U.S. EMERGING MARKETS MUTUAL FUNDS INDEX AND THE GROWTH OF EMERGING MARKET ECONOMIES

An empirical study on Asian economies

by

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Abstract

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Emerging market mutual funds were established in the early 1980s on both debt and equity markets; and the US emerging market mutual funds accounts for more than half of the total worldwide. The growth of this fund seems to coincide with the remarkable growth of the equity markets in the developing countries in the 1980s. This study examines the relationship of the performance of the index of US emerging market mutual funds and the economic growth of the fund-recipient countries, as well as other macroeconomic variables that support and relate to the economic growth, by using the Vector Error Correction Model (VEC Model) to find the Granger causal relations for each economy.

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TABLE OF CONTENTS Page

List of Tables Page

List of Charts and Figures Page

List of Appendix Page

I. Introduction

Mutual funds have become popular over the last two decades. By the end of 2004, investment companies in the United States managed a total of $8.1 trillion. About 95 percent was managed in mutual funds, with the remaining five percent a combination of closed-end funds and exchange-traded funds (Chart 1.1 summarizes the development of mutual funds). Mutual funds are an open-end investment that pools money and invests in a diversified portfolio of securities. Unlike closed-end funds, which issue a fixed number of shares, open-end mutual funds are obliged to redeem shares at the request of the shareholder. An investment manager determines the composition of the fund's portfolio and the fund can invest in different industries, and in many different countries.

The first modern mutual fund was the Massachusetts Investors Trust, which was introduced in 1924, and began with a modest portfolio of 45 stocks and $50,000 in assets. It introduced concepts that would revolutionize investment companies and investing: a continuous offering of new shares and redeemable shares that could be sold anytime based on the current value of the fund's assets[1]. Mutual funds began to grow in popularity in the 1940s. In 1940, there were fewer than 80 funds in the United States, with total assets of $500 million. Twenty years later, the number doubled to 160 funds and the assets increased to $17 billion. Significant amounts of money did not start flowing into the funds until the mid 1980s. In 1985, there were 1,528 funds with total assets of $495 billions. In 1990, there were 3,079 funds with total assets of $1 trillion. In 1995, there were 5,725 funds with total assets of $2.8 trillion. By end of 2004, there were 8,044 funds with total assets of $8.1 trillion.

[1] International Mutual Funds Survey, Mutual Fund Fact Book 1997

Worldwide mutual funds also had grown rapidly in the 1990's, and their assets have increased even more rapidly. Most of the mutual funds are based in the United States, with the remaining in Japan, and Western Europe countries including France, Germany, Luxemburg, United Kingdom, Spain, and Brazil. An increasing proportion of these mutual fund assets are being invested *outside* the United States. There are three types of mutual funds invested abroad: international mutual funds, global mutual funds, and emerging market mutual funds.

There are four basic varieties of mutual funds: Equity funds (stocks), Fixed-Income funds (bonds), Hybrid funds (combination of stocks and bonds), and money-market funds (short-term debt instruments usually securities that mature in about one year or less). Of the total $8.1 trillion invested in mutual funds at the end of 2004, $4.4 trillion were invested in equity funds, $1.3 trillion in bond funds, $519 billion in hybrid funds, and $1.9 trillion in money market funds[2]. From these four basics, we have different types of funds such as: Balanced Funds, Asset-allocation Funds, Global and International Funds, and Emerging Market Mutual Funds.

Balanced funds: a mixture of safety, income and capital appreciation, typically have a weight of 60 percent equity and 40 percent of fixed-income. *Asset-allocation funds*: similar objective to balanced fund, but do not hold a specified percentage of any asset class, instead, the portfolio manager is given freedom to switch the ratio as the economy moves through the business cycle. Global and International Funds: *An international fund* invests only outside the home country. *Global funds* invest anywhere around the world, *including* the home country. With this nature, these funds are more volatile and are very much influenced by country's risks. *Emerging market funds come under the*

International Funds. Despite their risky nature, many investors seek after these funds, as the economic growth of these emerging economies can be much higher than the developed countries.

Emerging markets mutual funds are one of the key sources for capital flows to the emerging economies that are much needed for the business expansion of these developing economies. On the other hand, the high and low performances of emerging markets mutual funds are determinants of the investors' decision, thus affecting the magnitude and scale of the capital flow to these economies. Therefore, there is a "mutual" interest and effect between the emerging economies and the investors.

The definition of the "emerging market" typically applies to developing countries with a per capita gross national product of $10,000 or less. The larger markets usually have more liquidity, accounting transparency, or better corporate-governance standards demanded by US fund managers than the smaller markets. About half of the emerging market fund assets are concentrated in Asia outside Japan, and a smaller portion goes to Latin America such as Brazil, Chile, and Mexico, that have strength in oil and other commodities. For the last two decades, the East Asian emerging markets experienced more rapidly rising consumer incomes, which further accelerated their economic growth.

Emerging markets funds have grown rapidly, from total assets of $25 billion in 1997 to $41 billion in 2004[3]. The performance of emerging markets mutual funds, which is measured in *index*, where it replicates the market return. In this study, we are using the MSCI (Morgan Stanley Capital Index) for Emerging Markets Asia as a group,

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[2] ICI Fact Book, May 2005, Table 3, US Mutual Fund Industry Total Net Assets, p.61
[3] FRBNY, Economic Policy Review, 2004

then later, as per individual country for country analysis. MSCI Emerging Markets Index is a well-known international benchmark for emerging markets, and is a free float-adjusted market capitalization index designed to measure equity market performance in the global emerging markets.

As economies become more open, integrated, and inter-related with the rest of the world, countries have experienced high levels of capital flows, both in and out. Emerging markets have new investment opportunities arising from economic reform, privatization, lower trade barriers, and rapid economic growth. The changes in economic growth and the changes in the MSCI index seems to have moved together in the past two decades, which motivates us to work on this research question:

Do the changes in performance of emerging markets mutual funds reflect the changes in the economic growth of the emerging economies?

This research tries to investigate the nature of these capital flows into the emerging markets through the portfolio flows, whether the capital flows are permanent or transitory, or subject to reversals in response to the business cycle. The high performance of emerging-markets mutual funds these last two decades has drawn attention to a potential link with the economic growths of the emerging market economies. As these funds invest in the stocks or bonds traded in developing countries, the domestic firms in the emerging economies benefit from funds through improved access to equity capital, and the local equities markets improved their liquidity and raised price-to-earning ratios, thus reducing the cost to firms of issuing new capital. The rate of return from diversified foreign equities outdoes the US counterparts. For instance, from 2002 to 2004, emerging-markets stock and bond funds *average annual gains* of more than 25 percent and 19 percent respectively. Meanwhile the average

diversified US stock fund has averaged only a fraction of it: 5.8 percent annual gain[4] (Table 1.4 shows the comparison of returns). In terms of the total assets, the emerging-markets mutual funds had doubled in 2003 from the previous year, from $19 billion to a total of $37 billion. Record amounts of money flowed into these funds by end 2004 to around $41 billion.

Since the 1997 East Asian economic crisis, there have been many research papers conducted on the cause and effect of the collapse of these emerging markets. The focus of many of these papers is the contagion effect or the herding behavior of the investment that might cause the crisis (Scharfstein, 1990; Banerjee, 1992; Avery-Zemsky, 1998, Masson, 1999, Sharma 2000). These studies show that the herding behavior in the portfolio investment had an *adverse effect* on the economic growth. Once a big portfolio investment "moves out" from an emerging country, other players would follow, which consequently further declined the economic growth of the country.

Continuing these thoughts, we try to relate the movement of the index of the US emerging markets fund, represented by MSCI (Morgan Stanley Capital Index) with the economic growth of the emerging markets, by looking into whether the index movement has a significant effect on the economic growth; or whether the economic growth – through some variables - that causes the index movement. This is evident in the emerging market index movement of the region before and after the 1997 crisis (Chart 1.3 shows the index movement of Emerging Markets Asia, 1987-1994; and for clearer view, Appendices A and B show each individual sample countries data in terms of MSCI and the economic growth rate, as well as the selective macroeconomic variables (the characteristics of individual country data is discussed in chapter three under the

[4] According to Lipper Inc., as quoted in the Wall Street Journal, September 18, 2004.

Data Collection). We look into how the MSCI index of the emerging markets funds relates to the macroeconomic variables such as real GDP growth rate, current account balance, inflation rate, and exchange rate to the US currency.

The choice of emerging markets funds is based on the fact that more than 95 percent of its funds are allocated for the stock markets, therefore this fund index should accurately reflect the movement of capital across countries during, before and after the crisis. Investment decisions to the emerging economies are determined by the prospect of higher returns and whether the potential investment is worthy of its price. While foreign direct investment (FDI) is more stable, usually implicating a controlling stake in a business, and often reflects ownership of physical assets such as equipment, buildings, and real estate, which usually conflicts with the foreign ownership regulations in the funds recipient countries. Furthermore, foreign direct investment is more difficult to pull out or sell off, (in other words, less in liquidity) and would be less likely to pull out at the first sign of trouble. In contrast, portfolio foreign investment is more liquid, easy to pull out when there is a first sign of trouble, which suits the investors' benefits. From the point of view of the funds recipient economies, this could be volatile. Sudden withdrawals of the portfolio can lead to dramatic economic downturn. For a country in the rise, this portfolio can bring about rapid development, helping an emerging economy move quickly to take advantage of economic opportunity, creating new jobs and significant wealth. However, just by failing to meet the expectations of international investors, the large inflows could turn into sudden outflows of investment withdrawals.

II. Some Literatures on Financial Markets and Economic Growth

The positive relationship between the development of financial markets and the economic growth of an economy had encouraged governments of developing countries to establish and liberalize their financial markets. This movement was partly inspired by the work of McKinnon (1973) and Shaw (1973) ~ the M-S school. Both have stressed the positive relationship between the accumulation of financial assets and physical capital formation. Firms' investments, and the economic growth, depend primarily on financial sources of investment, especially the external financial and capital markets if internal resources (retained profits and depreciation) are not sufficient. This is true especially for developing countries, where large numbers of firms do not have sufficient profits to generate retained earnings. That explains why most companies raise funding for their investment though issuing new shares. Until the 1970s, many emerging economies had poorly developed capital markets; they tended to rely more on indirect financing rather than on direct financing through the equity and bond markets[5]. East Asian countries during the 1980s have been actively reforming their financial systems by liberalizing them and making them more market-oriented, and inviting the investment from both domestic and foreign institutions. The result is the establishment of rapid expansion of stock markets.

According to Fry (1997) who argues that based on the endogenous growth models, a well-functioning stock market should affect economic growth through two channels: (a) through raising the quantity and the quality of investments; and (b) through the takeover mechanism that past investments are profitably utilized. The stock markets have played the role of channeling funds from domestic investors and as a major channel

for foreign capital flows to the emerging markets. Feldman and Kumar (1994) recorded the enormous growth of stock markets in emerging economies: between 1983 and 1993, the combined capitalization of companies quoted on the 38 emerging markets in *The Economist's* list rose by ten-fold, from less than $100 billion to nearly $1 trillion (Korea and Thailand recorded twenty-fold increase in market capitalization), while the corresponding growth of industrial country markets was a little over three-fold, from three to ten trillion dollars. In 2003, the U.S. market capitalization to the emerging markets has recorded to $ 8.1 trillion, more than triple the number in 1993, which was around $2.07 trillion. In addition to the domestic source, the stock markets have also been the major channel for the foreign capital flows to the developing countries. The international equity flows to the emerging markets increased from $3.3 billion in 1986 to $61.2 billion in 1993.

An important feature of a stock market system is that it provides almost instant *liquidity,* which is needed by the firms to operate. On the other side, this liquidity feature is also a benefit for investors so that they could be ensured of quick liquidity when needed. A downside for the firms, of course, is that there is *no long-term commitment*, which could usually be obtained from banking-based capital source. Although the main function of the equity market is to provide a source of *stable* financing for firms' investments, this reliance on equity exposes the corporate' fragility to the changes in investments which means *exposing the country's economic development to this volatility*. This volatility of the stock markets in the emerging economies is echoed into the variations of the index of the US emerging markets mutual funds. Whether the first (the emerging stock markets) caused the latter (the index of US

[5] IFC (2001), "Emerging Stockmarket Factbook", Washington, DC, The World Bank

emerging markets mutual funds) or the latter has impact on the first mentioned, it is still uncertain to many research studies.

Several major researches study on the economic growth of the emerging markets. Bekaert, Harvey, and Lundblad (2001) find that financial liberalizations are associated with significant increases in economic growth, and that the effect is larger for countries with high education levels. They concluded that the financial liberalizations are associated with the real growth rate (as the dependent variable) in the range of 1% per annum. Johnston (1998) argues that liberalizing capital account is risky, because if capital inflows are not used efficiently, the markets may question their sustainability of its economic growth. The study suggests that in order to maximize the benefits of capital account liberalization while minimizing the risks, the government must do *sequencing* of liberalization, allowing the domestic financial markets to develop before totally liberalizing the capital account of the economy. The starting point is fiscal balance, followed by domestic financial liberalization, and the development of prudential bank regulations. Current account liberalization should proceed in tandem with domestic financial liberalization. *Capital account liberalization should be the final element of the sequence, with long-term capital flows liberalized before short-term flows.*

In order to maintain high economic growth, the emerging economies are facing the dilemma of how to handle the balance between the risk and exposure to financial volatility and the need to open the economy through financial reform and liberalization. The East Asian countries[6] have experienced an impressive economic growth rate since

[6] East Asia refers to China, Japan, Taiwan, South Korea, Hong Kong, Singapore, Indonesia, Malaysia, Philippines, Thailand, and the rest of the South East Asian Nations: Vietnam, Myanmar, Laos, and Cambodia.

the 1980s through mid 1997. The newly industrialized economies (NIEs) that include Taiwan, South Korea, Hong Kong, and Singapore, together with China and Japan had exceptionally high rates of annual growth, ranging from 6.1 percent in Hong Kong to 10.2 percent in China prior to the 1997 financial crisis[7]. Not only the high economic growth rate, these countries had become more integrated through the efforts of trade liberalization with the goal of free trade in the region by 2020 as proposed by the APEC. Intraregional trade as a share of the region's total trade jumped from 31.4 percent in 1984 to 42.2 percent in 1994, and around 53 percent in 2003.[8] This market integration would allow East Asian countries to integrate their financial markets to forge stronger intraregional linkages and to gradually become integrated into the markets of North America and Europe.

This development in the East Asian region had increased the region's access to international financial markets, and therefore induced large capital inflows from outside the region. The high economic growth would bring high returns to investments either through corporations, or through capital markets. Combined with the lowering of interest rates in the United States, the higher returns of investments from these regions definitely invited foreign capital inflows. The trade liberalization and the growing trade with Europe and the United States require financial services. While most of the financial service sectors in these regions are still underdeveloped, with the exception of Singapore and Hong Kong, these emerging markets have been gradually reforming their financial structure.

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[7] Yung Chul Park, "East Asian Liberalization, Bubbles, and the Challenge from China", Brookings Papers on Economic Activity, Vol. 1996, No. 2 (1996) 357-371.

[8] A roadmap for APEC economies agreed in Bogor, Indonesia, 1994, to achieve the goals of free and open trade and investment in the APEC region, the target is 2010 for industrialized economies and 2020

III. Data, Model and Methodology

The Emerging Market Mutual Fund Index (represented by Morgan Stanley Capital Index ~ MSCI) is a reflection of how the investors view the emerging economies in terms of their potentials for economic growth, the sustainability of this growth, and how secure their investments would be in the future. We try to capture this view by looking at the changes in some economic variables and their impact on the investors' decision to invest or not on the emerging market mutual funds. In other words, we try to relate the MSCI with some potential macroeconomic variables that affect economic growth.

Our data is collected from the Morgan Stanley and the International Monetary Fund. For the emerging market mutual fund index, we use data from the MSCI (Morgan Stanley Capital Index) for emerging market Asia as a group, as well as per individual country. MSCI Emerging Markets Index is a well-known international benchmark for emerging markets. The index is currently comprised of 27 emerging market country indices. The index is constructed by targeting for index inclusion 85 percent of the free float adjusted market capitalization in each industry group, within each country. By targeting 85 percent of each industry group, the MSCI Country Index captures 85 percent of the total country market capitalization while it accurately reflects the economic diversity of the market.

This paper concentrates on the Asian countries for two reasons. First, the country weights for the Asian countries account for approximately fifty percent of the total MSCI Emerging Markets Index (with total market capitalization of over USD 490

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for developing economies. (www.apec.org); "Prospect for intraregional trade in Asia, at www.iie.com/publications/

billion on 676 securities by 2004). The ten countries explored are: China, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Sri Lanka, Taiwan, and Thailand. In addition, we also explore the three advanced Asian economies: Japan, Singapore, and Hong Kong, as comparison. The second reason is that the dynamic fast-growing Asian economies since the 1997 financial crisis has brought up a more interesting development in the performance of the Emerging Market Mutual Funds Index, as the movement of the Index performance seems to reflect the ups and downs of the economic growth of the region.

The Explanatory Variables

For the economic variables, we use the economic data from the International Monetary Fund, by country and by economic indicators. The following indicators are selected: (1) Real GDP Growth Rate; (2) Current Account Deficits as a ratio to GDP; (3) Inflation Rate; (4) Exchange Rates to the United States Dollars (Implied PPP). These four variables are selected for these reasons: first, not only because of the availability of these data, also because they reflect the soundness of the economies; and secondly, these variables are viewed as important variables for the investors in deciding about the economic soundness of the country to invest in the emerging market mutual funds.

GDP Growth Rate (Y)

The economic growth shows the increase in the value of goods and services produced by an economy. The lure of higher profits and returns from investing in the emerging markets are the major factors for the investment decision by the US emerging markets mutual funds portfolio manager. In the 1980s, a number of countries in East Asia (Hong Kong, Indonesia, Japan, South Korea, Malaysia, Singapore, Taiwan and Thailand) began to experience enormous economic growth rates, in some cases piling up

double-digit expansions in their GDP. Year after year GDP growth of these economies had been highly positive. Investors realized that the access to these high economic growth economies would give them much higher returns on their investments than could be obtained at home. A comparison of real GDP over the past decades tells us that the East Asian countries growth performance has been significantly strong compared to other developing countries outside the East Asian region. And compared to the developed world, the developed economies on average are growing at half the rate. This growth rate is an important factor for portfolio managers in deciding the country weights in the emerging market mutual funds portfolio.

Inflation Rate

Macroeconomic stability is the fundamental reason for positive economic growth. A high inflation rate could create uncertainty and instability in an economy, which would adversely affect productivity and investment, and as a consequence, economic growth. The inflation rate of the East Asian countries is around 6 percent for the average of the two decades, between 1980-2000; compared to the other developing countries ex-East Asian which was around 24 percent (source: World Bank, World Development Indicators). The level of stability in the East Asian countries have much to contribute to the economic growth, and to the investment decision of the US mutual funds portfolio manager.

Exchange Rates to the United States Dollars

A quick withdrawal of foreign investments could affect the exchange rate of a nation's currency. It would cause a rapid decline in the purchasing power of a currency and eventually could produce economic crises. In general, the level of overvaluation real exchange rate of the East Asian economies is comparatively lower than developing

countries ex-East Asian. The World Bank compiled the average of 1980-2000 for East Asian countries versus other developing countries (in figures: 88 to 115; no overvaluation = 100). It is based on purchasing power parity comparison, where 100 signifies the parity and higher (lower) numbers indicate over-(under)valuation, following US Dollar[9].

Current Account Balance

The volume of a country's current account is a good indicator for trade performance. We can get a clear picture of the extent of activity of a country's industries, capital market, its services and the money entering the country from other governments or through remittances. The current account is described as the total receipts from exports of goods and services minus its imports of goods and services, plus unilateral transfer such as gifts and foreign aid. The current account also highlights what is traded with other countries, so it is a good reflection of each nation's trade competitiveness in the global economy in the long term, although a country may run short term trade deficit for various reasons other than competitiveness.

Other Variables

There are too many variables that could be included, but we limit our model into those variables with direct impacts on the rate of return of investment, or on the price index of the emerging market mutual funds. While investors might be aware of the corruption practices, crony capitalism, or not, the principal guideline for their investment decisions is only one, the rate of return to their investment adjusted with the degree of risk. So, these variables such as weak financial institutions, lack of transparency, crony capitalism, corruption practices, accounting/corporate governance opacity, or

[9] World Bank, World Bank Indicators

economic/policy opacity (lack in transparencies to the public) are *assumed to be proxied by GDP Growth and the changes in the other macroeconomic variables (inflation, exchange rate, and current account deficit)* because these variables *would materialize* as part of the consequences of a good or mismanaged economy. Similarly, exchange rate appreciation and growth in credit to the private sector as a fraction of GDP can be used as a proxy for weaknesses in the banking system.

In terms of the regional choice of investment destination, the emerging markets in the Asian economies, along with the Latin American and Eastern Europe emerging economies, are probably benefiting from the current violence situation in the Middle East region, and would continue being the major channeling destination for the fund.

Characteristics of the Country Data

Appendix A shows the comparison of MSCI and the economic growth rate of each individual sample country. In general, most countries show that the two variables seemed to move in unison, at many data points. With China, Hong Kong and Singapore, there was a downward trend in 1992 and 1999, then a stable upward trend through 2005. Whenever the real GDP growth rate is upward, the MSCI index follows which signifies that they are strongly correlated. Data on Taiwan shows only after mid 1990s that Taiwan's economic growth rate seems to move in the same trend as its MSCI index. Similar case with Korea, only after 1990, the trends of movement are in the same direction. Thailand's MSCI index is obviously much more volatile than its economic growth rate, and it started a downward trend since 1993, several years prior to the 1997 financial crisis; the economic growth rate only followed in the same downward trend in 1996. Similar with Thailand, Indonesia and India's MSCI index was volatile, and seems to move in a downward trend while the economic growth was still stable for the period

1993 through 1996. Malaysia and the Philippines, the movements of both variables seem to move coherently in unison, as well as in Pakistan and Sri Lanka.

Appendix B shows the movement of macroeconomic variables of each sample country. China has stable economic growth at approximately ten percent annually, with relatively high inflation in 1990s, but it was curbed in 1999, and not affected by the 1997 financial crises. Hong Kong and Taiwan also had stable growth with a slight downward trend in the early 2000s, and slightly affected during the 1997 episode for just a small time phase. Japan in the 1990s experienced a volatile economic growth, a downward trend in 1993, and another downward in 1997, before the economic growth seems to start recovering in 2002. Korea and Thailand's stable growth was plummeted in the 1997 financial crises and quickly bounced back; its economic growth movement is mimicked by the inflation rate and the current account. Singapore's stable growth was accompanied with the increasingly large surplus in current account balance.

The most notable is the inflation rate being the highest during the 1997 financial crises when the economic growth being the lowest; this could be seen in Japan, Korea, Thailand, Malaysia, and Indonesia. Other countries: Singapore, Philippines, India, Pakistan, SriLanka seems to have been very mildly affected by the crises; while Taiwan, Hong Kong and China's economic variables seems not affected at all by the 1997 crises.

Based on these countries data, it seems that there is a tendency of movement in unison between the MSCI index and the economic growth of each country. Correlation matrix below further strengthen our analysis on a possible relations of these variables.

Correlations Matrix *(see complete output on Table 4.1 and summary in Table 5.1)*

In terms of correlations between MSCI with the four economic variables, MSCI is highly correlated (coefficient more than 0.5) with real GDP Growth (Y) *in all sample*

countries, except for Hong Kong. With inflation rate (INF) variable of seven countries are highly correlated with MSCI: China, Taiwan, Japan, Malaysia, Thailand, Philippines, and Pakistan. EXC variable is highly correlated to MSCI in these seven economies: Taiwan, Hong Kong, Japan, Indonesia, India, Pakistan, and Sri Lanka. CA variable is highly correlated with MSCI in these following eight economies: China, Hong Kong, Singapore, Malaysia, Philippines, Indonesia, Thailand, and India. Based on this correlation matrix, we can also say that MSCI is highly correlated with not only Y, but also INF, EXC, and CA variables. So, the next step is to examine the *direction* of the correlations among these variables, by looking into the Granger Causality Test.

Model and Methodology

For methodology we conduct the following steps: First, we implement unit root (Augmented Dickey-Fuller) tests to determine the order of integration of the data series, because we use macroeconomic series which are usually prone to nonstationary problems. Second, we apply an appropriate unit root test to the residuals to test for cointegration. Third, we conduct the cointegration test. Fourth, if the cointegration is accepted, we use the residuals from cointegrating regression as an error correction term and include this error correction term as an explanatory variable. Fifth, we conduct the Granger's causality test on each sample country.[10]

As the directional hypothesis, we established that the changes in the macroeconomic variables (current account balance, GDP growth, inflation, current account and exchange rates) of the emerging economies might be "associated" with the

[10] Kennedy, Peter, "A Guide to Econometrics", Cambridge MIT Press, 1998, pp. 265-270, on how to work with nonstationary series, unit root test, and cointegration.

investors' decisions to invest in the emerging economies. So we consider two cases that motivate us to use the Granger's causality test:

Case 1: MSCI = f { Growth }

Although the standard equity model considers the index as the indicator of growth, we think it is also important to see the possibility of the reverse direction, that the growth is the indicator for the index movement, as the investors would like to consider having a portfolio that includes the higher performing emerging markets. We construct the following model which shows that the emerging market mutual funds index is a function of the growth of GDP and some other macroeconomic variables that support growth, under the assumption that investors would make decision to invest in an equity market of a country that has promising higher yield returns to their investments. So the investors would identify emerging markets that have higher economic growth. As all investors are conducting their choices on the same principle, the index of the funds would abide to the law of demand and supply. That means higher economic growth is equivalent to the positive performance of the index, as demand for the funds would be higher. Since the largest portion of the emerging markets mutual funds are invested in equity market, we are going to look only on the equity markets, and ignore the debt market due to its currently insignificance role in the emerging economies.

$$\mathbf{MSCI_{i,t} = f\ \{\ G_{i,\ t-k}\ \}}$$

where MSCI (M) is the US emerging market mutual funds index on certain country (i), and G is the variables of macroeconomic indicators of that country, with t represents time, and k is the time lag. We consider the following possibilities:

a) The M index would be a function of a series of time lags of the economic growth variables: this explain the tendency of the investors looking into not only the current growth rate, but also the history or the past values of growth, before making decisions about investing. This can be written as follows:

$$\mathbf{M_t = \beta_0\, G_t + \beta_1\, G_{t-1} + \ \ldots + \ \beta_q\, G_{t-q}}$$

where $\{\beta_i\}$ are the coefficients.

b) The M index itself is a process that might follow its past values, because of the notion of "herding behavior" of investors, that tends to look at the previous index performance prior to investing or disinvesting, which in return would strengthen or weaken the M index itself.

$$\mathbf{M_t = \alpha_0 + \alpha_1\, M_{t-1} + \ \ldots + \ \alpha_p\, M_{t-p}}$$

c) Then we combine the above two equations in this relationship to try to explain the M index: $\mathbf{M_t = \alpha_0 + \alpha_1\, M_{t-1} + \ \ldots + \ \alpha_p\, M_{t-p} + \beta_1\, G_{t-1} + \ \ldots + \ \beta_q\, G_{t-q}}$

or: $\mathbf{M}_t = \boldsymbol{\alpha}_0 + \Sigma_{i=1..p}\, \boldsymbol{\alpha}_i\, \mathbf{M}_{t-i} + \Sigma_{i=1-p}\, \boldsymbol{\beta}_i\, \mathbf{G}_{t-i} + \boldsymbol{\varepsilon}_t$

This last equation is coherent with the linear VAR model:[11]

$$\mathbf{Y}_t = \boldsymbol{\alpha}_0 + \Sigma_{i=1..p}\, \boldsymbol{\alpha}_i\, \mathbf{Y}_{t-i} + \Sigma_{i=1-p}\, \boldsymbol{\beta}_i\, \mathbf{X}_{t-i} + \boldsymbol{\varepsilon}_t$$

where Y_t is the endogenous variable, X_t is exogenous variable, and ε_t is the error term. α_i and β are the parameters in the model to be estimated. In matrix notation, the equation can be written as:

$$\mathbf{Y}_t = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1 \mathbf{Y}_{t-1} + \ldots. + \boldsymbol{\alpha}_p\, \mathbf{Y}_{t-p} + \boldsymbol{\beta}_1\, \mathbf{X}_{t-1} + \ldots + \boldsymbol{\beta}_r\, \mathbf{X}_{t-r} + \boldsymbol{\varepsilon}_t$$

where $\boldsymbol{\alpha}_0$ is an (n x 1) vector of intercept terms, $\boldsymbol{\alpha}_1 \ldots. \boldsymbol{\alpha}_p$ are (n x n) matrices of coefficients that relate lagged values of the endogenous variables to current values of those variables, $\boldsymbol{\beta}_1 \ldots. \boldsymbol{\beta}_r$ are (n x m) matrices of coefficients of the current and lagged

values of the exogenous variables to current values of the endogenous variables, and ε_t is an (n x 1) vector of error terms (see Appendix D for theoretical background on VAR).

Case 2: G = f { MSCI }

Similar process as above, we look into the right-hand side of the original equation, the growth variable (G_i) itself is always autoregressive in nature, as it grows with time, the growth level today is somewhat determined by the level of growth of the previous periods. While the growth level is also affected by many other endogenous variables, in the case of this study, we focus on the impact of the MSCI index. As the US emerging market index is higher due to high demand for a certain country, the flow of capital into this country would also rise, which eventually find its way to higher productivity in the country, and help raise the economic growth in aggregate. So we specify the relationship for the G_i as follows:

$$\mathbf{G_t = \alpha_0 + \alpha_1 G_{t-1} + \ \ldots + \ \alpha_p G_{t-p} \ + \beta_1 M_{t-1} + \ \ldots + \ \beta_q M_{t-q}}$$

Stationarity Test

The Granger causality test is relevant only when the variables involved are either stationary, or nonstationary but cointegrated. And as in many macro time series data, the MSCI index series is likely to be nonstationary, so the Augmented Dickey-Fuller (ADF, 1981) unit root test needs to be performed on those variables. First, we observed the autocorrelation function and correlogram of the series. As it grows over time, the mean of each series becomes *time-dependent*. Looking at the table of correlogram (Tables 3.1 and 3.2), the spikes of both autocorrelation and partial

[11] Pindyck and Rubinfeld, "Econometric models and Economic Forecast", McGraw-Hill, 1998, p. 399-400, on Vector Autoregressions.

correlation, and the numbers are not anywhere near zero, and the Ljung-Box Q-statistics are significant. These show that the series are a nonstationary process. As the autocorrelation function for a stationary series drops off as *k*, the number of lags increases. The figures 3.1 shows that the autocorrelation function does decline as the number of lags becomes larger. We suspect that this series is a homogeneous nonstationary process. Taking the first difference shows that the mean is now about constant (figure 3.2), so we can conclude that differencing once should be sufficient to ensure the stationarity of the series, and therefore we can say that the series is now an integrated process of order one, I(1). The stationarity test[12] is conducted on all the macroeconomic variables of each sample countries: (1) GDP Growth Rate; (2) Current Account Deficits; (3) Inflation Rate; (4) Exchange Rates to the United States Dollars (5) the MSCI emerging market index for each country.

The results of the stationarity test on level series (Augmented Dickey-Fuller test is about 95 percent of all these series turned out to be nonstationary as predicted (see Table 3.3). We compare each statistical value of each variables with its critical values, and we reject the null hypothesis (Ho: unit root) when $|t_k| > t_c$ --- (t_c as the critical value; while t_k is for every variable's statistical value). Only three cases out of 65 *country-variable* points where we can reject Ho: Korea (Y variable), Malaysia (Y variable), and Taiwan (MSCI index variable). We cannot reject the null hypothesis of unit root of the series for the remaining 95 percent of total 65 series (13 countries and five variables).

The unit root test on first-differenced series (see Table 3.4) resulted as follows: out of 65 series (13 countries and 5 variables), 7 series reject null hypothesis at 5%

[12] Kennedy, Peter, "A Guide to Econometrics", Cambridge MIT Press, 1998, on Unit Root Test, p. 268-9, stated the following: If $y_t = \alpha\, y_{t-1} + e$ (where e is the error term, I(0)); if $\alpha = 1$ (unit root), then y is I(1), i.e. nonstationary.

significance level, 3 series reject null hypothesis at 10%, and the rest reject the null hypothesis at 1% significance level. We conclude that after first-differencing, the series are stationary. Based on these results, we choose to use the first-differenced series for all the following estimations thereafter.

Cointegration Test and VAR/VEC

Although individually the variables used are integrated of order one or I (1), a particular linear combination of them is I(0) – the levels, which is called *the cointegrating* combination of an equilibrium relationship. So, we conduct *cointegration* (Johansen) test for all these series. If the results show that these nonstationarity series are not cointegrated, we use vector autoregression(VAR) model, and if the series are cointegrated, then we use the VAR with error correction (VEC)[13] model, and conduct the granger causality test[14].

We found that all the sample countries' series are indeed cointegrated as indicated in the summary of output for the Johansen cointegration test (see Table 3.5). Thailand and Taiwan have three cointegrating equations, while Korea, Pakistan, and Sri Lanka have four cointegrating equations, and the other countries (China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, and Singapore) indicate one cointegrating equation. Therefore we conclude that the VEC model is the appropriate model for these series. Theoretical background of VAR/VEC model is attached in the Appendix D.

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[13] As pointed out by Engle and Granger (1987) that *a linear combination of two or more non-stationary series may be stationary.* The stationary linear combination is called the *cointegrating equation* and may be interpreted as a long-run equilibrium relationship among the variables. Johansen (1991, 1995) then developed the method of cointegration tests based on VAR (vector autoregressions). Also on Greene, W.H. "Econometric Analysis", Prentice Hall, 1997, on Johansen cointegration test, pp. 857-858.

IV. Vector Error Correction, Causality Test, and Test of Significance

Since the result of Johansen cointegration test shows that all sample countries have a cointegrating equation at least one, we can therefore use vector autoregression with the error correction term. We use the cointegrating (error correction) term that we generate from the Johansen cointegration test, and apply that to the VEC regression for each economy. All the variables are expressed as a linear function of lagged values of itself plus the error correction term as the cointegrating vector. We use two lags, as we consider that the changes of MSCI will be felt immediately in an economy, since the index reflects the changes in short-term equity investment.

VEC Outcome

The VEC equations are tested on each coefficient estimates, with t-statistics, and then F-statistics for the overall fitness where the null hypothesis is $\beta_0 = \beta_{1=\ldots} = \beta_r = 0$.

We conclude with the causality direction based on the null hypothesis (t-test) that the estimated coefficients are zero, significance are tested at 10%, 5% and 1% respectively. The following are the outcomes (refer to Appendix E for VEC output by individual economy or Table 5.1 for the summary).

MSCI Granger-Cause G

In terms of Granger –causal relation, the output shows *more intensive results that MSCI granger-cause the economic growth variables than the opposite direction.* MSCI granger-cause Y variable, and it is significant in ten countries (China, Japan, Korea, Singapore, Malaysia, Philippines, Indonesia, Thailand, India, Pakistan, Sri Lanka). MSCI Granger-cause INF in eight countries (China, Japan, Korea, Malaysia,

[14] Refer to Hsiao (2006) on Granger causality test using VAR (when variables are not cointegrated) and VEC (when variables are cointegrated) models.

Philippines, Indonesia, India and Pakistan). The output also shows that MSCI Granger-cause EXC in four countries (Hong Kong, Malaysia, Indonesia, Pakistan), and MSCI Granger-cause CA also in four countries (Japan, Korea, Malaysia, Thailand). This result confirms that MSCI Granger-cause GDP growth. It is a signal that high GDP growth rate can be expected in that country when its MSCI index for that country is high. And when the index is declining, that signals a warning for the economy. The government in the emerging economy can use the signal to prevent a potential economic downturn or crisis, and take proactive actions in terms of economic policies in order to sustain economic growth.

G Granger-Cause MSCI

The output shows much weaker results in the case of *G Granger-cause MSCI*. GDP Growth (Y) variable granger-cause MSCI only in three countries (Korea, Singapore, Thailand); while EXC granger-cause MSCI in five economies (China, Philippines, Malaysia, Indonesia, and Pakistan).

Pairwise Granger Causality Test

Prior to the VEC model, we also conduct the Pairwise Granger Causality Test (Table 4.2.), which *does not include the error correction term*. We would like to see if adding cointegrating error correction term would give us different result. The result (without error correction term) confirms the evidence that MSCI granger-cause economic growth variables in nine economies, more than the other direction. In comparison, the VEC output (with inclusion of error correction term as cointegrating vector) has stronger evidence of MSCI granger-cause Y and INF, and much less evidence of economic growth granger-cause MSCI.

VEC Output on China: Granger-Causality, and Policy Implication

The asterisk (*) sign on the VEC Output (Appendix E) shows the t-test and F-test rejection on the null hypothesis that particular estimated coefficients are zero. The t-test on the estimated coefficients on China's VEC model gives us the following results: MSCI $_{(-1,-2)}$ → Y and INF. The F-test shows that with the inclusion of error correction factor, the overall fit is better, and it reject the null hypothesis that all coefficients are zero on the above two relations; so we can say that the lagged values of MSCI Granger-cause Y and INF variables. In addition to that, we also found two more granger-causality relations: $EXC_{(-1,-2)}$ → MSCI , INF and $INF_{(-1,-2)}$ →Y. So we can put the Granger causal direction as in the following diagram:

EXC → MSCI → Y
↓
EXC → INF → Y

The output also shows that we cannot reject that all G variables (CA, Y, INF, EXC) does not Granger-cause MSCI. This implies that the second case (MSCI = f (G)) is not appropriate in the case of China. The policy implication of this Granger's Test on China is that the changes in the MSCI index, along with INF, could alert the China economy. And an important concern should be placed on the EXC variable, because EXC granger-causes both MSCI and INF variables.

It seems that although this Granger test provides evidence that in the case of China the changes in MSCI and its past values might be able to predict Y and INF, we find that the impact of MSCI is *relatively small.* In terms of magnitude, EXC has large and significant coefficients on the other variables, such as INF. We can say that for the period of 1992-2004, the US emerging market mutual funds on China had a small

contribution to the growth of China's economy, probably because China's economic growth is more influenced by foreign direct investment, rather than equity investment. A quick look at World Bank database[15] (see Table 4.4), China's portfolio investment in equity is only around 1.5 percent (as a percentage to the overall gross fixed capital formation) from 1997 through 2004, and prior to 1997 zero percentage. While gross fixed capital formation (as percent of GDP) – which include foreign direct investment, reaching 38 percent by the end of 2004.

Hong Kong, Taiwan, Japan, Korea

Although Hong Kong has been part of China the past eight years, for the purpose of this study, we treat it as a separate entity due to its more developed financial markets and separation in data. The VEC output tells us about the economic characteristics of these countries, where Taiwan and Hong Kong's output are the opposite of China's VEC output. The t-test on Hong Kong's coefficients that reject the null hypothesis is on the following relations: $MSCI_{(-1,-2)} \rightarrow EXC$ and $EXC_{(-1,-2)} \rightarrow EXC, Y$

F-test also shows that with the inclusion of error corrections, the overall fit is good, and the F-test reject the null hypothesis that all coefficients are zero on the above two relations; so we can say that the lagged values of MSCI and EXC Granger-cause EXC variable. As for Taiwan, none of the estimated coefficients are significant.

So for both Taiwan and Hong Kong, MSCI does not Granger-cause Y and INF (which is the opposite result with China). The high level of domestic capital formation and foreign exchange reserves in these two economies confirmed our result that MSCI is *insignificant* to economic growth on these economies.

[15] World Bank Data Query, http://www.wdi.org

Japan and Korea: We reject that MSCI does not granger-cause Y, INF, and CA; or in other words, MSCI $_{(-1, -2)}$ → Y, INF, CA. The t-test and F-test on these relations are significant. The policy implication of this Granger causality test is that the economic authorities of both Japan and Korea may use the changes in MSCI performance as a signaling tool of the economic performance. The same conclusion on the following countries that MSCI could be a tool for predicting the up and down effect of the global market towards each of these economies, as MSCI 's lagged values granger-cause Y or other variables (CA, INF, EXC) which eventually interact with the economic growth.

Thailand, Indonesia, Singapore, Malaysia, Philippines

In all these five countries, *MSCI Granger-cause Y, and not the other way around*.

Thailand: The t-tests are significant on the following $MSCI_{(-1, -2)}$ → Y, CA.

Indonesia: $MSCI_{(-1,-2)}$ → Y, EXC, INF; but F-test confirms only $MSCI_{(-1)}$ → INF

Singapore: Granger-causality is significant both directions:

MSCI → Y, and also Y→ MSCI.

Malaysia: The t-tests are significant on the following relations:

$MSCI_{(-1, -2)}$ → Y, INF, CA. All t-tests on these three variables (CA, Y, INF) are significant, but F-test confirmed only CA and Y, but not INF.

Philippines: $MSCI_{(-1,-2)}$ → Y, EXC, INF

India, Pakistan, Sri Lanka:

India: The t-tests are significant on the following $MSCI_{(-1, -2)}$ → Y, INF.

Pakistan: The t-tests are significant on the following $MSCI_{(-1,-2)}$ → Y, EXC, INF.

As for Sri Lanka, none of the estimated coefficients are significant.

Specification Tests on Significance of MSCI on Economic Growth

From the Correlation Matrix, we conclude that MSCI is highly correlated with real GDP growth (Y) very strongly (twelve out of 13 countries) than in other variables. And then from the Granger Causality test with VEC model, we also see that ten countries have significant result on the case of *MSCI granger cause Y* variable of economic growth. However, Granger-causality test does not allow us to directly conclude that MSCI has any significant effect on the economic growth, although these ten countries do have significant results of MSCI granger-cause Y variable. Granger causality only measures the precedence and information content, but does not by itself indicate causality in the more common use term; it shows that the MSCI *can be a useful predictor* to the economic growth *in the presence of other variables*. By conducting the next tests, we would be able to see the significance, or insignificance, of MSCI in economic growth.

We conduct several tests to confirm or deny the significance of MSCI in GDP growth equation: First, the t-test, F-test, and the adjusted R-square comparisons, then Akaike Information Criterion and Scwhwarz Criterion tests. We conduct these tests on all sample countries with the following two steps:

Economic Growth (G) = f { $G_{t, t-1, \ldots}$; **MSCI**} …… (step 1)

Economic Growth (G) = f { $G_{t, t-1, \ldots}$ } …… (step 2)

The first step is *with MSCI* as one of the explanatory variables of Growth, and the second, *without MSCI.*

The t-test, F-statistics, and R-bar-square

We conduct the following t-test on each individual coefficients (and especially to see if MSCI's estimated coefficient is significant or not), as well as F-test[16] on the overall regression's coefficients, and the adjusted R-square of both two equations. The t-test result tells us that INF variable has a dominant *negative effect* on determining the economic growth in all the nine sample countries, significant at 99 percent confidence level, either with or without MSCI variable in the equation. EXC variable has also *negative impact* to the economic growth, and in terms of its magnitude of its coefficient, in both equations (with and without MSCI), countries such as Taiwan, Hong Kong, Malaysia, Singapore and Thailand, the magnitude of EXC's coefficient ranges from 63 to 96 percent, as determinant to economic growth. When MSCI variable is added to the equation, its magnitude ranges from 1 to 12 percent, and all are *positively significant* to the economic growth.

Table 4.7 summarizes *the improvement* in comparison of values of the Adjusted R-square and the F-statistics of the overall estimates with and without MSCI in the economic growth equations. Our expectation is the F-statistics would be higher when MSCI is included in the economic growth equation than when MSCI is not included, if MSCI has some significant role in economic growth. So, if the F-statistics of the step (1) is greater than F-statistics of the step (2), it means we can state with confidence that MSCI does have a marginal effect on the economic growth. We also make comparison of the value of adjusted R-square statistics, because the adjusted R-square can be used to compare the fits of the equation with the same dependent variable, and *different* numbers

[16] The F-test of overall significance measures the overall degree of fit of an equation. The null hypothesis is that all the coefficients equal zero. We reject the null hypothesis when the overall fit of the estimated

of independent variables, and lastly the t-test significance of the estimated coefficient of MSCI variable when it is added to the equation.

The comparison between the two steps on F-stat shows that eleven out of thirteen countries actually have improved F-statistics when MSCI is introduced into the economic growth equation, with only two countries, *Taiwan and Philippines*, consistently show the reverse. Furthermore, the adjusted R-square also shows the same response, i.e. when MSCI is introduced; its value increases, showing the better fitness in the equation. It is also worthy to mention that the t-test on the slope coefficient of MSCI variable in the step (1) confirmed *that the coefficient of MSCI as explanatory variable to the economic growth is significant,* mostly at 99 percent confidence level, with a few on 95 and 90 percent confidence level, except for three countries: India, *Taiwan and Philippines*.

Akaike Information Criterion and Schwarz Criterion

The next test, the Akaike's Information Criterion (AIC) and Schwarz Criterion (SC). These criteria are used to decide if the improved fit caused by an additional variable is worth the decreased degrees of freedom and increased complexity caused by the addition. *The lower AIC or SC are, the better the specification*. The following results in Table 4.6 show that these countries, again, except for Taiwan and Philippines, have AIC and SC values lower when MSCI variable is added into the economic growth equation. This AIC and SC tests confirm the significance of MSCI in economic growth in Hong Kong, Korea, Malaysia, Indonesia, Singapore, Thailand, and Sri Lanka.

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equation is statistically significant. F-statistic = $(R^2/k)/[(1-R^2/(N-k)]$; N = number of observations, k = number of slope coefficients.

Conclusion of Significance Test Results

Based on the above tests' results, from t-test on the coefficients, F-statistics, R-bar-square, and AIC/SC tests, we found *consistent* result that *in some* countries (Hong Kong, Korea, Singapore, Malaysia, Indonesia, Thailand, Sri Lanka) (seven countries in the sample) ~ *but not in other countries* (in this case, Taiwan and Philippines) ~ that MSCI has some *marginal effect* on the economic growth. Part of the reason for these "inconclusive" results are:

1) The economic growth equation includes only the financial variable without other conventional growth measurements, such as: initial level of per capita income, factor accumulation in human resources or capital, machineries, technology; or investment in secondary education;
2) "Openness" in those outward-looking economies is also excluded from the equation. These sample countries are actively trading with the world with different degree of openness.

The Different Degree of Foreign Investment

We look into whether this consistently insignificant result in the two countries, Taiwan and the Philippines, as opposed to the other significant result in other countries, is caused by the different degree of penetration by foreign capitals or the financial structure in these countries, which leaves them *unresponsive* to the MSCI changes.

Taiwan has a tightly regulated banking and financial system. However, since the mid-1980s, the financial sector as a whole has been steadily opening to private investment, gradually liberalized the restriction of foreign portfolio flows. The gradual financial liberalization includes the lifting of the ceiling of foreign capital in a firm, or

industry. In October 2003, it abolished the complicated regulatory system governing foreign portfolio investment by gradually liberalizing the ceiling of QFII (qualified foreign institutional investors) under which mutual funds are included. Nevertheless, the market share held by foreign banks remains relatively small (below three percent). The establishment of new securities firms, banks, insurance companies, and holding companies, has underscored this liberalization trend and enhanced competition[17].

As for the Philippines, the 1991 Foreign Investment Act (FIA) contains two "negative lists" that outline areas where foreign investment is restricted or limited. This list is normally updated every two years. The restrictions stem from a constitutional provision, which permits the Philippine Congress to reserve only to Philippine citizens, certain areas of investment. Many analysts view these restrictions as a significant contributing factor to the Philippines' poor record in attracting foreign investment. In addition, the Philippines generally impose a foreign-ownership ceiling of 40 percent. While there are exceptions to the ceiling, foreign capital participation that reaches the 40 percent foreign equity level is required to divest within certain years, and then the ownership will be diverted back to the Philippine citizens.

In contrast to Taiwan and the Philippines, economies like Hong Kong, Singapore, as well as Thailand, Malaysia, and Korea have wider open policy towards foreign investment. Hong Kong pursues a free market philosophy, and there is minimum government interference in the economy. The Hong Kong Government welcomes foreign investment. It offers neither special incentives nor does it impose disincentives for foreign investors. Hong Kong's well-established rule of law is applied

[17] Source: Taiwan's Foreign Investment Commission, "The Recent Deregulation of Foreign Portfolio Investment in Taiwan", www.cbc.gov.tw

consistently and without discrimination. There is no distinction in law or practice between investments by foreign-controlled companies and those controlled by local interests. There are no impediments to the free flow of financial resources. Non-interventionist economic policies, complete freedom of capital movement and a well-understood regulatory and legal environment have greatly facilitated Hong Kong's role as a regional and international financial center.

Singapore also maintains an open investment regime. The World Bank's report, "Doing Business in 2005: Removing Obstacles to Growth," ranked Singapore as the third easiest economy in which to do business, after New Zealand and the United States. The U.S.- Singapore Free Trade Agreement, which came into force January 1, 2004, expanded U.S. market access in goods, services, investment, government procurement, and intellectual property. Attracting foreign investment into the country -- initially to spearhead industrialization and subsequently to climb the technological and value-added ladders -- has been the key economic strategy of the government. Through this strategy, Singapore has evolved into a base for multinational companies (MNCs) to engage in high value-added manufacturing and product development, and coordinate regional procurement, production, marketing, and distribution operations. Singapore continues to have a sophisticated investment promotion strategy designed to attract major investment in high value-added manufacturing and service activities[18].

The Malaysian government encourages foreign investment, particularly in export-oriented manufacturing and high-tech industries, and in "back office" service operations. The government does permit 100% foreign ownership in the manufacturing sector. Malaysia actively encourages foreign investment in the information technology

industry, for example, the Multimedia Super Corridor (MSC), an ambitious project to transform a 15-by-40 kilometer area stretching south of its capital, Kuala Lumpur, into Asia's version of Silicon Valley. Foreign investors in the MSC receive a host of tax and regulatory exemptions.[19]

In Korea, the foreign portfolio investors now enjoy good access to Korea's stock markets. Foreign investment ceilings in the Korean Stock Exchange (KSE) were abolished in 1998. Financial sector reform has been a bright spot for the Korean government in the past eight years and could provide a positive example for reform efforts. In the aftermath of the 1997-98 Asian financial crises, Korea made rapid progress in reforming its financial institutions and capital markets. The Korean government has also taken steps to tighten competition policy and enacted measures to enhance foreign investment incentives. Koreans in general began to see more foreign investment as something positive, even necessary, for Korea. These changes have combined to help the Korean economy become more attractive to outside investors and for it to begin to shed its long-standing reputation as a difficult environment for foreign capital.

The Royal Thai Government (RTG) has long maintained an open, market-oriented economy and encouraged foreign direct investment as a means of promoting economic development, employment, and technology transfer. Thailand welcomes investment from all countries and seeks to avoid dependence on any one country as a source of investment. Since 2001, the government announced new investment funds designed to stimulate activity in the Thai capital market. Several of these funds are open

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[18] www.ida.gov.sg

[19] The Malaysian Industrial Development Authority (MIDA), www.mida.gov.my/invest.html

to foreign participation, including the Thailand Equity Fund, which is investing $250 million in large Thai industrial firms undergoing corporate restructuring; the Thailand Recovery Fund, an off-shore fund that focuses on medium-sized Thai firms, and the Thailand Corporate Recovery Fund, which is raising $500 million for investment in Thai firms, especially businesses undergoing restructuring.[20]

China's capital markets have not kept pace with its economic needs. Two stock exchanges have been established in Shanghai (in November 1990) and in Shenzhen in southern China's booming Guangdong Province (July 1991). The Securities Law took effect in June 1999. The Law includes tougher penalties for insider trading, falsifying prospectuses and financial reports, and other forms of fraud. China's stock markets are gradually adopting accounting standards closer to those in use in other markets. While foreign securities firms can invest in domestic markets through the Qualified Foreign Institutional Investor (QFII) program, this offers only limited access. Foreign investors are only allowed to acquire a 33 percent stake in a Chinese securities firm.

With such different degree of openness and different financial regulations and structure, one cannot generalize the effect of the U.S. mutual fund on the economic growth in the emerging market economies. However, we can say through the result of this study, there is a consistency that in some countries, where there exists openness towards foreign investment, the MSCI (the benchmark of U.S. Emerging Market Mutual Funds) variable seems to have high correlation with GDP growth rate of these emerging economies, that MSCI can be a useful predictor and a positive to the economic growth.

[20] Thailand's Board of Investment

V. Conclusion

We have examined whether the US Emerging Market Index (represented by MSCI Index) is an indicator of economic growth of the emerging economies, on the sample of thirteen countries, for the period 1980-2000, using various tools, applying unit root tests on the series, vector autoregression with error correction term, correlation matrix, Granger's test, and specification test on the significance of MSCI (t-test, F-test, R-square, Akaike and Schwarz Information Criteria). Table 5.1. summarizes all the results of those tests, and we found the following conclusion from this study:

1) MSCI is *highly correlated* to the GDP growth variable. Twelve countries have strong correlation between the real economic growth and MSCI index. In seven countries, the MSCI index is correlated with the inflation rate, exchange rate and current account.
2) There is more evidence on *the direction of the effect*: that MSCI "granger-cause" economic growth, rather than the other way around. Ten countries confirmed that MSCI could be a significant predictor of economic growth (MSCI → G).
3) Only three countries have this granger causal relationship (G → MSCI). This implies that investment behavior such as chasing the higher return by measuring the economic growth of the destination country to decide where to invest, seems to *be less significant*.
4) MSCI is *positively significant* as explanatory variable to the economic growth in most sample countries, except for *Taiwan and the Philippines.* We found from the Significance Tests that it shows definite improvement when MSCI is added into the equation in these countries.

Findings and Policy Implications

The results are not conclusive about the contribution of short-term investment in economic growth. And it shows the limitation of this bivariate analysis of Granger Causality test, rather than a direct impact to the economic growth, the MSCI index seems to function and act more as a signaling tool. However, it is evident that from the sample countries at least in ten out of thirteen emerging economies (Taiwan, Hong Kong, Korea, Singapore, Malaysia, Philippines, Indonesia, Thailand, and Sri Lanka) that short-term foreign investment can partially explain, albeit small in magnitude, the country's economic growth.

This finding has two implications. First, the increased integration of an emerging economy into the global market through opening up its financial market would lead to a higher exposure to volatility and instability of the global markets. However, the exposure itself brings some benefits, the capital inflow into these countries had supported the corporate and industrial developments. A positive signal would bring a positive impact on economic growth, while a negative signal from MSCI index might bring economic hazards, probably with a much stronger blow than the positive one, as the short term portfolio investor quickly and panickly moved out of an economy. This has policy implication that those governments in emerging economies needs to be sensitive to the changes in the index, and set up a responsive contingency plan to prevent overblown crisis whenever there is a negative signaling.

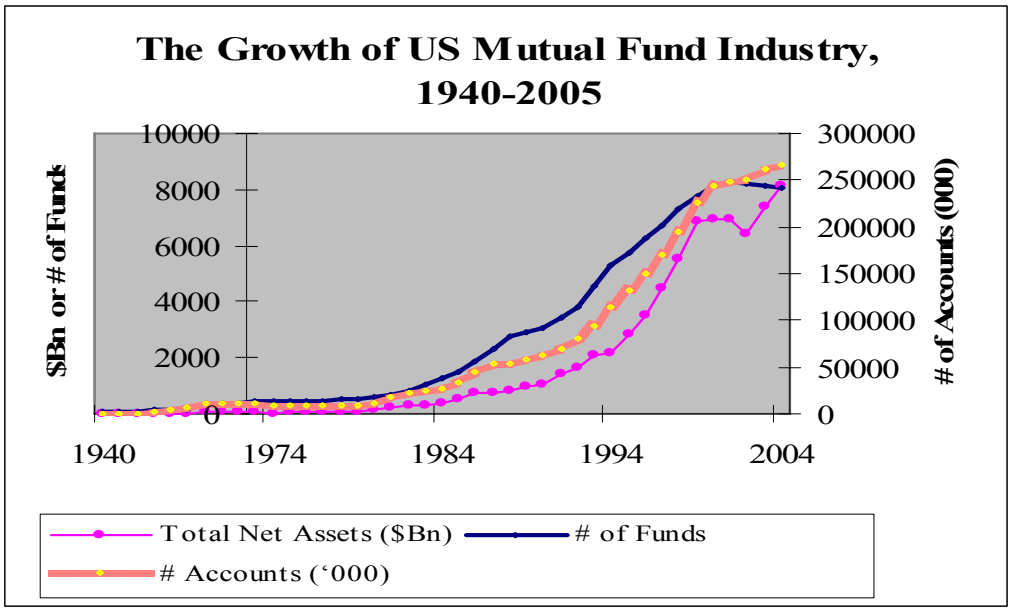
Second, the experiences of these countries show that stronger economic domestic fundamentals are necessary, prior to receiving short-term foreign capital inflow, as we could see in countries such as Taiwan and Hong Kong. Their MSCI has no significant impact on the GDP growth, but the economic growth is sustainable and unaffected

during the economic crisis. Since high and stable economic growth is favorable for emerging economies, free and open financial markets are essential. Countries that have conducive financial markets, which allows more capital flows to the needed economic activities, would benefit from it and achieve high economic growth. The Asian financial market is still a young market, and is still in an undergoing process towards free and open markets, economic fundamentals still need to be strengthened, therefore a gradualism approach toward an open and free financial market would be the appropriate way for these emerging economies.

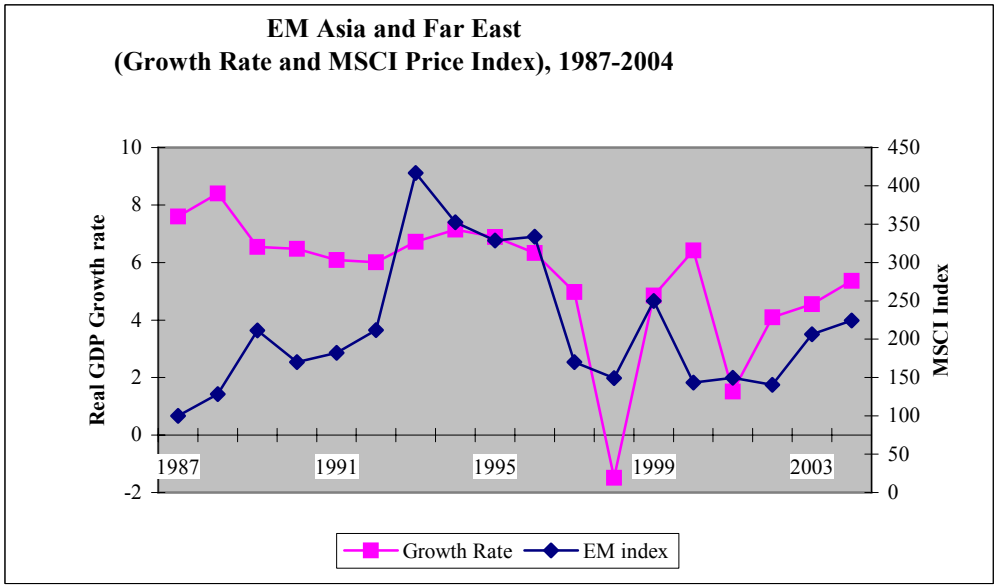
Recommendation for Further Study

We conclude with some ideas for future study. After completing this study and concluding that MSCI has some marginal effect on the economic growth, we become aware that the mutual funds that pour into the emerging markets, although it has experienced a tremendous growth in the last two decades, they had small *size* effect to the economic growth of the emerging markets. This prompts us to the question, whether these funds could channel its way, or give signal through other economic variables that might affect the economic growth in a bigger magnitude. We hypothesize that some other variables, possibly components of GDP ~ such as the gross capital formation, that might be more sensitive to the MSCI, could *compound* the impact of MSCI into a more dominant variable in the market. It would be useful to know if this indirect effect of MSCI on the economic growth so it might help the countries to focus on specific policies that sustain growth.

Chart 1.1. ***Chart 1.2.***

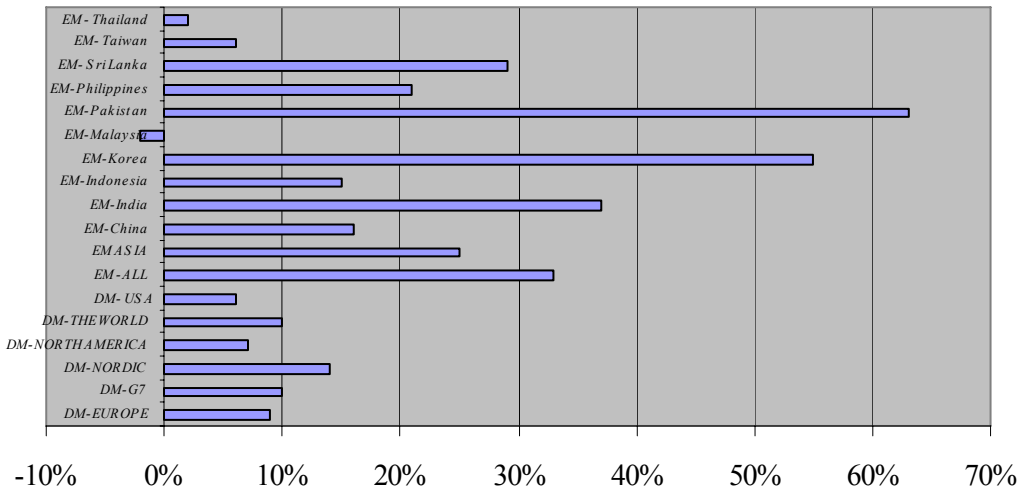


Source: Investment Company Factbook, ICI, 2005



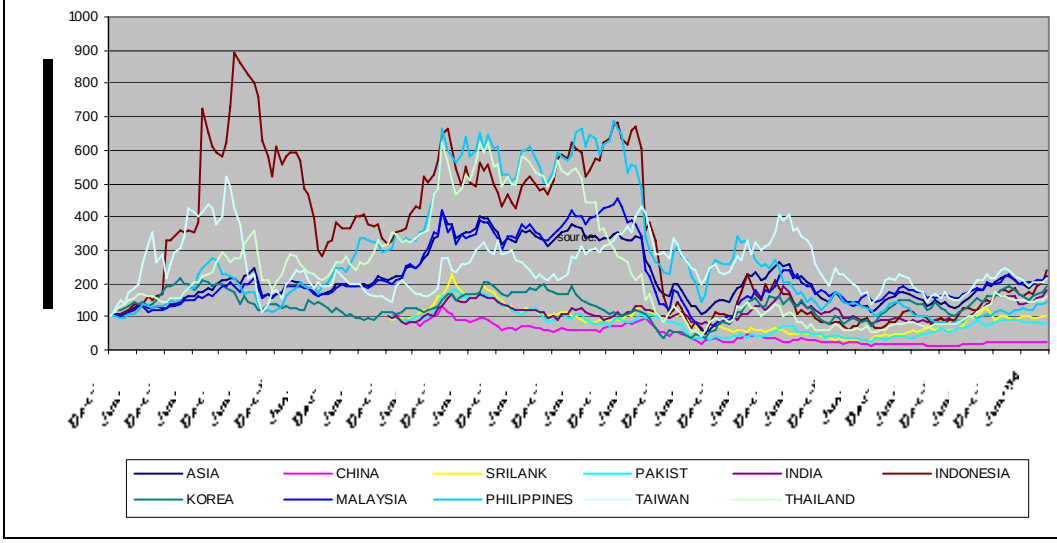
Source: MSCI database and World Bank's Key Indicator database

Chart 1.3 Comparison of MSCI Annualized Return (EM & DM) one year average, as of Dec 2005



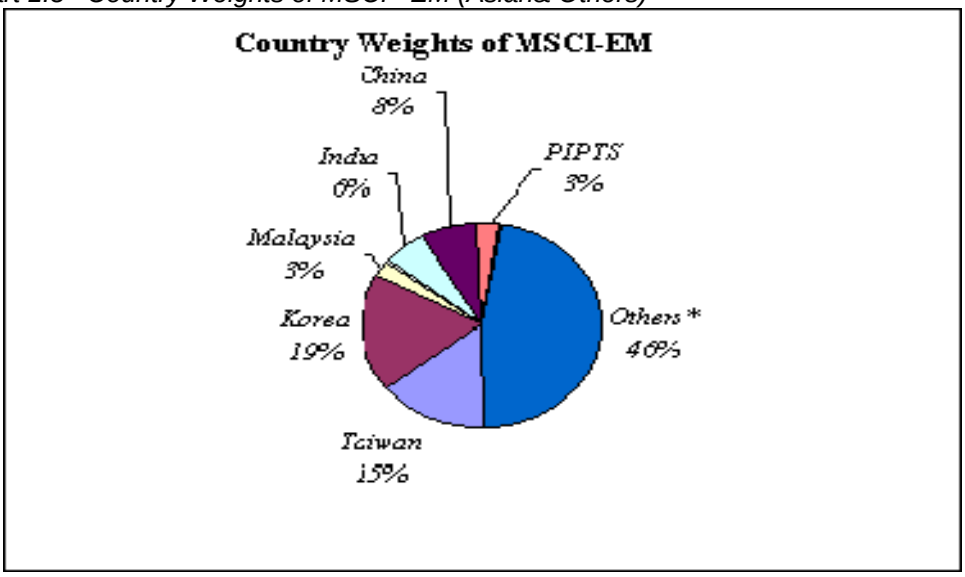
Source: MSCI database

Chart 1.4. MSCI Performance - All EM Asian



Source: MSCI database

Chart 1.5 Country Weights of MSCI –EM (Asian& Others)



Note: PIPTS: Pakistan, Indonesia, Philippines, Thailand, Sri Lanka
Others: covers the South American, Mid-Eastern, and Eastern Europe countries

Source: MSCI database

Table 3.1 EM-ALL Correlogram (Level)

Date: 01/23/05 Time: 15:52
Sample: 1 204
Included observations: 204

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|******* |	.|******* |	1	0.965	0.965	192.66	0.000
.|******* |	*|. |	2	0.925	-0.083	370.61	0.000
.|******* |	*|. |	3	0.882	-0.067	533.10	0.000
.|****** |	.|. |	4	0.841	0.015	681.55	0.000
.|****** |	.|* |	5	0.807	0.091	819.20	0.000
.|****** |	.|. |	6	0.776	-0.005	947.09	0.000
.|****** |	.|. |	7	0.751	0.049	1067.3	0.000
.|****** |	*|. |	8	0.720	-0.090	1178.5	0.000
.|***** |	*|. |	9	0.683	-0.097	1279.2	0.000
.|***** |	.|. |	10	0.643	-0.051	1368.8	0.000
.|***** |	.|. |	11	0.599	-0.053	1446.9	0.000
.|**** |	.|. |	12	0.560	0.033	1515.5	0.000
.|**** |	.|. |	13	0.522	-0.013	1575.4	0.000
.|**** |	.|. |	14	0.487	-0.020	1627.8	0.000
.|*** |	.|. |	15	0.457	0.032	1674.2	0.000
.|*** |	.|. |	16	0.432	0.064	1715.9	0.000
.|*** |	.|* |	17	0.415	0.095	1754.5	0.000
.|*** |	.|. |	18	0.400	0.040	1790.7	0.000
.|*** |	.|. |	19	0.390	0.050	1825.2	0.000
.|*** |	.|* |	20	0.385	0.074	1859.0	0.000
.|*** |	.|. |	21	0.381	0.033	1892.3	0.000
.|*** |	.|. |	22	0.376	-0.033	1924.9	0.000
.|*** |	*|. |	23	0.366	-0.060	1956.0	0.000
.|*** |	*|. |	24	0.353	-0.061	1985.1	0.000
.|*** |	.|. |	25	0.341	-0.024	2012.3	0.000
.|*** |	.|. |	26	0.329	-0.009	2038.0	0.000
.|** |	.|. |	27	0.322	0.006	2062.6	0.000
.|** |	*|. |	28	0.309	-0.122	2085.4	0.000
.|** |	.|. |	29	0.299	0.028	2106.9	0.000
.|** |	.|. |	30	0.291	0.033	2127.3	0.000
.|** |	.|. |	31	0.278	-0.024	2146.2	0.000
.|** |	.|. |	32	0.265	0.024	2163.4	0.000
.|** |	.|. |	33	0.249	-0.017	2178.6	0.000
.|** |	*|. |	34	0.226	-0.103	2191.2	0.000
.|** |	.|. |	35	0.198	-0.053	2201.0	0.000
.|* |	.|. |	36	0.168	-0.009	2208.1	0.000

Figure 3.1. Autocorrelation function (level)

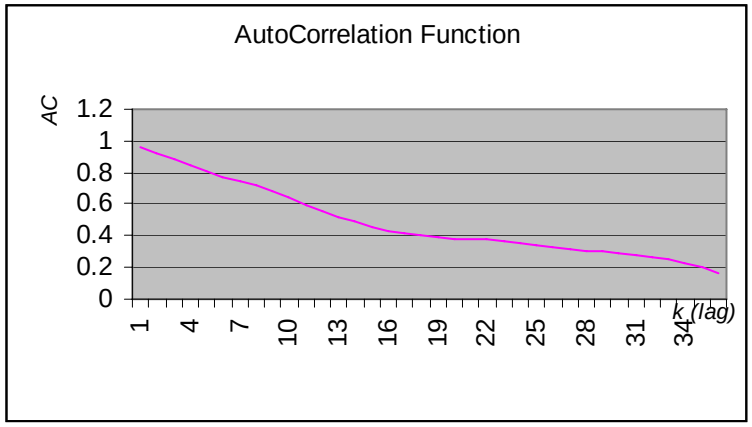


Table 3.2. EM-ALL Correlogram (First Difference)

Date: 01/23/05 Time: 15:53
Sample: 1 204
Included observations: 203

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|* |	.|* |	1	0.194	0.194	7.7925	0.005
.|* |	.|. |	2	0.097	0.062	9.7460	0.008
.|. |	.|. |	3	-0.002	-0.033	9.7471	0.021
*|. |	*|. |	4	-0.171	-0.178	15.860	0.003
*|. |	.|. |	5	-0.065	0.001	16.744	0.005
*|. |	*|. |	6	-0.135	-0.100	20.591	0.002
.|* |	.|* |	7	0.094	0.152	22.461	0.002
.|* |	.|. |	8	0.085	0.034	24.005	0.002
.|* |	.|* |	9	0.110	0.069	26.623	0.002
.|* |	.|. |	10	0.115	0.032	29.489	0.001
*|. |	*|. |	11	-0.100	-0.122	31.673	0.001
.|. |	.|. |	12	-0.007	0.031	31.683	0.002
*|. |	.|. |	13	-0.066	0.002	32.626	0.002
*|. |	.|. |	14	-0.066	-0.024	33.583	0.002
*|. |	*|. |	15	-0.105	-0.123	36.019	0.002
*|. |	*|. |	16	-0.104	-0.071	38.449	0.001
.|. |	*|. |	17	-0.046	-0.070	38.932	0.002
*|. |	*|. |	18	-0.127	-0.102	42.555	0.001
*|. |	*|. |	19	-0.082	-0.083	44.070	0.001
.|. |	.|. |	20	-0.003	0.025	44.072	0.001
.|* |	.|* |	21	0.079	0.089	45.495	0.001
.|* |	.|. |	22	0.097	0.037	47.641	0.001
.|. |	.|. |	23	0.054	0.026	48.320	0.002
.|. |	.|. |	24	0.029	0.014	48.512	0.002
.|. |	.|. |	25	0.001	0.055	48.513	0.003
.|. |	.|. |	26	-0.047	-0.009	49.041	0.004
.|. |	.|* |	27	0.012	0.079	49.076	0.006
.|. |	.|. |	28	-0.046	-0.045	49.579	0.007
.|. |	*|. |	29	-0.031	-0.066	49.803	0.009
.|* |	.|. |	30	0.076	0.022	51.186	0.009
.|. |	.|. |	31	0.037	-0.017	51.519	0.012
.|. |	.|. |	32	0.019	-0.045	51.603	0.016
.|* |	.|* |	33	0.130	0.118	55.721	0.008
.|* |	.|* |	34	0.117	0.066	59.089	0.005
.|. |	.|. |	35	0.038	-0.018	59.438	0.006
.|. |	*|. |	36	-0.057	-0.060	60.248	0.007

Figure 3.2. Autocorrelation function (first-differenced)

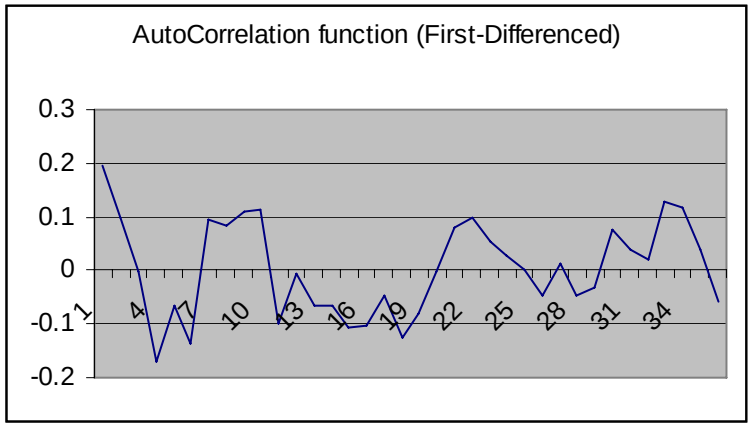


*Table 3-3. Augmented Dickey-Fuller test statistics on Variables (**Level**)*

Country	*CA*	*Y*	*INF*	*EXC*	*MSCI*
China	-1.894	-2.432	-1.301	-2.801	-1.693
5%	*-2.924*	*-2.924*	*-2.924*	*-2.924*	*-2.924*
10%	*-2.600*	*-2.600*	*-2.600*	*-2.600*	*-2.600*
India	-1.021	-2.274	-1.876	-1.513	-2.696
5%	*-2.9241*	*-2.9241*	*-2.9241*	*-2.9241*	*-2.9241*
10%	*-2.5997*	*-2.5997*	*-2.5997*	*-2.5997*	*-2.5997*
Indonesia	-0.667	-3.249	0.611	-2.200	-2.669
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Korea	-2.298	**-3.803**	-2.343	-2.683	-2.589
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Malaysia	-0.780	**-3.006**	-2.600	-0.987	-1.932
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Pakistan	-1.028	-1.227	-0.911	-1.996	-1.635
5%	*-2.924*	*-2.924*	*-2.924*	*-2.924*	*-2.924*
10%	*-2.600*	*-2.600*	*-2.600*	*-2.600*	*-2.600*
Philippine	-1.572	-2.712	-1.988	-0.581	-1.419
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Sri Lanka	-2.418	-2.897	-2.762	0.116	-1.587
5%	*-2.924*	*-2.924*	*-2.924*	*-2.924*	*-2.924*
10%	*-2.600*	*-2.600*	*-2.600*	*-2.600*	*-2.600*
Taiwan	-0.237	-2.406	-1.502	2.018	**-3.300**
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Thailand	-1.198	-2.199	-2.181	-1.639	-1.197
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Japan	-1.308	-2.395	-1.291	1.306	-2.123
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Hongkong	-0.227	-1.471	-1.906	-1.471	-1.117
5%	*-2.891*	*-2.891*	*-2.891*	*-2.891*	*-2.891*
10%	*-2.582*	*-2.582*	*-2.582*	*-2.582*	*-2.582*
Singapore	0.012	-1.659	-2.729	-1.521	-1.877
5%	*-2.891*	*-2.891*	*-2.891*	*-2.891*	*-2.891*
10%	*-2.582*	*-2.582*	*-2.582*	*-2.582*	*-2.582*

Note: Critical values are reported in ithalics.
About 95% shows the statistic value greater than the critical values (accept Ho; Ho: unit root)
that we do not reject he null hypothesis of unit root of the series
(Print in bold) shows rejection of the null hypothesis of a unit root

Table 3-4. Augmented Dickey-Fuller test statistics on Variables (First Difference)

Country	*CA*	*Y*	*INF*	*EXC*	*MSCI*
China	**-3.613**	**-6.315**	**-2.776**	**-2.786**	**-3.138**
5%	*-3.011*	*-3.004*	*-3.004*	*-3.004*	*-3.011*
10%	*-2.646*	*-2.642*	*-2.642*	*-2.642*	*-2.646*
India	**-3.505**	**-3.728**	**-5.583**	**-7.704**	**-3.103**
5%	*-2.9286*	*-2.9271*	*-2.9286*	*-2.9256*	*-2.9286*
10%	*-2.6021*	*-2.6013*	*-2.6021*	*-2.6005*	*-2.6021*
Indonesia	**-3.943**	**-3.834**	**-4.010**	**-4.638**	**-4.999**
5%	*-2.926*	*-2.927*	*-2.929*	*-2.926*	*-2.927*
10%	*-2.601*	*-2.601*	*-2.602*	*-2.601*	*-2.601*
Korea	**-4.514**	**-4.518**	**-4.656**	**-6.896**	**-3.842**
5%	*-2.906*	*-2.906*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.590*	*-2.590*	*-2.590*	*-2.590*	*-2.590*
Malaysia	**-3.386**	**-4.420**	**-4.533**	**-4.845**	**-3.482**
5%	*-2.908*	*-2.908*	*-2.906*	*-2.906*	*-2.906*
10%	*-2.591*	*-2.591*	*-2.590*	*-2.590*	*-2.590*
Pakistan	**-3.763**	**-3.925**	**-2.896**	**-7.512**	**-4.188**
5%	*-2.927*	*-2.927*	*-2.929*	*-2.926*	*-2.926*
10%	*-2.601*	*-2.601*	*-2.602*	*-2.601*	*-2.601*
Philippine	**-3.762**	**-3.746**	**-5.877**	**-7.902**	**-5.001**
1%	*-3.581*	*-3.581*	*-3.585*	*-3.578*	*-3.578*
5%	*-2.927*	*-2.927*	*-2.929*	*-2.926*	*-2.926*
Sri Lanka	**-3.701**	**-3.156**	**-4.336**	**-7.785**	**-4.756**
1%	*-3.581*	*-3.578*	*-3.585*	*-3.578*	*-3.578*
5%	*-2.927*	*-2.926*	*-2.929*	*-2.926*	*-2.926*
Taiwan	**-3.984**	**-3.714**	**-5.311**	**-5.429**	**-5.394**
1%	*-3.581*	*-3.581*	*-3.585*	*-3.578*	*-3.578*
5%	*-2.927*	*-2.927*	*-2.929*	*-2.926*	*-2.926*
Thailand	**-3.749**	**-3.699**	**-4.813**	**-4.813**	**-4.759**
1%	*-3.581*	*-3.581*	*-3.585*	*-3.578*	*-3.578*
5%	*-2.927*	*-2.927*	*-2.929*	*-2.926*	*-2.926*
Japan	**-2.624**	**-3.776**	**-3.070**	**-8.280**	**-5.220**
1%	*-3.589*	*-3.581*	*-3.585*	*-3.578*	*-3.578*
5%	*-2.930*	*-2.927*	*-2.929*	*-2.926*	*-2.926*
Hongkong	**-3.832**	**-5.462**	**-5.038**	**-5.631**	**-4.815**
1%	*-3.501*	*-3.501*	*-3.501*	*-3.499*	*-3.499*
5%	*-2.892*	*-2.892*	*-2.892*	*-2.891*	*-2.892*
Singapore	**-4.344**	**-5.307**	**-3.884**	-6.355	-5.180
1%	***-3.501***	*-3.501*	*-3.501*	***-3.499***	***-3.499***
5%	*-2.892*	*-2.892*	*-2.892*	*-2.892*	*-2.892*

Note: Critical values are reported in ithalics.

(Print in bold) shows rejection of the null hypothesis of a unit root

Table 3-5. Johansen Cointegration Test Summary

Country	Number of Cointegrating Relations
China	1
Hongkong	1
India	1
Indonesia	1
Japan	1
Korea	4
Malaysia	1
Pakistan	4
Philippines	1
Singapore	1
Sri Lanka	4
Thai	2
Taiwan	2

Note:
Test equation includes intercept and linear deterministic trend.
Reject the null hypothesis: Number of CE(s) = r (1,2,3 respectively)
at the 5% significance level

Table 4.1 Correlations matrix

China	CA	Y	INF	EXC	MSCI
CA	1.00				
Y	**-0.62**	1.00			
INF	**-0.67**	**0.84**	1.00		
EXC	0.37	**-0.62**	-0.24	1.00	
MSCI	**-0.68**	**0.80**	**0.73**	-0.31	1.00

Hongkong	CA	Y	INF	EXC	MSCI
CA	1.00				
Y	-0.27	1.00			
INF	**-0.66**	0.19	1.00		
EXC	-0.04	-0.40	-0.20	1.00	
MSCI	**0.63**	-0.29	-0.23	**0.84**	1.00

India	CA	Y	INF	EXC	MSCI
CA	1.00				
Y	-0.09	1.00			
INF	**-0.64**	0.29	1.00		
EXC	0.50	-0.08	**-0.60**	1.00	
MSCI	**0.62**	**0.65**	-0.12	**0.68**	1.00

Indonesia	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	**-0.77**	1.00			
Y	**0.51**	-0.46	1.00		
INF	-0.31	0.21	**-0.94**	1.00	
EXC	**-0.70**	**0.92**	-0.41	0.17	1.00

Japan	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	-0.35	1.00			
Y	**0.51**	-0.48	1.00		
INF	**0.65**	-0.56	0.37	1.00	
EXC	**0.61**	**-0.60**	0.37	**0.73**	1.00

Korea	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	-0.30	1.00			
Y	**0.58**	-0.44	1.00		
INF	-0.06	-0.19	-0.12	1.00	
EXC	-0.28	0.24	-0.43	**-0.64**	1.00

Malaysia	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	**-0.58**	1.00			
Y	**0.55**	**-0.55**	1.00		
INF	**0.56**	-0.43	-0.13	1.00	
EXC	-0.14	**0.74**	**-0.58**	-0.20	1.00

Pakistan	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	-0.41	1.00			
Y	**0.52**	**0.51**	1.00		
INF	**0.77**	**-0.80**	-0.31	1.00	
EXC	**-0.68**	**0.70**	0.34	**-0.84**	1.00

Philippines	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	**-0.57**	1.00			
Y	**0.61**	-0.03	1.00		
INF	**0.54**	-0.45	-0.32	1.00	
EXC	-0.19	**0.64**	0.01	**-0.72**	1.00

Singapore	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	**0.71**	1.00			
Y	**0.78**	-0.39	1.00		
INF	-0.21	-0.45	0.42	1.00	
EXC	-0.43	**-0.78**	0.42	**0.70**	1.00

Sri Lanka	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	-0.29	1.00			
Y	**0.52**	-0.32	1.00		
INF	-0.03	0.19	-0.50	1.00	
EXC	**-0.53**	0.41	-0.29	-0.26	1.00

Thailand	CA	Y	INF	EXC	MSCI
CA	1.00				
Y	**-0.55**	1.00			
INF	**-0.52**	-0.16	1.00		
EXC	**0.61**	**-0.79**	-0.25	1.00	
MSCI	**-0.81**	**0.72**	**0.54**	-0.32	1.00

Taiwan	MSCI	CA	Y	INF	EXC
MSCI	1.00				
CA	-0.36	1.00			
Y	**0.53**	**-0.50**	1.00		
INF	**0.57**	**-0.54**	**0.58**	1.00	
EXC	**0.51**	**-0.91**	**0.54**	0.50	1.00

Table 4.2 – Pairwise Granger Causality Test (Without Error Correction Model)

Country	Null Hypothesis:			F-Statistic	Prob.	Country	Null Hypothesis:			F-Statistic	Prob.
China	MSCI	----/---->	CA	4.39841 *	0.018	Philippines	CA	----/---->	MSCI	0.93048	0.432
Fc(4,38)=2.62	CA	----/---->	MSCI	1.48554	0.238	F_c= 2.54	MSCI	----/---->	CA	2.46503*	0.071
	MSCI	----/---->	Y	0.9715	0.387		Y	----/---->	MSCI	2.02954	0.120
	Y	----/---->	MSCI	1.73235	0.189		MSCI	----/---->	Y	2.68302*	0.055
	MSCI	----/---->	INF	7.94741 *	0.001		INF	----/---->	MSCI	0.91336	0.440
	INF	----/---->	MSCI	1.63548	0.207		MSCI	----/---->	INF	0.08637	0.967
	MSCI	----/---->	EXC	4.56316 *	0.016		EXC	----/---->	MSCI	2.19419	0.098
	EXC	----/---->	MSCI	0.79377	0.459		MSCI	----/---->	EXC	3.70572*	0.016
Taiwan	CA	----/---->	MSCI	1.14896	0.324	Singapore	CA	----/---->	MSCI	1.91932	0.152
F_c (4, 58)=2.54	MSCI	----/---->	CA	1.00742	0.371	F_c= 2.47	MSCI	----/---->	CA	1.32151	0.272
	Y	----/---->	MSCI	2.4192	0.097		Y	----/---->	MSCI	3.26963*	0.042
	MSCI	----/---->	Y	3.15989*	0.049		MSCI	----/---->	Y	2.97151*	0.056
	INF	----/---->	MSCI	0.17489	0.840		INF	----/---->	MSCI	1.44642	0.241
	MSCI	----/---->	INF	0.71411	0.494		MSCI	----/---->	INF	0.45208	0.638
	EXC	----/---->	MSCI	1.59323	0.211		EXC	----/---->	MSCI	0.57653	0.564
	MSCI	----/---->	EXC	0.44333	0.644		MSCI	----/---->	EXC	0.40993	0.665
Hong Kong	CA	----/---->	MSCI	2.09933	0.128	Thailand	CA	----/---->	MSCI	2.45767	0.094
F_c (4,90)= 2.47	MSCI	----/---->	CA	0.7534	0.474	F_c= 2.54	MSCI	----/---->	CA	8.24989*	0.001
	Y	----/---->	MSCI	7.12488*	0.001		Y	----/---->	MSCI	3.07813*	0.053
	MSCI	----/---->	Y	1.94895	0.148		MSCI	----/---->	Y	3.29929*	0.043
	INF	----/---->	MSCI	0.3446	0.709		INF	----/---->	MSCI	0.23539	0.791
	MSCI	----/---->	INF	0.12528	0.882		MSCI	----/---->	INF	2.32311	0.106
	EXC	----/---->	MSCI	1.80934	0.169		EXC	----/---->	MSCI	2.1227	0.128
	MSCI	----/---->	EXC	2.41248	0.095		MSCI	----/---->	EXC	0.99526	0.375
Japan	CA	----/---->	MSCI	0.47978	0.621	India	CA	----/---->	MSCI	1.43825	0.249
F_c= 2.54	MSCI	----/---->	CA	5.39249*	0.007	F_c= 2.62	MSCI	----/---->	CA	0.22405	0.800
	Y	----/---->	MSCI	0.00203	0.998		Y	----/---->	MSCI	1.3518	0.270
	MSCI	----/---->	Y	1.16953	0.317		MSCI	----/---->	Y	3.91503*	0.028
	INF	----/---->	MSCI	0.30857	0.736		INF	----/---->	MSCI	0.45503	0.638
	MSCI	----/---->	INF	1.25871	0.291		MSCI	----/---->	INF	0.22729	0.798
	EXC	----/---->	MSCI	1.75236	0.182		EXC	----/---->	MSCI	0.48893	0.617
	MSCI	----/---->	EXC	0.30222	0.740		MSCI	----/---->	EXC	0.6025	0.552
Korea	CA	----/---->	MSCI	2.32527	0.106	Pakistan	CA	----/---->	MSCI	0.86449	0.429
F_c= 2.54	MSCI	----/---->	CA	9.24351*	0.000	F_c= 2.62	MSCI	----/---->	CA	4.36109*	0.019
	Y	----/---->	MSCI	2.55904*	0.086		Y	----/---->	MSCI	0.96269	0.390
	MSCI	----/---->	Y	7.97456*	0.001		MSCI	----/---->	Y	2.78274	0.073
	INF	----/---->	MSCI	1.29476	0.281		INF	----/---->	MSCI	1.60383	0.213
	MSCI	----/---->	INF	3.76401*	0.029		MSCI	----/---->	INF	5.45309*	0.008
	EXC	----/---->	MSCI	0.89974	0.412		EXC	----/---->	MSCI	2.80056*	0.072
	MSCI	----/---->	EXC	0.92647	0.401		MSCI	----/---->	EXC	0.36338	0.697

Country	Null Hypothesis:		F-Statistic	Prob.
Malaysia	CA	----/----> MSCI	1.82503	0.170
	MSCI	----/----> CA	3.59405	0.033
F_c= 2.54	Y	----/----> MSCI	4.22754	0.019
	MSCI	----/----> Y	3.62948	0.032
	INF	----/----> MSCI	2.50621	0.090
	MSCI	----/----> INF	1.22092	0.302
	EXC	----/----> MSCI	1.79184	0.175
	MSCI	----/----> EXC	0.47422	0.625
Indonesia	CA	----/----> MSCI	2.28071	0.111
	MSCI	----/----> CA	3.09118	0.053
F_c= 2.54	Y	----/----> MSCI	1.79102	0.175
	MSCI	----/----> Y	4.11112	0.021
	INF	----/----> MSCI	0.92513	0.402
	MSCI	----/----> INF	4.29793	0.018
	EXC	----/----> MSCI	2.80883	0.068
	MSCI	----/----> EXC	2.51066	0.089

Country	Null Hypothesis:		F-Statistic	Prob.
Sri Lanka	CA	----/----> MSCI	0.58437	0.562
	MSCI	----/----> CA	1.36497	0.266
F_c= 2.62	Y	----/----> MSCI	2.41116*	0.102
	MSCI	----/----> Y	2.25674*	0.117
	INF	----/----> MSCI	2.16713	0.127
	MSCI	----/----> INF	0.9553	0.393
	EXC	----/----> MSCI	0.41243	0.665
	MSCI	----/----> EXC	0.38699	0.681

Note: * = rejected F_c = critical value of F, at 5% significance level at (p, T-2p-1)

("----/----> " denotes "does not Granger Cause")

Table 4.3 Vector Error Correction Model – Output Summary

China	EXC	Granger-Cause	MSCI
	EXC	Granger-Cause	INF
	MSCI	Granger-Cause	Y
	MSCI	Granger-Cause	INF
Hongkong	EXC	Granger-Cause	Y
	MSCI	Granger-Cause	EXC
Taiwan	*None*		
Japan	MSCI	Granger-Cause	Y, INF, CA
Korea	MSCI	Granger-Cause	Y, INF, CA
Singapore	MSCI	Granger-Cause	Y
Malaysia	MSCI	Granger-Cause	Y, INF, CA
Thailand	MSCI	Granger-Cause	Y, CA
Philippines	MSCI	Granger-Cause	Y, INF, EXC
Indonesia	MSCI	Granger-Cause	Y, INF, EXC
India	MSCI	Granger-Cause	Y, INF
Pakistan	MSCI	Granger-Cause	Y, INF, EXC
Sri Lanka	*None*		

Note: Appendix E shows the detailed of each country's VEC output

Table 4.4. China's Equity and Capital

China:	*Equity/ Gross Capital*	*Gross fixed capital formation/GDP*
1997	1.65%	31.85%
1998	0.21%	32.74%
1999	0.17%	32.87%
2000	1.76%	32.88%
2001	0.19%	33.57%
2002	0.44%	34.84%
2003	1.25%	37.73%
2004	1.46%	38.38%

Table 4.5. Significance Tests (t, F, R-square)

MSCI ---------> Economic Growth

Countries	Coefficient Estimates -**With MSCI**					
	CA	INF	EXC	MSCI	F-stat	Adjusted R-sq
China	0.012	0.073	-2.960	0.008	278.430	0.966
t-stat	*2.547*	*4.236*	*-5.235*	*2.383*		
	***	***	***	***	***	
Taiwan	0.071	0.665	1.275	0.028	11.871	0.390
	0.789	*3.794*	*2.099*	*0.832*		
		***	**		***	
Hongkong	-0.258	-0.051	-2.585	0.011	10.947	0.287
	-4.016	*-0.597*	*-4.998*	*2.829*		
	***		***	***	***	
Japan	-0.045	0.289	-0.561	0.000	175.381	0.948
	-7.884	*3.427*	*-4.938*	*2.697*		
	***	***	***	***	***	
Korea	-0.102	-1.144	-0.028	0.138	24.552	0.581
	-4.203	*-5.769*	*-6.337*	*2.855*		
	***	***	***	***	***	
Malaysia	0.007	-1.201	-26.238	0.022	24.168	0.577
	0.110	*0.292*	*6.322*	*0.005*		
		***	***	***	***	
Indonesia	-0.166	-0.348	0.000	0.017	373.610	0.956
	-2.569	*-32.628*	*-0.539*	*1.897*		
	**	***		*	***	
Philippines	-0.001	-0.373	-0.417	0.001	4.361	0.165
	-0.006	-4.037	-2.455	0.321		
		***	**		***	
Singapore	-0.575	0.556	-8.069	0.057	38.366	0.602
	-8.136	*3.351*	*-2.033*	*9.818*		
	***	***	**	***	***	
Thailand	-0.134	-1.357	-4.166	0.069	92.704	0.844
	-1.904	-9.609	-11.054	2.286		
	*	***	***	**	***	
India	0.060	0.754	0.095	0.001	21.854	0.684
	2.027	*7.950*	*2.119*	*0.275*		
	***	***	***			
Pakistan	0.095	0.717	-0.039	0.011	41.803	0.809
	1.169	*8.873*	*-0.563*	*2.414*		
	***	***		**	***	
Sri Lanka	-0.172	-0.361	-0.108	0.020	12.893	0.498
	-0.199	*-4.766*	*-1.551*	*3.066*		
		***		***	***	

Note:	**t-test** on each coefficient estimates:	Critical Point
	reject Ho at 99% confidence level	1.671
	reject Ho at 95% confidence level	2.010
	F-test (v1 = 5, v2= 63) on overall regression	
	reject Ho at 95% confidence level	2.370
	reject Ho at 99% confidence level	3.340

Table 4.6. Significance Tests (t, F, R-square)

Countries	Coefficient Estimates -**Without MSCI**				
	CA	INF	EXC	F-stat	Adjusted R-sq
China	0.007	0.064	-2.355	24.237	0.963
t-stat	*1.590*	*3.596*	*-4.427*		
		***	***	***	
Taiwan	0.052	0.660	1.225	15.672	0.393
	0.602	*3.778*	*2.031*		
		***	**	***	
Hongkong	-0.214	-0.110	-1.326	11.117	0.235
	-3.316	*-1.297*	*-4.859*		
	***		***	***	
Japan	-0.046	0.347	-0.710	148.223	0.940
	-7.407	*3.974*	*-6.673*		
	***	***	***	***	
Korea	-0.113	-1.253	-0.031	31.226	0.571
	-4.796	*-6.672*	*-7.471*		
	***	***	***	***	
Malaysia	-0.308	-1.325	-12.178	21.522	0.475
	0.087	*0.323*	*5.899*		
	***	***	**	***	
Indonesia	-0.219	-0.353	0.000	477.837	0.955
	-3.694	*-33.318*	*-0.498*		
	***	***		***	
Philippines	-0.023	-0.378	-0.411	5.861	0.177
	-0.246	*-4.179*	*-2.451*		
		***	**	***	
Singapore	-0.127	0.557	0.254	9.543	0.206
	-1.666	*2.375*	*0.046*		
	*	**	***	***	
Thailand	-0.260	-1.354	-3.839	114.424	0.833
	-5.780	*-9.293*	*-10.669*		
	***	***	***	***	
India	0.060	0.766	0.093	21.799	0.691
	2.083	*9.240*	*2.126*		
	**	***	**	***	
Pakistan	0.189	0.801	0.069	35.663	0.788
	2.506	*10.404*	*1.233*		
	**	***		***	
Sri Lanka	-0.236	-0.403	-0.214	11.846	0.404
	-0.252	*-4.970*	*-3.275*		
		***	***	***	

Note:	**t-test** on each coefficient estimates:	Critical Point
	*** reject Ho at 99% confidence level	1.671
	** reject Ho at 95% confidence level	2.010
	* reject Ho at 90% confidence level	2.660
	F-test (v1 = 5, v2= 63) on overall regression	
	** reject Ho at 95% confidence level	2.370
	* reject Ho at 99% confidence level	3.340

Table 4.7. Test of Significance: Summary of the Steps 1 and 2 results

Countries	***Adj.R-square***	***F-stat***	***t-test on individual MSCI's coefficient***	
China	V	V	V	
Taiwan	X	X	X	
Hongkong	V	V	V	***
Japan	V	V	V	
Korea	V	V	V	***
Malaysia	V	V	V	***
Indonesia	V	V	V	*
Philippines	X	X	X	
Singapore	V	V	V	***
Thailand	V	V	V	**
India	V	V	X	
Pakistan	V	V	V	**
Sri Lanka	V	V	V	***

Note: ***, **, *, shows the significance in 1%, 5%, 10% respectively.
V = the value improved as MSCI is added into the equation
X = the value does not improved as MSCI is added

Table 4.8. Summary of AIC and SC

Countries		*With MSCI*	*Without MSCI*	
China	AIC	0.866923	0.952087	V
	SC	1.100823	1.147004	V
Taiwan	AIC	4.335229	4.317002	X
	SC	4.497121	4.446515	X
Hongkong	AIC	5.388105	5.448986	V
	SC	5.518364	5.553193	V
Japan	AIC	1.715625	1.833666	V
	SC	1.949525	2.028583	V
Korea	AIC	4.837572	4.846084	V
	SC	4.975597	4.999464	V
Malaysia	AIC	4.998955	5.200637	V
	SC	5.160847	5.33015	V
Indonesia	AIC	2.924763	2.950496	V
	SC	3.086655	3.080009	V
Philippines	AIC	4.316794	4.289416	X
	SC	4.478685	4.418929	X
Singapore	AIC	4.811027	5.491458	V
	SC	4.941286	5.595665	V
Thailand	AIC	4.446369	4.495875	V
	SC	4.60826	4.625388	V
Pakistan	AIC	2.00207	1.913834	X
	SC	2.196987	2.147734	X
India	AIC	2.029288	2.069153	V
	SC	2.224205	2.303053	V
Sri Lanka	AIC	3.730281	3.883088	V
	SC	3.923324	4.037522	V

Table 5.1. Summary of All Test Results

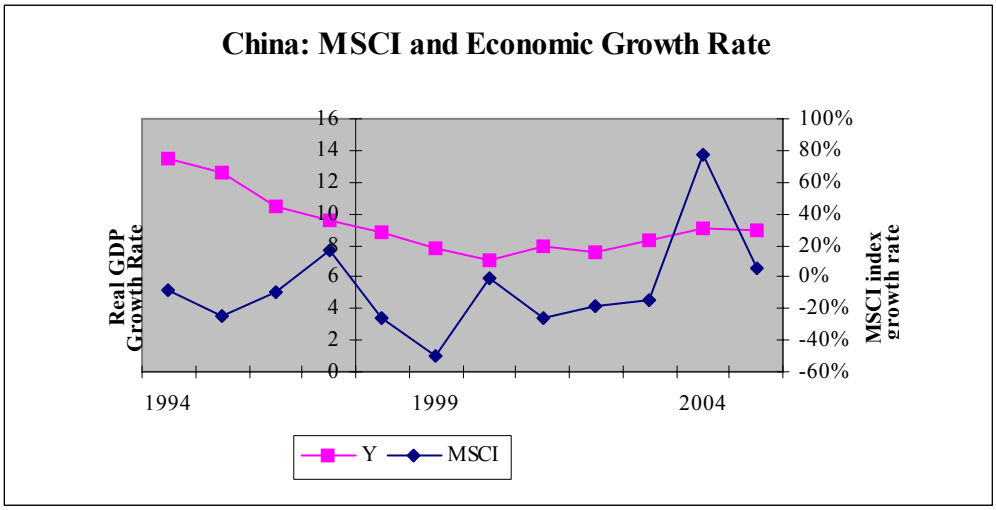
Summary of Correlations Matrix: MSCI with G variables

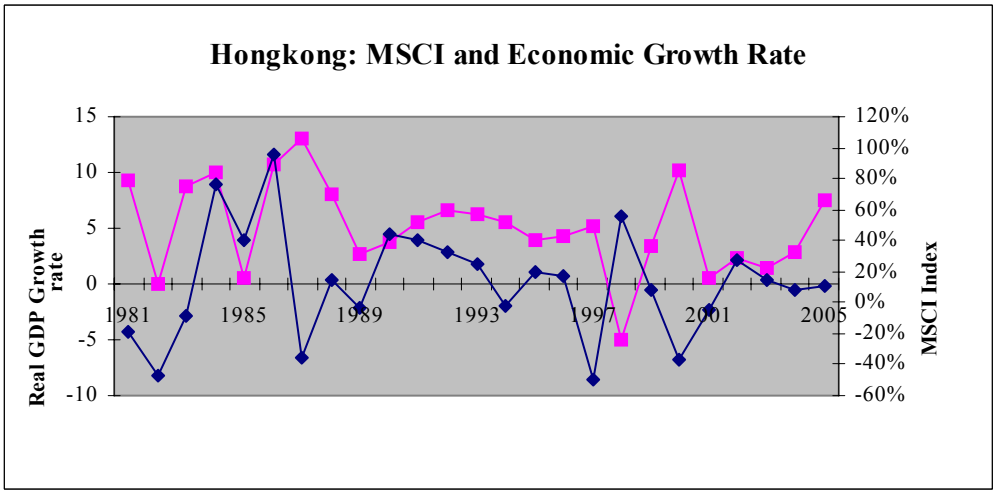
	Chn	Twn	Hkg	Jpn	Kor	Sin	Mal	Phi	Indo	Thai	India	Pak	Srl	Total
Y	v	v		v	v	v	v	v	v	v	v	v	v	12
INF	v	v		v			v	v		v		v		7
EXC		v	v	v					v		v	v	v	7
CA	v		v			v	v	v	v	v	v			8
Summary of Pairwise Granger Causality Test														
MSCI ----> Economic Growth														
Y		v	v		v	v	v	v	v	v			v	9
INF	v				v				v			v		4
EXC	v							v						2
CA	v			v	v		v	v	v	v	v	v		9
Economic Growth ----> MSCI														
Y					v	v	v			v			v	5
INF														
EXC									v			v		2
CA														
Summary of VEC Output														
MSCI ----> Economic Growth														
Y	v			v	v	v	v	v	v	v	v	v		10
INF	v			v	v		v	v	v		v	v		8
EXC			v					v	v			v		4
CA				v	v		v			v				4
Economic Growth ----> MSCI														
Y					v	v				v				3
INF														
EXC	v						v	v	v			v		5
CA														
Summary of Specification Test on MSCI's Significance														
t-test	v		v	v	v	v	v		v	v		v	v	10
F-test	v		v	v	v	v	v		v	v	v	v	v	11
Adj.R-sq	v		v		v	v	v		v	v		v	v	9
Akaike	v		v	v	v	v	v		v	v	v		v	10
Schwarz	v		v	v	v	v	v		v	v	v		v	10

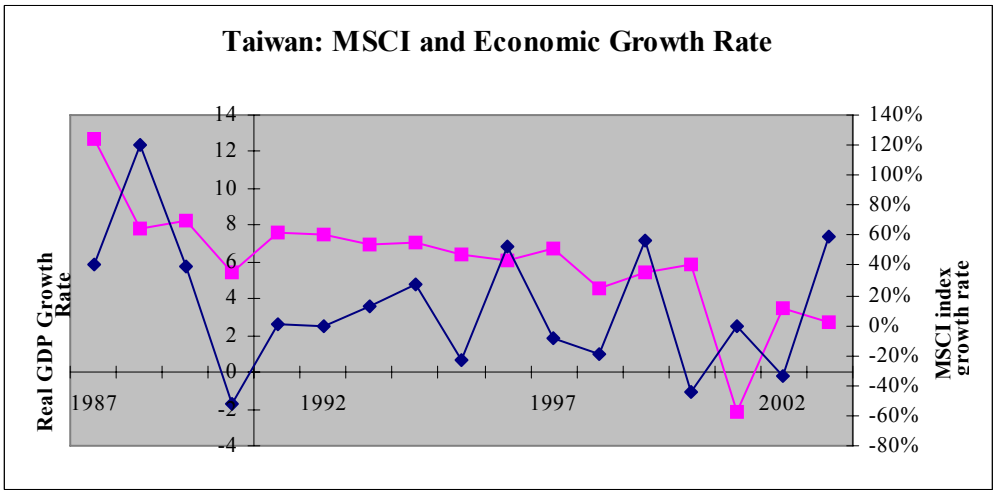
Note: (v) shows the correlation, granger-cause, or the significance of MSCI on the economic growth equation.

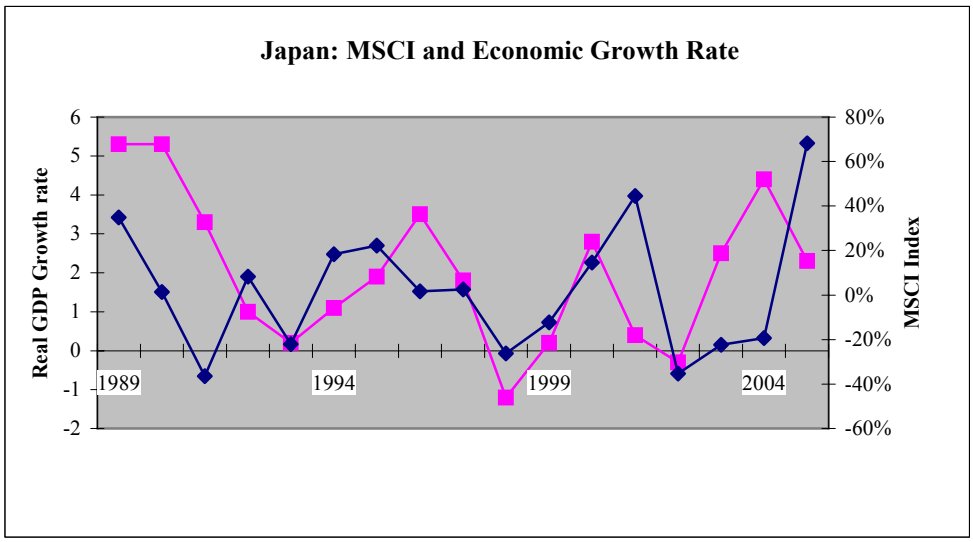
APPENDIX A

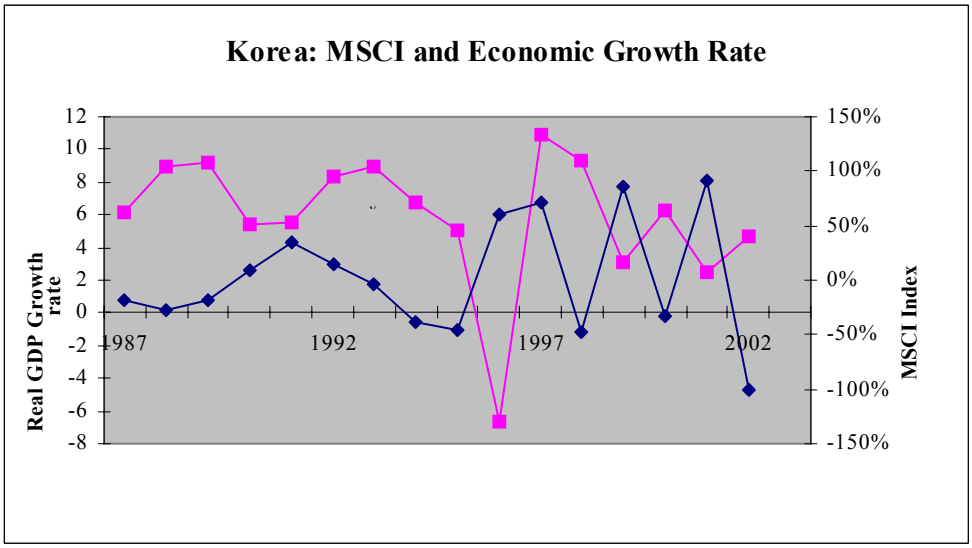
(Source: MSCI database and World Bank's Key Indicator database)

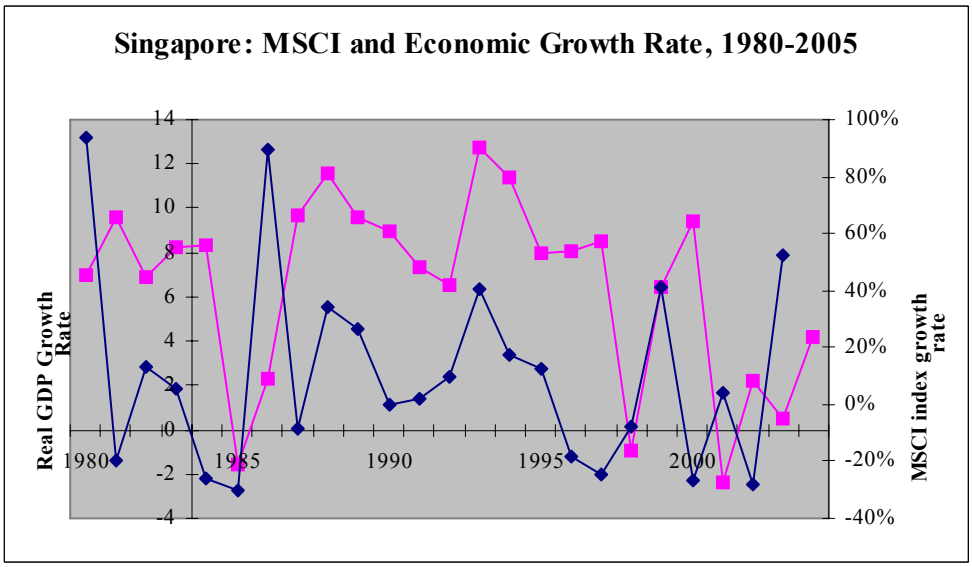







Japan: MSCI and Economic Growth Rate
Real GDP Growth rate
MSCI Index
6
5
4
3
2
1
0
-1
-2
80%
60%
40%
20%
0%
-20%
-40%
-60%
1989
1994
1999
2004


Korea: MSCI and Economic Growth Rate
Real GDP Growth rate
MSCI Index
12
10
8
6
4
2
0
-2
-4
-6
-8
150%
100%
50%
0%
-50%
-100%
-150%
1987
1992
1997
2002


Singapore: MSCI and Economic Growth Rate, 1980-2005
Real GDP Growth Rate
MSCI index growth rate
14
12
10
8
6
4
2
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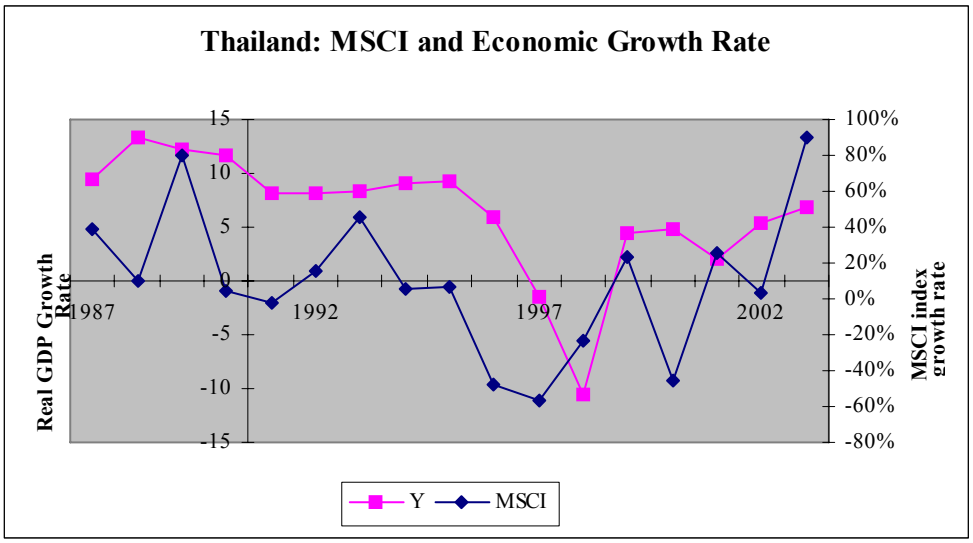
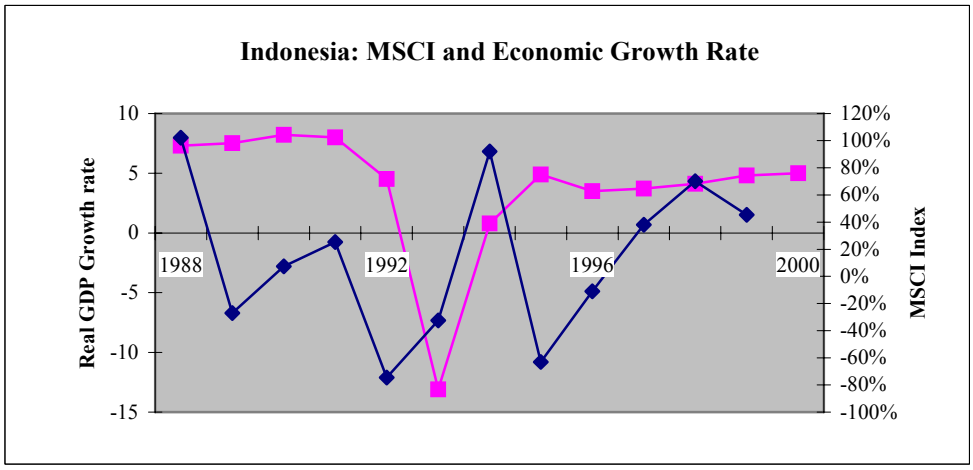
0%
-20%
-40%
1980
1985
1990
1995
2000


Thailand: MSCI and Economic Growth Rate
Real GDP Growth Rate
MSCI index growth rate
15
10
5
0
-5
-10
-15
100%
80%
60%
40%
20%
0%
-20%
-40%
-60%
-80%
1987
1992
1997
2002
Y
MSCI


Indonesia: MSCI and Economic Growth Rate
Real GDP Growth rate
MSCI Index
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5
0
-5
-10
-15
120%
100%
80%
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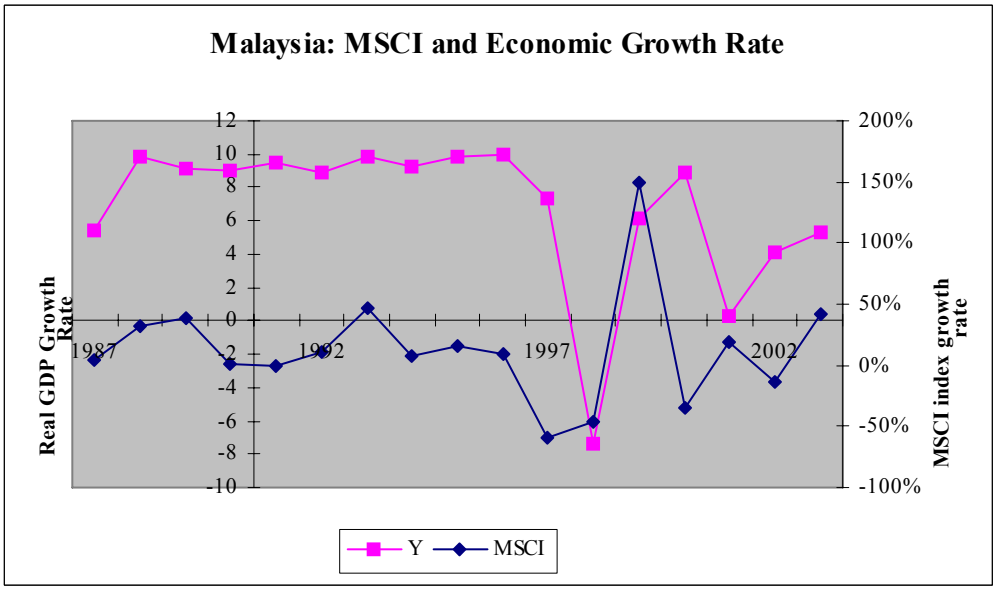
-60%
-80%
-100%
1988
1992
1996
2000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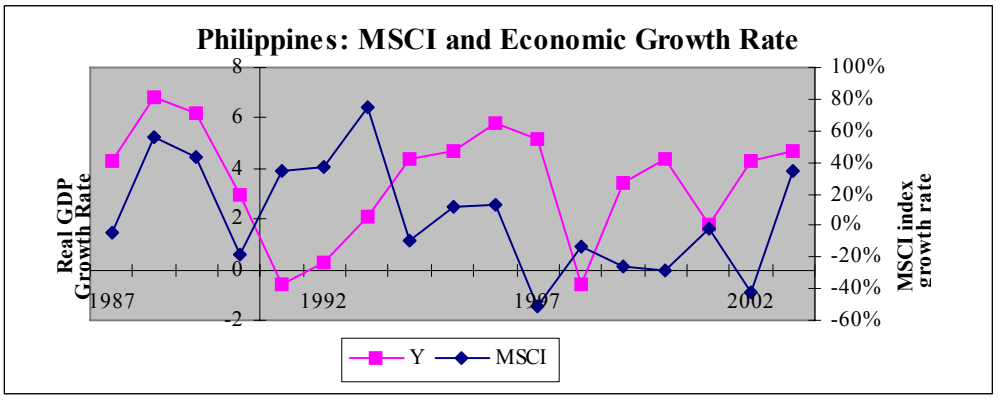
Real GDP Growth Rate
MSCI index growth rate
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
200%
150%
100%
50%
0%
-50%
-100%
1987
1992
1997
2002
Y
MSCI


Philippines: MSCI and Economic Growth Rate
Real GDP Growth Rate
MSCI index growth rate
8
6
4
2
0
-2
100%
80%
60%
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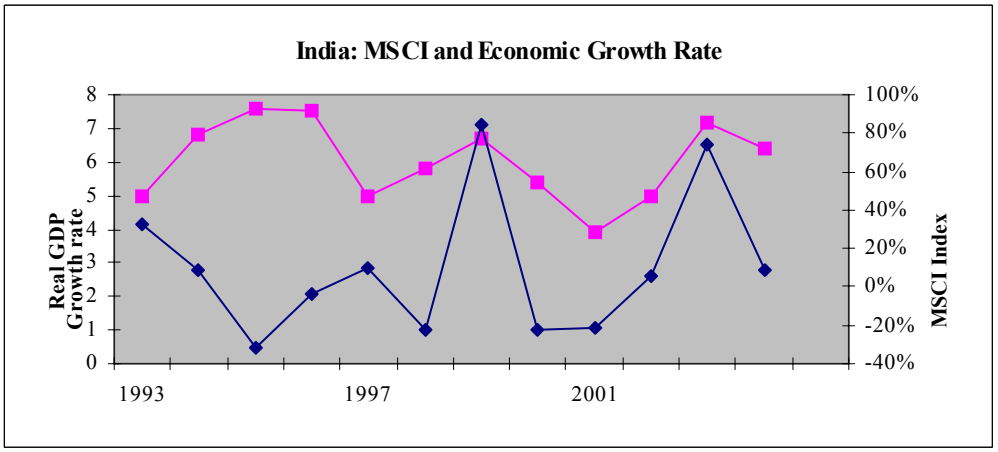
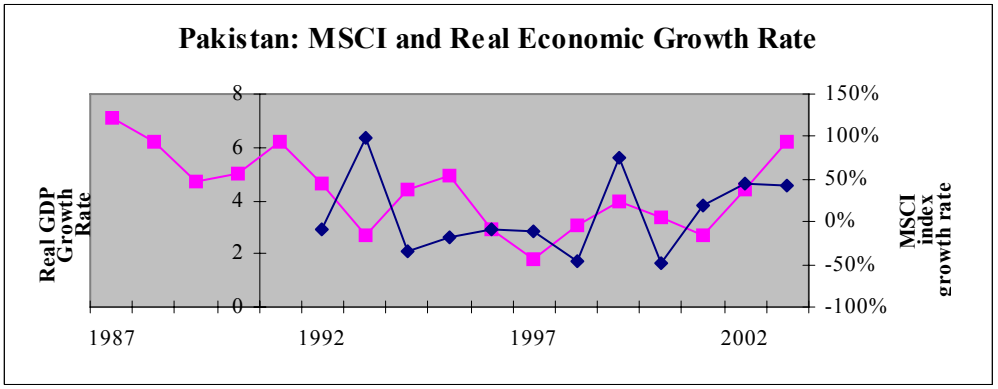
-20%
-40%
-60%
1987
1992
1997
2002
Y
MSCI


India: MSCI and Economic Growth Rate
Real GDP Growth rate
MSCI Index
8
7
6
5
4
3
2
1
0
100%
80%
60%
40%
20%
0%
-20%
-40%
1993
1997
2001


Pakistan: MSCI and Real Economic Growth Rate
Real GDP Growth Rate
MSCI index growth rate
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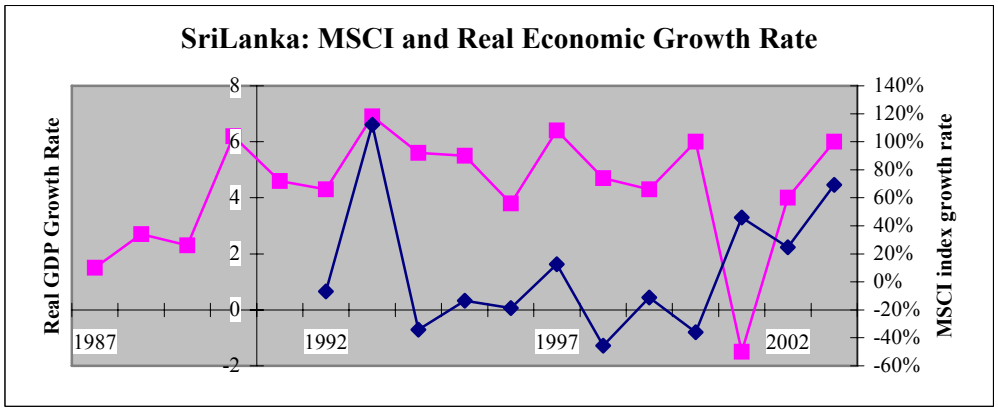
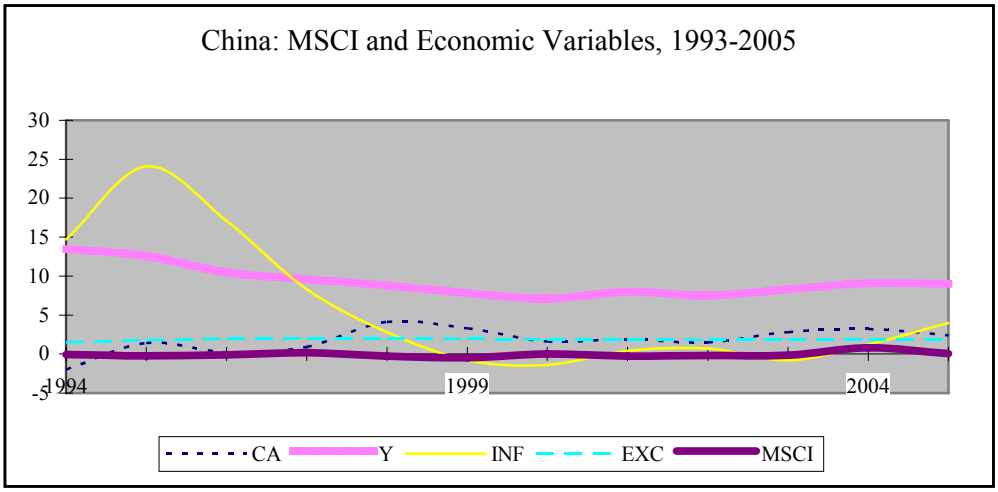
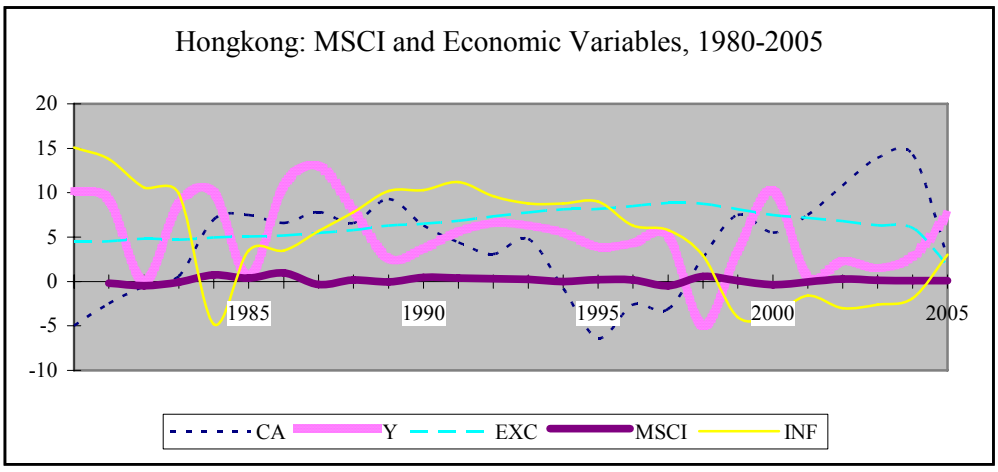
6
4
2
0
150%
100%
50%
0%
-50%
-100%
1987
1992
1997
2002

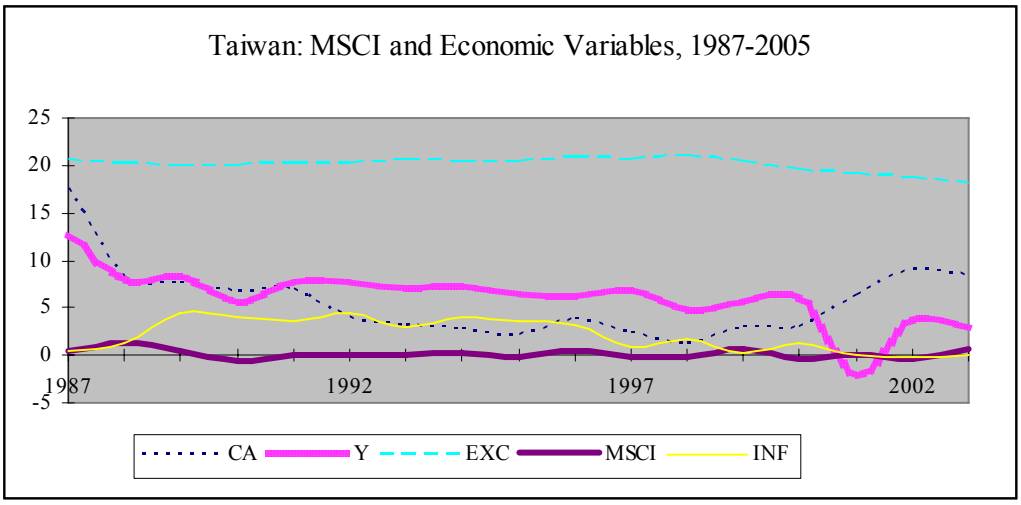

SriLanka: MSCI and Real Economic Growth Rate
Real GDP Growth Rate
MSCI index growth rate
8
6
4
2
0
-2
140%
120%
100%
80%
60%
40%
20%
0%
-20%
-40%
-60%
1987
1992
1997
2002

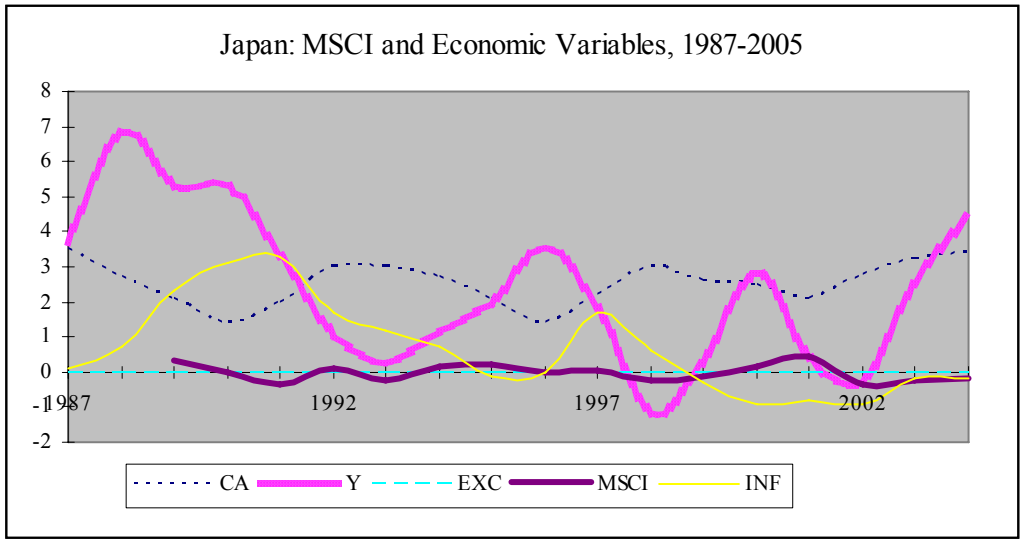
APPENDIX B

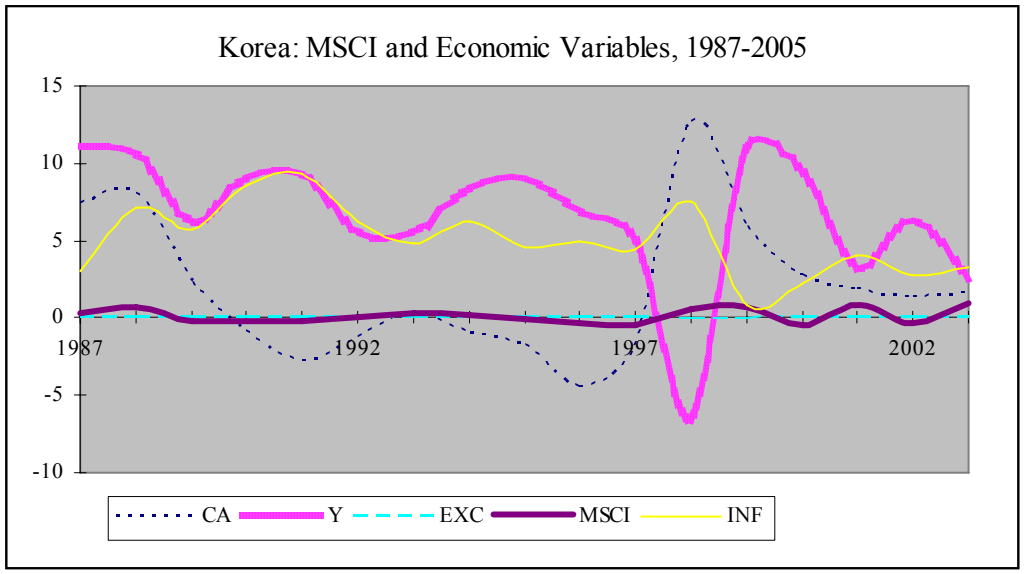
(Source: MSCI database and World Bank's Key Indicator database)








Japan: MSCI and Economic Variables, 1987-2005
8
7
6
5
4
3
2
1
0
-1
-2
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


Korea: MSCI and Economic Variables, 1987-2005
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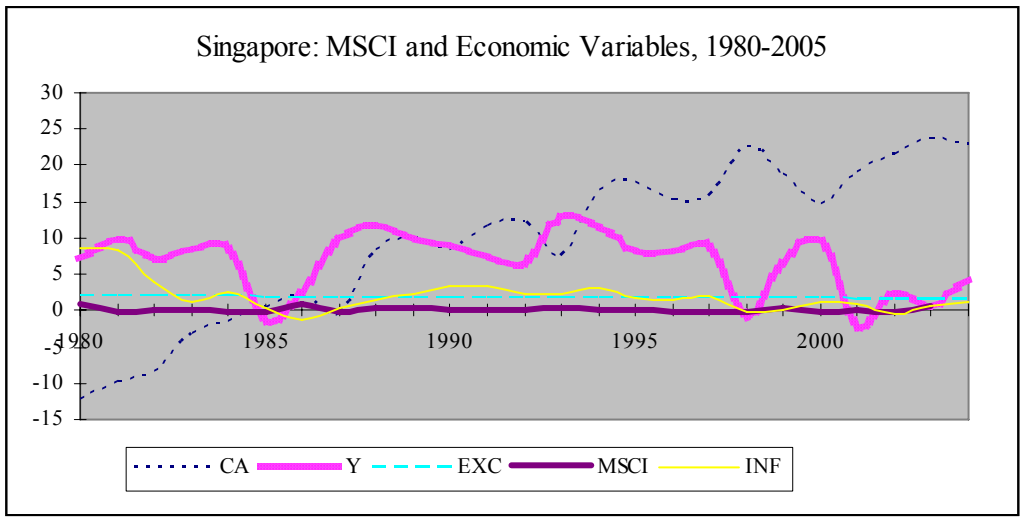
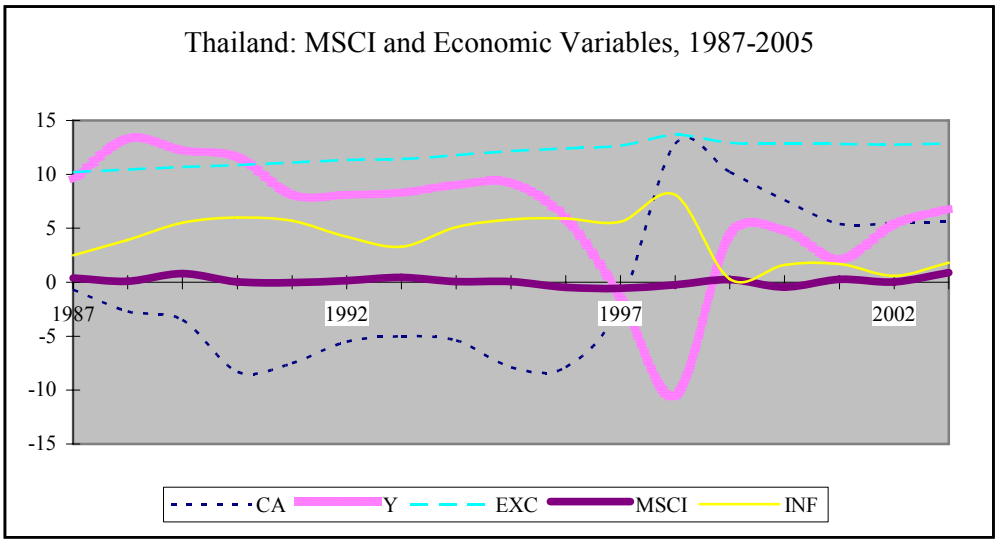
10
5
0
-5
-10
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


Singapore: MSCI and Economic Variables, 1980-2005
30
25
20
15
10
5
0
-5
-10
-15
1980
1985
1990
1995
2000
CA
Y
EXC
MSCI
INF


Thailand: MSCI and Economic Variables, 1987-2005
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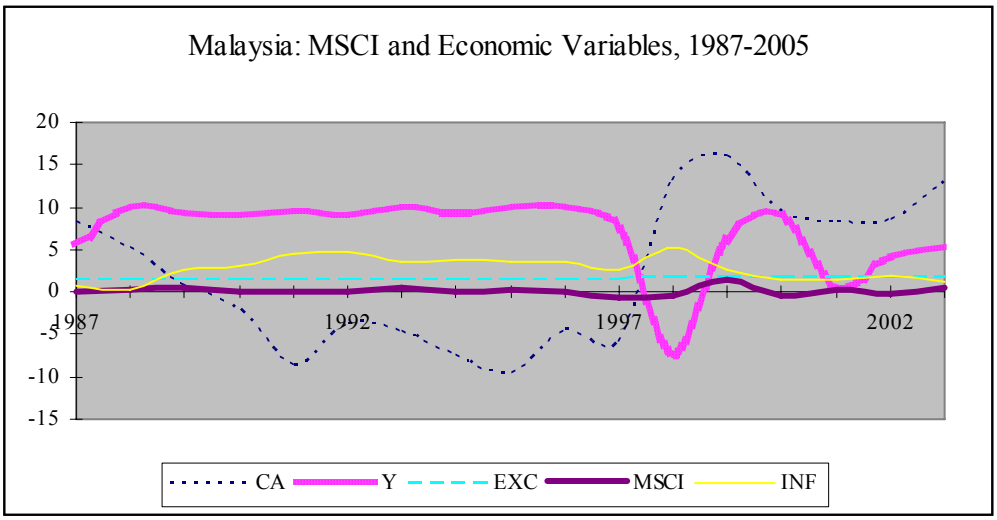
5
0
-5
-10
-15
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


Malaysia: MSCI and Economic Variables, 1987-2005
20
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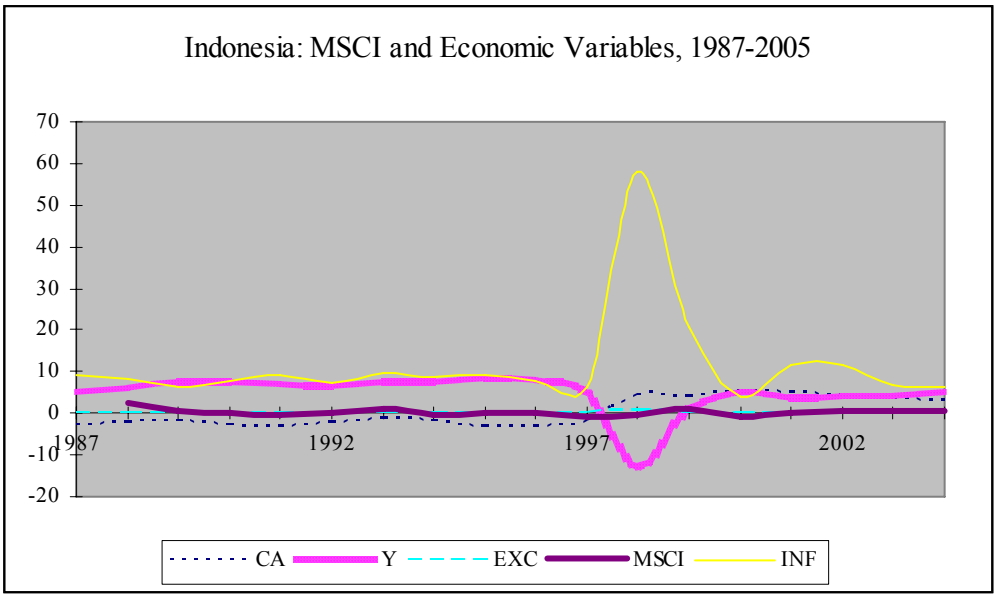
5
0
-5
-10
-15
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


Indonesia: MSCI and Economic Variables, 1987-2005
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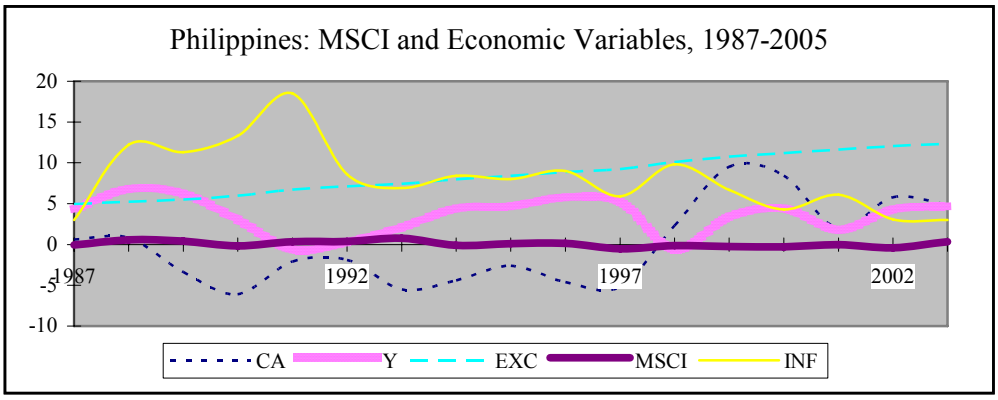
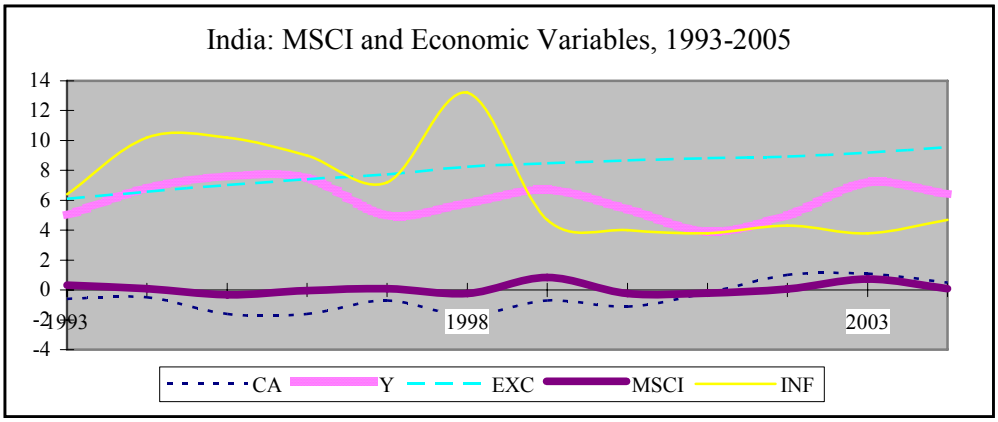
60
50
40
30
20
10
0
-10
-20
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


Philippines: MSCI and Economic Variables, 1987-2005
20
15
10
5
0
-5
-10
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


India: MSCI and Economic Variables, 1993-2005
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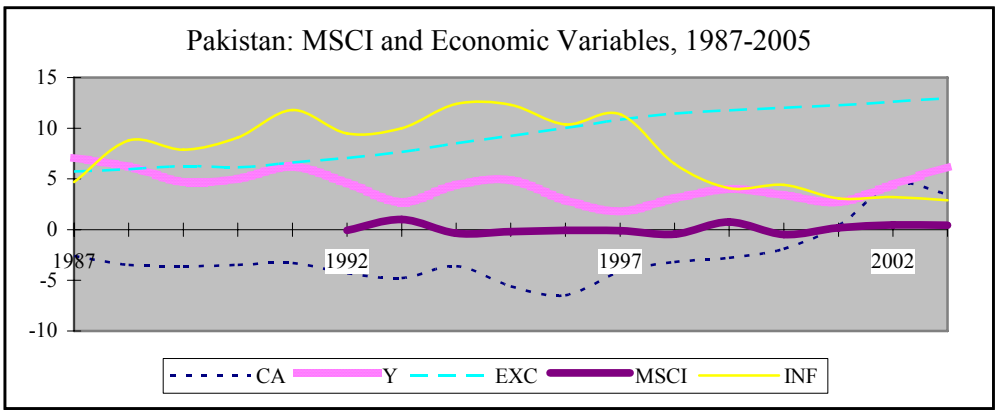
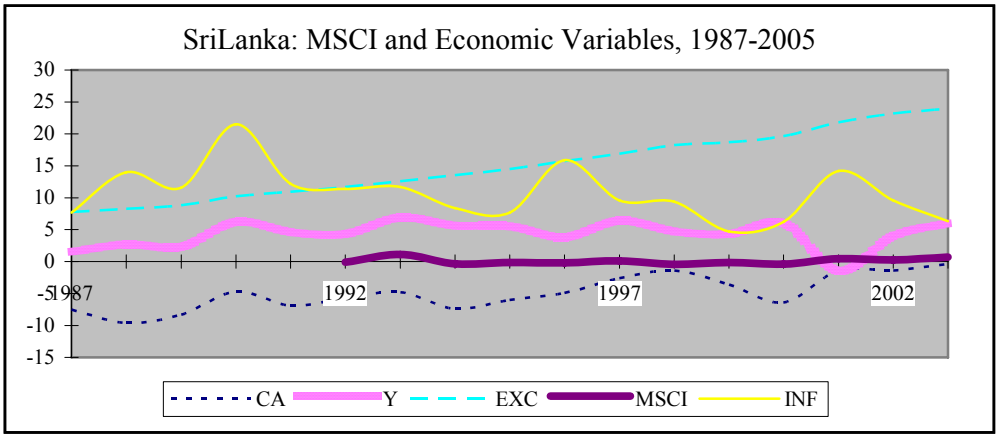
12
10
8
6
4
2
0
-2
-4
1993
1998
2003
CA
Y
EXC
MSCI
INF


Pakistan: MSCI and Economic Variables, 1987-2005
15
10
5
0
-5
-10
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF


SriLanka: MSCI and Economic Variables, 1987-2005
30
25
20
15
10
5
0
-5
-10
-15
1987
1992
1997
2002
CA
Y
EXC
MSCI
INF

APPENDIX C. *Descriptive Statistics*

MSCI	Mean	Median	Max	Min	StD	Skewness	Kurtosis	Jaque-Bera	ProbObs	
China	47.975	34.387	133.553	13.824	30.011	0.695	2.597	4.279	0.118	49
Hongkong	2899.823	2850.585	6715.840	339.728	1942.345	0.257	1.665	8.520	0.014	100
India	116.120	110.089	180.910	76.741	27.493	0.635	2.418	3.983	0.137	49
Indonesia	326.943	320.286	890.044	48.700	221.166	0.481	2.085	5.074	0.079	69
Japan	2758.341	2772.780	4149.240	1460.740	672.708	0.091	2.187	1.996	0.369	69
Korea	133.149	133.361	214.005	35.075	41.338	-0.274	2.734	1.069	0.586	69
Malaysia	215.206	189.020	432.058	56.178	95.291	0.924	2.789	9.940	0.007	69
Pakistan	80.126	80.407	181.418	26.328	38.912	0.839	3.289	5.919	0.052	49
Philippine	276.497	213.037	665.014	81.850	184.504	0.938	2.436	11.041	0.004	69
Singapore	1456.912	1366.250	2916.730	466.583	665.392	0.452	2.063	7.063	0.029	100
Sri Lanka	90.216	91.598	197.549	27.563	40.046	0.718	3.305	4.397	0.111	49
Thai	231.087	169.847	624.333	56.380	162.005	0.924	2.715	10.053	0.007	69
Taiwan	248.550	226.569	435.174	100.000	80.165	0.559	2.588	4.078	0.130	69
CA										
China	20.245	17.405	45.875	-11.903	16.857	-0.214	2.045	2.238	0.327	49
Hongkong	4.703	3.836	22.875	-9.064	7.681	0.818	3.396	11.817	0.003	100
India	-1.638	-3.003	6.497	-6.903	4.222	0.667	2.229	4.844	0.089	49
Indonesia	0.457	-2.100	8.029	-7.300	5.363	0.227	1.458	7.431	0.024	69
Japan	102.826	112.333	159.402	43.943	30.077	-0.215	2.273	2.052	0.358	69
Korea	4.362	5.360	40.365	-23.005	14.062	0.610	3.832	6.272	0.043	69
Malaysia	2.369	0.258	13.935	-8.644	7.338	0.228	1.612	6.136	0.047	69
Pakistan	-1.148	-1.914	2.897	-4.078	2.122	0.678	2.424	4.436	0.109	49
Philippine	0.299	-0.944	7.219	-4.330	3.424	0.562	2.219	5.393	0.067	69
Singapore	7.988	4.993	22.115	-1.451	8.022	0.308	1.557	10.253	0.006	100
Sri Lanka	-0.521	-0.554	-0.073	-1.065	0.290	-0.190	2.051	2.132	0.344	49
Thai	-0.331	-2.498	14.291	-14.351	8.651	0.117	1.798	4.314	0.116	69
Taiwan	12.159	10.195	25.893	3.437	6.928	1.003	2.704	11.815	0.003	69

Y growth	Mean	Median	Max	Min	StD	Skewness	Kurtosis	Jaque-Bera	Prob	Obs
China	9.416	9.000	14.200	7.100	2.027	1.019	2.863	8.516	0.014	49
Hongkong	5.192	5.100	13.000	-5.000	4.136	-0.213	2.767	0.980	0.613	100
India	5.988	5.800	7.600	3.900	1.160	-0.174	1.848	2.955	0.228	49
Indonesia	4.604	5.800	8.200	-13.100	4.829	-2.849	10.875	271.651	0.000	69
Japan	2.314	1.900	6.800	-1.200	2.181	0.368	2.228	3.273	0.195	69
Korea	6.235	6.300	11.000	-6.700	4.054	-1.728	6.524	70.054	0.000	69
Malaysia	6.826	8.900	10.000	-7.400	4.374	-2.120	7.073	99.369	0.000	69
Pakistan	3.914	4.000	6.300	1.800	1.350	0.412	2.223	2.622	0.270	49
Philippine	3.604	4.400	6.800	-0.600	2.214	-0.662	2.360	6.226	0.044	69
Singapore	6.500	8.000	12.700	-2.400	4.147	-0.783	2.586	10.943	0.004	100
Sri Lanka	4.749	5.400	6.900	-1.500	2.101	-2.050	6.817	64.058	0.000	49
Thai	6.138	6.800	13.300	-10.500	5.458	-1.555	5.733	49.284	0.000	69
Taiwan	5.604	6.100	12.700	-2.200	2.614	-1.246	5.819	40.711	0.000	69
INF										
China	5.869	2.800	24.100	-1.400	8.039	1.096	2.880	9.834	0.007	49
Hongkong	5.248	6.300	15.100	-4.800	5.956	-0.334	1.838	7.484	0.024	100
India	6.894	6.400	13.200	3.800	3.113	0.669	2.110	5.273	0.072	49
Indonesia	11.735	8.100	58.000	3.800	12.084	3.303	12.868	405.415	0.000	69
Japan	0.691	0.600	3.300	-0.900	1.296	0.638	2.317	6.023	0.049	69
Korea	5.006	4.800	9.300	0.800	2.234	0.178	2.371	1.501	0.472	69
Malaysia	2.799	2.700	5.300	0.300	1.341	0.019	2.272	1.527	0.466	69
Pakistan	7.157	6.500	12.400	2.900	3.720	0.236	1.330	6.146	0.046	49
Philippine	8.188	8.000	18.500	3.000	3.893	0.920	3.708	11.174	0.004	69
Singapore	2.036	1.500	8.600	-1.400	2.286	1.532	5.463	64.407	0.000	100
Sri Lanka	9.318	9.400	15.900	4.700	3.171	0.662	2.634	3.857	0.145	49
Thai	3.967	4.200	8.100	0.300	2.176	-0.107	1.999	3.014	0.222	69
Taiwan	2.123	1.700	4.500	-0.200	1.681	0.066	1.418	7.250	0.027	69
EXC										
China	1.839	1.831	2.033	1.344	0.151	-1.317	4.983	22.187	0.000	49
Hongkong	6.567	6.503	8.847	4.492	1.403	0.058	1.702	7.074	0.029	100
India	8.009	8.243	9.543	5.723	1.095	-0.457	2.021	3.666	0.160	49
Indonesia	1302.404	873.150	2531.526	550.023	733.599	0.512	1.523	9.292	0.010	69
Japan	172.916	173.742	204.824	138.135	19.623	-0.323	1.849	5.007	0.082	69
Korea	652.521	697.919	755.883	449.649	102.688	-0.642	1.903	8.194	0.017	69
Malaysia	1.509	1.501	1.655	1.372	0.099	0.069	1.415	7.279	0.026	69
Pakistan	10.988	11.457	13.336	7.068	1.844	-0.592	2.114	4.464	0.107	49
Philippine	8.946	8.874	12.571	4.950	2.440	-0.005	1.673	5.066	0.079	69
Singapore	1.779	1.785	2.069	1.548	0.140	0.148	2.510	1.366	0.505	100
Sri Lanka	18.554	18.216	25.683	11.704	4.222	0.155	1.832	2.980	0.225	49
Thai	12.056	12.397	13.655	10.193	0.956	-0.309	1.848	4.914	0.086	69
Taiwan	19.863	20.120	20.943	17.312	0.968	-1.357	3.929	23.660	0.000	69

Appendix D. *Theoretical Background on* ***VAR/VEC*** *Model,* ***Granger's Causality****, and* ***Johansen*** *Cointegration Test.*[21]

VAR is commonly used for a system of inter-related time series, and for analyzing the dynamic impact of random disturbances on the system's variables, by allowing the data to specify the dynamic structure of the model. The VAR treats endogenous variable in the system as a function of the lagged values of the endogenous variables. Consider a VAR of order *p*: where $Y_t = f\{Y_{t-i}, X_{t-i}\}$. Y_t is the endogenous variable, X_t is exogenous variable, and ε_t is the error term. α_i and β are the parameters in the model to be estimated. Or in vector form, letting $Y_1, Y_2, \ldots, Y_n$ be the endogenous variables and $X_1, X_2, \ldots, X_m$ be the exogenous variables, the VAR of n linear equations can be written as follows:

$$Y_{1,t} = \alpha_{10} + \Sigma_{j=1..p}\ \alpha_{11j}\ Y_{1,t-j} + \Sigma_{j=1..p}\ \alpha_{12j}\ Y_{2,t-j} + .. + \Sigma_{j=1..p}\ \alpha_{1nj}\ Y_{n,t-j} + \Sigma_{j=0..r}\ \beta_{11j}\ X_{1,t-1} + .. + \Sigma_{j=0..r}\ \beta_{1mj}\ X_{m,t-j} + \varepsilon_{1t}$$

$$Y_{2,t} = \ldots$$

$\ldots$

$$Y_{n,t} = \alpha_{n0} + \Sigma_{j=1..p}\ \alpha_{n1j} Y_{1,t-j} + \Sigma_{j=1..p}\ \alpha_{n2j} Y_{2,t-j} + .. + \Sigma_{j=1..p}\ \alpha_{nnj} Y_{n,t-j} + \Sigma_{j=0..r}\ \beta_{n1j}\ X_{1,t-1} + \ldots + \Sigma_{j=0..r}\ \beta_{nmj}\ X_{m,t-j} + \varepsilon_{nt}$$

Or in matrix notation, the equation can be rewritten as:

$$\mathbf{Y}_t = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1 \mathbf{Y}_{t-1} + \ldots + \boldsymbol{\alpha}_p \mathbf{Y}_{t-p} + \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1 \mathbf{X}_{t-1} + \ldots + \boldsymbol{\beta}_r \mathbf{X}_{t-r} + \boldsymbol{\varepsilon}_t$$

where $\boldsymbol{\alpha}_0$ is an (n x 1) vector of intercept terms, $\boldsymbol{\alpha}_1 \ldots \boldsymbol{\alpha}_p$ are (n x n) matrices of coefficients that relate lagged values of the endogenous variables to current values of

[21] Pindyck and Rubinfeld, "Econometric models and Economic Forecast", McGraw-Hill, 1998, p. 399-400, on Vector Autoregressions; Hamilton, J.D., "Time Series Analysis, Princeton Press, 1994, on Ch.18.2:Vector Autoregressions Containing Unit Roots, p.549; Greene, W.H., "Econometric Analysis", Prentice Hall, 1997, on VAR and Granger's Causality test, p.815-6. Kennedy Peter, "A Guide to Econometrics", pp.275-6.

those variables, $\boldsymbol{\beta}_0$ …. $\boldsymbol{\beta}_r$ are (n x m) matrices of coefficients of the lagged values of the exogenous variables to current values of the endogenous variables, and $\boldsymbol{\varepsilon}_t$ is an (n x 1) vector of error terms.

Granger causality approach uses this VAR model by including only the lagged values of X (not the current value) into the equation, and rewritten as:

$$\mathbf{Y}_t = \boldsymbol{\alpha}_0 + \Sigma_{i=1..p}\, \boldsymbol{\alpha}_i\, \mathbf{Y}_{t-i} + \Sigma_{i=1-p}\, \boldsymbol{\beta}_i\, \mathbf{X}_{t-i} + \boldsymbol{\varepsilon}_t$$

F-test is conducted to test the null hypothesis: H_0: $\boldsymbol{\beta}_1 = \boldsymbol{\beta}_2 = \ldots = \boldsymbol{\beta}_p = 0$. If the F-statistic is greater than the specified critical value, then we reject the null hypothesis that "X does not Granger-cause Y". The Granger approach to the question of whether *x* variable causes *y* variable is to see how much of the *current y* can be explained by *past values of y* and then ***to see whether adding lagged values of x*** can improve the explanation. ***It means that y is said to be Granger-caused by x if x helps in the prediction of y***, or equivalently if the coefficients on the lagged x's are statistically significant; so the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but **does not indicate that x, by itself,** has causality effect on y, in the more common use of the term, but it shows that x can be a useful predictor to y.

Originially, VAR assumed that all the variables are endogenous. By specifying the X variables as exogenous, it introduces restrictions on the model, because X variables will be able to affect the endogenous and cause bias. To overcome this bias, we use the vector error correction (VEC), i.e. the VAR with restrictions. A vector error correction (VEC) is a restricted vector autoregression designed for use with the *nonstationarity series* that are known to be *cointegrated*. The VEC model has cointegration relations built into the specification so that it restricts the long run behavior

of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is called the error correction term (ε_t) since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. In this VEC model, the error correction term (which is the estimated coefficient of the residuals to its own lagged values – which is obtained through cointegration test) is included in the right hand side of the equation. To test whether the two variables, X and Y, are cointegrated, in this study, we use Johansen Cointegration test. Cointegration test was conducted initially by Engle and Granger (1987), then Engle and Yoo (1987), Stock and Watson (1988), and Johansen (1988). The essence of cointegration is as follows: (i) The two cointegrated variables, X and Y, share a common trend, although individually their moves appear random and unpredictable (because they follow unit root process), but jointly they move together; the location of one can give information about the other. (ii) Estimating the relationship of these two variables, and then estimating its residuals to its own lagged residuals, and conducting unit root test for these residuals, where finding a unit root in the residuals means "no cointegration", or, if we find these residuals stationary (reject the null hypothesis of unit root) means there is evidence of cointegration.

Johansen cointegration test is widely used, not only because the method is easily available through some software, but also because when there is possibility of more than one cointegrating relationship, Johansen method is more reliable, due to its "maximum likelihood" procedure, which is as follows:

(i) conduct the likelihood ratio (LR test) on the number (r) of cointegrating vectors (or the rank of the residuals in the VEC equations), where the maximum likelihood L_{max} (r)

is a function of the cointegration rank (r). This test is also called lambda-max test (maximum eigenvalue test), which is based on log LR: $\ln [L_{max} (r) / L_{max} (r +1)]$; then

(ii) test the null hypothesis that the cointegration rank is equal to (r) against the alternative that the cointegration rank is equal to (r +1); and test it against the critical value using Chi-square distribution.

APPENDIX E . VEC Ouput

VEC Estimates Output (China)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	0.010652	0.004025	0.043308	4.27E-05	0.003395
t-stat	-0.40029	-2.49701 *	-6.27176 *	-0.23548	-1.46328
D(CA(-1))	-0.096139	0.004294	-0.040475	-0.000951	0.015764
	(-0.51367)	-0.37872	(-0.83342)	(-0.74574)	-0.77847
D(CA(-2))	-0.062792	0.003932	-0.016039	-0.000626	0.016679
	(-0.36582)	-0.37822	(-0.36012)	(-0.53530)	-0.82774
D(Y(-1))	2.176243	-0.138557	0.638075	0.023377	-0.007355
	-0.57001	(-0.59912)	-0.64409	-0.89869	(-0.29122)
D(Y(-2))	2.340949	-0.140338	0.756084	0.024937	-0.012709
	-0.61146	(-0.60514)	-0.76109	-0.95604	(-0.59902)
D(INF(-1))	-0.101517	-0.013854	-0.204865	-0.000805	0.005818
	(-0.16600)	(-2.374) *	(-1.29105)	(-0.19324)	-0.33141
D(INF(-2))	-0.177289	-0.013037	-0.257585	-0.001497	0.002835
	(-0.29836)	(-2.3622) *	(-1.67058) *	(-0.36987)	-0.22121
D(EXC(-1))	3.284153	2.418965	22.35002	-0.022087	-0.46274
	-0.0936	-1.13807	-2.45474 *	(-0.09239)	(-3.50833) *
D(EXC(-2))	1.4327	2.438699	21.22476	-0.036326	-0.472821
	-0.04201	-1.18036	-2.39822 *	(-0.15632)	(-3.61290) *
C	-2.751726	-0.133073	-4.306127	-0.038888	0.170296
	(-0.88502)	(-0.70655)	(-5.33739) *	(-1.83575) *	(-3.06825) *
D(MSCI(-1))	0.095156	-0.001049	-0.08284	1.14E-03	0.16232
	-1.50831	(-2.7452)*	(5.06047) *	(-2.65823) *	(-2.95756)*
D(MSCI(-2))	-0.016442	0.19947	-0.03845	-1.17E-06	0.612621
	(-0.51794)	(4.08041) *	(2.92912) *	(-0.02615)	(-1.91129) *
F-statistic	0.346102	1.72702 *	4.03049 *	1.321353	2.4863 *

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

t-test (on each coefficient estimates):	**Critical Point**
reject Ho at 99% confidence level	1.671
reject Ho at 95% confidence level	2.010
reject Ho at 90% confidence level	2.660
F-test (on overall regression):	
reject Ho at 95% confidence level	2.370
reject Ho at 99% confidence level	3.340

VEC Estimates Output (Hong Kong)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.006631	-0.024102	-0.000124	0.001697	-0.034488
t-stat	(-1.38217)	(-3.80108)*	(-0.02530)	(-4.51641) *	(-0.73868)
D(CA(-1))	-0.041424	-0.069026	0.014264	0.003021	0.088946
	(-0.33386)	(-0.42094)	-0.11232	-0.31094	-0.35908
D(CA(-2))	-0.041405	-0.06885	0.014293	0.002958	0.088873
	(-0.33368)	(-0.41984)	-0.11254	-0.3044	-0.35879
D(Y(-1))	0.041507	0.159456	0.002476	-0.012042	0.166263
	-0.452	-1.31389	-0.02634	(-1.67446)*	-1.28747
D(Y(-2))	0.04124	0.157	0.002075	-0.011158	0.148475
	-0.45021	-1.29689	-0.02213	(-1.55544)	-1.16793
D(INF(-1))	0.015364	0.035941	-0.003263	-0.002752	0.292745
	-0.12906	-0.22845	(-0.02678)	(-0.29522)	-0.80253
D(INF(-2))	0.015384	0.036128	-0.003232	-0.002819	0.265154
	-1.29E-01	-2.30E-01	(-0.02653)	(-0.30240)	-0.72836
D(EXC(-1))	0.377343	2.286158	0.183735	-0.225739	8.702283
	-0.26327	(-2.20691) *	-0.12525	(-2.01116)*	-0.6734
D(EXC(-2))	0.373382	2.249708	0.177789	-0.212621	10.11478
	-0.26285	(-2.19833)*	-0.12228	(-1.91129) *	-0.77992
C	0.247901	-0.291081	-0.223931	0.095674	-1.187567
	-6.08E-01	(-0.54010)	(-0.53651)	-3.00E+00	(-1.57601)
D(MSCI(-1))	7.99E-06	7.35E-05	1.20E-05	-2.65E-05	0.186204
	-0.06962	-0.48481	-0.10212	(-2.94447) *	(-1.78123)*
D(MSCI(-2))	0.017281	0.00061	0.003963	-0.225181	0.177789
	-0.19971	-0.01979	-0.30003	(-1.75104) *	(-2.62228)*
F-statistic	0.201994	1.445883	0.00587	2.655318 *	2.43723 *

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Taiwan)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	0.006744	0.009994	-0.003676	1.37E-05	0.000277
t-stat	-1.52592	(-2.49886) *	(-1.61195)	-0.03012	(-3.54791) *
D(CA(-1))	-0.070106	-0.07423	0.02738	0.001116	0.000926
	(-0.46376)	(-0.75981)	-0.56881	-0.07162	-0.44189
D(CA(-2))	-0.080841	-0.120293	0.044453	-8.95E-08	0.000927
	(-0.59101)	(-1.36079)	-1.02063	(-6.3E-06)	-0.44206
D(Y(-1))	0.146602	0.219397	-0.082513	-0.001224	-0.000799
	-0.67683	-1.56733	(-1.19637)	(-0.05480)	(-0.73080)
D(Y(-2))	0.14538	0.166513	-0.062489	-0.00277	-0.000712
	-0.75906	-1.34527	(-1.02466)	(-0.14025)	(-0.66139)
D(INF(-1))	-0.02805	-0.065921	0.024008	-0.001246	-0.002738
	(-0.06735)	(-0.24491)	-0.18103	(-0.02902)	(-0.88686)
D(INF(-2))	-0.015912	-0.064628	0.023978	-0.001496	-0.002603
	(-0.03817)	(-0.23986)	-0.18062	(-0.03481)	(-0.84478)
D(EXC(-1))	-0.288524	-0.739676	0.233713	-0.047073	-0.165765
	(-0.19503)	(-0.77365)	-0.49614	(-0.30859)	(-1.51548)
D(EXC(-2))	-0.384725	-1.114006	0.372118	-0.055932	-0.172685
	(-0.27688)	(-1.24057)	-0.84107	(-0.39040)	(-1.57313)
C	0.777559	-0.437253	0.150934	-0.070982	-0.001723
	-0.8494	(-0.73910)	-0.51781	(-0.75203)	(-0.27018)
D(MSCI(-1))	-0.002042	0.001412	-0.000613	9.06E-05	0.79523
	(-0.59168)	-0.63278	(-0.55804)	-0.25461	(-2.2144) *
D(MSCI(-2))	0.017281	0.00061	0.003963	-0.225181	0.68719
	-0.19971	-0.01979	-0.30003	(-1.65104)	(-2.28125) *
F-statistic	0.35821	1.23993	0.685933	0.040946	1.75288

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Japan)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	0.013134	0.003574	-0.004228	0.0002	0.482641
t-stat	(-2.44964)*	(-1.68017) *	(-4.58377) *	-0.05118	(-6.05945) *
D(CA(-1))	-0.119625	-0.003733	0.006616	0.011316	-0.329441
	(-0.84422)	(-0.34635)	-1.47843	-0.59622	(-1.99008)
D(CA(-2))	-0.101687	-0.003837	0.006429	0.011257	-0.340512
	(-0.72625)	(-0.36019)	-1.45391	-0.60025	(-2.05372)
D(Y(-1))	0.388124	0.029814	-0.04611	-0.16615	0.072378
	-0.21144	-0.2135	(-0.79542)	(-0.67579)	-0.4969
D(Y(-2))	0.642779	0.047587	-0.070165	-0.161131	-0.013322
	-0.36479	-0.35501	(-1.26094)	(-0.68275)	(-0.09443)
D(INF(-1))	0.344767	0.026958	-0.035198	0.023761	-0.564006
	-0.0943	-0.09693	(-0.30487)	-0.04852	(-0.91101)
D(INF(-2))	0.975236	0.036237	-0.056122	0.02562	-0.564248
	-0.26933	-0.13155	(-0.49080)	-0.05283	(-0.91141)
D(EXC(-1))	0.607127	-0.016825	-0.006429	-0.412709	14.24162
	-0.6483	(-0.23616)	(-0.21738)	(-3.29031) *	-0.80579
D(EXC(-2))	0.483681	-0.021316	0.000644	-0.413887	19.09174
	-0.52666	(-0.30510)	-0.02219	(-3.36473) *	-1.08631
C	18.56717	-0.459397	0.135017	-1.906982	-4.381711
	(-2.2935) *	(-0.74596)	-0.52811	(-1.75872) *	(-3.98899) *
D(MSCI(-1))	-0.005835	0.000144	-6.23E-05	5.28E-05	0.79947
	(-2.07053) *	(-1.67243)*	(-1.69960)*	-0.13986	(-4.08041) *
D(MSCI(-2))	-0.062792	0.003932	-0.016039	-0.000626	0.61679
	(-1.36582)	-1.37822	(-0.36012)	(-0.53530)	(-1.82774)*
F-statistic	2.710813*	3.267031*	3.321502*	1.745395	1.28416

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Korea)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.023451	0.026637	-0.008938	-0.018976	-0.000124
t-stat	(-1.76886) *	(-5.6392) *	(-4.41696) *	(-0.90811)	(-0.02530)
D(CA(-1))	-0.076817	-0.070228	0.029402	0.16531	0.014264
	(-0.46804)	(-1.20097)	(-1.17375)	-0.63903	-0.11232
D(CA(-2))	-0.046501	-0.076376	0.03028	0.154785	0.014293
	(-0.28763)	(-1.32597)	-1.22719	-0.60744	-0.11254
D(Y(-1))	-0.124462	0.087718	-0.028209	0.009486	0.02476
	(-0.26982)	-0.53374	(-0.40068)	-0.01305	(-2.02634)*
D(Y(-2))	-0.014409	0.096663	-0.035629	-0.11831	0.02075
	(-0.03286)	-0.61868	(-0.53233)	(-0.17117)	(-2.02213)*
D(INF(-1))	0.474769	-0.322228	0.08558	0.689322	-0.003263
	-0.47447	(-0.90383)	-0.56036	-0.43706	(-0.02678)
D(INF(-2))	0.10126	-0.063005	0.012503	0.293226	-0.003232
	-0.11705	(-0.20441)	-0.09469	-0.21504	(-0.02653)
D(EXC(-1))	0.034342	-0.009384	0.006674	-0.212381	0.183735
	-0.39191	(-0.30057)	-0.49901	(-1.53770)	-0.12525
D(EXC(-2))	0.017281	0.00061	0.003963	-0.225181	0.177789
	-0.19971	-0.01979	-0.30003	(-1.65104)	-0.12228
C	12.07472	-3.987132	0.732775	6.151902	-0.223931
	(-3.30878) *	(-3.06654) *	-1.31562	-1.06953	(-0.53651)
D(MSCI(-1))	-0.092997	0.029569	-0.006328	0.001598	0.23775
	(-3.49005) *	(-3.11453) *	(-2.55593)*	-0.03805	(-2.10212)*
D(MSCI(-2))	3.153686	0.216288	-2.22875	0.100483	0.50801
	-2.43725	-0.40541	(-1.69560) *	-0.8954	-1.40052
F-statistic	3.228718*	3.248358 *	3.972672 *	0.555645	1.79275

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Singapore)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	0.009833	-0.034488	0.004395	0.000277	0.006744
t-stat	(-2.21443) *	(-3.73868) *	(-1.41495)	(-3.54791) *	-1.52592
D(CA(-1))	-0.102851	0.088946	0.010337	0.000926	-0.070106
	(-0.86257)	-0.35908	-0.12394	-0.44189	(-0.46376)
D(CA(-2))	-0.102838	0.088873	0.010337	0.000927	-0.080841
	(-0.86246)	-0.35879	-0.12395	-0.44206	(-0.59101)
D(Y(-1))	-0.068093	0.166263	-0.012626	-0.000799	0.146602
	(-1.09538)	-1.28747	(-0.29038)	(-0.73080)	(-2.67683)*
D(Y(-2))	-0.064964	0.148475	-0.012542	-0.000712	0.14538
	(-1.06158)	-1.16793	(-0.29303)	(-0.66139)	(-2.75906)*
D(INF(-1))	-0.081423	0.292745	-0.047544	-0.002738	-0.02805
	(-0.46370)	-0.80253	(-0.38711)	(-0.88686)	(-0.06735)
D(INF(-2))	-0.076569	0.265154	-0.047414	-0.002603	-0.015912
	(-0.43693)	-0.72836	(-0.38683)	(-0.84478)	(-0.03817)
D(EXC(-1))	0.912519	8.702283	-2.733561	-0.165765	-0.288524
	-0.14669	-0.6734	(-0.62826)	(-1.51548)	(-0.19503)
D(EXC(-2))	0.664015	10.11478	-2.740182	-0.172685	-0.384725
	-0.10636	-0.77992	(-0.62754)	(-1.57313)	(-0.27688)
C	0.50801	-1.187567	-0.112072	-0.001723	0.777559
	-1.40052	(-1.57601)	(-0.44174)	(-0.27018)	-0.8494
D(MSCI(-1))	-0.000152	0.210862	-4.04E-06	-4.22E-06	2.32042
	(-0.65100)	(-1.78123)*	(-0.02480)	(-1.03096)	(-2.59168)*
D(MSCI(-2))	0.005604	-0.058359	-0.244869	-0.420071	2.438699
	-0.09099	(-2.14226)*	-0.37833	(-2.66378)	(-1.78036)*
F-statistic	0.712428	3.444159*	0.345374	1.68709	0.35821

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Malaysia)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.267134	0.482641	-0.071097	-0.000476	0.000473
t-stat	(-3.50796) *	(-6.05945) *	(-3.32444) *	(-0.65196)	-0.17029
D(CA(-1))	0.125235	-0.329441	0.038943	0.000524	-0.010911
	-0.79129	(-1.99008)	-0.87616	-0.3455	(-0.62706)
D(CA(-2))	0.134222	-0.340512	0.041055	0.000525	-0.011855
	-0.84674	(-2.05372)	-0.92222	-3.45E-01	(-0.69879)
D(Y(-1))	-0.084047	0.072378	-0.01797	1.74E-05	0.008624
	(-0.60354)	-0.4969	(-0.45948)	-1.30E-02	-0.25747
D(Y(-2))	-0.021583	-0.013322	-0.002772	6.04E-06	0.009346
	(-0.16002)	(-0.09443)	(-0.07317)	-0.00467	-0.28676
D(INF(-1))	0.152425	-0.564006	0.056381	0.001017	0.001464
	-2.58E-01	(-0.91101)	-0.33918	-0.17924	-0.09333
D(INF(-2))	0.143837	-0.564248	0.055009	0.001	0.000217
	-0.24301	(-0.91141)	-0.33093	-0.17614	-0.01579
D(EXC(-1))	-2.835216	14.24162	-1.202324	-0.072919	-0.412502
	(-0.16779)	-0.80579	(-0.25336)	(-0.45011)	(-2.52454) *
D(EXC(-2))	-7.193259	19.09174	-2.195294	-0.073924	-0.400025
	(-0.42811)	-1.08631	(-0.46522)	(-0.45890)	(-2.58718)
C	3.756008	-4.381711	0.863533	0.004213	0.100483
	(-3.57653) *	(-3.98899) *	(-2.92791) *	-4.18E-01	-0.8954
D(MSCI(-1))	-0.016442	0.019947	-0.003845	-1.17E-06	0.60349
	(-3.51794) *	(-4.08041) *	(-2.92912) *	(-0.02615)	(-2.37621)*
D(MSCI(-2))	0.06234	0.082399	-0.012709	-0.019145	0.45052
	(-2.49406)*	(-2.46333)*	(-2.59902)*	(-0.36413)	(-3.19621)*
F-statistic	2.425157 *	3.703352 *	3.15708 *	0.102019	1.061288

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Thailand)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.398456	0.147649	0.047829	-0.0084	0.321495
t-stat	(-5.99069) *	(-2.01181) *	-1.42213	(-1.61519)	(-5.22214) *
D(CA(-1))	0.077796	-0.091522	0.00348	0.011591	-0.229508
	-0.49396	(-0.52665)	-0.04369	-0.9412	(-0.52681)
D(CA(-2))	-0.003686	-0.074715	0.016387	0.011437	-0.211879
	(-0.02325)	(-0.42714)	-0.20443	-0.92268	(-0.48909)
D(Y(-1))	0.351071	-0.160342	-0.034555	0.010187	0.737868
	-1.33998	(-0.55464)	(-0.26084)	-0.49725	(1.81336)*
D(Y(-2))	0.423469	-0.178517	-0.044743	0.00995	0.702716
	(-1.85107) *	(-0.70720)	(-0.38680)	-0.55624	(2.26538)*
D(INF(-1))	0.470186	-0.317115	-0.030768	0.03769	-0.273863
	-0.93142	(-0.56932)	(-0.12054)	-0.95485	(-1.41676)
D(INF(-2))	0.434238	-0.312881	-0.023818	0.037256	-0.256862
	-0.90488	(-0.59089)	(-0.09816)	-0.99287	(-1.34210)
D(EXC(-1))	-1.318116	1.803359	-0.066419	-0.300106	-0.005268
	(-0.41490)	-0.51444	(-0.04135)	(-1.20807)	(-0.90737)
D(EXC(-2))	-0.285345	1.566564	-0.22063	-0.300895	-0.005447
	(-0.09237)	-0.45959	(-0.14125)	(-1.24568)	(-0.93914)
C	4.102198	-1.065537	-0.620225	0.064554	-0.74035
	(-5.25053) *	(-1.23600)	(-1.56998)	-1.05666	(-1.05443)
D(MSCI(-1))	-0.016414	0.003465	0.002569	-2.18E-05	0.403204
	(-5.33398) *	(-2.24054) *	-1.65079	(-0.09057)	-1.87264
D(MSCI(-2))	-0.133073	4.306127	-0.038888	-0.170296	0.318819
	(-1.83575) *	(-5.33739) *	-0.70362	(-0.06825)	-0.12651
F-statistic	3.742008 *	3.467994 *	0.27985	0.64345	2.740928 *

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Philippines)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.01705	0.160407	-0.225744	0.003395	-0.008505
t-stat	(-0.31516)	(-3.68053) *	(-3.67500) *	(-2.46328)*	(-0.61549)
D(CA(-1))	0.019677	-0.140605	0.175399	0.015764	0.029744
	-0.13163	(-1.16755)	-1.03337	-0.77847	-0.49482
D(CA(-2))	0.018819	-0.130663	0.163559	0.016679	0.03114
	-0.12651	(-1.09035)	-0.96838	-0.82774	-0.51955
D(Y(-1))	-0.007148	0.046586	-0.068861	-0.007355	-0.028886
	(-0.03834)	-0.31016	(-0.32528)	(-0.29122)	(-0.50080)
D(Y(-2))	-0.010247	0.06234	-0.082399	-0.012709	-0.019145
	(-0.06542)	-0.49406	(-0.46333)	(-0.59902)	(-0.36413)
D(INF(-1))	0.002682	-0.011012	0.005794	0.005818	-0.012229
	-0.02069	(-0.10548)	-0.03938	-0.33141	(-0.32527)
D(INF(-2))	-0.003014	0.033899	-0.042224	0.002835	-0.018011
	(-0.03186)	-0.44473	(-0.39303)	-0.22121	(-0.46732)
D(EXC(-1))	-0.083634	-0.301202	0.910909	-0.46274	-0.460897
	(-0.08589)	(-0.38398)	-0.82392	(-3.50833) *	(-2.94257) *
D(EXC(-2))	-0.086103	-0.302168	0.919729	-0.472821	-0.452077
	(-0.08912)	(-0.38824)	-0.83843	(-3.61290) *	(-3.03522) *
C	0.13192	-0.81078	0.680752	0.170296	0.088878
	-0.32197	(-2.45631) *	-1.46327	(-3.06825) *	-0.72371
D(MSCI(-1))	-0.000292	0.003033	-0.003522	0.000162	0.001879
	(-0.23346)	(-3.01209) *	(-2.48157) *	(-2.95756)*	(-3.27195)*
D(MSCI(-2))	0.373382	2.249708	-0.177789	-0.212621	10.11478
	-0.26285	(-2.19833)*	(-2.12228)*	(-1.91129) *	-0.77992
F-statistic	0.012889	3.465843 *	3.388553*	2.950014*	1.547574

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Indonesia)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.034759	0.321495	-0.948295	-2.038366	0.006744
t-stat	(-1.07125)	(-5.22214) *	(-5.41146) *	(-1.86497)*	-1.52592
D(CA(-1))	0.045052	-0.229508	0.608962	9.287369	-0.070106
	-0.19621	(-0.52681)	-0.49107	-0.55692	(-0.46376)
D(CA(-2))	0.042039	-0.211879	0.559794	8.796145	-0.080841
	-0.18412	(-0.48909)	-0.45397	-0.53044	(-0.59101)
D(Y(-1))	0.057159	-0.737868	2.0657	6.201027	0.146602
	-0.19304	(-1.31336)	-1.29172	-0.28834	-0.67683
D(Y(-2))	0.051269	-0.702716	1.967971	5.228129	0.14538
	-0.17516	(-1.26538)	-1.24496	-0.24594	-0.75906
D(INF(-1))	0.030303	-0.273863	0.774868	3.688711	-0.02805
	-0.29744	(-1.41676)	-1.40827	-0.49852	(-0.06735)
D(INF(-2))	0.025941	-0.256862	0.723577	3.133544	-0.015912
	-0.25717	(-1.34210)	-1.32821	-0.42772	(-0.03817)
D(EXC(-1))	-0.000976	-0.005268	0.015563	-0.280274	-0.288524
	(-0.31892)	(-0.90737)	-0.94175	(-1.26120)	(-0.19503)
D(EXC(-2))	-0.000915	-0.005447	0.016142	-0.273613	-0.384725
	(-0.29946)	(-0.93914)	-0.97771	(-1.23235)	(-0.27688)
C	0.613989	-0.74035	2.626658	88.23922	0.777559
	-1.65918	(-1.05443)	-1.31426	-3.28312	-0.8494
D(MSCI(-1))	-0.001304	0.003204	-0.010947	-0.131569	-0.002042
	(-1.44646)	(-1.87264)*	(-2.24783) *	(-2.00896) *	(-1.59168)
D(MSCI(-2))	0.125235	-0.329441	-0.038943	0.000524	-0.010911
	-0.79129	(-1.99008)*	-0.87616	-0.3455	(-1.62706)
F-statistic	0.262749	2.740928 *	2.928626 *	2.681648*	0.35821

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (India)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	0.001359	0.039894	0.080654	0.000473	0.009833
t-stat	-0.04246	(-3.02418) *	(-2.48159) *	-0.17029	(-2.21443) *
D(CA(-1))	-0.146951	-0.104814	-0.089877	-0.010911	-0.102851
	(-0.73241)	(-1.26699)	(-0.44097)	(-0.62706)	(-0.86257)
D(CA(-2))	-0.087026	-0.097574	-0.125515	-0.011855	-0.102838
	(-0.44489)	(-1.20981)	(-0.63166)	(-0.69879)	(-0.86246)
D(Y(-1))	-0.120435	0.096709	0.299203	0.008624	-0.068093
	(-0.31184)	-0.60732	-0.76264	-0.25747	(-1.09538)
D(Y(-2))	-0.103261	0.068412	0.226576	0.009346	-0.064964
	(-0.27478)	-0.44152	-0.59353	-0.28676	(-1.06158)
D(INF(-1))	-0.004071	-0.061273	-0.122424	0.001464	-0.081423
	(-0.02251)	(-0.82184)	(-0.66648)	-0.09333	(-0.46370)
D(INF(-2))	-0.000789	-0.024308	-0.049227	0.000217	-0.076569
	(-0.00497)	(-0.37172)	(-0.30554)	-0.01579	(-0.43693)
D(EXC(-1))	-0.279117	0.174544	0.635754	-0.412502	0.912519
	(-0.14815)	-0.22469	-0.33218	(-2.52454) *	-0.14669
D(EXC(-2))	-0.599727	-0.091609	0.359079	-0.400025	0.664015
	(-0.33639)	(-0.12463)	-0.19827	(-2.58718)	-0.10636
C	3.153686	0.216288	-2.22875	0.100483	0.50801
	-2.43725	-0.40541	(-1.69560) *	-0.8954	-1.40052
D(MSCI(-1))	-0.025378	-0.001536	-0.018235	0.000349	0.40152
	(-0.03769)	(-2.36918) *	(-1.67586) *	-0.37621	(0.68103)*
D(MSCI(-2))	1.803359	-0.066419	-0.005268	0.030016	0.400025
	-0.51444	(-2.04135)*	(-2.20807)*	(-0.90737)	(2.58718)*
F-statistic	0.59176	3.981561*	3.799454 *	1.061288	0.712428

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Pakistan)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	0.027538	0.145598	0.096817	-0.008505	0.009994
t-stat	-0.65486	(-4.45706) *	(-2.54752) *	(-2.61549)	(-3.49886) *
D(CA(-1))	-0.097591	-0.230697	-0.115989	0.029744	-0.07423
	(-0.53351)	(-1.62348)	(-0.42620)	-0.49482	(-0.75981)
D(CA(-2))	-0.099671	-0.221063	-0.107643	0.03114	-0.120293
	(-0.54645)	(-1.56018)	(-0.39668)	-0.51955	(-1.36079)
D(Y(-1))	0.012739	-0.00978	0.007881	-0.028886	0.219397
	-0.07257	(-0.07173)	-0.03018	(-0.50080)	-1.56733
D(Y(-2))	0.010849	0.066893	0.061162	-0.019145	0.166513
	-0.0678	-0.53818	-0.25693	(-0.36413)	-1.34527
D(INF(-1))	0.047359	-0.026488	-0.055894	-0.012229	-0.065921
	-0.41392	(-0.29802)	(-0.32836)	(-0.32527)	(-0.24491)
D(INF(-2))	0.054896	-0.067171	-0.090022	-0.018011	-0.064628
	-0.46805	(-0.73725)	(-0.51590)	(-0.46732)	(-0.23986)
D(EXC(-1))	0.113648	-0.122871	0.240671	-0.460897	-0.739676
	-0.23843	(-0.33184)	-0.33938	(-2.94257) *	(-2.77365)*
D(EXC(-2))	0.072534	-0.083075	0.304304	-0.452077	-1.114006
	-0.16003	(-0.23594)	-0.45126	(-3.03522) *	(-2.24057)*
C	0.30587	-0.890377	-1.096777	0.088878	-0.437253
	-0.81842	(-3.06685) *	(-2.97256) *	(-2.72371)*	(-0.73910)
D(MSCI(-1))	-0.003137	0.012708	-0.011362	0.001879	0.001412
	(-0.69769)	(-3.63818) *	(-2.69849) *	(-2.27195)*	-0.63278
D(MSCI(-2))	0.146602	0.219397	-0.082513	-0.001224	-0.000799
	-0.67683	-1.56733	(-1.19637)	(-0.05480)	(-0.73080)
F-statistic	0.329762	3.105963 *	3.354975 *	3.547574 *	1.23993

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

VEC Estimates Output (Sri Lanka)

Error Correction:	D(CA)	D(Y)	D(INF)	D(EXC)	D(MSCI)
CointEq1	-0.038857	1.139592	-1.458683	-0.02213	0.004025
t-stat	(-0.93667)	(-4.12489) *	(-3.34639) *	(-0.20837)	-2.49701 *
D(CA(-1))	0.019031	-1.576343	1.752438	0.114626	0.004294
	-0.09801	(-1.21899)	-0.85891	-0.23058	-0.37872
D(CA(-2))	0.046447	-1.777294	2.144794	0.132402	0.003932
	-0.24155	(-1.38788)	-1.06153	-0.26895	-0.37822
D(Y(-1))	-0.009456	0.121716	-0.1894	-0.009602	-0.138557
	(-0.29635)	-0.57278	(-0.56491)	(-0.11754)	(-0.59912)
D(Y(-2))	-0.004604	0.103361	-0.135987	-0.0126	-0.140338
	(-0.15978)	-0.53866	(-0.44917)	(-0.17081)	(-0.60514)
D(INF(-1))	-0.001088	-0.044455	0.033183	0.018233	-0.013854
	(-0.05434)	(-0.33350)	-0.15778	-0.35581	(-0.37400)
D(INF(-2))	-0.001507	-0.030048	0.016625	0.013916	-0.013037
	(-0.07791)	(-0.23322)	-0.08178	-0.28095	(-0.36220)
D(EXC(-1))	0.005781	-0.086959	0.272823	-0.410207	2.418965
	-0.09247	(-0.20887)	-0.41533	(-2.56299)	-1.13807
D(EXC(-2))	0.005604	-0.058359	0.244869	-0.420071	2.438699
	-0.09099	(-0.14226)	-0.37833	(-2.66378)	-1.18036
C	0.089513	-0.894169	1.324074	0.66008	-0.133073
	-0.96207	(-1.44304)	-1.35433	(-2.77104) *	(-0.70655)
D(MSCI(-1))	-0.001078	0.009907	-0.017298	-0.001414	-0.001049
	(-1.18716)	-1.63773	(-1.81238)	(-0.60815)	(-2.7452)*
D(MSCI(-2))	-0.437253	0.150934	-0.070982	-0.001723	0.19947
	(-0.73910)	-0.51781	(-0.75203)	(-0.27018)	(4.08041) *
F-statistic	0.16459	1.705478	1.1437	1.091455	1.572027

Note: asterisk (*) signifies the rejection of null hypothesis of estimated coefficient = 0

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