SUBMITTED BY:

Mr. Tauseef Mahmood.

MBA-2K8 (Finance).

NUST Business School, NUST, Islamabad, Pakistan.

"Malaysian Futures Market"

Impact of Liquidity & Volatility On Performance Of Futures Index (Final Copy-For Evaluation by Supervisor)

SUBMITTED RESPECTFULLY TO:

Mr. Syed Haroon Rashid (Supervisor).

ABSTRACT

This Thesis Study has been conducted on Malaysian Futures Index Market. But the findings, analysis and conclusions derived are applicable to all commodity futures index markets. Since impact of liquidity has been researched previously as well for other exchanges, I have added another variable of volatility and derived the impact analysis of both variables on a financial ratio called as Return on Investment or ROI.

Methodology involved includes use of VAR or Vector Auto-Regression models of Microsoft Excel Sheet Application. A vector methodology has been used, as data is multi-period or over a span of time period where each time period can be called as one vector for the underlying models of Microsoft Excel Sheet Application. These models automatically pick data from highlighted vectors/time periods and compute regression and correlation results. Correlation Analysis has also been conducted along with 'skewness' calculations for each data set to support thesis analysis claims and general raw data integrity.

Study limitations like law and order, macro and micro economic conditions have also been covered in study limitations section and explained for as to why these factors were not considered for thesis analysis.

Future research has been suggested on the Risk Analysis of Futures Index Market. The recommendation made requires individual company's futures portfolio data for any futures index or to put simply risk portfolio be related in terms of impact on returns from such securities portfolio. Then an annual averaging of results from such risk portfolio be linked and analyzed in terms of impact on averaged annual returns for individual companies and also compare it with any futures main index net risk portfolios data. Thereby, helping to analyze impact of overall risk behavior for any futures index on returns from such futures indices.

Table of Contents

List of Figures

List of Tables

CHAPTER-1

✓Introduction and Background

The purpose of this chapter is to refresh basic academic knowledge with regards to futures index markets.

In definition,

Futures index market comprises of index based futures contract shares with underlying security as commodity shares or equity shares that are exercised at a future date if price of each futures contract shares reaches a certain level of price for that particular commodity or equity share in relation with upward or downward movement of market index (commodity or equity futures market index).

Stock equity futures are exercised when the price of individual futures shares of a company reaches a certain level with respect to price of the regular shares of the same company listed in stock index market.

Commodity futures are exercised when the price of futures contract shares of any commodity reaches a certain level with respect to price of that particular commodity on the futures index.

Stock index futures are settled as cash unlike commodity futures that are settled with some physical good. These contracts are sold in fixed bundles or sizes or multipliers, for hypothetical instance, say a futures contract sold in sizes or bundles or multipliers of $500 per index point.

a. Futures Index Mathematical and Conceptual Framework

For background knowledge, basic formula for any Futures index calculation is given as:

"FIGURE-1"

Index Level =

$$\sum (\text{Price of Each Futures Contract} * \text{Each Futures Contract Size}) / \text{Index Divisor}$$

Where: - Index divisor is to normalize long numerical values

The best known model for Stock Index Futures Contract price calculation is *"cost of carry"*. For commodity futures trading, it is mathematically given as

"FIGURE-2"

$$F = (S + s) * e^{(r-c)*t}$$

Where;

F	= Futures Contract Price
S	= Spot Price of Futures Contract Shares
s	= Storage Cost
e	= Base of Natural Logarithm
r	= Risk Free Interest Rate
c	= Convenience Yield
t	= Number of days to futures expiration/360
D	= Dividends, expressed in index points, for stocks going ex-dividend prior to futures expiration

S

Storage cost is generally added as percentage of spot price and is meant for physical commodities such as corn, wheat and gold. Convenience yield is deducted because holding of such an asset could have given benefits like ability to profit from temporary shortages and the ability to keep a production process running. This convenience yield in Chicago Mercantile Exchange is treated as Dividends for equity futures trading and subtracted from formula. That formula for futures contract price is given as

Dividend payments are converted into index dividend points and published daily after the close of trading. The Index Rules define which dividends and other payments are generating dividend points.

1. Example

For conceptual understanding, consider following hypothetical futures contracts example:

In usual futures trade, short or long positions are kept in theoretical balance or in other words, investor is hedged even in risk management portfolio i.e. a portfolio kept to manage company financial risk. No downright payment is made for securing a futures contract other than premiums and transaction costs. Say an index is using *'$500 multiplier*

per index point'. Unlike options where maximum losses or profits can be contained to premiums paid by not exercising contracts but for futures, transaction is must. So losses or profits are dependent on index point movements. General thumb rule is, long or buy party wants to buy cheap or at an advantage and short or sell party wants to sell at a profit.

When an investor is short on a futures contract he sells the contract at a future date. If instance, for $500 multiplier per index point, if a contract has a strike price of 441 and index is at 440 on contract exercise day. The long party pays $500 to short party or a profit of $500 for short contract.

On the other hand, if strike price is 441 and index is at 443. Then short party pays long party $1000, (2 * $500=$1000), or suffers a loss of $1000.

When an investor is long on a futures contract he buys the contract at a future date. If instance, for $500 multiplier per index point, if a contract has a strike price of 441 and index is at 443 on contract exercise day. Then long party receives a profit of $1000.

On the other hand, for the same multiplier, if strike price is 441 and index is at 440. Then long party pays $500.

b. Limitations on Futures Index Trading

Futures index market has a market and a nonmarket component. Market component is due to price movements in index for an underlying security also called as spot market price for that security and the 'risk' imposed is due to price position taken in future contract that ultimately determines return for any hedged position. Each of these components impact basis risk for any future contract where basis risk is the risk that future contract's price will not move in perfect tandem with the spot price of underlying security.

Nonmarket component is also called as diversifiable risk component or non-systematic risk. This nonmarket component in a futures trade is the theoretical balance of short and long positions by an investor on an index. Theoretically balanced if net $ amounts of risk exposure taken in the shape of short and long contract terms are balanced. This fact was given in the study of Frans A. de Roon in 2000.

Market component is also called as systematic or non-diversifiable risk component. On every exchange, there is limit on the extent futures contract price can fluctuate.

CHAPTER-2

✓Literature Review

The purpose of this chapter is to highlight present day research related to the selected topic. This chapter shall provide an insight with regards to how previous researches support or negate the basis of my research. Every author quoted in this section has a detailed bibliography and references information in the respective section of the bibliography and references section.

There are a number of factors that impact futures market trading. Among them are basis risk, level of market liquidity, corporate payable taxes, agency costs, transaction costs, information availability and general hedging pressures.

a. Factors Impacting Futures Trade

1. Basis Risk

Basis Risk is the risk of futures contract price fluctuation not moving in tandem with index market movement. (Figlewski, 1983(Jul., 1984)) concludes that basis risk is impacted by factors of futures market's index composition, duration of contracts and overall market maturity with regards to years of trading. Duration impacts because of uncertainty factor in daily business trading. Author concludes that unsystematic risk is only best diversifiable, if indices are so composed that particular futures contracts groups are traded only within their groups, especially by separating small portfolios (i.e. having small money amount involved & smaller time duration) because in a portfolio less risky securities tend to incorporate risk of securities of other industries with riskier betas.

2. Market Liquidity

(Asani Sarkar, 1996)**,** find that customer trading costs do not impact futures contract trade. However, market volatility has an impact over market liquidity. For instance, high volatility levels during any weekday suffer due to any reason then this shall have an impact on next day liquidity levels. This was related to active and inactive contracts. Inactive contracts are contracts that are either expired or terminated for trade.

Inactive contracts suffer more in terms of liquidity and volatility due to their inactivity in the prevailing trading period as compared to active contracts.

(Stambaugh, June 2003), explored volume related variable or liquidity's impact on stock returns. In their research, they found that stocks that are more sensitive to aggregate market liquidity in a cross-sectional or cross sector way, have substantially higher expected returns. In other words, for any investor, the portfolios providing high returns will attract high liquidity thereby impacting liquidity, volatility and returns of other portfolios. Stock liquidity is impacted by the size of the stock portfolio, in terms of market capitalization & weighted contribution. For example, small size portfolios are less liquid. Such small stocks have high sensitivities to aggregate liquidity.

(David, 1997), has concluded that future volatility for any given traded futures contracts on the index is negatively correlated with excess returns. This also contributes in determination of investor's confidence with regards to futures market trading. In other words, excess returns causes indices to move securities prices back to equilibrium level due to market price adjustment mechanism.

(Stephen Fagan, 2007), conclude that extreme trading positions by hedgers and speculators in any trading exchange cause markets to experience liquidity shocks that only dissipate once both of these trading classes reach average in terms of trading positions. Extreme positions are 'cautious' for hedgers and 'risky or profit making' for speculators.

(Chien-Chung Nieh, 2008) , have in their paper concluded that depth or market volatility is monotonically or repetitively increasing with decreasing bid or buy price for long positions and monotonically or repetitively increasing with increasing ask or sell price for short positions.

3. Firm Value

(Jorion, April 2006), find that hedging increases firm value. They conducted this study on 119 US oil and gas producers from 1998 to 2001. They found that hedging reduces firm's stock price sensitivity to adverse global oil and gas price changes due to beforehand risk management measures in shape of financial or commodity hedging thereby ensuring smooth returns in daily business.

4. Corporate Payable Taxes

(Stulz, The Determinants of Firm's Hedging Policies, December 1985)**,** conclude that if hedging can reduce variability of pre-tax firm values then it is optimum for a corporation to take hedging as a policy. Firm value is in $ figure and theoretically it is the sum of firm's market values of shareholder equity plus market values of financial debt. This is especially true for large firms which can suffer huge losses in case of no hedging.

5. Transaction Costs of Bankruptcy

(Stulz, The Determinants of Firm's Hedging Policies, 1985), conclude that firm shareholders due to high transaction costs of bankruptcy prefer hedging so that bankruptcy can be avoided in case current account financial transactions suffer setback.

When a firm is not hedged, then in case of bankruptcy, firm bears high bankruptcy costs by paying both first and second right asset claimholders. In case of hedging, bankruptcy costs are reduced when hedged positions are also diluted resulting in lesser firm assets liquidation.

Hedging is especially attractive in case hedging costs are lesser than bankruptcy costs for a firm.

6. Agency Costs

This cost is best highlighted in the same paper of**,** (Stulz, The Determinants of Firm's Hedging Policies, 1985)**.** It is concluded that managers having direct ownership as compared to indirect ownership like stock options, given as part of compensation packages, are likely to let their firms take hedging as a policy because investment returns have more direct impact on direct ownership stakeholders. This is because of a linear relationship of direct owners with the success of a firm in a given year. But for indirect owners like stock options, their wealth is maximized, if they can show maximum business made on papers, no matter the amount of associated risk.

7. Transaction Costs of Trading

(Alex Frino, 2008)**,** conclude that transaction costs include market-impact costs, bid-ask spread and depth for futures contract trading. This term depth when used in context of futures price determination is basically volatility. Meaning of it, with regards to transaction costs for trading, is explained in the following paragraph.

Market impact cost is a function of both the bid-ask spread and depth. Market impact means the impact that daily trade has over futures price in a given day. Bid-ask spread represent the minimum cost of trading futures. Depth is the size of futures contracts being traded at an exchange.

8. Information Availability

(Poteshman, 2006), conclude that option and stock markets tend to take clues from each other on price discovery of security instruments. Thus, it can be concluded that commodity futures markets due to same market mechanics as for above mentioned markets also take clues from other trading markets. Therefore, apart from other information means of trading, such information clues are a major determinant of information availability for futures trading.

9. General Hedging Pressures

(Bessembinder, 1992), conclude that type of market segmentation and its supporting hedging pressure determine the premiums on futures contracts. Example of market segments such as foreign currency and agricultural futures hedging has been highlighted as having returns that vary with the net holdings of hedgers after controlling for the systematic risk. Thus, for market segments such as foreign currency and agriculture, their futures premiums are dependent on hedging pressure of 'net holdings'. Net holdings in a particular market segment do tend to impede liquidity and returns for other market segment's net holdings. Other types of hedging pressures include such pressures as bankruptcy costs for large corporate firms or futures contracts price pressure.

Covering the same topic, authors namely (Frans A. de Roon, 2000), have defined hedging pressure as: "FIGURE-3"

$$\text{HEDGING PRESSURE} = \frac{(\text{number of short hedge positions} - \text{number of long hedge positions})}{(\text{total number of hedge positions})}$$

The theoretical balance of short and long positions in the above equation is the target of any investor while diversifying the nonmarket or non-systematic or diversifiable component of risk.

They have found hedging pressure observed at two levels:

- One is the hedging pressure for individual firms to hedge that include such pressures as bankruptcy costs, after catering for price pressure
- Second is the hedging pressure of firms of a particular industry group like type of market segment as explained above, after catering for price pressure

Where;

Price pressure is the pressure of futures contracts prices in terms of providing clues to futures market with regards to pricing of contracts in future.

10. Margin Levels

In journal paper by, (G.Geoffrey Booth & J.P., 1997), they concluded that futures market needs to provide investors adequate margin levels. This is dependent on factors of investor risk aversion and overall hedging activity level. Higher activity levels and less risk-averse investors demand more margin levels and vice versa.

b. Previous Researches

In the paper by (Michael Fleming, 1993), authors have measured liquidity for U.S. Treasury Spot and Futures Markets. They concluded that liquidity of trading is concentrated in specific contract baskets in terms of maturity. Liquidity was higher and concentrated for

- Futures contracts having longer maturities and,
- For spot contracts having shorter maturities.

(Asani Sarkar, 1996)**,** find that customer trading costs do not impact futures contract trade. However, market volatility has an impact over market liquidity. For instance, high volatility levels during any weekday suffer due to any reason then this shall have an impact on next day liquidity levels. This was related to active and inactive contracts. Inactive contracts are contracts that are either expired or terminated for trade. Inactive

contracts suffer more in terms of liquidity and volatility due to their inactivity in the prevailing trading period as compared to active contracts.

(Stambaugh, June 2003), explored volume related variable or liquidity's impact on stock returns. In their research, they found that stocks that are more sensitive to aggregate market liquidity in a cross-sectional or cross sector way, have substantially higher expected returns. In other words, for any investor, the portfolios providing high returns will attract high liquidity thereby impacting liquidity, volatility and returns of other portfolios. Stock liquidity is impacted by the size of the stock portfolio, in terms of market capitalization & weighted contribution. For example, small size portfolios are less liquid. Such small stocks have high sensitivities to aggregate liquidity.

In the paper, (Eva Benz), states that through her research of European $C0_2$ Futures market, she concluded that trading transaction costs are lower for large or well liquidated exchanges such as European Climate Exchange or ECX while they are higher for less liquidated exchanges such as Nord Pool.

CHAPTER-3

✓Data Description

a. Research Methodology

I have used the methodology of Vector Auto Regression (VAR). VAR is an econometric *(Definition in Glossary section)* model developed to study interdependency among multiple time series data like here I have used data spanning over the period from 2007 to 2010 for variables of volume as liquidity, volatility and ROI which have been generalized and analyzed mathematically in Auto Regression models using Microsoft Office 2007 Excel Sheet Correlation and Regression Analysis.

A vector methodology has been used, as data is multi-period or over a span of time period where each time period can be called as one vector for the underlying models of Microsoft Excel Sheet Application. These models automatically pick data from highlighted vectors/time periods and compute regression and correlation results.

Daily trading data of spot month contracts for 4 years from 2007 to 2010 was taken for

- 'Commodity Sector/Main' Futures Index (FKLI) to test a set of hypotheses and,
- Palm Oil Commodity Sub-Sector Index (FCPO), to test the same hypotheses used for 'All Commodities' Futures Index

Michael Fleming, 1993, in his study for U.S. Treasury Bills also concluded futures securities, over short term (usually involving speculators) and long term (usually involving hedgers) maturities, having highest liquidity due to type of investor involved. Therefore, to use spot or current month's contracts historical data over 1 year period shall contribute more in analyzing liquidity's and volatility's impact on returns. This data was manipulated on Microsoft Excel Sheets whose results have been given as tables within this document along with analysis. Data was used to test daily and yearly average of variables for FKLI and FCPO indices, in terms of correlations and impact of these on performance of indices measured by Return on Investment (ROI), plus overall data 'skewness' for any variable's

data series to show the data integrity used for analyzing correlation behaviors and variable regressions. Skewness table shows which two data distributions have the highest number of positive numeric values in their vectors of data lists, e.g. between Volume & ROI etc.

b. Research Details

1. Duration

The maximum duration of research is 1 year but can be submitted early given research requirements have been completed.

2. Sample Size

Population and sample sizes of data were the 4 quarter months and spot months data respectively for the years 2007 to 2010 from the Malaysian futures index market called as FTSE Bursa Malaysia Index.

3. Inclusion Criteria

I have taken data of only futures spot month contracts since this was available in good detail with entries for each day for any year spanning from 2007 to 2010 and is therefore enough representation for analysis of hypotheses. (See data table sheets)

4. Exclusion Criteria

This includes any data other than spot month futures contracts available from FTSE Bursa Malaysia Website.

5. Data Collection Procedure

I downloaded the futures contracts data from FTSE Bursa Malaysia Index website. (*http://www.ftse.com/Indices/FTSE_Bursa_Malaysia_Index_Series/index.jsp)*

6. Problem Statement

Lacking detailed data on Karachi Stock Exchange for futures trading, data from well established futures trading index namely FTSE Bursa Malaysia Index was taken to establish old hypothesis of impact of '*Liquidity'* and taking it further to explore impact of new variable namely '*Volatility'* based on my methodology. These impacts were tested on performance of index measured by '*Return on Investment' within and among futures markets of FKLI and FCPO.*

CHAPTER-4

✓Data-Sheets

(SEE APPENDIX-II)

CHAPTER-5

✓Research Hypotheses

a. Variables Used

I have taken following variables for research:

1. *Liquidity*
2. *Volatility*
3. *Return on Investment (ROI)*

Interrelationship behavior of above three variables on any futures index can best be represented diagrammatically as:

- ✓ **High Liquidity → High Volatility→ High ROI**
- ✓ **Low Liquidity→ Low Volatility→ Low ROI**

Liquidity was calculated as number of volume of shares traded in a futures market over the daily period and as well in terms of yearly average for years 2007 to 2010. Volatility is percentage change in Futures Prices. ROI as a statement is, what percentage of inflows has been received as against percentage outflows.

At first I have normalized inflows and outflows results for the sake of calculation of formula as figures were daily and also that returns are either positive, negative or zero and can't be in non-determined values because of which normalization was used. Daily figures were causing zero figures appearing in denominator of formula. At end of excel sheet formula exercise these normalized value results were reverted back to actual result figures. Following formulae have been used in excel sheet calculations.

"FIGURE-4"

$$\text{Percentage Volatility} = \frac{[\text{Trade Closing Value} - \text{Trade Opening Value}]}{\text{Trade Closing Value}}$$

"FIGURE-5"

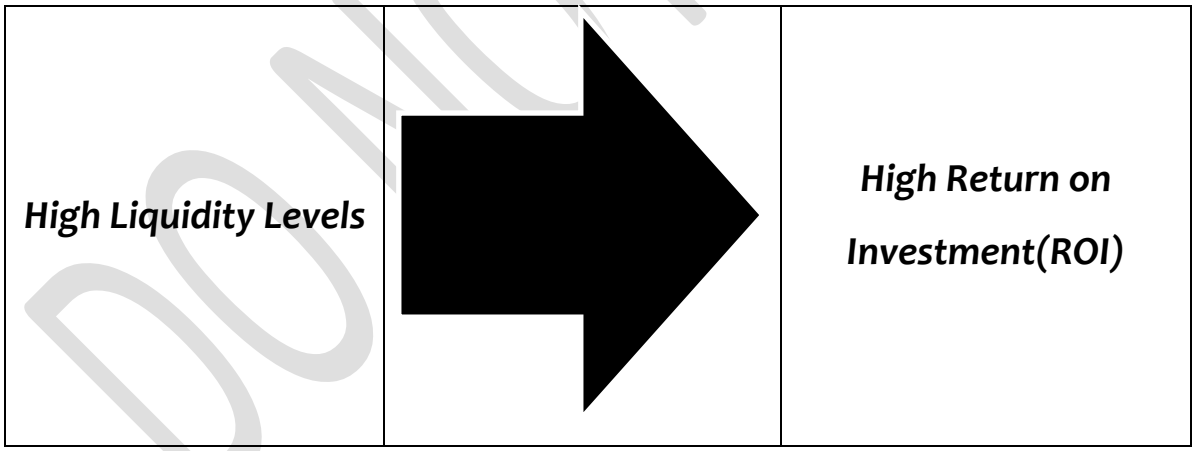
$$ROI = \frac{\text{Inflows of an Investment} - \text{Outflows of an Investment}}{\text{Outflows of an Investment}}$$

b. Hypotheses

These hypotheses were not applied across, both the indices of commodity sector futures index and palm oil sector, because any main commodity index covers its index movement for more than one commodity sector, therefore such an analysis is best when commodity sector index is compared with *all the individual commodity sectors* trading at a futures exchange.

MALAYSIAN COMMODITY SECTOR FUTURES INDEX & PALM OIL SECTOR FUTURES INDEX: FOR BOTH DAILY AND YEARLY AVERAGES 2007-2010

"FIGURE-6"

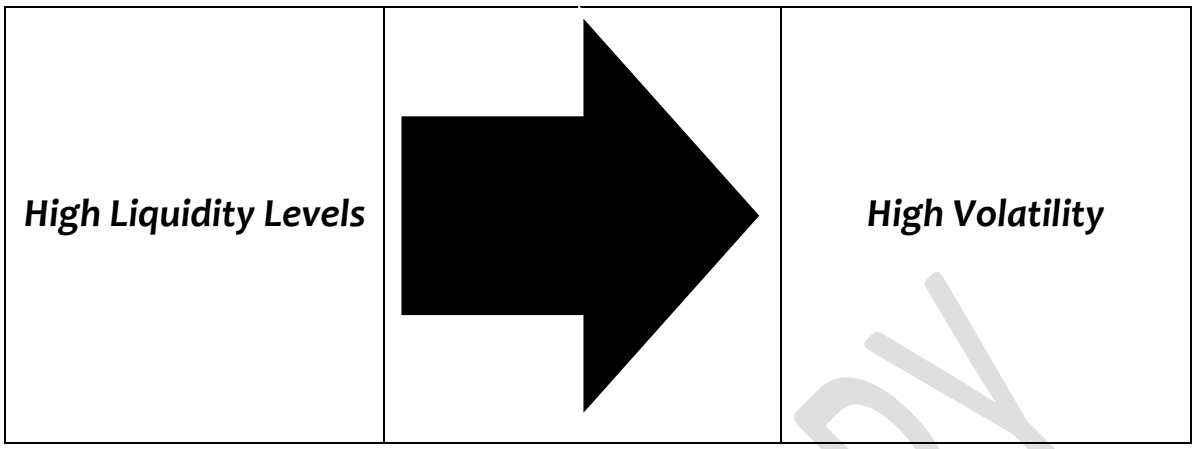


"Hypothesis-1"

- **INDEPENDENT VARIABLE: LIQUIDITY**
- **DEPENDENT VARIABLE: ROI**
- **ANALYZED USING CORRELATION & REGRESSION ANALYSIS**

<----------->

"FIGURE-7"

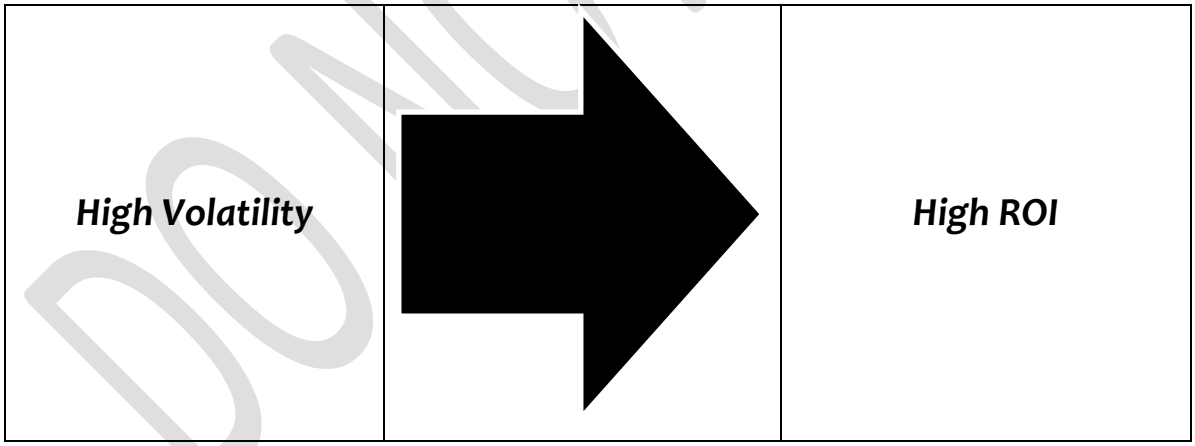


"Hypothesis-2"

- **INDEPENDENT VARIABLE: LIQUIDITY**
- **DEPENDENT VARIABLE: VOLATILITY**
- **ANALYZED USING CORRELATION & REGRESSION ANALYSIS**

<--->

"FIGURE-8"



"Hypothesis-3"

- **INDEPENDENT VARIABLE: VOLATILITY**
- **DEPENDENT VARIABLE: ROI**
- **ANALYZED USING CORRELATION & REGRESSION ANALYSIS**

<--->

CHAPTER-6

✓Correlation Findings

- **Commodity Sector's Futures Index Correlation Findings**

"TABLE-1"

Findings		
SHORT TERM CORRELATIONS		
1	Daily Correlationsbetween Volume & Volatility	low but +ve, low asvolume or liquidity isa long term behaviour variable and +ve due to high direct impact relationship.
2	Daily Correlationsbetween Volume & ROI	low but +ve, low asvolume or liquidity isa long term behaviour variable and +ve due to high direct impact relationship.
3	Daily Correlationsbetween Volatility & ROI	+ve and high
LONG TERM CORRELATIONS		
4	4 year Average Correlations between Volume & Volatility	+ve and high
5	4 year Average Correlations between Volume & ROI	+ve and high
6	4 year Average Correlations between Volatility & ROI	+ve and high

- **Palm Oil Commodity Sub-Sector's Futures Index Correlation Findings**

"TABLE-2"

Findings		
SHORT TERM CORRELATIONS		
1	Daily Correlations between Volume & Volatility	-ve and low except when price equilibrium needs adjustment like in year 2009, Low because volume is a long term variable.
2	Daily Correlations between Volume & ROI	-ve and low except when price equilibrium needs adjustment like in year 2009, Low because volume is a long term variable.
3	Daily Correlations between Volatility & ROI	+ve and high
LONG TERM CORRELATIONS		
4	4 year Average Correlations between Volume & Volatility	-ve and high
5	4 year Average Correlations between Volume & ROI	-ve and high
6	4 year Average Correlations between Volatility & ROI	+ve and high

- **Finding's Conclusions With Regards to Behavior of Variables**

These results show that,

a. Liquidity or Volume traded is a variable best studied over long term period due to

    i. Inherent nature of market trading dynamics i.e.

        ❖ At days volume is higher

        ❖ At days it will be lower

b. Volatility and Return have no specific variable nature in terms of period but are preferably analyzed using short term data
c. But Volatility & ROI has more preferable behavior for study when data over short term period is under consideration because of more direct changing nature with daily trade
d. Non specific nature because both are a consequence of liquidity therefore can be analyzed in long term

CHAPTER-7

✓Correlation Result's Analysis

1. Commodity Sector Futures Index Correlation Result's Analysis

a. Commodity Sector Futures Index (2007-2010) Yearly Averages Results Analysis

"TABLE-3"

4 Year Average Values				
YEAR	Average Volume-'07 to '10	Average ROI-'07 to '10	Average Volatility-'07-'10	Average Volatility-'07 to '10
2007	9200.00	34.725	0.0073	0.73%
2008	8788.00	23.927	0.0027	0.27%
2009	6147.00	3.908	0.0011	0.11%
2010	6002.00	3.046	0.0004	0.04%

"TABLE-4"

Serial No.	2007-2010 Yearly Average Correlation Calculations	
1	Correlation B/W Volume & Volatility-Average of 4 years	84.96%
2	Correlation B/W Volume & ROI-Average of 4 years	98.24%
3	Correlation B/W Volatility & ROI-Average of 4 years	93.16%

Yearly Averages Correlation Results are in consonance with 'Correlation Findings Table-1'.

Result for Volume & Volatility: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volume & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

CONCLUSION:

Thus it can be safely concluded that overall, all three hypotheses hold true

OR

- ✓ **High Liquidity → High Volatility→ High ROI**
- ✓ **Low Liquidity→ Low Volatility→ Low ROI**

b. Commodity Sector Futures Index (2007-2010) Daily Result's Analysis

1. 2010

"TABLE-5"

Index's 2010 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	4.60%
Daily Correlation B/W Volume & ROI	29.61%
Daily Correlation B/W Volatility & ROI	87.14%

"TABLE-6"

Index's 2010 Skewness Calculations			
Serial No.	Skewness Volume Distribution	Skewness Volatility Distribution	Skewness ROI Distribution
1	1.227412004	0.217413135	2.196366577

Daily correlation results for 2010 are overall in consonance with 'Correlation Findings Table-1'.

Result for Volume & Volatility: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volume & ROI: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

2. 2009

"TABLE-7"

Index's2009 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	5.09%
Daily Correlation B/W Volume & ROI	25.25%
Daily Correlation B/W Volatility & ROI	87.61%

"TABLE-8"

Index's 2009 Skewness Calculations			
Serial No.	Skewness Volume Distribution	Skewness Volatility Distribution	Skewness ROI Distribution
1	0.56665462	0.12907792	1.530404178

Daily correlation results for 2010 are in consonance with 'Correlation Findings Table-1'.

Result for Volume & Volatility: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volume & ROI: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

3. 2008

"TABLE-9"

Index's 2008 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	-4.61%
Daily Correlation B/W Volume & ROI	-4.42%
Daily Correlation B/W Volatility & ROI	97.42%

"TABLE-10"

Index's 2008 Skewness Calculations			
Serial No.	**Skewness Volume Distribution**	**Skewness Volatility Distribution**	**Skewness ROI Distribution**
1	1625485408	14.25343888	15.66647646

Price adjustment mechanism was the conclusion of study by "*David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis".* He concluded high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volume & Volatility: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Due to Price adjustment mechanism

Result for Volume & ROI: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Due to Price adjustment mechanism

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

4. 2007

"TABLE-11"

Index's 2007 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	3.76%
Daily Correlation B/W Volume & ROI	-0.36%
Daily Correlation B/W Volatility & ROI	76.86%

"TABLE-12"

Index's 2007 Skewness Calculations			
Serial No.	**Skewness Volume Distribution**	**Skewness Volatility Distribution**	**Skewness ROI Distribution**
1	1.190192762	10.90139598	14.93001796

Price adjustment mechanism was the conclusion of study by "*David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis".* He concluded high levels of liquidity reduce

overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volume & Volatility: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → No need for Price adjustment mechanism & Due to direct impact relationship of Independent Variable on Dependent Variable

Result for Volume & ROI: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Due to Price adjustment mechanism

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

CONCLUSION:

Thus it can be safely concluded that overall, all three hypotheses hold true

OR

- ✓ **High Liquidity → High Volatility→ High ROI**
- ✓ **Low Liquidity→ Low Volatility→ Low ROI**

2. Palm Oil Commodity Sub-Sector Futures Index Correlation Result's Analysis

a. Palm Oil Commodity Sub-Sector Futures Index (2007-2010) Yearly Averages Result's Analysis

"TABLE-13"

YEAR	Average Volume-'07 to '10	Average ROI-'07 to '10	Average Volatility-'07 to '10	Average Volatility-'07 to '10
2007	479.00	86.27	0.03	3.35%
2008	254.00	265.21	0.08	7.67%
2009	360.00	95.85	0.04	3.83%
2010	436.00	24.57	0.01	0.75%

"TABLE-14"

Serial No.	2007-2010 Yearly Average Correlation Calculations	
1	Correlation B/W Volume & Volatility-Average of 4 years =	-83.40%
2	Correlation B/W Volume & ROI-Average of 4 years =	-86.77%
3	Correlation B/W Volatility & ROI-Average of 4 years =	98.34%

Yearly Averages Correlation Results are in consonance with 'Correlation Findings Table-2'.

Result for Volume & Volatility: High & Negative

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volume & ROI: High & Negative

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

CONCLUSION:

Thus it can be safely concluded that overall, all three hypotheses hold true

OR

- ✓ **High Liquidity → High Volatility→ High ROI**
- ✓ **Low Liquidity→ Low Volatility→ Low ROI**

b. Palm Oil Commodity Sub-Sector Futures Index (2007-2010) Daily Result's Analysis

1. 2010

"TABLE-15"

Palm Oil Sector 2010 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	-7.073%
Daily Correlation B/W Volume & ROI	-1.179%
Daily Correlation B/W Volatility & ROI	99.878%

"TABLE-16"

Palm Oil Sector 2010 Skewness Calculations			
Serial No.	**Skewness Volume**	**Skewness Volatility Distribution**	**Skewness ROI Distribution**
1	2.060995785	12.67479225	12.77393014

Daily correlation results for 2010 are overall in consonance with 'Correlation Findings Table-2'.

Result for Volume & Volatility: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volume & ROI: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

2. 2009

"TABLE-17"

Palm Oil Sector 2009 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	1497%
Daily Correlation B/W Volume & ROI	8.123%
Daily Correlation B/W Volatility & ROI	99.498%

"TABLE-18"

Serial No.	Skewness Volume Distribution	Skewness Volatility Distribution	Skewness ROI Distribution
1	1766822025	4.925451187	5.022205522

Result for Volume & Volatility: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to Price adjustment mechanism as given in the study *by David A. in his 1997 study but overall it was low and negative trend for this sub-sector (see yearly averages correlation results and overall daily correlation results in Chapter#6 of Correlation Findings),*therefore here price adjustment for sub-sector has to be in inverse order

Result for Volume & ROI: Low & Positive

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to Price adjustment mechanism as given in the study *by David A. in his 1997 study but overall it was low and negative trend for this sub-sector (see yearly averages correlation results and overall daily correlation results in Chapter#6 of Correlation Findings),*therefore here price adjustment for sub-sector has to be in inverse order

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

3. 2008

"TABLE-19"

Palm Oil Sector 2008 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	-26.662%
Daily Correlation B/W Volume & ROI	-26.354%
Daily Correlation B/W Volatility & ROI	98.867%

"TABLE-20"

Serial No.	Skewness Volume Distribution	Skewness Volatility Distribution	Skewness ROI Distribution
1	1.891817502	3.150261843	3.278680677

Result for Volume & Volatility: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volume & ROI: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

4. 2007

"TABLE-21"

Palm Oil Sector 2007 Daily Correlation Values	
Daily Correlation B/W Volume & Volatility	-8.311%
Daily Correlation B/W Volume & ROI	-7.685%
Daily Correlation B/W Volatility & ROI	99.369%

"TABLE-22"

Serial No.	Skewness Volume Distribution	Skewness Volatility Distribution	Skewness ROI Distribution
1	2.195081949	5.286244328	5.396184176

Result for Volume & Volatility: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volume & ROI: Low & Negative

Low → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Negative → Because only one sub-sector of commodity sector has been considered for analysis as any one sub-sector always tends to ride against the main market price wave to ensure sub-sector profitability and win over liquidity from other sub-sectors i.e. high liquidity causing high volatility will cause contracts to over-price resulting in reducing sub-sector profitability and reducing liquidity and then price adjustment mechanism will take over

Following studies support above conclusion:

- *Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .*

i.e. Volatility impact Liquidity

- *David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .*

i.e. high levels of liquidity reduce overall returns from securities due to high volatility resulting in reducing profit from per contract.

Result for Volatility & ROI: High & Positive

High → Due to Independent Variable behavior (See Chapter#6 Conclusion)

Positive → Due to direct impact relationship of Independent Variable on Dependent Variable

3. Across Indices Correlation Yearly Averages Result's Analysis

"TABLE-23"

Serial No.	FKLI & FCPO-(2007-2010), Calculations	
1	4 Years Correlation Calculation Between Yearly Average Volume (FKLI-'07-'10) & Yearly Average Volatility (FCPO-'07-'10)	60.18%
2	4 Years Correlation Calculation Between Yearly Average Volume (FKLI-'07-'10) & Yearly Average ROI (FCPO-'07-'10)	58.28%
3	4 Years Correlation Calculation Between Yearly Average Volatility (FKLI-'07-'10) & Yearly Average ROI (FCPO-'07-'10)	10.87%

Yearly correlation percentages between main commodity index with any sub-sector's index, say above mentioned FCPO, show little correlated behavior as any index's behavior is best gauged when all sectors are taken for study and then correlated with main index's behavior, otherwise there is large error figure in error term of underlying VAR models of Microsoft Excel Sheet Application.

CHAPTER-8

✓Regression Result's Analysis

a. Commodity Sector Futures Index (2007-2010) Yearly Averages Regression Result's Analysis

"TABLE-24"

Malaysian 'All' Futures Index Regression Calculation Values			
Serial No.	**Volume & ROI**	**Volume & Volatility**	**Volatility & ROI**
R Square	96.50%	72.19%	86.79%
P-Value	0.017635385	0.150376547	0.068368416

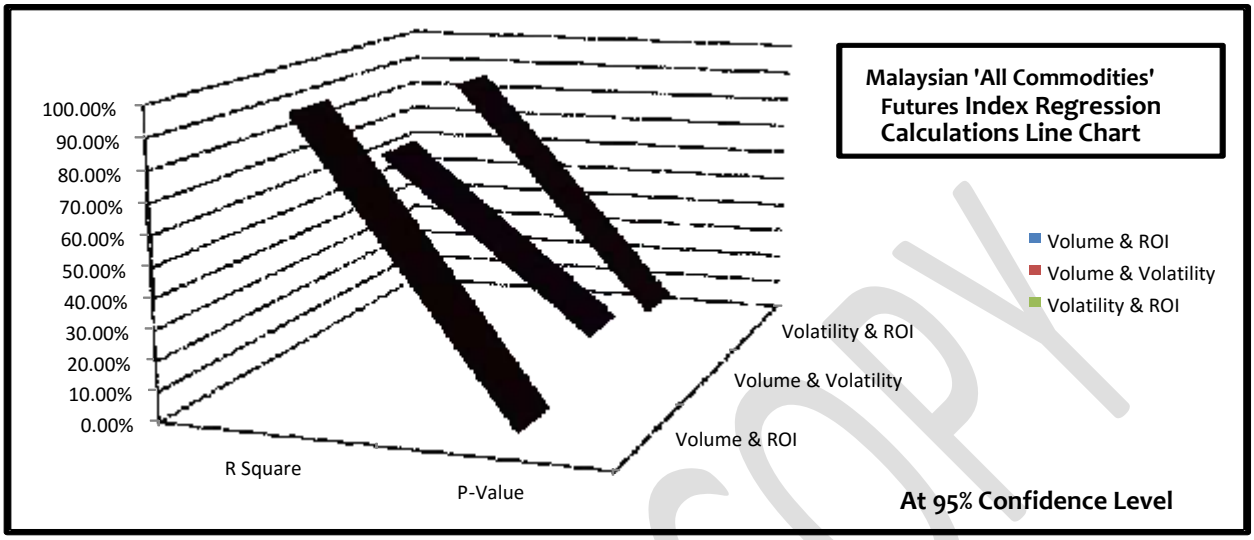
This Table shows that, for r-square values of any variable X regression with variable Y, all above variable X i.e. first mentioned in the above Table have high correlation with all variable Y, in the sense changes in variable Y can be highly explained by changes in variable X.

For all p-values, Volume & ROI regression has p-value < 0.05, as 95% confidence level was used; therefore rejecting the null hypothesis that the two data sets are unrelated i.e. they are related. For other two regressions, their 'p-values' are greater than 0.05 despite having reasonably high correlation in terms of 'r-square' value. As data has been recorded in real time so some error always gets included because of which 'p-values' can exceed 0.05 despite 'r-square' results showing reasonably high value. However, 'p-value' between Volatility and ROI is slightly above 0.05 as compared to between Volume & Volatility.

Therefore, these results are almost true representation for the Variables under analysis THROUGH ABOVE MENTIONED HYPOTHESES.

b. Commodity Sector Futures Index (2007-2010) Yearly Averages Regression Results Figure Depiction

"FIGURE-9"



"TABLE-25"

SUMMARY OUTPUT OF 'REGRESSION FOR VOLUME & ROI (2007-2010)'

Regression Statistics	
Multiple R	0.98236461
R Square	0.96504024
Adjusted R Square	0.94756035
Standard Error	3.56442003
Observations	4

ANOVA

	df	SS	MS	F	Significance F
Regression	1	701430547	701430545	55.208624	0.017635385
Residual	2	25.410180 34	12.7050902		
Total	3	726.840725			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-51566944	9.319527249	-5.5332146	0.0311443	-9166563385	-11468255	-91665634	-11468255
X Variable 1	0.00902126	0.001214126	7.430250 59	0.0176354	0.003797299	0.01424523	0.0037973	0.01424523

"TABLE-26, 27 & 28"

SUMMARY OUTPUT OF 'REGRESSION FOR VOLUME & VOLATILITY (2007-2010)'								
Regression Statistics								
Multiple R	0.84962345							
R Square	0.72186001							
Adjusted R Square	0.58279002							
Standard Error	0.00200434							
Observations	4							
ANOVA								
	df	***SS***	***MS***	***F***	***Significance F***			
Regression	1	2.08527E-05	2.0853E-05	5.1906237	0.150376547			
Residual	2	8.03477E-06	4.0174E-06					
Total	3	2.88875E-05						
	Coefficients	***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***	***Lower 95.0%***	***Upper 95.0%***
Intercept	-0.0088442	0.005240548	-1.6876402	0.2335342	-0.0313924	0.0137041	-0.0313924	0.0137041
X Variable 1	1.5555E-06	6.82726E-07	2.27829404	0.1503765	-1.38208E-06	4.493E-06	-1.382E-06	4.493E-06

SUMMARY OUTPUT OF 'REGRESSION FOR VOLATILITY & ROI (2007-2010)'								
Regression Statistics								
Multiple R	0.93163158							
R Square	0.86793741							
Adjusted R Square	0.80190611							
Standard Error	6.92778716							
Observations	4							
ANOVA								
	df	***SS***	***MS***	***F***	***Significance F***			
Regression	1	630.8522552	630.852255	13.144334	0.068368416			
Residual	2	95.98846982	47.9942349					
Total	3	726.840725						
	Coefficients	***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***	***Lower 95.0%***	***Upper 95.0%***
Intercept	2.96622068	5.072595322	0.58475405	0.6178925	-18.85939542	24.79183682	-18.859395	24.79183682
X Variable 1	4673.14063	1288.960347	3.62551155	0.0683684	-872.8081242	10219.08942	-872.80812	10219.08942

Index's 4 Year Average Values for Skewness			
Serial No.	**Skewness of Average Yearly Volume Distribution**	**Skewness of Average Yearly Volatility Distribution**	**Skewness of Average Yearly ROI Distribution**
1	0.044581197	1.469996685	0.397051542

c. Palm Oil Commodity Sub-Sector Futures Index (2007-2010) Yearly Averages Regression Result's Analysis

"TABLE-29"

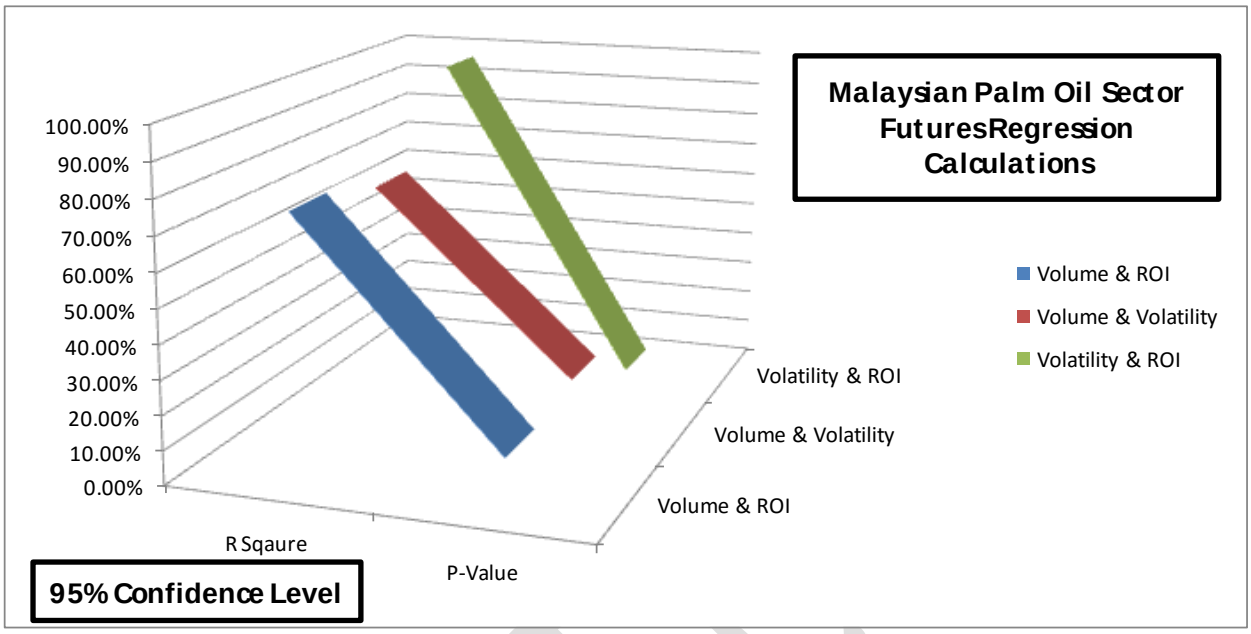
Malaysian Palm Oil Futures Regression Calculation Values			
Serial No.	**Volume & ROI**	**Volume & Volatility**	**Volatility & ROI**
R Square	75.29%	69.55%	96.70%
P-Value	0.1323	0.1660	0.0166

This Table shows that, for r-square values of any variable X regression with variable Y, all above variable X i.e. first mentioned in the above Table have high correlation with all variable Y, in the sense changes in variable Y can be highly explained by changes in variable X.

For all p-values, Volatility & ROI regression has p-value < 0.05, as 95% confidence level was used; rejecting the null hypothesis that the two data sets are unrelated i.e. they are related. For other two regressions, their 'p-values' are greater than 0.05 despite having reasonably high correlation in terms of 'r-square' value. ***This is because only Sub-Sector of main commodity sector has been taken such that data is not the true enough representation for Variables under analysis THROUGH ABOVE MENTIONED HYPOTHESES, because of which 'p-value' is higher than 0.05 despite 'r-square' value being reasonably high.***

d. Palm Oil Commodity Sub-Sector Futures Index (2007-2010) Yearly Averages Regression Results Figure Depiction

"FIGURE-10"



"TABLE-30"

SUMMARY OUTPUT OF 'REGRESSION FOR VOLUME & ROI (2007-2010)'

Regression Statistics	
Multiple R	0.86772056
R Square	0.75293896
Adjusted R Square	0.62940845
Standard Error	62.7717902
Observations	4

ANOVA

	df	SS	MS	F	Significance F
Regression	1	24016.76662	24016.7666	6.0951656	0.132279444
Residual	2	7880.595285	3940.29764		
Total	3	31897.3619			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	464.685711	143.8992219	3.22924409	0.0839906	-154.4626686	1083.83409	-154.46267	1083.83409
X Variable 1	-0.9070261	0.367389729	-2.4688389	0.1322794	-2.487776479	0.67372436	-2.4877765	0.67372436

"TABLE-31 & 32"

SUMMARY OUTPUT OF 'REGRESSION FOR VOLUME & VOLATILITY (2007-2010)'

Regression Statistics	
Multiple R	0.83396826
R Square	0.69550306
Adjusted R Square	0.54325459
Standard Error	0.01929088
Observations	4

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.001700004	0.0017	4.5682105	0.16603174
Residual	2	0.000744276	0.00037214		
Total	3	0.00244428			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.13124333	0.044222763	2.96777775	0.0972559	-0.05903186	0.32151853	-0.059032	0.32151853
X Variable 1	-0.0002413	0.000112905	-2.1373372	0.1660317	-0.00072709	0.00024448	-0.000727	0.00024448

SUMMARY OUTPUT OF 'REGRESSION FOR VOLATILITY & ROI (2007-2010)'

Regression Statistics	
Multiple R	0.9833566
R Square	0.96699021
Adjusted R Square	0.95048532
Standard Error	22.9447724
Observations	4

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	30844.43674	30844.4367	58.588089	0.016643395
Residual	2	1052.925164	526.462582		
Total	3	31897.3619			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-20.565756	21.42935045	-0.9597004	0.4384764	-112.7688088	71.6372976	-112.7688	71.6372976
X Variable 1	3552.32707	464.0964833	7.65428568	0.0166434	1555.481065	5549.17307	1555.481	5549.17307

"TABLE-33 & 34"

SUMMARY OUTPUT OF 'REGRESSION FOR VOLUME & ROI (2007-2010)' AT 65% CONFIDENCE LEVEL								
Regression Statistics								
Multiple R	0.86772056							
R Square	0.75293896							
Adjusted R Square	0.62940845							
Standard Error	62.7717902							
Observations	4							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	24016.76662	24016.7666	6.0951656	0.132279444			
Residual	2	7880.595285	3940.29764					
Total	3	31897.3619						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 65.0%*	*Upper 65.0%*
Intercept	464.685711	143.8992219	3.22924409	0.0839906	-154.4626686	1083.83409	290.620971	638.750451
X Variable 1	-0.9070261	0.367389729	-2.4688389	0.1322794	-2.487776479	0.67372436	-1.3514315	-0.4626206

Palm Oil Sector 4 Year Average Values for Skewness			
Serial No.	Skewness of Average Yearly Volume Distribution	Skewness of Average Yearly Volatility Distribution	Skewness of Average Yearly ROI Distribution
1	-0.735872701	0.635235458	1.419354589

CHAPTER-9

✓Study Limitations + Recommendations

STUDY LIMITATIONS:

Limitation # 1:

This research does not cover impact of factors like overall macro-economic and micro-economic conditions of a country. Moreover, factors like law and order have not been linked as well. However, no matter how these previous factors are, since they are more related to investor's choice of investment, if the variables under analysis are following the pattern being highlighted in this thesis study, then the results and conclusions of this study have general application for all futures indices.

Also, Malaysian economy does not suffer from lack of good law and order or good macro and micro economic conditions.

Limitation # 2:

This study pertains to analysis of returns from performance of both indices on daily basis and calculated results of yearly averages whereas study's scope can be widened to **individual companies** in terms of their returns on futures securities from these indices in light of their net long versus net short positions on this particular exchange either daily or over a period of time. Therefore, element of overall individual companies Risk Portfolio's impact on returns of their net daily or net yearly futures positions can be included for 'Return or Performance based Analysis' and compared with other companies by keeping any one company as base or focal point of comparison for within index comparison **OR** compared with main index returns for cross-index comparison.

For such an analysis, same variables can be used in relation to their impact on returns of respective companies.

Possibility for such a study has also been highlighted in the paper of "*Stambaugh, L. P. (June 2003). Liquidity Risk and Expected Stock Returns. The Journal of Political Economy , 642-685",*

Quote, *"One direction for future research is to explore whether liquidity risk plays a role in various pricing anomalies in financial markets."*

RECOMMENDATION: Thus, my recommendation is to carry such a study in the above mentioned methodology.

CHAPTER-10

✓Conclusions

- These results show that, Liquidity or Volume traded is a variable best studied over long term period due to inherent nature of market trading dynamics i.e. at days volume is higher and at days it will be lower
- Volatility and Return have no specific variable nature in terms of period. But Volatility has more preferable behavior for study when data over short term period is under consideration
    - Non specific nature because both are a consequence of liquidity or because both variables are obtained through formula manipulation.
    - Volatility is preferable for short term periods as it has a more direct changing nature with change in level of daily market trading
- Correlation and Regression results for main and palm oil sub-sector indices show that high liquidity results into high volatility which in turn ensures high returns

CHAPTER-11

✓Appendix-I

Hedge Fund Indices

There are many indices that track the hedge fund industry, and these fall into three main categories. In their historical order of development they are Non-investable, Investable and Clone.

In traditional equity investment, indices play a central and unambiguous role. They are widely accepted as representative, and products such as futures and ETFs provide investable access to them in most developed markets. However hedge funds are illiquid, heterogeneous and ephemeral, which makes it hard to construct a satisfactory index. Non-investable indices are representative, but, due to various biases, their quoted returns may not be available in practice. Investable indices achieve liquidity at the expense of limited representativeness. Clone indices seek to replicate some statistical properties of hedge funds but are not directly based on them. None of these approaches is wholly satisfactory.

Non-Investable Indices

Non-investable indices are indicative in nature, and aim to represent the performance of some database of hedge funds using some measure such as mean, median or weighted mean from a hedge fund database. The databases have diverse selection criteria and methods of construction, and no single database captures all funds. This leads to significant differences in reported performance between different indices.

Although they aim to be representative, non-investable indices suffer from a lengthy and largely unavoidable list of biases.

Funds' participation in a database is voluntary, leading to self-selection bias because those funds that choose to report may not be typical of funds as a whole. For example, some do not report because of poor results or because they have already reached their target size and do not wish to raise further money.

The short lifetimes of many hedge funds means that there are many new entrants and many departures each year, which raises the problem of survivorship bias. If we examine only funds that have survived to the present, we will overestimate past returns because many of the worst-performing funds have not survived, and the observed association between fund youth and fund performance suggests that this bias may be substantial.

When a fund is added to a database for the first time, all or part of its historical data is recorded ex-post in the database. It is likely that funds only publish their results when they are favorable, so that the average performances displayed by the funds during their incubation period are inflated. This is known as "instant history bias" or "backfill bias".

Investable Indices

Investable indices are an attempt to reduce these problems by ensuring that the return of the index is available to shareholders. To create an investable index, the index provider selects funds and develops structured products or derivative instruments that deliver the performance of the index. When investors buy these products the index provider makes the investments in the underlying funds, making an investable index similar in some ways to a fund of hedge funds portfolio.

To make the index investable, hedge funds must agree to accept investments on the terms given by the constructor. To make the index liquid, these terms must include provisions for redemptions that some managers may consider too onerous to be acceptable. This means that investable indices do not represent the total universe of hedge funds, and most seriously they may under-represent more successful managers.

Hedge Fund Replication

The most recent addition to the field is the approach to the problem in a different manner. Instead of reflecting the performance of actual hedge funds they take a statistical approach to the analysis of historic hedge fund returns, and use this to construct a model of how hedge fund returns respond to the movements of various investable financial assets. This model is then used to construct an investable portfolio of those assets. This makes the index investable, and in principle they can be as representative as the hedge fund database from which they were constructed.

However, they rely on a statistical modeling process. As replication indices have a relatively short history it is not yet possible to know how reliable this process will be in practice, although initially indications are that much of hedge fund returns can be replicated in this manner without the problems of illiquidity, transparency and fraud that exist in direct hedge fund investments.

✓Appendix-II

DATA-SHEET: 1

DATA-SHEET: 2

DATA-SHEET: 3

DATA-SHEET: 4

DATA-SHEET: 5

DATA-SHEET: 6

DATA-SHEET: 7

DATA-SHEET: 8

CHAPTER-12

✓Hedging Glossary

- ✓ **Blocked Currency** - A currency that is not available for trading freely in the open market. It is normally used only for domestic trade.
- ✓ **Continuous Compounding** - The process of calculating interest and adding it to existing principal and interest at infinitely short time intervals, i.e. number of compounding periods are infinite.
- ✓ **Country Risk** - This risk deals with government intervention or otherwise, central bank intervention excepted. Examples include war, the freezing of foreign funds, political pressures on the banking system, etc.
- ✓ **Credit Risk** - This type of risk deals with the counter party to any fx transaction. An outstanding currency position may not be closed out due to the failure of the counter party for whatever reason.
- ✓ **Currency Overlay** - A separate and distinct program designed to specifically neutralize the inherent currency exposure of an entity. Ideally, it is supposed to function as an autonomous operation from other treasury functions.
- ✓ **Devaluation** - Simply the decline in value of one currency versus the value of another currency caused by either market forces or by official designated exchange rates.
- ✓ **Discrete Compounding** - The process of calculating interest and adding it to existing principal and interest at finite time intervals, such as daily, monthly or yearly, i.e. number of compounding periods are finite.
- ✓ **Econometric Analysis** - An analysis conducted to study economic relationships by combining economic theory with statistical mathematics.
- ✓ **Economic Exposure** - This relates to changing exchange rates and its' affect on the cash flow and earning power of a corporation. Import/Export companies are particularly affected by economic exposure.

- **Exchange Rate Risk** - Deals with the risk associated with the spot price. It is affected by the supply and demand of foreign exchange worldwide.
- **Hedging** - Transactions to reduce the volatility in portfolio value. This is accomplished by taking the opposite side of ones' portfolio exposure similar to insurance. The instruments used are varied and include forwards, futures, options, and combinations of all of them.
- **Replacement Risk** - The consequence of settlement risk. If you have not received payment from your counter party, you now have to enter the market and make the necessary purchase/sale to settle your books thus exposing your firm to the prevailing market rates.
- **Reporting Currency** - This is simply the currency used in the reporting of financial documents of a corporation.
- **Risk Manager** - The person entrusted to administer a forex hedging program for a corporation/institution.
- **Settlement Risk** - Risk that relates to making an fx payment to a counter party before the counter payment is received. This risk arises from the possibility that your counter party will never pay you.
- **Stochastic Interest Rate** - It is the Probabilistic/Expected Interest Rate.
- **Transaction Exposure** - Also known as exchange risk. This reflects the potential gain or loss from transactions in fx. These transactions could be attributed to accounts receivable, payable or transactions that may occur in the future, such as being awarded a contract.
- **Translation Exposure** - Applies to the fluctuation of reported earnings/cash flows of a corporation due to the exchange rate(s) used to convert the statements of foreign subsidiaries and affiliates.
- **Value at Risk** - The total value of a portfolio that could potentially be adversly affected by market movements. A probability factor is normally attached to such a potential event.

CHAPTER-13

✓Web Resource Bibliography + Web-Page References

a. Web Resource Bibliography

Alex Frino, A. L. (2008). Comparisons of Liquidity and Transactions Costs of Asia-Pacific Stock Index Futures.

Asani Sarkar, P. R. (1996, May). Volatility and Liquidity in Futures Markets. Federal Reserve Bank of New York, Research Paper No. 9612 .

Bessembinder, H. (1992). Systematic Risk, Hedging Pressure and Risk Premiums in Futures Markets. The Review of Financial Studies , 637-667.

Chien-Chung Nieh, M. C.-j. (2008). Liquidity Provision of Futures Markets. International Research Journal of Finance and Economics .

David, A. (1997). Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility. Journal of Financial and Quantitative Analysis .

Eva Benz, J. H. Liquidity and Price Discovery in the European CO2 Futures Market. Bonn, Germany: Bonn Graduate School of Economics.

Figlewski, S. (1983(Jul., 1984)). Hedging Performance and Basis Risk in Stock Index Futures. The Journal of Finance , 657-669.

Frans A. de Roon, T. E. (2000). Hedging Pressure Effects in Futures Markets. The Journal of Finance , 1437-1456.

G.Geoffrey Booth, J. P. (1997). Prudent Margin Levels in the Finnish Stock Index Futures Market. Management Science , 1177-1188.

Jorion, Y. J. (April 2006). Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers. The Journal of Finance , 893-919.

Michael Fleming, A. (1993). Liquidity in U.S. Treasury Spot and Futures Markets. New York: Federal Reserve Bank of New York.

Poteshman, J. P. (2006). The Information in Option Volume for Future Stock Prices. The Review of Financial Studies , 871-908.

Sarkar, M. F. Liquidity in US Treasury Spot and Futures Markets. Federal Reserve Bank of New York.

Stambaugh, L. P. (June 2003). Liquidity Risk and Expected Stock Returns. The Journal of Political Economy , 642-685.

Stephen Fagan, R. G. (2007). Liquidity Induced Dynamics in Futures Markets.

Stulz, C. W. (1985). The Determinants of Firm's Hedging Policies. The Journal of Financial and Quantitative Analysis , 391-405.

Stulz, C. W. (1985). The Determinants of Firm's Hedging Policies. The Journal of Financial and Quantitative Analysis , 391-405.

Stulz, C. W. (December 1985). The Determinants of Firm's Hedging Policies. The Journal of Financial and Quantitative Analysis , 391-405.

b. Web-Page References

- http://www.oir.com/tables/prem_exp.htm
- http://en.wikipedia.org/wiki/Cost_of_carry
- http://www.investopedia.com/articles/exchangetradedfunds/08/ETF-liquidity.asp
- http://en.wikipedia.org/wiki/Exchange-traded_fund
- http://www.referenceforbusiness.com/encyclopedia/Sel-Str/Stock-Index-Futures.html
- http://www.exchange-handbook.co.uk/index.cfm?section=articles&action=detail&id=78449
- http://www.investopedia.com/articles/exchangetradedfunds/08/ETF-liquidity.asp,"ETF Liquidity: Why It Matters", by William Artzberger, CFA
- http://finance.wharton.upenn.edu/~pbond/teaching/Review%20of%20continuous%20compounding.pdf
- http://en.wikipedia.org/wiki/Vector_autoregression
- http://en.wikipedia.org/wiki/Econometrics
- http://jalt.org/test/bro_1.htm
- http://www.qimacros.com/qiwizard/regression.html
- http://www.futures-trading-mentor.com/most-liquid-futures-contracts.html
- http://www.forexdirectory.net/rmgloss.html