. This is an important factor that is practiced by many well known institutional fund managers as this could improve their entire portfolio performance. By understanding the study, investors could manage their investment risk by building their own investment portfolio with different sectors using different combinations that could maximize their return. In additional, they would understand how each of the sectors correlated to each other during bull and bear market. As a result, Malaysian investors (institutional and retails) can improve their stock investment portfolio building method by taking into consideration both Bursa Malaysia individual sector performance and under different market conditions.

## **1.6 Explanation of Key Terms**

This study included few key terms that are important for the research. Under this chapter, some brief explanations on the key terms which regards to market sector of Bursa Malaysia will be made in order to share common understanding of the concepts under discussion.

### **1.6.1 Bursa Malaysia Market Sectors**

There are thousands of stocks that are listed under Bursa Malaysia, the simplest way to classify all these stocks is by their type of business. Under this idea, Bursa Malaysia categories companies in similar industry together for comparison purposes. Like others stock market around the world, Bursa Malaysia called these group “sectors”. There are in total 10 different sectors that under Bursa Malaysia, which are construction, consumer products, finance, industrial products, mining, plantations, properties, REITS, technology and trading/services (Bursa Malaysia, n.d.). Although there are 10 sectors in Bursa Malaysia, this study will use only 7 main sectors for analysis.

#### **1.6.1.1 Industrial Products**

This sector includes companies operating mainly in industrial products, such as aerospace products, building material, general industries, waste water management, industrial trading, engineering consultancy companies and industrial related company (Bursa Malaysia, n.d.).



### **1.6.1.2 Consumer Products**

This sector includes companies where the major business dealing are into consumer goods, such as beverages, electronic home appliances, meat products, office supplies, tobacco products and so on. This category inclusive wide range of companies and normally the fluctuation with the market are less (Bursa Malaysia, n.d.).

### **1.6.1.3 Finance**

This sector is one of the largest sectors in Bursa Malaysia that includes companies like insurance policies providers, banks, brokerage companies and investment companies. Although number of stocks traded under this sector is less but these companies make significant impact on KLCI index. Other than that, finance sector also very vulnerable to economic turmoil (Bursa Malaysia, n.d.).

### **1.6.1.4 Plantation**

This sector includes companies that run its core business on palm oil plantation, supplying of plantation products and company that involve in the processing of oil palm (Bursa Malaysia, n.d.).

### **1.6.1.5 Trading & Services**

This sector includes companies that deals on providing services to gain company revenue, such as airline companies, advertising agencies, publishing houses, restaurants, entertainment and gambling related business (Bursa Malaysia, n.d.).

### **1.6.1.6 Properties**

This sector includes companies that involved in private/public properties developments, properties investment and properties service provide.

### **1.6.1.7 Construction**

This sector is a dynamic, and comprehensive industry sector that are important in the Malaysia stock market. The companies from this sector include residential unit, commercial unit and repairing & maintaining local physical infrastructure. This may involve building of new structures, dividing land for sale as building sites, preparation of sites for new development, renovations and engineering projects such as highways or utility systems (Bursa Malaysia, n.d. and Behm, 2008).

## **1.6.2 Market Condition**

### **1.6.2.1 Bull Market**

This is a financial condition where the financial prices are rising or in the condition of expectation to rise in the future. The terms "Bull market" commonly refer to the stock market with characteristic of future optimism that the investors become more confident towards the future and expect the rising results will continue. The identification of bull market will be explain in details in Chapter 2.8.1.

### **1.6.2.2 Bear Market**

This is a financial condition where the financial prices are falling or in the condition of expectation for market collapse in the future. The term "Bear market" commonly refer to

the stock market with characteristic of wide spreading negative sentiment and news. It generally needs at least two months period of time to consider an entry into a bear market (Harjit, 2011). Some investors confused a bear market with a correction, which assume bear market occurred in a short term trend of less than two months. Bear markets rarely provide great entry points, as timing the bottom is very difficult to predict. Similarly, identification of bear market will be discuss further in Chapter 2.8.2.

### **1.6.3 Diversification**

Diversification is a kind of risk management technique to mix wide variety of investments within a portfolio to control the entire investment portfolio risk. The concept of this technique of managing a portfolio by combining different kinds of investments will resulting in gain of higher returns on average with lower risk than any individual investment found within the portfolio. The reason is because the positive performance from some of the investments will neutralize the negative performance of the others.

## **Chapter 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter has shown the reviews of previous literatures that had been studied and researched by the expertise in specific field. The relevant information from them will be reorganizes into more specific group of information that could be utilized for this research. Some studies are solid evidence that had been done by researches in the similar matter but in different regions. Previous studies gaps, variation in research result, time frame different and etc had become a guidance in creating idea and inspiration that lead to this research topic. Due to pass evidence and guidance, this research as a result becomes more valuable and trusts worth it.

#### **2.2 Literature Overview**

Since the appearance of stock market as a base of capital economic across the world, neither institutional nor retail investors always seek for opportunity to learn more about the market movement and some of them even tried to predict the market movement trending. No matter how investors predict the market, stock market always bound to high volatility especially to market rumors. In order to reduce single stock investment risk, building of stock investment portfolio had become more and more famous after Markowitz first introduced his Modern Portfolio Theory (MPT) to the market. Since after that, investors start to understand that the risk of investment come from the entire investment portfolio itself is much more lower than the risk come from investing in specific stock. Specific study had also proven that diversification in investment is highly

important, especially stocks market that are highly volatile. As the market is highly volatile and it is hard to predict the market condition (bearish or bullish), the best way to reduce the risk is by managing the risk through investment portfolio diversification. At the later stage, the diversification also resulting in the development of investors interest to focus in sector indices investment. They even spent huge money to understand stock market sectors movement and also how their movement interrelated to each others. For the past few years itself, there are many studies being done to understand the sector indices movement at different regions. The reason of the study is to examine the possibility of any investors to out beat the market through diversification strategy only in specific market. Hence, investment portfolio diversification, investment risk and return, sector indices return and correlations in global market, correlations of stock in Malaysian stock market, efficient market hypothesis, investment portfolio risk and return, market conditions (bullish or bearish) and sector indices & portfolio return become important element for this research.

### **2.3 Efficient Market Hypothesis**

Malkiel (2003) stated the concept of efficient market hypothesis on the not possible to "beat the market" because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. Based the hypothesis, the general believed was the securities markets were extremely efficient in reacting information about individual stocks and about the stock market as a whole. The accepted view was that when information arises, the news spreads very quickly and is incorporated into the prices of securities without delay. Thus, neither technical analysis, which is the

study of past stock prices in an attempt to predict future prices, nor even fundamental analysis, which is the analysis of the financial information such as company earnings and asset values to help investors select “undervalued” stocks, would enable an investor to achieve returns greater than those that could be obtained by holding a randomly selected portfolio of individual stocks, at least not with comparable risk.

Malkiel (2003) also discussed that the efficient market hypothesis is actually associated with the idea of a “random walk”, which means that all subsequent price changes represent random departures from the previous prices. The logic of the random walk idea is that if the flow of information is unimpeded and it will immediately reflected in stock prices, then tomorrow’s price change will reflect only tomorrow’s news and will be independent of the price changes today. Nevertheless whatever news by it means is by definition unpredictable, and thus resulting price changes must be unpredictable and random.

In Birau (2007) studied of efficient market capital also given similar explanations about the efficient market hypothesis. He mentioned that a market price is always "fully reflect" available information is called efficient. He also has the same believe as the Malkiel (2003) study on the efficient market theory that it is not possible to outperform the market over the long-term. An efficient capital market is characterized by the fact that any information is available to all investors or market participants. Therefore, stock prices are always incorporate and reflect all relevant information. Hence, the price of a stock should reflect the knowledge and expectations of all investors or market participants. Strictly speaking, the efficient market theory seems a utopian and unrealistic

theoretical composition, but beyond its critics, efficient market theory reaches profound meanings and revolutionized the field of investing.

Based on both Malkiel (2003) and Birau (2007) study, it can be conclude that stock prices fully reflect all known information in the market. As a result, the stocks always trade at their fair value in market and making it impossible for investors to either purchase undervalued stocks or sell stocks at overvalued prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments through structuring high risk and high return portfolio. Under the explanation of this hypothesis, some uninformed investors that buy a diversified portfolio at the tableau of prices given by the market will obtain a rate of return as generous as that achieved by the experts become possible. This shown that the important of diversification in constructing an investment portfolio could result in better return within the accessible range of information available in the market.

#### **2.4 Investment Portfolio Diversification**

Diversification in investment means reducing risk by investing in a variety of assets. While, stock investment portfolio diversification means building of investment portfolio that come with different combination of stocks. The higher the number stocks combination of a portfolio, the bigger the portfolio size it is. Based on Evans and Archer (1968), they found that the process of diversification proceeds rapidly as portfolio size increases with most of the effect of diversification having taken place with the aggregation of only few securities. The study of Evans and Arches had proven that an

investment portfolio that consists of 8 - 10 securities will be diversifying enough to reduce the investment risk.

Whereas, the study of Claudio and Pasquale (2012) shown that the relationship between portfolio diversification and the systemic risk could be summarized as following result.

1. The gain obtained from diversifying one's portfolio, thus reducing risk exposure through risk sharing.
2. The gain obtained through risk shifting from higher to lower risk-aversion agents.

From their study, it has shown the important of the diversification in investment portfolio that could balance up the overall performance of individual asset. This general idea can be apply on the stocks investment portfolio diversification that could share the risk among all stocks on the portfolio and then even up the bad performer with the good performer. As an investor not able to 100 percent confirm, their prediction on future return of a particular stock on good side or bad side. As a result, the best way of stocks investment is by diversification.

Basically, the benefit of diversification in portfolio is to reduce the volatility of the portfolio to the market information leaked or changed. The diversification can be either different sectors, different industries, have different management teams, some are defensive, some are cyclical, and they have differing sensitivities to interest rates, consumer demand, or any other market influences. If something in the greater economy (or market) changes, the effects on the various stocks will be different and react differently according to the information. Some stocks might increase in value as a result of the change and others will decrease in value. Moreover, those that increase (or



decrease) in value will do so by differing degrees. The point is that by holding different stocks, the reaction to an exogenous influence will cause some stocks to go up and some to go down, and assuming we hold sufficient stocks, and more importantly, sufficiently different stocks from different sectors, the increases in some stock prices will cancel out by the decreases in other stock prices. The risk that the unique characteristics of a particular stock will cause it to decline in value in response to an exogenous influence is referred to as its unique or unsystematic risk.

#### **2.4.1 Markowitz Diversification Theory (Modern Portfolio Theory)**

Mangram (2013) study discussed more on the Modern Portfolio Theory (MPT) that was introduced by Harry Markowitz (1952). Markowitz is a famous financial economist that has made huge contributions in portfolio selection. He was awarded the Nobel Prize on his contribution to Portfolio Selection research. MPT explained that an investment framework for the selection and construction of investment portfolios based on the maximization of expected portfolio returns and simultaneous minimization of investment risk. The general concept is about to manage the investment risk by diversifying in the investment selection. The more the investment is diversified, the better the diversification result. Mangram (2013) study of MPT also mentioned that, the risk component of MPT can be measured using various mathematical formulations, and reduced via the concept of diversification, which aims to properly select a weighted collection of investment assets that together exhibit lower risk factors than investment in any individual asset or singular asset class.

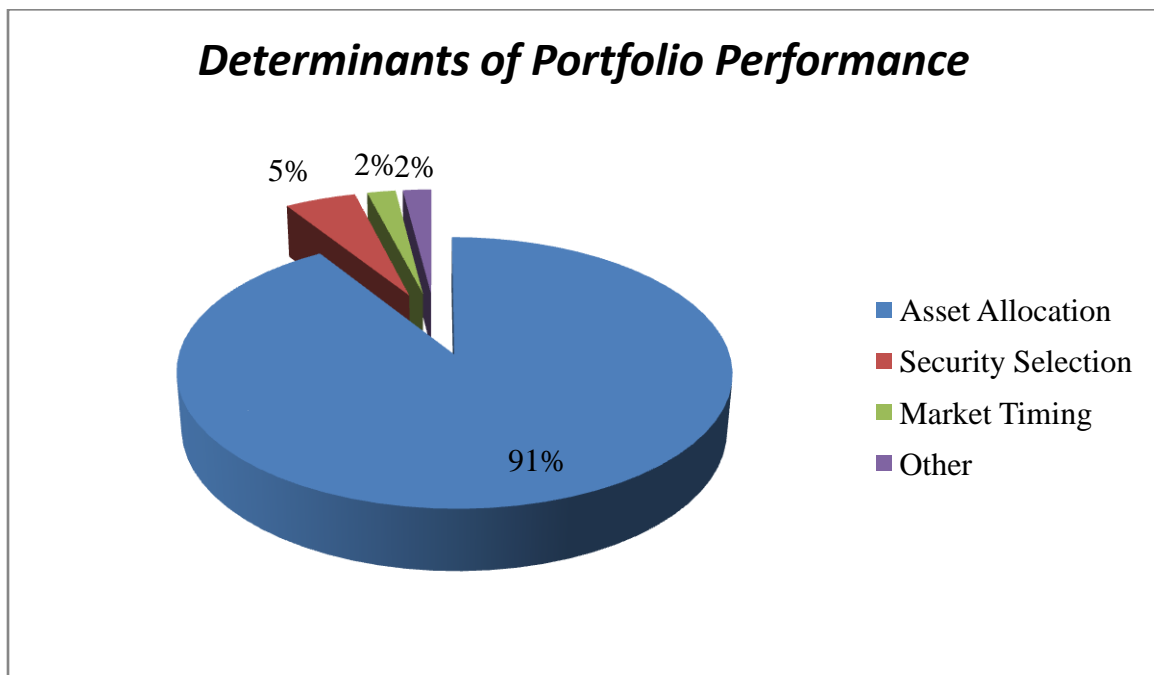
Other than that, Markowitz believes that diversification is about “never putting all your eggs in one basket”. His quote is the best explanation of risk reduction by diversification. Due to the potential of risk reduction by diversification, portfolio investment risk measured as its variance depends upon both individual asset return variances as well as the ‘covariance’ of pairs of assets but not an individual component performance. Therefore based on Markowitz studied, we can conclude that portfolio selection should be based on overall risk-reward characteristics, as opposed to simply compiling portfolios with securities with individually attractive risk-reward characteristics. This is practically similar with Evans & Archer (1968) and Claudio & Pasquale (2012) study. The study of Mangram (2013) did not explained in details of the MPT, he only tested MPT to prove the result of risk and return in portfolio diversification.

Choudhry, Turner, Landuyt and Butt (2012) discussed in details about the MPT also explained the theory 4 important elements, which could be summarized as below:

1. Investors are risk averse. Most investors are more concerned with risk in any investment than the reward from their investment. Practically, if they were given a choice of two securities investment which offer the same return, any rational investor will choose the security which comes with lower risk. Therefore, rational investors normally will not willing to take any additional risk unless the level of return compensates risk level.
2. Security markets are efficient. Efficient Market Hypothesis states that while the returns of different securities may vary as new information becomes available, these variations are inherently random and unpredictable. Price of any asset tense to change every second of the day according to what news is immediately available in the

market. As soon as the new information enters the market, it will quickly reflected in the prices of securities, and thus temporary pricing discrepancies are extremely difficult, if not impossible, to exploit for profit. Nowadays, advanced information dissemination technology and increased sophistication on the part of investors are causing the markets to become even more efficient, further complicating attempts to exploit price fluctuations arising from inefficient dissemination of information. Market efficiency is practically much influenced by the information that flow around the market.

3. Focus on the portfolio as a whole and not on individual securities. The risk and reward characteristics of all of the portfolio's holdings should be analyzed as one, not separately. The individual equity return or loss of the portfolio will be even up with lump sum return. An efficient allocation of capital to specific asset classes of equities is far more important than selecting the individual securities.



*Figure 2.1* The Determinants of Portfolio Performance (Financial Analysts Journal, 1986).

The significant of portfolio asset allocation had shown in *Figure 2.1*, reproduced from Brinson, Hood and Beebower (1986). Asset allocation of a portfolio is far more important (90%) than other factors to gain effective portfolio return. Although market timing and securities selection are important, both of the factors are rarely significantly impact the investor with proper portfolio build up. Therefore, proper asset allocation can maximize the effectiveness of portfolio not matter the market is at bullish or bearish.

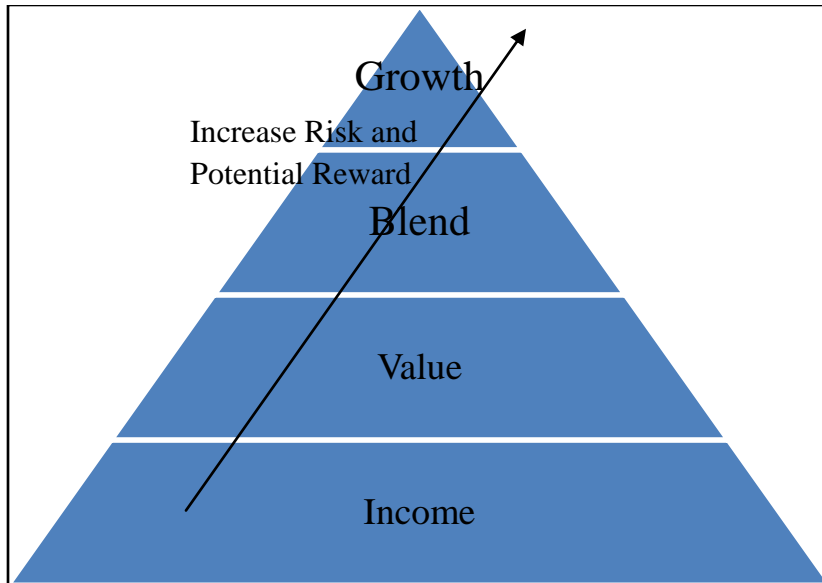
4. Every risk level has a corresponding optimal combination of asset classes that maximizes returns. Portfolio diversification is about how many individual stocks are involved, but rather the lack of correlation of one asset to another. The higher a correlation between two investments, the more likely they are to move in the same direction. We can conclude that an investment portfolio of many different oil company stocks is highly correlated but poorly diversified, as the portfolio still stuck in single sector but not multi sectors. It is risky to build portfolio on single sectors, as single incident in market will resulting in high portfolio penalty cost. For example, a disruption in oil supply will likely have a similar effect on all oil related stocks. A portfolio that builds from combination of oil company stocks and alternative energy stocks is not as correlated and an oil supply disruption would probably have a different effect on oil company stocks than alternative energy company stocks. Therefore, higher lack of correlation equates to a greater level of diversification.

### **2.3.2 Behavioral Portfolio Theory**

Meir Statman (2004) discusses that investment portfolios could be diversified into a puzzle by The Diversification Puzzle. From his research, he found that the optimal level of diversification can be measured by the rules of mean-variance portfolio theory. Even most investors build their portfolios on the diversification concept but the average investor holds only 3 or 4 stocks that are not strong enough to withstand market fluctuations. The diversification puzzle can be solved, however, in the context of behavioral portfolio theory. With behavioral portfolio theory, investors construct their portfolios as layered pyramids in which the bottom layers are designed for downside protection and the top layers are designed for upside potential. Risk aversion gives way to risk seeking at the uppermost layer as the desire to avoid poverty gives way to the desire for riches. The motivation under this theory is the aspirations behavior of the investors, not their attitudes toward risk. Some investors fill the uppermost layer with the few stocks of an undiversified portfolio; others fill it with lottery tickets. Neither lottery buying nor undiversified portfolios are consistent with mean-variance portfolio theory, but both are consistent with behavioral portfolio theory.

The behavioral portfolio theory of Meir Statman (2004) mentioned that the view of investors in behavioral portfolio theory is different from the view of investors in mean-variance portfolio theory (similar to modern portfolio theory), where “mean-variance investors” consider their portfolios as a whole and are always risk averse, while “behavioral investors” do not consider their portfolios as a whole and are not always risk averse. The general concept of the theory is that investors divide their money into two layers of a portfolio pyramid, a downside protection layer designed to protect them from

poverty and an upside-potential layer designed to make them rich. Somehow the two layers pyramid is too much simple to apply in real investment portfolio, hence most of the investors divide their money into many layers that corresponds to a goal or aspiration. The working principal of the theory could be show on the following pyramid diagram:



*Figure 2.2* The Layered Pyramid Portfolio Build Based on Behavioral Portfolio Theory (Statman, 2004).

From the *Figure 2.2*, the pyramid show that the income funds was placed at the bottom of the pyramid because it could provide a regular stream of income for the portfolio and growth funds are placed at the top of the pyramid to help build the value of the investment over time. The construction of the pyramid shows that the weight of the income funds will be higher as compare to the weight of growth funds. The pyramid also reflected in the upside-potential and downside-protection layers of “core and satellite” portfolios as comprising a well-diversified Core to serve as the “foundation” layer of the

portfolio and a less diversified explore layer to seek returns that are higher than the overall market, which layer entails greater risk.

Similar studied shown by Shefrin and Statman (2000) about behavioral portfolio theory (BPT) on investment portfolio construction. The optimal portfolios of BPT investors come from the combinations of bonds and lottery tickets (low risk and high risk investment). He compares the BPT efficient frontier with the mean-variance efficient frontier (also called as "MPT") and found that the two frontiers do not coincide. His study also shows that optimal BPT portfolios are also different from optimal capital asset pricing model (CAPM) portfolios. In particular, the CAPM stated that return of investment portfolio of investors need to be compensated in two ways, which are time value of money and risk. The basic concept for both types of portfolio investors characteristic are mean variance investors choose portfolios by considering mean and variance. In contrast, BPT investors choose portfolios by considering expected wealth, desire for security and potential, aspiration levels, and probabilities of achieving aspiration levels.

## **2.5 Investment Portfolio Risk and Return**

Based on Robert and John (1975) the investment risk can be derived from the portfolio approach which makes the basic assumption that investors evaluate the risk of a portfolio as a whole rather than the risk of each asset individually. As such, we should consider the investment risk of return of the entire investment portfolio performance rather than single stocks return. Furthermore, the portfolio approach concludes that the risk of a portfolio should be measured by the co-variability of its returns with the returns