ANALYSIS OF THE CO INTEGRATION OF ASEAN STOCKS MARKET BY APPLYING ARDL APPROACH 1990. i – 2004.ii

A THESIS

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To Obtain the Bachelor Degree in Economics Department

By

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Hopefully this thesis can give contributions and benefits for others.

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Iqbal Himawan

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ABSTRACT

Iqbal Himawan (2007), "Analysis of the Co Integration of ASEAN Stock Market by applying ARDL Approach, 1990. i – 2004.ii". Faculty of Economics, Developmental Economics Studies, International Program, Islamic University of Indonesia, Yogyakarta.

This study seeks to examine the dynamic interactions of stock price indices in four ASEAN countries, Indonesia; Malaysia; the Philippines; and Singapore, with particular attention to the 1997 Asian financial crisis and period onwards. Using quarterly time series data of the stock price indices countries, a Johansen co integration test is employed to empirically examine the interaction among the variables.

The finding is that the four ASEAN stock market prices were found to be integrated during the sample period, and the Auto Regressive Distributive Lags (ARDL) shows the short run dynamic interactions among those stock markets. The important implication might be drawn from the finding is that portfolio diversification across the four ASEAN stock markets is unlikely to reduce investment risk due to high degree of financial integration of these markets.

ABSTRAKSI

Iqbal Himawan (2007), "Analysis of the Co Integration of ASEAN Stock Market by applying ARDL Approach, 1990. i – 2004.ii". Fakultas Ekonomi, Ilmu Ekonomi Studi Pembangunan, Program Internasional, Universitas Islam Indonesia, Yogyakarta.

Studi ini bertujuan meneliti interaksi dinamis antara indeks harga saham yang terdapat di empat negara ASEAN, yaitu Indonesia, Malaysia, Filipina, dan Singapura, yang terjadi selama masa krisis finansial Asia tahun 1997 dan periode sesudahnya. Dengan menggunakan data time series empat bulanan indeks harga saham dari keempat negara tersebut selama periode penelitian, suatu tes kointegrasi Johansen diaplikasikan untuk meneliti secara empiris interaksi dinamis yang terjadi diantara berbagai variabel yang dipergunakan dalam penelitian ini.

Dari hasil penelitian ditemukan kointegrasi antar pasar saham selama masa penelitian, dan analisa Auto Regressive Distributive Lags (ARDL) menunjukan adanya interaksi dinamis jangka pendek diantara pasar saham tersebut. Implikasi penting yang mungkin perlu diperhatikan dari penemuan ini adalah bahwa diversifikasi portofolio saham pada empat pasar saham tersebut agaknya tidak akan secara signifikan mengurangi tingkat resiko investasi. Hal ini dikarenakan oleh tingginya tingkat integrasi diantara pasar saham tersebut.

CHAPTER I

INTRODUCTION

1.1. Background of the Study

The rapid development of the capital market, especially in terms of company stock transactions has opened up a brand new way of operating in financial markets in ASEAN countries. Before the development of the overall capital market banking systems dominated this market, because when companies needed funds for their operational costs, for both the short and long term, they tended to obtain them from banks.

Other than banks, the capital market is represented by the stock exchange market, which is considered a place to gain relatively cheap additional capital. It has become one favorable alternative way for companies looking for funds through going-public, both by issuing stocks and obligations (Keller, Shiue, 2004)

In that case, companies will obtain direct benefits from the rapid growth of the stock market by "going-public". This option has been implemented by companies throughout ASEAN countries. It is obvious that companies that have gone public significantly improved compared with those which have not.

Members of the Association of Southeast Asian Nations (ASEAN) have recently made progress in forming a free trade area and investment zone, and are now examining the possibility of stock market integration. Regional integration may be fostered by simply coordinating existing national stock markets or, at an extreme, by creating a supranational exchange. Financial theory suggests that an integrated regional market is more efficient than segmented national markets, and this is what's driving the interest in ASEAN stock market integration. From the perspective of a portfolio investor, integration of markets suggests that the separate markets move together and have high correlations, so there is less benefit from portfolio diversification across countries. The issue of stock market integration is thus of interest to ASEAN policymakers and international portfolio investors alike.

This paper examines stock market integration in Indonesia, Malaysia, the Philippines, and Singapore. These four countries, along with Thailand, are the original members of the Association of Southeast Asian Nations (ASEAN), which now also includes Brunei, Cambodia, Laos, Myanmar, and Vietnam. Over the past few years, ASEAN member countries have made tremendous progress in forming a free trade area and investment zone - witness the ASEAN Free Trade Area (AFTA) and the ASEAN Investment Area (AIA). They are now examining the possibility of capital market integration for national bond markets and stock markets alike.

The stock markets of the ASEAN-4 countries generally have market capitalizations in line with the sizes of their economies. Singapore and Malaysia have market capitalizations as a percent of gross domestic product quite similar to the United States; 165.7% and 130.4%, respectively, versus 153.5% for the U.S. The Philippines, where stock market capitalization is 69.9% of GDP, is quite similar to the level of Japan, at 65.2%. Indonesia is the smallest markets, at 17.5%, respectively, but not out of line with emerging markets around the world. (Cerny, 2004)

These figures suggest that there is a general level of equity market development which may be conducive to integration. In contrast, the stock markets of Brunei, Cambodia, Laos, Myanmar, and Vietnam are either under-developed or non-existent. The four original ASEAN countries are the most likely candidates to undertake integrative measures first and therefore provide the focus for this paper.

The issue is integration, as opposed to stock market development more generally, although one motivation for integration is typically to foster development of the market. Interest in stock market integration arises because an integrated regional stock market is more efficient than segmented national capital markets. (W'alti, 2006)

Capital market efficiency in Southeast Asia has become even more important after of the Asian financial crisis of 1997-1998, as countries seek to reduce the traditional dependence of firms on bank loans rather than bond and stock issuances, at the same time that they seek new capital from outside the region. With an integrated regional stock market, investors from all member countries will be able to allocate capital to the locations in the region where it is the most productive.

With more cross-border flows of funds, additional trading in individual securities will improve the liquidity of the stock markets, which will in turn lower the cost of capital for firms seeking capital and lower the transaction costs investors incur.

These suggest a more efficient allocation of capital within the region. An integrated regional stock exchange will also be more appealing to investors from outside the region, who would find investment in the region easier or more justifiable. As shares become more liquid and transaction costs fall, fund managers become increasingly willing to take positions in the stocks. In addition, outside investors may take notice of the regional stock exchange instead of dismissing a collection of small national exchanges: the whole (one regional stock exchange) might be greater than the sum of the parts (individual country exchanges).

Based on the background above the writer's purpose is to use ASEAN stock market as the object of this research with the title: **"ANALYSIS OF THE CO INTEGRATION OF ASEAN STOCKS MARKET BY APPLYING ARDL APPROACH, 1990.i-2004.ii".**

1.2. Problem Identification

This research will focus on the co integration of ASEAN stock markets. This includes the stock markets of the four ASEAN member countries. We want to find out whether the ASEAN stock markets are integrated. For example if there is a fluctuation in Stock Price Index of one of the ASEAN countries, would this change affect on the overall ASEAN stock market?

1.3. Problem Formulation

Based on the study background, we formulate the following problems:

1. Are the ASEAN stock markets integrated?
2. Which of the ASEAN stock markets are strongly integrated?

1.4.Problem Limitation

This paper specifically considers whether the stock markets of Indonesia, Malaysia, the Philippines, and Singapore are currently co integrated. We examine a particular period of time, in order to consider the recent experiences of the ASEAN markets rather than a long history.

1.5.Research Objectives

The main purposes of this study are:

1. To examine whether the ASEAN stock markets are integrated.
2. To determine which of the ASEAN stock markets are strongly integrated.

1.6.Research Contribution

1. Writer

   This research can give positive contributions for the writer, mainly concerning knowledge of the co integration of ASEAN stock markets, the data of which has been provided by each ASEAN countries' statistical centre. This research paper also provides the writer with the opportunity to practice systematic analytical thought.

2. Other Parties

   This research will be useful for other parties who want to conduct further research. It can be a reference for them in making their report.

3. Requirement

As the partial fulfillment of the requirements in order to obtain the Bachelor Degree in International Program of the Faculty of Economics, Universitas Islam Indonesia.

1.7.Definition of Terms

The following describes the definition of terms used in this research and the title of this thesis in order to have clear understanding.

1. Capital Market

   A financial market that trades bonds, stocks, or any other long-term financial instruments used by businesses to raise funds. The term "capital" comes from the notion that business commonly gets their funds to finance investment in capital from these markets.

2. Stocks

   A supply of money that a company has raised. This supply comes from people who have given the company money in the hope that the company will make their money grow.

3. Stock Market

   The market in which shares are issued and traded either through exchanges or over-the-counter markets. Also known as the equity market, it is one of the most vital areas of a market economy as it provides companies with access to capital and investors with a slice of ownership in the company and the potential of gains based on the company's future performance.

4. The Foreign Exchange Rate

   The price at which one country's currency exchanges for the currency of another country.

5. Capital Loss

   The decrease in the value of an investment or asset.

6. Capital Gain

   The amount by which an asset's selling price exceeds its initial purchase price. A realized capital gain is an investment that has been sold at a profit. An unrealized capital gain is an investment that hasn't been sold yet but would result in a profit if sold. Capital gain is often used to mean realized capital gain. For most investments sold at a profit, including mutual funds, bonds, options, collectibles, homes, and businesses, the IRS is owed money called capital gains tax

7. Efficient markets theory

   The application of rational expectations to the pricing of securities in financial markets.

1.8. Organization of Thesis

- Chapter I

  This chapter explains the reason for choosing the co integration of ASEAN stock market as the topic of this thesis, and the way to analyze the model.

- Chapter II

  Describe the overview of ASEAN stock market condition.

- Chapter III

  This chapter reviews previous research about stock market co integration.

- Chapter IV

  This chapter explains theories as a fundamental basic to this thesis, i.e. the co integration of stock market.

- Chapter V

  This chapter explains the research methods to use in data analysis.

- Chapter VI

  This chapter is the core of this thesis; it includes data analysis and data testing.

- Chapter VII

  This chapter consists of the conclusion and discussion of the implications.

CHAPTER II

ASEAN CAPITAL MARKET OVERVIEW

2.1 ASEAN Stocks Market

This Chapter provides background information on several major ASEAN stock exchanges. Apart from being large, and therefore important, these markets differ substantially in their structure, their surrounding financial industry, and the legal environment. With regard to each market, we provide some basic information, particularly on its international activity.

2.1.1. Indonesian Capital Market

The capital market became an alternative source of relatively low-cost, long-term funding from the 1980s. However, even though the capital market can meet the requirements of the private sector, government, and state-owned enterprises, Indonesian entrepreneurs did not readily tap this source of funds. Before the crisis, bank financing dwarfed financing through the capital market. For example, in 1991 the value of bank loans was ten times the value of equity issues. Since July, 1997, though, bank lending has been declining and capital market financing has become more important for the business sector. In 2001, the value of bond and share issues reached almost three-fourths the value of bank lending (Herwidayatmo, 2001).

It is recognized that excessive dependence on bank borrowing by Indonesian businesses resulted in a mismatch, with long-term investments being financed with short-term bank loans. Such a risky situation contributed to the protracted economic crisis.

To reduce this mismatch, the role of the dominant supplier of funds from business should shift from the banking sector to the capital market.

2.1.2. Malaysia Capital Market

Malaysia, a middle-income country, transformed itself from 1971 through the late 1990s from a producer of raw materials into an emerging multi-sector economy. Today, about a quarter of all Malaysian's exports are electronic products. (www.abacus.com)

Malaysia's stock market also presents opportunities. Currently, private US investors cannot purchase Malaysian shares (not even ADRs or pink-sheet stocks), which is a plus sign for intelligent investors to be front-runners. Malaysia's plantation companies, transportation companies, and companies related to tourism would be the main source of income.

From a foreign perspective it's a signal of change. Malaysia has managed the equivalent of $316 million in stocks and bonds at Hwang-DBS Asset Management Sdn. in Kuala Lumpur. This heralds a new beginning for the country.

2.1.3. Philippine Capital Market

The formal Philippine capital market is one of the oldest in Asia. The Manila Stock Exchange was established in 1927. Gold and copper mining stocks dominated trading during the first five decades of operation, and trade in oil stocks caused a boom in the late 1970s. A rival financial group established a second stock exchange in 1963.

After years of conflict, the government induced the two exchanges to merge in 1994 to form the Philippine Stock Exchange (PSE). The stock market took on increasing importance in the late 1980s. In the five-year period beginning in 1987, total market capitalization grew from $3 billion to $14 billion (Asian Economic News, 2000).

This resulted both from bidding up prices of existing issues and major new offerings, such as from privatization of the Philippine National Bank and by the property-holding Ayala Corporation. Despite major fluctuations, as with a coup attempt in 1989, the market continued to boom, with capitalization jumping to $40 billion by 1993 and doubling again by 1996 to $81 billion. But the market lost more than half its value in dollar terms following the crash in Asian financial markets. It ended 1997 at $36 billion. A government regulatory body, the Philippine Securities Exchange Commission (SEC), was formed in 1936. In its oversight of securities markets, the SEC operated on the principle of "merit regulation."

Under this approach, the commission had to give its approval prior to public issuance of stock in any company. After reviewing and valuating the company's offering, the SEC would set the price at which the issue could be sold. The commission did not conduct surveillance or actively regulate the stock exchange. Units within the SEC frequently had overlapping responsibilities, and staff had little or no knowledge of regulations or the techniques required to conduct tasks. The commission chairman made all major decisions.

2.1.4. Singapore Capital Market

The Singapore stock market was operated jointly with Malaysia until 1973, and until 1989, Malaysian companies were listed on both stock exchanges. Later Malaysian and international shares were traded through electronic trading in Central Limit Order Book [CLOB], which was closed after 1998. The growth is gradual; the increase in market capitalization is high, though dominated by a small number of enterprises of the state or statutory boards. Singapore therefore has large companies but fewer than those listed in Malaysia. The majority of the shares in these SOEs were held by one of the four government holding companies (The Library of Congress Country Studies; CIA World Fact book).

At the close of 1999, there were 370 companies listed on the stock market with total market capitalization of Sp$434 billion, 3.4 times the GDP for that year. Of this market capitalization, 27 per cent is held by one single government holding company, Temasek Holdings.

This domination by the state has persisted from the 1970s. The few privatizations undertaken since 1987 have helped to stimulate trading. This was particularly keen in 1993 with the listing of Singtel. Thus market capitalization leapt from US$48.8 billion to US$132.7 billion between 1992 and 1993.2 between 1990 and 1994, trading value had risen from US$20.2 billion to US$81.0 billion.

Foreign counters accounted for 20 per cent of the total market capitalization in 1988-92.3 In addition, there was secondary listing of foreign stocks denominated in foreign currencies.

CHAPTER III

REVIEW OF RELATED LITERATURE

This chapter discusses capital market co integration and factors that influence it. Because the writer intends to analyze the capital market of each ASEAN country related with the co-integration of the ASEAN capital market as a whole, the previous research included in this chapter is about co-integration of capital markets and the factors that influence it.

Soebagiyo and *Prasetyowati* (2003) study the factors that influence the Indonesian Stock Price Indices. They use annual data from the years 1998 to 2002. Stock Price Indices is used as the dependent variable, while for independent variables, they use the sum of money velocity, deposit interest rate, exchange rate, and inflation. For the trial they apply *Partial Adjustment Model*. The conclusion from their research is that there are four variables that influence the Stock Price Indexes that are; inflation variable, the sum of money velocity, interest rate, and previous month stock price indices. Those four variables, except the exchange variable, influence α = 0.05.

Furthermore, *Astuti* (2000) observes the macro analysis of capital market performance using Error Correction Model Approach, using monthly time series data from the years 1996.01 to 1999.11. The capital market performance is reflected by the fluctuation of Stock Price Indices' value, which are very much influenced by Macroeconomics variables, that are; exchange value, which will determine the investment profit level from capital market; public funds from banking sector, as the capital market's main competitor as a source of collecting public funds; and interest rates inside and outside the country, which are considered as an opportunity cost for capital owners that invest their money in the capital market. The analysis model used by Astuti is monetary crisis *dummy* variable, which becomes a shock, then the Error Correction Model is produced. The conclusion from this research is that capital market performance is significantly influenced by the variables of exchange; public funds position; real deposit interest rate; and foreign interest rate, with a monetary crisis dummy variable shock since August 1997. In a short period of time, capital market performance is determined by the variables exchange, public funds position, and real deposit interest rate, while the exchange variable has a negative relationship to capital market performance.

At the same time, *Desak Putu Suciwati* and *Mas'ud Machfoeds* (2000) examine the influence of the Indonesian Rupiah exchange rate to the stocks return. They conduct an empirical study in Jakarta Stock Exchange-registered manufacturing enterprises, by using secondary data samples from manufacturing enterprises registered in the Jakarta Stock Exchange from 1994 to 2000. The independent variables they use are the real effective exchange rate and total debt as a control, while the dependent variables are the cumulative abnormal return and earning per share. This research uses a difference-test analysis for regression model in two different periods including the *Chow difference-test* and *the classic assumption test*. The conclusion drawn by them is that Rupiah exchange rate fluctuation will cause a profitable and loss exchange risk. If the Rupiah value fluctuates in normal conditions, the risk to cash flow and company value is considered profitable, on the other hand, when Rupiah depreciation occurs, the risk to cash flow and company value is considered to be a loss.

In addition to the issue of capital market integration, *Osamah Al-Khazali, Ali F.Darrat,* and *Mohsen Saad* (2006) study the intra-regional integration of the GCC stock markets: the role of market liberalization. It examines empirically whether, and to what extent, equity markets in the Gulf Cooperation Council (GCC) are integrated inter-regionally. The study focuses on four

GCC countries, namely, Saudi Arabia, Kuwait, Bahrain, and Oman. It examines stock price indexes in these four GCC countries on a weekly basis over more than a nine year period from October 1994 to December 2003 (482 weekly observations). This study uses weekly (as opposed to daily) data to avoid potential problems with non-trading, non-synchronous trading or bid/ask spreads. They use the Johansen-Juselius (1990) cointegration test and unit root tests. Non-stationary variable is characterized with time-varying stochastic properties.

It resulted as the four equity markets of the Gulf become more integrated intra-regionally, opportunities for long-term gains from portfolio diversification across these markets are likely to disappear. However, the prospects for short-term diversification gains remain possible especially if the relatively high average returns in the Gulf markets achieved in recent years persist and transaction costs continue to fall resulting from efforts to reform and liberalize capital markets in the region.

This research concerning the co integration between the stocks markets of ASEAN countries, that are; Indonesia, Singapore, Malaysia and the Philippines. We use quarterly data, from years 1990 to 2004 by applying the Johansen co integration analysis model. The dependent and independent variables are substitutable, that are; Indonesian, Singaporean, Malaysian, and the Filipino stock price indexes.

The dependent variable used in most of the research above is ER (exchange rate), while the independent variables are: deposit interest rate, earning per share, foreign interest rate, and inflation rate. The estimation models typically used are:

1. *ECM (Error Correction Model)*
2. *PAM (Partial Adjustment Model)*

3. *Chow Test, difference-test*

4. *Classic assumption test.*

In this thesis, the writer would like to do something different by applying the ARDL analysis model, using Indonesian, Malaysian, the Philippine and Singapore stock price index reversibly used as dependent and independent variables.

Table 1.Summary of Literature Review

No	Authors & Year	Objectives	Model	Variable	Data	Results
1.	Daryono Soebagiyo and Endah Heni Prasetyowati (2003)	Study the factors that influence the Indonesian Stock Price Indices.	*Partial Adjustment Model.*	Stock Price Indices is used as the dependent variable, while the independent variables they use are sum of money velocity, deposit interest rate, exchange rate, and inflation.	Annual data from years 1998 to 2002	There are four variables that influence the Stock Price Indices that are; inflation variable, the sum of money velocity, interest rate, and previous month stock price indices. Those four variables, except the exchange variable, influence $\alpha = 0.05$.
2.	Rini Dwi Astuti (2000)	Study macro analysis of capital market performance using Error Correction Model Approach	Monetary crisis *dummy* variable, which become a shock, then Error Correction Model is being made.	Exchange value that will determine the investment profit level from capital market; public funds from banking sector as the capital market's main competitor as a source of collecting public funds; and	Monthly time series data from 1996.01 to year 1999.11.	The capital market performance is significantly influenced by exchange variable; public funds position; real deposit interest rate; and foreign interest rate, with a monetary crisis dummy variable shock since August 1997. In a short period

				interest rates inside and outside the country, which are considered as an opportunity cost for capital owners that invest their money in the capital market		of time, capital market performance is determined by exchange variable, public funds position, and real deposit interest rate, while exchange variable has a negative relationship to capital market performance.
3.	Desak Putu Suciwati and Mas'ud Machfoeds (2000)	Examine the influence of Rupiah exchange rate to the stocks return in an empirical study of Jakarta Stock Exchange-registered manufacturing enterprises.	Difference-test analysis for regression model in two different periods includes the *Chow Test*, *difference-test* and *classic assumption test*.	The independent variable is the real effective exchange rate and total debt as a control, while the dependent variable is the cumulative abnormal return and earning per share.	Secondary data (samples of manufacturing enterprises registered in the Jakarta Stock Exchange from 1994 to 2000).	Rupiah exchange rate fluctuations will cause profit and loss exchange risks. If the Rupiah fluctuates in normal conditions, the risk to cash flow and company value is considered profitable, on the other hand, when Rupiah depreciation occurs, the risk to cash flow and company value is considered to be a loss.

4.	Osamah Al-Khazali, Ali F.Darrat, and Mohsen Saad (2006)	Study about intra-regional integration of the GCC stock markets with the role of market liberalization. It examines empirically, whether, and to what extent, equity markets in the Gulf Cooperation Council (GCC) are integrated inter-regionally.	The Johansen-Juselius (1990) cointegration test and unit root tests.	Non-stationary variable is characterized with time-varying stochastic properties.	Weekly (as opposed to daily) data to avoid potential problems with non-trading, non-synchronous trading or bid/ask spreads.	As the four equity markets of the Gulf become more integrated intra-regionally, opportunities for long-term gains from portfolio diversification across these markets are likely to disappear. However, the prospects for short-term diversification gains remain possible especially if the relatively high average returns in the Gulf markets achieved in recent years persist and transaction costs continue to fall resulting from efforts to reform and liberalize capital markets in the region.

CHAPTER IV

THEORETICAL FRAMEWORK

This chapter discusses about the basic theories of this thesis and will give description in guiding the writer also the reader to figure out about the next chapter.

4.1. Theoretical Background.

4.1.1 Market Integration

Market Integration is the development of free market among number of countries with the purpose of gaining benefit from international specialization. (Collin's Economic Dictionary) There are four kind of market integration varying from untied trade partner association to fully integrated country group. **(Egger, Falkinger, Grossmann, 2005)**

1. Free Trade Area

   The member gets rid of the trade barrier among them, but still operate particular barrier to those which are not member countries.

2. Customs Union

   The member gets rid of the trade barrier among them and create similar barrier to those which are not member countries such as one general external tariff.

3. Common Market

   Common market is one customs office alliance that giving free space for labor and capital to go off the national border.

4. Economic Union

This is a general market that integrates the member's general purpose concerning the economic growth, and also the harmonization of monetary and fiscal policy, along with other policies.

4.1.2 Measuring financial integration.

Financial markets are integrated when the law of one price holds. This states that assets generating identical cash flows command the same return, regardless of the domicile of the issuer and of the asset holder (www.wikipedia.com) given this definition, financial market integration can be measured by comparing the returns of assets that are issued in different countries and generate identical cash flows.

When identical assets command different returns one would tend to conclude that financial markets are not integrated, for instance because legal barriers prevent capital from freely flowing between countries. Such barriers may reflect capital controls, tax codes, accounting and auditing differences, different bankruptcy law, different quality of judicial enforcement, etc. However, some caution is warranted. Countries may share a common legal and regulatory framework, but still identical assets may command different returns. Beyond legal barriers, there might be economic barriers, for instance situations of asymmetric information that induce investors to evaluate differently assets that are otherwise identical.

A pre-requisite for measuring financial market integration is the identification of assets generating identical cash flows. Lacking this, one might consider slightly different assets, provided it is possible to control for the differences in the risk associated with their cash flows. If one fails to identify identical assets, or does not correct appropriately for their risk differences, one will conclude that financial markets are segmented even when they are in fact integrated. This highlights the crucial role of a specific asset and therefore to a specific market. Consider the credit market, the market for fixed-income securities and the stock market. For each of them, measurement of financial integration is based on asset returns and prices, while others are based on asset quantities. The latter may be flow measures, such as international capital flows, or stock measures, such as the amount of cross-border holdings of debt and equity.

The quantity need to be emphasized, despite the fact that the law of one price has no obvious concern for that. Nevertheless, these measures are of interest. In a system with no financial barriers, the domicile of assets issuers and holders should play a decreasing role over time.

Flow and stock measures may allow us to assess whether such a process is taking place or not. Finally, the literature has considered also direct or indirect measures of financial integration. Several studies consider the effects of financial market integration on households' choices, for example the portfolio choice between home and foreign assets. Still others analyze its effects on companies' choices, such as mergers with foreign companies or acquisitions of foreign subsidiaries.

Further measures of integration are based on broad market characteristics, e.g. the size of equity, bond and bank markets, or the cross-border penetration of commercial banks and other financial institutions.

On financial integration, we can classify existing indicators of financial integration into four broad categories:

a) Indicators of credit and bond market integration;
b) Indicators of stock market integration;
c) Indicators of integration based on economic decisions of households and firms.
d) Indicators of institutional differences that may induce financial market segmentation.

One can then evaluate existing indicators according to four criteria. Firstly, the availability of data needed to construct the considered indicators. Secondly, the reliability of the data on which these indicators are based. Thirdly, the economic meaning of the indicators. Finally, the ease with which they can be constructed and updated.

When evaluating the indicators against the above criteria, indicators based on price and return data tend to dominate indicators based on quantities, i.e. stock or flow data. Price data are more easily available and more accurate. Moreover, with reference to the law-of-one-price, price-based indicators also have a clear-cut interpretation, which is often lacking for quantity indicators when based on flow data. Quantity indicators based on stock data, however, sometimes can be interpreted in the light of portfolio theory and thus deserve serious consideration.

From a methodological viewpoint, whenever theoretical benchmark values for the indicators are available, one can analyze financial market integration in terms of β-convergence and σ- convergence. These concepts have been developed in the economic growth literature but can be adapted for measuring financial market integration. β-convergence measures the speed of adjustment of deviations of countries to the long-run benchmark value. σ-convergence measures if countries tend to become more similar over time in terms of deviations from the benchmark. (Pagano, 2007)

4.1.3 Indicators of Market Integration

The first set of indicators includes interest-rate differentials to analyze the degree of convergence in the interbank market, the government bond market, the mortgage market, and the short-term corporate loan market in the ASEAN.

In the government bond market (maturity of 10 years) there are signs of increased β-convergence and σ-convergence. However, the largest part of the reduction of interest rate differentials took place already. There is also evidence that convergence in the ASEAN zone is stronger. Overall, convergence is almost achieved in this market.

In the mortgage market there is evidence of β-convergence, which gains strength. But the degree of σ-convergence is weak and does not increase after. This can be taken as evidence that mortgage markets are not yet fully integrated.

Also quantity-based indicators of money market and bond market integration have been produced, using data on the international portfolio composition of institutional investors.

The analysis of money market funds reveals that in most countries money market funds moved to an international investment strategy, which indicates a high degree of integration and confirms the findings based on interest rate differentials.

The analysis of bond market funds indicates that the bond market is less integrated than the money market. While in some ASEAN countries the adoption of the US Dollar caused a strong shift towards internationally investing bond funds, these developments are not equally strong everywhere.

Price-based indicators of credit market integration have been computed using data on bank charges' differentials for cross-country credit transfers. The proposed indicators provide only limited evidence in favor of convergence. While the within-country dispersion of foreign bank transfer charges decreases, the average cost of cross-country transfers does not appear to converge across countries. Moreover, costs depend on the direction of the bank transfer, suggesting that credit markets in ASEAN be not fully integrated yet.

Finally, quantity-based indicators of credit market integration have been considered. A first set of indicators considered the importance of foreign banks in terms of the number of foreign banks present in the domestic markets and the overall share of assets held by foreign banks. These indicators provide little evidence of increased banking market integration.

Foreign banks play a marginal role for the national banking systems. Moreover, Singapore is the only country with a significant increase in the number and asset share of foreign banks.

A second set of indicators considered cross-border lending and borrowing as an alternative way of achieving credit market integration. In particular, the shares of foreign assets and liabilities held by each national banking sector have been evaluated relative to a benchmark portfolio to assess the degree of the home bias in these portfolios:

Overall, this set of indicators suggests that convergence is achieved in the money market and government bond market. In contrast, most indicators of credit market integration suggest that progress in financial integration has so far been modest and is still far from being complete.

4.1.4 Indicators of Stock market Integration

There are some important indicators to measure the stock market integration. Each of them is related to one another:

1. Price-based indicators of stock market returns.

   Since asset pricing models are difficult to estimate and require long time series to provide reliable estimates, one can consider the correlation of stock market returns as an alternative indicator, mainly due to its simplicity. Given the instability of the indicator and the questionable economic interpretation of ex-post return correlations, it appears unwise to draw any conclusions based on such kind of indicators.

2. Quantity-based indicators of stock market integration.

   It can be built based on the international investment strategy of equity funds. Such indicators show an increasing degree of stock market integration in the ASEAN area:

   - The analysis of the investment fund industry reveals that the share of equities that is managed by funds with an international investment strategy increased for the ASEAN countries.
   - The evidence based on the analysis of the share of foreign equities in pension funds is similar. Most countries saw an increase in the share of foreign equities. Unfortunately, data availability problems prevent a timelier monitoring of these developments.
   - These results are further confirmed by evidence on the share of foreign assets held by insurance companies. Again, data availability problems preclude an analysis of more recent developments.

4.1.5 Why using Stock Price Index as indicators of Stock Market Co Integration?

Stock price indexes are useful for benchmarking portfolios, for generalizing the experience of all investors, and for determining the market return used in the Capital Asset Pricing Model. A hypothetical portfolio encompassing all possible securities would be too broad to measure, so proxies such as stock indexes have been developed to serve as indicators of the overall market's performance. In addition, specialized indexes have been developed to measure the performance of more specific parts of the market, such as small companies.

It is important to realize that a stock price index by itself does not represent an average return to shareholders. By definition, a stock price index considers only the prices of the underlying stocks and not the dividends paid. Dividends can account for a large percentage of the total investment return.

4.1.6 Weighting.

One characteristic that varies among stock indexes is how the stocks comprising the index are weighted in the average. Even if no explicit weighting is applied when calculating an average, there may be an implicit one. While a one dollar price change in one stock in a simple stock price index will have the same effect as a one dollar change in any other stock, a given percentage increase of a higher price stock influences the index more than a corresponding percentage increase of a lower price stock. For example, a 1% change in a $100 stock will change the index more than a 1% change in a $10 stock. For this reason, indexes that are based on the simple summation of stock prices are referred to as *price-weighted*.

In a price-weighted index, a change in the stock price of the largest company in the index would influence the average no more than an equal change in the stock price of the smallest company in the index. However, the larger company's performance will have a greater impact on the economy. To consider the size of a company, a *market capitalization weighted* index (or *value-weighted* index) can be used, in which a company's impact on the index is proportional to the size of the company.

In value-weighting, in effect the market capitalization of the stocks influences the index, not the prices. For this reason, there is no need to adjust for stock splits.

Some indexes do not weight for market capitalization, but do adjust for price differences to remove the implicit price weighting. This unweighted method tracks the performance of an index in which equal dollar amounts are invested in the underlying stocks. Some consider an unweighted index to be a good indicator of the market's performance from the perspective of the investor who places an equal amount of money in each stock in his or her portfolio, regardless of its market capitalization. However, if every investor placed an equal amount of money in each investment, relatively few investors would own small-cap stocks, so an unweighted index would not reflect the portfolio performance of the average investor when all investors are considered.

4.1.7 Hypothesis

Some previous research (Chan et al., 1992; DeFusco et al., 1996; Masih et al., 1999) document that stock markets in the Asian region are interdependent not only among themselves, but also with some of the developed market. Furthermore, those stock markets are even more interdependent during and after financial crises (Sheng et al., 2000; Yang et al., 2003)

In the case on the ASEAN, Palac-McMiken (1997:299) reports the existence of co integration in the countries' stock markets, except Indonesia, before the 1997 crisis. In contrast, Roca (2000:145) finds the existence of interdependency among ASEAN's stock markets in the short run, but not significantly related in the long run before the 1997 crisis.

Therefore, based on these findings, it is hypothesized that the four ASEAN's stock markets (Indonesian, Malaysian, Philippine, and Singaporean) are interdependent toward each other.

CHAPTER V

RESEARCH METHOD

5.1 Introduction

This chapter presents the empirical methods employed in this research. Before proceeding to bound testing co integration based on ARDL, the researcher conducts unit root test on the variables used the Augmented Dickey Fuller (ADF) Method.

5.2 Research Method

Referring to the research conducted by the previous researchers about the co integration test, we uses the same hypothesis but different variables and methods. For example; Osamah Al-Khazali, Ali F.Darrat, and Mohsen Saad (2006) analyzed the intra-regional integration of the Gulf Cooperation Council Stock Markets by applying the Johansen co integration procedure test. The purpose is to find out whether, and to what extent, equity markets in the Gulf Cooperation Council (GCC) are integrated inter-regionally. The error correction model used is to find out the existence of long run equilibrium between dependent variable and independent variables and the relationship among them. This method is to find the short run and long run relationship between dependent and independent variables in order to avoid spurious regression.

In this research, we analyze the co integration between ASEAN stock market of Indonesian, Malaysian, The Philippines, and Singaporean during period 1990:1 – 2004:2. We use unit root test to know whether the data are stationer or not and use bound test to avoid the error term in the data interpretation.

5.3 Research Subject

Indonesian, Malaysian, The Philippines and Singapore Stock Price Index are the subject of research. The data ranges are from 1990:1 – 2004:2 collected from each 4 ASEAN countries financial and monetary department website.

5.4 Research Variables

We use four variables i.e., the Indonesian, Malaysian, The Philippines, and Singapore Stock Price Index. Its position as dependent and independent variable are cyclically substituted. These data are in log form and taken from 1990:1 to 2004:2. The Johansen test is conducted to measure the co integration strength between each variable. We also use unit root test to find out whether the data are stationary or not, and bound test to get the optimum time lags.

5.5 Technique of Data Analysis

This research use Unit Root test, Co integration test and bound test based on ARDL approach. We use quantity time series data, in time series data usually show spurious correlation, because the data are not stationer and not co integrated. To avoid that problem, the test must follow the following requirements:

5.5.1. Integration Testing (Unit Root Test) or Stationery Test

This test is to find out whether the data are stationer or not. If the data are not stationer, they need to be differentiated many times to get the stationer data. The data are stationer if they follow this term:

Average : $E(Y_t) = \mu$ (constant average)

Variance : $Var(Y_t) = E(Y_t - \mu)^2 = \alpha^2$ (constant variance)

Covariance: $k = [(Y_t - \mu)(Y_t + k + \mu)]$

(Covariance between two periods depends on time length, between two periods, does not depend on the counting of the covariance).

Analyzing the time series data which are stationer has moved to average range, it means that the progress of variables point causes random factor. This test method and root square are developed by Dickey and Fuller (Df test) and Augmented Dickey Fuller (ADF test). The data are tested by the following three models:

$$\Delta Y_t = \delta y_{t-1} + U_t \qquad (1)$$

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + U_t \qquad (2)$$

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + U_t \qquad (3)$$

ADF test with maximum velocity as much as K = N. the model is:

$$\Delta Y_t = \delta y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + U_t \qquad (4)$$

$$\Delta Y_t = \beta_1 + \delta y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + U_t \qquad (5)$$

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-i} + U_t \qquad (6)$$

Tested hypothesis are:

$Ho = \delta = 0$ (non stationer data) and $Ha = \delta = 0$ (stationer data)

(Kuncoro, 2001:146).

5.5.2. Johansen Co Integration Test

This test is to investigate the degree of linkage among variables. Since results from the Johansen test that may sensitive to the particular lag structure used in the tests, the appropriate lag profile is determined in the tests based the AIC (Akaike Information Criterion) is conjunction with the added requirement that the resulting errors must also be white noise. The Johansen co integration test is based on the following model:

$$\Delta xt = \sum_{i=1}^{p-i} \Gamma i \, \Delta \, xt\text{-}i + \pi \, xt\text{-}i + \varepsilon t \quad (1)$$

Where xt and εt are (n x 1) vectors, π is an (n x n) matrix of parameters, and p is the lag length. The Johansen methodology requires estimating models 1 and examining the rank of matrix π. If rank (π) = 0, there is no stationary linear combination of the $\{xl/t\}$ process, that is, the variables are not cointegrated. Since the rank of a matrix is the number of non-zero eigenvalues (λ), the number of $\lambda > 0$ represents the number of contegrating vectors among the variables. The following two statistics can be used to test for non-zero eigenvalues:

$$\lambda trace\,(r) = -T \sum_{i=r+1}^{n} \ln\,(1 - \lambda i) \qquad (2)$$

$$\lambda max\,(r, r+1) = -T \ln\,(1 - \lambda r{+}1) \qquad (3)$$

Where λi is the estimated eigenvalues, T is the number of valid observations, n is the lag length, and r is the number of cointegrating vectors. Note that λtrace statistic is simply the sum of λmax statistic. In equation 2, λtrace tests the null hypotheses that the number of distinct cointegrating vectors is less than or equal to r against a general alternative.

The λmax statistic tests the null hypothesis of r cointegrating vectors against $r + 1$ co-integrating vectors. Johansen and Juselius (1990) derive the critical values of λtrace and λmax by simulation method.

5.5.3. ARDL (Autoregressive Distributive Lags) Approach

ARDL method is to test the existence of a level relationship between a dependent variable and a set of regressor when it is known with certainty whether the underlying regressor is trend or first difference stationary. The proposed test is based on standard F and t-statistic used to the significance of the lagged levels of the variables in a univariate equilibrium correction mechanism. The asymptotic distribution of this statistic is non standard under the null hypothesis that exists no level relationship irrespective of whether the regressors are I (0) or I (1).

Two sets of asymptotic critical values are provided: one is when all regressor are pure I (1), and the other is if they are pure I (0). These two sets of critical values provide a band covering all possible classifications of the regressor into pure I (0), pure I (1) or mutually cointegrated. Accordingly, various bounds testing procedures are proposed. It is shown that the proposed test is consistent, and their asymptotic distribution under the null and suitable defined local alternatives is derived.(Pesaran & Shin, 2001)

5.5.4.1 Bound Test based ARDL approach.

In order to test the absence of a level in data that affects in the absence of level relationship between Yt and Xt, it differentiates among five cases of interest delineated according to how the deterministic components are specified, and these five cases are presented in tables of bound test (see appendix) by Pesaran to detect the co integration. The cases are:

a. Case I (no intercepts, no trends) co = 0 and c1 = 0. That is $\mu = 0$ and $\gamma = 0$.

$$\Delta\gamma_t = \pi\ yy\ y_t - 1 + \pi\ yx.x\ X_{t-1} + \sum_{i=1}^{p-1} \psi i\ \Delta z_{t-1} + \varpi\ \Delta x_t + \mu_t$$

b. Case II (restricted intercepts, no trend) co = -(π yy, π yx.x) μ $c_1 = 0, \gamma = 0$

$$\Delta\gamma_t = \pi\ yy\ (\gamma_{t-1} - \mu_y) + \pi\ yx\ (x_{t-1} - \mu_x) + \sum_{i=1}^{p-1} \psi i\ \Delta z_{t-1} + \varpi\ \Delta x_t + \mu_t$$

c. Case III (Unrestricted intercepts, no trends) co $\neq$ 0, c1 = 0. $\gamma = 0$.

The intercept restriction co = -(π yy, π yx.x) is ignored

$$\Delta\gamma_t = co + \pi\ yy\ y_{t-1} + \pi\ yx.x\ x_{t-1} + \sum_{i=1}^{p-1} \psi i\ \Delta z_{t-1} + \varpi\ \Delta x_t + \mu_t$$

d. Case IV (unrestricted intercepts, restricted trends) co $\neq$ 0 and

c_1 = -(π yy, π yx.x) γ

$$\Delta\gamma_t = co + \pi\ yy\ (y_{t-1} - \gamma_y t)\ \pi_{yx.x}\ (x_{t-1} - \gamma_x t) + \sum_{i=1}^{p-1} \psi i\ \Delta z_{t-1} + \varpi\ \Delta x_t + \mu_t$$

e. Case V (unrestricted intercepts, unrestricted trends) $co \neq 0$ and $c_1 \neq 0$

The deterministic trends restriction $c_1 = -(\pi\, yy, \pi\, yx.x)\, \gamma$ is ignored.

$$\Delta\gamma_t = co + c_1 t + \pi\, yy\, \gamma_{t-1} + \pi_{yx.x}\, x_{t-1} + \sum_{i=1}^{p-1} \psi i\, \Delta z_{t-1} + \varpi\, \Delta x_t + \mu_t$$

The five cases above are to determine the F statistic of bound test cointegration among variables in given lags. If the computed F statistic is larger than the critical value of bound test of level relationship table, it is cointegrated I (1), on the other hand, if the computed F statistic is less than critical value, it is not co integrated. To detect the long run relationship between the four ASEAN countries stock markets, we employ autoregressive distributed lag cointegration procedure by Pesaran et. al. (1996), we also apply different model selection criteria to test the consistency of the variables.

We start with testing the null of no cointegration against the existence of a long run relationship. Unlike other co integration techniques (e.q., Johansen procedure) which require certain pre testing for unit roots, and that the underlying variables to be integrated in order one, the ARDL models provide an alternative test for examining a long run relationship whether the underlying variables to be integrated I (0), I (1), or fractionally integrated. Accordingly, the null hypothesis of no cointegration (as defined by $Ho = n_1 = n_2 = 0$) is tested against the alternative by means F test. The asymptotic distributions of F statistic are non-standard irrespective of whether the variables are I (0) or I (1). Pesaran provides two sets of asymptotic critical values. One set assumes that all variables are I (0) and the others are I (1).

If the computed F statistic falls above the upper bound critical value, the null hypothesis of no cointegration is rejected. If it falls below the lower bound, the null hypothesis cannot be rejected. Finally, if it falls inside the critical value band, the result would be inconclusive. Once co integration is confirmed, we move to the second stage and estimated the long run coefficient of cointegration function and the associated ARDL error correction model.

5.5.5. Diagnostic Test

This test is to find out whether the data have heterocedasticity, correlation, normality, and functional form problems or not. Diagnostic test is calculated from ARDL through Autoregressive Distributed Lag Estimates. When the result of LM version is more than 10% (0.10), it means that there is rejection of the problem. When LM version is less than 10% (0.10) it means that there is no rejection of the problem.

5.5.6. Coefficient Stability Test CUSUM and CUSUM Square

The CUSUM test make use of the cumulative sum of recursive residuals based on the first set of *n* observations and is updated recursively and plotted against break points. If the plot of CUSUM statistics stays within the critical bounds of 5% significance level represented by a pair of straight lines drawn at the 5% level of significance whose equations are given in Brown, Durbin, and Evans (1975), the null hypothesis that all coefficients in the error correction model are stable cannot be rejected.

If either of the lines is crossed, the null hypothesis of coefficient constancy can be rejected at the 5% level of significance. A similar procedure is used to carry out the CUSUMSQ test, which is based on the squared recursive residuals. If the entire coefficient is relative stable after the test, it shows that the coefficient of variables relationship is quite significant in term of causation relationship.

CHAPTER VI

DATA ANALYSIS

6.1 Introduction

This chapter presents the data analysis. It describes the result of a unit root test, Johansen co integration test, as well with the result of co integration test using bounds test based on ARDL (autoregressive distributive lag) approach.

6.2 Data Analysis

The data used are quarterly data from 1990:1 until 2004:2 period (table a). Before regressing the data, we transform the data into log. The log transformation can reduce the problem such as heteroscedasticity. It compresses the scale in which the variables are measured, thereby reducing a tenfold difference among two values to a twofold difference (Gujarati 1995). We use computer program Eviews and Microfit to interpret the data. The result interpretation begins with stationery data test by using Augmented Dickey Fuller as condition to apply the bound test. Before applying the bound test, a Johansen co integration test is conducted with stationery data to avoid spurious result. In this research, a new approach is also developed to the problem that is testing the existence of a level relationship between a dependent variable and a set of regressors.

The proposed tests are based on F statistics, and they are used to test the significance of lagged levels of the variables in a univariate equilibrium correction mechanism. Once co integration was confirmed, the test moves to the second stage and estimates the long-run coefficients of co integration and the associated ARDL error correction models. Finally, we examine the stability of the long-run coefficients together with the short-run dynamic. We follow Pesaran and Pesaran (1997) and apply the CUSUM and CUSUMSQ to check the coefficient stability [Brown, Durbin, and Evans (1975)].

6.2.1 Unit Root Test ADF

An Augmented Dickey-Fuller (ADF) unit root test is employed to test the stationarity between dependent and independent variables. Then they are employed at the level and first difference of each series in length of lag 4. The results of the ADF at level are reported in Table 2, by taking into consideration the trend variable and no trend variable in the regression. Based on Table 2(a), the t-statistics for all series from ADF tests is statistically insignificant to reject the null hypothesis of non-stationary at 5% significance level. It indicates that all of these series are non-stationary. Therefore, these variables contain a unit root, or they share a common stochastic movement. When the ADF test conducted on the first difference of each variable, the null hypothesis of non-stationary is rejected at 5% significance level as shown in Table 2(b).

Therefore, all the data series are integrated in degree 1. Johansen co integration test will be valid if the data used is non-stationary. As shown in the table 2.a that the data are non-stationary, so it is possible to do the Johansen co integration test. Before stepping to bound test, it is also important to do unit root test, in order to know whether the data is stationary or not in the same degree.

Table 2. Unit Root Test for Logina, Log Malay, Log Phil, Log Sing

a. Augmented Dickey Fuller Test at Level (lag length = 4)

Variable	**ADF test statistic**	**Critical Value at 5%**
Log Ina	-0.457320	-2.9167
Log Malay	-2.627053	-2.9167
Log Phil	-0.127077	-2.9167
Log Sng	-2.744231	-2.9167

Notes: * the ADF value is less than the critical values at all significance level.

b. Augmented Dickey Fuller Test at 1st difference (lag length = 4)

Variable	**ADF test statistic**	**Critical Value at 5%**
Log Ina	-3.021906	-2.9178
Log Malay	-3.530240	-2.9178
Log Phil	-3.589990	-2.9178
Log Sng	-3.473595	-2.9178

Notes: * the ADF value is larger than the critical values at all significance level.

6.2.2 Johansen Co integration Test

Since the variables are integrated in order one (table 2b), the Johansen co integration test is conducted. It is to examine whether the four variables are co integrated or not. From table 3, we can see that the likelihood ratio of hypothesis CE at none is 56.29040 > critical value at 5% (47.21) and 1% (54.46), so there is a rejection of no co integration hypothesis. The likelihood ratio of hypothesis CE at most 1 is 22.42787 < critical value at 5% (29.68) and 1% (35.65), so there is no rejection and has co integration at most one, which means only one co integration occurs.

Table 3. Johansen Co integration Test (Lags interval 1 to 4)

Eigenvalue	Likelihood Ratio	5% critical value	1% critical value	Hypothesis No of CE
0.472135	56.29040	47.21	54.46	None
0.274732	22.42787	29.68	35.65	At most 1
0.096524	5.403564	15.41	20.04	At most 2
0.000448	0.023751	3.76	6.65	At most 3

6.3 Autoregressive Distributive Lag (ARDL) Framework

The next analysis is dynamic error correction model test using ARDL method. It is conducted because the Johansen co integration test has a weakness, which is even all data are stationery. This test only examines the existence of co integration among variables, but it does not suggest the direction of causation and whether the relation constitutes a co integration function or not.

Then we regress the variables into the co integration test through ordinary least square. After that, we regress the variables into the long run estimation and ECM from co integration test result through ARDL approach.

This approach is to testing the existence of a relationship between variables in levels which is applicable irrespective of whether the underlying regresses are purely I(0), purely I(1) or mutually co integrated. The statistic underlying this procedure is the familiar F-statistic.

In general, Dickey Fuller type regression is used to test of lagged levels of the variables under consideration in a conditional unrestricted equilibrium error correction model (Pesaran and Shin, 1994).

6.3.1 ARDL Based Co integration Test

a. Bound Test Approach to Co integration

This stage involves testing for the existence of a long-run equilibrium relationship between 4 ASEAN stock market within a univariate framework. In order to test for the existence of any long-run relationship among the variables, we use the bound test approach to co integration.

One of the benefits of the bound test approach to co integration is that there is a single long-run relationship that can identify which variable is the dependent variable. Furthermore, this approach can be applied to the data which are stationery or non stationery.

The ARDL method of co integration analysis is unbiased and efficient, because the method is used in small samples of data such as in this research. ARDL method can estimate the long run and short run components of the model simultaneously and remove problems associated with omitted variables and autocorrelation. Finally, the ARDL method can distinguish dependent and explanatory variables. The bound test approach suggests that X and Y become co integrated when X is the dependent variable. The results of the co integration tests are presented in Table 4.

As explained in the previous chapter, these hypotheses can be examined using the standard *F* statistic. However, this study has relatively small sample sizes, those are 53 observations. With small sample sizes, the relevant critical values potentially deviate substantially from the critical values (Pesaran *et al.* (2001).

Table 4. Bounds F Statistic for Co integration Relation

1). Bounds F Statistic for Co integration Relation

Dependent Variable	**F Statistics**
LOG INA	2.3941
LOG MLY	5.7799
LOG PHIL	0.99157
LOG SNG	6.7921

The relevant critical value bounds are given in Table C1.ii (with a restricted intercept and no trend; number of regressors = 3), Shin and Smith (1999). They are 2.79 – 3.67 at the 5% significance level.

Based on the table above, considering the critical value is between 2.79 and 3.67, Indonesia and the Philippine show less co integration because from the overall lags the computed F statistic is less than 2.79. Malaysia shows co integration in lag 2, which is 5.7799, while Singapore shows very strong co integration because all of the F Statistic is bigger than 3.67.

We conclude that in bound F statistic test, by using Indonesia and Philippines as the dependent variables, variables are less co integrated. Different with Malaysia stock price index as dependent variable, there is co integration between variables in lag 2. While using Singapore stock price index as dependent variable, all variables are strongly co integrated, and there is a significant long-run relationship.

6.3.2 The Long Run Stock Market Co integration Relation

a. Long run approach to Co integration

We test for the presence of long-run relationships. The quarterly data and the maximum number of lags used in the ARDL are set equal to 4. This test is to find the relationship between variables. The calculated coefficients are presented in Table 5.

Table 5. Estimated Long Run Co integration Relation of ASEAN stock market

1. Long Run Based Model Selection Criterion.

Dependent Variable	Ina	Malay	Phil	Sing	C
Ina	-	-1.0245 (-1.4802)	2.7747 (6.9411)	-6.7323 (-0.94789)	27.4123 (0.76998)
Malay	0.20999 (0.30559)	-	-0.72454 (-0.36563)	-5.3620 (-2.1768)	31.4871 (1.9454)
Phil	0.34331 (7.6205)	0.42053 (1.7016)	-	1.5436 (1.0537)	-5.8530 (-0.76547)
Sng	0.12039 (1.2289)	0.018258 (0.29654)	-0.15250 (-0.52883)	-	4.6562 (6.0519)

Notes: C stands for constant and figures in the brackets are t statistics

There is long run equilibrium stock market co integration relation and based on AIC model selection criteria, all variables are significant and stable. We try to do the calculation by adding the dummy variables, but it shows similar result (see appendix). The long run stock market co integration equation is:

Indonesia:

$$LogIna = 27.4123 - 1.0245\ Log\ MLY + 2.7747\ Log\ PHIL - 6.7323\ Log\ SNG$$

$$(0.76998) \quad (-1.4802) \quad (6.9411) \quad (-0.94789)$$

It means that there is a long run relationship between variables. The equation above shows when Indonesian stock price index increases by 1%, log Malaysia will decrease 1.0245%, log Philippine will increase 2.7747%, and log Singapore will decrease 6.7323%.

Long run equations interpret the variable relationship. Malaysia and Singapore stock markets have negative relationship to Indonesia stock market, but Philippine stock market has positive relationship with Indonesia stock market.

It means that when Malaysia and Singapore stock market decrease, Indonesia stock market will increase, while Philippine stock market increases, Indonesia stock market will increase as well.

Malaysia:

$$LogMly = 31.4871 + 0.20999\ Log\ INA - 0.72454\ Log\ PHIL - 5.3620\ Log\ SNG$$

$$(1.9454) \qquad (0.30559) \qquad (-0.36563) \qquad (-2.1768)$$

It means that there is a long run relationship between variables. The equation above shows when Malaysia stock price index increases by 1%, log Indonesia will increase 0.20999%, log Philippine will decrease 0.72454%, and log Singapore will decrease 5.3620%.

Long run equations interpret the variables relationship. Philippine and Singapore stock markets have negative relationship to Malaysia stock market, but Indonesia stock market has positive relationship with Malaysia stock market. It means that when Philippine and Singapore stock market decrease, Malaysia stock market will increase, while Indonesia stock market increases, Malaysia stock market will increase as well.

The Philippine:

$$LogPhil = -5.8530 + 0.34331\, Log\, INA + 0.42053\, Log\, MLY + 1.5436\, Log\, SNG$$

$$(-.76547) \quad (7.6205) \quad (1.7016) \quad (1.0537)$$

It means that there is a long run relationship between variables. The equation above shows when Philippine stock price index increases by 1%, log Indonesia will increase 0.34331%, log Malaysia will increase 0.42053%, and log Singapore will increase 1.5436%.

Long run equations interpret the variables relation. All three countries, those Indonesia, Malaysia, and Singapore show positive relationship to the Philippine. It means that when those three countries' stock markets increase, Philippine stock market will increase as well.

Singapore:

$$LogSng = 4.6562 + 0.12039\, Log\, INA + 0.018258\, Log\, MLY - 0.15250\, Log\, PHIL$$

$$(6.0519) \quad (1.2289) \quad (.29654) \quad (-.52883)$$

It means that there is a long run relationship between variables. The equation above shows when Singapore stock price index increases by 1%, log Indonesia will increase 0.12039%, log Malaysia will increase 0.018258 %, and log Singapore will decrease 0.15250 %.

Long run equations interpret the variable relation. In this case, only Philippine has negative relationship with Singapore. Then when Philippine stock market decreases, Singapore stock market will increase. However, when Indonesia and Malaysia stock markets increase, Singapore stock market will also increase.

6.2.3. Diagnostic Test

1). Diagnostic Test

The term of serial correlation is defined as correlation between residual of one observation in time series data or space in cross sectional data. The tool of analysis used to detect serial correlation is LM test (Lagrange Multiple Test). LM test used the level of degree χ^2 (chi square), Ho expresses that there is no serial correlation (if χ^2 statistic < value of χ^2 table) and there is a serial correlation (if χ^2 statistic > value of χ^2 table), hence Ho is rejected, and also contrary. Besides that, to get the best lag is by estimating the smallest number of Akaike Info Criterion (AIC). To detect whether there is any heterocedasticity problem or not, we use diagnostic test. If χ^2 statistic is less than the value of χ^2 table, there is no heterocedasticity problem and if χ^2 stat > the value of χ^2 table, there is a heterocedasticity problem.

Table 6. Diagnostic Test (AIC)

a. ARDL based on AIC (Log INA as dependent variable)

```
Diagnostic Tests
*******************************************************************************
*  Test Statistics  *      LM Version       *       F Version       *
*******************************************************************************
*                   *                       *                       *
* A:Serial Correlation*CHSQ(  4)=  8.1858[.085]*F(  4, 33)=  1.4741[.232]*
*                   *                       *                       *
* B:Functional Form   *CHSQ(  1)=  1.6716[.196]*F(  1, 36)=  1.1500[.291]*
*                   *                       *                       *
* C:Normality        *CHSQ(  2)= 106.7525[.000]*     Not applicable     *
*                   *                       *                       *
* D:Heteroscedasticity*CHSQ(  1)=  .060386[.806]*F(  1, 52)=  .058215[.810]*
*******************************************************************************
  A:Lagrange multiplier test of residual serial correlation
  B:Ramsey's RESET test using the square of the fitted values
  C:Based on a test of skewness and kurtosis of residuals
  D:Based on the regression of squared residuals on squared fitted values
```

In this ARDL test estimation (based on Akaike criterion) using Log INA as dependent variable, the classical assumption through the diagnostic test resulted in the serial correlation test with LM statistic is $0.085 < 0.10$ (10%) significance level, so there is autocorrelation in the model. The heterocedasticity test with LM statistic is $0.806 > 0.10$ (10%) significance level, it means that there is no heterocedasticity in the model. In the model selection criteria AIC and using of maximum lags 4 have similar value, the model passes the test (see on appendixes), and there is no autocorrelation and heterocedasticity problem. There is no functional form problem because LM statistic $0.196 > 0.10$ (10%), but there is normality problem because LM statistic $0.000 > 0.10$ (10%). The result by using Log INA as a dependent variable is there are normality problems in both ARDL test estimation and ARDL lags 4 selected (see appendix).

b. Log MLY as dependent variable

```
Diagnostic Tests
*******************************************************************************
*   Test Statistics  *      LM Version        *       F Version          *
*******************************************************************************
*                    *                        *                          *
* A:Serial Correlation*CHSQ(  4)=  6.0032[.199]*F(  4, 38)=  1.1882[.332]*
*                    *                        *                          *
* B:Functional Form   *CHSQ(  1)=  .15436[.694]*F(  1, 41)=  .11753[.733]*
*                    *                        *                          *
* C:Normality         *CHSQ(  2)=  3.0064[.222]*     Not applicable      *
*                    *                        *                          *
* D:Heteroscedasticity*CHSQ(  1)=  1.1459[.284]*F(  1, 52)=  1.1274[.293]*
*******************************************************************************
A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values
```

It shows that there are no autocorrelation , heterocedasticity, functional form, or normality problem.

c. Log PHIL as dependent variable

```
Diagnostic Tests
*******************************************************************************
*  Test Statistics *    LM Version      *     F Version      *
*******************************************************************************
*                  *                    *                    *
* A:Serial Correlation*CHSQ(  4)=  2.5018[.644]*F(  4, 37)=  .44937[.772]*
*                  *                    *                    *
* B:Functional Form  *CHSQ(  1)=  1.0631[.303]*F(  1, 40)=  .80332[.375]*
*                  *                    *                    *
* C:Normality        *CHSQ(  2)= .073950[.964]*    Not applicable      *
*                  *                    *                    *
* D:Heteroscedasticity*CHSQ(  1)= .010391[.919]*F(  1, 52)= .010008[.921]*
*******************************************************************************
A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values
```

It also shows no autocorrelation, heterocedasticity, functional form, or normality problems occur.

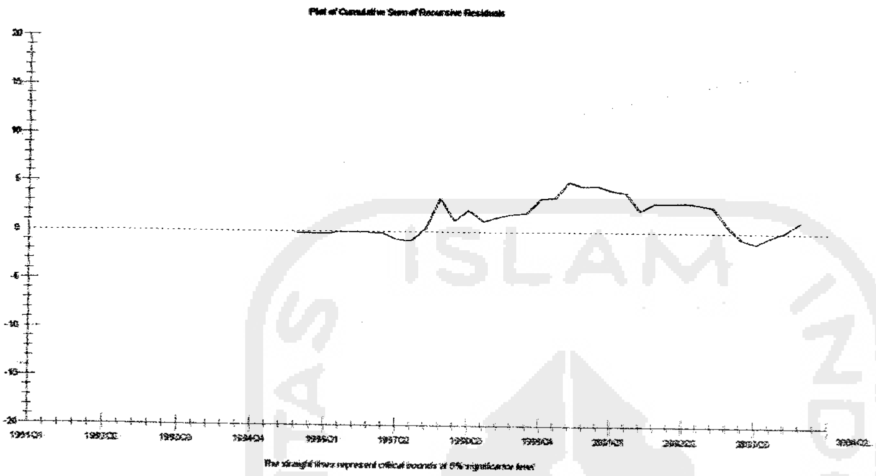
d. Log SNG as dependent variable

```
Diagnostic Tests
*******************************************************************************
*  Test Statistics *    LM Version      *     F Version      *
*******************************************************************************
*                  *                    *                    *
* A:Serial Correlation*CHSQ(  4)=  6.7029[.152]*F(  4, 40)=  1.4172[.246]*
*                  *                    *                    *
* B:Functional Form  *CHSQ(  1)=  .78050[.377]*F(  1, 43)=  .63062[.431]*
*                  *                    *                    *
* C:Normality        *CHSQ(  2)= 10.6584[.005]*    Not applicable      *
*                  *                    *                    *
* D:Heteroscedasticity*CHSQ(  1)=  .72490[.395]*F(  1, 52)=  .70755[.404]*
*******************************************************************************
A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values
```

There is normality problem because the LM statistic is 0.005, which is less than 0.10 (10%). Those problems such as normality occurs when the data have high volatility, or in this case, outliers or extreme data like the one we use in this research.

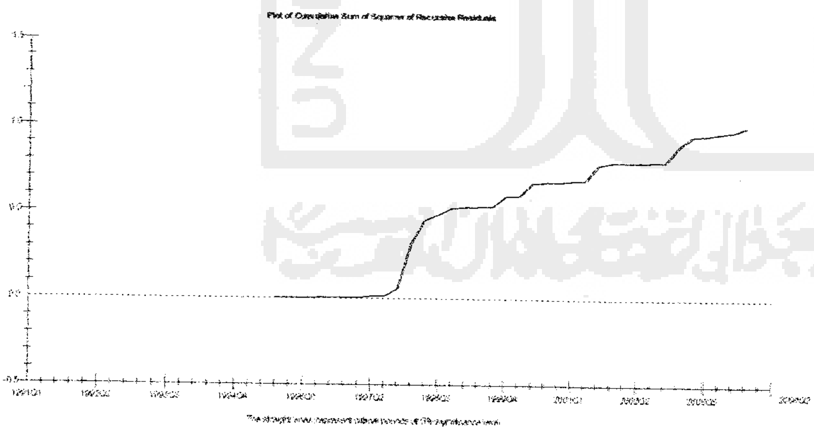
6.2.4. Coefficient Stability Using CUSUM and CUSUM Square

Figure 1.CUSUM test of INA (ARDL based on AIC)



Represent critical bounds at 5% significance level

Figure 2.CUSUM Square test of INA (ARDL based on AIC)



Represent critical bounds at 5% significance level

Figure 1.CUSUM test of MLY (ARDL based on AIC)

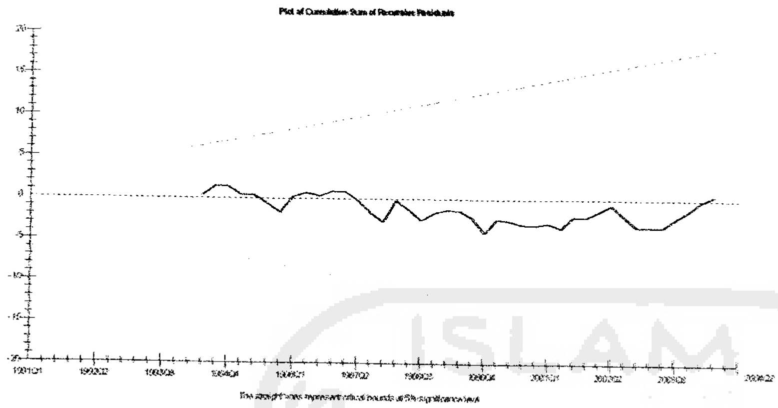


Figure 2.CUSUM Square test of MLY (ARDL based on AIC)

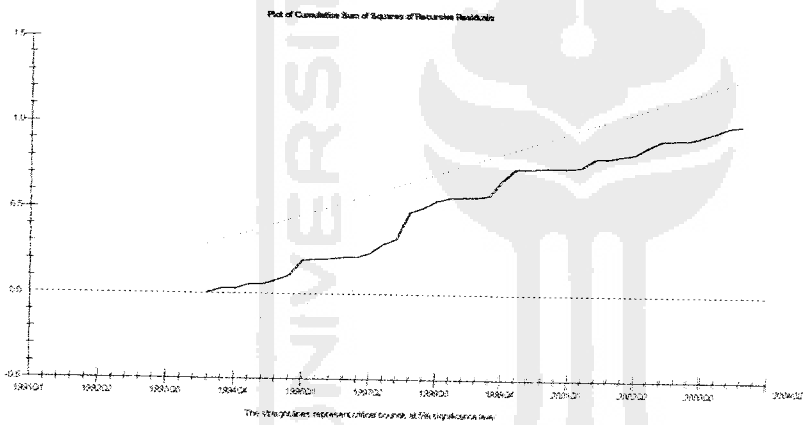


Figure 1.CUSUM test of PHIL (ARDL based on AIC)

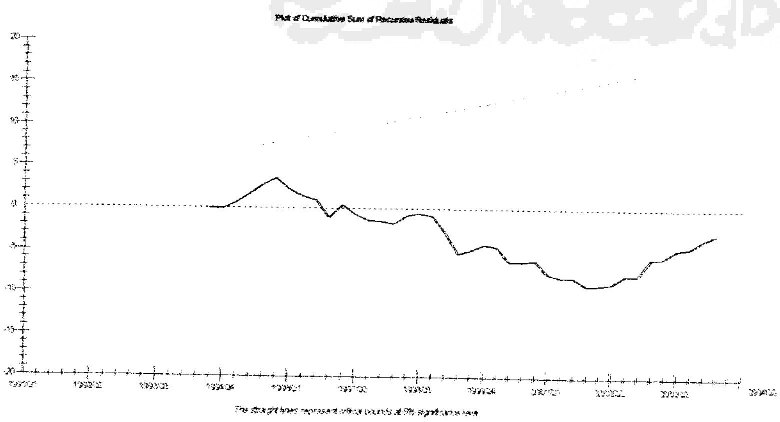


Figure 2.CUSUM Square test of PHIL (ARDL based on AIC)

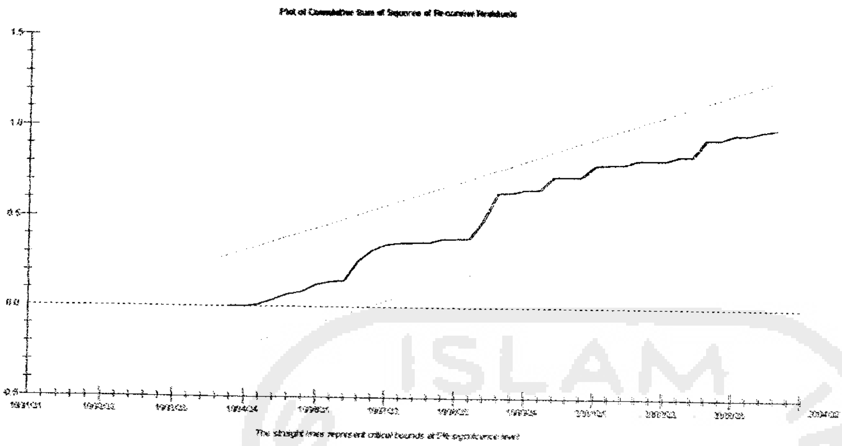


Figure 1.CUSUM test of SNG (ARDL based on AIC)

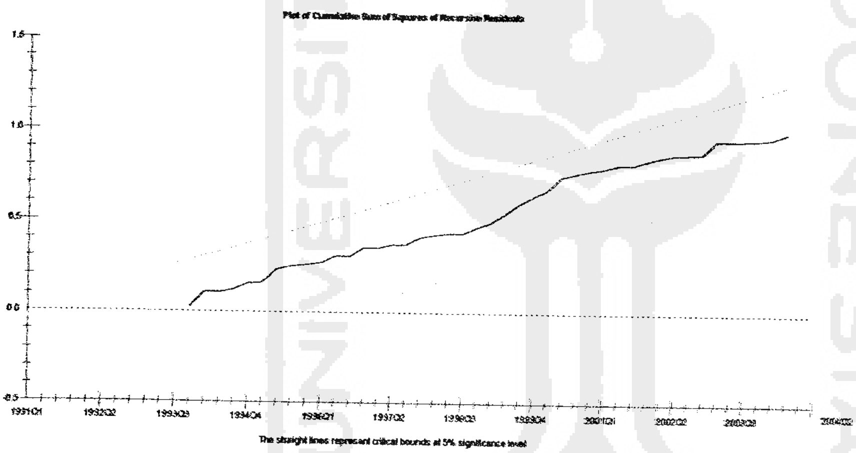
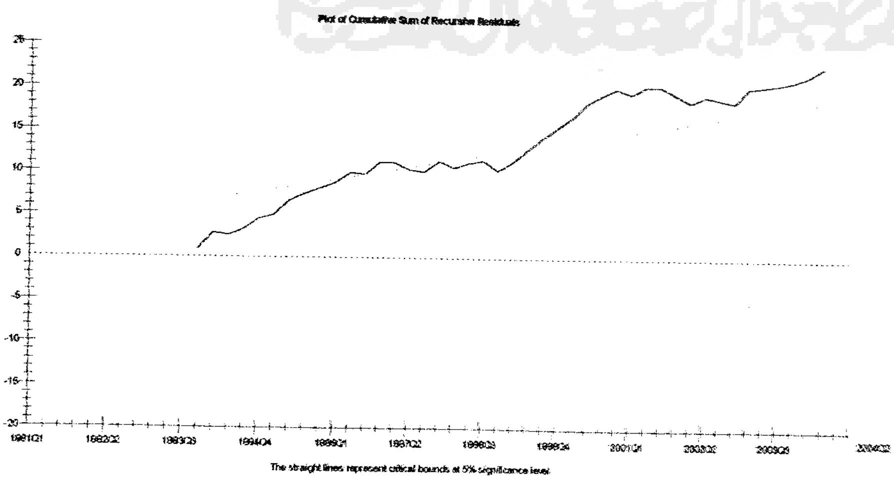


Figure 2.CUSUM Square test of SNG (ARDL based on AIC)



Specifically, the CUSUM test makes use of the cumulative sum of recursive residuals based on the first set of n observations and is updated recursively and plotted against break points. If the plot of CUSUM statistics stays within the critical bounds of 5% significance level represented by a pair of straight lines drawn at the 5% level of significance whose equations are given in Brown, Durbin, and Evans (1975), the null hypothesis that all coefficients in the error correction model are stable cannot be rejected. If either of the lines is crossed, the null hypothesis of coefficient constancy can be rejected at the 5% level of significance. A similar procedure is used to carry out the CUSUMSQ test, which is based on the squared recursive residuals.

The graphs show that the coefficient is stable or not. From the square test graph of Indonesia, Malaysia, and Philippine, when CUSUM Square tests of ARDL based on AIC, the blue line is still in the boundaries. Stretch from point (0), means the coefficients is dynamic or consistent (stable) using this model; the straight lines represent critical bounds at 5% significance level. Whether the coefficient stability test using CUSUM based on AIC or using maximum lags 4, the result is the coefficient is still stable (see the appendixes). For the case of Singapore, the blue line is partly upside the boundaries, but by using maximum lag 4, the blue line is inside the boundaries.

CONCLUSION AND POLICY IMPLICATIONS

Conclusion

The objective of this study is to observe the dynamic interaction among stock price index in four ASEAN countries, namely Indonesia, Malaysia, Philippine, and Singapore from period 1990.i to 2004.ii.

The maximum likelihood based λtrace statistics introduced by Johansen (1988, 1991), bound test by using Autoregressive Distributive Lags Approach, finds co integration among the four ASEAN's stock indices during the sample period. This means that those stock price indices are integrated during the period. Thus, the hypothesis that the countries' stock markets are interdependent is confirmed by these results.

Implications

The four ASEAN stock indices are highly integrated. This means that the countries' stock indices influence each other and move together to their long run equilibrium. A decrease in one stock index would be followed by the others. Since most of the ASEAN stock markets, except for the Singaporean stock market, have not been well developed, as their price indices widely fluctuate, they provide not only higher returns, but also higher risks to their investors. Therefore, diversification of portfolio within the ASEAN stock markets is unlikely to reduce the risk due to the high degree of financial integration of these markets.

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Table 1.Indonesian, Malaysian, the Philippine, and Singapore Stock Price Index (in Log)

Year	Log Indo	Log Malay	Log Phil	Log Sng
1990 Q1	1.3815	1.8478	1.7193	2.0161
Q2	1.3772	1.8252	1.7235	2.0006
Q3	1.3982	1.8263	1.7490	2.0303
Q4	1.4455	1.7599	1.7825	2.0544
1991 Q1	1.4213	1.8052	1.7882	2.0208
Q2	1.4127	1.8555	1.7875	1.9967
Q3	1.4237	1.8284	1.8041	1.9932
Q4	1.4351	1.8020	1.8162	1.9910
1992 Q1	1.4373	1.8430	1.8195	1.9776
Q2	1.4411	1.8454	1.8136	1.9854
Q3	1.4506	1.8461	1.8202	1.9849
Q4	1.4513	1.8764	1.8209	1.9813
1993 Q1	1.4607	1.8764	1.8122	1.9487
Q2	1.4628	1.9256	1.8089	1.9822
Q3	1.4635	1.9718	1.8129	1.9751
Q4	1.4628	2.0742	1.8209	1.9688
1994 Q1	1.4663	2.1118	1.8395	1.9629
Q2	1.4753	2.0783	1.8457	1.9664
Q3	1.4915	2.1139	1.8561	1.9707
Q4	1.5013	2.0927	1.8500	1.9683
1995 Q1	1.5184	2.0501	1.8488	1.9675
Q2	1.5312	2.0785	1.8531	1.9702
Q3	1.5331	2.0886	1.8621	1.9644
Q4	1.5396	2.0559	1.8814	1.9665
1996 Q1	1.5542	2.1105	1.8927	1.9690
Q2	1.5604	2.1359	1.9009	1.9667
Q3	1.5643	2.1222	1.9058	1.9625
Q4	1.5748	2.1499	1.8982	1.9723
1997 Q1	1.5792	2.1682	1.9261	1.9649
Q2	1.5737	2.1162	1.9159	1.9563
Q3	1.5904	2.0372	1.9149	1.9587
Q4	1.6548	1.8940	1.9227	1.9705

1998 Q1	1.8335	1.8933	1.9425	1.9585
Q2	1.8919	1.8282	1.9628	1.9483
Q3	1.9624	1.6566	1.9689	1.9491
Q4	1.9248	1.7445	1.9952	1.9408
1999 Q1	1.9481	1.8212	1.9978	1.9385
Q2	1.9490	1.9247	1.9908	1.9529
Q3	1.9467	1.9581	1.9877	1.9625
Q4	1.9518	1.9460	1.9926	1.9780
2000 Q1	1.9693	2.0505	1.9987	1.9865
Q2	1.9908	2.0264	1.9921	1.9961
Q3	2.0120	1.9739	1.9987	2.0064
Q4	2.0258	1.9407	2.0103	2.0106
2001 Q1	2.0376	1.9179	2.0060	1.9945
Q2	2.0681	1.8381	2.0065	2.0027
Q3	2.0600	1.8867	2.0175	1.9937
Q4	2.0635	1.8765	2.0107	1.9810
2002 Q1	2.0688	1.9327	2.0179	1.9776
Q2	2.0650	1.9605	2.0228	1.9903
Q3	2.0667	1.9278	2.0334	1.9871
Q4	2.0772	1.8830	2.0286	1.9915
2003 Q1	2.0873	1.8872	2.0435	2.0032
Q2	2.0727	1.8894	2.0434	1.9921
Q3	2.0734	1.9390	2.0481	1.9921
Q4	2.0799	1.9709	2.0542	1.9936
2004 Q1	2.0913	2.0040	2.0663	2.0004
Q2	2.1117	1.9959	2.0784	2.0122

E VIEWS

UNIT ROOT TEST

Log Ina

ADF Test Statistic	-0.516403	1% Critical Value*	-3.5478
		5% Critical Value	-2.9127
		10% Critical Value	-2.5937

*MacKinnon critical values for rejection of hypothesis of a unit root.

Log Malay

ADF Test Statistic	-2.373409	1% Critical Value*	-3.5478
		5% Critical Value	-2.9127
		10% Critical Value	-2.5937

*MacKinnon critical values for rejection of hypothesis of a unit root.

Log Phil

ADF Test Statistic	-1.311270	1% Critical Value*	-3.5501
		5% Critical Value	-2.9137
		10% Critical Value	-2.5942

*MacKinnon critical values for rejection of hypothesis of a unit root.

Log Sng

ADF Test Statistic	-1.941133	1% Critical Value*	-3.5501
		5% Critical Value	-2.9137
		10% Critical Value	-2.5942

*MacKinnon critical values for rejection of hypothesis of a unit root.

	ADF	Critical value at 5%	Decision
Lina	-0.516403	-2.9127	Stationery
L Malay	-2.373409	-2.9127	Stationery
L Phil	-1.311270	-2.9137	Stationery
L Sng	-1.941133	-2.9137	Stationery

Johansen Co integration Test

Date: 07/29/07 Time: 20:14
Sample: 1990:1 2004:2
Included observations: 53
Test assumption: Linear deterministic trend in the data
Series: LINA LMALAY LPHIL LSNG
Lags interval: 1 to 4

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.472135	56.29040	47.21	54.46	None **
0.274732	22.42787	29.68	35.65	At most 1
0.096524	5.403564	15.41	20.04	At most 2
0.000448	0.023751	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

LINA	LMALAY	LPHIL	LSNG
-0.079876	0.303239	-0.365311	4.983636
-0.178387	-0.805080	-0.060675	-3.189081
1.663322	0.182421	-4.457612	-2.155248
-1.643090	-0.739092	4.892944	4.219116

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

LINA	LMALAY	LPHIL	LSNG	C
1.000000	-3.796379	4.573491	-62.39231	276.8484
	(17.5435)	(31.4987)	(258.400)	

Log likelihood 440.5116

Normalized Cointegrating

Coefficients: 2 Cointegrating Equation(s)

LINA	LMALAY	LPHIL	LSNG	C
1.000000	0.000000	2.639388	-25.71933	101.3742
		(14.2075)	(56.6542)	
0.000000	1.000000	-0.509460	9.659989	-46.22147
		(3.30722)	(13.1880)	
Log likelihood	449.0238			

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

LINA	LMALAY	LPHIL	LSNG	C
1.000000	0.000000	0.000000	-14.00326	59.73988
			(4.94720)	
0.000000	1.000000	0.000000	7.398530	-38.18513
			(2.04705)	
0.000000	0.000000	1.000000	-4.438934	15.77422
			(1.84576)	
Log likelihood	451.7137			

Bounds F Statistic for Co integration Relation

Indonesia

Order Of Lags	F statistic
1	1.4051
2	1.9390
3	2.3941
4	1.5450

Malaysia

Order Of Lags	F statistic
1	2.3053
2	5.7799
3	2.7294
4	1.5036

Philippine

Order Of Lags	F statistic
1	0.36317
2	0.48260
3	0.45128
4	0.99157

Singapore

Order Of Lags	F statistic
1	4.8343
2	5.1990
3	6.7921
4	5.8777

BOUND TEST

INDONESIA

Variable Addition Test (OLS case)

****

Dependent variable is DLOGINA
List of the variables added to the regression:
LOGINA(-1) LOGMLY(-1) LOGPHIL(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	1.6962	2.4969	.67930[.502]
DLOGINA(-1)	.23117	.20041	1.1535[.257]
DLOGINA(-2)	.12791	.16783	.76214[.452]
DLOGINA(-3)	-.64549	.18818	-3.4302[.002]
DLOGINA(-4)	.046449	.22191	.20932[.836]
DLOGMLY(-1)	-.21994	.086207	-2.5513[.016]
DLOGMLY(-2)	-.033356	.096829	-.34448[.733]
DLOGMLY(-3)	-.13599	.080523	-1.6888[.101]
DLOGMLY(-4)	.093495	.083640	1.1178[.272]
DLOGPHIL(-1)	.12778	.54355	.23509[.816]
DLOGPHIL(-2)	-.26695	.45688	-.58428[.563]
DLOGPHIL(-3)	-.19021	.40953	-.46447[.645]
DLOGPHIL(-4)	.42992	.40404	1.0640[.295]
DLOGSNG(-1)	.12460	.44754	.27840[.782]
DLOGSNG(-2)	.16353	.36251	.45110[.655]
DLOGSNG(-3)	.73234	.34440	2.1264[.041]
DLOGSNG(-4)	.15071	.34581	.43581[.666]
LOGINA(-1)	-.11498	.12179	-.94413[.352]
LOGMLY(-1)	-.084062	.059630	-1.4097[.168]
LOGPHIL(-1)	.32937	.34412	.95713[.346]
LOGSNG(-1)	-.50005	.39345	-1.2709[.213]

****

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	8.5789[.073]
Likelihood Ratio Statistic	CHSQ(4)=	9.3586[.053]
F Statistic	F(4, 32)=	1.5450[.213]

****

Variable Addition Test (OLS case)

****

Dependent variable is DLOGINA
List of the variables added to the regression:
LOGINA(-1) LOGMLY(-1) LOGPHIL(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	1.3335	1.8961	.70328[.486]
DLOGINA(-1)	.15255	.14897	1.0240[.313]
DLOGINA(-2)	.085452	.15616	.54722[.588]
DLOGINA(-3)	-.60569	.17911	-3.3817[.002]
DLOGMLY(-1)	-.22623	.084901	-2.6646[.011]
DLOGMLY(-2)	-.045627	.072599	-.62848[.534]
DLOGMLY(-3)	-.16794	.076652	-2.1909[.035]
DLOGPHIL(-1)	.18874	.48894	.38601[.702]
DLOGPHIL(-2)	-.34183	.42047	-.81297[.422]
DLOGPHIL(-3)	-.21041	.38329	-.54895[.586]
DLOGSNG(-1)	.32653	.37758	.86481[.393]
DLOGSNG(-2)	.21176	.32424	.65310[.518]
DLOGSNG(-3)	.67538	.31338	2.1551[.038]

BOUND TEST

LOGINA(-1)	-.12966	.10743	-1.2069[.235]
LOGMLY(-1)	-.079672	.050136	-1.5891[.121]
LOGPHIL(-1)	.35330	.30911	1.1430[.261]
LOGSNG(-1)	-.43267	.27911	-1.5502[.130]

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	11.1362[.025]
Likelihood Ratio Statistic	CHSQ(4)=	12.5012[.014]
F Statistic	F(4, 36)=	2.3941[.069]

Variable Addition Test (OLS case)

Dependent variable is DLOGINA
List of the variables added to the regression:
LOGINA(-1) LOGMLY(-1) LOGPHIL(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	-2.8590	1.7192	-1.6630[.104]
DLOGINA(-1)	.36913	.16077	2.2960[.027]
DLOGINA(-2)	.23802	.16994	1.4006[.169]
DLOGMLY(-1)	-.059078	.080274	-.73596[.466]
DLOGMLY(-2)	-.0066739	.083363	-.080059[.937]
DLOGPHIL(-1)	-.51663	.50804	-1.0169[.315]
DLOGPHIL(-2)	-.62563	.44698	-1.3997[.169]
DLOGSNG(-1)	-.055037	.38275	-.14380[.886]
DLOGSNG(-2)	.057278	.33616	.17039[.866]
LOGINA(-1)	-.26409	.10759	-2.4546[.019]
LOGMLY(-1)	-.056287	.052523	-1.0717[.290]
LOGPHIL(-1)	.75304	.31047	2.4255[.020]
LOGSNG(-1)	.18897	.25583	.73866[.464]

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	8.6075[.072]
Likelihood Ratio Statistic	CHSQ(4)=	9.3927[.052]
F Statistic	F(4, 40)=	1.9390[.123]

Variable Addition Test (OLS case)

Dependent variable is DLOGINA
List of the variables added to the regression:
LOGINA(-1) LOGMLY(-1) LOGPHIL(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	-1.9970	1.5002	-1.3312[.190]
DLOGINA(-1)	.38862	.15279	2.5434[.015]
DLOGMLY(-1)	-.084553	.077518	-1.0908[.281]
DLOGPHIL(-1)	-.10111	.44943	-.22498[.823]
DLOGSNG(-1)	.088616	.33688	.26305[.794]
LOGINA(-1)	-.20324	.095172	-2.1355[.038]
LOGMLY(-1)	-.045132	.046573	-.96906[.338]
LOGPHIL(-1)	.58217	.27574	2.1113[.040]
LOGSNG(-1)	.10001	.23104	.43284[.667]

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	6.0032[.199]
Likelihood Ratio Statistic	CHSQ(4)=	6.3712[.173]

BOUND TEST

F Statistic F(4, 44)= 1.4051[.248]

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MALAYSIA

Variable Addition Test (OLS case)

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Dependent variable is DLOGMLY
List of the variables added to the regression:
LOGMLY(-1) LOGINA(-1) LOGPHIL(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	4.4260	4.9015	.90300[.373]
DLOGMLY(-1)	.16535	.16922	.97709[.336]
DLOGMLY(-2)	-.16165	.19008	-.85046[.401]
DLOGMLY(-3)	.16564	.15807	1.0479[.303]
DLOGMLY(-4)	-.27782	.16419	-1.6921[.100]
DLOGINA(-1)	-.28996	.39341	-.73704[.466]
DLOGINA(-2)	-1.1471	.32946	-3.4819[.001]
DLOGINA(-3)	.46501	.36940	1.2588[.217]
DLOGINA(-4)	.28770	.43561	.66045[.514]
DLOGPHIL(-1)	.57896	1.0670	.54261[.591]
DLOGPHIL(-2)	.73263	.89686	.81689[.420]
DLOGPHIL(-3)	-.94689	.80392	-1.1778[.248]
DLOGPHIL(-4)	.49844	.79314	.62843[.534]
DLOGSNG(-1)	1.2213	.87852	1.3902[.174]
DLOGSNG(-2)	1.1525	.71161	1.6196[.115]
DLOGSNG(-3)	.26146	.67607	.38673[.702]
DLOGSNG(-4)	-.64862	.67882	-.95550[.346]
LOGMLY(-1)	-.086205	.11705	-.73645[.467]
LOGINA(-1)	.19694	.23907	.82377[.416]
LOGPHIL(-1)	-.68733	.67551	-1.0175[.317]
LOGSNG(-1)	-.38652	.77236	-.50044[.620]

****

Joint test of zero restrictions on the coefficients of additional variables:
Lagrange Multiplier Statistic CHSQ(4)= 8.3852[.078]
Likelihood Ratio Statistic CHSQ(4)= 9.1280[.058]
F Statistic F(4, 32)= 1.5036[.224]

****

Variable Addition Test (OLS case)

****

Dependent variable is DLOGMLY
List of the variables added to the regression:
LOGMLY(-1) LOGINA(-1) LOGPHIL(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	6.6993	3.8552	1.7377[.091]
DLOGMLY(-1)	.19634	.17263	1.1374[.263]
DLOGMLY(-2)	-.17524	.14761	-1.1872[.243]
DLOGMLY(-3)	.17558	.15585	1.1266[.267]
DLOGINA(-1)	-.37289	.30290	-1.2311[.226]
DLOGINA(-2)	-1.0827	.31751	-3.4101[.002]
DLOGINA(-3)	.41248	.36418	1.1326[.265]
DLOGPHIL(-1)	.60250	.99414	.60605[.548]
DLOGPHIL(-2)	1.0066	.85493	1.1774[.247]
DLOGPHIL(-3)	-.69212	.77932	-.88810[.380]
DLOGSNG(-1)	1.2473	.76771	1.6247[.113]
DLOGSNG(-2)	.87594	.65926	1.3287[.192]
DLOGSNG(-3)	.16709	.63719	.26222[.795]

BOUND TEST

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PHILLIPINES

Variable Addition Test (OLS case)

****

Dependent variable is DLOGPHIL
List of the variables added to the regression:
LOGPHIL(-1) LOGINA(-1) LOGMLY(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	-1.1711	1.0095	-1.1600[.255]
DLOGPHIL(-1)	-.13937	.21976	-.63420[.530]
DLOGPHIL(-2)	-.091236	.18472	-.49391[.625]
DLOGPHIL(-3)	-.091873	.16558	-.55485[.583]
DLOGPHIL(-4)	.041154	.16336	.25192[.803]
DLOGINA(-1)	.17967	.081030	2.2173[.034]
DLOGINA(-2)	.020575	.067857	.30321[.764]
DLOGINA(-3)	.11008	.076084	1.4469[.158]
DLOGINA(-4)	.11832	.089721	1.3188[.197]
DLOGMLY(-1)	-.014078	.034855	-.40390[.689]
DLOGMLY(-2)	.021371	.039150	.54588[.589]
DLOGMLY(-3)	.031823	.032557	.97746[.336]
DLOGMLY(-4)	.0043433	.033817	.12843[.899]
DLOGSNG(-1)	-.081218	.18095	-.44885[.657]
DLOGSNG(-2)	-.25261	.14657	-1.7235[.094]
DLOGSNG(-3)	-.075285	.13925	-.54065[.592]
DLOGSNG(-4)	-.13555	.13982	-.96949[.340]
LOGPHIL(-1)	-.016390	.13913	-.11780[.907]
LOGINA(-1)	.0039269	.049241	.079750[.937]
LOGMLY(-1)	.032349	.024110	1.3418[.189]
LOGSNG(-1)	.23837	.15908	1.4984[.144]

****

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	5.8447[.211]
Likelihood Ratio Statistic	CHSQ(4)=	6.1928[.185]
F Statistic	F(4, 32)=	.99157[.426]

****

Variable Addition Test (OLS case)

****

Dependent variable is DLOGPHIL
List of the variables added to the regression:
LOGPHIL(-1) LOGINA(-1) LOGMLY(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	-.35077	.75585	-.46408[.645]
DLOGPHIL(-1)	-.040591	.19491	-.20826[.836]
DLOGPHIL(-2)	-.011558	.16762	-.068956[.945]
DLOGPHIL(-3)	-.065682	.15279	-.42987[.670]
DLOGINA(-1)	.11046	.059387	1.8600[.071]
DLOGINA(-2)	-.4355E-3	.062250	-.0069967[.994]
DLOGINA(-3)	.090005	.071400	1.2606[.216]
DLOGMLY(-1)	-.011175	.033845	-.33019[.743]
DLOGMLY(-2)	-.0075607	.028941	-.26125[.795]
DLOGMLY(-3)	.023085	.030556	.75547[.455]
DLOGSNG(-1)	.024880	.15052	.16530[.870]
DLOGSNG(-2)	-.23500	.12925	-1.8181[.077]
DLOGSNG(-3)	-.042441	.12493	-.33973[.736]
LOGPHIL(-1)	-.041419	.12322	-.33613[.739]

BOUND TEST

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PHILLIPINES

Variable Addition Test (OLS case)

****

Dependent variable is DLOGPHIL
List of the variables added to the regression:
LOGPHIL(-1) LOGINA(-1) LOGMLY(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	-1.1711	1.0095	-1.1600[.255]
DLOGPHIL(-1)	-.13937	.21976	-.63420[.530]
DLOGPHIL(-2)	-.091236	.18472	-.49391[.625]
DLOGPHIL(-3)	-.091873	.16558	-.55485[.583]
DLOGPHIL(-4)	.041154	.16336	.25192[.803]
DLOGINA(-1)	.17967	.081030	2.2173[.034]
DLOGINA(-2)	.020575	.067857	.30321[.764]
DLOGINA(-3)	.11008	.076084	1.4469[.158]
DLOGINA(-4)	.11832	.089721	1.3188[.197]
DLOGMLY(-1)	-.014078	.034855	-.40390[.689]
DLOGMLY(-2)	.021371	.039150	.54588[.589]
DLOGMLY(-3)	.031823	.032557	.97746[.336]
DLOGMLY(-4)	.0043433	.033817	.12843[.899]
DLOGSNG(-1)	-.081218	.18095	-.44885[.657]
DLOGSNG(-2)	-.25261	.14657	-1.7235[.094]
DLOGSNG(-3)	-.075285	.13925	-.54065[.592]
DLOGSNG(-4)	-.13555	.13982	-.96949[.340]
LOGPHIL(-1)	-.016390	.13913	-.11780[.907]
LOGINA(-1)	.0039269	.049241	.079750[.937]
LOGMLY(-1)	.032349	.024110	1.3418[.189]
LOGSNG(-1)	.23837	.15908	1.4984[.144]

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	5.8447[.211]
Likelihood Ratio Statistic	CHSQ(4)=	6.1928[.185]
F Statistic	F(4, 32)=	.99157[.426]

****

Variable Addition Test (OLS case)

****

Dependent variable is DLOGPHIL
List of the variables added to the regression:
LOGPHIL(-1) LOGINA(-1) LOGMLY(-1) LOGSNG(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	-.35077	.75585	-.46408[.645]
DLOGPHIL(-1)	-.040591	.19491	-.20826[.836]
DLOGPHIL(-2)	-.011558	.16762	-.068956[.945]
DLOGPHIL(-3)	-.065682	.15279	-.42987[.670]
DLOGINA(-1)	.11046	.059387	1.8600[.071]
DLOGINA(-2)	-.4355E-3	.062250	-.0069967[.994]
DLOGINA(-3)	.090005	.071400	1.2606[.216]
DLOGMLY(-1)	-.011175	.033845	-.33019[.743]
DLOGMLY(-2)	-.0075607	.028941	-.26125[.795]
DLOGMLY(-3)	.023085	.030556	.75547[.455]
DLOGSNG(-1)	.024880	.15052	.16530[.870]
DLOGSNG(-2)	-.23500	.12925	-1.8181[.077]
DLOGSNG(-3)	-.042441	.12493	-.33973[.736]
LOGPHIL(-1)	-.041419	.12322	-.33613[.739]

BOUND TEST

SINGAPORE

Variable Addition Test (OLS case)

****

Dependent variable is DLOGSNG
List of the variables added to the regression:
LOGSNG(-1) LOGINA(-1) LOGMLY(-1) LOGPHIL(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	1.9622	.91491	2.1447[.040]
DLOGSNG(-1)	-.25141	.16398	-1.5331[.135]
DLOGSNG(-2)	-.064054	.13283	-.48223[.633]
DLOGSNG(-3)	-.0051580	.12619	-.040874[.968]
DLOGSNG(-4)	.16593	.12671	1.3095[.200]
DLOGINA(-1)	-.015598	.073434	-.21241[.833]
DLOGINA(-2)	-.040215	.061496	-.65395[.518]
DLOGINA(-3)	-.10507	.068952	-1.5238[.137]
DLOGINA(-4)	-.045025	.081310	-.55375[.584]
DLOGMLY(-1)	-.016431	.031587	-.52019[.607]
DLOGMLY(-2)	.046166	.035480	1.3012[.202]
DLOGMLY(-3)	.041796	.029505	1.4166[.166]
DLOGMLY(-4)	.039575	.030647	1.2913[.206]
DLOGPHIL(-1)	-.17611	.19916	-.88423[.383]
DLOGPHIL(-2)	-.036418	.16741	-.21754[.829]
DLOGPHIL(-3)	.22910	.15006	1.5267[.137]
DLOGPHIL(-4)	-.088703	.14805	-.59915[.553]
LOGSNG(-1)	-.42736	.14417	-2.9643[.006]
LOGINA(-1)	.027839	.044625	.62384[.537]
LOGMLY(-1)	-.013027	.021849	-.59622[.555]
LOGPHIL(-1)	-.014442	.12609	-.11453[.910]

****

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	22.4473[.000]
Likelihood Ratio Statistic	CHSQ(4)=	29.1945[.000]
F Statistic	F(4, 32)=	5.8777[.001]

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Variable Addition Test (OLS case)

****

Dependent variable is DLOGSNG
List of the variables added to the regression:
LOGSNG(-1) LOGINA(-1) LOGMLY(-1) LOGPHIL(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	1.5627	.70705	2.2102[.034]
DLOGSNG(-1)	-.28079	.14080	-1.9943[.054]
DLOGSNG(-2)	-.047865	.12091	-.39588[.695]
DLOGSNG(-3)	-.0095145	.11686	-.081418[.936]
DLOGINA(-1)	.0023647	.055552	.042566[.966]
DLOGINA(-2)	-.047322	.058231	-.81266[.422]
DLOGINA(-3)	-.090025	.066790	-1.3479[.186]
DLOGMLY(-1)	-.022963	.031660	-.72532[.473]
DLOGMLY(-2)	.050468	.027072	1.8642[.070]
DLOGMLY(-3)	.040850	.028584	1.4291[.162]
DLOGPHIL(-1)	-.17910	.18233	-.98230[.333]
DLOGPHIL(-2)	-.10532	.15679	-.67171[.506]
DLOGPHIL(-3)	.21217	.14293	1.4844[.146]
LOGSNG(-1)	-.33972	.10408	-3.2640[.002]
LOGINA(-1)	.037712	.040061	.94136[.353]
LOGMLY(-1)	.0082248	.018696	.43993[.663]

SINGAPORE BOUND TEST

Variable Addition Test (OLS case)

Dependent variable is DLOGSNG
List of the variables added to the regression:
LOGSNG(-1) LOGINA(-1) LOGMLY(-1) LOGPHIL(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	1.9622	.91491	2.1447[.040]
DLOGSNG(-1)	-.25141	.16398	-1.5331[.135]
DLOGSNG(-2)	-.064054	.13283	-.48223[.633]
DLOGSNG(-3)	-.0051580	.12619	-.040874[.968]
DLOGSNG(-4)	.16593	.12671	1.3095[.200]
DLOGINA(-1)	-.015598	.073434	-.21241[.833]
DLOGINA(-2)	-.040215	.061496	-.65395[.518]
DLOGINA(-3)	-.10507	.068952	-1.5238[.137]
DLOGINA(-4)	-.045025	.081310	-.55375[.584]
DLOGMLY(-1)	-.016431	.031587	-.52019[.607]
DLOGMLY(-2)	.046166	.035480	1.3012[.202]
DLOGMLY(-3)	.041796	.029505	1.4166[.166]
DLOGMLY(-4)	.039575	.030647	1.2913[.206]
DLOGPHIL(-1)	-.17611	.19916	-.88423[.383]
DLOGPHIL(-2)	-.036418	.16741	-.21754[.829]
DLOGPHIL(-3)	.22910	.15006	1.5267[.137]
DLOGPHIL(-4)	-.088703	.14805	-.59915[.553]
LOGSNG(-1)	-.42736	.14417	-2.9643[.006]
LOGINA(-1)	.027839	.044625	.62384[.537]
LOGMLY(-1)	-.013027	.021849	-.59622[.555]
LOGPHIL(-1)	-.014442	.12609	-.11453[.910]

Joint test of zero restrictions on the coefficients of additional variables:

Lagrange Multiplier Statistic	CHSQ(4)=	22.4473[.000]
Likelihood Ratio Statistic	CHSQ(4)=	29.1945[.000]
F Statistic	F(4, 32)=	5.8777[.001]

Variable Addition Test (OLS case)

Dependent variable is DLOGSNG
List of the variables added to the regression:
LOGSNG(-1) LOGINA(-1) LOGMLY(-1) LOGPHIL(-1)
53 observations used for estimation from 1991Q2 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
C	1.5627	.70705	2.2102[.034]
DLOGSNG(-1)	-.28079	.14080	-1.9943[.054]
DLOGSNG(-2)	-.047865	.12091	-.39588[.695]
DLOGSNG(-3)	-.0095145	.11686	-.081418[.936]
DLOGINA(-1)	.0023647	.055552	.042566[.966]
DLOGINA(-2)	-.047322	.058231	-.81266[.422]
DLOGINA(-3)	-.090025	.066790	-1.3479[.186]
DLOGMLY(-1)	-.022963	.031660	-.72532[.473]
DLOGMLY(-2)	.050468	.027072	1.8642[.070]
DLOGMLY(-3)	.040850	.028584	1.4291[.162]
DLOGPHIL(-1)	-.17910	.18233	-.98230[.333]
DLOGPHIL(-2)	-.10532	.15679	-.67171[.506]
DLOGPHIL(-3)	.21217	.14293	1.4844[.146]
LOGSNG(-1)	-.33972	.10408	-3.2640[.002]
LOGINA(-1)	.037712	.040061	.94136[.353]
LOGMLY(-1)	.0082248	.018696	.43993[.663]

ECM lag 4

INA

Autoregressive Distributed Lag Estimates
ARDL(4,4,1,4) selected based on Akaike Information Criterion

Dependent variable is LOGINA
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGINA(-1)	.89315	.14433	6.1882[.000]
LOGINA(-2)	-.064672	.20226	-.31975[.751]
LOGINA(-3)	-.57127	.22526	-2.5360[.016]
LOGINA(-4)	.63838	.15688	4.0692[.000]
LOGMLY	-.16096	.078409	-2.0529[.047]
LOGMLY(-1)	-.11948	.10905	-1.0956[.280]
LOGMLY(-2)	.069452	.098013	.70860[.483]
LOGMLY(-3)	-.047720	.090778	-.52568[.602]
LOGMLY(-4)	.15174	.071121	2.1336[.040]
LOGPHIL	.85124	.40938	2.0793[.045]
LOGPHIL(-1)	-.56153	.45859	-1.2245[.229]
LOGSNG	.16904	.40327	.41917[.678]
LOGSNG(-1)	-.45526	.37030	-1.2294[.227]
LOGSNG(-2)	.054088	.37556	.14402[.886]
LOGSNG(-3)	.16039	.35702	.44926[.656]
LOGSNG(-4)	-.63119	.27422	-2.3018[.027]
C	2.8622	1.6886	1.6950[.098]

R-Squared	.99563	R-Bar-Squared	.99374
S.E. of Regression	.048910	F-stat. F(16, 37)	526.6500[.000]
Mean of Dependent Variable	4.0278	S.D. of Dependent Variable	.61806
Residual Sum of Squares	.088511	Equation Log-likelihood	96.5449
Akaike Info. Criterion	79.5449	Schwarz Bayesian Criterion	62.6385
DW-statistic	1.9142		

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 8.1858[.085]	F(4, 33)= 1.4741[.232]
B:Functional Form	CHSQ(1)= 1.6716[.196]	F(1, 36)= 1.1500[.291]
C:Normality	CHSQ(2)= 106.7525[.000]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .060386[.806]	F(1, 52)= .058215[.810]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(4,4,1,4) selected based on Akaike Information Criterion

Dependent variable is LOGINA
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGMLY	-1.0245	.69209	-1.4802[.147]
LOGPHIL	2.7747	.39974	6.9411[.000]

LOGSNG	-6.7323	7.1024	-.94789[.349]
C	27.4123	35.6013	.76998[.446]

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Error Correction Representation for the Selected ARDL Model
ARDL(4,4,1,4) selected based on Akaike Information Criterion

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Dependent variable is dLOGINA
54 observations used for estimation from 1991Q1 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLOGINA1	-.0024399	.14388	-.016958[.987]
dLOGINA2	-.067112	.15163	-.44259[.660]
dLOGINA3	-.63838	.15688	-4.0692[.000]
dLOGMLY	-.16096	.078409	-2.0529[.047]
dLOGMLY1	-.17347	.072911	-2.3793[.022]
dLOGMLY2	-.10402	.068917	-1.5094[.139]
dLOGMLY3	-.15174	.071121	-2.1336[.039]
dLOGPHIL	.85124	.40938	2.0793[.044]
dLOGSNG	.16904	.40327	.41917[.677]
dLOGSNG1	.41671	.32484	1.2828[.207]
dLOGSNG2	.47080	.30441	1.5466[.130]
dLOGSNG3	.63119	.27422	2.3018[.027]
dC	2.8622	1.6886	1.6950[.098]
ecm(-1)	-.10441	.085139	-1.2264[.227]

****

List of additional temporary variables created:
dLOGINA = LOGINA-LOGINA(-1)
dLOGINA1 = LOGINA(-1)-LOGINA(-2)
dLOGINA2 = LOGINA(-2)-LOGINA(-3)
dLOGINA3 = LOGINA(-3)-LOGINA(-4)
dLOGMLY = LOGMLY-LOGMLY(-1)
dLOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
dLOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
dLOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGSNG = LOGSNG-LOGSNG(-1)
dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
dLOGSNG2 = LOGSNG(-2)-LOGSNG(-3)
dLOGSNG3 = LOGSNG(-3)-LOGSNG(-4)
dC = C-C(-1)
ecm = LOGINA + 1.0245*LOGMLY -2.7747*LOGPHIL + 6.7323*LOGSNG -27.4123*
C

****

R-Squared	.62580	R-Bar-Squared	.46399
S.E. of Regression	.048910	F-stat. F(13, 40)	4.7599[.000]
Mean of Dependent Variable	.028398	S.D. of Dependent Variable	.066805
Residual Sum of Squares	.088511	Equation Log-likelihood	96.5449
Akaike Info. Criterion	79.5449	Schwarz Bayesian Criterion	62.6385
DW-statistic	1.9142		

****

R-Squared and R-Bar-Squared measures refer to the dependent variable dLOGINA and in cases where the error correction model is highly restricted, these measures could become negative.

utoregressive Distributed Lag Estimates
ARDL(4,4,4,4) selected

****

ependent variable is LOGINA
4 observations used for estimation from 1991Q1 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
OGINA(-1)	.85001	.14788	5.7481[.000]
OGINA(-2)	-.035956	.20560	-.17488[.862]

LOGINA(-3)	-.50895	.23258	-2.1882[.036]
LOGINA(-4)	.53760	.17798	3.0205[.005]
LOGMLY	-.16102	.081505	-1.9756[.056]
LOGMLY(-1)	-.11667	.11432	-1.0205[.315]
LOGMLY(-2)	.054944	.10689	.51403[.611]
LOGMLY(-3)	-.047163	.097944	-.48153[.633]
LOGMLY(-4)	.14186	.073372	1.9335[.062]
LOGPHIL	.81800	.41358	1.9779[.056]
LOGPHIL(-1)	-.28816	.55994	-.51463[.610]
LOGPHIL(-2)	-.44851	.53790	-.83381[.410]
LOGPHIL(-3)	-.14022	.52116	-.26906[.790]
LOGPHIL(-4)	.48141	.36956	1.3026[.201]
LOGSNG	.32097	.42452	.75609[.455]
LOGSNG(-1)	-.54574	.39590	-1.3785[.177]
LOGSNG(-2)	.049486	.39593	.12499[.901]
LOGSNG(-3)	.33721	.38673	.87195[.389]
LOGSNG(-4)	-.73023	.30029	-2.4318[.020]
C	1.9730	2.0409	.96672[.341]

****

R-Squared	.99594	R-Bar-Squared	.99367
S.E. of Regression	.049186	F-stat. F(19, 34)	438.6731[.000]
Mean of Dependent Variable	4.0278	S.D. of Dependent Variable	.61806
Residual Sum of Squares	.082254	Equation Log-likelihood	98.5244
Akaike Info. Criterion	78.5244	Schwarz Bayesian Criterion	58.6346
DW-statistic	1.7786		

****

Diagnostic Tests

****

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 11.8598[.018]	F(4, 30)= 2.1108[.104]
B:Functional Form	CHSQ(1)= 1.2435[.265]	F(1, 33)= .77784[.384]
C:Normality	CHSQ(2)= 83.4653[.000]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .0017760[.966]	F(1, 52)= .0017102[.967]

****

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(4,4,4,4) selected

****

Dependent variable is LOGINA
54 observations used for estimation from 1991Q1 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGMLY	-.81402	.43541	-1.8695[.070]
LOGPHIL	2.6861	.28067	9.5704[.000]
LOGSNG	-3.6129	3.9441	-.91603[.366]
C	12.5429	20.1181	.62347[.537]

****

Error Correction Representation for the Selected ARDL Model
ARDL(4,4,4,4) selected

****

Dependent variable is dLOGINA
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLOGINA1	.0073070	.15479	.047207[.963]
dLOGINA2	-.028649	.17328	-.16534[.870]
dLOGINA3	-.53760	.17798	-3.0205[.005]
dLOGMLY	-.16102	.081505	-1.9756[.056]
dLOGMLY1	-.14964	.081288	-1.8409[.074]
dLOGMLY2	-.094700	.073398	-1.2902[.205]
dLOGMLY3	-.14186	.073372	-1.9335[.061]
dLOGPHIL	.81800	.41358	1.9779[.055]
dLOGPHIL1	.10733	.43154	.24871[.805]
dLOGPHIL2	-.34119	.38339	-.88991[.379]
dLOGPHIL3	-.48141	.36956	-1.3026[.201]
dLOGSNG	.32097	.42452	.75609[.454]
dLOGSNG1	.34354	.33727	1.0186[.315]
dLOGSNG2	.39302	.31580	1.2445[.221]
dLOGSNG3	.73023	.30029	2.4318[.020]
dC	1.9730	2.0409	.96672[.340]
ecm(-1)	-.15730	.10312	-1.5254[.136]

List of additional temporary variables created:
dLOGINA = LOGINA-LOGINA(-1)
dLOGINA1 = LOGINA(-1)-LOGINA(-2)
dLOGINA2 = LOGINA(-2)-LOGINA(-3)
dLOGINA3 = LOGINA(-3)-LOGINA(-4)
dLOGMLY = LOGMLY-LOGMLY(-1)
dLOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
dLOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
dLOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGPHIL1 = LOGPHIL(-1)-LOGPHIL(-2)
dLOGPHIL2 = LOGPHIL(-2)-LOGPHIL(-3)
dLOGPHIL3 = LOGPHIL(-3)-LOGPHIL(-4)
dLOGSNG = LOGSNG-LOGSNG(-1)
dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
dLOGSNG2 = LOGSNG(-2)-LOGSNG(-3)
dLOGSNG3 = LOGSNG(-3)-LOGSNG(-4)
dC = C-C(-1)
ecm = LOGINA + .81402*LOGMLY -2.6861*LOGPHIL + 3.6129*LOGSNG -12.5429*
C

R-Squared	.65226	R-Bar-Squared	.45793
S.E. of Regression	.049186	F-stat. F(16, 37)	3.9858[.000]
Mean of Dependent Variable	.028398	S.D. of Dependent Variable	.066805
Residual Sum of Squares	.082254	Equation Log-likelihood	98.5244
Akaike Info. Criterion	78.5244	Schwarz Bayesian Criterion	58.6346
DW-statistic	1.7786		

R-Squared and R-Bar-Squared measures refer to the dependent variable dLOGINA and in cases where the error correction model is highly restricted, these measures could become negative.

\LAY

Autoregressive Distributed Lag Estimates
ARDL(1,3,1,3) selected based on Akaike Information Criterion

ependent variable is LOGMLY
4 observations used for estimation from 1991Q1 to 2004Q2

egressor	Coefficient	Standard Error	T-Ratio[Prob]
OGMLY(-1)	.76214	.073045	10.4339[.000]
OGINA	-.56201	.23598	-2.3816[.022]

LOGINA(-1)	.17059	.36861	.46278[.646]
LOGINA(-2)	-.46385	.37096	-1.2504[.218]
LOGINA(-3)	.90522	.24197	3.7410[.001]
LOGPHIL	1.5669	.73686	2.1265[.039]
LOGPHIL(-1)	-1.7393	.80269	-2.1668[.036]
LOGSNG	-.83633	.68739	-1.2167[.231]
LOGSNG(-1)	.41845	.67234	.62239[.537]
LOGSNG(-2)	.64220	.68928	.93170[.357]
LOGSNG(-3)	-1.4997	.52216	-2.8722[.006]
C	7.4896	2.5636	2.9215[.006]

R-Squared	.89983	R-Bar-Squared	.87360
S.E. of Regression	.094717	F-stat. F(11, 42)	34.2994[.000]
Mean of Dependent Variable	4.5040	S.D. of Dependent Variable	.26641
Residual Sum of Squares	.37680	Equation Log-likelihood	57.4331
Akaike Info. Criterion	45.4331	Schwarz Bayesian Criterion	33.4992
DW-statistic	1.9873	Durbin's h-statistic	.055254[.956]

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 6.0032[.199]	F(4, 38)= 1.1882[.332]
B:Functional Form	CHSQ(1)= .15436[.694]	F(1, 41)= .11753[.733]
C:Normality	CHSQ(2)= 3.0064[.222]	Not applicable
D:Heteroscedasticity	CHSQ(1)= 1.1459[.284]	F(1, 52)= 1.1274[.293]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(1,3,1,3) selected based on Akaike Information Criterion

Dependent variable is LOGMLY
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGINA	.20999	.68717	.30559[.761]
LOGPHIL	-.72454	1.9816	-.36563[.716]
LOGSNG	-5.3620	2.4632	-2.1768[.035]
C	31.4871	16.1851	1.9454[.058]

Error Correction Representation for the Selected ARDL Model
ARDL(1,3,1,3) selected based on Akaike Information Criterion

Dependent variable is dLOGMLY
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLOGINA	-.56201	.23598	-2.3816[.022]
dLOGINA1	-.44137	.24636	-1.7916[.080]
dLOGINA2	-.90522	.24197	-3.7410[.001]
dLOGPHIL	1.5669	.73686	2.1265[.039]
dLOGSNG	-.83633	.68739	-1.2167[.230]
dLOGSNG1	.85755	.52338	1.6385[.108]

dLOGSNG2	1.4997	.52216	2.8722[.006]
dC	7.4896	2.5636	2.9215[.005]
ecm(-1)	-.23786	.073045	-3.2564[.002]

```
*******************************************************************************
List of additional temporary variables created:
dLOGMLY = LOGMLY-LOGMLY(-1)
dLOGINA = LOGINA-LOGINA(-1)
dLOGINA1 = LOGINA(-1)-LOGINA(-2)
dLOGINA2 = LOGINA(-2)-LOGINA(-3)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGSNG = LOGSNG-LOGSNG(-1)
dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
dLOGSNG2 = LOGSNG(-2)-LOGSNG(-3)
dC = C-C(-1)
ecm = LOGMLY   -.20999*LOGINA +   .72454*LOGPHIL +   5.3620*LOGSNG  -31.4871*
C
*******************************************************************************
```

R-Squared	.55740	R-Bar-Squared	.44148
S.E. of Regression	.094717	F-stat. F(8, 45)	6.6117[.000]
Mean of Dependent Variable	.010080	S.D. of Dependent Variable	.12674
Residual Sum of Squares	.37680	Equation Log-likelihood	57.4331
Akaike Info. Criterion	45.4331	Schwarz Bayesian Criterion	33.4992
DW-statistic	1.9873		

R-Squared and R-Bar-Squared measures refer to the dependent variable dLOGMLY and in cases where the error correction model is highly restricted, these measures could become negative.

Autoregressive Distributed Lag Estimates
ARDL(4,4,4,4) selected

Dependent variable is LOGMLY
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGMLY(-1)	.80606	.18544	4.3467[.000]
LOGMLY(-2)	-.26563	.20894	-1.2714[.212]
LOGMLY(-3)	.24204	.19141	1.2645[.215]
LOGMLY(-4)	-.057873	.15373	-.37646[.709]
LOGINA	-.63950	.32370	-1.9756[.056]
LOGINA(-1)	.22833	.41196	.55425[.583]
LOGINA(-2)	-.55403	.39876	-1.3894[.174]
LOGINA(-3)	.88829	.47106	1.8858[.068]
LOGINA(-4)	.12528	.39889	.31406[.755]
LOGPHIL	1.7055	.81973	2.0806[.045]
LOGPHIL(-1)	-1.3248	1.0969	-1.2077[.235]
LOGPHIL(-2)	.074116	1.0828	.068447[.946]
LOGPHIL(-3)	-1.3996	1.0116	-1.3835[.176]
LOGPHIL(-4)	.74338	.74380	.99942[.325]
LOGSNG	-.27443	.85180	-.32218[.749]
.OGSNG(-1)	.041548	.81070	.051250[.959]
.OGSNG(-2)	.11408	.78898	.14459[.886]
.OGSNG(-3)	-.63591	.77161	-.82413[.416]
.OGSNG(-4)	-.66288	.63835	-1.0384[.306]
	8.4447	3.8600	2.1877[.036]

-Squared	.91316	R-Bar-Squared	.86462
.E. of Regression	.098021	F-stat. F(19, 34)	18.8160[.000]
ean of Dependent Variable	4.5040	S.D. of Dependent Variable	.26641
esidual Sum of Squares	.32668	Equation Log-likelihood	61.2870
kaike Info. Criterion	41.2870	Schwarz Bayesian Criterion	21.3971
W-statistic	1.9110		

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 17.9550[.001]	F(4, 30)= 3.7360[.014]
B:Functional Form	CHSQ(1)= .0043931[.947]	F(1, 33)= .0026849[.959]
C:Normality	CHSQ(2)= .50056[.779]	Not applicable
D:Heteroscedasticity	CHSQ(1)= 1.2111[.271]	F(1, 52)= 1.1930[.280]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(4,4,4,4) selected

Dependent variable is LOGMLY
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGINA	.17563	.81706	.21495[.831]
LOGPHIL	-.73134	2.3535	-.31075[.758]
LOGSNG	-5.1472	2.9684	-1.7340[.092]
C	30.6625	19.8102	1.5478[.131]

Error Correction Representation for the Selected ARDL Model
ARDL(4,4,4,4) selected

Dependent variable is dLOGMLY
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLOGMLY1	.081466	.16930	.48118[.633]
dLOGMLY2	-.18417	.14644	-1.2576[.216]
dLOGMLY3	.057873	.15373	.37646[.709]
dLOGINA	-.63950	.32370	-1.9756[.056]
dLOGINA1	-.45954	.29824	-1.5408[.132]
dLOGINA2	-1.0136	.29854	-3.3951[.002]
dLOGINA3	-.12528	.39889	-.31406[.755]
dLOGPHIL	1.7055	.81973	2.0806[.044]
dLOGPHIL1	.58211	.85497	.68085[.500]
dLOGPHIL2	.65622	.76467	.85818[.396]
dLOGPHIL3	-.74338	.74380	-.99942[.324]
dLOGSNG	-.27443	.85180	-.32218[.749]
dLOGSNG1	1.1847	.65137	1.8188[.077]
dLOGSNG2	1.2988	.60375	2.1512[.038]
dLOGSNG3	.66288	.63835	1.0384[.306]
dC	8.4447	3.8600	2.1877[.035]
ecm(-1)	-.27541	.10142	-2.7154[.010]

ist of additional temporary variables created:
LOGMLY = LOGMLY-LOGMLY(-1)
LOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
LOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
LOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
LOGINA = LOGINA-LOGINA(-1)
LOGINA1 = LOGINA(-1)-LOGINA(-2)
LOGINA2 = LOGINA(-2)-LOGINA(-3)

```
dLOGINA3 = LOGINA(-3)-LOGINA(-4)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGPHIL1 = LOGPHIL(-1)-LOGPHIL(-2)
dLOGPHIL2 = LOGPHIL(-2)-LOGPHIL(-3)
dLOGPHIL3 = LOGPHIL(-3)-LOGPHIL(-4)
dLOGSNG = LOGSNG-LOGSNG(-1)
dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
dLOGSNG2 = LOGSNG(-2)-LOGSNG(-3)
dLOGSNG3 = LOGSNG(-3)-LOGSNG(-4)
dC = C-C(-1)
ecm = LOGMLY   -.17563*LOGINA +   .73134*LOGPHIL +   5.1472*LOGSNG  -30.6625*
C
*******************************************************************************
R-Squared                        .61627   R-Bar-Squared                  .40183
S.E. of Regression              .098021   F-stat.    F( 16,  37)    3.4128[.001]
Mean of Dependent Variable      .010080   S.D. of Dependent Variable     .12674
Residual Sum of Squares          .32668   Equation Log-likelihood       61.2870
Akaike Info. Criterion          41.2870   Schwarz Bayesian Criterion    21.3971
DW-statistic                     1.9110
*******************************************************************************
R-Squared and R-Bar-Squared measures refer to the dependent variable
dLOGMLY and in cases where the error correction model is highly
restricted, these measures could become negative.
```

PHIL

```
              Autoregressive Distributed Lag Estimates
      ARDL(1,4,0,4) selected based on Akaike Information Criterion
*******************************************************************************
Dependent variable is LOGPHIL
54 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
Regressor              Coefficient       Standard Error         T-Ratio[Prob]
LOGPHIL(-1)                 .88579            .077218           11.4712[.000]
LOGINA                      .10950            .051176            2.1397[.038]
LOGINA(-1)                 .022981            .074278            .30939[.759]
LOGINA(-2)                -.067748            .071544           -.94694[.349]
LOGINA(-3)                  .10113            .073646            1.3731[.177]
LOGINA(-4)                 -.12665            .052792           -2.3990[.021]
LOGMLY                     .048030            .017224            2.7886[.008]
LOGSNG                     .032941             .13223            .24913[.805]
LOGSNG(-1)                  .13572             .13095            1.0365[.306]
LOGSNG(-2)                 -.27901             .12727           -2.1922[.034]
LOGSNG(-3)                  .15325             .12352            1.2406[.222]
LOGSNG(-4)                  .13340             .10268            1.2993[.201]
C                          -.66848             .53919           -1.2398[.222]
*******************************************************************************
R-Squared                        .99403   R-Bar-Squared                  .99228
S.E. of Regression              .018110   F-stat.    F( 12,  41)  568.4722[.000]
Mean of Dependent Variable       4.4412   S.D. of Dependent Variable     .20608
Residual Sum of Squares         .013447   Equation Log-likelihood      147.4232
Akaike Info. Criterion         134.4232   Schwarz Bayesian Criterion   121.4948
DW-statistic                     2.1704   Durbin's h-statistic     -.76038[.447]
*******************************************************************************


                            Diagnostic Tests
*******************************************************************************
*    Test Statistics  *        LM Version       *         F Version          *
*******************************************************************************
*                     *                         *                            *
* A:Serial Correlation*CHSQ(   4)=   2.5018[.644]*F(   4,  37)=   .44937[.772]*
*                     *                         *                            *
* B:Functional Form   *CHSQ(   1)=   1.0631[.303]*F(   1,  40)=   .80332[.375]*
```

```
*                           *                          *                         *
* C:Normality              *CHSQ(   2)=  .073950[.964]*      Not applicable     *
*                           *                          *                         *
* D:Heteroscedasticity*CHSQ(   1)=  .010391[.919]*F(   1,  52)=  .010008[.921]*
*******************************************************************************
   A:Lagrange multiplier test of residual serial correlation
   B:Ramsey's RESET test using the square of the fitted values
   C:Based on a test of skewness and kurtosis of residuals
   D:Based on the regression of squared residuals on squared fitted values


          Estimated Long Run Coefficients using the ARDL Approach
       ARDL(1,4,0,4) selected based on Akaike Information Criterion
*******************************************************************************
 Dependent variable is LOGPHIL
 54 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
 Regressor              Coefficient       Standard Error         T-Ratio[Prob]
 LOGINA                    .34331              .045051           7.6205[.000]
 LOGMLY                    .42053              .24714            1.7016[.096]
 LOGSNG                    1.5436              1.4650            1.0537[.298]
 C                        -5.8530              7.6462           -.76547[.448]
*******************************************************************************


    Error Correction Representation for the Selected ARDL Model
       ARDL(1,4,0,4) selected based on Akaike Information Criterion
*******************************************************************************
 Dependent variable is dLOGPHIL
 54 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
 Regressor              Coefficient       Standard Error         T-Ratio[Prob]
 dLOGINA                   .10950              .051176           2.1397[.038]
 dLOGINA1                 .093270              .045368           2.0558[.046]
 dLOGINA2                 .025522              .050071           .50973[.613]
 dLOGINA3                  .12665              .052792           2.3990[.021]
 dLOGMLY                  .048030              .017224           2.7886[.008]
 dLOGSNG                  .032941               .13223           .24913[.804]
 dLOGSNG1               -.0076365               .11244         -.067916[.946]
 dLOGSNG2                 -.28665               .10322          -2.7772[.008]
 dLOGSNG3                 -.13340               .10268          -1.2993[.201]
 dC                       -.66848               .53919          -1.2398[.222]
 ecm(-1)                  -.11421              .077218          -1.4791[.146]
*******************************************************************************
 List of additional temporary variables created:
 dLOGPHIL = LOGPHIL-LOGPHIL(-1)
 dLOGINA = LOGINA-LOGINA(-1)
 dLOGINA1 = LOGINA(-1)-LOGINA(-2)
 dLOGINA2 = LOGINA(-2)-LOGINA(-3)
 dLOGINA3 = LOGINA(-3)-LOGINA(-4)
 dLOGMLY = LOGMLY-LOGMLY(-1)
 dLOGSNG = LOGSNG-LOGSNG(-1)
 dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
 dLOGSNG2 = LOGSNG(-2)-LOGSNG(-3)
 dLOGSNG3 = LOGSNG(-3)-LOGSNG(-4)
 dC = C-C(-1)
 cm = LOGPHIL   -.34331*LOGINA   -.42053*LOGMLY   -1.5436*LOGSNG +   5.8530*C
*******************************************************************************
 -Squared                       .39207   R-Bar-Squared                    .21414
 .E. of Regression             .018110   F-stat.    F( 10,  43)     2.6442[.013]
 ean of Dependent Variable     .012620   S.D. of Dependent Variable      .020429
 esidual Sum of Squares        .013447   Equation Log-likelihood        147.4232
 kaike Info. Criterion        134.4232   Schwarz Bayesian Criterion     121.4948
 W-statistic                    2.1704
*******************************************************************************
```

```
R-Squared and R-Bar-Squared measures refer to the dependent variable
dLOGPHIL and in cases where the error correction model is highly
restricted, these measures could become negative.

     Autoregressive Distributed Lag Estimates
                        ARDL(4,4,4,4) selected
*******************************************************************************
 Dependent variable is LOGPHIL
 54 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
 Regressor              Coefficient       Standard Error         T-Ratio[Prob]
 LOGPHIL(-1)               .85938              .16433            5.2297[.000]
 LOGPHIL(-2)              .063433              .21310            .29767[.768]
 LOGPHIL(-3)              .043199              .20474            .21100[.834]
 LOGPHIL(-4)             -.029917              .14861           -.20131[.842]
 LOGINA                    .12614             .063777            1.9779[.056]
 LOGINA(-1)               .012790             .081512            .15691[.876]
 LOGINA(-2)              -.061439             .080084           -.76719[.448]
 LOGINA(-3)               .077248             .096649            .79926[.430]
 LOGINA(-4)               -.13107             .075435           -1.7375[.091]
 LOGMLY                   .066220             .031828            2.0806[.045]
 LOGMLY(-1)              -.024154             .045388           -.53217[.598]
 LOGMLY(-2)               .012159             .042086            .28891[.774]
 LOGMLY(-3)               .017686             .038473            .45969[.649]
 LOGMLY(-4)              -.030155             .029911           -1.0082[.321]
 LOGSNG                  -.027027              .16804           -.16084[.873]
 LOGSNG(-1)                .14726              .15774            .93354[.357]
 LOGSNG(-2)               -.22491              .15065           -1.4929[.145]
 LOGSNG(-3)                .16308              .15099            1.0801[.288]
 LOGSNG(-4)                .13777              .12556            1.0973[.280]
 C                        -.89332              .79779           -1.1197[.271]
*******************************************************************************
 R-Squared                    .99436   R-Bar-Squared                    .99122
 S.E. of Regression          .019315   F-stat.    F( 19,  34)  315.7497[.000]
 Mean of Dependent Variable   4.4412   S.D. of Dependent Variable       .20608
 Residual Sum of Squares     .012684   Equation Log-likelihood        149.0000
 Akaike Info. Criterion     129.0000   Schwarz Bayesian Criterion     109.1102
 DW-statistic                 2.1439
*******************************************************************************


                              Diagnostic Tests
*******************************************************************************
*    Test Statistics  *        LM Version        *         F Version          *
*******************************************************************************
*                     *                          *                            *
* A:Serial Correlation*CHSQ(   4)=  11.4197[.022]*F(   4,  30)=   2.0114[.118]*
*                     *                          *                            *
* B:Functional Form   *CHSQ(   1)=   1.2200[.269]*F(   1,  33)=   .76280[.389]*
*                     *                          *                            *
* C:Normality         *CHSQ(   2)=   1.6576[.437]*       Not applicable       *
*                     *                          *                            *
* D:Heteroscedasticity*CHSQ(   1)=   .36414[.546]*F(   1,  52)=   .35303[.555]*
*******************************************************************************
  A:Lagrange multiplier test of residual serial correlation
  B:Ramsey's RESET test using the square of the fitted values
  C:Based on a test of skewness and kurtosis of residuals
  D:Based on the regression of squared residuals on squared fitted values


          Estimated Long Run Coefficients using the ARDL Approach
                        ARDL(4,4,4,4) selected
*******************************************************************************
 ependent variable is LOGPHIL
 4 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
```

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGINA	.37038	.099798	3.7113[.001]
LOGMLY	.65336	1.0320	.63313[.531]
LOGSNG	3.0695	6.8476	.44827[.657]
C	-13.9779	35.8431	-.38997[.699]

****

Error Correction Representation for the Selected ARDL Model
ARDL(4,4,4,4) selected

****

Dependent variable is dLOGPHIL
54 observations used for estimation from 1991Q1 to 2004Q2

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLOGPHIL1	-.076715	.16910	-.45366[.653]
dLOGPHIL2	-.013282	.15228	-.087220[.931]
dLOGPHIL3	.029917	.14861	.20131[.842]
dLOGINA	.12614	.063777	1.9779[.055]
dLOGINA1	.11526	.057481	2.0052[.052]
dLOGINA2	.053821	.067443	.79803[.430]
dLOGINA3	.13107	.075435	1.7375[.091]
dLOGMLY	.066220	.031828	2.0806[.044]
dLOGMLY1	.3107E-3	.033474	.0092809[.993]
dLOGMLY2	.012470	.029442	.42353[.674]
dLOGMLY3	.030155	.029911	1.0082[.320]
dLOGSNG	-.027027	.16804	-.16084[.873]
dLOGSNG1	-.075939	.13382	-.56748[.574]
dLOGSNG2	-.30085	.11583	-2.5973[.013]
dLOGSNG3	-.13777	.12556	-1.0973[.280]
dC	-.89332	.79779	-1.1197[.270]
ecm(-1)	-.063910	.11691	-.54665[.588]

****

List of additional temporary variables created:
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGPHIL1 = LOGPHIL(-1)-LOGPHIL(-2)
dLOGPHIL2 = LOGPHIL(-2)-LOGPHIL(-3)
dLOGPHIL3 = LOGPHIL(-3)-LOGPHIL(-4)
dLOGINA = LOGINA-LOGINA(-1)
dLOGINA1 = LOGINA(-1)-LOGINA(-2)
dLOGINA2 = LOGINA(-2)-LOGINA(-3)
dLOGINA3 = LOGINA(-3)-LOGINA(-4)
LOGMLY = LOGMLY-LOGMLY(-1)
LOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
LOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
LOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
LOGSNG = LOGSNG-LOGSNG(-1)
LOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
OGSNG2 = LOGSNG(-2)-LOGSNG(-3)
OGSNG3 = LOGSNG(-3)-LOGSNG(-4)
: = C-C(-1)
:m = LOGPHIL -.37038*LOGINA -.65336*LOGMLY -3.0695*LOGSNG + 13.9779*C

****

-Squared	.42656	R-Bar-Squared	.10611
.E. of Regression	.019315	F-stat. F(16, 37)	1.5807[.124]
ean of Dependent Variable	.012620	S.D. of Dependent Variable	.020429
esidual Sum of Squares	.012684	Equation Log-likelihood	149.0000
kaike Info. Criterion	129.0000	Schwarz Bayesian Criterion	109.1102
V-statistic	2.1439		

****

-Squared and R-Bar-Squared measures refer to the dependent variable
.OGPHIL and in cases where the error correction model is highly
estricted, these measures could become negative.

NG

Autoregressive Distributed Lag Estimates
ARDL(2,0,4,0) selected based on Akaike Information Criterion

Dependent variable is LOGSNG
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGSNG(-1)	.50571	.11635	4.3463[.000]
LOGSNG(-2)	.22333	.11061	2.0190[.050]
LOGINA	.032622	.027446	1.1886[.241]
LOGMLY	-.011223	.025574	-.43883[.663]
LOGMLY(-1)	.016658	.034731	.47962[.634]
LOGMLY(-2)	.072802	.034444	2.1137[.040]
LOGMLY(-3)	-.0058018	.034460	-.16836[.867]
LOGMLY(-4)	-.067488	.024587	-2.7448[.009]
LOGPHIL	-.041321	.080002	-.51650[.608]
C	1.2617	.40101	3.1462[.003]

R-Squared	.83310	R-Bar-Squared	.79896
S.E. of Regression	.019498	F-stat. F(9, 44)	24.4031[.000]
Mean of Dependent Variable	4.5541	S.D. of Dependent Variable	.043486
Residual Sum of Squares	.016727	Equation Log-likelihood	141.5290
Akaike Info. Criterion	131.5290	Schwarz Bayesian Criterion	121.5841
DW-statistic	2.2088		

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 6.7029[.152]	F(4, 40)= 1.4172[.246]
B:Functional Form	CHSQ(1)= .78050[.377]	F(1, 43)= .63062[.431]
C:Normality	CHSQ(2)= 10.6584[.005]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .72490[.395]	F(1, 52)= .70755[.404]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(2,0,4,0) selected based on Akaike Information Criterion

ependent variable is LOGSNG
observations used for estimation from 1991Q1 to 2004Q2

egressor	Coefficient	Standard Error	T-Ratio[Prob]
)GINA	.12039	.097971	1.2289[.226]
)GMLY	.018258	.061572	.29654[.768]
)GPHIL	-.15250	.28836	-.52883[.600]
	4.6562	.76939	6.0519[.000]

Error Correction Representation for the Selected ARDL Model
ARDL(2,0,4,0) selected based on Akaike Information Criterion

ependent variable is dLOGSNG

54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLOGSNG1	-.22333	.11061	-2.0190[.049]
dLOGINA	.032622	.027446	1.1886[.241]
dLOGMLY	-.011223	.025574	-.43883[.663]
dLOGMLY1	.4877E-3	.023484	.020768[.984]
dLOGMLY2	.073290	.022628	3.2390[.002]
dLOGMLY3	.067488	.024587	2.7448[.009]
dLOGPHIL	-.041321	.080002	-.51650[.608]
dC	1.2617	.40101	3.1462[.003]
ecm(-1)	-.27097	.061573	-4.4007[.000]

List of additional temporary variables created:
dLOGSNG = LOGSNG-LOGSNG(-1)
dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
dLOGINA = LOGINA-LOGINA(-1)
dLOGMLY = LOGMLY-LOGMLY(-1)
dLOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
dLOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
dLOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dC = C-C(-1)
ecm = LOGSNG -.12039*LOGINA -.018258*LOGMLY + .15250*LOGPHIL -4.6562*C

R-Squared	.55823	R-Bar-Squared	.46787
S.E. of Regression	.019498	F-stat. F(8, 45)	6.9500[.000]
Mean of Dependent Variable	-.0018173	S.D. of Dependent Variable	.026729
Residual Sum of Squares	.016727	Equation Log-likelihood	141.5290
Akaike Info. Criterion	131.5290	Schwarz Bayesian Criterion	121.5841
DW-statistic	2.2088		

R-Squared and R-Bar-Squared measures refer to the dependent variable dLOGSNG and in cases where the error correction model is highly restricted, these measures could become negative.

Autoregressive Distributed Lag Estimates
ARDL(4,4,4,4) selected

'ependent variable is LOGSNG
4 observations used for estimation from 1991Q1 to 2004Q2

egressor	Coefficient	Standard Error	T-Ratio[Prob]
)GSNG(-1)	.47589	.14108	3.3733[.002]
)GSNG(-2)	.20203	.15483	1.3049[.201]
)GSNG(-3)	-.034345	.15655	-.21939[.828]
)GSNG(-4)	.040759	.13016	.31315[.756]
)GINA	.051518	.068137	.75609[.455]
)GINA(-1)	-.0041739	.083187	-.050174[.960]
)GINA(-2)	-.068634	.081563	-.84149[.406]
)GINA(-3)	.011526	.099506	.11584[.908]
)GINA(-4)	.065371	.079518	.82209[.417]
)GMLY	-.011091	.034424	-.32218[.749]
)GMLY(-1)	.0036587	.046494	.078693[.938]
)GMLY(-2)	.071673	.041195	1.7399[.091]
)GMLY(-3)	-.010524	.039332	-.26757[.791]
)GMLY(-4)	-.043329	.030064	-1.4412[.159]
)GPHIL	-.028131	.17490	-.16084[.873]
)GPHIL(-1)	-.17903	.22310	-.80246[.428]
)GPHIL(-2)	.087453	.21718	.40268[.690]
)GPHIL(-3)	.27284	.20371	1.3394[.189]
)GPHIL(-4)	-.25621	.14521	-1.7645[.087]
	1.6245	.78057	2.0812[.045]

Squared	.86827	R-Bar-Squared	.79466
E. of Regression	.019705	F-stat. F(19, 34)	11.7951[.000]

Mean of Dependent Variable	4.5541	S.D. of Dependent Variable	.043486
Residual Sum of Squares	.013202	Equation Log-likelihood	147.9190
Akaike Info. Criterion	127.9190	Schwarz Bayesian Criterion	108.0292
DW-statistic	2.1717		

Diagnostic Tests

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(4)= 3.2919[.510]	F(4, 30)= .48689[.745]
B:Functional Form	CHSQ(1)= 5.1928[.023]	F(1, 33)= 3.5110[.070]
C:Normality	CHSQ(2)= 9.4809[.009]	Not applicable
D:Heteroscedasticity	CHSQ(1)= .082201[.774]	F(1, 52)= .079277[.779]

A:Lagrange multiplier test of residual serial correlation
B:Ramsey's RESET test using the square of the fitted values
C:Based on a test of skewness and kurtosis of residuals
D:Based on the regression of squared residuals on squared fitted values

Estimated Long Run Coefficients using the ARDL Approach
ARDL(4,4,4,4) selected

Dependent variable is LOGSNG
54 observations used for estimation from 1991Q1 to 2004Q2

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LOGINA	.17616	.11775	1.4961[.144]
LOGMLY	.032910	.074361	.44257[.661]
LOGPHIL	-.32652	.33668	-.96984[.339]
-	5.1465	.87498	5.8819[.000]

Error Correction Representation for the Selected ARDL Model
ARDL(4,4,4,4) selected

ependent variable is dLOGSNG
4 observations used for estimation from 1991Q1 to 2004Q2

egressor	Coefficient	Standard Error	T-Ratio[Prob]
.OGSNG1	-.20845	.13243	-1.5740[.124]
.OGSNG2	-.0064139	.12936	-.049580[.961]
.OGSNG3	-.040759	.13016	-.31315[.756]
.OGINA	.051518	.068137	.75609[.454]
.OGINA1	-.0082633	.061998	-.13328[.895]
.OGINA2	-.076897	.068184	-1.1278[.267]
.OGINA3	-.065371	.079518	-.82209[.416]
.OGMLY	-.011091	.034424	-.32218[.749]
.OGMLY1	-.017820	.034014	-.52391[.603]
.OGMLY2	.053853	.028666	1.8787[.068]
.OGMLY3	.043329	.030064	1.4412[.158]
.OGPHIL	-.028131	.17490	-.16084[.873]
.OGPHIL1	-.10409	.17212	-.60473[.549]
.OGPHIL2	-.016633	.15535	-.10707[.915]
.OGPHIL3	.25621	.14521	1.7645[.086]
:	1.6245	.78057	2.0812[.044]
:m(-1)	-.31566	.12140	-2.6002[.013]

ist of additional temporary variables created:

```
dLOGSNG = LOGSNG-LOGSNG(-1)
dLOGSNG1 = LOGSNG(-1)-LOGSNG(-2)
dLOGSNG2 = LOGSNG(-2)-LOGSNG(-3)
dLOGSNG3 = LOGSNG(-3)-LOGSNG(-4)
dLOGINA = LOGINA-LOGINA(-1)
dLOGINA1 = LOGINA(-1)-LOGINA(-2)
dLOGINA2 = LOGINA(-2)-LOGINA(-3)
dLOGINA3 = LOGINA(-3)-LOGINA(-4)
dLOGMLY = LOGMLY-LOGMLY(-1)
dLOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
dLOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
dLOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGPHIL1 = LOGPHIL(-1)-LOGPHIL(-2)
dLOGPHIL2 = LOGPHIL(-2)-LOGPHIL(-3)
dLOGPHIL3 = LOGPHIL(-3)-LOGPHIL(-4)
dC = C-C(-1)
ecm = LOGSNG   -.17616*LOGINA  -.032910*LOGMLY +   .32652*LOGPHIL   -5.1465*C
*******************************************************************************
R-Squared                          .65133   R-Bar-Squared                  .45649
S.E. of Regression                .019705   F-stat.    F( 16,  37)   3.9697[.000]
Mean of Dependent Variable -.0018173   S.D. of Dependent Variable     .026729
Residual Sum of Squares           .013202   Equation Log-likelihood      147.9190
Akaike Info. Criterion           127.9190   Schwarz Bayesian Criterion   108.0292
DW-statistic                       2.1717
*******************************************************************************
R-Squared and R-Bar-Squared measures refer to the dependent variable
dLOGSNG and in cases where the error correction model is highly
restricted, these measures could become negative.
```

```
              Autoregressive Distributed Lag Estimates
                     ARDL(4,4,4,4) selected
*******************************************************************************
Dependent variable is LOGSNG
54 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
```

؛egressor	Coefficient	Standard Error	T-Ratio[Prob]
.OGSNG(-1)	.47589	.14108	3.3733[.002]
OGSNG(-2)	.20203	.15483	1.3049[.201]
OGSNG(-3)	-.034345	.15655	-.21939[.828]
OGSNG(-4)	.040759	.13016	.31315[.756]
OGINA	.051518	.068137	.75609[.455]
OGINA(-1)	-.0041739	.083187	-.050174[.960]
OGINA(-2)	-.068634	.081563	-.84149[.406]
OGINA(-3)	.011526	.099506	.11584[.908]
OGINA(-4)	.065371	.079518	.82209[.417]
OGMLY	-.011091	.034424	-.32218[.749]
OGMLY(-1)	.0036587	.046494	.078693[.938]
OGMLY(-2)	.071673	.041195	1.7399[.091]
OGMLY(-3)	-.010524	.039332	-.26757[.791]
OGMLY(-4)	-.043329	.030064	-1.4412[.159]
OGPHIL	-.028131	.17490	-.16084[.873]
OGPHIL(-1)	-.17903	.22310	-.80246[.428]
OGPHIL(-2)	.087453	.21718	.40268[.690]
OGPHIL(-3)	.27284	.20371	1.3394[.189]
OGPHIL(-4)	-.25621	.14521	-1.7645[.087]
	1.6245	.78057	2.0812[.045]

```
*******************************************************************************
-Squared                          .86827   R-Bar-Squared                  .79466
.E. of Regression                .019705   F-stat.    F( 19,  34)  11.7951[.000]
ean of Dependent Variable        4.5541   S.D. of Dependent Variable     .043486
esidual Sum of Squares          .013202   Equation Log-likelihood      147.9190
aike Info. Criterion           127.9190   Schwarz Bayesian Criterion   108.0292
W-statistic                      2.1717
```

```
*******************************************************************************

                              Diagnostic Tests
*******************************************************************************
*    Test Statistics  *        LM Version         *         F Version         *
*******************************************************************************
*                     *                           *                           *
* A:Serial Correlation*CHSQ(   4)=   3.2919[.510]*F(   4,  30)=   .48689[.745]*
*                     *                           *                           *
* B:Functional Form   *CHSQ(   1)=   5.1928[.023]*F(   1,  33)=   3.5110[.070]*
*                     *                           *                           *
* C:Normality         *CHSQ(   2)=   9.4809[.009]*       Not applicable       *
*                     *                           *                           *
* D:Heteroscedasticity*CHSQ(   1)=  .082201[.774]*F(   1,  52)=  .079277[.779]*
*******************************************************************************
   A:Lagrange multiplier test of residual serial correlation
   B:Ramsey's RESET test using the square of the fitted values
   C:Based on a test of skewness and kurtosis of residuals
   D:Based on the regression of squared residuals on squared fitted values


  Estimated Long Run Coefficients using the ARDL Approach
                          ARDL(4,4,4,4) selected
*******************************************************************************
 Dependent variable is LOGSNG
 54 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
 Regressor              Coefficient       Standard Error         T-Ratio[Prob]
 LOGINA                     .17616              .11775            1.4961[.144]
 LOGMLY                    .032910             .074361            .44257[.661]
 LOGPHIL                   -.32652              .33668           -.96984[.339]
 C                          5.1465              .87498            5.8819[.000]
*******************************************************************************

   Error Correction Representation for the Selected ARDL Model
                          ARDL(4,4,4,4) selected
*******************************************************************************
 ependent variable is dLOGSNG
 4 observations used for estimation from 1991Q1 to 2004Q2
*******************************************************************************
 egressor               Coefficient       Standard Error         T-Ratio[Prob]
 .OGSNG1                   -.20845              .13243           -1.5740[.124]
 .OGSNG2                 -.0064139              .12936         -.049580[.961]
 .OGSNG3                  -.040759              .13016           -.31315[.756]
 .OGINA                    .051518             .068137            .75609[.454]
 .OGINA1                 -.0082633             .061998           -.13328[.895]
 .OGINA2                  -.076897             .068184           -1.1278[.267]
 .OGINA3                  -.065371             .079518           -.82209[.416]
 .OGMLY                   -.011091             .034424           -.32218[.749]
 .OGMLY1                  -.017820             .034014           -.52391[.603]
 .OGMLY2                   .053853             .028666            1.8787[.068]
 .OGMLY3                   .043329             .030064            1.4412[.158]
 .OGPHIL                  -.028131              .17490           -.16084[.873]
 .OGPHIL1                  -.10409              .17212           -.60473[.549]
 .OGPHIL2                 -.016633              .15535           -.10707[.915]
 .OGPHIL3                   .25621              .14521            1.7645[.086]
 :                          1.6245              .78057            2.0812[.044]
 m(-1)                     -.31566              .12140           -2.6002[.013]
*******************************************************************************
 st of additional temporary variables created:
 .OGSNG = LOGSNG-LOGSNG(-1)
 .OGSNG1 = LOGSNG(-1)-LOGSNG(-2)
 .OGSNG2 = LOGSNG(-2)-LOGSNG(-3)
 .OGSNG3 = LOGSNG(-3)-LOGSNG(-4)
 .OGINA = LOGINA-LOGINA(-1)
```

```
dLOGINA1 = LOGINA(-1)-LOGINA(-2)
dLOGINA2 = LOGINA(-2)-LOGINA(-3)
dLOGINA3 = LOGINA(-3)-LOGINA(-4)
dLOGMLY = LOGMLY-LOGMLY(-1)
dLOGMLY1 = LOGMLY(-1)-LOGMLY(-2)
dLOGMLY2 = LOGMLY(-2)-LOGMLY(-3)
dLOGMLY3 = LOGMLY(-3)-LOGMLY(-4)
dLOGPHIL = LOGPHIL-LOGPHIL(-1)
dLOGPHIL1 = LOGPHIL(-1)-LOGPHIL(-2)
dLOGPHIL2 = LOGPHIL(-2)-LOGPHIL(-3)
dLOGPHIL3 = LOGPHIL(-3)-LOGPHIL(-4)
dC = C-C(-1)
ecm = LOGSNG   -.17616*LOGINA  -.032910*LOGMLY +   .32652*LOGPHIL   -5.1465*C
*******************************************************************************
R-Squared                         .65133   R-Bar-Squared                  .45649
S.E. of Regression               .019705   F-stat.     F( 16,  37)    3.9697[.000]
Mean of Dependent Variable -.0018173   S.D. of Dependent Variable     .026729
Residual Sum of Squares          .013202   Equation Log-likelihood       147.9190
Akaike Info. Criterion          127.9190   Schwarz Bayesian Criterion    108.0292
DW-statistic                      2.1717
*******************************************************************************
R-Squared and R-Bar-Squared measures refer to the dependent variable
dLOGSNG and in cases where the error correction model is highly
restricted, these measures could become negative.
```