UNIVERSITAS INDONESIA

COINTEGRATION MODEL FOR THE DEMAND OF EQUITY MUTUAL FUNDS IN INDONESIA YEAR 2000 UNTIL YEAR 2009

THESIS

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FACULTY OF ECONOMICS
MAGISTER OF MANAGEMENT
JAKARTA
JUNE 2010

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Submitted to fulfill one of the requirements to obtain degree of Magister Management

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STATEMENT OF ORIGINALITY

This final paper represents my own effort,
Any idea or excerpt from other writers in this final paper, either in form of publication or in other form of publication, if any, have been acknowledged in this paper in accordance to academic standard or reference procedures

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Date : **25 June 2010**

PREFACE

Thanks to my one and only God, Jesus Christ, for Him, I am able to reach this point in my life until and cannot wait to see You Christ. Love You so much. Also writer want to say thanks to:

1. Prof. Rhenald Kasali, PhD.
2. Prof. Dr. Adler H. Manurung.
3. My family, my dad, my mom, my brothers, my sisters, my nephews.
4. Friends.

Final words, I hope this thesis brought knowledge to people who read it.

Jakarta, 25 June 2010

Freda Sitorus

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ABSTRACT

Name :Freda Sitorus
Study Program :Magister of Management–Master of Business International
Title :**COINTEGRATION MODEL FOR THE DEMAND OF EQUITY MUTUAL FUNDS IN INDONESIA YEAR 2000 UNTIL YEAR 2009**

This thesis tests the model that the demand of equity mutual funds in Indonesia was affected by three factors, the three factors that being tested was the rate of return on equity mutual funds, the rate of return on certificates deposit and the gross domestic product. This research use data from year 2000 until year 2009 and in data were in quarterly manner. The time series data were statistically tested and proven to be stationary so, the result of this thesis presents the behavior of the demand of equity mutual funds as a whole not only to that particular period. Using the cointegration test, this research proven that factors that significantly affect the demand of equity mutual funds are varies according to its time frame. In long-run the gross domestic product is the factor that significantly affects the demand of equity mutual funds. In the short-run the changes of the rate of return on equity mutual funds current period and the changes of the demand or the price of equity mutual funds are the factor that significantly affects the demand on equity mutual funds. In the last model which is the error-correction model the changes of the rate of return on equity mutual funds current period and the rate of return of equity mutual previous period are the factors that significantly affect the demand of equity mutual funds.

Key Words:
Equity Mutual Funds, Stationary, Cointegration, The Demand of Equity Mutual Funds, The Rate of Return on Equity Mutual Funds, The Rate of Return on Certicates Deposit, The Gross Domestic Product, Long-run, Short-run, Error-correction

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF EQUATIONS

LIST OF ATTACHMENT

CHAPTER 1
INTRODUCTION

1.1 Background

Americans love mutual funds. Just over twelve years ago, Americans had invested about $810 billion in mutual funds, which is not exactly chicken feed. Today, however, they have more than $6.9 trillion in mutual funds, a 750 percent increase.

Not only has the amount of money invested in mutual funds skyrocketed, but the variety of funds is outstanding. Thirty years ago there were just a few types of mutual funds. You could buy a growth fund (composed of stocks that paid low dividends but were growing rapidly), income funds (primarily composed of stocks that paid high dividends), or a bond fund. Now you can buy funds that specialize in virtually any type of assets. There are funds that specialize on stocks from a particular industry, a particular continent, or a particular country. There are many money market funds that invest only in Treasury bills and other short-terms securities. There are even funds that hold municipal bonds from only one state.

For those of you with a social conscience, you can buy funds that refuse to own stocks of companies that pollute, sell tobacco products, or have work forces that are not culturally diverse. For others, there is the "Vice Fund", which invests only in brewers, defense contractors, tobacco companies, and the like.

You can buy "market neutral funds", which sell some stock short, invest in others and promise (perhaps falsely) to do well no matter which way the market goes. There is the Undiscovered Managers Behavioral fund that picks stocks by psychoanalyzing Wall Street analyst. And then there is the Tombstone fund, which owns stocks only from the funeral industry.

How many funds are there? One urban myth is that there are more funds than stocks. But that includes bond funds, money market funds, and funds that invest in non-U.S. stocks. It also includes "flavors" of the same fund. For example, some funds allow you to by some different "share classes" of a single fund, with each share class having different funds of all types, there are only about 2,000 U.S. equity mutual funds. Still, that's a lot of funds, especially considering that there are only about 8,000 regularly traded U.S. stocks. (Sources:The May New Faces of Mutual Funds, Fortune, July 6, 1998, 217-218;"Street Myths" Fortune, May 24, 1999, 320; and http;//www.sia.com, 2001 Fact Book)

As it happened in the United States, Indonesia also experiences the same phenomenon. Mutual funds is a type of investment that professionally managed by a fund manager that trades (buys and sells) the fund's investments in accordance with the fund's investment objective. The funds is a collective investment scheme that pools money from many investors then the fund manager will invests it in an investment securities such as stocks, bonds, short-term money market instruments, other mutual funds, other securities, and/or commodities such as precious metals.

In Indonesia, nowadays this kind of investment is growing rapidly, as the awareness of people towards saving for the future is increasing in order to secure their live after the productive age passed by and the most important thing is that the return from this investment is much higher than the conventional one. The common product of these mutual funds is by combining the investment in securities and in health insurance. The health insurance factor is the important factor that attracts people from all social classes; society sees this as a guarantee that they don't loose their money. Another important factor of this rapid growth is the sales force where everyone can be the sales person without attached to a formal working hour and other regular company's policies.

In this thesis, research focus on mutual funds that goes to the equity sectors and data shows that it has been a significant growth for the past decade. In conclusion growths are 8 folds in total NAV and 10 folds in terms of numbers of shares.

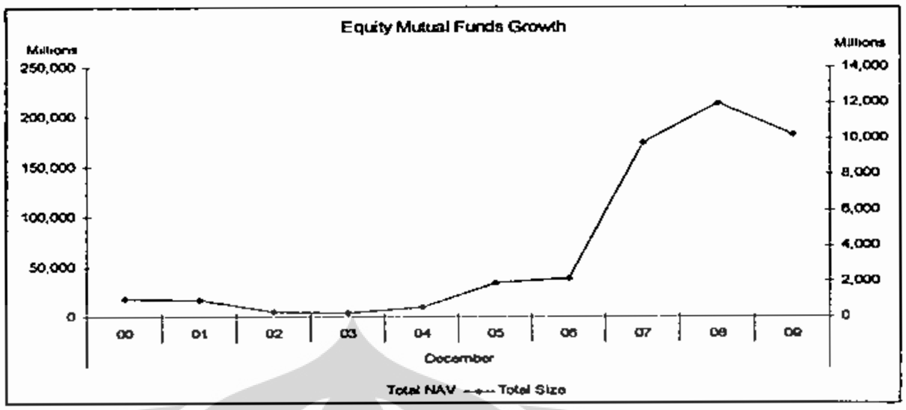


Figure 1.1 Equity Mutual Funds Growth

Source: reproduce from Equity Mutual Funds BAPEPAMLK DEPKEU RI

Shown by the graph there has been a significant increase starts from year 2004, since that the demand is continuing to growth. In year 2008, equity mutual funds suffered a great loss; wild guesses this loss was caused by the financial crisis that happened in the United States of America, the sub prime mortgage crisis.

Several researches had been done to find out about the nature of the demand on equity mutual funds, to name one is a research done by Nelson C. Modeste and Muhammad Mustafa "An Error-Correction Model of the Demand for Equity Mutual Funds in the U.S. 1973-1994". This thesis use it as a basic data to starts the research. C. Modeste and Muhammad Mustafa had statistically proven that factors such as the rate of return on equity mutual funds, the rate of return on certificates deposit and the real income or the gross domestic products do significantly affect the demand on equity mutual funds both in long-run and short-run.

This thesis conduct the same statistical testing to find out do those factors also significantly affect the demand on equity mutual funds here in Indonesia.

As an introduction research, data comparison were done; the first one is comparing data of demand on equity mutual funds and the rate of return on certificates deposit.

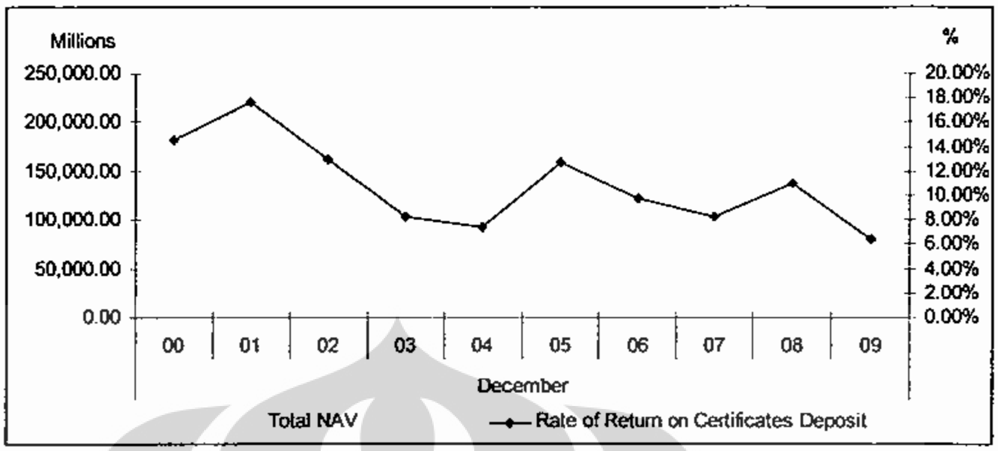


Figure 1.2 The Demand on Equity Mutual Funds and The Rate of Return on Certificates Deposit

Source: BAPEPAMLK DEPKEU RI and Central Bank of Indonesia

Clearly from the graph that this two factors move in opposite way, right after the rate of return on certificates deposit goes down equity mutual funds goes up. In 2008, when demand on equity mutual funds goes down, the rate on certificates deposit goes up.

Another comparison is, comparing demand on equity with the real income or gross domestic product.

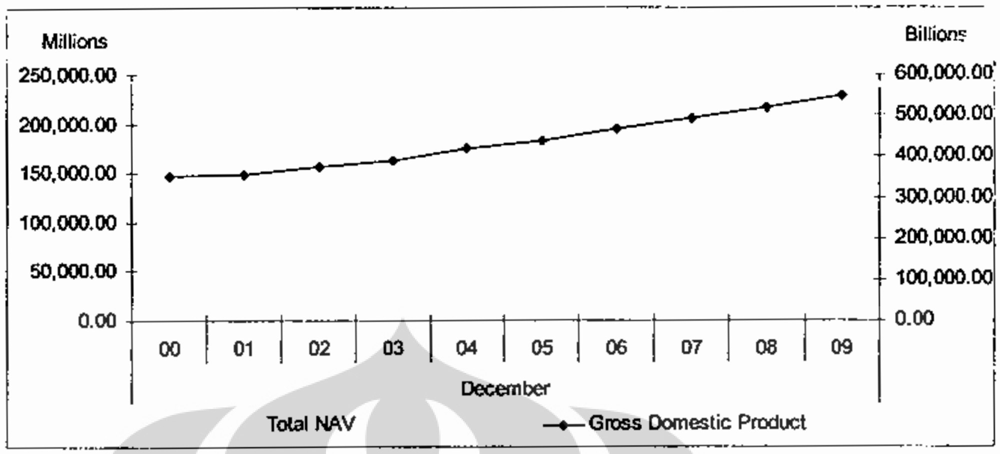


Figure 1.3 The Demand on Equity Mutual Funds and The Gross Domestic Product

Source: BAPEPAMLK DEPKEU RI and Statistical Bureau of Indonesia

The above graph shows that the two factors move in the same direction, in 2008 where the demand fell down but the gross domestic product didn't.

1.2 Problem identification

Based on introduction research, problem were identified, the phenomenon when the rate of return on certificates deposit starts to fell down, the demand on equity mutual funds starts to increase significantly. The prejudice that market or investors deviate to mutual funds since it gives higher return are being statistically tested in this thesis in order to give answer that has scientific ground.

1.3 Objective of Research

The objectives of this writing are:

1. What factors that significantly affects the demand of equity mutual funds?
2. How those significant factors move the demand of equity mutual funds?

1.4 Scope of Limitation

To discuss and solve the problems in this research in an appropriate order and not deviate from the purpose of the writing, scope of limitation were made. The scopes are:

a. Research was based on data from year 2000 until year 2009 and in quarterly based.
b. The rate on equity mutual funds and the rate of return on equity mutual funds were taken from BAPEPAMLK DEPKEU RI.
c. The rate of return on certificates deposit was taken from the Central Bank of Indonesia.
d. The real income or gross domestic product was taken from the Statistical Bureau of Indonesia.
e. Statistical discussed in this research only the statistical test that being used in this research.

1.5 Methods of Writing

This research is divided into 5 chapters. The following are the methods of writing:

Chapter 1 Introduction

This chapter discussed background; problem identification; objective of research; scope of limitation and the methods of writing.

Chapter 2 Literature Framework

This chapter discussed theories, terms and formulas used in data processing to conclude the hypothesis testing.

Chapter 3 Research Methodology

This chapter covered steps used in testing the hypothesis, which are: introduction research; problem identification; theoretical framework; purpose of writing; data processing; analysis; and conclusion and suggestion.

Chapter 4 Data Process and Analysis

This chapter discussed data collecting; data processing and analyzing the results. Data collects from various sources such BAPEPAM LK RI, Bank of Indonesia and Statistical Bureau. Data was processed by various statistical tests and analysis drawn based on statistical test results.

Chapter 5 Conclusion and Suggestion

This chapter gives conclusion from the whole research and gives suggestion for the public and the knowledge.

CHAPTER 2
LITERATURE FRAMEWORK

2.1 Portfolio

A portfolio is a combination of investments that an individual or an institution held to minimize the risk in order to maximize the return. In minimizing the risk by holding a portfolio, the strategy lies in the risk-limiting strategy which is diversification. This diversification means having several assets which each assets have its own risk, than this different level of risk will offset each other to minimize the risk and at the trying to maximizing the return. A portfolio can consist of different assets such as: stocks, bonds, options, warrants, gold certificates, real estate, futures contracts, production facilities, or any other item that is expected to retain its value.

There are several types of known diversification, the first one is the simple diversification in this type of diversification in a portfolio will consist of ten to twenty investments. By enlarging the number of investments it will diverse the level of risk and automatically reducing it. Across industry diversification, this portfolio mixed different investments from different industries. The logic behind this type of diversification is the same with the simple diversification but the different lies in the way how they diverse it, it assumes that different industries will have different risk and have low correlation so; the risk will offset each other. Superfluous diversification is a type of diversification that tries to minimize the number of investment where this type of diversification assumes that the bigger the number of investment will give lower return because of the cost in managing those investments.

Markowitz diversification is a type of portfolio that tries to diverse the investments by using a correlation coefficient, where the lower the coefficient value will give lower correlation and then will lower the risk. This diversification considered more scientific compare to the previous type of diversification. Next is the single model diversification, this diversification type have the same scientific approach with the Markowitz approach. The single model diversification assumes that an investment will move in the same direction with the market movement where it belongs. The investment will goes up if the market goes up and the investment will goes down if the market goes down. The assumption function is to minimize the overall risk.

Choosing assets and put them in a portfolio can be done freely there are no standards rules it depends on diversification type being choose. An institution usually will do its own investment analysis in selecting their assets to make a portfolio whereas an individual can use a financial consultant to do the analysis for them and make a portfolio.

As it stated before in chapter one, this individuals that are using services of a financial consultant are a business that growing rapidly and an important source of funds. In managing a portfolio, beside deciding which assets other important factors are how many assets to purchase, when is the correct time to purchase, when is the time to sell the asset and what type of assets to put in a portfolio. All of this managing process must be done by taking into account all of the economic factors and the changes. These economical factors and changes will influence the rate of return which is the whole managing is about.

The preferences of an investor also one of the important factor in managing a portfolio, higher risk higher return and lower risk lower return so, one must pay attention with the investor's preferences in deciding their portfolio. An investor that a risk averse will like their portfolio to have a lower risk meanings that their portfolio will have a lower return whereas an investor that love risk would like to have their portfolio with higher risk in order to get higher return. Managing a portfolio is all about managing the risk and the return.

2.1.1 Risk and Return

Risk can be measured in different ways, and different conclusions about an asset's risks can be reached depending on the measured used:

a. All financial assets are expected to produce cash flows and the risk of an asset is judged by the risk of its cash flows.

b. The risk of an asset can be considered in two ways: (1) on a stand-alone basis, where the asset's cash flows are analyzed by themselves, or (2) in a portfolio context, where the asset's cash flows are combined with those of other assets, and then consolidated cash flows are analyzed. There is an important difference between the stand-alone and portfolio risk, and an asset that has a great deal of risk it held by itself may be much less risky if it is held as part of a larger portion.

c. In a portfolio context, an asset's risk can be divided into two components: (a) diversifiable risk, which can be diversified away and thus is of little concern to diversified investors, and (b) market risk, which reflects the risk of a general stock market decline, which cannot be eliminated by diversification, and does concern investors. Only market risk is relevant—diversifiable risk is irrelevant to rational investors because it can be eliminated.

d. An asset with a high degree of relevant (market) risk must provide a relatively high expected rate of return to attract investors. Investor ini general are averse to risk, so they will not buy risky assets unless those assets have high expected returns. (Brigham and Ehrhard, page 127, 2005)

$$\text{Dollar return} = \text{Amount received} - \text{Amount invested} \quad (2.1)$$

$$\text{Rate of return} = \frac{Amountreceived - Amountinvested}{Amountinvested} \quad (2.2)$$

2.1.1.1 Modern Market Theory

Modern portfolio theory is a theory that tries to manage a portfolio by carefully choosing different assets to minimize risk and maximize return. Modern portfolio theory is a mathematical formulation of the concept of diversification in investing, with the aim of selecting a collection of investment assets that has collectively lower risk than any individual asset. This type of portfolio will combine different assets such as combining stock with bonds, where when the stock market fell it means that bonds value will increase and when the bonds value decrease the stock market will increase. From this each asset's risk will offset each other; a collection of both types of assets can therefore have lower overall risk than either individually. Modern portfolio theory have an asset's return that is normally distributed random variable, defines risk as the standard deviation of return, and models a portfolio as a weighted combination of assets so that the return of a portfolio is the weighted combination of the assets' returns. The idea is to combining different assets that their returns are not correlated so; the total variance can be reduced. Other assumption is that in this theory, investors were people that are rational and the market is an efficient market. The theory of Modern Portfolio was introduced by Harry Markowitz in a 1952 article and a 1959 book.

The basic concept is that individually choosing an asset is not correct; rather it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price. Investing is a tradeoff between risk and return. Modern portfolio theory selects a portfolio with the highest possible return from a given return and selects the lowest possible risk from the desired return. Modern portfolio theory is therefore a form of diversification. Under certain assumptions and for specific quantitative definitions of risk and return, modern portfolio theory explains how to find the best possible diversification strategy.

2.1.1.2 Single-Index Model

The single-index model is a type of simple asset pricing model that been widely used the finance industry to measure risk and return of a stock.

$$r_{it} - r_f = \alpha_i + \beta_i (r_{mt} - r_f) + \varepsilon_{it} \qquad (2.3)$$

$$\varepsilon_{it} \sim N(0, \sigma_i)$$

r_{it} : return to stock i in period t

r_f : the risk free rate (i.e. the interest rate on treasury bills)

r_{mt} : the return to the market portfolio in period t

α_i : the stock's alpha or abnormal return

β_i : the stocks's beta, or responsiveness to the market return

$r_{it} - r_f$: the excess return on the stock

$r_{mt} - r_f$: the excess return on the market

ε_{it} : the residual (random) return (assumed normally distributed with mean zero and standard deviation σi)

The equation above says that the stock return is affected by the market or beta and has a firm specific expected value or alpha and has a firm-specific unexpected component or residual. Every stock's performance is in relation to the performance of a market index (such as the All Ordinaries). Security analysts often use the SIM for such functions as computing stock betas, evaluating stock selection skills, and conducting event studies.

The single-index model assumes that there is only one macroeconomic factor that causes the systematic risk affecting all stock returns. This factor can be in a form of the rate of return on a market index, for example the Jakarta Composite Index. According to this model, the return of any stock can be decomposed into the expected excess return of the individual stock due to firm-specific factors, commonly denoted by its alpha coefficient (α), the return due to macroeconomic events that affect the market, and the unexpected microeconomic events that affect only the firm. The term $\beta i(rm - rf)$ represents the movement of the market modified by the stock's beta, while ei represents the unsystematic risk of the security due to firm-specific factors. Macroeconomic events, such as changes in interest rates or the cost of labor, causes the systematic risk that affects the returns of all stocks, and the firm-specific events are the unexpected microeconomic events that affect the returns of specific firms, such as the death of key people or the lowering of the firm's credit rating, that would affect the firm, but would have a negligible effect on the economy. In a portfolio, the unsystematic risk due to firm-specific factors can be reduced to zero by diversification. The index model is based on the following:

a. Most stocks have a positive covariance because they all respond similarly to macroeconomic factors.

b. However, some firms are more sensitive to these factors than others, and this firm-specific variance is typically denoted by its beta (β), which measures its variance compared to the market for one or more economic factors.

c. Covariances among securities result from differing responses to macroeconomic factors. Hence, the covariance of each stock can be found by multiplying their betas and the market variance:

$$Cov(Ri, Rk) = \beta i \beta k \sigma 2 \quad (2.4)$$

This last equation greatly reduces the computations required to determine covariance because otherwise the covariance of the securities within a portfolio must be calculated using historical returns, and the covariance of each possible pair of securities in the portfolio must be calculated independently. With this equation, only the betas of the individual securities and the market variance need to be estimated to calculate covariance. Hence, the index model greatly reduces the number of calculations that would otherwise have to be made to model a large portfolio of thousands of securities (http://en.wikipedia.org/wiki/Single-index_model, Saturday June 26, 2010).

2.1.1.3 Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM), specifies the relationship between risk and required rates of return on assets when they are held in well-diversified portfolios. The assumptions underlying the CAPM's development are summarized as follows:

a. All investors focus on a single holding period, and they seek to maximize the expected utility of their terminal wealth by choosing among alternative portfolios on the basis of each portfolio's expected return and standard deviation.

b. All investors can borrow or lend an unlimited amount at a given risk-free rate of interest, r_{RF}, and there are no restrictions on short sales of any asset.

c. All investors have identical estimates of the expected returns, variances, and covariances among all assets; that is, investors have homogeneous expectations.
d. All assets are perfectly divisible and perfectly liquid (that is, marketable at the going price).
e. There are no transaction costs.
f. There are no taxes.
g. All investors prices are taker (that is, all investors assume their own buying and selling activity will not affect stock prices).
h. The quantities of all assets are given and fixed. (Brigham and Ehrhard, 2005)

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \tag{2.5}$$

$$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)} \tag{2.6}$$

$E(R_i)$ = expected return on the capital asset
R_f = the risk-free rate on interest
β_i = the sensitivity of the expected excess asset returns to the expected excess market returns
$E(R_m - R_f)$ = market premium or risk premium

2.1.1.4 Arbitrage Pricing Theory

Arbitrage pricing theory is a well known asset pricing method that being use in pricing stocks. This theory stated that the expected return of an asset is a linier function with the various macro-economic factors where sensitivity to changes in each factor is represented by a factor-specific beta coefficient. The theory was firstly introduced by Stephen Ross in 1976, Ross stated that the model-derived rate of return will then be used to price the asset correctly - the asset price should equal the expected end of period price discounted at the rate implied by model. If the price diverges, arbitrage should bring it back into line.

$$R = \bar{R} + \beta_1 F_1 + \beta_2 F_2 + \ldots + \beta_k F_k + \varepsilon \quad (2.7)$$

R : rate of return

$\bar{R}$: expected return

β : beta coefficient of the sensitivity responsiveness to the factor F

F : systematic factors

ε : unsystematic risk of an assets

In the arbitrage pricing theory the unsystematic risk of an assets will diversified away and eventually fade away as the number of stocks in a portfolio is increasing or larger.

In Ross's book The Modern Financial Management stated that in the arbitrage pricing theory, if the market portfolio lies in the security market line, the factor is the market portfolio and the beta of the market portfolio is one then the expected rate of return become:

$$\bar{R} = R_f + \beta(\bar{R}_m + R_f) \quad (2.8)$$

The above equation shows that the expected return on any assets is linearly related to the security's beta. The equation above is the same with the capital assets pricing model.

2.2 Cointegration and Error Correction Model

According to Granger and Newbold (1974) regresses a time series data that is not stationary will cause a spurious condition or spurious regression; this spurious regression happened if the determination coefficient is high but the relationship between the independent variable and the dependent variable does not shows any patterns or does not have any relationship at all. This no patterns or no meaningful relationship happens because the relationship that exists is only a trend. The high determination coefficient happens due to the trend not because of the relationship between the dependent variable with the independent variables. If the dependent variable and the independent variables each has a unit root or non stationary but it might be that the linier combination between the dependent variable and the independent variables (e_t) are stationary and if the dependent variable does not have a unit root or stationary then there will be a long-term cointegration between the dependent variable and the independent variables. Generally speaking in a time series data the dependent variable and the independent variables not stationary at first order but become stationary after differencing then those data are cointegrated.

Cointegration means that in long-run there is equilibrium among the variables. In short-run there is a possibility that these variables have disequilibrium. The behavior between the short-run and the long-run is something that economist try to capture. In doing that the economist comes up with the error-correction model. The error-correction model explains the adjustment that the independent variables and dependent variable in correcting the error in order to reach the equilibrium in long-run. The error-correction model first was introduced by Sardan and further it was developed by Hendry and finally it was Engle and Granger who make this model well known and widely use in econometrics.

Error-correction term is the error disequilibrium, when the error-correction term is equal to zero for sure the dependent variable and the independent variables in its equilibrium. The error-correction model explains the changes in the dependent variable which it was affected by the error from the independent variables and the error-correction term in the previous period. This error-correction term is the error variable in the previous period (e_{t-1}). The absolute value from the coefficient of error-correction determines how fast it will re-bounce to its equilibrium after experiencing disequilibrium. Below is the illustration from the book Basic Econometrics by Gujarati and Porter (page 764 – 765):

$$u_t = LPCE_t - \beta_1 - \beta_2 LDPI - \beta_3 t \quad (2.9)$$

$$\Delta LPCE_t = \alpha_0 + \alpha_1 \Delta LDPI_t + \alpha_2 u_{t-1} + \varepsilon_t \quad (2.10)$$

LPCE: real personal consumption expenditure

DPI: real disposable personal income

ε_t: white noise error term

u_{t-1}: lagged value of the error term

From the error-correction model above states that ΔLPCE depends on ΔLDPI and also the equilibrium error term. If the latter is nonzero, then the model is out of equilibrium. Suppose ΔLDPI is zero and u_{t-1} is positive. This means $LPCE_{t-1}$ is too high to be in equilibrium, that is, $LPCE_{t-1}$ is above its equilibrium value of ($\alpha_0 + \alpha_1 LDPI_{t-1}$). Since α_2 is expected to be negative the term $\alpha_2 u_{t-1}$ is negative and, therefore, $\Delta LPCE_t$ will be negative to restore the equilibrium. That is, $LPCE_t$ is above its equilibrium value it will start falling in the next period to correct the equilibrium error; hence the name error-correction model. By the same token, if u_{t-1} is negative (i.e., LPCE is below its equilibrium value), $\alpha_2 u_{t-1}$ will be positive, which will cause $\Delta LPCE_t$ to be positive, leading $LPCE_t$ to rise in period t. Thus, the absolute value of α_2 decides how quickly the equilibrium is restored. In practice, we estimate (u_{t-1} by $\hat{u}_{t-1} = LPCE_t - \hat{\beta}_1 - \hat{\beta}_2 LDPI - \hat{\beta}_3 t$). Keep in mind that the error correction coefficient α_2 is expected to be negative (why?)

Returning to pur illustrative example, the empirical counterpart of equation (21.11.6) is:

$$\Delta L\hat{PCE}_t = 0.0061 + 0.2967 \Delta LDPI_t - 0.1223 \hat{u}_{t-1}$$

t = (9.6753) (62282) (-3.8461)

$R^2 = 0.1658$ d = 2.1496

Statistically the ECM term is significant, suggesting that PCE adjusts to DPI with a lag; only about 12 percent of the discrepancy between long-term and short-term PCE is corrected within a quarter. From regression (21.11.7) we see that the short-run consumption elasticity is about 0.29. The long-run elasticity is about 0.58, which can be seen from eq. (21.11.3a). Before we conclude this section, the caution sounded by S>G Hall is worth remembering: While the concept of cointegration is clearly an important theoretical underpinning of the error-correction mode there are still a number of problems surrounding its practical application; the critical values and small sample performance of many these test are unknown for a wide range of models; informed inspection of the correlogram may still be an important tool.

There are two important factors in an error-correction term coefficient value:

a. If $e_{t-1} > 0$, the error-correction model is not in its equilibrium that means that the dependent variable changes above the equilibrium. This shows that if the dependent variable is above its equilibrium then the dependent variable will decrease or go down in the next period to make a correction so it returns to its equilibrium

b. If $e_{t-1} < 0$, the error-correction model is not in its equilibrium that means that the dependent variable changes below the equilibrium. This shows that if the dependent variable is below its equilibrium then the dependent variables will increase or go up in the next period to make a correction so it returns to its equilibrium (Nachrowi and Usman, 2006).

2.3 Previous Research

There was several preceding literature that based this research:

- Nelson C. Modeste and Muhammad Mustafa (1999), tested that the U.S. demand of equity mutual funds were influenced by the rate of return, rate of return on savings deposits, and the growth of income both in long-run and short-run. The result was, yes, the US demand of equity mutual funds were influenced by those factors. Nelson and Mustafa used the Engle-Granger method for the cointegration test and used the Chow test to test the equation in different time frame.

- Rahardian Setyasmoro (2009), tested that the performances of Jakarta Composite Index were influenced by the global and Asian regional stock prices index both in long-run and short-run, then the result was, yes, the Jakarta Composite Index were influenced by those factors. Rahardian Setyasmoro used the Johansen method for the cointegration test and error-correction mechanism in explaining the variables in reaching the equlibrium.
- Chan, Grup and Pan (1992), tested the relationship between the Hong Kong stock market, South Koream Singapore, Taiwan, Japan, and United States. They use pairwaise and higher order cointegration to show that there is no cointegration among them. This research supports that the stocks in major country in Asia and United States are a form of weak efficient as an individual and collective in long-run. This research also shows that international diversification (in tested market) are effective.
- Martin Fukac (2005) use the Engle-Granger method to test two theoretical relationships in Austrian economic using the cointegration approach, to test whether growth of nominal wages is a function of the growth of aggregate price level and the relationship given by the Friedman's rule, i.e., in equilibrium inflation grows at the same rate as the real output does. The first test result is there is a quite close relationship; this fact suggests that the inflation phenomenon is anticipated in the wage policy. The second result is that in the case of Austrian economics that in equilibrium inflation doesn't grows at the same rate as the real output does although there is certain causality between inflation and output growth.
- Noriega and Ventosa-Santaul`aria (2006), analyze the asymptotic behavior of the Engle-Granger t-test for cointegration when the data include structural breaks, instead of being pure $I(1)$ processes. The result is that the test does not possess a limiting distribution, but diverges as the sample size tends to infinity. Calculations involving the asymptotic expression of the t-test, as well as Monte Carlo simulations, reveal that

the test can diverge in either direction, making it unreliable as a test for cointegration, when there are neglected breaks in the trend function of the data.

- Sheng and Tu (2000), analyze the national stock market before and after the Asian financial crisis with cointegration analysis and variance decomposition. Data being used are daily closing of S&P 500 index and 11 index of Asia Pacific stock market (Tokyo Nikker225, Hong Kong Hangseng, Singapore STI, Sidney All Ordinaries, Seoul Composite index, Bangkok Composite Index, Jakarta Composite Index and Shanghai B-Shares Index) from July 1, 1996 until June 1998. The study shows that ASEAN countries have strong relationship with other East Asia countries and there is no cointegration before the Asian financial crisis. The result shows that the exogeneity for all stocks have been decreasing.
- Sharma and Wongbanpo (2002) test the dependency of Indonesian stock market, Malaysian, Singapore, Thailand and Philippines using the cointegration technic for the situation in January 1986 until December 1998. The result is that there is a long-term cointegration between stocks market in counties: Indonesia, Malaysia, Singapore and Thailand except with Philippines. Other result is that the Malaysian and Singapore stock market move together one for one in a cointegrated vector. This happened probably because the geographic and the cultural similarity between these two countries.
- Arshanapalli and Urrutia (1992), test the dependency and dynamical interaction among five stock markets (England, Germany, United States, France and Japan) by using data from January 1980 until May 1990 using the pairwise cointegration and error correction models. The research shows that there has been a same level movement in the international market since the 1987 crash. During the post-crash period, United States market shows significantly influencing the market in France, Germany and England and not vice versa. The result shows that there is no dependency between the United States stock market, Japan,

France, Germany and England during the pre and post October crash and also the research shown that the Japanese stock market doesn't have any relationship with the other market since the October crash.

CHAPTER 3
RESEARCH METHODOLOGY

Research methodology is a series of process and logical thinking to formulate, analyze, solve and to conclude a set of research. Research methodology gives a systematical guidance for a researcher so; the result will be more accurate and better. This chapter will describe the details steps of research in this research.

3.1 Background

This research starts with introduction research; the purpose of this research is to find out what mutual funds is; the history; the nature of the business and to find out the factors that affect this business. This research conducted by exploring various valid data and valid research done previously by econometricians, statisticians and other researchers. Next step is identify the problems occurs based on the introduction research and after that is determining the purposes of the research. Both of these steps are very crucial because based on those two things this thesis is all about.

3.2 Literature Framework

Literature framework contains all the literature, theory and previous research done by others as knowledge based to do this thesis. This research test a hypothesis that stated that the change in demand of equity mutual funds were significantly affected by its rate of return, the real income and the rate of return on certificate of deposits and both the short-run and long-run factors also significantly affected the change.

3.3 Colleting Data

Collecting data is a process to gather all information that needed to construct a research. This data that eventually will be use in analyzing in order to solve the problem or to test a hypothesis that been formulated before and finally to conclude the problem solution.

This thesis use secondary data, where all data were collected from various sources. There are 4 main data, the first one is the demand of equity mutual funds or REMF for short, second is the rate of return on Equity mutual funds or RTEMF for short, third data is the rate of return on certificate of Bank Indonesia or RTCD for short and the last data is the gross domestic product in constant price of year 2000 or GDP for short.

REMF data were collected from the BAPEPAM and RTEMF were derived from the value of log normal of current price divided by the previous price or log normal X2/X1; and RTCD data were collected from the Bank of Indonesia and the last data GDP or the Gross Domestic Product were derived from the BPS and from Bloomberg. All data collected from year 2000 until year 2009, data were in quarter manner.

3.4 Data Processing

This thesis use time series data, time series data is a set of observations on the values that a variable takes at different times, where this set of data may be collected at regular time intervals, such as daily, weekly, monthly, quarterly, annually, quinquennially and decennially. (Gujarati & Porter, 2009)

According to Gujarati and Porter, time series are heavily used in econometric studies, where in this study, analyst assumes that a time series is stationer. A stationer time series is a time series that has means and variance that do not vary systematically over time.

To understand clearly a time series data, knowing the data generating process is very crucial, still according to Gujarati and Porter, there are nine concepts that generate this time series. These nine concepts are:

a. Stochastic processes
b. Stationary processes
c. Purely random processes
d. Nonstationary processes
e. Integrated variables
f. Random walk models
g. Cointegration

h. Deterministic and stochastic trends

i. Unit root tests

A random or stochastic process is a collection of random variables ordered in time. An example is the GDP; GDP figure is depending on the realization of economic and political climate, the economic and political climate are the factors that make a random or stochastic.

Stationary stochastic process is a process if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed.

Purely random process is a stochastic process that has a zero mean, constant variance σ and is serially uncorrelated. A white noise process is an example of purely random process, which denoted by u_t ; that is u_t is independently and identically distributed as a normal distribution with zero mean and constant variance. Such a process is called a Gaussian white noise process.

A nonstationary stochastic process is a time series that have a time-varying mean or a time-varying variance or both. A classical sample of a nonstationary stochastic process is the random walk model, there are two types: a random walk model without drift and a random walk model with drift. Integrated processes is a random walk model but in a specific case of a more general class of stochastic processes.

Cointegration is a case where a series of data that is integrated at order 0 or $I(0)$ then regressed it with a series of data that is integrated at order 1 or $I(1)$ and the result is that those series are integrated at order 0 or $I(0)$, that is to say that those series are not spurious or those series are cointegrated. In other word, two variables are cointegrated if they have a long-term, or equilibrium.

Unit root test is a test to identifying whether a variable consist of a root or $\rho = 1$. In this state where a variable has a root or $\rho = 1$ means that the variable is nonstationer variable. The well known root test that widely used is the Dickey-Fuller test (DF for short) or the Augmented Dickey-Fuller test (ADF for short).

This thesis uses the ADF test to identifying a root in each variable and the Phillips-Perron test.

3.4.1 Stationery Process

A time series data is a series of data in a specific range of time. As it stated, a "time" series of data, these data only represent the condition in that range of time. Nowadays people really relying on this time series in research, analyzing and deciding. Since, it really depends on time, this series must be free from autocorrelation and heteroschedaticity in other word it should be stationary in order to use them as a whole not partially. A stationary data is a data that has the same mean and variance or it does not have significant changes in the value of mean and variance. If a series of data is stationary, it can be used to represent the situation as a whole. According to Nachwori and Usman, a stochastic stationary data meaning, stochastic means that it is random, has these criteria:

a. $P(Y_t,....,Y_{t+k}) = P(Y_{t+m},...,Y_{t+k+m}) \forall m,t,k$

b. $E(Y_t) = \mu y$ -- not depends on t

c. $Var(Y_t) = \sigma^2 Y = \mathrm{E}[(Y_t - \mu y^2)]$ -- not depends on t

d. $\gamma_k = \mathrm{cov}(Y_t, Y_{t+k})$ -- not depends on t

$= \mathrm{cov}(Y_{t+m}, Y_{t+m+k})$

e. if k=0 -- $\gamma_0 = \mathrm{cov}(Y_t, Y_t) = \mathrm{var}(Y_t) = \sigma^2 Y$

3.4.2 Stationery Test

3.4.2.1 Graphical Analysis

A graphical analysis is an informal test to analyze a time series, by plotting the data, the nature behavior of a series of data can be easily seen from the line. For example, a series of log GDP was plot and the result is the line shows an increasing trend, this increasing trend shows that perhaps the mean of GDP change over time. Since the mean changes all the time meaning that the GDP is not stationary. When the series shows a decreasing trend which means that the mean also changes all the time, the same with the increasing trend situation, then the data is not stationary.

3.4.2.2 Autocorrelation Function (ACF) and Correlogram

Autocorrelation function is one of the simple tests to know whether a series is stationary or not stationary, taken from Gujarati and Porter, Basic Econometrics, the formula for autocorrelation function is:

$$\rho_k = \frac{\gamma_k}{\gamma_0} \qquad \rho_k = \frac{\text{cov}\,arianceatlagk}{\text{var}\,iance} \tag{3.1}$$

Both covariance and variance are measured in the same units, ρ_k is a *unitless*, or *pure*, *number*. The value lies between – 1 and + 1 and then the plot of these ρ_k called as the population correlogram.

This thesis use a sample data so, the autocorrelation function value is the value of the sample autocorrelation function or SAFC for short or $\square_k$. Since the AFC is a sample value, both variance and covariance also have to be in form of their sample value. $\hat{\gamma}_k$ denotes the sample covariance at lag k and $\hat{\gamma}_0$ denotes the sample variance. The formula for sample autocorrelation function is (Gujarati and Porter, page 749):

$$\hat{\gamma}_k = \frac{\sum \left(Y_t - \bar{Y}\right)\left(Y_{t+k} - \bar{Y}\right)}{n} \tag{3.2}$$

$$\hat{\gamma}_0 = \frac{\sum \left(Y_t - \bar{Y}\right)^2}{n} \tag{3.3}$$

$$\hat{\rho}_k = \frac{\hat{\gamma}_k}{\hat{\gamma}_0} \tag{3.4}$$

Correlogram of these sample autocorrelation function called sample correlogram. According to Gujarati and Porter, for a purely white noise process the autocorrelations at various lags hover around zero value meanings that is to say that the series is stationary. Plotting a series of sample autocorrelation value in a correlogram and if the result shown that the value hover around the zero axis it means that the series has the same behavior with the purely white noise means that the series is stationary. If the sample value autocorrelation doesn't hover around zero axis means that it does not have the same behavior with the purely white noise that is to say that the series is not stationary.

- **Choosing the Lag Length**

In calculating the sample autocorrelation value, the lag length is an important factor, next step is deciding the correct lag length and deciding whether a correlation coefficient at a certain lag is statistically significant. The common rule is the optimum lag length is one-third to one-quarter the length of the time series. The best way to choose the lag length in practice is by starting with sufficient large lags and then reduces them by using the Akaike criterion and Schwarz criterion.

- **Statistical Significant Test for Autocorrelation Value**

The sample autocorrelation value significances can be measured by its standard error value, Bartlett has shown that if a time series is purely random, it exhibit white noise so, the sample autocorrelation coefficient are approximately:

$$\hat{\rho}_k \sim N(0, 1/n) \tag{3.5}$$

The above equation means that in large samples the sample autocorrelation are normally distributed with zero mean and variance equal to one over the sample sizes. For example, measuring the significance of the sample autocorrelation coefficient at 95% level of confidence, the confidence interval is:

$$\hat{\rho}_k \pm 1.96 \text{ (standard error)} \tag{3.6}$$

If the interval includes zero than do not reject the null hypothesis that the true ρ_k is zero and reject the hypothesis if the interval include zero. Other way to know the individual significance of the sample autocorrelation coefficient is by joint test hypothesis that all the ρ_k up to certain lags are simultaneously equal to zero. The calculation is by using the Q statistic that being developed by Box and Pierce, the Q statistic formula is:

$$Q = n\sum_{k=1}^{m} \hat{\rho}_k^2 \tag{3.7}$$

n = sample size

m = lag length

Q statistic function is to find out whether a time series is a white noise or not. If the computed Q statistic exceeds the critical Q value from the chi-square distribution at the chosen level of significance, reject the null hypothesis that all the true ρ_k are zero, at least some of them must be zero. Besides Q statistic, Ljung-Box statistic (LB statistic) can be use to know whether a series of data is a white noise or not, the formula for it is:

$$\text{LB} = \text{n(n+2)} \sum\left(\frac{\hat{\rho}_k^2}{n-k}\right) \sim \chi^2 \text{m} \tag{3.8}$$

3.4.2.3 Unit Root Test

- **The Dickey-Fuller and Augmented Dickey-Fuller Test**

Stationary test using unit root test is by using the Augmented Dickey-Fuller test or ADF for short. The method is by comparing the absolute statistical value with the absolute critical value on Mac-Kinnon table. The stationary test using 95% of confidence level so, a series of data will be stationary if the absolute statistical value is larger than the critical value of 5% on Mac-Kinnon table and when the absolute statistical value is smaller than the critical value than the series is not stationary. Before go to the Augmented Dickey-Fuller test, the unit root test starts with the Dickey-Fuller test, the model is (Basic Econometrics by Gujarati and Porter, page 754 – 762), :

$$Y_t = \rho Y_{t-1} + u_t \tag{3.9}$$

Deduct the above equation with t-1 on both sides the equation become:

$$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + u_t$$
$$\Delta Y_t = (\rho - 1)\, Y_{t-1} + u_t$$

Rewrite the above equation become:

$$\Delta Y_t = \delta\, Y_{t-1} + u_t$$

Where $\delta = (\rho - 1)$ and Δ is the first difference. If $\delta = 0$ the $\rho = 1$ meaning that the series has a root that is to say that the series is not stationary. Plugged in the $\delta = 0$, then the result for the above equation is:

$$\Delta Y_t = \delta\, Y_{t-1} + u_t$$
$$\Delta Y_t = 0\, Y_{t-1} + u_t$$
$$\Delta Y_t = u_t$$

It means that the first difference is the white noise error term that is to say that the first difference is stationary. The actual procedure of Dickey-Fuller test gives three possibilities:

Yt is a random walk: $\Delta Y_t = \delta Y_{t-1} + u_t$ (3.10)

Yt is a random walk with drift: $\Delta Y_t = \beta_1 + \delta Y_{t-1} + u_t$ (3.11)

Yt is a random walk with drift

Around a deterministic trend: $\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + u_t$ (3.12)

Where t is the time or trend variable. In each possibility, the hypotheses are:

$H_0 : \delta = 0$, it means it has a unit root means that the series is not stationary or it has a stochastic trend.

$H_1 : \delta < 0$, it means it does not have a unit root means that the series is stationary or possibly around a deterministic trend.

The Dickey-Fuller test assumed that the error term u_t was not correlated. In a situation that the error term is correlated, an Augmented Dickey-Fuller test can be used to test stationary. This test is conducted by adding the lagged values of the dependent variable ΔY_t, the model is:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{n} \alpha_i \Delta Y_{t-i} + \varepsilon_t \qquad (3.13)$$

Where ε_t is a pure white noise error term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$ and so on. The number of lagged difference terms to include is often determined, the idea is to make the error term uncorrelated. In this thesis the lag length will be automatically selected from the software usung the Akaike and Schwarz criterion.

- **The Phillips-Perron Test**

The Phillips-Perron use non parametric statistical methods different with the Dickey-Fuller and the Augmented Dickey-Fuller test in managing the serial correlation. The distribution of Phillips-Perron and the Augmented Dickey-Fuller test are the same.

3.4.3 Transforming Non Stationary Time Series

Regress a stationary time series data with a non stationary time series data will cause a spurious condition. To avoid this situation, all data has to be in stationary form. To do this, there are 2 methods, differencing and trend-stationary process.

3.4.3.1 Differencing

By differencing series of data that is not stationary, it can transform the non stationary data into a stationary series data. The difference can be in any type of differencing, for example a data can be stationary at first order difference or second order difference, etc. After the computed τ (tau) value is given from the software you output there is a more negative than the critical value

3.4.3.2 Trend-Stationary Process

Trend-stationary process is regress a time series data on time and then the results is the residual that become stationary. Steps in regress a time series (Basic Econometrics by Gujarati and Porter, page 760 – 762):

$$\Delta Y_t = \beta_1 + \beta_2 t + u_t \quad (3.14)$$

Y_t : time series

t : trend variable measured

$$\hat{u}_t = (Y_t - \hat{\beta}_1 - \beta_2 t) \text{ -- will be stationary} \quad (3.15)$$

$\hat{u}_t$ is known as a linearly detrended time series, in a case that the series is non linier, for example the series is a quadratic series then the residual will be quadratic detrended time series.

3.4.4 Cointegration Test

The regression of a non stationary time series on another non stationary time series will make a spurious condition. Cointegrated means that two variables have a long term, or equilibrium, relationship between them. The cointegration test functions as a pre test to avoid a spurious condition. According to Granger in an Xt variable, where all of the variable are integrated at the same order and all components from Xt will be integrated only if error term vector in the next equation is stationary ((Basic Econometrics by Gujarati and Porter, page 762 – 765):

$$Zt = \beta_1 + \beta_2 Yt + u_t \qquad (3.16)$$

$$u_t = Zt - \beta_1 + \beta_2 Yt \qquad (3.17)$$

A regression equation above is a cointegrating regression and the β_2 is the slope parameter also known as the cointegrating parameter. The concept of cointegration can be extended to a regression model that has a k regressors, this k regressors also known as cointegrating parameters.

In a cointegration test a long term relationship or equilibrium of variables will be seen where all the information of that long term relationship are gone in differencing process. Cointegration concept is very important in an error correction model where in an cointegration, time series that have been differentiated can be put in an linier combination of those time series.

This thesis use Johansen test in testing the cointegration. Johansen test procedure has the opportunity to test a form of limited cointegration vector. To test the limitation of a cointegration vector, Johansen test has two matrix which are α and with both have a dimension (n x r) where r is the rank of π.

$$\mu = \alpha\beta^{1} \qquad (3.18)$$

β = cointegration matrix parameter

α = matrix coefficient value or the speed of adjustment

3.4.4.1 The Johansen Test

This thesis us Eviews to do the Johansen test which using the Vector Autoregression Johansen. If Y_t is an endogen variable in a VAR with the lag length of p so, the VAR is (Setyasmoro, Analisis Cointegratation Dan Error Correstion Model Indeks Bursa Global Dan Regional Asia Terhadap Indeks Harga Saham Gabungan, page 42 – 43).:

$$Y_t = A_t\, Y_{t-1} + A_t\, Y_{t-2} + A_t\, Y_{t-3} + \ldots\ldots + A_p\, Y_{t-p} + BX_t + \varepsilon_t \qquad (3.19)$$

Y_t = k – vector $I(1)$ – a non stationary variable

A, B = matrix coefficient

X_t = d vector a variable deterministic

ε_t = innovation vector

There are five assumptions in the Johansen test:

1. Y_t does not has a deterministic trend and the cointegration equation does not has an intercept.

$$H_2(r): \Pi Y_{t-1} + BX_t = \alpha\beta' Y_{t-1} \qquad (3.20)$$

2. Y_t does not has a deterministic trend and the cointegration equation has an intercept.

$$H_1^*(r): \Pi Y_{t-1} + BX_t = \alpha\left(\beta' Y_{t-1} + \rho_0\right) \qquad (3.21)$$

3. Y_t has a deterministic trend and the cointegration equation only has an intercept.

$$H_1(r): \Pi Y_{t-1} + BX_t = \alpha\left(\beta' Y_{t-1} + \rho_0\right) + \alpha \perp \gamma_0 \qquad (3.22)$$

4. Both Y_t and the cointegration equation have a linier trend.

$$H^{*}(r):\Pi Y_{t-1}+BX_{t}=\alpha\left(\beta' Y_{t-1}+\rho_{0}+\rho_{1}t\right)+\alpha\perp\gamma_{0} \quad (3.23)$$

5. Y_t has a quadratic trend and the cointegration equation have a linier trend.

$$H(r):\Pi Y_{t-1}+BX_{t}=\alpha\left(\beta' Y_{t-1}+\rho_{0}+\rho_{1}t\right)+\alpha\perp(\gamma\ +\gamma_{1}t) \quad (3.24)$$

This thesis use the assumption that the there is a linier deterministic trend (intercept and no trend in CE and test VAR) in testing the Johansen cointegration test. In concluding the test results, the trace statistic value and the max-eigen value were use to accept or to reject the null hypothesis. The bigger the eigen value the bigger that the probability of a cointegration amongs variables and with n number of maximum cointegration variables will result a cointegration (k-1).

The trace statistic value and the max eigen formulation are (Setyasmoro, Analisis Cointegratation Dan Error Correstion Model Indeks Bursa Global Dan Regional Asia Terhadap Indeks Harga Saham Gabungan, page: 44):

Trace statistic

$$LR_{tr}\left(t|k\right)=-T\sum_{i=r+1}^{k}\log(1-\lambda_{i}) \quad (3.25)$$

Maximum-eigen value

$$LR_{\max}\left(r|r+1\right)=\lambda_{\max}=-T\sum_{i=r+1}^{k}\log(1-\lambda_{r+1}) \quad (3.26)$$

$$LR_{tr}\left(r|k\right)-LR_{tr}(r+1|k)$$

3.4.5 Error Correction Mechanism

In this part, the models that had been made before were being regress to find out the coefficient value and the significance. It uses the least squares (NLS and ARMA) method to estimates the equation. This thesis estimates three models:

a. Long-run equation

$$REMF_t = \alpha_0 + \alpha_1\, GDP_t + \alpha_2\, RTEMF_t + \alpha_3\, RTCD_t + U_t \qquad (3.27)$$

b. Short-run equation

$$\Delta REMF_t = \beta_0 + \beta_1 \Delta\, GDP_t + \beta_2\, \Delta RTEMF_t + \beta_3\, \Delta RTCD_t + \beta_4\, \Delta REMF_{t-1} + \beta_5\, U_{t-1} + \varepsilon_t \qquad (3.28)$$

c. Error – correction equation

$$\Delta REMF_t = (\beta_0 - \beta_5 \alpha_0) + \beta_1 \Delta\, GDP_t + \beta_2\, \Delta RTEMF_t + \beta_3\, \Delta RTCD_t + \beta_4\, \Delta REMF_{t-1} + \beta_5\, REMF_{t-1} + \beta_5\, \alpha_1\, GDP_{t-1} + \beta_5\, \alpha_2\, RTEMF_{t-1} + \beta_5\, \alpha_3\, RTCD_{t-1} + \varepsilon_t \qquad (3.29)$$

3.5 Analysis

In this part, the results of data processing were being analyzed in accordance with the rules applied. Starts by analyzing the result from the stationary test, the cointegration test and the behavior of each variables affecting the demand of equity mutual funds in short-run, long-run and error-correction model.

3.6 Conclusion and Suggestion

After analyzing the results, then conclusions were drawn up to answer the purpose of the research. Finally recommendations were made based on this research in helping public to understand more about the Equity and Mutual Funds market.

3.7 Statistical Tools

This thesis uses Eviews in conducting the entire statistical test based on the given theory. The output of this statistical test will be presented in the appendix part of this thesis.

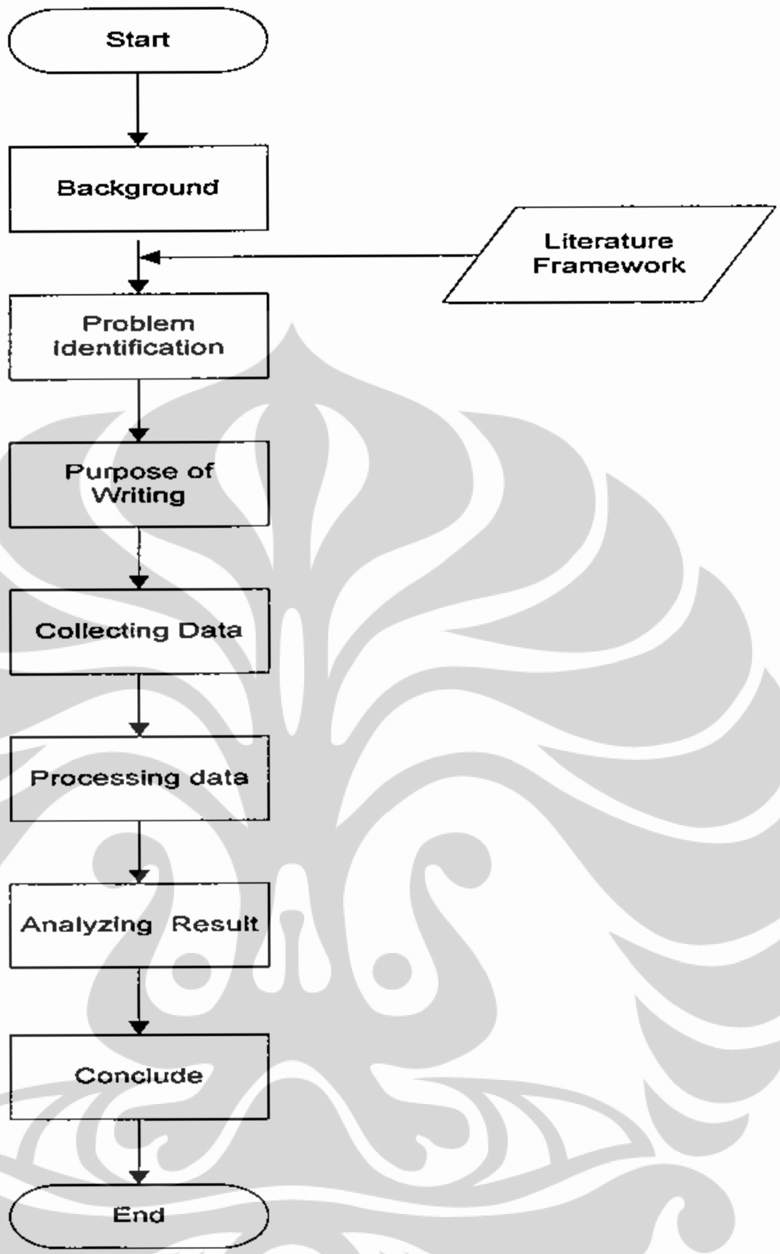


Figure 3.1 Methodology Flowchart

Source: writer's data process

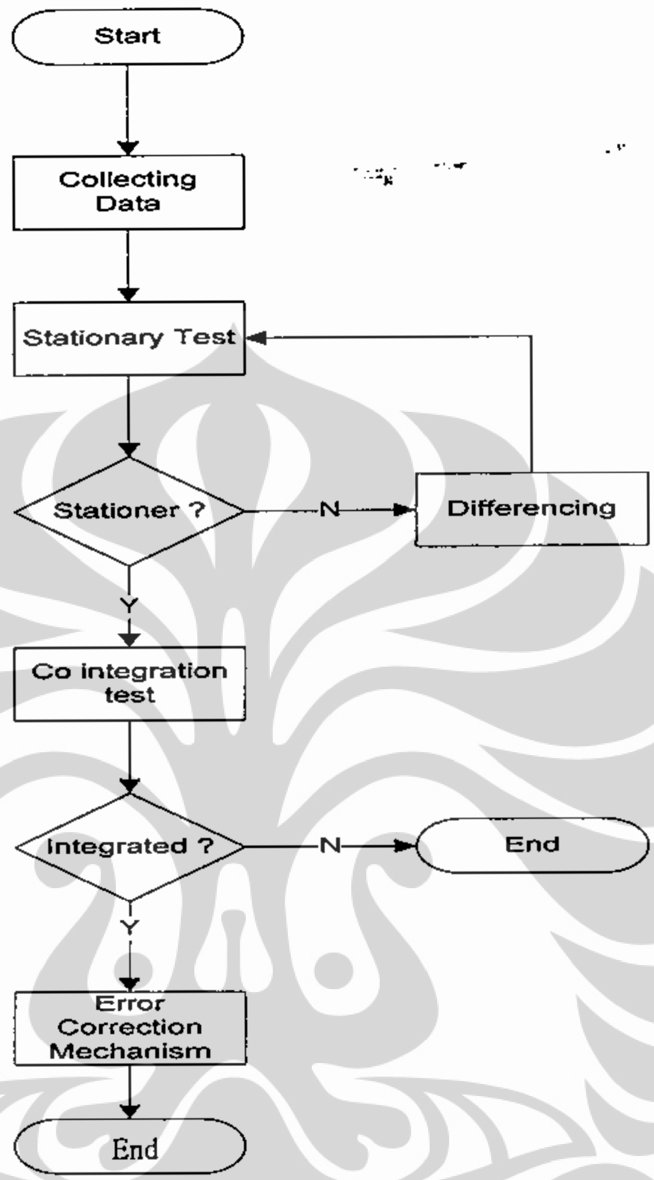


Figure 3.2 Data Processing and Analyzing Flowchart

Source: writer's data process

CHAPTER 4

DATA PROCESS AND ANALYSIS

4.1 Data Processing

4.1.1 Raw Data Processing

This thesis use data from various resources and it use data from year 2000 until year 2009. The data are divided in quarter group. There are 4 data, which are: the demand of equity mutual funds or REMF for short; the rate of return on equity mutual funds or RTEMF for short; the rate of return on certificates of deposit or RTCD for short and the last data is the gross domestic products of GDP for short.

First, the REMF, data are taken from BAPEPAMLK DEPKEU RI, the original data provided are in form of total NAV and the size of the equity it self. REMF calculations are as follows:

$$\text{Rate of return} = \frac{NAV_{t-1} - NAV_0}{NAV_0} \qquad (4.1)$$

Final form of the above calculation is the price, in this thesis the price of equity mutual funds are in log form or generally speaking data are in continuous form.

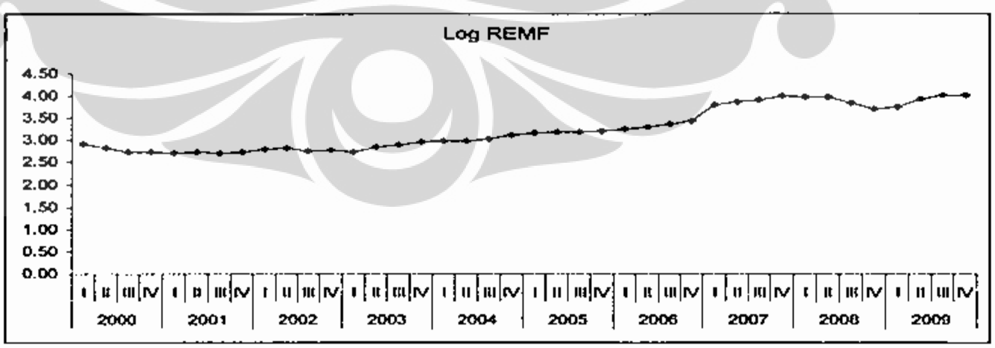


Figure 4.1 Log Value of Return on Equity Mutual Funds

Source: reproduce from Equity Mutual Funds BAPEPAMLK DEPKEU RI

Second data is RTEMF, the formula is $LN=REMF_t/REMF_{t-1}$. Third data is RTCD, this RTCD data are taken from the Central Bank of Indonesia.

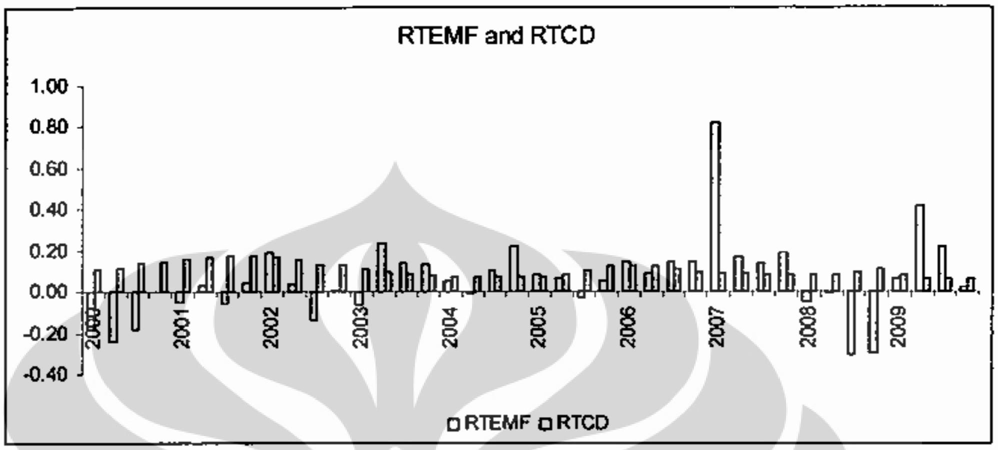


Figure 4.2 Rate of Return on Equity Mutual Funds and Rate of Return on Certificates of Deposits

Source: reproduce from Equity Mutual Funds BAPEPAMLK DEPKEU RI and Central Bank of Indonesia

The fourth data is the gross domestic product, data taken from the Statistical Bureau of Indonesia or BPS and there is no calculation process, it simply uses the raw data but is in the form of Log value, the same with REMF.

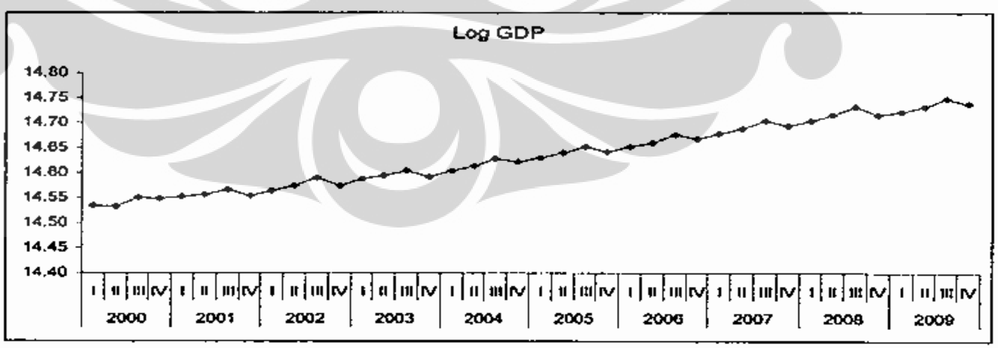


Figure 4.3 Log Value of GDP in Constant Dollars

Source: reproduce from Statistical Bureau of Indonesia

4.1.2 Statistical Testing

4.1.2.1 General Statistic Value

This thesis is trying to find out what factors that significantly affect the demand of equity mutual funds and how those factors move the demand on equity mutual funds. To start, a general statistical test conducted for all data.

Table 4.1 General Statistic Data

Parameter	REMF	GDP	RTEMF	RTCD
Mean	3.2450	14.6333	0.0595	0.1069
Median	3.1440	14.6286	0.0539	0.0964
Maximum	4.0327	14.7490	0.8210	0.1762
Minimum	2.7098	14.5317	-0.3025	0.0646
Std.Dev.	0.4775	0.0656	0.1931	0.0329
Skewness	0.4921	0.1497	1.2562	0.6790
Kurtosis	1.6842	1.7536	7.6645	2.3011
Jarque-Bera	4.4998	2.7387	46.7817	3.8872
Probability	0.1054	0.2543	0.0000	0.1432
Sum	129.7996	585.3322	2.3782	4.2754
SumSq.Dev.	8.8920	0.1679	1.4540	0.0422
Observations	40	40	40	40

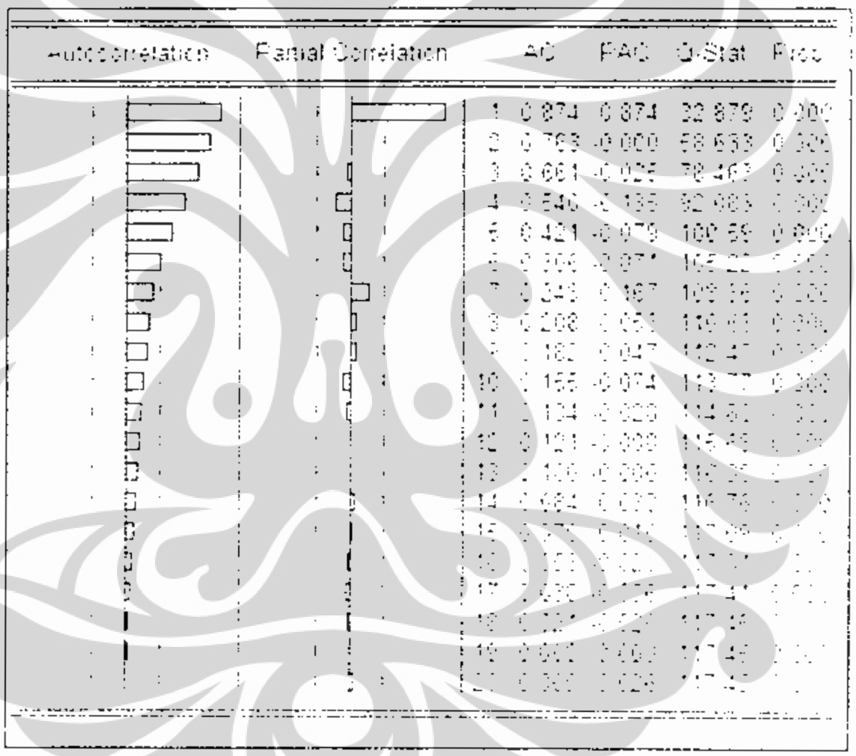
Source: writer's data process

From the table above, REMF and RTEMF are data that have higher standard deviation among the four data. Skewness shown all positive results, meaning that it has longer tail on the right hand side and more data lies on the left hand side of the mean. A positive skewness also means data has a relative low high values. RTEMF has the biggest kurtosis value, meaning that it has more acute peak around the mean compare to the other data and also means that it has more variance as a result of infrequent extreme deviations. For Jarque-Bera values, all four data have high value, meaning that all data taken as samples has a normal distribution.

4.1.2.2 Stationary Test

A stationer time series is a time series that has means and variance that do not vary systematically over time, meaning that data can represent the situation in all time not only in a particular set of time. This thesis uses two types of test, correlogram test and formal test, for formal test this thesis uses the Augmented Dickey-Fuller test or ADF test for short and the Phillips-Perron test. The following are stationer test using correlogram for the four data.

Figure 4.4 Log REMF Correllogram Test Result

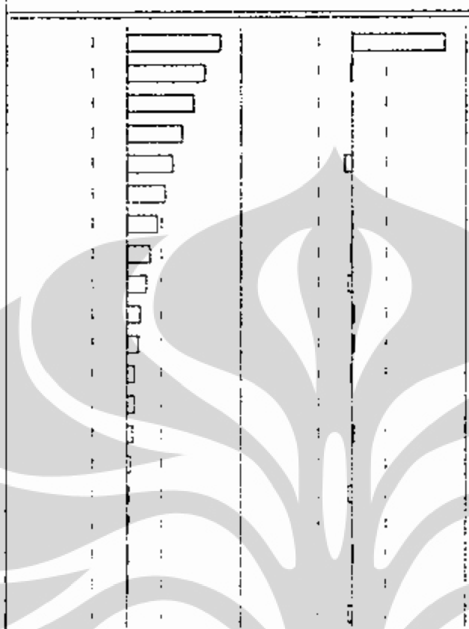


Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.874	0.874	32.879	0.000
		2	0.763	-0.000	58.653	[illegible]
		3	0.661	-0.025	78.467	[illegible]
		4	0.540	[illegible]	92.083	[illegible]
		5	0.421	-0.079	100.59	0.000
		6	[illegible]	[illegible]	[illegible]	[illegible]
		7	[illegible]	[illegible]	[illegible]	[illegible]
		8	0.208	[illegible]	[illegible]	[illegible]
		9	[illegible]	[illegible]	[illegible]	[illegible]
		10	[illegible]	-0.074	[illegible]	[illegible]
		11	[illegible]	[illegible]	[illegible]	[illegible]
		12	[illegible]	[illegible]	[illegible]	[illegible]
		13	[illegible]	[illegible]	[illegible]	[illegible]
		14	[illegible]	[illegible]	[illegible]	[illegible]
		15	[illegible]	[illegible]	[illegible]	[illegible]
		16	[illegible]	[illegible]	[illegible]	[illegible]
		17	[illegible]	[illegible]	[illegible]	[illegible]
		18	[illegible]	[illegible]	[illegible]	[illegible]
		19	[illegible]	[illegible]	[illegible]	[illegible]
		20	[illegible]	[illegible]	[illegible]	[illegible]

Source: writer's data process

From the figure above, autocorrelation coefficients are not moving around near zero axis instead it all has a positive value and has a decreasing trend. Conclusion drawn, REMF is nonstationer.

Figure 4.5 Log GDP Correllogram Test Result



Lag	AC	PAC	Q-Stat	Prob
1	0.850	0.850	31.158	0.000
2	0.717	-0.021	53.802	0.000
3	0.606	0.005	70.530	0.000
4	0.514	0.008	82.841	0.000
5	0.416	-0.071	91.159	0.000
6	0.337	0.005	96.776	0.000
7	0.275	0.006	100.61	0.000
8	0.221	-0.009	103.16	0.000
9	0.167	[illegible]	104.[illegible]	[illegible]
10	0.129	0.021	105.62	0.000
11	0.105	0.017	106.26	[illegible]
12	0.080	[illegible]	106.[illegible]	[illegible]
13	0.058	[illegible]	[illegible]	[illegible]
14	0.047	0.018	107.[illegible]	[illegible]
15	0.040	[illegible]	107.11	[illegible]
16	0.024	[illegible]	107.16	[illegible]
17	0.011	[illegible]	107.[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	107.[illegible]	[illegible]

Source: writer's data process

Log GDP autocorrelation coefficients also not moving around near zero axis, has a positive value and has a decreasing trend. Log GDP has the same conclusion with REMF which is nonstationer.

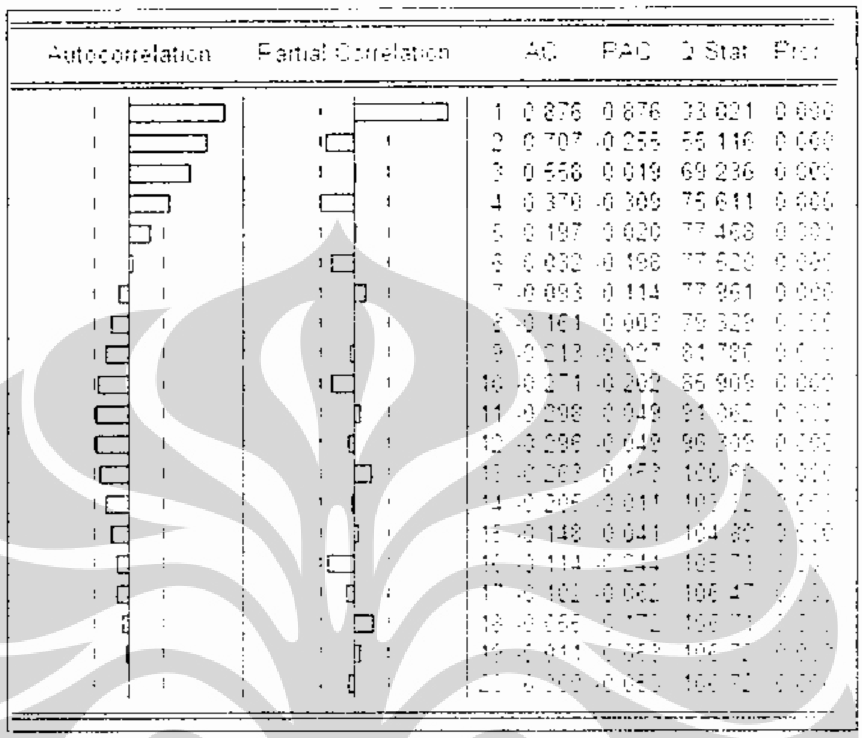
Figure 4.6 RTEMF Correllogram Test Result

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.395	0.395	6.7096	0.010
		2	0.101	-0.065	7.1613	0.028
		3	0.077	0.071	7.4275	0.059
		4	-0.037	-0.105	7.4910	0.112
		5	0.017	0.086	7.5049	0.186
		6	0.011	-0.036	7.5108	0.276
		7	-0.014	0.004	7.5201	0.377
		8	0.016	0.012	7.5329	0.480
		9	0.086	0.098	7.9363	0.541
		10	0.093	0.024	8.4210	0.588
		11	0.002	-0.061	8.4212	0.675
		12	-0.014	0.001	8.4336	0.750
		13	-0.059	-0.060	8.6526	0.799
		14	-0.054	0.003	8.8433	0.841
		15	-0.016	-0.006	8.8612	[illegible]
		16	0.008	0.031	8.8613	[illegible]
		17	-0.024	-0.050	8.9064	[illegible]
		18	-0.045	-0.028	9.0583	[illegible]
		19	-0.032	-0.018	9.1405	[illegible]
		20	0.000	[illegible]	9.1406	[illegible]

Source: writer's data process

RTEMF autocorrelation coefficients showing differently compare the previous two data, the coefficients show numbers that move around near zero axis so, conclusion RTEMF is stationer.

Figure 4.7 RTCD Correllogram Test Result



Source: writer's data process

RTCD autocorrelation coefficients shows the same results with the two first data, log REMF and log GDP, autocorrelation coefficients is not moving around near zero axis, has both positive and negative value and has a decreasing trend. In conclusion RTCD is nonstationer.

To get accurate result, a formal stationary test was done. By conducting a unit root test, where $\rho = 1$ meaning that a series has a root, that is to say that the series is nonstationer. To do this unit root test, an Augmented Dickey-Fuller test and Phillips-Perron test are done.

An Augmented Dickey-Fuller test with Schwarz info criterion to automatically choose the lag length; and with three models: intercept; trend and intercept; and none were done first and the results are:

Table 4.2 Augmented Dickey-Fuller Test

	With Intercept				Conclusion
	ADF Value	1%	5%	10%	
REMF	-0.2512	-3.6156	-2.9411	-2.6091	nonstationer
GDP	0.8807	-3.6329	-2.9484	-2.6129	nonstationer
RTEMF	-4.1269	* -3.6104	-2.9390	-2.6079	*I(0)*
RTCD	-1.8652	-3.6156	-2.9411	-2.6091	nonstationer
DREMF	-4.3147	* -3.6155	-2.9411	-2.6091	*I(1)*
DGDP	-2.5368	-3.6329	-2.9484	-2.6129	nonstationer
DRTEMF	-7.8732	* -3.6155	-2.9411	-2.6091	*I(0)*
DRTCD	-3.3640	-3.6156	* -2.9411	-2.6091	*I(1)*
DDGDP	-27.0147	* -3.6329	-2.9484	-2.6129	*I(2)*

	With Trend and Intercept				Conclusion
	ADF Value	1%	5%	10%	
REMF	-2.6979	-4.2191	-3.5331	-3.1983	nonstationer
GDP	-2.3896	-4.2436	-3.5443	-3.2047	nonstationer
RTEMF	-4.1918	-4.2119	* -3.5297	-3.1964	*I(0)*
RTCD	-2.9354	-4.2191	-3.5331	-3.1983	nonstationer
DREMF	-4.2934	* -4.2191	-3.5331	-3.1983	*I(1)*
DGDP	-2.7491	-4.2436	-3.5443	-3.2047	nonstationer
DRTEMF	-7.7997	* -4.2191	-3.5331	-3.1983	*I(0)*
DRTCD	-3.3257	-4.2191	-3.5331	* -3.1983	*I(1)*
DDGDP	-26.5152	* -4.2436	-3.5443	-3.2047	*I(2)*

	Without Trend and Without Intercept				Conclusion
	ADF Value	1%	5%	10%	
REMF	2.2067	-4.2119	-3.5298	-3.1964	nonstationer
GDP	2.5414	-2.6327	-1.9507	-1.6111	nonstationer
RTEMF	-3.8335	* -2.6256	-1.9496	-1.6116	*I(0)*
RTCD	-0.9637	-2.6272	-1.9499	-1.6115	nonstationer
DREMF	-3.9055	* -2.6272	-1.9499	-1.6115	*I(1)*
DGDP	-0.3116	-2.6327	-1.9507	-1.6111	nonstationer
DRTEMF	-7.9682	* -2.6272	-1.9499	-1.6115	*I(0)*
DRTCD	-3.3698	* -2.6272	-1.9499	-1.6115	*I(1)*
DDGDP	-27.4325	* -2.6326	-1.9507	-1.6111	*I(2)*

* reject H_0

Source: writer's data process

Next is the Phillips-Perron test with Newey-West Bandwith to automatically choose the lag length; and with three models: intercept; trend and intercept; and none were done and the results are:

Table 4.3 Phillips-Perron Test

	With Intercept				Conclusion
	PP Value	1%	5%	10%	
REMF	0.3131	-3.6105	-2.9390	-2.6079	nonstationer
GDP	0.1474	-3.6105	-2.9390	-2.6079	nonstationer
RTEMF	-4.0406	* -3.6104	-2.9390	-2.6079	*I(0)*
RTCD	-1.3329	-3.6105	-2.9390	-2.6079	nonstationer
DREMF	-4.2074	* -3.6155	-2.9411	-2.6091	*I(1)*
DGDP	-16.2851	* -3.6155	-2.9411	-2.6091	*I(1)*
DRTEMF	-14.5055	* -3.6155	-2.9411	-2.6091	*I(0)*
DRTCD	-3.3510	-3.6156	* -2.9411	-2.6091	*I(1)*
DDGDP	-27.7166	* -3.6210	-2.9434	-2.6103	*I(1)*

	With Trend and Intercept				Conclusion
	PP Value	1%	5%	10%	
REMF	-2.7787	-4.2119	-3.5298	-3.1964	nonstationer
GDP	-5.4685	* -4.2118	-3.5298	-3.1964	*I(0)*
RTEMF	-4.1125	-4.2119	* -3.5297	-3.1964	*I(0)*
RTCD	-2.3304	-4.2119	-3.5298	-3.1964	nonstationer
DREMF	-4.1712	-4.2191	* -3.5330	-3.1983	*I(1)*
DGDP	-17.4654	* -4.2191	-3.5331	-3.1983	*I(0)*
DRTEMF	-17.2675	* -4.2191	-3.5331	-3.1983	*I(0)*
DRTCD	-3.3228	-4.2191	-3.5331	* -3.1983	*I(1)*
DDGDP	-27.2560	* -4.2268	-3.5366	-3.2003	*I(0)*

	Without Trend and Without Intercept				Conclusion
	PP Value	1%	5%	10%	
REMF	1.8807	-2.6256	-1.9496	-1.6116	nonstationer
GDP	8.3203	-2.6256	-1.9496	-1.6116	nonstationer
RTEMF	-3.8239	* -2.6256	-1.9496	-1.6116	*I(0)*
RTCD	-0.7980	-2.6256	-1.9496	-1.6116	nonstationer
DREMF	-3.9030	* -2.6272	-1.9499	-1.6115	*I(1)*
DGDP	-6.7012	* -2.6272	-1.9499	-1.6115	*I(1)*
DRTEMF	-13.2013	* -2.6272	-1.9499	-1.6115	*I(0)*
DRTCD	-3.3653	* -2.6272	-1.9499	-1.6115	*I(1)*
DDGDP	-28.2866	* -2.6289	-1.9501	-1.6113	*I(1)*

* reject H_0

Source: writer's data process

Table 4.4 Stationer at Order (a Summary)

	ADF			PP		
	With Intercept	With Trend and Intercept	None	With Intercept	With Trend and Intercept	None
REMF	*I*(1) at α 1%	*I*(1) at α 1%	*I*(1) at α 1%	*I*(1) at α 1%	*I*(1) at α 5%	*I*(1) at α 1%
GDP	*I*(2) at α 1%	*I*(2) at α 1%	*I*(2) at α 1%	*I*(1) at α 1%	*I*(0) at α 1%	*I*(1) at α 1%
RTEMF	*I*(1) at α 1%	*I*(1) at α 1%	*I*(0) at α 1%	*I*(0) at α 1%	*I*(0) at α 5%	*I*(0) at α 1%
RTCD	*I*(1) at α 5%	*I*(1) at α 10%	*I*(1) at α 1%	*I*(1) at α 5%	*I*(1) at α 10%	*I*(1) at α 1%

Source: writer's data process

From the above table, the four data has various level of order in stationery. Different order in an equation can result into a spurious condition. To avoid this, a cointegration test is conducted. This thesis uses the Johansen cointegration test. Before runs the Johansen test, order of integration must be done first. In selecting the optimal order, this thesis uses the Akaike's Information Criterion or AIC for short and Schwarz's Information Criterion or SIC for short.

4.1.2.3 Cointegration Test

As explain before, cointegration test function is to know whether the variables can be put in an equation and not resulting into a spurious condition. A Johansen test with the assumption that there is a linier deterministic trend (intercept and no trend in CE and test VAR) is conducted. Once should conclude that a cointegration equation has its equilibrium in a long-run if the value of trace statistic or max-eigen has a value larger than the critical value at a level of 5% and 1%.

Table 4.5 Johansen Test – Trace Statistic Value

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.7607	104.9439	47.8561	0.0000
At most 1 *	0.6608	53.4601	29.7971	0.0000
At most 2	0.2045	14.5391	15.4947	0.0693
At most 3 *	0.1606	6.3010	3.8415	0.0121

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Trend assumption: Linear deterministic trend

Series: DREMF DDGDP DRTEMF DRTCD

Lags interval (in first differences): 1 to 1

Source: writer's data process

Table 4.6 Johansen Test – Max-Eigen Value

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen	0.05 Critical Value	Prob.**
None *	0.7607	51.4838	27.5843	0.0000
At most 1 *	0.6608	38.9210	21.1316	0.0001
At most 2	0.2045	8.2381	14.2646	0.3550
At most 3 *	0.1606	6.3010	3.8415	0.0121

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Trend assumption: Linear deterministic trend

Series: DREMF DDGDP DRTEMF DRTCD

Lags interval (in first differences): 1 to 1

Source: writer's data process

From the above Johansen test based on trace statistic value and max-eigen value there are two cointegration equations at confidence level 95%.

4.1.2.4 Error Correction Mechanism

A cointegration means that the series has equilibrium in the long-run. In reaching that long-run equilibrium there has been turbulences in the short-run. An error correction mechanism is used to know the behavior of those series or factors in their short-run. This method first used by Sargan and later on was corrected by Engle and Granger. Engle and Granger stated that if two variables are cointegrated the relationship between them can be expressed as Error Correction Mechanism or ECM for short. There are three model of error correction mechanism in this thesis, there are:

a. Long-run equation

$$REMF_t = \alpha_0 + \alpha_1\, GDP_t + \alpha_2\, RTEMF_t + \alpha_3\, RTCD_t + U_t \qquad (4.2)$$

b. Short-run equation

$$\Delta REMF_t = \beta_0 + \beta_1 \Delta\, GDP_t + \beta_2\, \Delta RTEMF_t + \beta_3 \Delta RTCD_t + \beta_4\, \Delta REMF_{t-1} + \beta_5\, U_{t-1} + \varepsilon_t \qquad (4.3)$$

c. Error – correction equation

$$\Delta REMF_t = (\beta_0 - \beta_5 \alpha_0) + \beta_1 \Delta\, GDP_t + \beta_2\, \Delta RTEMF_t + \beta_3 \Delta RTCD_t + \beta_4\, \Delta REMF_{t-1} + \beta_5\, REMF_{t-1} + \beta_5\, \alpha_1\, GDP_{t-1} + \beta_5\, \alpha_2\, RTEMF_{t-1} + \beta_5\, \alpha_3\, RTCD_{t-1} + \varepsilon_t \qquad (4.4)$$

Table 4.7 Estimates of the Long-Run Model of the Demand on Equity Mutual Funds

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-95.32362	7.584478	-12.56825	0
GDP	6.738067	0.513551	13.12053	0
RTEMF	0.069512	0.13597	0.511229	0.6123
RTCD	-0.334155	1.027578	-0.325187	0.7469
R-squared	0.900556	Mean dependent var		3.24499
Adjusted R-squared	0.892269	S.D. dependent var		0.477492
S.E. of regression	0.156725	Akaike info criterion		-0.774012
Sum squared resid	0.884255	Schwarz criterion		-0.605124
Log likelihood	19.48024	F-statistic		108.6704
Durbin-Watson stat	0.407746	Prob(F-statistic)		0

Source: writer's data process

Based on the above table, in the long-run the variables that are significantly affected the demand on equity mutual fund is the gross domestic product. The significance level for the gross domestic product is 99%, whereas for the other variables are: the rate of return on equity mutual funds is not significant at the level of 38% and the rate of return on certificates deposit is not significant at the level of 25%.

Table 4.8 Estimates of the Short-Run Model of the Demand on Equity Mutual Funds

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.14E-06	1.42E-05	-0.151085	0.8809
DGDP	-0.000852	0.001263	-0.674704	0.5047
DRTEMF	0.434462	7.52E-05	5779.164	0
DRTCD	0.001358	0.001126	1.206556	0.2364
DREMF(-1)	1.000269	0.000186	5377.008	0
U(-1)	4.71E-05	9.55E-05	0.493041	0.6253
R-squared	0.999999	Mean dependent var		0.031992
Adjusted R-squared	0.999999	S.D. dependent var		0.081379
S.E. of regression	7.12E-05	Akaike info criterion		-16.11797
Sum squared resid	1.62E-07	Schwarz criterion		-15.8594
Log likelihood	312.2414	F-statistic		9664655
Durbin-Watson stat	2.829268	Prob(F-statistic)		0

Source: writer's data process

Based on the above table, in the short-run the variables that are significantly affected the demand on equity mutual fund is the rate of return on equity mutual funds current period and the price or demand of equity mutual funds previous period. The significance level for the rate of return on equity mutual funds current period and the price or demand of equity mutual funds current period are 99%, whereas for the other variables are: the gross domestic product is not significant at the level of 49%, the rate of return on certificates deposit is not significant at the level of 76% and the price or demand of equity mutual funds is not significant at the level of 37%.

Table 4.9 Estimates of the Error-Correction Model of the Demand on Equity Mutual Funds

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000835	0.00725	0.115222	0.9091
DGDP	0.000218	0.000861	0.252855	0.8022
DRTEMF	0.434323	5.23E-05	8312.369	0
DRTCD	0.001247	0.000765	1.629886	0.1139
DREMF(-1)	-0.320971	0.188513	-1.702647	0.0993
REMF(-1)	1.10E-05	6.39E-05	0.171806	0.8648
GDP(-1)	-6.10E-05	0.000508	-0.120141	0.9052
RTEMF(-1)	0.573755	0.081863	7.008763	0
RTCD(-1)	0.000117	0.000329	0.3545	0.7255
R-squared	1	Mean dependent var		0.031992
Adjusted R-squared	1	S.D. dependent var		0.081379
S.E. of regression	4.53E-05	Akaike info criterion		-16.96115
Sum squared resid	5.96E-08	Schwarz criterion		-16.5733
Log likelihood	331.2618	F-statistic		14896223
Durbin-Watson stat	2.224568	Prob(F-statistic)		0

Source: writer's data process

Based on the above table, the variables that are significantly affected the demand on equity mutual fund is the rate of return on equity mutual funds current period and the rate of return on equity mutual funds previous period. Both factors are significant at the level of 99%. The price or the demand of equity mutual funds previous period is significant at the level of 90%.

4.2 Analysis

4.2.1 Equity Mutual Funds Growth Analysis

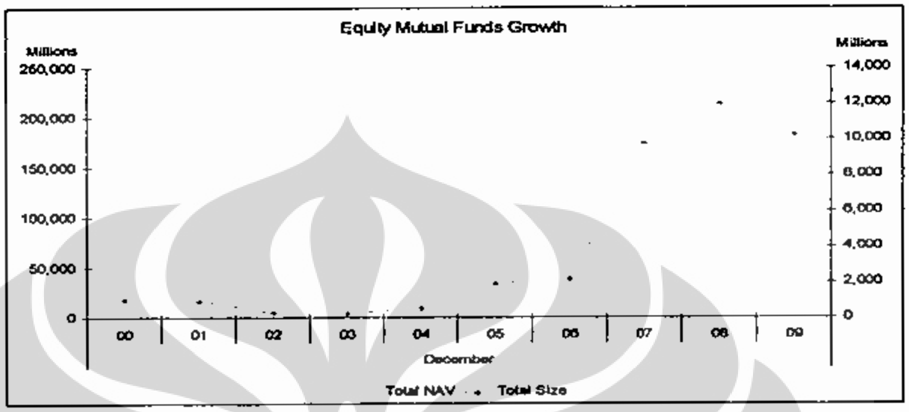


Figure 4.8 Equity Mutual Funds Growth

Source: reproduce from Equity Mutual Funds BAPEPAMLK DEPKEU RI and Central Bank of Indonesia

As it briefly stated in chapter one that the equity mutual funds been a phenomenon not in the United States only but it also happened here in Indonesia. Analyzing year by year, in year 2000 and year 2001, total NAV and total size of the equity mutual funds move in the same direction, both of them shows a decreasing trend while in year 2002 and year 2003 total NAV and total size of the equity mutual funds move oppositely, where the total NAV increase but the total size decreasing. The following year, year 2004 until year 2007, the trend shows the same path in the early year 2000 and year 2001 where both the total NAV and the total size of equity mutual funds were moving up. After year 2007, the trend goes back the same like in year 2002 and 2003 where they both move oppositely but this time the total NAV that goes down while the total size goes down. Last year in this thesis is the year 2009, also shows that both the total NAV and the total size move differently. From the above graph, one can concludes that both the total NAV and total size of equity mutual funds doesn't have a certain path in their development.

Interesting scene captured in the graph is that since year 2004 the demand of equity mutual funds experienced a significant growth. The biggest leap is the leap from year 2008 to year 2009, after huge crash it bounced back by 101.70%. Year 2002 to year 2003 34.6% increase, year 2003 to year 2004 53.92% increase, year 2004 to year 2005 27.48% increase, year 2005 to year 2006 69.62% increase and year 2007 to year 2008 48.01%decrease.

One important economic issue happened in 2008 which is the financial crisis in the United States that caused by the subprime mortgage. This subprime mortgage issue has been destroying the stock market in United States and it affects most of all stock market in the whole wide world including Indonesia. This affect can be seen from the crash of equity mutual funds in year 2008.

This thesis doesn't analyze the effect of the financial crisis to the equity mutual funds growth but it analyzes the whole growth of equity mutual funds in the given period by taking factors: rate of return on equity mutual funds, the rate of return on certificates deposits and the gross domestic product and finds out what make this phenomenon happened.

4.2.2 Statistical Analysis

4.2.2.1 Stationary Analysis

Stationary test is consists of two types of test the informal and the formal test. The informal test is using the correllogram, all tests show that up until lag 20th the demand of equity mutual funds, gross domestic products and rate of return on certificates deposit are not stationary and the only data that are stationary is the rate of return on equity mutual funds.

The autocorrelation coefficient for the three data (the demand of equity mutual funds, the gross domestic product and the rate of return on certificates deposits) doesn't move around near the zero axis and also the value of Q-statistic value up until lag 20th has the probability of zero so, conclusion is that those three data are not stationary. Different with the three previous data, the rate of return on equity mutual funds has autocorrelation coefficient that move around near the zero axis and the Q-statistic value up until the 20th length is 9.1406 with the probability value of 98.10% means that one can reject the null hypothesis and conclude that the rate of return on equity mutual funds are stationary.

The formal stationary test uses are the Augmented Dickey-Fuller test and the Phillips-Perron test.

The Augmented Dickey-Fuller test uses three assumptions with intercept; with trend and intercept; and without trend and without intercept. First the results from the assumption with intercept, in order level zero the rate of return on equity mutual funds is the only data that is stationary with 99% significance level. For the demand of equity mutual funds and the rate of return on certificates deposit are stationary at order one, with 99% significance level of for the demand on equity mutual funds and 95% significance level for the rate of return on certificates deposits. The gross domestic product stationary at order two with 99% significance level.

Second is the assumption with trend and intercept; in order level zero the rate of return on equity mutual funds is the only data that is stationary with 95% significance level. For the demand of equity mutual funds and the rate of return on certificates deposit are stationary at order one, with the 99% significance level for the demand on equity mutual funds and 90% significance level for the rate of return on certificates deposits. The gross domestic product stationary at order two with 99% significance level.

Third is the assumption without trend and without intercept; in order level zero the rate of return on equity mutual funds is the only data that is stationary with 99% significance level. For the demand of equity mutual funds and the rate of return on certificates deposit are stationary at order one, with 99% significance level for the demand on equity mutual funds and 99% significance level for the rate of return on certificates deposits. The gross domestic product stationary at order two with 99% significance level.

The Phillips-Perron test also uses three assumptions: with intercept; with trend and intercept; and without trend and without intercept. First the results from the assumption with intercept, in order level zero the rate of return on equity mutual funds is the only data that is stationary with 99% significance level. For the demand of equity mutual funds, the rate of return on certificates deposit and the gross domestic product are stationary at order one, with 99% significance level for the demand on equity mutual funds, 95% significance level for the rate of return on certificates deposits and 99% significance level for the gross domestic product.

Second is the assumption with trend and intercept; in order level zero the rate of return on equity mutual funds and the gross domestic product are data that stationary with significance level 99% and 95% for the gross domestic product. For the demand of equity mutual funds and the rate of return on certificates deposit are stationary at order one, with 95% significance level for the demand on equity mutual funds and 90% significance level for the rate of return on certificates deposits.

Third is the assumption without trend and without intercept; in order level zero the rate of return on equity mutual funds is the only data that is stationary with the significance level of 99%. For the demand of equity mutual funds, the gross domestic product and the rate of return on certificates deposit are stationary at order one with 99% significance level for the demand on equity mutual funds, 99% for the gross domestic product and 99% significance level for the rate of return on certificates deposits.

4.2.2.2 Cointegration Analysis

This thesis conducts the cointegration test by using the Johansen test. The Johansen test conclusion was based on the value of the trace statistic value and the max-eigen value. One should reject the null hypothesis and conclude that there is equilibrium in long-run if the value of trace statistic and max-eigen value are larger that the critical value at a given significant level.

From table 4.5 the Johansen test with trace-statistic value with the assumption linear deterministic trend, the results are at none, at most one and at most three the trace statistic value are larger than the critical value at 5% and one must reject the null hypothesis and conclude that there are equilibrium in long-run. The cointegration test also indicates that are two cointerating equations at the level of 5%. For a most two, the trace statistic value is smaller than the critical value at 5% so, one can not reject the null hypothesis and conclude that there are no equilibrium in long-run.

From table 4.6 the Johansen test with max-eigen value with the assumption linear deterministic trend, the results are at none, at most one and at most three the trace statistic value are larger than the critical value at 5% and one must reject the null hypothesis and conclude that there are equilibrium in long-run. The cointegration test also indicates that are two cointerating equations at the level of 5%. For a most two, the trace statistic value is smaller than the critical value at 5% so, one can not reject the null hypothesis and conclude that there is no equilibrium in long-run.

4.2.3 Model Analysis

4.2.3.1 Long-run Analysis

Next the analysis of the three equation model, the first one is the estimated equation on the long-run model:

$$REMF_t = -95.3236 + 6.7381GDP_t + 0.0695\ RTEMF_t - 0.3342RTCD_t + U_t \quad (4.5)$$
$$(-12.57) \quad (13.12) \quad (0.51) \quad (-0.33)$$

As is stated in their probability value, the gross domestic product has a significant impact on the demand of equity mutual funds; here changes in the gross domestic product will move up the demand of equity mutual funds by 6.7 times.

The other variables that has the same movement is the rate of return on equity mutual funds hence the coefficient is not as big as the gross domestic product and it not significant also. The rate of return on equity mutual funds coefficient value is 0.0695 and the significance level is 38%. So, changes in the rate of return on equity mutual funds will move up the demand of equity mutual funds by 0.0695 times and this rate of return on equity mutual funds has the smallest coefficient value compare to the other three values.

Next variable is the rate of return on certificates deposit; it has negative value which means it has reverse movement with the demand of equity mutual funds. The coefficient value is -0.3342 so, changes in the rate of return on certificates deposit will move the demand on equity mutual funds down by 0.3342 times. This rate of return on certificates deposit is not significant in this long-run equation model, the significance level is at 25%.

The constant variable is -95.3236 and it is a variable that significantly affect the demand of equity mutual funds. This variable has a significant level of 99%.

4.2.3.2 Short-run Analysis

The second one is the estimated equation in the short-run, the short-run equation model is:

$$\begin{aligned} \Delta REMF_t = {} & \underset{(-0.15)}{-0.000002} - \underset{(-0.67)}{0.000852}\,\Delta GDP_t + \underset{(5{,}779.16)}{0.434462}\,\Delta RTEMF_t + \\ & \underset{(1.21)}{0.001358}\,\Delta RTCD_t + \underset{(5{,}377.01)}{1.000269}\,\Delta REMF_{t-1} + \underset{(0.49)}{0.0000471}\,U_{t-1} + \varepsilon_t \end{aligned} \qquad (4.6)$$

As is stated in their probability value, the changes of rate of return on equity mutual funds have a significant impact on the demand of equity mutual funds; the level of significance is 99%. Changes in the rate of return on equity mutual funds will move up the demand of equity mutual funds by 0.434462 times.

The changes of price or the demand of equity mutual funds previous period has a significant impact on the demand of equity mutual funds; the level of significance is 99%. Changes in the rate of return on equity mutual funds will move up the demand of equity mutual funds by 1.000269 times.

The other variables that have the same movement are the changes of rate of return on certificates deposit and the changes of demand of equity mutual funds previous period or generally speaking the price of the equity mutual funds previous period. The changes of rate of return on certificate deposit are not significantly affecting the demand on equity mutual funds; it is not significant at the level of 76%. Changes in this variable will move the demand on equity mutual funds by 0.001358 times.

The last variable that has the same movement is the error term previous period. This variable is not significantly affecting the demand of equity mutual funds; it is significant at the level of 37%. Changes in this variable will move the demand on equity mutual funds by 0.0000471 times.

The constant variable and the changes of the gross domestic product have a negative value meaning that these variables will move reversely with the demand of equity mutual funds. Both variables are not significant, each is not significant at the level of 11% and 49%. Each of the changes in these variables will move down the demand of equity mutual funds by 0.000002 times and 0.000852 times.

4.2.3.3 Error-correction Analysis

Final estimated equation is the error-correction model, the error correction model is:

$$\begin{aligned} \Delta REMF_t = {} & 0.000835 + 0.000218\,\Delta GDP_t + 0.434323\,\Delta RTEMF_t + \\ & (0.12) \quad (0.25) \quad (8{,}312.37) \\ & 0.001247\,\Delta RTCD_t - 0.320971\,\Delta REMF_{t-1} + 0.000011 REMF_{t-1} \\ & (1.63) \quad (-1.70) \quad (0.17) \\ & -0.000061 GDP_{t-1} + 0.573755\, RTEMF_{t-1} + 0.000117 RTCD_{t-1} + \varepsilon_t \\ & (-0.12) \quad (7.01) \quad (0.35) \end{aligned} \qquad (4.7)$$

In this model the variables that has the same movement with the changes of the demand of equity mutual funds are the constant variable, the changes of the gross domestic product, the changes of the rate of return on equity mutual funds current period, the changes of the rate of return on certificates deposit current period, the demand on equity mutual funds previous period, the rate of return on equity mutual funds previous period and the rate of return on certificates deposit previous period. These variables will all move the demand on equity mutual funds up according to its own coefficient value.

The variables that move reversely with the changes of the demand on equity mutual funds are the changes of the demand on equity mutual funds previous period and the gross domestic product previous period. These variables will all move the demand on equity mutual funds down according to its own coefficient value.

In this error-correction model, the changes of the rate of return on equity mutual funds current period and the rate of return on equity mutual funds previous period are the variables or the factors that are significantly affect the demand on equity mutual funds. The significance level is 99%.

4.2.4 Comparison Analysis

4.2.4.1 Long-run and Short-run Comparison Analysis

Table 4.10 Variables Comparison in Long-run and Short-Run

	Vectors		Significant	
Variables	Long-run	Short-run	Long-run	Short-run
Constant	-	-	yes	no
GDP	+	-	yes	no
RTEMF	+	+	no	yes
RTCD	-	+	no	no

Source: writer's data process

Comparison one on one, first although the constant variable has the same negative sign but the constant variable only significantly affecting the demand of equity mutual funds in the long-run not in the short-run.

Comparison on the gross domestic product is that the gross domestic product has a positive value in the long-run and it significantly affecting the demand on equity mutual funds whereas in the short-run the value is negative and is not significantly affecting the demand on equity mutual funds.

Next is the rate of return on equity mutual funds, this variable has the same value which is a positive value but they differ in terms of its significances, in the short-run it significantly affecting the demand on equity mutual funds whereas in the long-run is not significantly affecting the demand on equity mutual funds.

The last variable is the rate of return on certificates deposit, the rate of return on certificates deposit not significantly affecting the demand on equity mutual funds both in long-run and short-run. This variable has a different value of coefficient, in long-run it has a negative sign meanings reverse movement with the demand on equity mutual funds whereas it has positive value in the short-run meanings that it will move in the same direction with the demand on equity mutual funds.

4.2.4.1 Long-run, Short-run and Error-Correction Comparison Analysis

Table 4.11 Variable Comparison in Short-run, Long-run and Error-Correction

	Vectors			Significant		
Variables	Long-run	Short-run	Error-corection	Long-run	Short-run	Error-corection
Constant	-	-	+	yes	no	No
GDP	+			yes		
RTEMF	+			no		
RTCD	-			no		
$DGDP_t$		-	+		no	No
DRTEMF		+	+		yes	Yes
DRTCD		+	+		no	No
$DREMF_{t-1}$		+	-		yes	No
$REMF_{t-1}$			+		no	No
GDP_{t-1}			-		no	No
$RTEMF_{t-1}$			+		no	Yes
$RTCD_{t-1}$			+		no	No
Ut_{-1}		+				

Source: writer's data process

The above table explains that in the long-run, the factor that determines the demand of equity mutual funds is the gross domestic product while in the short-run the changes of the rate of return on equity mutual funds current period and the changes of demand or the price on equity mutual funds previous period are the factors that determine the demand. In reaching the equilibrium, as explain by the error correction model, the changes of the rate of return on equity mutual funds and the price or the demand of equity mutual funds are the factor that will move the short-run and reach the equilibrium in the long-run.

CHAPTER 5
CONCLUSION AND SUGGESTION

5.1 Conclusion

Based on data processing and analysis the conclusion are:

a. Factors that are significantly affect the demand of equity mutual funds are the gross domestic product in the long-run. In the short-run the changes of the rate of return on equity mutual funds current period and the changes of the demand or the price of equity mutual funds are the factor that significantly affects the demand on equity mutual funds. In the last model which is the error-correction model the changes of the rate of return on equity mutual funds current period and the rate of return of equity mutual previous period are the factors that significantly affect the demand of equity mutual funds.

b. Those significant factors will move the demand of equity mutual funds:

Table 5.1 Models' Vectors

	Vectors		
Variables	Long-run	Short-run	Error-corection
Constant	-	-	+
GDP	+		
DRTEMF		+	+
$DREMF_{t-1}$		+	-
$RTEMF_{t-1}$			+

Source: writer's data process

All of the significant factor will move up the demand of equity mutual funds except the constant variables where it will move down the demand of equity mutual funds both in the short-run and long-run. While in the error-correction model, the constant variable will move up the demand of equity mutual funds and the changes of the demand or the price of equity mutual funds will down the demand of equity mutual funds in reaching the equilibrium in the long-run.

5.2 Suggestion

Based on the conclusion above, this thesis suggests that:

a. One should really pay attention to its income to put their investment in this instrument. As describe in the first chapter, this kind of investment had modified its way to find funds by making a product that joint the investment and health insurance so, both sales person and the targeting people should measures the income in deciding to targeting and to decide to invest.

b. One can really make profit by making short period investment by really understand the movement of the rate of return on equity mutual funds and the price, as it has been proven by the short-run model.

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ADF - Intercept
Null Hypothesis: REMF has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.251209	0.9228
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(REMF)
Method: Least Squares
Date: 06/06/10 Time: 23:48
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMF(-1)	-0.00713	0.028381	-0.251209	0.8031
D(REMF(-1))	0.364339	0.158266	2.302061	0.0274
C	0.044461	0.091443	0.486219	0.6298

R-squared	0.135139	Mean dependent var	0.031992
Adjusted R-squared	0.085718	S.D. dependent var	0.081379
S.E. of regression	0.077813	Akaike info criterion	-2.19336
Sum squared resid	0.21192	Schwarz criterion	-2.06408
Log likelihood	44.67386	F-statistic	2.734458
Durbin-Watson stat	1.996727	Prob(F-statistic)	0.078807

ADF - None
Null Hypothesis: REMF has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.206682	0.9924
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(REMF)
Method: Least Squares
Date: 06/06/10 Time: 23:50
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMF(-1)	0.008991	0.004075	2.206682	0.0335

R-squared	0.006505	Mean dependent var	0.028531
Adjusted R-squared	0.006505	S.D. dependent var	0.083159
S.E. of regression	0.082889	Akaike info criterion	-2.11733
Sum squared resid	0.26108	Schwarz criterion	-2.07468
Log likelihood	42.28798	Durbin-Watson stat	1.246509

Phillips Perron - Intercept
Null Hypothesis: REMF has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.313133	0.9761
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006684
HAC corrected variance (Bartlett kernel)	0.008945

Phillips-Perron Test Equation
Dependent Variable: D(REMF)
Method: Least Squares
Date: 06/06/10 Time: 23:52
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMF(-1)	0.016067	0.029212	0.550008	0.5856
C	-0.023281	0.095157	-0.244664	0.8081

R-squared	0.00811	Mean dependent var	0.028531
Adjusted R-squared	-0.018698	S.D. dependent var	0.083159
S.E. of regression	0.083933	Akaike info criterion	-2.06767
Sum squared resid	0.260658	Schwarz criterion	-1.98236
Log likelihood	42.3195	F-statistic	0.302508
Durbin-Watson stat	1.257764	Prob(F-statistic)	0.585619

PP - Trend & Intercept
Null Hypothesis: REMF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.778697	0.2133
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005182
HAC corrected variance (Bartlett kernel)	0.005182

Phillips-Perron Test Equation
Dependent Variable: D(REMF)
Method: Least Squares
Date: 06/06/10 Time: 23:53
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMF(-1)	-0.197631	0.071124	-2.778697	0.0086
C	0.478053	0.176958	2.701513	0.0105
@TREND(2000Q1)	0.00939	0.002908	3.2295	0.0026

R-squared	0.230922	Mean dependent var	0.028531
Adjusted R-squared	0.188195	S.D. dependent var	0.083159
S.E. of regression	0.074927	Akaike info criterion	-2.27081
Sum squared resid	0.202105	Schwarz criterion	-2.14284
Log likelihood	47.28069	F-statistic	5.404639
Durbin-Watson stat	1.312521	Prob(F-statistic)	0.008861

PP - None
Null Hypothesis: REMF has a unit root
Exogenous: None
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		1.880658	0.984
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006694
HAC corrected variance (Bartlett kernel)	0.008993

Phillips-Perron Test Equation
Dependent Variable: D(REMF)
Method: Least Squares
Date: 06/06/10 Time: 23:54
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMF(-1)	0.008991	0.004075	2.206682	0.0335

R-squared	0.006505	Mean dependent var	0.028531
Adjusted R-squared	0.006505	S.D. dependent var	0.083159
S.E. of regression	0.082889	Akaike info criterion	-2.11733
Sum squared resid	0.26108	Schwarz criterion	-2.07468
Log likelihood	42.28798	Durbin-Watson stat	1.246509

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.880739	0.994
Test critical values:	1% level	-3.6329	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/06/10 Time: 23:56
Sample (adjusted): 2001Q2 2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.011387	0.012929	0.880739	0.3857
D(GDP(-1))	-0.406397	0.161797	-2.511771	0.0178
D(GDP(-2))	-0.406253	0.161854	-2.510001	0.0179
D(GDP(-3))	-0.377896	0.163406	-2.312625	0.028
D(GDP(-4))	0.568798	0.158642	3.58543	0.0012
C	-0.157807	0.187819	-0.840211	0.4077

R-squared	0.878599	Mean dependent var	0.00532
Adjusted R-squared	0.857668	S.D. dependent var	0.010441
S.E. of regression	0.003939	Akaike info criterion	-8.080879
Sum squared resid	0.00045	Schwarz criterion	-7.814248
Log likelihood	147.4154	F-statistic	41.97554
Durbin-Watson stat	1.574464	Prob(F-statistic)	0

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.389619	0.3782
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/06/10 Time: 23:56
Sample (adjusted): 2001Q2 2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.371379	0.155413	-2.389619	0.0238
D(GDP(-1))	-0.178254	0.175477	-1.015824	0.3184
D(GDP(-2))	-0.276442	0.158238	-1.747	0.0916
D(GDP(-3))	-0.331439	0.151857	-2.182575	0.0376
D(GDP(-4))	0.519117	0.14767	3.515372	0.0015
C	5.396208	2.255095	2.392896	0.0237
@TREND(2000Q1)	0.002183	0.000884	2.470171	0.0199

R-squared	0.900321	Mean dependent var	0.00532
Adjusted R-squared	0.878961	S.D. dependent var	0.010441
S.E. of regression	0.003633	Akaike info criterion	-8.22088
Sum squared resid	0.000369	Schwarz criterion	-7.90981
Log likelihood	150.8654	F-statistic	42.15026
Durbin-Watson stat	1.635701	Prob(F-statistic)	0

Null Hypothesis: GDP has a unit root
Exogenous: None
Lag Length: 4 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.541443	0.9965
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable:
D(GDP)
Method: Least Squares
Date: 06/06/10 Time: 23:57
Sample (adjusted): 2001Q2 2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.000525	0.000207	2.541443	0.0164
D(GDP(-1))	-0.344512	0.143353	-2.40325	0.0226
D(GDP(-2))	-0.347261	0.145116	-2.392992	0.0232
D(GDP(-3))	-0.323853	0.149476	-2.166588	0.0383
D(GDP(-4))	0.619947	0.145777	4.252709	0.0002

R-squared	0.875644	Mean dependent var	0.00532
Adjusted R-squared	0.859063	S.D. dependent var	0.010441
S.E. of regression	0.00392	Akaike info criterion	-8.11397
Sum squared resid	0.000461	Schwarz criterion	-7.891777
Log likelihood	146.9945	Durbin-Watson stat	1.607906

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.147418	0.9654
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000102
HAC corrected variance (Bartlett kernel)	2.14E-05

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/06/10
Time: 23:58
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.008594	0.026261	-0.327241	0.7453
C	0.13096	0.384222	0.340845	0.7351

R-squared	0.002886	Mean dependent var	0.005228
Adjusted R-squared	-0.024063	S.D. dependent var	0.010267
S.E. of regression	0.01039	Akaike info criterion	-6.246023
Sum squared resid	0.003994	Schwarz criterion	-6.160712
Log likelihood	123.7974	F-statistic	0.107087
Durbin-Watson stat	2.757939	Prob(F-statistic)	0.74533

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.468497	0.0003
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	5.66E-05
HAC corrected variance (Bartlett kernel)	6.46E-05

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/06/10
Time: 23:58
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.876937	0.162005	-5.413036	0
C	12.73686	2.352126	5.415039	0
@TREND(2000Q1)	0.004925	0.000912	5.400428	0

R-squared	0.449147	Mean dependent var	0.005228
Adjusted R-squared	0.418544	S.D. dependent var	0.010267
S.E. of regression	0.007829	Akaike info criterion	-6.788138
Sum squared resid	0.002207	Schwarz criterion	-6.660172
Log likelihood	135.3687	F-statistic	14.67661
Durbin-Watson stat	2.002419	Prob(F-statistic)	0.000022

Null Hypothesis: GDP has a unit root
Exogenous: None
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		8.320271	1
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000103
HAC corrected variance (Bartlett kernel)	1.50E-05

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/06/10 Time: 23:59
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.000357	0.000112	3.178184	0.0029

R-squared	-0.000245	Mean dependent var	0.005228
Adjusted R-squared	-0.000245	S.D. dependent var	0.010267
S.E. of regression	0.010268	Akaike info criterion	-6.29417
Sum squared resid	0.004007	Schwarz criterion	-6.251514
Log likelihood	123.7363	Durbin-Watson stat	2.773801

Null Hypothesis: RTEMF has a unit root
Exogenous:
Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.126922	0.0025
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTEMF)
Method: Least
Squares
Date: 06/06/10 Time: 23:59
Sample (adjusted): 2000Q2
2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTEMF(-1)	-0.609248	0.147628	-4.126922	0.0002
C	0.042093	0.029854	1.409939	0.1669

R-squared	0.315214	Mean dependent var	0.005277
Adjusted R-squared	0.296706	S.D. dependent var	0.212158
S.E. of regression	0.177922	Akaike info criterion	-0.565027
Sum squared resid	1.171275	Schwarz criterion	-0.479716
Log likelihood	13.01803	F-statistic	17.03149
Durbin-Watson stat	1.983053	Prob(F-statistic)	0.0002

Null Hypothesis: RTEMF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.191759	0.0105
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTEMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:00
Sample (adjusted): 2000Q2
2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTEMF(-1)	-0.654284	0.156088	-4.191759	0.0002
C	-0.003745	0.058727	-0.06377	0.9495
@TREND(2000Q1)	0.002428	0.002677	0.907139	0.3704

R-squared	0.330517	Mean dependent var	0.005277
Adjusted R-squared	0.293324	S.D. dependent var	0.212158
S.E. of regression	0.178349	Akaike info criterion	-0.536346
Sum squared resid	1.1451	Schwarz criterion	-0.40838
Log likelihood	13.45875	F-statistic	8.886433
Durbin-Watson stat	1.943529	Prob(F-statistic)	0.00073

Null Hypothesis: RTEMF has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.83351	0.0003
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTEMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:01
Sample (adjusted): 2000Q2
2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTEMF(-1)	-0.547051	0.142702	-3.83351	0.0005

R-squared	0.278422	Mean dependent var	0.005277
Adjusted R-squared	0.278422	S.D. dependent var	0.212158
S.E. of regression	0.18022	Akaike info criterion	-0.563975
Sum squared resid	1.234205	Schwarz criterion	-0.52132
Log likelihood	11.99752	Durbin-Watson stat	1.999307

Null Hypothesis: RTEMF has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.040622	0.0032
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.030033
HAC corrected variance (Bartlett kernel)	0.026428

Phillips-Perron Test Equation
Dependent Variable: D(RTEMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:01
Sample (adjusted): 2000Q2
2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTEMF(-1)	-0.609248	0.147628	-4.126922	0.0002
C	0.042093	0.029854	1.409939	0.1669

R-squared	0.315214	Mean dependent var	0.005277
Adjusted R-squared	0.296706	S.D. dependent var	0.212158
S.E. of regression	0.177922	Akaike info criterion	-0.565027
Sum squared resid	1.171275	Schwarz criterion	-0.479716
Log likelihood	13.01803	F-statistic	17.03149
Durbin-Watson stat	1.983053	Prob(F-statistic)	0.0002

Null Hypothesis: RTEMF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.112525	0.0128
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.029362
HAC corrected variance (Bartlett kernel)	0.026509

Phillips-Perron Test Equation
Dependent Variable: D(RTEMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:02
Sample (adjusted): 2000Q2
2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTEMF(-1)	-0.654284	0.156088	-4.191759	0.0002
C	-0.003745	0.058727	-0.06377	0.9495
@TREND(2000Q1)	0.002428	0.002677	0.907139	0.3704

R-squared	0.330517	Mean dependent var	0.005277
Adjusted R-squared	0.293324	S.D. dependent var	0.212158
S.E. of regression	0.178349	Akaike info criterion	-0.536346
Sum squared resid	1.1451	Schwarz criterion	-0.40838
Log likelihood	13.45875	F-statistic	8.886433
Durbin-Watson stat	1.943529	Prob(F-statistic)	0.00073

Null Hypothesis: RTEMF has a unit root
Exogenous: None
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.82386	0.0003
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.031646
HAC corrected variance (Bartlett kernel)	0.031278

Phillips-Perron Test Equation
Dependent Variable: D(RTEMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:03
Sample (adjusted): 2000Q2
2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTEMF(-1)	-0.547051	0.142702	-3.83351	0.0005

R-squared	0.278422	Mean dependent var	0.005277
Adjusted R-squared	0.278422	S.D. dependent var	0.212158
S.E. of regression	0.18022	Akaike info criterion	-0.563975
Sum squared resid	1.234205	Schwarz criterion	-0.52132
Log likelihood	11.99752	Durbin-Watson stat	1.999307

Null Hypothesis: RTCD has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.865231	0.3445
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:04
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCD(-1)	-0.093168	0.04995	-1.865231	0.0706
D(RTCD(-1))	0.591788	0.139729	4.235268	0.0002
C	0.009362	0.005657	1.654771	0.1069

R-squared	0.348025	Mean dependent var	-0.001389
Adjusted R-squared	3.11E-01	S.D. dependent var	0.011733
S.E. of regression	0.009741	Akaike info criterion	-6.349382
Sum squared resid	0.003321	Schwarz criterion	-6.22E+00
Log likelihood	123.6383	F-statistic	9.34E+00
Durbin-Watson stat	2.08E+00	Prob(F-statistic)	0.000561

Null Hypothesis: RTCD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.935359	0.1634
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:04
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCD(-1)	-0.186963	0.063693	-2.935359	0.0059
D(RTCD(-1))	0.593226	0.132607	4.47356	0.0001
C	0.0279	0.009976	2.796682	0.0084
@TREND(2000Q1)	-0.00041	0.000186	-2.204801	0.0343

R-squared	0.429581	Mean dependent var	-0.001389
Adjusted R-squared	0.37925	S.D. dependent var	0.011733
S.E. of regression	0.009244	Akaike info criterion	-6.430385
Sum squared resid	0.002905	Schwarz criterion	-6.258007
Log likelihood	126.1773	F-statistic	8.535094
Durbin-Watson stat	2.165168	Prob(F-statistic)	0.000231

Null Hypothesis: RTCD has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.963743	0.2936
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:05
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCD(-1)	-0.013836	0.014357	-0.963743	0.3416
D(RTCD(-1))	0.531609	0.138132	3.848563	0.0005

R-squared	0.297017	Mean dependent var	-0.001389
Adjusted R-squared	0.27749	S.D. dependent var	0.011733
S.E. of regression	0.009973	Akaike info criterion	-6.326687
Sum squared resid	0.003581	Schwarz criterion	-6.240498
Log likelihood	122.2071	Durbin-Watson stat	1.961625

Null Hypothesis: RTCD has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.332933	0.6046
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000131
HAC corrected variance (Bartlett kernel)	0.000275

Phillips-Perron Test Equation
Dependent Variable: D(RTCD)
Method: Least Squares
Date: 06/07/10
Time: 00:06
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCD(-1)	-0.041345	0.058371	-0.708322	0.4832
C	0.003292	0.006576	0.500615	0.6196

R-squared	0.013379	Mean dependent var	-0.001172
Adjusted R-squared	-0.013287	S.D. dependent var	0.011657
S.E. of regression	0.011734	Akaike info criterion	-6.002715
Sum squared resid	0.005094	Schwarz criterion	-5.917404
Log likelihood	119.0529	F-statistic	0.501721
Durbin-Watson stat	0.904616	Prob(F-statistic)	0.483184

Null Hypothesis: RTCD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.330387	0.4085
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000118
HAC corrected variance (Bartlett kernel)	0.000252

Phillips-Perron Test Equation
Dependent Variable: D(RTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:07
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCD(-1)	-0.135859	0.074615	-1.820791	0.077
C	0.021741	0.011468	1.89583	0.066
@TREND(2000Q1)	-0.000412	0.000213	-1.93148	0.0613

R-squared	0.10602	Mean dependent var	-0.001172
Adjusted R-squared	0.056355	S.D. dependent var	0.011657
S.E. of regression	0.011324	Akaike info criterion	-6.050036
Sum squared resid	0.004616	Schwarz criterion	-5.922069
Log likelihood	120.9757	F-statistic	2.134681
Durbin-Watson stat	0.916871	Prob(F-statistic)	0.133015

Null Hypothesis: RTCD has a unit root
Exogenous: None
Bandwidth: 3 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.798042	0.3639
Test critical values:	1% level	-2.625606	
	5% level	-1.949609	
	10% level	-1.611593	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000132
HAC corrected variance (Bartlett kernel)	0.000272

Phillips-Perron Test Equation
Dependent Variable: D(RTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:07
Sample (adjusted): 2000Q2 2009Q4
Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RTCD(-1)	-0.013342	0.016512	-0.808028	0.4241

R-squared	0.006696	Mean dependent var	-0.001172
Adjusted R-squared	0.006696	S.D. dependent var	0.011657
S.E. of regression	0.011618	Akaike info criterion	-6.047246
Sum squared resid	0.005129	Schwarz criterion	-6.004591
Log likelihood	118.9213	Durbin-Watson stat	0.923451

Null Hypothesis: DREMF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.314687	0.0015
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DREMF)
Method: Least Squares
Date: 06/07/10 Time: 00:11
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DREMF(-1)	-0.646823	0.149912	-4.314687	0.0001
C	0.021737	0.013196	1.647213	0.1082

R-squared	0.340859	Mean dependent var	0.002955
Adjusted R-squared	0.322549	S.D. dependent var	0.093301
S.E. of regression	0.076794	Akaike info criterion	-2.24419
Sum squared resid	0.212302	Schwarz criterion	-2.158
Log likelihood	44.63963	F-statistic	18.61653
Durbin-Watson stat	1.986969	Prob(F-statistic)	0.000119

Null Hypothesis: DREMF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.293392	0.0083
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DREMF)
Method: Least Squares
Date: 06/07/10 Time: 00:12
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DREMF(-1)	-0.675447	0.157322	-4.293392	0.0001
C	0.006578	0.026717	0.246203	0.807
@TREND(2000Q1)	0.00078	0.001192	0.654273	0.5172

R-squared	0.348823	Mean dependent var	0.002955
Adjusted R-squared	0.311613	S.D. dependent var	0.093301
S.E. of regression	0.077411	Akaike info criterion	-2.20372
Sum squared resid	0.209737	Schwarz criterion	-2.07443
Log likelihood	44.87061	F-statistic	9.374421
Durbin-Watson stat	1.958581	Prob(F-statistic)	0.000549

Null Hypothesis: DREMF has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.905533	0.0003
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DREMF)
Method: Least Squares
Date: 06/07/10 Time: 00:12
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DREMF(-1)	-0.565367	0.144761	-3.905533	0.0004

R-squared	0.29118	Mean dependent var	0.002955
Adjusted R-squared	0.29118	S.D. dependent var	0.093301
S.E. of regression	0.078552	Akaike info criterion	-2.22416
Sum squared resid	0.228303	Schwarz criterion	-2.18106
Log likelihood	43.25901	Durbin-Watson stat	1.997678

Null Hypothesis: DREMF has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.207436	0.0021
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005587
HAC corrected variance (Bartlett kernel)	0.004509

Phillips-Perron Test Equation
Dependent Variable: D(DREMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:13
Sample (adjusted): 2000Q3
2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DREMF(-1)	-0.646823	0.149912	-4.314687	0.0001
C	0.021737	0.013196	1.647213	0.1082

R-squared	0.340859	Mean dependent var	0.002955
Adjusted R-squared	0.322549	S.D. dependent var	0.093301
S.E. of regression	0.076794	Akaike info criterion	-2.24419
Sum squared resid	0.212302	Schwarz criterion	-2.158
Log likelihood	44.63963	F-statistic	18.61653
Durbin-Watson stat	1.986969	Prob(F-statistic)	0.000119

Null Hypothesis: DREMF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 4 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.171177	0.0113
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.005519
HAC corrected variance (Bartlett kernel)	0.004527

Phillips-Perron Test Equation
Dependent Variable: D(DREMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:13
Sample (adjusted): 2000Q3
2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DREMF(-1)	-0.675447	0.157322	-4.293392	0.0001
C	0.006578	0.026717	0.246203	0.807
@TREND(2000Q1)	0.00078	0.001192	0.654273	0.5172

R-squared	0.348823	Mean dependent var	0.002955
Adjusted R-squared	0.311613	S.D. dependent var	0.093301
S.E. of regression	0.077411	Akaike info criterion	-2.20372
Sum squared resid	0.209737	Schwarz criterion	-2.07443
Log likelihood	44.87061	F-statistic	9.374421
Durbin-Watson stat	1.958581	Prob(F-statistic)	0.000549

Null Hypothesis: DREMF has a unit root
Exogenous: None
Bandwidth: 1 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.902967	0.0003
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.006008
HAC corrected variance (Bartlett kernel)	0.005988

Phillips-Perron Test Equation
Dependent Variable: D(DREMF)
Method: Least
Squares
Date: 06/07/10 Time: 00:14
Sample (adjusted): 2000Q3
2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DREMF(-1)	-0.565367	0.144761	-3.905533	0.0004

R-squared	0.29118	Mean dependent var	0.002955
Adjusted R-squared	0.29118	S.D. dependent var	0.093301
S.E. of regression	0.078552	Akaike info criterion	-2.22416
Sum squared resid	0.228303	Schwarz criterion	-2.18106
Log likelihood	43.25901	Durbin-Watson stat	1.997678

Null Hypothesis: DGDP has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.536811	0.1158
Test critical values:	1% level	-3.6329	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 06/07/10 Time: 00:14
Sample (adjusted): 2001Q2 2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-1.377222	0.542895	-2.536811	0.0166
D(DGDP(-1))	0.037547	0.413503	0.090803	0.9283
D(DGDP(-2))	-0.304999	0.282858	-1.078275	0.2895
D(DGDP(-3))	-0.624301	0.145043	-4.304261	0.0002
C	0.007591	0.003007	2.524586	0.0171

R-squared	0.954484	Mean dependent var	-0.000451
Adjusted R-squared	0.948416	S.D. dependent var	0.017279
S.E. of regression	0.003924	Akaike info criterion	-8.111625
Sum squared resid	0.000462	Schwarz criterion	-7.889432
Log likelihood	146.9534	F-statistic	157.2782
Durbin-Watson stat	1.610435	Prob(F-statistic)	0

Null Hypothesis: DGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.749133	0.2245
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 06/07/10 Time: 00:15
Sample (adjusted): 2001Q2 2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-1.656106	0.60241	-2.749133	0.0102
D(DGDP(-1))	0.244992	0.456801	0.536321	0.5958
D(DGDP(-2))	-0.168887	0.31017	-0.544497	0.5903
D(DGDP(-3))	-0.556382	0.158322	-3.514254	0.0015
C	0.007395	0.003006	2.459849	0.0201
@TREND(2000Q1)	7.74E-05	7.31E-05	1.058997	0.2983

R-squared	0.956179	Mean dependent var	-0.000451
Adjusted R-squared	0.948624	S.D. dependent var	0.017279
S.E. of regression	0.003917	Akaike info criterion	-8.092424
Sum squared resid	0.000445	Schwarz criterion	-7.825793
Log likelihood	147.6174	F-statistic	126.5564
Durbin-Watson stat	1.569143	Prob(F-statistic)	0

Null Hypothesis: DGDP has a unit root
Exogenous: None
Lag Length: 3 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.311629	0.5661
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 06/07/10 Time: 00:15
Sample (adjusted): 2001Q2 2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-0.040463	0.129843	-0.311629	0.7574
D(DGDP(-1))	-0.971569	0.114698	-8.470703	0
D(DGDP(-2))	-0.983304	0.095788	-10.2654	0
D(DGDP(-3))	-0.958395	0.064307	-14.90345	0

R-squared	0.944814	Mean dependent var	-0.000451
Adjusted R-squared	0.939474	S.D. dependent var	0.017279
S.E. of regression	0.004251	Akaike info criterion	-7.976124
Sum squared resid	0.00056	Schwarz criterion	-7.798369
Log likelihood	143.5822	Durbin-Watson stat	1.827185

Null Hypothesis: DGDP has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-16.28509	0
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	8.31E-05
HAC corrected variance (Bartlett kernel)	1.65E-05

Phillips-Perron Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 06/07/10 Time: 00:16
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-1.456182	0.153011	-9.516855	0
C	0.008015	0.001748	4.584885	0.0001

R-squared	0.715574	Mean dependent var	-0.000205
Adjusted R-squared	0.707673	S.D. dependent var	0.017327
S.E. of regression	0.009368	Akaike info criterion	-6.451773
Sum squared resid	0.00316	Schwarz criterion	-6.365585
Log likelihood	124.5837	F-statistic	90.57053
Durbin-Watson stat	2.203404	Prob(F-statistic)	0

Null Hypothesis: DGDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-17.46538	0
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	8.30E-05
HAC corrected variance (Bartlett kernel)	1.33E-05

Phillips-Perron Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 06/07/10 Time: 00:17
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-1.460476	0.15589	-9.368624	0
C	0.007279	0.003315	2.19588	0.0348
@TREND(2000Q1)	3.71E-05	0.000141	0.262407	0.7945

R-squared	0.716132	Mean dependent var	-0.000205
Adjusted R-squared	0.699911	S.D. dependent var	0.017327
S.E. of regression	0.009492	Akaike info criterion	-6.401107
Sum squared resid	0.003153	Schwarz criterion	-6.271824
Log likelihood	124.621	F-statistic	44.14839
Durbin-Watson stat	2.203671	Prob(F-statistic)	0

Null Hypothesis: DGDP has a unit root
Exogenous: None
Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.701175	0
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000132
HAC corrected variance (Bartlett kernel)	0.000145

Phillips-Perron Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 06/07/10 Time: 00:18
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-1.10955	0.165143	-6.718717	0

R-squared	0.549491	Mean dependent var	-0.000205
Adjusted R-squared	0.549491	S.D. dependent var	0.017327
S.E. of regression	0.01163	Akaike info criterion	-6.044501
Sum squared resid	0.005004	Schwarz criterion	-6.001407
Log likelihood	115.8455	Durbin-Watson stat	1.875198

Null Hypothesis: DRTEMF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.873169	0
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DRTEMF)
Method: Least Squares
Date: 06/07/10 Time: 00:19
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTEMF(-1)	-1.276613	0.162147	-7.873169	0
C	0.009735	0.034021	0.286155	0.7764

R-squared	0.632604	Mean dependent var	-0.003787
Adjusted R-squared	0.622398	S.D. dependent var	0.34085
S.E. of regression	0.20945	Akaike info criterion	-0.237468
Sum squared resid	1.579294	Schwarz criterion	-0.151279
Log likelihood	6.511887	F-statistic	61.98679
Durbin-Watson stat	2.074411	Prob(F-statistic)	0

Null Hypothesis: DRTEMF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.799728	0
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DRTEMF)
Method: Least Squares
Date: 06/07/10 Time: 00:19
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTEMF(-1)	-1.278223	0.16388	-7.799728	0
C	0.042226	0.072852	0.57961	0.5659
@TREND(2000Q1)	-0.001584	0.003132	-0.505842	0.6161

R-squared	0.63527	Mean dependent var	-0.003787
Adjusted R-squared	0.614428	S.D. dependent var	0.34085
S.E. of regression	0.211649	Akaike info criterion	-0.19212
Sum squared resid	1.567832	Schwarz criterion	-0.062837
Log likelihood	6.650286	F-statistic	30.4807
Durbin-Watson stat	2.086515	Prob(F-statistic)	0

Null Hypothesis: DRTEMF has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.968239	0
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DRTEMF)
Method: Least Squares
Date: 06/07/10 Time: 00:20
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTEMF(-1)	-1.274271	0.159919	-7.968239	0

R-squared	0.631768	Mean dependent var	-0.003787
Adjusted R-squared	0.631768	S.D. dependent var	0.34085
S.E. of regression	0.206835	Akaike info criterion	-0.287827
Sum squared resid	1.582887	Schwarz criterion	-0.244733
Log likelihood	6.468719	Durbin-Watson stat	2.073365

Null Hypothesis: DRTEMF has a unit root
Exogenous: Constant
Bandwidth: 23 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-14.50551	0
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.04156
HAC corrected variance (Bartlett kernel)	0.005487

Phillips-Perron Test Equation
Dependent Variable: D(DRTEMF)
Method: Least Squares
Date: 06/07/10 Time: 00:20
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTEMF(-1)	-1.276613	0.162147	-7.873169	0
C	0.009735	0.034021	0.286155	0.7764

R-squared	0.632604	Mean dependent var	-0.003787
Adjusted R-squared	0.622398	S.D. dependent var	0.34085
S.E. of regression	0.20945	Akaike info criterion	-0.237468
Sum squared resid	1.579294	Schwarz criterion	-0.151279
Log likelihood	6.511887	F-statistic	61.98679
Durbin-Watson stat	2.074411	Prob(F-statistic)	0

Exogenous: Constant, Linear Trend
Bandwidth: 25 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-17.26752	0
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.041259
HAC corrected variance (Bartlett kernel)	0.003555

Phillips-Perron Test Equation
Dependent Variable: D(DRTEMF)
Method: Least Squares
Date: 06/07/10 Time: 00:21
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTEMF(-1)	-1.278223	0.16388	-7.799728	0
C	0.042226	0.072852	0.57961	0.5659
@TREND(2000Q1)	-0.001584	0.003132	-0.505842	0.6161

R-squared	0.63527	Mean dependent var	-0.003787
Adjusted R-squared	0.614428	S.D. dependent var	0.34085
S.E. of regression	0.211649	Akaike info criterion	-0.19212
Sum squared resid	1.567832	Schwarz criterion	-0.062837
Log likelihood	6.650286	F-statistic	30.4807
Durbin-Watson stat	2.086515	Prob(F-statistic)	0

Null Hypothesis: DRTEMF has a unit root
Exogenous: None
Bandwidth: 21 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-13.20129	0
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.041655
HAC corrected variance (Bartlett kernel)	0.007199

Phillips-Perron Test Equation
Dependent Variable: D(DRTEMF)
Method: Least Squares
Date: 06/07/10 Time: 00:21
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTEMF(-1)	-1.274271	0.159919	-7.968239	0

R-squared	0.631768	Mean dependent var	-0.003787
Adjusted R-squared	0.631768	S.D. dependent var	0.34085
S.E. of regression	0.206835	Akaike info criterion	-0.287827
Sum squared resid	1.582887	Schwarz criterion	-0.244733
Log likelihood	6.468719	Durbin-Watson stat	2.073365

Null Hypothesis: DRTCD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.364026	0.0187
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DRTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:22
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTCD(-1)	-0.471446	0.140143	-3.364026	0.0018
C	-0.000766	0.001642	-0.46672	0.6435

R-squared	0.239169	Mean dependent var	-0.000211
Adjusted R-squared	0.218035	S.D. dependent var	0.011388
S.E. of regression	0.01007	Akaike info criterion	-6.307247
Sum squared resid	0.003651	Schwarz criterion	-6.221058
Log likelihood	121.8377	F-statistic	11.31667
Durbin-Watson stat	1.946187	Prob(F-statistic)	0.001835

Null Hypothesis: DRTCD has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.32569	0.0774
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DRTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:23
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTCD(-1)	-0.478339	0.143831	-3.32569	0.0021
C	0.000158	0.003524	0.044767	0.9645
@TREND(2000Q1)	-4.55E-05	0.000153	-0.297424	0.7679

R-squared	0.241087	Mean dependent var	-0.000211
Adjusted R-squared	0.19772	S.D. dependent var	0.011388
S.E. of regression	0.0102	Akaike info criterion	-6.257139
Sum squared resid	0.003642	Schwarz criterion	-6.127856
Log likelihood	121.8856	F-statistic	5.559295
Durbin-Watson stat	1.937314	Prob(F-statistic)	0.008005

Null Hypothesis: DRTCD has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.369793	0.0013
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DRTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:23
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTCD(-1)	-0.464864	0.13795	-3.369793	0.0018

R-squared	0.234565	Mean dependent var	-0.000211
Adjusted R-squared	0.234565	S.D. dependent var	0.011388
S.E. of regression	0.009963	Akaike info criterion	-6.353846
Sum squared resid	0.003673	Schwarz criterion	-6.310751
Log likelihood	121.7231	Durbin-Watson stat	1.947351

Null Hypothesis: DRTCD has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.350989	0.0193
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	9.61E-05
HAC corrected variance (Bartlett kernel)	9.47E-05

Phillips-Perron Test Equation
Dependent Variable: D(DRTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:24
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTCD(-1)	-0.471446	0.140143	-3.364026	0.0018
C	-0.000766	0.001642	-0.46672	0.6435

R-squared	0.239169	Mean dependent var	-0.000211
Adjusted R-squared	0.218035	S.D. dependent var	0.011388
S.E. of regression	0.01007	Akaike info criterion	-6.307247
Sum squared resid	0.003651	Schwarz criterion	-6.221058
Log likelihood	121.8377	F-statistic	11.31667
Durbin-Watson stat	1.946187	Prob(F-statistic)	0.001835

Null Hypothesis: DRTCD has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.3228	0.0779
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	9.58E-05
HAC corrected variance (Bartlett kernel)	9.55E-05

Phillips-Perron Test Equation
Dependent Variable: D(DRTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:26
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTCD(-1)	-0.478339	0.143831	-3.32569	0.0021
C	0.000158	0.003524	0.044767	0.9645
@TREND(2000Q1)	-4.55E-05	0.000153	-0.297424	0.7679

R-squared	0.241087	Mean dependent var	-0.000211
Adjusted R-squared	0.19772	S.D. dependent var	0.011388
S.E. of regression	0.0102	Akaike info criterion	-6.257139
Sum squared resid	0.003642	Schwarz criterion	-6.127856
Log likelihood	121.8856	F-statistic	5.559295
Durbin-Watson stat	1.937314	Prob(F-statistic)	0.008005

Null Hypothesis: DRTCD has a unit root
Exogenous: None
Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.365279	0.0013
Test critical values:	1% level	-2.627238	
	5% level	-1.949856	
	10% level	-1.611469	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	9.67E-05
HAC corrected variance (Bartlett kernel)	9.62E-05

Phillips-Perron Test Equation
Dependent Variable: D(DRTCD)
Method: Least Squares
Date: 06/07/10 Time: 00:27
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRTCD(-1)	-0.464864	0.13795	-3.369793	0.0018

R-squared	0.234565	Mean dependent var	-0.000211
Adjusted R-squared	0.234565	S.D. dependent var	0.011388
S.E. of regression	0.009963	Akaike info criterion	-6.353846
Sum squared resid	0.003673	Schwarz criterion	-6.310751
Log likelihood	121.7231	Durbin-Watson stat	1.947351

Null Hypothesis: DDGDP has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-27.01472	0.0001
Test critical values:	1% level	-3.6329	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DDGDP)
Method: Least
Squares
Date: 06/07/10 Time: 00:27
Sample (adjusted): 2001Q2
2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDGDP(-1)	-3.976693	0.147205	-27.01472	0
D(DDGDP(-1))	1.973542	0.111298	17.7321	0
D(DDGDP(-2))	0.969061	0.054935	17.64006	0
C	0.000151	0.00072	0.210482	0.8347

R-squared	0.982049	Mean dependent var	-0.001
Adjusted R-squared	0.980312	S.D. dependent var	0.030322
S.E. of regression	0.004255	Akaike info criterion	-7.974424
Sum squared resid	0.000561	Schwarz criterion	-7.79667
Log likelihood	143.5524	F-statistic	565.316
Durbin-Watson stat	1.839063	Prob(F-statistic)	0

Null Hypothesis: DDGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-26.51515	0
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DDGDP)
Method: Least
Squares
Date: 06/07/10 Time: 00:27
Sample (adjusted): 2001Q2
2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDGDP(-1)	-3.975247	0.149924	-26.51515	0
D(DDGDP(-1))	1.97254	0.113313	17.40796	0
D(DDGDP(-2))	0.968806	0.055852	17.34584	0
C	0.000381	0.001755	0.217054	0.8296
@TREND(2000Q1)	-1.04E-05	7.26E-05	-0.14383	0.8866

R-squared	0.982062	Mean dependent var	-0.001
Adjusted R-squared	0.97967	S.D. dependent var	0.030322
S.E. of regression	0.004323	Akaike info criterion	-7.91797
Sum squared resid	0.000561	Schwarz criterion	-7.695778
Log likelihood	143.5645	F-statistic	410.5981
Durbin-Watson stat	1.841241	Prob(F-statistic)	0

Null Hypothesis: DDGDP has a unit root
Exogenous: None
Lag Length: 2 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-27.43253	0
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DDGDP)
Method: Least
Squares
Date: 06/07/10 Time: 00:28
Sample (adjusted): 2001Q2
2009Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDGDP(-1)	-3.975805	0.14493	-27.43253	0
D(DDGDP(-1))	1.973066	0.109601	18.00234	0
D(DDGDP(-2))	0.968841	0.054099	17.9087	0

R-squared	0.982024	Mean dependent var	-0.001
Adjusted R-squared	0.9809	S.D. dependent var	0.030322
S.E. of regression	0.004191	Akaike info criterion	-8.030139
Sum squared resid	0.000562	Schwarz criterion	-7.896823
Log likelihood	143.5274	Durbin-Watson stat	1.837743

Null Hypothesis: DDGDP has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-27.71656	0.0001
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.00018
HAC corrected variance (Bartlett kernel)	2.26E-05

Phillips-Perron Test Equation
Dependent Variable: D(DDGDP)
Method: Least
Squares
Date: 06/07/10 Time: 00:28
Sample (adjusted): 2000Q4
2009Q4
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDGDP(-1)	-1.61847	0.135596	-11.93597	0
C	-0.000459	0.002272	-0.202088	0.841

R-squared	0.802781	Mean dependent var	-0.001295
Adjusted R-squared	0.797146	S.D. dependent var	0.030668
S.E. of regression	0.013813	Akaike info criterion	-5.673936
Sum squared resid	0.006678	Schwarz criterion	-5.586859
Log likelihood	106.9678	F-statistic	142.4674
Durbin-Watson stat	2.185789	Prob(F-statistic)	0

Null Hypothesis: DDGDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-27.25602	0
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.20032	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.00018
HAC corrected variance (Bartlett kernel)	2.25E-05

Phillips-Perron Test Equation
Dependent Variable: D(DDGDP)
Method: Least
Squares
Date: 06/07/10 Time: 00:29
Sample (adjusted): 2000Q4
2009Q4
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDGDP(-1)	-1.618435	0.137575	-11.76401	0
C	-0.000278	0.005084	-0.054741	0.9567
@TREND(2000Q1)	-8.61E-06	0.000216	-0.039911	0.9684

R-squared	0.80279	Mean dependent var	-0.001295
Adjusted R-squared	0.791189	S.D. dependent var	0.030668
S.E. of regression	0.014014	Akaike info criterion	-5.619929
Sum squared resid	0.006677	Schwarz criterion	-5.489314
Log likelihood	106.9687	F-statistic	69.20248
Durbin-Watson stat	2.185895	Prob(F-statistic)	0

Null Hypothesis: DDGDP has a unit root
Exogenous: None
Bandwidth: 10 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-28.28659	0
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000181
HAC corrected variance (Bartlett kernel)	2.25E-05

Phillips-Perron Test Equation
Dependent Variable: D(DDGDP)
Method: Least
Squares
Date: 06/07/10 Time: 00:29
Sample (adjusted): 2000Q4
2009Q4
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DDGDP(-1)	-1.619314	0.133714	-12.11029	0

R-squared	0.802551	Mean dependent var	-0.001295
Adjusted R-squared	0.802551	S.D. dependent var	0.030668
S.E. of regression	0.013627	Akaike info criterion	-5.726824
Sum squared resid	0.006685	Schwarz criterion	-5.683286
Log likelihood	106.9462	Durbin-Watson stat	2.182224

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ADF - Intercept
Null Hypothesis: REMF has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.251209	0.9228
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(REMF)
Method: Least Squares
Date: 06/06/10 Time: 23:48
Sample (adjusted): 2000Q3 2009Q4
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMF(-1)	-0.00713	0.028381	-0.251209	0.8031
D(REMF(-1))	0.364339	0.158266	2.302061	0.0274
C	0.044461	0.091443	0.486219	0.6298

R-squared	0.135139	Mean dependent var	0.031992
Adjusted R-squared	0.085718	S.D. dependent var	0.081379
S.E. of regression	0.077813	Akaike info criterion	-2.19336
Sum squared resid	0.21192	Schwarz criterion	-2.06408
Log likelihood	44.67386	F-statistic	2.734458
Durbin-Watson stat	1.996727	Prob(F-statistic)	0.078807

Date: 06/08/10 Time: 20:10
Sample (adjusted): 2001Q1 2009Q4
Included observations: 36 after adjustments
Trend assumption: Linear deterministic trend
Series: DREMF DDGDP DRTEMF DRTCD
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.7607	104.9439	47.8561	0.0000
At most 1 *	0.6608	53.4601	29.7971	0.0000
At most 2	0.2045	14.5391	15.4947	0.0693
At most 3 *	0.1606	6.3010	3.8415	0.0121

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen	0.05 Critical Value	Prob.**
None *	0.7607	51.4838	27.5843	0.0000
At most 1 *	0.6608	38.9210	21.1316	0.0001
At most 2	0.2045	8.2381	14.2646	0.3550
At most 3 *	0.1606	6.3010	3.8415	0.0121

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

DREMF	DDGDP	DRTEMF	DRTCD
1.291371	64.67205	6782.649	3.214409
2.091488	123.5816	-1938.987	0.161941
19.43451	-12.05785	1008.66	69.81535
-5.788309	56.72775	152.1243	91.25045

Unrestricted Adjustment Coefficients (alpha):

D(DREMF)	0.005228	-0.034696	-0.030259	0.000597
D(DDGDP)	-0.007924	-0.012212	0.002113	-1.42E-03
D(DRTEMF)	0.011844	-0.079794	-0.069671	0.001391
D(DRTCD)	0.003275	0.004757	-0.000461	-0.003185

1 Cointegrating Equation(s): Log likelihood 526.9959

Normalized cointegrating coefficients (standard error in parentheses)

DREMF	DDGDP	DRTEMF	DRTCD
1	50.08015	5252.286	2.489145
	-11.9471	-557.814	-8.5208

Adjustment coefficients (standard error in parentheses)

D(DREMF)	0.006752
	-0.01873
D(DDGDP)	-0.010233
	-0.00394
D(DRTEMF)	0.015295
	-0.0431
D(DRTCD)	0.00423
	-0.00238

2 Cointegrating Equation(s): Log likelihood 546.4564

Normalized cointegrating coefficients (standard error in parentheses)

DREMF	DDGDP	DRTEMF	DRTCD
1	0	39607.56	15.8975
		-4315.96	-63.943
0	1	-686.0058	-0.267738
		-77.3397	-1.14582

Adjustment coefficients (standard error in parentheses)

D(DREMF)	-0.065814	-3.949631
	-0.03207	-1.81953
D(DDGDP)	-0.035775	-2.021674
	-0.00513	-0.29104
D(DRTEMF)	-0.151594	-9.095139
	-0.07382	-4.18878
D(DRTCD)	0.014179	0.799722
	-0.00399	-0.22664

3 Cointegrating Equation(s): Log likelihood 550.5755

Normalized cointegrating coefficients (standard error in parentheses)

DREMF	DDGDP	DRTEMF	DRTCD
1	0	0	3.542799
			-1.87907
0	1	0	-0.053754
			-0.10028
0	0	1	0.000312
			-0.00162

Adjustment coefficients (standard error in parentheses)

D(DREMF)	-0.653884	-3.584773	72.21627
	-0.2315	-1.65446	-84.2126

D(DDGDP)	0.005289	-2.047151	-27.93399
	-0.04017	-0.28709	-14.6132
D(DRTEMF)	-1.505622	-8.255054	164.7765
	-0.53291	-3.80862	-193.86
D(DRTCD)	0.005223	0.805279	12.52611
	-0.03179	-0.22718	-11.5637

Dependent Variable: REMF
Method: Least Squares
Date: 06/25/10 Time: 17:41
Sample: 2000:1 2009:4
Included observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-95.32362	7.584478	-12.56825	0
GDP	6.738067	0.513551	13.12053	0
RTEMF	0.069512	0.13597	0.511229	0.6123
RTCD	-0.334155	1.027578	-0.325187	0.7469

R-squared	0.900556	Mean dependent var	3.24499
Adjusted R-squared	0.892269	S.D. dependent var	0.477492
S.E. of regression	0.156725	Akaike info criterion	-0.774012
Sum squared resid	0.884255	Schwarz criterion	-0.605124
Log likelihood	19.48024	F-statistic	108.6704
Durbin-Watson stat	0.407746	Prob(F-statistic)	0

Dependent Variable: DREMF
Method: Least Squares
Date: 06/25/10 Time: 17:43
Sample(adjusted): 2000:3 2009:4
Included observations: 38 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.14E-06	1.42E-05	-0.151085	0.8809
DGDP	-0.000852	0.001263	-0.674704	0.5047
DRTEMF	0.434462	7.52E-05	5779.164	0
DRTCD	0.001358	0.001126	1.206556	0.2364
DREMF(-1)	1.000269	0.000186	5377.008	0
U(-1)	4.71E-05	9.55E-05	0.493041	0.6253

R-squared	0.999999	Mean dependent var	0.031992
Adjusted R-squared	0.999999	S.D. dependent var	0.081379
S.E. of regression	7.12E-05	Akaike info criterion	-16.11797
Sum squared resid	1.62E-07	Schwarz criterion	-15.8594
Log likelihood	312.2414	F-statistic	9664655
Durbin-Watson stat	2.829268	Prob(F-statistic)	0

Dependent Variable: DREMF
Method: Least Squares
Date: 06/25/10 Time: 17:44
Sample(adjusted): 2000:3 2009:4
Included observations: 38 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000835	0.00725	0.115222	0.9091
DGDP	0.000218	0.000861	0.252855	0.8022
DRTEMF	0.434323	5.23E-05	8312.369	0
DRTCD	0.001247	0.000765	1.629886	0.1139
DREMF(-1)	-0.320971	0.188513	-1.702647	0.0993
REMF(-1)	1.10E-05	6.39E-05	0.171806	0.8648
GDP(-1)	-6.10E-05	0.000508	-0.120141	0.9052
RTEMF(-1)	0.573755	0.081863	7.008763	0
RTCD(-1)	0.000117	0.000329	0.3545	0.7255

R-squared	1	Mean dependent var	0.031992
Adjusted R-squared	1	S.D. dependent var	0.081379
S.E. of regression	4.53E-05	Akaike info criterion	-16.96115
Sum squared resid	5.96E-08	Schwarz criterion	-16.5733
Log likelihood	331.2618	F-statistic	14896223
Durbin-Watson stat	2.224568	Prob(F-statistic)	0