Chapter 2: LITERATURE REVIEW

2.1 Modern Portfolio Theory

Before moving any further, let us take a closer look at modern portfolio theory. Markowitz (1952, 1959) is the founder of modern portfolio theory. His original book and article on the subject clearly delineated, for the first time, modern portfolio theory. The book was filled with insights and suggestions that anticipated many of the subsequent developments in the field. Markowitz formulates the portfolio problem as a choice of the mean and variance of a portfolio of assets. This gives rise to the term "mean-variance analysis". He proves the fundamental theorem of mean variance portfolio theory, namely holding constant variance, maximise expected return, and holding constant expected return, minimise variance. These two principles lead to the formulation of an efficient frontier from which the investor could choose his or her preferred portfolio, depending on individual risk return preferences. The important message of the theory is that assets could not be selected only on characteristics that are unique to the security. Rather, an investor has to consider how each security co-moves with all other securities. Furthermore, taking these co-movements into account results in an ability to construct a portfolio that has the same expected return and less risk than a portfolio constructed by ignoring the interactions between securities.

Mean variance portfolio theory is developed to find the optimum portfolio when an investor is concerned with return distributions over a single investment horizon. An investor is assumed to estimate the mean return and variance of return for each asset being considered for the portfolio over the single period. In addition, the correlations or covariances between all pairs of assets being considered need to be estimated.

There are many questions arising from this pioneering work of Markowitz. One of the questions is how to evaluate his or her portfolio given his or her preferred level of return and risk. Early studies employ a variety of evaluation techniques. These include the Sharpe Ratio (Sharpe, 1966), the Treynor Ratio (Treynor, 1965), the Jensen Alpha (1968, 1969) and the use of randomly generated passive portfolios of the same risk of Friend et al. (1970). Each of these studies evaluates performance adjusting for a measure of risk. Some use total risk (Sharpe) as the correct measure. Others (Treynor, Jensen, and Friend et al.) use beta as the correct measure of risk. While Friend et al. evaluate a managed portfolio against randomly generated unmanaged portfolios of the same risk, each of the other authors uses the fact that combinations of any portfolio and the riskless asset lie along a straight line in either expected return beta-space or expected return standard-deviation space to evaluate performance.

Another question is how to combine or allocate assets such as stocks and bonds to achieve an optimally efficient portfolio. There are many literatures, be it theoretical research or empirical research, on this particular issue. For example, Kothari and Shanken (2002), examines the impact of indexed and non-indexed bonds on portfolios return and risk. They use the data for the period of 1953 to 2000. Then, they examine the historical returns, risk and the relationship of stocks and bonds throughout this period. Subsequently, they construct a portfolio of stock and indexed bonds and another portfolio of stocks and non-indexed bonds; they, then, compare the two portfolios to ascertain which one could provide a superior mean-variance efficient portfolio. The result of the study shows that the portfolio of stocks and indexed bonds provides real (inflation-adjusted) returns that are less volatile than the returns of the other portfolio. Furthermore, the study also discovers that the correlation of the indexed bonds' returns with stocks' is much lower compared with the conventional or non-indexed bonds' returns with stocks'.

Moreover, recently, another question had arisen - could other alternative asset classes be considered to be part of an efficient portfolio? These types of asset classes, whose historical returns normally do not co-move with the traditional investment assets e.g. stocks and bonds, provide interesting ways to reduce the portfolios' risks through diversification. It is to this area that this study now turns.

2.2 Benefits of Commodity Futures Investment

There are many academicians and practitioners who have delved into research on the commodity futures markets. The scope of their studies varies widely. However, upon closer inspection, one may say that the areas of the study are largely concentrated on the price, return and risk as well as the relationship of spot and futures prices of these markets. For instance, Chatrath, Adrangi and Dhanda (2002), conduct tests to determine the presence of low-dimensional chaotic prices structure in the future prices of agricultural commodities. Their study found out that though there is strong evidence of non-linear dependence, the evidence suggests that there is no long-lasting chaotic structure. In addition, Emery (1896) indicates that futures trading increases price variability due to over speculation, whereas Keynes (1930) and Blau (1945) conclude that futures trading tends to reduce price fluctuations.

Recently, many studies have been done on analysing the effect of diversification contributed by investment in commodity futures markets. Traditionally, according to Hull (2000), commodities can be classified into two types of assets. Some of the commodities such as gold and silver are investment assets, while others, for instance agriculture produce, crude oil and metals, can be classified as consumption assets. He explains that commodities are classified as investment assets because some individuals are willing to hold them for investment purposes and then, these individuals are prepared to sell their holdings in order to gain investment returns on these commodities. However, recent studies in this

area have proven that traded commodities that are traditionally regarded as consumption assets, can now be used for investment purposes.

Previous academic studies [Greer, 1994, Froot, 1995, Huberman, 1995, Strongin, 1995, Schneeweis et al., 1997, Anson, 1998] have shown that commodity investing offers the ability to:

1. diversify a portfolio against economic conditions such as unexpected commodity price increases, which favour certain commodities but harm various stocks, bonds and other traditional investments;
2. obtain "natural" sources of return (e.g., scarcity return, convenience yield, collateral return[1]) over the long term which are available from futures based commodity investing; and
3. exploit opportunistically through active management the pricing inefficiencies that may exist in the commodity markets.

In addition, Froot (1995) points out that commodity investing may provide unique returns not generally available through traditional alternative investments. Froot also concludes, however, that the argument is weak for holding individual commodities such as gold to hedge stock and bond investments, and recommends the use of commodity-based indices to diversify stock and bond portfolios such as the GSCI[2]. The salient point raised in Froot's research is the interesting question of what is the best way to obtain the benefits of commodity diversification.

Georgiev (2001) examines further the diversification benefits provided by investing in commodities. Georgiev examines the monthly returns of stocks,

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[1] Assume the full value of the underlying of the futures contracts are invested at a risk-free rate. This is similar to assuming an investor posts 100 per cent margin with Treasury bills.

[2] GSCI is a composite index of commodity sector returns, representing unleveraged, long-only investment in commodity futures that is broadly diversified across the spectrum of commodities. GSCI is world-production weighted; the quantity of each commodity in the index is determined by the average quantity of production in the last five years of available data.

bonds and GSCI index for the time period from January 1990 to December 2001. He constructs seven experimental portfolios containing stock, bond index, the GSCI commodity and hedge fund indices to prove that commodities investments contribute to diversification advantage in a fully diversified portfolio consisting of traditional investment assets. The result of the study proves that commodity investment using GSCI does provide diversification benefits for a well-diversified portfolio. Anson (1998) also make a similar conclusion that is commodity futures provide diversification benefits. He adds that the diversification benefits of commodity futures exist even without the existence of a long-term convenience yield. Schneeweis and Spurgin (1999) examine the potential benefits of investment on the London Metal Exchange (LMEX). The study uses data for the period of ten years, from 1990 to 1999. This particular period is deliberately chosen to include period of stock market decline. The results of this study indicate that the returns of LMEX investment were negatively correlated with stocks and bonds. In addition, the investment in LMEX would have increased the risk-adjusted return of a diversified stock and bond portfolio and provided better diversification benefits over the study period than a more broadly based commodity index such as GSCI. Furthermore, the study shows that a strategy of diversifying into metals through LMEX is better than diversifying into metal producing companies.

To extend further the research in this area, Schneeweis and Spurgin (1997b) examine the correlations of oil futures contracts with energy related stocks. Their results confirm that, except in periods of extreme energy price movement, investments in energy stocks or natural resource mutual funds are not correlated with energy price movements. This is as expected. Given the risk management and diversification capabilities of most corporate firms, unless the price change in the underlying commodity is structural and long lasting, short term changes in commodity prices have little impact on the performance of a natural resource company's stock price.

2.2.1 Sources of Return to commodity futures investment

Numerous studies have been done to analyse the sources of return of commodity futures investment. Till (2000) points out that there are two sources of systematic returns available in the commodity futures market. The first source of return is concentrated on commodity futures contracts whose underlying commodity has difficult storage situation. Till describes commodities with difficult storage situation as either the storage for the commodities is impossible, too expensive, or producers decide it is much cheaper to leave the commodities in the ground than store above the ground. Prices for these commodities are the main factor in equilibrating supply and demand; thus, leading to very volatile spot prices. Producers and holders of these commodities will have to minimise forward price risk by hedging activity. This activity causes price pressure, which in turn leads to commodity futures price to be underpriced. Consequently, a long commodity futures position will gain a positive expected return. Kolb (1996) supports the above arguments in his study. Kolb carries out the parametric and non-parametric tests of the historical returns of 45 commodities futures over the time frame of 1969-1972. He finds that commodities with a difficult storage situation recorded significant positive returns under both tests. The commodities are crude oil, gasoline, live cattle, live hogs, soymeal and copper. The other source of systematic return, according to Till (2000), is weather premium trade i.e. trade that is due to uncertainty of an upcoming weather event. This type of trade is usually found in the grain and cotton futures markets during particular times of the year.

Besides that, previous academic research (Fama and French, 1988, Anand, 1999) has studied the return properties of metal-based futures prices. For instance, Fama and French have explained the existence of high convenience yield for metal-based futures contracts in relationship to changing aspects of the business cycle on metals prices. The Fama and French study identifies a strong business cycle component in the variation of spot and futures prices for metals in

the period 1972-1983. Both Fama and French and Anand present empirical evidence that convenience yields for industrial metals increases during periods of increasing volatility.

2.3 The Study of CPO futures in Malaysia

Previous academic research on the CPO futures trade on MDEX has mostly replicated the studies done on other markets focusing on issues such as price, return and risk behaviour as well as the relationship of spot and futures prices. Cheong (1985) undertakes study to examine the price behaviour and market efficiency of the CPO futures. Cheong provides evidence that the CPO futures market was weakly efficient. Furthermore, some of the studies focus on the pricing behaviour of the CPO futures. These studies used the technical and fundamental approaches in explaining the pricing behaviour (Low, 1981; Ng, 1981; Yeow, 1981; Ngan, 1984; and Ho, 1985). Besides that, Fatimah (1985) examines the impact of future trading of the CPO futures on the CPO cash price variability. Fatimah discovers that the CPO futures trading did not significantly reduce the spot price variability; instead, it has partially contributed to the increase in the spot price volatility.

Wan and Siti (2001) analyse the relations between returns, trade volume and market depth of the CPO futures. This study examines the effect of volume and market dept on volatility and vice versa. The result of this study indicates that volume and market depth do affect the volatility of the futures market. Apart from that, Ooi (1989) examines the hedging technique using the CPO futures. He discusses and provides methods to optimally hedge the inherent risk in the CPO prices.

Even though there are extensive studies done on the CPO futures, none of which focuses on the benefits of the CPO futures as a stand-alone or as a part of well-diversified portfolios i.e. the diversification benefits of CPO futures. As mentioned

above, prior studies on the diversification benefits of commodity futures markets investments are mostly done using the data on the well-developed financial markets (the U.S and the U.K).

Among the conspicuous reasons that no studies has been done using the CPO futures trading on MDEX is that MDEX does not have a commodity-based index that is investable. Hence, investors find it is quite inconvenient to invest in the CPO futures. Moreover, this market is regulated as a physical settlement market. As such, individuals who do not close their contracts by offsetting their current positions before the maturity date of the contracts will receive the actual CPO physically delivered to them.