THE BEHAVIOR OF EXCHANGE RATES, CRUDE OIL PRICES, AND MONEY SUPPLY AND THEIR EFFECTS ON PHILIPPINE STOCK MARKET PERFORMANCE: A COINTEGRATION ANALYSIS

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ABSTRACT

The primary objective of this study is to analyze the possible impact of changes in the peso-dollar exchange rates, crude oil prices, and money supply on the performance of the Philippine stock market. The choice of explanatory variables was dictated by theoretical considerations, related scholarly studies, and relevance to the current economic environment of the Philippines. However, the researcher also acknowledges that other variables could possibly impose significant effects on the performance of the domestic bourse. A dynamic multiple regression analysis using Autoregressive Distributed Lag (ARDL) model was utilized to analyze the relationships between the dependent and explanatory variables. The Johansen Cointegration Procedure was employed to assess the long-run cointegrating relationship between the Philippine Stock Exchange Index (PSEI) and its predictor variables. The Granger Causality Test was used to determine the direction of causality among the variables. The results of the econometric procedures employed showed that 86.0 percent of the variation in the Philippine stock market performance is explained by its co-variates. Moreover, a one-period lag for the PSEi, current, one- and two-period lags for the peso-dollar exchange rates, and current and one-period lag of the money supply exert significant effects on the PSEi. The results of cointegration analysis indicated that there is a long-run equilibrium relationship between the PSEI and its predictor variables. Finally, the Granger Causality Test results showed the presence of a unidirectional causality from the peso-dollar exchange rates to the PSEI.

Keywords: exchange rates, money supply, crude oil prices, Philippine Stock Exchange Index

CHAPTER 1

THE PROBLEM RATIONALE

1.1 Introduction

Error! Bookmark not defined.A stock market essentially functions as a venue for capital generation. Exchange-listed firms may issue shares of company ownership represented by stocks and may raise capital that may be used to fund business expansions, asset acquisitions, and other similar ventures that can be expected to yield profits in the near term. On the other hand, investors can gain in the stock market by trading, that is, by buying and selling shares of stocks. In simpler terms, the stock market aids in the allocation of capital, from those who can provide it to those who are temporarily fund-insufficient. Such capital can then be utilized for productive purposes.

Financial market development is generally accepted as a vehicle toward economic growth. In particular, the stock market may serve as an engine for wealth generation, whether on the perspective of a listed firm or that of an individual investor. However, the Philippine stock market remains less

developed in comparison to other stock exchanges, even to those that are situated in Asia. Thus, it is deemed relevant to establish a research that is focused on the performance of the Philippine Stock Exchange (PSE). Based on existing literature, numerous studies were devoted to analyzing the stock markets of developed economies such as the United States and member countries of the European Monetary Union (EMU). In comparison, relatively few researches on the stock markets of developing economies including that of the Philippines have been done.

To provide an analysis that can contribute to the development of the Philippine stock market and give guidance in investment decision-making, it is essential to identify several factors that could impose significant influences on stock market performance. Factors deemed influential should be critically taken into consideration when dealing with investment options. For instance, an economic environment characterized by unstable inflation, high unemployment rate, and low gross domestic product (GDP) will likely have negative implications on investments, consumption, and production. According to Mishkin (2007), it will be more difficult for businesses and individuals to make proper decisions with high inflation levels given the uncertainties regarding commodity prices. Thus, inflation and factors that could result to unfavorable price levels should be given adequate attention so as to prevent it from severely affecting the financial market, including stock exchanges. The

influence of inflation to the stock market is widely accepted in the literature such as in the research made by Du (2006) concerning U.S. stock returns. He concluded that the relationship between the consumer price index (CPI) and stock returns depends on the cause of inflation, whether it comes from demand or supply shocks, as well as on the kind of monetary policy adopted by the government.

The researcher recognizes the potential contribution of exchange rate changes to stock market activities. Investments in foreign assets expose the investor to the risk of foreign exchange appreciation or depreciation. Exchange rate movements may also have spillover effects on the performance of the domestic stock market. Several studies showed that the 1997 Asian Financial Crisis, which stemmed from the collapse of the Thai Baht, adversely affected several Asian stock markets, including that of the Philippines. Intuitively, this will lead to an assumption that substantial swings in the foreign exchange rates can carry serious implications to stock market performance.

Aside from foreign exchange rate changes, movements in world crude oil prices may likewise affect the stock market. For an investor, fluctuations in the prices of crude oil may lead to unstable inflation levels and bring about market uncertainties. On the part of listed companies, significant changes in world crude oil prices may translate to a rise in the cost of raw

materials and transportation. In any aspect, substantial movements in crude oil prices heighten investment risks. The inclusion of oil prices in the proposed model is further made relevant by the energy-intensive characteristics of several industries included in the PSE and the continuous dependence of the domestic economy on imported petroleum.

Monetary variables could also have an influence on the stock market, via the interest rate and the money supply channels. Changes in these monetary variables affect the cost of borrowing and price levels. Balke and Wynne (2007) found that a contractionary monetary shock increased the prices of several goods since the shock was generally perceived as a form of "cost" shock. Thus, ambiguities regarding the direction of monetary variable movements may encourage investors to temporarily hold their investment plans and purchases until such a time when conditions seem more stable.

Based on the existing academic literature, several other economic factors have been identified to carry an influential effect on stock markets. However, to the best of the researcher's knowledge, there is no particular study that explored the potential joint impact of benchmark crude oil prices and economic variables (i.e., foreign exchange rates and money supply) to the performance of the Philippine stock market.

1.2 Objectives of the Study

The primary objective of this research was to analyze the potential influence of foreign exchange rates, benchmark crude oil prices, and money supply on the performance of the Philippine stock market as represented by the Philippine Stock Exchange Index (PSEI). Furthermore, it was also intended to assess the direction of causality between each of the variables through the application of the Granger Causality Test. This research has the following specific objectives:

1.2.1 Describe the historical trend of the variables included in the model, namely, PSEI (LnPSEI), peso–dollar exchange rates (LnFOREX), Dubai Fateh crude oil prices (LnCRUDE), and broad money supply (LnM2MONEY)

1.2.2 Measure the effect of the changes in the lagged values of LnPSEI, current and lagged values of LnFOREX, LnCRUDE, and LnM2MONEY to the current value of LnPSEI

1.2.3 Find out if there is a long-run equilibrium relationship between LnPSEI and the given explanatory variables

1.2.4 Establish if the relationship between LnPSEI and the explanatory variables is stable over time and can be utilized for forecasting

1.2.5 Assess if the past values of the explanatory variables contain information that can be useful in predicting the future values of LnPSEI

1.3 Significance of the Study

With underdevelopments in the Philippine stock market, it can be considered useful to undertake a research anchored on variables that could have a potential impact on the performance of the local bourse. A number of empirical studies made use of a variety of economic, financial, and non-economic variables and analyzed its effects on the stock market of developed and emerging economies. These allowed them to identify several factors that could impose substantial distortions on stock market performance. The application of similar techniques in the Philippine stock market resulted to findings that may be regarded as beneficial in the following sectors:

To the Government

The findings of this research would be useful to the government, particularly to those involved in monetary policy formulation. This study may provide information on how economic variables in the form of foreign exchange rates and money supply could have an impact on the performance of the stock market. Thus, in their monetary decision-making process, policymakers may also consider the potential effect of their plans and actions on the domestic bourse.

To Medium- and Long-Term Investors

Stocks are primarily short-term investments such that buy-and-sell transactions can be made in the market on a daily basis. Note, however, that stocks can also be traded on a medium- to long-term arrangement. As such, the results of the study may be utilized by investors whose securities are traded at least on a quarterly interval. Changes in the explanatory variables that are considered influential in the PSEI could serve as indicators on the future direction of the stock market.

To the Academe

This study can serve as a guide or reference to researchers and students who are particularly involved in the areas of Finance and Monetary Economics. The use of several econometric tools in this paper may also be helpful to those who would like to apply Econometrics in their research methodology. Moreover, the results of this study can provide relevant information to those individuals who would like to establish a research with a similar theme in the future.

1.4 Research Impediments

The study is mainly focused on the potential impact of the changes in the peso–dollar exchange rates, crude oil prices, and broad money supply on the performance of the Philippine stock market. As such, it did not take into account the possible influence of other macroeconomic variables such as interest rates, government budget deficits/surpluses, and unemployment rates, although these may also have important implications on stock market returns. Numerous studies were already devoted to such macroeconomic variables in relation to the stock markets of various developed and emerging economies.

Since quarterly data were utilized in this study, the researcher also acknowledges that the results may not be very useful for market participants who are strictly engaged in short-term trading. On the contrary, stock investors who hold their securities for at least a quarter may derive relevant information from the findings of this study.

Given that stocks are primarily short-term investments, high-frequency time series data e.g. daily, monthly may also be utilized. However, based on the available statistical data, quarterly data were used in this particular research undertaking.

1.5 Definition of Terms

This particular research undertaking necessitated the use of technical terms that are commonly used in the areas of Finance and Monetary Economics. To give a better view on the meaning of these technical terms, the researcher deems it important to define these words in two ways: (1) by their textbook definition and (2) by their usage in this research.

Stocks Represent shares of ownership in a corporation. Stockholders become part-owners of the company. Stocks may be

categorized as *common stocks* or *preferred stocks*. Aside from receiving dividends, owners of common stocks are normally given voting rights specifically on the selection of company directors and on other important corporate matters. On the other hand, preferred stock holders are given preference over common stockholders, in terms of the distribution of their dividends.

Contractionary Monetary Shock A change in the monetary policy of the government arising from a *contractionary* monetary action which is intended to reduce the level of liquidity or supply of money in the economy that could lead to a lower inflation path. Some examples cited by the BSP are the increases in policy interest rates and reserve requirements.

Philippine Stock Exchange Index (PSEI) Previously known as the PSE Composite Index or Phisix, the PSEI serves as an aggregate measure of relative changes in the market capitalization of common stocks. It is made up of a fixed basket of 30 listed common stocks, selected based on a criteria, to represent the general movement of stock prices.

Dubai Fateh crude oil Light sour crude sourced from the Persian Gulf. As one of the major crude oil markers or reference points for the various types of oil traded in the market, the Dubai crude is used as a benchmark for the pricing of crude oil exports to Asia.

Security refers to share, participation, or interest in a corporation or business enterprise or venture that is evidenced by written or electronic instruments

Arbitrage Pricing Theory (APT) is a general theory of asset pricing which states that the expected return of a financial asset can be modeled as a linear function of different macroeconomic, industry- or firm-specific variables. Sensitivity to changes in each of these variables is represented by a variable-specific beta.

S&P 500 refers to the free-float capitalization-weighted index of prices of 500 large-cap common stocks that are actively traded in the United States. It covers the stocks of large publicly held companies that are traded on either the New York Stock Exchange or the NASDAQ, two of the largest U.S. stock exchanges.

Fixed exchange rate is also known as pegged exchange rate since it is a kind of exchange rate regime wherein the value of a particular currency is matched or "pegged" to the value of another currency or to a group of currencies, or to another measure such as gold and other similar valuable commodities

Managed floating exchange rate is a type of exchange rate regime wherein the value of a particular domestic currency is allowed to fluctuate based on the demand and supply conditions, but can sometimes be controlled by the government to reduce substantial fluctuations.

Foreign Direct Investment (FDI) Based on the definition of the Philippine National Statistical Coordination Board, these are investments that are made to acquire a lasting interest by an entity that is a resident of a given country in an enterprise that is based in another country. The purpose for this investment is to have a significant influence in the management of the enterprise. An investor can be considered as a direct investment enterprise if it owns ten percent or more of the ordinary shares (for

incorporated companies) or the equivalent (in the case of unincorporated entities).

Current Account Deficit A condition wherein the total imports/payments of a country are greater than total exports/ receipts. With a current account deficit, the country is considered as a net borrower from abroad, or a user of funds. In other words, the subject country invested more than the amount that its domestic savings can finance.

Bear Market A market, which according to the BSP, is characterized by declining prices. Given this scenario, investors tend to position themselves on the sell side because they are anticipating for losses. This is the opposite of the bull market where prices are generally on an upward trend and investor confidence is increasing.

Capital Asset Pricing Model is commonly utilized for the pricing of risky securities. It describes the relationship between the risk factor and the expected return of a given security or portfolio. Specifically, the CAPM states that the expected return of a security or portfolio is equal to the rate on a risk-free security plus

a risk premium. The idea is that if the expected return falls below or is not equal to the required return, then investment on the security or portfolio should not be considered.

CHAPTER 2

THE RESEARCH QUESTIONS

2.1 Review of the Literature

This chapter provides a discussion of relevant information that are related to the following research components: stock market performance, foreign exchange rates, crude oil prices and oil price shocks, monetary policy changes, and other macroeconomic variables that may be considered pertinent in the fulfillment of the research objectives. Early empirical studies provided evidence of a relationship between stock markets and various economic and non-economic factors. However, to the best of the researcher's knowledge, no previous empirical effort made use of foreign exchange rates, benchmark crude oil prices, and money supply and related these factors to the performance of the Philippine stock market.

2.1.1 Stock market and economic growth

It has been widely accepted in the literature that stock markets and other components of the capital market have substantial contributions to economic growth, whether directly or indirectly. Specifically, the stock market serves as a wealth channel for individuals and institutions. It allows individuals to generate more wealth by investing in stocks and maximizing their returns. The same can be applied to institutional investors. On the part of exchange-listed firms, the stock market provides them with an organized venue for raising capital that can be used for business expansions, asset acquisitions, and streamlining of operations. The stock market also enhances financial intermediation as it reduces the risks and costs involved in financial asset trading by organizing the sellers and buyers of securities among the investing public.

Since companies may utilize the capital raised from the stock market in various revenue-generating activities, aggregate production of these firms could increase. Improvements in production may bring about higher output and contribute to the growth of the economy. A number of studies have found a positive relationship between stock market development and economic growth. For instance, upon a recent research made by Cooray (2010) that examined the stock markets of 35 developing (low and medium income)

countries including several Asian markets such as Indonesia, Malaysia, and the Philippines, he concluded that the presence of stock markets has a significant impact on economic growth.

On the contrary, Rosseau and Xiao (2007) found that stock market development does not have an impact on output growth and fixed investments, with China as the basis of their study. Meanwhile, other empirical researches such as those authored by Enisan and Olufisayo (2009) and Wu, Hou, and Cheng (2010) showed that the presence of a stock market does not guarantee economic growth. Rather, their studies pointed out that only well-developed stock exchanges can contribute to economic progress.

Stock market development necessitates an examination of economic and non-economic factors that may have significant effects on its performance. Previous empirical studies have identified some of the variables that affect stock market fluctuations using various subject countries or regions. However, these factors cannot be assumed to have a universal, same magnitude impact on every stock market given diverse economic and social structures. Thus, it is deemed necessary to deal exclusively with a particular country's stock market and analyze the factors that could significantly influence its movements.

2.1.2 Influential factors to stock market fluctuations

As suggested by the Arbitrage Pricing Theory (APT) of Stephen Ross, the expected returns for financial assets such as stocks is affected by several macroeconomic factors and firm- or industry-specific variables. Most macroeconomic announcements are regarded to have a market-wide impact on the stock exchange, affecting most if not all of its sub-indices and its component firms. Examples of these macroeconomic factors are the GDP, inflation rate, unemployment, and interest rates, among several others.

The unexpected changes in these macroeconomic variables appear to cause the fluctuations in the stock market. An example of this unexpected change was encapsulated in the studies made by Farka (2009) and Kurov (2010). According to their research, monetary policy shocks have a more pronounced impact on the level of stock returns during the policy announcement. The magnitude of the effect was found to be declining prior to and after the announcement period.

While influential factors on stock market performance may be described as either market-influential or firm- and industry-specific, it can also be categorized as external or domestic. External factors such as significant movements in oil prices, financial or economic crises in industrialized nations

such as the United States and members of the EMU, and economic downturns in major export markets may have an impact on the prices of financial assets.

Research studies done by Abugri (2008); Lim, Brooks, and Kim (2008); and Choi and Hammoudeh (2010) emphasized the role played by global factors on the stock markets of different countries. By investigating the stock markets of four Latin American countries, Abugri (2008) found that global factors such as the MSCI World Index[1] and the U.S. 3-month Treasury bill significantly affected the stock returns in all of the four countries considered. Meanwhile, Lim et al. (2008) arrived at a conclusion that the 1997 Asian Financial Crisis had an undesirable impact on the stock markets of several Asian countries, particularly in Hong Kong and in the Philippines. Finally, Choi and Hammoudeh (2010) made an assessment of the volatilities of various commodities and the stock market index and came up with a result that the S&P 500 is susceptible to geopolitical and financial downturns.

On the other hand, domestic factors also appear to have an effect on the performance of stock markets. In the case of economic powerhouses such as the United States, domestic events such as the announcement of a change in the interest rate target by the Federal Reserve may even generate spillover effects to the stock markets of less developed

[1] A stock market index of over 1,600 world stocks, maintained by MSCI, Inc. formerly Morgan Stanley Capital International. It is used as a benchmark for global stocks.

countries. In other instances, the stock markets of different countries may be interconnected such that the performance of one bourse may have an impact on the performance of another country's stock market. Such scenario is consistent with the study of Maysami and Koh (2000), which found evidence of a significant and positive cointegrating relationship between the Singapore stock market and the U.S. and Japanese stock markets.

Numerous empirical studies were made to decipher the influence of various global and domestic variables on stock market performance. Taking into account the results of these research undertakings, it can be deduced that a change in a particular economic (or non-economic) factor tends to affect stock markets differently. For instance, a change in the CPI may result to a strong positive impact on the stock market of an industrialized economy but may have a weak effect on the bourse of a developing country.

In the Philippine context, it makes intuitive sense to consider the peso–dollar exchange rates and relate it to the performance of the local bourse. Appreciation or depreciation of the domestic currency may affect the stock market in several ways: inflation expectations, unwillingness of investors to hold assets (including stocks) that are denominated in a depreciating currency, trade orientation of a particular listed company, and impact to the aggregate economy.

2.1.3 Exchange rates, economic growth, and the stock market

An exchange rate can be defined as the price at which one form of currency is exchanged for another. Its movements are determined based on whether an economy is under a fixed exchange rate regime or a floating arrangement. In the case of the Philippines, which uses the managed floating exchange rate, the value of the local currency appreciates or depreciates based on market forces, that is, demand and supply conditions. However, the Bangko Sentral ng Pilipinas (BSP) may intervene from time to time so as to resist highly unfavorable fluctuations in the value of the Philippine peso.

While exchange rate depreciation is generally deemed undesirable, the appreciation of the domestic currency does not necessarily contribute to improvements in market conditions. For instance, it imposes a negative impact on the value of foreign remittances, one of the factors that fuel the economy. It also has an unfavorable effect to exporters as it makes locally manufactured products more expensive in the global market, thus less competitive.

Several studies including those of Schnabl (2008) and Aghion, Bacchetta, Ranciere, and Rogoff (2009) suggested the importance of

exchange rate stability, rather than appreciation. Schnabl (2008) argued that exchange rate stability has a positive impact on economic growth. However, in some countries, this benefit was found to be weaker owing to capital market developments that reduce the vulnerability of the economy to exchange rate fluctuations. In countries where exchange rates are tightly pegged to the dollar, the linkage between exchange rate stability and economic growth was considered insignificant. Meanwhile, Aghion et al. (2009) stated that exchange rate volatilities tend to stunt the growth of economies, especially in countries with underdeveloped capital markets where abrupt financial fluctuations serve as significant sources of macroeconomic instabilities.

Aside from its impact on economic growth, exchange rate fluctuations were also found to affect other macroeconomic factors. In the analysis of Arratibel, Furceri, Martin, and Zdzienicka (2011), lower fluctuations in the exchange rate were found to be favorable for real output growth and foreign direct investments. Lower exchange rate volatilities were also associated with elevated current account deficits, as well as excess credit. Note that while current account deficit makes a country a net debtor relative to the world market, it is not necessarily a negative indicator since it may also denote an increase in domestic production and export earnings in the longer term.

However, despite conventional perception that exchange rate plays a significant role in the growth of the economy, several studies noted that this is not always the case. In an empirical work made by Nagayasu (2007), he concluded that the use of exchange rates as a mechanism to improve the economy may not be necessarily effective. According to his analysis, the depreciation of the Japanese yen did not boost Japan's economy during the sample period 1970:Q1 to 2003:Q1.

The magnitude of the impact of exchange rate fluctuations to economic growth remains inconclusive. Moreover, given that stock market development can be regarded as an economic growth indicator, exchange rate movements were similarly found to yield diverse effects across different bourses.

The impact of exchange rate fluctuations to the stock market may pass through inflation, eventually affecting stock returns as well as the profitability of listed companies. According to a 2011 BSP publication, exchange rate movements can influence actual inflation, as well as expectations on the future price level. Exchange rate changes tend to have a direct impact on imported goods and services. For import-intensive industries, a weaker peso increases the cost of imported inputs. With higher input costs, these industries will likely impose steeper prices on the goods and services

that they produce. In the case of investors, inflation can be regarded as a significant threat to the investment portfolio. With inflation, the general price level of goods including financial assets such as stocks increases. Thus, inflation could reduce the demand for stocks, thereby decreasing stock prices. Note that while lower stock prices may be ideal for those who intend to buy shares of stocks, the unstable economic environment associated with rising inflation rates may make investment decision-making more difficult. Meanwhile, deflation cannot also be considered desirable for stock investors. Ultimately, holding all other factors constant, a relatively stable inflation level is deemed generally favorable in the investment setting.

Exposure in the international financial market allows investors to hold assets, including stocks, denominated in foreign currencies. A highly volatile domestic currency may drive investors away from local stocks and into assets that are denominated in a more stable currency. Investors in the local stock market typically face a substitution dilemma in terms of choosing between a local and a foreign investment. There are also inherent risks associated in foreign stocks; however, it provides opportunities for diversification and, in some instances, better returns.

On the part of trade-oriented listed companies, exchange rate fluctuations may undermine their profitability. As Zhao (2010) stated, exchange

rate movements indirectly affect the competitive power of local products in the global market. Appreciation of the domestic currency will make export products more expensive abroad, thereby reducing foreign demand for these goods.

Based on existing literature, a number of empirical studies have been done in order to examine the linkage between exchange rate movements and the stock market. Some of these research works were conducted by Mun (2007); Yang and Chang (2008); Lim, Brooks, and Kim (2008); Kasman, Vardar, and Tunć (2011); and Diamandis and Drakos (2011). Their analyses found evidence of a significant relationship between exchange rate movements and stock market performance.

According to Mun (2007), exchange rate fluctuations account for a relatively large share of the variation in domestic stock market returns. However, foreign exchange variability has a lesser impact on the variability of U.S. stock market returns owing to a weaker correlation between the two variables. The strong association between exchange rate movements and domestic stock returns suggests that local stock investors should take a close watch on the foreign exchange market.

On a similar note, Yang and Chang (2008) concluded that foreign exchange market news significantly explained the domestic stock returns in

Japan, Singapore, South Korea, Taiwan, and the United States. In addition, the authors found a stronger relationship between the local stock market and the foreign exchange market following unfavorable news from either of the two markets.

Lim et al. (2008) argued that the efficiency of selected Asian stock markets was negatively affected by the 1997 Asian Financial Crisis that was initiated by the severe depreciation of the Thai Baht. The authors cited the stock markets of Hong Kong, Philippines, Malaysia, Singapore, Thailand, and Korea as the most severely affected by the currency crisis.

In another study, Kasman et al. (2011) found that aside from interest rates, foreign exchange rates also have a negative significant effect on the volatility of bank stock returns in Turkey. Meanwhile, Diamandis and Drakos (2011) found a statistically significant cointegration vector between the stock market of each Latin American country that was under observation and its respective foreign exchange rate. Their findings were indicative of a long-run equilibrium relationship between the exchange rates and the stock market.

Empirical studies by Zhao (2010) and Walid, Chaker, Masood, and Fry (2011) focused on the cointegration and asymmetrical relationship between exchange rates and the stock markets, respectively. More specifically,

Zhao (2010) concluded that there is no cointegrating vector between the Renminbi real effective exchange rate and stock prices in China, indicative of the absence of a long-term equilibrium relationship between the two variables. Meanwhile, Walid et al. stated that stock prices react asymmetrically to changes in the foreign exchange market. In other words, the stock market reacts more negatively to unfavorable changes in the foreign exchange rates compared to positive exchange rate developments, even if such changes are of the same magnitude.

As previously stated, various economic and non-economic variables may affect the stock market. While a sizeable literature examined the linkage between foreign exchange rates and stock markets, several other research works have taken into account a number of external factors.

In this study, the researcher regarded it appropriate to include crude oil price changes for three reasons. First, crude oil serves as an important input to several industries, including those that are listed in the PSE. Thus, significant changes in the price of crude oil and its by-products may impact on the profitability of some listed firms that may eventually affect its stock prices. Second, the Philippines is a net importer of crude oil, and as such, it has little control over substantial swings in the prices of this commodity. Finally, existing literature generated conflicting results regarding the influence

of crude oil price changes on the stock market. Therefore, the enormity of the impact of crude oil price changes may be different in the case of the Philippine stock market.

2.1.4 Crude oil price changes in relation to economic growth and stock markets

It has been widely accepted in the literature that oil prices perform an important role in economic activities, whether in an industrialized developed country or in an emerging market. Specifically, crude oil and its fuel by-products serve as primary production and transportation inputs. The scope of substantial oil price changes also goes beyond domestic production and consumption since existing literature provide evidence that oil price fluctuations also affect trade transactions such as in the study made by Bodenstein, Erceg, and Guerrieri (2011). Meanwhile, other research works such as those authored by Milani (2009); Du, Yanan, and Wei (2010); and Naccache (2010) stressed out the changing magnitude in the linkage between oil price volatility and the macroeconomy.

The impact of oil price movements on the economy may depend on whether the country being considered is a net exporter or importer of the

commodity. In a broad sense, an uptrend in oil prices translates to higher export revenues for major oil-exporting nations. On the other hand, oil price hikes would mean higher costs for a net importer of the product. On this basis, Bodenstein et al. (2010) stated that oil price increases lead to a transfer of wealth from an oil-importing country to an exporting one. On the contrary, Chen (2009); Farzanegan and Markwardt (2009); and Tang, Wu, and Zhang (2010) concluded that unexpected changes in oil prices have a weak to insignificant impact on the prices of other commodities.

The conflicting academic notions regarding the oil price - macroeconomy nexus can be attributed to the fact that the revenue potential of oil-exporting economies during periods of price increases can be neutralized by demand adjustments on the side of importers. In other words, oil importers may opt to temporarily adjust their demand for the commodity by attempting to reduce their energy intensiveness or by adopting energy-efficient measures. Thus, Bjornland (2009) stated that there remains no clear consensus on how significant movements in oil prices affect the economic performance of developed nations.

On the other hand, existing literature shows that the influence of oil price shocks on oil-importing economies is relatively more conclusive. Studies made by Rafiq, Salim, and Bloch (2009); Du, Yanan, and Wei (2010);

Jayaraman and Choong (2009); Qianqian (2011); and Fofana, Chitiga, and Mabugu (2009) all found evidences of a negative influence of oil price shocks on the macro indicators in net oil-importing countries. On a narrower perspective, Henriques and Sadorsky (2010) claimed that oil price volatilities affect firm-level investments as it bring about uncertainties that cause firms to postpone their investments.

In the past, a great deal of attention was given to the relationship between oil prices and economic growth in developed countries. More recent studies that focused on this linkage include those by Bachmeier (2008) and Zhang (2008), which tested the impact of oil price shocks using the economies of the United States and Japan, respectively. However, the observable uptrend in the petroleum demand of developing markets led to the establishment of studies related to oil prices and economic growth in emerging nations. Specifically, Basher and Sadorsky (2006) and Nandha and Hammoudeh (2007) reported an insignificant increase in the oil consumption of several countries in the Asia Pacific region. While developed countries are still the world's top oil consumers as measured by their daily raw consumption, the Asia Pacific region registered the highest oil consumption growth rate. As cited by Basher and Sadorsky (2006), the Asia Pacific region recorded the largest increase in oil consumption over a ten-year period (1994 to 2004) at 37.2

percent. Meanwhile, Europe and Eurasia posted the smallest increase in their consumption of the commodity during the same period, at 1.3 percent.

Some of the studies that related oil prices to macroeconomic variables using a developing economy backdrop are those of Rafiq, Salim, and Bloch (2009) for Thailand; Iwayemi and Fowowe (2011) for Nigeria; Jbir and Zouari-Ghorbel (2009) for Tunisia; Prasad, Narayan, and Narayan (2007) for the Fiji islands; Jayaraman and Choong (2009) for a number of Pacific Island countries; and Lorde, Jackman, and Thomas (2009) using the economy of Trinidad and Tobago.

As previously described, economic and non-economic factors that affect the economy may likewise have an influence on the capital market, particularly the stock market. Therefore, crude oil price changes may also have an impact on the performance of the local bourse. In the research conducted by Lee and Chiou (2011) and Miller and Ratti (2009), oil prices and stock returns were found to have an inverse relationship, that is, as oil prices go up, stock returns tend to decrease. Nandha and Faff (2008) likewise observed the negative relationship between oil prices and stock returns with the exception of stocks from the mining, oil, and gas sector. In a separate analysis, Chen (2010) concluded that rising oil prices will most likely move the stock market into a bear or recession phase. On the other hand, Narayan and Narayan (2010)

observed a positive relationship between oil prices and stock returns in the case of the Vietnam Stock Exchange. Other studies focused on the relationship symmetry between oil prices and the stock market. Chiou and Lee (2009) described the relationship to be asymmetrical, with oil price increases having a more significant effect on stock market returns than oil price decreases.

On the contrary, Cong, Wei, Jiao, and Fan (2008) examined the effects of oil price shocks on the Chinese stock market and found out that most indices in this bourse are not significantly affected by oil price shocks, except for the stock returns of several oil firms and the manufacturing index. The manufacturing index is particularly affected by oil price shocks since crude oil and fuel products serve as basic inputs in most manufacturing processes. As such, oil price changes result to downward or upward pressures in the operational costs of manufacturing firms.

The waning impact of crude oil shocks on stock market returns was emphasized in the analysis by Jammazi and Aloui (2010) that considered the bourses of Japan, France, and United Kingdom. They concluded that crude oil shocks used to have a long-term effect on stock prices. However, after 1999, the researchers observed that the impact of crude oil shocks was slowly diminishing, which may be attributed to the presence of other renewable

resources and improving energy efficiency of some developed nations. Based on the review of various related literature, it can be conjectured that crude oil price changes may or may not have an influence on the stock market. The magnitude and direction of the impact may also vary across different bourses.

Generally, changes in global economic and non-economic factors were proven difficult to manage. For instance, wide swings in commodity prices in the world market cannot be easily influenced by governments, especially in the case of a developing country. Studies conducted by Zhang (2008) and Du, Yanan, and Wei (2010) provided evidence on the difficulty of controlling commodity prices in the global setting. Specifically, Zhang (2008) described the relationship between world oil prices and the Japanese economy to be unidirectional. Simply put, oil price fluctuations can affect Japan's economic growth, but the latter cannot influence oil prices. Du et al. (2010) concluded that China, despite its rapidly accelerating economy, still has no substantial power to stabilize oil price movements in the world market.

On the contrary, the public sector can act in response to the spillover effects of external factors to the domestic economy through macroeconomic strategies that may come in the form of fiscal and monetary policies. Fiscal policy refers to the tool that is used to manage government revenues and expenditures in order to affect the macroeconomy. On the other

hand, monetary policy is defined as the management of the country's supply of money and interest rates. The government observes six basic objectives in the implementation of the changes in monetary policy. These are high employment, economic growth, and stability in prices, interest rates, financial markets, and foreign exchange markets (Mishkin, 2003). With the financial market stability objective, it can be said that monetary policy changes may have a considerable impact on the performance of the stock market.

2.1.5 Monetary policy shocks and the stock market

Monetary policy actions by the central bank are primarily aimed toward the achievement of economic growth, among other important macro indicators. Specifically, the BSP stated that the primary objective of its monetary policy is "to promote a low and stable inflation level that is conducive to a balanced and sustainable economic growth" (BSP.gov.ph). In order to promote price stability, central banks can apply several monetary policy instruments, one of which is to alter the supply of money in the economy.

With several policy instruments that can be utilized by central banks to achieve its economic objective, a number of studies focused on the optimal monetary policy. These include research works authored by

Kormilitsina (2011); Zhang (2009); Hafer, Haslag, and Jones (2007); and Liu and Zhang (2010).

In his empirical work, Kormilitsina (2011) stated that historical recessions were possibly worsened by incorrect monetary policies. Meanwhile, Zhang (2009) arrived at a conclusion that the response of the economy to monetary policies depends on the type of instrument adopted, describing the price (interest rate) rule as more superior than the quantity (money supply) rule in reducing macroeconomic fluctuations. Hafer et al. (2007) provided evidence that money stock has a significant position in explaining the fluctuations in economic activity, particularly output gap, even after the 1980s or the so-called "Great Moderation"[2]. More specifically, monetary aggregate M2 was found to be useful in forecasting output gap movements. Finally, Liu and Zhang (2010) stated that a hybrid monetary policy rule, one that combines both interest rate and quantity of money, is more effective than the interest rate instrument or the quantity rule of money taken separately. On a similar note but disregarding the concept of optimal monetary policy, Favara and Giordani (2009) conjectured that shocks to monetary aggregates contain information on the future movements of output, inflation, and interest rates in the United States.

[2] Refers to the decline in the volatility of business cycle fluctuations starting in the mid-1980s, perceived to have been caused by institutional and structural developments in industrialized nations

With empirical evidences emphasizing the influence of monetary aggregates on economic growth, the same variable may likewise be said to affect stock market performance. Note that the performance of the bourse may be utilized as a barometer of financial development and economic growth. Given this supposition, several studies were established to analyze the relationship between monetary policies and the stock market such as those by Baharumshah, Mohd, and Yol (2009); He (2006); and Chen (2009).

In their empirical works, Baharumshah et al. (2009) found evidence of a cointegrating relationship between monetary aggregate M2 and key macroeconomic variables such as output, foreign interest rates, and stock prices. Meanwhile, He (2006) supported the belief that stock prices are sensitive to monetary policy changes but also accentuated the instability of such sensitivity. On the contrary, Chen (2009) downplayed the ability of the monetary aggregate M2 to predict bear (recession) stock markets but regarded inflation rates and yield curve spreads as useful leading indicators.

Furthermore, other research disintegrated the index into sub-indices in order to analyze the heterogeneous impact of changes in the monetary policy. Basistha and Kurov (2008); Scharler (2008); and Kholodilin, Montagnoli, Napolitano, and Siliverstovs (2009) described the varying effects of monetary policy shocks across sectoral indices. Meanwhile, Chen, Kim, and

Kim (2005) focused on hotel stock returns listed on the Taiwan Stock Exchange. Through regression analysis, Chen et al. (2005) found that, among the five macroeconomic variables considered (i.e., money supply, industrial production growth, expected inflation, unemployment rate change, and the yield spread), only money supply and changes in the unemployment rate significantly explained the movements of hotel stock returns. However, albeit the significant influence of money supply and unemployment rate on hotel stock returns in Taiwan, their findings emphasized that non-macroeconomic variables including news on the Severe Acute Respiratory Syndrome and the September 11 terrorist attack in the United States were stronger return predictors.

In a separate research, Basistha and Kurov (2008) concluded that interest rate changes have greater impact on cyclical and capital-intensive sectors. Meanwhile, Scharler (2008) deduced that the stock returns of bank-dependent firms respond more strongly to monetary policy shocks represented by interest rate changes. In the case of the monetary policy announcements of the European Central Bank, Kholodilin et al. (2009) found that some sectoral indices failed to exhibit a response to such announcements.

Li, Iscan, and Xu (2010); Jimenez-Rodriguez (2008); and Wongbangpo and Sharma (2002) also supported the heterogeneous effect of

monetary policies on the stock market but employed a cross-country approach. According to Li et al. (2010), stock price responses to monetary policy differ among economies, taking Canada and the United States as case countries. Similarly, Jimenez-Rodriguez (2008) found a cross-country heterogeneous response to monetary policy among the members of the EMU. He stated that the adoption of a common monetary policy in response to oil shocks can result to asymmetric economic effects owing to the structural differences in these EMU member countries. Finally, Wongbangpo and Sharma (2002) used macroeconomic variables such as gross national product, CPI, money supply, interest rates, and the exchange rates on stock prices in five member countries of the Association of Southeast Asian Nations. The effects of these variables to the stock prices were not the same for all the five countries considered. Nevertheless, these macroeconomic factors were found to carry a significant influence on stock prices. On the contrary, Heimonen (2010) failed to find a strong causal relationship between stock returns and monetary policy variables using the European setting.

Contradicting perceptions regarding macroeconomic policies cast doubts on whether the government can effectively affect the economy and financial markets. Classical economists assume the market-clearing mechanism that justifies laissez-faire, whereas the proponents of Keynesian economics suggest price rigidities and market imperfections as a rationale for

government intervention. In practice, the question on whether policymakers should proactively intervene in the economy and in financial markets or rely on self-correction entails various economic and political judgments.

2.1.6 Synthesis

Evaluation of various empirical studies provided the researcher with pertinent information regarding macroeconomic variables that could affect the Philippine stock market. As broadly stated in the study of Chen (2009), stock markets may be influenced by different financial indicators and macroeconomic variables, as well as non-economic factors (i.e., political events and national security concerns).

Focusing primarily on macroeconomic variables, the researcher further recognized the diverse effects of these factors to the stock market. Moreover, it was established that the influence of a given macro variable to a stock market may differ from one bourse to another. In the local context, underdevelopments in the Philippine stock market provide a rationale for undertaking a research work focused on analyzing the potential linkages between selected macroeconomic variables and the market.

The review of various related literature showed that numerous studies have been done on the stock markets of developed economies such as the United States, Japan, and members of the European Union. On the contrary, relatively few studies were devoted to analyzing the stock markets of developing economies. Empirical works by Lim, Brooks, and Kim (2008); Nandha and Hammoudeh (2007); and Narayan and Narayan (2010) took into account several factors such as exchange rates and oil prices and related these to the stock markets of Thailand, Vietnam, and Malaysia, among others.

A slew of empirical studies that related foreign stock markets to a variety of economic variables provide the justification for analyzing the possible relationship between the local bourse and selected macro indicators. Among other economic variables, exchange rates and the money supply were chosen since these factors were also applied in the previous studies that involved other developing markets. Meanwhile, crude oil prices were also included as these were utilized as an external economic variable in several stock market analyses.

The APT, which was adopted in this particular research, was also employed in the study by Azeez and Yonezawa (2006) who attempted to examine the influence of macroeconomic variables such as money supply, industrial production, and exchange rate in the Japanese stock market. Similar

with other empirical studies, econometric tools were applied in order to test the validity and robustness of the regression results.

2.2 Theoretical Framework

With variables that are representative of risks and return, the study utilized the APT as a basis for its theoretical model. The APT model of risk and return is a concept developed more recently relative to its alternative approach known as the Capital Asset Pricing Model (CAPM) by Jack Treynor and William Sharpe.

Both the APT and the CAPM view the relationship between expected returns and risks as positive. However, APT is distinct from CAPM in the sense that it separates market risk factors and assigns a beta for each component. In comparison, the CAPM valuation model utilizes one market risk factor and thus a single beta. The concept of the APT valuation model can be explained by describing the components on stock market return:

$$R = \overline{R} + U \qquad (2.2.1)$$

where R represents the actual stock market's return, $\overline{R}$ is the expected component of the return, and U serves as the unexpected factor. Equation (2.2.1) states that the actual stock market return is dependent on the expected (forecasted) component and on the unexpected (shock) factor.

For instance, a government announcement of a 5.0 percent inflation rate for the month of January may be regarded as the expected component $\overline{R}$ or may be separated into expected and unexpected factors. If the forecasted January inflation rate is at 5.0 percent, then U = 0 because the forecasted value is equal to the actual value (the absence of the unexpected or "shock" component since the actual inflation rate perfectly satisfied the forecasted inflation rate). On the other hand, if the forecasted inflation rate is at 4.0 percent, then the expected component $\overline{R}$ is 4.0 percent while the unexpected component U is 1.0 percent.

The unexpected component of the actual return is considered as the true measure of risk since the expected factor has already been discounted by the market. The expected component will have no impact if such is satisfied by the actual value. Under the APT model, the unexpected component U can be further broken down into two kinds of risks: systematic risks (market risks) and unsystematic or idiosyncratic risks (company-specific

risks). As the name implies, market risks have a general influence on stock returns, whereas company risks may only affect a particular company's stock returns or that of an industry.

Macroeconomic factors such as the GDP, interest rates, or inflation generally have an effect on nearly all firms. On the other hand, company-specific announcements such as the launching of a particular product may only have an impact on its manufacturers, distributors, and competitors.

With the incorporation of the systematic and unsystematic risks in equation (2.2.1), the new equation will be

$$(2.2.2) \qquad R = \overline{R} + U$$

$$= \overline{R} + m + \epsilon$$

where m stands for the systematic risks, and ϵ represents the unsystematic risks. Note that the ϵ of a specific company, say firm A, is not related to the ϵ of another company, say firm B. In other words, the uncertainty factors

affecting the stocks of company A are not correlated to the uncertainties that may influence the stocks of company B.

$$\text{(2.2.3)} \qquad \text{Corr}\,(\epsilon_A, \epsilon_B) = 0$$

While the unsystematic risk ϵ components of the returns of companies A and B are not related, the same systematic risk may exert an influence on both companies, indicating a link between their returns. For instance, inflation announcements will most likely have an effect on all the listed companies, thus their returns share the common factor of being affected by inflation news. The impact of a systematic risk is represented by the beta coefficient β. Specifically, it indicates the responsiveness of a stock's return on a given systematic risk. The β can be positive, negative, or zero, depending on the response of the stock return on the systematic risk. When a stock increases (decreases) in response to a positive (negative) movement in the systematic risk, then the β is regarded as positive. Meanwhile, when a stock had an inverse response relative to the movement of the systematic risk, then the β is considered negative. In some cases, the β can be zero when the stock is uncorrelated with the systematic risk. By returning to equation (2.2.2) and incorporating the variables included in this study, the return of a stock can be expressed in this form:

$$R = \overline{R} + U$$

$$= \overline{R} + m + \epsilon$$

(2.2.4) $$= \overline{R} + \beta_1 F_1 + \beta_{FOREX} F_{FOREX} + \beta_{CRUDE} F_{CRUDE} + \beta_{M2MONEY} F_{M2MONEY}$$

where β_{FOREX}, β_{CRUDE}, and $\beta_{M2MONEY}$ denote the stock's peso-dollar exchange rate beta, crude oil price beta, and broad money supply beta, respectively. The extent of the impact of a systematic risk on a stock can be measured by the magnitude of the beta. Thus, assuming that the β_{FOREX} is 1, then stock return would increase (decrease) by 1.0 percent for every 1.0 percent increase (decrease) in the value of the Philippine peso vis-à-vis the U.S. dollar. On the other hand, when β_{FOREX} is -1, then stock return would increase (decrease) by 1.0 percent for every 1.0 percent decrease (increase) in the value of the Philippine peso. Equation (2.2.4) is known as the factor model, with factors (denoted by F) representing systematic risk sources. For a factor model with *n* factors, a more formal and general equation would be:

(2.2.5) $$R = \overline{R} + \beta_1 F_1 + \beta_2 F_2 + \ldots + \beta_n F_n + \varepsilon$$

where ε is stock specific and does not have a relationship with the ε of other stocks. A three-factor model is expressed in equation (2.2.4) with the peso–dollar exchange rates, crude oil prices, and broad money supply as systematic

risk sources. However, based on existing literature, there are no rules that can be used to identify the appropriate number of systematic risk factors to be included in a model. Thus, the study utilized these three variables that are deemed relevant and viewed as possible sources of systematic risks.

The return of a particular stock can be replaced with an index of stock market returns such as the S&P 500 or, in the case of the Philippine stock market, the PSEI. Since a stock index is mainly utilized as a typical representation of the entire stock market, the new model is considered as a "market model", which can be expressed as:

$$R = \overline{R} + \beta (R_M - \overline{R}_M) + \varepsilon \quad (2.2.6)$$

Substituting the components of the model with the PSE composite index:

$$R = \overline{R} + \beta (R_{PSEI} - \overline{R}_{PSEI}) + \varepsilon \quad (2.2.7)$$

where R_{PSEI} is the return on the PSEI (market portfolio), and $\overline{R}_{PSEI}$ is the expected component of the return on the PSEI. Thus, the fraction of the equation $(R_{PSEI} - \overline{R}_{PSEI})$ is another representation of the unexpected or shock

component of the stock index return and is also comparable to the unexpected changes in the macroeconomic variables.

One must note that whether the k-factor model or the market model was utilized, the equations can be used to represent the potential impact of the changes in a given variable to a particular stock or to the stock market index. However, if equation (2.2.7) is applied in this study, it will be difficult to identify how a specific factor uniquely influenced the PSEI. To recapitulate the presented theory and equations, a multifactor APT model was employed in this study:

$$(2.2.8) \quad \overline{R} = R_F + \beta_1(\overline{R}_1 - R_F) + \beta_2(\overline{R}_2 - R_F) + \ldots + \beta_n(\overline{R}_n - R_F)$$

Substituting the above equation with the variables included in this study:

$$(2.2.9) \quad \overline{R}_{PSEI} = R_F + \beta_{FOREX}(\overline{R}_{FOREX} - R_F) + \beta_{CRUDE}(\overline{R}_{CRUDE} - R_F) + \beta_{M2MONEY}(\overline{R}_{M2MONEY} - R_F)$$

where β_{FOREX} stands for the PSEI's peso-dollar exchange rate beta, and β_{CRUDE} and $\beta_{M2MONEY}$ represent the index' crude oil price beta and money supply beta, respectively.

2.3 Research Hypotheses

To provide an empirical analysis of the research objectives, the following hypotheses were examined:

$H_0$1: There is no significant relationship between the performance of the stock market (PSEI) and the independent variables, namely, peso–dollar exchange rates (FOREX), crude oil prices (CRUDE), and broad money supply (M2MONEY).

$H_0$2: Changes in the peso–dollar exchange rates, crude oil prices, and money supply have no significant impact on stock market performance.

$H_0$3: The PSEI is not a stable function of foreign exchange rates, crude oil prices, and money supply.

$H_0$4: There exists no long-run relationship between stock market performance, peso–dollar exchange rates, crude oil prices, and money supply.

$H_0$5: The past values of each of the explanatory variables do not contain information that can be useful in forecasting the future values of the PSEI.

2.4 Research Paradigm

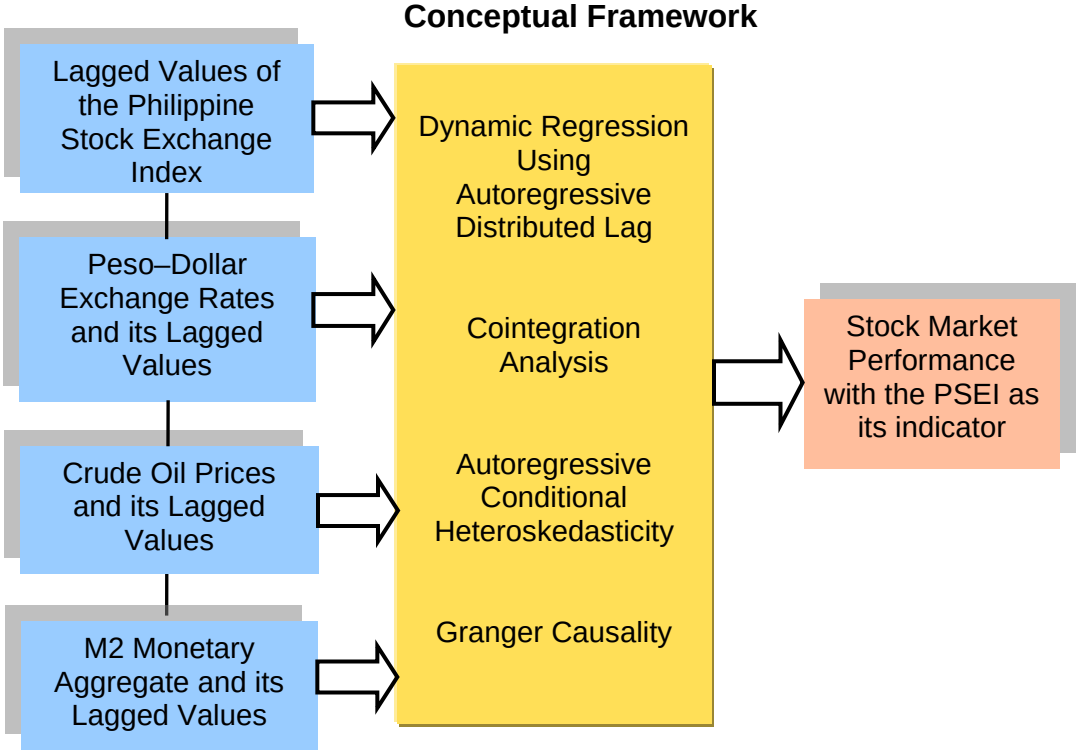
The schematic diagram represented by Figure (2.1) demonstrates how the research objectives were fulfilled based on the theoretical model utilized in the study.

The diagram consists of four variables, namely, the stock market performance using the PSEI, peso–dollar exchange rates, Dubai Fateh crude oil prices, and the monetary aggregate M2. These variables are representative of the two types of primary variables commonly used in research: the dependent variable and the independent or explanatory variable. The PSEI, which is commonly utilized as a barometer of Philippine stock market performance, represented the dependent variable. Meanwhile, the lagged values of the PSEI and current and lagged values of the peso–dollar exchange rates, Dubai Fateh crude oil prices, and monetary aggregate M2 served as the explanatory variables. The explanatory variables acted as the risk components of the multifactor APT that was explained in the theoretical framework.

2.5 Conceptual Framework

Figure 2.1

Conceptual Framework



The research employed the Autoregressive Distributed Lag (ARDL) model that requires the inclusion of the lagged values of the dependent variable and the original explanatory variables as additional regressors in order to predict the dependent variable (Ramanathan, 2002). Therefore, the lagged values of the PSEI and the explanatory variables were incorporated in the model. According to Vinod (2008), there are several reasons for the inclusion of lags. These may be psychological inertia or human habits, permanent versus transitory income, implementation postponements, and institutional factors. In the case of the PSEI, the presence of psychological inertia may best explain the suitability of including the lagged values of the PSEI and the explanatory variables in the model. Stock market

activities generally depend on investor perceptions that often take into account the previous performance of the market itself and economic factors that are deemed relevant to investment decisions.

The study used the average peso–dollar exchange rates published in the Online Statistical Interactive Database of the BSP. For crude oil prices, it employed the Dubai Fateh crude oil prices that serve as a pricing benchmark for crude oil supplies in Asia including the Philippines. The Dubai Fateh crude oil price data were derived from the U.S. Energy Information Administration. Finally, for the money supply, the study used the monetary aggregate M2 or broad money since economists and researchers generally use these when they intend to quantify the amount of money in circulation. It is also utilized when aiming to explain various monetary conditions in the economy. Based on the Depository Corporations Survey by the BSP, M2 or Broad Money consists of the following:

M2 = Narrow Money + Other Deposits or Quasi-Money

where: *Narrow Money* = *Currency outside Depository Corporations or Currency in Circulation + Transferable Deposits or Demand Deposits*

Other Deposits (Quasi-Money) = Savings Deposits + Time Deposits

Except for the PSEI, all the other variables were adjusted for inflation by taking into account the CPI. Real exchange rates were derived by multiplying the nominal peso–dollar exchange rates to the quotient of the Philippine CPI to U.S. CPI.

CHAPTER 3

THE RESEARCH METHODS

This chapter describes the research designs that were applied in the study, techniques of data collection and recording, and the statistical and mathematical instruments that were considered necessary for the empirical analysis of the objectives of the paper.

3.1 Research Design

The researcher utilized qualitative and quantitative methods of research in order to describe, explore, and perform statistical analyses on the secondary (time series) data that were gathered.

Specifically, a descriptive research design was employed to determine and describe the characteristics of the dependent variable, which is the PSEI, and the chosen independent variables, namely, the peso–dollar exchange rates, Dubai Fateh crude oil prices, and the monetary aggregate M2.

Aside from the descriptive method, a causal or exploratory research was also adopted to quantitatively investigate on the peso–dollar exchange rates, crude oil prices, and money supply in relation to the PSEI. Consequently, the exploratory research design was applied to find out whether correlation exists among the variables included in the study. It also explored the potential response of the dependent variable to the changes in the independent variables.

In order to determine whether a long-run equilibrium relationship exists among the dependent variable and the regressors, the Johansen methodology for testing cointegration was used. Such approach was also performed to resolve the possibility of committing spurious regression results. In addition to the cointegration tests, a number of relevant statistical tools were

also applied to fulfill the research objectives and to test the robustness of the results.

3.2 Data Collection Technique

The study made use of quarterly data covering the period from 1992 to 2010, equivalent to 76 observations. As secondary data, the values were derived from existing statistics of various domestic and foreign institutions.

The values of the dependent variable PSEI were sourced from the PSE. Meanwhile, the independent variables peso–dollar exchange rate and the monetary aggregate M2 were derived from the archived monetary statistics of the BSP. The CPIs used to adjust some of the variables for inflation were taken from the National Statistics Office and the U.S. Bureau of Labor Statistics. Finally, the historical data for Dubai Fateh crude oil prices were collected from the International Financial Statistics of the International Monetary Fund.

Other secondary information deemed pertinent to the review of related literature and that provided further support to the content of the study

were derived from the online database of published journals, specifically ScienceDirect. Other relevant informative materials were gathered from up-to-date books on economics, finance, and econometrics.

3.3 Data Treatment

The PSEI was used as a representation of the Philippine stock market performance, which served as the dependent variable of the research. On the other hand, independent variables were signified by the peso–dollar exchange rates, Dubai Fateh crude oil prices, and monetary aggregate M2. To eliminate the potential misleading impact of inflation on the time series variables, the researcher made adjustments through the use of the CPI.

3.4 Data Recording and Analysis Technique

The raw data and the results of the analyses were presented through tables and graphical representations. Graphs and charts were utilized in order to depict the characteristics and trend patterns of the dependent and the independent variables.

To empirically analyze the potential effects of the changes in the peso–dollar exchange rates, Dubai Fateh crude oil prices, and monetary aggregate M2 on the PSEI, equation (3.4.1) was used:

$$(3.4.1)\ PSEi_t = \alpha+\beta_1 PSEi_{t-1}+\beta_2 PSEi_{t-2}+\ldots+\beta_k^{*} PSEi_{t-k}+\beta_4 FOREX_{2t}+ \beta_5 FOREX_{2t-1}+\beta_6 FOREX_{2t-2}+\ldots+\beta_k^{*} FOREX_{2t-k}+\beta_8 CRUDE_{3t}+ \beta_9 CRUDE_{3t-1}+\beta_{10} CRUDE_{3t-2}+\ldots+\beta_k^{*} CRUDE_{3t-k}+ \beta_{12} M2MONEY_{4t}+\beta_{13} M2MONEY_{4t-1}+\beta_{14} M2MONEY_{4t-2}+\ldots+ \beta_k^{*} M2MONEY_{4t-k}+ \mu_t$$

The above equation also provided direction on the hypotheses that the lagged values of the independent variables, namely, peso–dollar exchange rates, Dubai Fateh crude oil prices, and monetary aggregate M2, may give statistically important information on the future values of the PSEI.

Through the application of eViews 4.0 statistical software package, actual computations and tests were made. The results of these statistical tests aided in the fulfillment of the research objectives.

3.5 Statistical and Econometric Tools

In order to provide a systematic and reliable approach to hypotheses testing, a number of relevant statistical and econometric tools were applied in this research.

3.5.1 Dickey–Fuller Unit Root Test. Utilized to determine whether the time series variables included in this study are stationary or nonstationary. The null and alternative hypotheses of the Dickey–Fuller Unit Root Test are as follows:

H_0: The series is nonstationary or $\gamma = 0$

H_1: The series is stationary or $\gamma < 0$

Test statistic: $\tau = \dfrac{\hat{\gamma}}{\text{se}(\hat{\gamma})}$

3.5.2 Augmented Dickey–Fuller (ADF) Unit Root Test. Given the case of serially correlated error terms (ε_t), the ADF Unit Root Test was used. Note that the null and alternative hypotheses of the ADF Test are the same as those of the Dickey–Fuller Test.

3.5.3 Multiple Regression (Ordinary Least Squares). Used to estimate the unknown parameters of the multiple regression equation that are useful in analyzing the relationships of the

peso–dollar exchange rates, crude oil prices, and money supply to the performance of the Philippine stock market

3.5.4 Coefficient of Determination (R^2). Utilized to assess how well the regression equation can be used to forecast the dependent variable. It provided information on how much of the variance of the PSEI is explained by the combined effects of the peso–dollar exchange rates, crude oil prices, and money supply.

3.5.5 Adjusted Coefficient of Determination (Adjusted R^2). Similar to the Coefficient of Determination since it is also a goodness-of-fit measure but adjusts for the degrees of freedom, taking into consideration the number of explanatory variables

3.5.6 t-Test. Used to identify if each of the explanatory variables, namely, the peso–dollar exchange rates, crude oil prices, and money supply, has no significant influence on the Philippine stock market performance. Its hypotheses are stated as:

H_0: $\beta_j = 0$

H_1: $\beta_j \neq 0$

Test statistic: $t_j = \frac{\hat{\beta}}{s.e.\hat{\beta}_j}$

3.5.7 F-Test. Applied to examine whether the peso–dollar exchange rates, crude oil prices, and money supply, taken together, has no significant influence on the Philippine stock market performance. Its null and alternative hypotheses are stated as:

H_0: $\beta_2 = \beta_3 = \beta_4 = 0$

H_1: There is a $\beta_j \neq 0$

Test statistic: $F = \frac{ESS/(k-1)}{RSS/n-k}$

3.5.8 Akaike Information Criterion (AIC). Utilized to determine how many lags should be included in the regression (optimal lag length)

3.5.9 Jarque–Bera Test. Used to test for the normality of the residuals

H_0: The residuals are normally distributed

H_1: The residuals do not follow a normal distribution

3.5.10 White's Heteroskedasticity Test. The presence of heteroskedasticity may lead to wrong results in the testing of the hypotheses.

H_0: There is no heteroskedasticity

H_1: There is heteroskedasticity

Test statistic: $nR^2 = \chi^2$ (m)

where m = number of regressors including the constant

3.5.11 Autoregressive Conditional Heteroskedasticity (ARCH) Test. Applied to measure the stability of the variance or its volatility

H_0: The residuals do not exhibit conditional heteroskedasticity or ARCH effects

H_1: The residuals exhibit conditional heteroskedasticity or ARCH effects

3.5.12 Breusch–Godfrey Serial Correlation Test.

Used to detect higher-order serial correlation

H_0: $\rho_1 = \rho_2 = \rho_j = 0$

H_1: There is at least one ρ_j that is not equal to zero

Test statistic: $(n-p)R^2$

3.5.13 Ramsey's Regression Specification Error Test (RESET). Applied to test for the following types of specification errors: omitted variables and incorrect functional form

3.5.14 Chow Breakpoint Test. To examine the stability of the coefficients of a regression model between time periods, the Chow Breakpoint Test was used. According to Danao (2002), the hypotheses for this test are as follows:

H_0: There is no structural change

H_1: There is structural change

F Statistic: $\frac{[RSS - (RSS_1+RSS_2)]/k}{(RSS_1+RSS_2)/n-2k}$

3.5.15 Johansen Cointegration Test. To determine the long-run relationships among the variables, the Johansen methodology for testing cointegration was employed.

3.5.16 Granger Causality Test. Used to establish the direction of causality or influence among the dependent and explanatory variables.

CHAPTER 4

RESULTS AND DISCUSSIONS

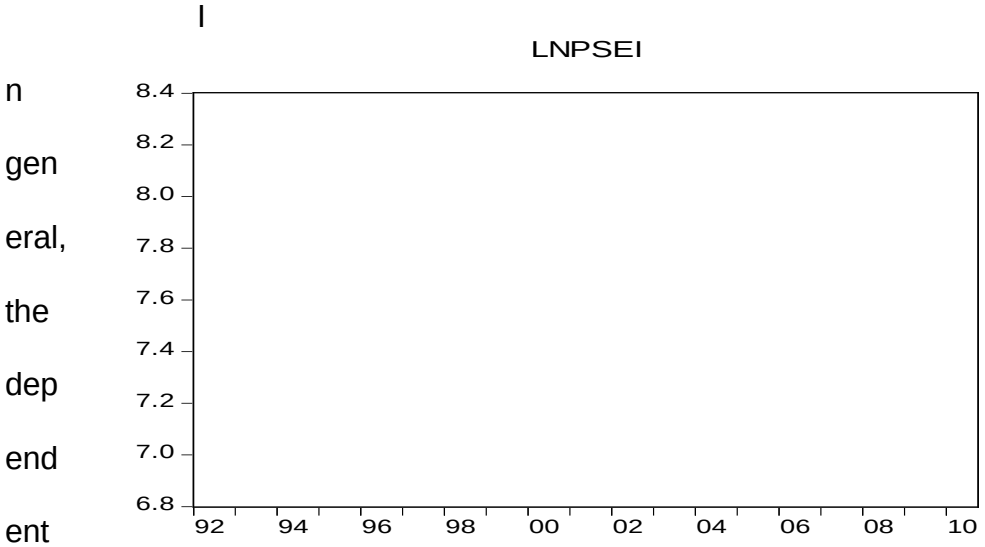
This chapter provides an overview of the historical performance of the Philippine stock market with the PSEI as the barometer, as well as the patterns exhibited by the given explanatory variables, namely, peso–dollar exchange rates, Dubai Fateh crude oil prices, and monetary aggregate M2. The results of the multiple regression analysis were presented to quantitatively show the strength of the relationship between the PSEI and the explanatory variables. Moreover, the outcome of the diagnostic tests was described to prove the validity and robustness of the regression results.

4.1 Trend of the Dependent and Explanatory Variables

This section presents the historical movements of the time series data used in the study from the first quarter of 1992 up to the last quarter of 2010. The general trend and major fluctuations that characterized each variable were discussed so as to describe the movements and identify the possible factors that contributed to such changes. Moreover, the growth rate of broad money supply, the variable that clearly followed a trend, was estimated using the Logarithmic-Linear (Log-Lin) Model.

4.1.1 Trend of the PSEI

Figure 4.1
Historical Movements of LnPSEI



In general, the dependent variable PSEI exhibited a mixed trend during the time period considered. In 1997, the PSEI plummeted owing to the adverse effects of the Asian financial crisis on investor confidence. The PSEI continued to reach record-low figures in 2008 with the prolonged “wait-and-see” attitude of the investors given the instabilities in the investment scenario.

As the impact of the crisis waned sometime toward the end of 2008 and during 2009, the PSEI improved albeit almost abruptly. In 2000, the PSE again experienced another downturn that persisted until 2002. According to the Asian Development Bank’s Asia Recovery Report 2000, investors

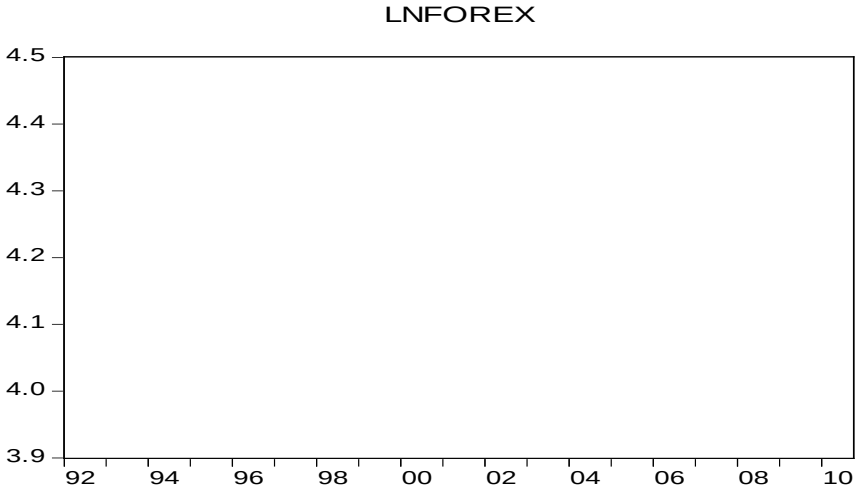
remained risk averse owing to the slow financial and business restructuring of institutions in the Asian region. In the Philippines, investor confidence further eroded due to the allegations concerning insider trading and stock market manipulations.

A generally favorable economic outlook and renewed optimism in emerging economies stirred investor interests in the Philippine equity markets during 2003 to 2007. However, in 2008, the PSEI dipped as investors became cautious with the emergence of the global financial crisis, which significantly affected some developed economies primarily the United States and European Union member countries. Note, however, that the downtrend in the PSEI during the global economic turmoil was not as worse as the decline experienced during the Asian financial crisis though some investors opted to transfer their investments from the United States and the European Union to more resilient Asian economies. With the gradual but continuous recovery of the global market from the economic downturn and the optimistic prospects given to emerging economies, the PSEI maintained an upward movement up to the year 2010.

4.1.2 Trend of Peso–Dollar Exchange Rates

Figure 4.2

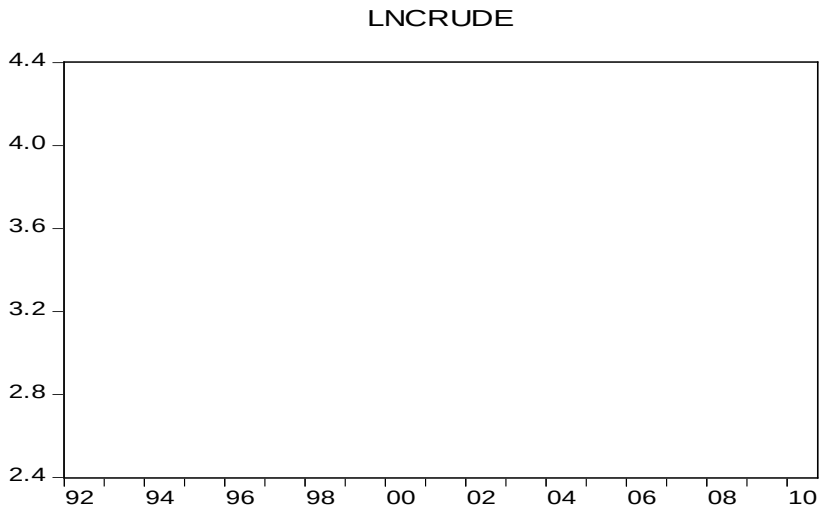
Historical Movements of LnFOREX



The value of the Philippine peso against the U.S. dollar was fairly stable from 1992 until 1996. However, in 2007, the peso began to depreciate owing to the emergence of the Asian financial crisis that negatively affected the majority of currencies in Asia. Since then, the peso has kept its low values vis-à-vis the U.S. dollar. A slight improvement in the peso was witnessed in 2008 when the dollar significantly weakened due to the global financial crisis. However, the value of the local currency failed to rebound to its post-Asian financial crisis levels.

4.1.3 Trend of the Dubai Fateh Crude Oil Prices

Figure 4.3
Historical Movements of LnCRUDE

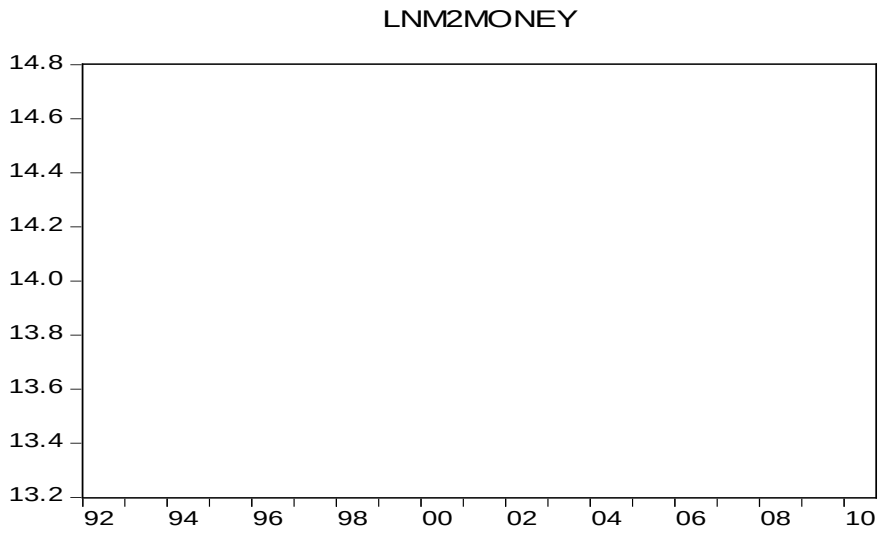


It can be observed that Dubai Fateh crude oil prices moved from 1992 to 2010 without any discernible pattern. However, major world developments led to significant fluctuations in the prices of the commodity. In 1998, Dubai crude oil prices plunged to record-level lows due to the Asian economic crisis. After a brief recovery period, the price of the commodity substantially decreased again following a series of terrorist attacks that occurred in the United States in 2001. In 2008, crude oil prices peaked owing to the increasing demand for the commodity (particularly in emerging economies such as India and China), low spare capacity, and a weak U.S. dollar due to the global economic crunch. In 2009, crude oil prices temporarily decreased but began to rise again with the emergence of geopolitical concerns in the Middle East, the world's largest oil-producing region.

4.1.4 Trend of Monetary Aggregate M2

The central bank may implement an expansionary monetary policy or a contractionary one in order to influence the demand for goods and services. This, in turn, is expected to indirectly assist the BSP in its primary goal of maintaining an environment characterized by low and stable inflation levels. Given the quarterly time frame of 1992 to 2010, the country's money supply generally exhibited an upward trend. Normally, a tight liquidity situation necessitates an increase in the money supply. On the other hand, when liquidity appears to be excessive such that actual inflation figures seem to deviate from the BSP's inflation expectations, a contractionary monetary policy is typically applied.

Figure 4.4
Historical Movements of LnM2MONEY



Cc

Slow inflation growth resulted to a more apparent increase in the country's money supply level during 2006 and 2007. In 2006, inflation averaged at 6.2 percent, lower than the 7.6 percent inflation rate recorded in 2005. The general price level declined further in 2007 as average inflation rate was estimated at 2.8 percent.

Since the broad money supply evidently followed a trend, the Log-Lin model was applied to determine its growth rate. Under this model, the log of the variable is regressed against time. The regression results are specified below:

$$\begin{aligned} \text{LnM2MONEY} &= 13.3983 + 0.01724t \\ \text{s.e.} &= (0.0228) \quad (0.00051) \\ t &= (587.758)\ (33.5078) \qquad r^2 = 0.9382 \end{aligned}$$

Over the quarterly period 1992:Q1 to 2010:Q4, the monetary aggregate M2 increased at a quarterly rate of 1.724 percent. This is roughly equal to an annual average growth rate of 6.90 percent.

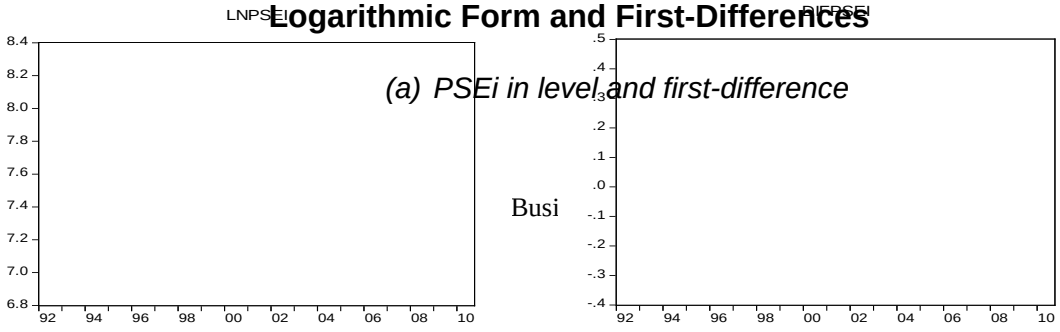
4.2 Testing for Stationarity

Nonstationarity of the variables may result to spurious regression. This means that a high R-squared may arise even when there is no significant relationship between the dependent variable and the explanatory variables. Thus, it was deemed necessary to determine the stationarity or nonstationarity of the variables. Graphical analyses can provide information on stationarity. However, a more formal test called the Dickey–Fuller Test was also applied in the study to provide further evidence on the nonstationarity (or stationarity) of the PSEI, peso–dollar exchange rates, Dubai Fateh crude oil prices, and the money supply.

4.2.1 Graphical Analysis of the Variables

A multiple graph of the variables depicting their form in levels and first-differences can indicate whether they are stationary or nonstationary. A variable is generally considered nonstationary when it has a discernible upward or downward pattern. The following panel presents the graphical representations of the PSEI, peso–dollar exchange rates, Dubai Fateh crude oil prices, and the monetary aggregate M2.

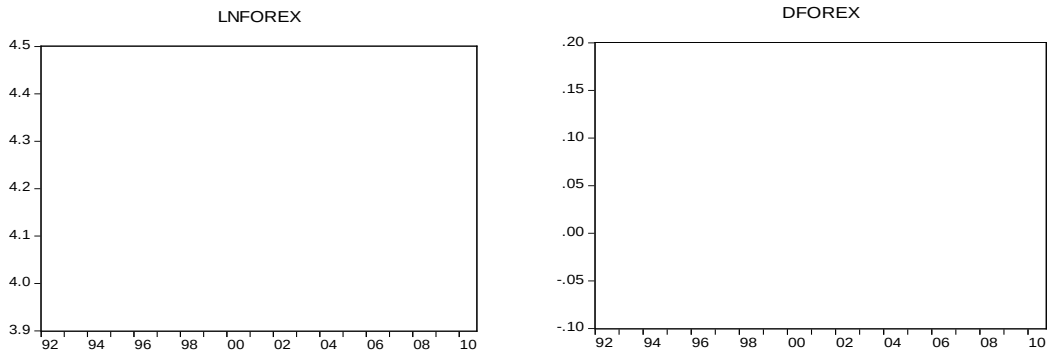
Figure 4.5
Graphical Representation of the Dependent and Explanatory Variables in Logarithmic Form and First-Differences



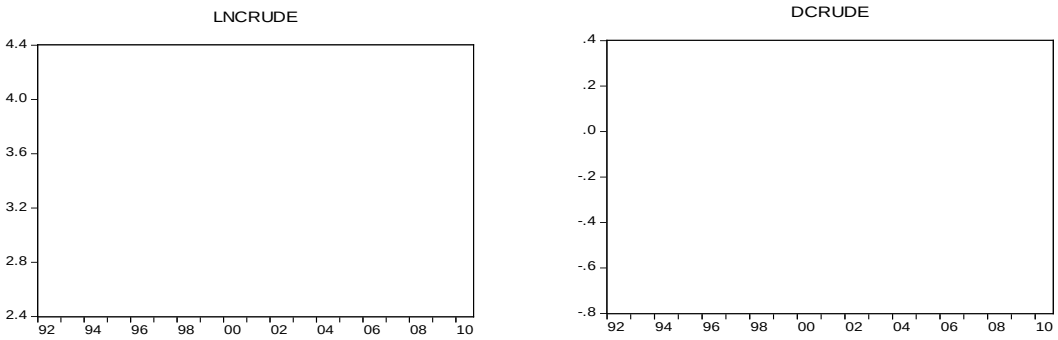
(a) PSEi in level and first-difference

Busi

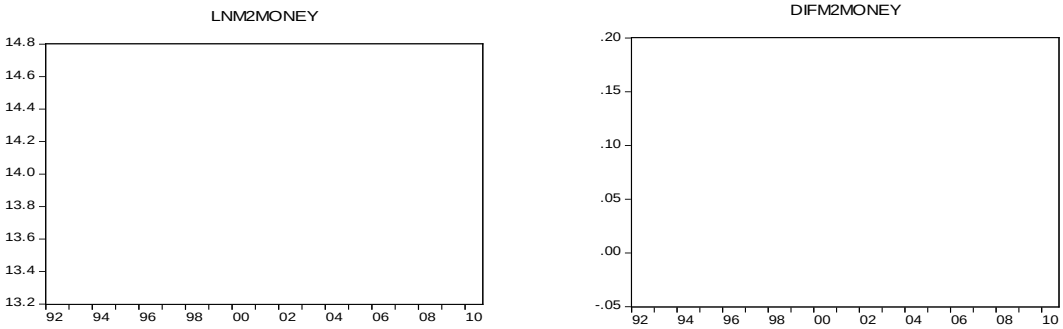
(b) Peso–dollar exchange rate in level and first-difference



(c) Dubai Fateh crude oil prices in level and first-difference



(d) Monetary aggregate M2 in level and first-difference



An apparent upward trend has been observed in the graph of monetary aggregate M2. Meanwhile, the graphs of the variables in their first-differenced forms indicated that the series are stationary. To further prove the nonstationarity of the variables, a more formal test known as the Dickey–Fuller Test was utilized.

4.2.2 Unit Root Tests

As stated in the previous section, graphical representations may provide information on the stationarity of the variables. However, a formal test in the form of the Dickey–Fuller Test or the ADF Test may more precisely detect stationarity or nonstationarity. Under both tests, the null hypothesis is that the series is nonstationary. Note, however, that the results of the Dickey–Fuller Test are valid only when the error terms are serially uncorrelated. Otherwise, the ADF Test should be applied (Danao, 2002).

A Durbin–Watson statistic that is approximately equivalent to 2.0 is indicative of the absence of serial correlation. In this paper, the application of the ADF Test generated results that showed the presence of serial correlation, thereby necessitating the use of the ADF Test. The outcome of the ADF Test on all the four variables in their logarithmic forms and first-differences has been summarized in the following table:

Table 4.1
Summary of Augmented Dickey–Fuller Test Results

Variables in Levels						
Variable	With Intercept			With Trend and Intercept		
	t-Statistic	Critical Value (5%)	Probability	t-Statistic	Critical Value (5%)	Probability
LnPSEI	-1.445372	-2.90122	0.5555	-1.544109	-3.471693	0.8052
LnFOREX	-1.400336	-2.90122	0.5777	-1.113273	-3.471693	0.9195
LnCRUDE	-1.756582	-2.90122	0.3990	-3.279494	-3.471693	0.0777
LnM2MONEY	-1.074336	-2.90122	0.7219	-2.077353	-3.471693	0.5495
First-Differenced Variables						
Variable	With Intercept			With Trend and Intercept		
	t-Statistic	Critical Value (5%)	Probability	t-Statistic	Critical Value (5%)	Probability
LnPSEI	-6.020749	-2.901779	0.0000	-5.993283	-3.472558	0.0000
LnFOREX	-4.903876	-2.90179	0.0001	-5.053009	-3.472558	0.0005
LnCRUDE	-7.002439	-2.901779	0.0000	-7.074544	-3.472558	0.0000
LnM2MONEY	-6.317897	-2.901779	0.0000	-6.389813	-3.472558	0.0000

The application of the ADF Test on the natural logarithm of the variables showed that the t-statistics are lower than their corresponding critical values at the 5.0 percent significance level. This led to the acceptance of the null hypothesis that each of the variables has a unit root. Applying the ADF Test on the first-differenced variables, whether the intercept or the trend and intercept were included, yielded t-statistics that are greater than the critical value at the 5.0 percent significance level. Therefore, the unit test results indicated stationarity of all the variables at first-difference. While the variables were proven to be nonstationary at levels, they were integrated of the same order, I(1), that is, the variables have synchronized movements. On this basis, the data were regressed in their levels form.

4.3 Verification of the Validity of the Model using the Philippine Stock Market

A number of existing studies made an attempt to link the stock market to a myriad of economic factors. Some of these common economic indicators include the GDP, inflation, and government deficits/surpluses. A large portion of the stock market performance literature has focused on the markets of developed countries such as the United States and members of the European Union. The availability of such studies possibly contributed to the sustained growth of the stock markets in these industrialized nations.

On the other hand, fewer studies were devoted to the stock markets of developing economies such as the Philippines. The model, which relates foreign exchange rates, crude oil prices, and money supply to stock market performance, has also been utilized in several existing foreign literature. However, these variables were not taken altogether, but each of them has been used along with other usual economic indicators such as the GDP and government budget deficits. The lack of domestic and foreign studies devoted to the possible effects of oil price movements, monetary shocks, and foreign exchange rates on the stock markets of developing countries served as an

impetus for applying relevant statistical and econometric procedures on the specified variables using the Philippine stock market.

4.3.1 Specification of the Regression Equation

Initially, the regression equation is specified as:

(4.3.1.1) $LnPSEI = b_0+b_1LnFOREX+b_2LnCRUDE+b_3LnM2MONEY$

The initial regression results that were based on equation (4.3.1.1) are specified in the following table.

Table 4.2
Initial Regression Results

Dependent Variable: LNPSEI
Method: Least Squares
Date: 07/29/11 Time: 09:00
Sample: 1992Q1 2010Q4
Included observations: 76

	Coefficient	Std. Error	t-Statistic	Prob.
C	8.928916	0.999255	8.935571	0.0000
LNFOREX	-1.705534	0.161462	-10.56310	0.0000
LNCRUDE	0.101343	0.079138	1.280589	0.2044
LNMONEY	0.395120	0.084377	4.682783	0.0000

R-squared	0.671682	Mean dependent var	7.635339
Adjusted R-squared	0.658002	S.D. dependent var	0.371912
S.E. of regression	0.217496	Akaike info criterion	-0.162073
Sum squared resid	3.405938	Schwarz criterion	-0.039403
Log likelihood	10.15876	Hannan-Quinn criter.	-0.113048
F-statistic	49.09983	Durbin–Watson stat	0.529922
Prob(F-statistic)	0.000000		

The initial regression output has provided evidence of a positive first-order serial correlation given a very low (close to 0) Durbin–Watson statistic at 0.529922. The incorporation of AR(1) in the equation has improved the Durbin–Watson statistic as it grew closer to 2.0 at 1.797751 [see Appendix for the regression results with AR(1) in the model]. Meanwhile, the null hypothesis of no serial correlation was not rejected based on the critical values of the Durbin–Watson statistic using n=76 and k'=3 where d_L and d_U is 1.54673 and 1.71043, respectively. For the Jarque–Bera Test, the JB statistic of 6.419404 has a p-value of 0.040369. Since the level of significance is 5.0 percent and 0.05 is greater than the p-value (0.040369), the null hypothesis of the normality of the residuals has been rejected. The regression results also showed the presence of heteroskedasticity since the p-value of the Obs*R-squared is lower than the 5.0 percent level of significance. Moreover, there has been a specification error problem because according to Ramsey's RESET results, the computed F-statistic is 0.740088, lower than the critical F at the 5.0 percent significance level ($F_{3,72}$) of 2.73.

With the specification error problem and expectations that the stock market is driven by market perceptions from its previous performance, as well as the delayed effects of the independent variables, the lagged values of LnPSEI and the explanatory variables LnFOREX, LnCRUDE, and LnM2MONEY were utilized as additional regressors. The revised specification

has been based on the optimal number of lags that were determined through the AIC. The robustness of the revised regression equation has also been tested for validity according to the assumptions of the classical linear regression model.

4.3.1.1 Optimal Lag Length

The previous performance of the Philippine stock market may have an impact on the current value of the PSEI. Moreover, peso–dollar exchange rates, crude oil prices, and the money supply may have delayed effects on stock market performance. Hence, the lagged values of the PSEI and the current as well as the previous values of the peso–dollar exchange rates, crude oil prices, and money supply were incorporated as explanatory variables in the model.

However, the number of lags to be included should be selected based on a criteria and theoretical knowledge. In this case, the AIC was used to determine the optimal lag length. The results of the AIC have shown that 4 is the optimal lag length for the model. Thus, four-quarter lags of the PSEI, FOREX, CRUDE, and M2MONEY were used as regressors, in addition to the current values of the original explanatory variables. Note that when using the AIC, the optimal lag is

chosen based on the number with the lowest AIC value. The higher the lags, say 10 to 14 quarters, the lower the value of the AIC. However, in theory, it does not appear realistic to state that the values of the given explanatory variables two to three years ago still continue to affect the PSEI.

Table 4.3
Determination of the Optimal Lag Length

Number of Lags	AIC	SC	R^2	HQ
0	-0.16207	-0.03940	0.67168	-0.11305
1	-0.92005	-0.67286	0.85828	-0.82135
2	-0.92884	-0.55521	0.852714	-0.77979
3	-0.93832	-0.4363	0.889224	-0.73826
4	**-0.94194**	-0.30954	0.900543	-0.69018
5	-0.82329	-0.05844	0.900684	-0.51914

4.3.2 Multiple Regression Results

The possibility of obtaining spurious regression results was eliminated given the presence of a cointegrating vector as indicated in the results of the Johansen Cointegration Procedure. The validity of the model using the Philippine stock market was estimated through the Ordinary Least Squares (OLS) method. Over the period 1992:Q1 to 2010:Q4, OLS estimation in equation form was stated as:

(4.3.2.1) lnPSEI = b0 + 0.788328LNPSEI(-1) – 0.05377LNPSEI(-2) + 0.090140LNPSEI(-3) – 0.181285 LNPSEI(-4) – 1.642584LNFOREX + 2.597803LNFOREX(-1) – 1.826704LNFOREX(-2) + 0.365613LNFOREX(-3) + 0.065660LNFOREX(-4) + 0.236103LNCRUDE – 0.262202LNCRUDE(-1) + 0.060478LNCRUDE(-2) – 0.125167LNCRUDE(-3) + 0.216570LNCRUDE(-4) + 1.067615LNMONEY – 1.454776LNMONEY(-1) + 1.004663LNMONEY(-2) –0.953462LNMONEY(-3) + 0.355952LNMONEY(-4)

Details of the estimation results can be found in the following table:

Table 4.4
OLS Results of the Model

Dependent Variable: LNPSEI
Included observations: 72 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	3.878715	1.527507	2.539245	0.0141
LNPSEI(-1)	0.788328	0.155053	5.084246	0.0000
LNPSEI(-2)	-0.053777	0.197483	-0.272314	0.7865
LNPSEI(-3)	0.090140	0.179486	0.502215	0.6176
LNPSEI(-4)	-0.181285	0.129267	-1.402408	0.1667
LNFOREX	-1.642584	0.544684	-3.015666	0.0040
LNFOREX(-1)	2.597803	0.848511	3.061603	0.0035
LNFOREX(-2)	-1.826704	0.886250	-2.061160	0.0443
LNFOREX(-3)	0.365613	0.947272	0.385964	0.7011
LNFOREX(-4)	0.065660	0.611779	0.107327	0.9149
LNCRUDE	0.236103	0.159105	1.483943	0.1439
LNCRUDE(-1)	-0.262202	0.225403	-1.163258	0.2500
LNCRUDE(-2)	0.060478	0.243963	0.247900	0.8052
LNCRUDE(-3)	-0.125167	0.234846	-0.532974	0.5963
LNCRUDE(-4)	0.216570	0.135384	1.599671	0.1157
LNMONEY	1.067615	0.504840	2.114757	0.0393
LNMONEY(-1)	-1.454776	0.696156	-2.089726	0.0416
LNMONEY(-2)	1.004663	0.720958	1.393511	0.1694
LNMONEY(-3)	-0.953462	0.697209	-1.367541	0.1773
LNMONEY(-4)	0.355952	0.477239	0.745856	0.4591

R-squared	0.900543	Mean dependent var	7.659900
Adjusted R-squared	0.864204	S.D. dependent var	0.365431
S.E. of regression	0.134663	Akaike info criterion	-0.941943
Sum squared resid	0.942981	Schwarz criterion	-0.309535
Log likelihood	53.90994	Hannan-Quinn criter.	-0.690180
F-statistic	24.78114	Durbin–Watson stat	2.061638
Prob(F-statistic)	0.000000		

$t_{.05/2,59} = 2.662$ $F_{.05/19,56} = 1.775$

Based on the results of the multiple regression, the elasticity of LnPSEI with respect to the previous quarter's LnPSEI, holding other variables constant, is about 0.788328. This suggests that, if the previous quarter's LnPSEI went up by 1.0 percent, on the average, holding other

variables constant, the current value of LnPSEI will increase by approximately 0.788328 percent. The responsiveness of the current LnPSEI to the previous quarter's change in the LnPSEI can be said to be inelastic since it is less than one. The elasticity coefficient of LnPSEI can be described as statistically significant since its t-statistic (5.084246) exceeded the critical value of $t_{.05/2,59}$ (2.662), leading to the rejection of the null hypothesis. The LnPSEI lagged by two, three, and four quarters were found to be insignificant given its corresponding p-values that exceeded the 5.0 percent significance level.

Meanwhile, the coefficients of LnFOREX and its lagged values showed that they have a significant and stronger impact on the LnPSEI compared to the other explanatory variables in the model. The coefficient of -1.642584 for LnFOREX means that, holding all the other variables constant, a 1.0 percent increase in the current peso–dollar exchange rate will contribute to a decrease in the LnPSEI by 1.642584 percent. For LnFOREX lagged by one quarter, a percent increase in the LnFOREX will result to a 2.597803 percent increase in the LnPSEI, holding the other variables constant. Note that the previous quarter's average peso–dollar exchange rate has a more pronounced impact on the LnPSEI. This is representative of the lasting effect of the exchange rate on the performance of the stock market. When lagged by two quarters,

LnFOREX appeared to have a diminished impact on the stock market as compared to the LnFOREX lagged by only one quarter. Specifically, a 1.0 percent increase in the LnFOREX lagged by two quarters will result to a decrease in the LnPSEI by 1.826704 percent, holding all the other variables constant. Finally, with p-values of 0.7011 and 0.9149, LnFOREX lagged by three and four quarters, respectively, has been proven to be insignificant.

Dubai Fateh crude oil price changes were shown to have an insignificant impact on the PSEI. Current and lagged values of Dubai Fateh crude oil prices have corresponding p-values that are greater than the 5.0 percent significance level.

Meanwhile, changes in the money supply were found to have a significant influence on the performance of the stock market, albeit weaker compared to the effect of the peso–dollar exchange rates. Holding all the other variables constant, a 1.0 percent increase in the broad money supply will lead to a 1.067615 percent increase in the LnPSEI. Meanwhile, a 1.0 percent increase in the broad money supply (lagged by one quarter) will yield to a decrease in the LnPSEI by 1.454776 percent. Finally, two to four quarter lags in the broad money supply were considered insignificant based on the p-values generated by the multiple regression. Note that

prior to running the multiple regression, the interest rate variable using the 90-day Treasury bill yield was used as a predictor variable. However, initial regression results showed that this variable is statistically insignificant.

To recapitulate, the variation in LnPSEI, as a result of the changes in the current LnFOREX, and LnFOREX lagged by one and two quarters have been observed to be highly significant at the 5.0 percent significance level, holding the other variables constant. The t-statistics of LnFOREX (-3.015666) exceeded the critical value of $t_{.05/2,59}$ (2.662), thus rejecting the null hypothesis. Meanwhile, holding the other variables constant, the absolute values of the t-statistics of LnFOREX lagged by one quarter (3.061603) and two quarters (-2.061160) were higher than the critical value. For these variables, there has been very little risk of rejecting the null hypothesis erroneously. In other words, the t-statistic results led to the conclusion that β_5, β_6, and β_7 are significantly different from zero at the 5.0 percent level of significance.

Except for the coefficients of LnPSEI(-1), LnFOREX, LnFOREX(-1), LnFOREX(-2), LnM2MONEY, and LnM2MONEY(-1), the coefficients of the other explanatory variables were not significantly different from zero as denoted by their corresponding p-values that are

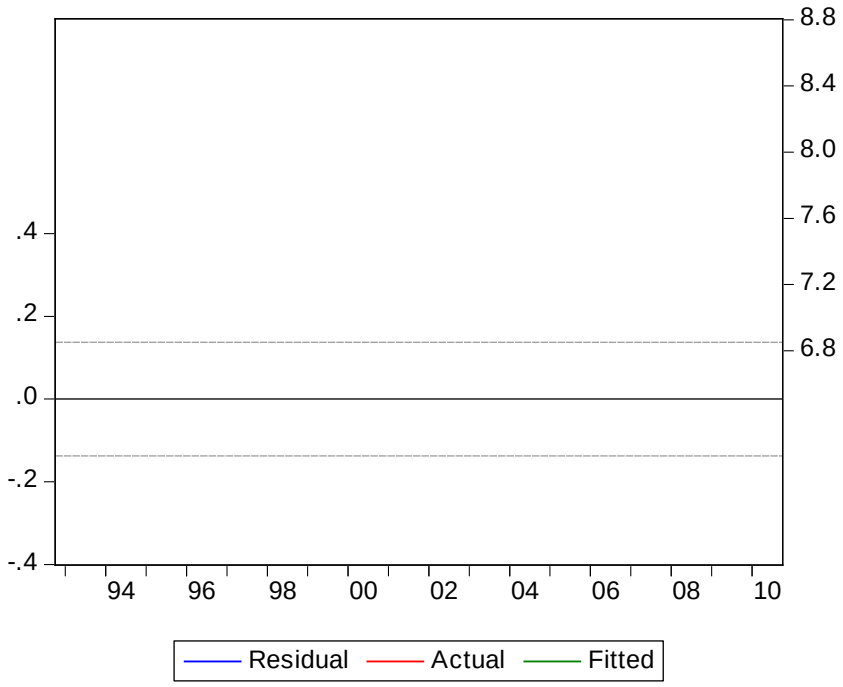
higher than the chosen level of significance of 5.0 percent. Moreover, the t-statistics of these variables are lower than the critical value of $t_{.05/2,59}$ (2.662).

The R^2 value of 0.900543 means that about 90.05 percent of the variation in the LnPSEI is explained by the past values of LnPSEI itself and the current and lagged values of LnFOREX, LnCRUDE, and LnM2MONEY. Since the R^2 itself may not be an accurate prediction of how much of the variation in the stock market performance is explained by the model, the adjusted R^2 was also reported. Taking into account the number of explanatory variables, 86.42 percent of the variation in the LnPSEI is explained by the regression model. Despite a lower adjusted R^2, it can still be said that a substantial proportion of the total variation in the performance of the Philippine stock market is explained by the regression model.

The regression model appeared to be highly significant based on the result of the F-test. As indicated in Table 4.4, the F-statistic of 24.78114 greatly exceeded the critical $F_{(19, 56)}$, which is 1.775. Therefore, the null hypothesis stating that the explanatory variables, taken together, have no significant effect on the performance of the Philippine stock market was rejected. Moreover, the sample regression line fitted the data

very well. This has been graphically presented in Figure 4.6, which plots the actual data and the fitted data, as well as the residual or the difference between the actual and fitted values of the model.

Figure 4.6



Actual, Fitted, Residual Graph

4.3.3 Classical Linear Regression Model Assumptions

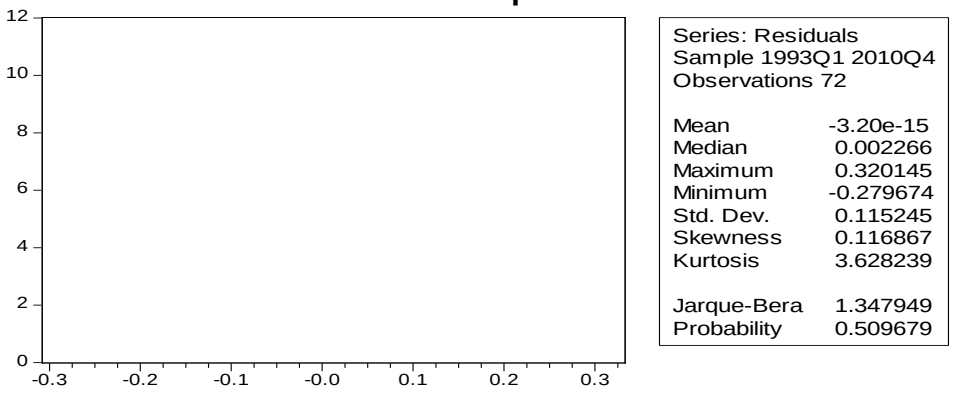
The OLS method was used to estimate the parameters of the model. The method follows the Gauss–Markov Theorem stating that "given the assumptions of the classical linear regression model, the least-square estimators, in the class of unbiased linear estimators, have minimum variance, that is, they are the best linear unbiased estimators" (Gujarati, 2003). If the regression model failed the assumptions of the classical linear regression model, then the βs are not the best linear unbiased estimators.

4.3.3.1 Normality of Residuals: The Jarque–Bera Test

Among the assumptions of the classical linear regression is the normality of the residuals. When the residuals are non-normal, the least-square estimators are not normally distributed in normal samples (Danao, 2005). This invalidates the confidence

intervals and test of significance. In order to detect the normality of the residuals, the Jarque–Bera Test was used.

Figure 4.7
Results of the Jarque–Bera Test



Based on the results of the Jarque–Bera Test as depicted in Figure 4.7, the JB statistic of 1.347949 has a p-value of 0.509679. Given the 5.0 percent level of significance, $0.05 < p = 0.51$, the null hypothesis that the error terms or residuals are normal was accepted.

4.3.3.2 Problem of Multicollinearity

An exact linear or nearly exact linear relationship between the explanatory variables results to the problem of multicollinearity. There are several methods to assess the severity of multicollinearity such as through the examination of the R^2 and F

ratios, correlation matrix, Klein's rule of thumb, and computing for the Variance Inflation Factor (VIF).

One of the common symptoms of multicollinearity is the presence of a very high R^2 and insignificant t-ratios. In this case, the R^2 of 0.900543 can be considered high. Moreover, some of the t-ratios of the parameters are insignificant except for the parameters β_1, β_5, β_6, β_7, $\beta_{15,}$ and β_{16} at the 5.0 percent level of significance. Based on these given information, it is inconclusive if the degree of multicollinearity can be regarded as high. This inconclusiveness necessitated the application of the other methods for testing the severity of multicollinearity.

Based on the pair-wise correlations of the regressors, the degree of multicollinearity appeared to be acceptable since the correlations are not high. Note, however, that the pair-wise correlations of the variables may be an adequate but not a necessary condition for the existence of a strong multicollinearity. According to Gujarati (2003), the correlation coefficients between the regressors may be considered high once it exceeds 0.80. In this case, none of the correlation coefficients exceeded the 0.80 value.

Table 4.5

Correlation Matrix

LNCRUDE	LNFOREX	LNMONEY
1.00000	-0.08040	0.55228
-0.08040	1.00000	0.30292
0.55228	0.30292	1.00000

Another method for testing the severity of multicollinearity is through the examination of the VIF. The VIF is an estimate of the increase in the variance of an estimated coefficient due to multicollinearity (Danao, 2005). High VIFs are indicative of a multicollinearity problem. The rule of thumb is that multicollinearity is not a serious problem when no VIF is greater than 10.

Table 4.6
Variance Inflation Factors of the Variables

Variable	Variance Inflation Factor
LnFOREX	1.219570
LnCRUDE	1.593796
LnMONEY	1.743475

The above table presents the VIFs of each of the explanatory variables. Since none of the VIFs are larger than 10, then the degree of multicollinearity was, again, deemed acceptable.

4.3.3.3 Test for Heteroskedasticity – White's Test

The presence of heteroskedasticity can result to erroneous conclusions when testing the hypothesis. Thus, the model was subjected to a test for heteroskedasticity. There are several methods to detect the presence of heteroskedasticity. These include plotting of the dependent variable against the independent variable, plotting of the residual against the independent variable, application of the Goldfeld–Quandt Test, and the use of White's Heteroskedasticity Test. The White's Test was applied since it is considered as a more general approach compared to the Goldfeld–Quandt Test, which requires the specification of the nature of heteroskedasticity.

Table 4.7
Results of White's General Heteroskedasticity Test
(no cross terms)

Heteroskedasticity Test: White

F-statistic	1.325337	Prob. F(19,52)	0.2085
Obs*R-squared	23.49090	Prob. Chi-Square(19)	0.2164
Scaled explained SS	16.10187	Prob. Chi-Square(19)	0.6505

Chi-Square (.95, 19) = 30.1435

Since the chi-square value (23.49090) obtained in eViews did not exceed the critical chi-square value at the 5.0 percent level of significance with 19 degrees of freedom (30.1435), the null hypothesis of no heteroskedasticity was not rejected.

Moreover, the p-value of the Obs*R-squared (0.2164) is greater than the 5.0 percent significance level.

4.3.3.4 Test for Heteroskedasticity – ARCH Test

As a supplement to White's General Heteroskedasticity Test and as a means to determine the possible presence of volatility clustering among the time series variables, the Autoregressive Conditional Heteroskedasticity (ARCH) Test was used. As defined by Gujarati (2003), volatility clustering is a phenomenon in which the time series data exhibit wide swings for a given period followed by periods of relative calmness. Knowledge of volatility clustering is primarily important since the presence of these substantial fluctuations makes planning and decision-making difficult.

Table 4.8
Results of Autoregressive Conditional Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	1.206177	Prob. F(1,69)	0.2759
Obs*R-squared	1.219815	Prob. Chi-Square(1)	0.2694

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/10/11 Time: 09:57
Sample (adjusted): 1993Q2 2010Q4
Included observations: 71 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011523	0.002994	3.848560	0.0003
RESID^2(-1)	0.130942	0.119226	1.098261	0.2759

The table presented above shows the results of the ARCH Test using eViews. Since the coefficient of the lagged term (0.2759) is highly insignificant as it exceeded the 5.0 percent significance level, it can be stated that there was no volatility clustering in the time series data.

4.3.3.5 Serial Autocorrelation Problem

When serial correlation is present, the OLS estimators are not the best among the linear unbiased estimators and are not efficient asymptotically. It also contributes to the unreliability of the F-test and the t-Test, thereby increasing the possibility of arriving at incorrect conclusions. The Durbin–Watson Test is commonly used to detect the presence of first-order serial correlation. However, it cannot be applied in cases where the lagged values of the dependent variable are included in the model. Since the lagged values of LnPSEI were also used as regressors, the Breusch–Godfrey Test for higher-order serial correlation was used in lieu of the Durbin–Watson Test.

Table 4.9
Results of the Breusch–Godfrey Test

Breusch–Godfrey Serial Correlation LM Test:

F-statistic	0.141602	Prob. F(4,48)	0.9658
Obs*R-squared	0.839702	Prob. Chi-Square(4)	0.9330

$\chi^2_{.05,\,4} = 9.4877$

The F-statistic of the Obs*R-Squared of 0.1416 is lower than the χ^2 critical value of 9.4877 at the 5.0 percent level of significance. Thus, the null hypothesis of no serial correlation in any order was not rejected.

4.3.3.6 Specification Error Problem

The classical linear regression assumes that the model is correctly specified. Otherwise, there is a specification error that may take one of the following forms: omission of a relevant independent variable, inclusion of an irrelevant regressor, or use of an incorrect functional form (Danao, 2005). To determine the presence of specification error, the Ramsey's RESET was applied.

Table 4.10
Results of Ramsey's RESET

Ramsey RESET Test:

F-statistic	0.733045	Prob. F(1,51)	0.3959
Log likelihood ratio	1.027521	Prob. Chi-Square(1)	0.3107

The results of the Ramsey's RESET indicate that there was no specification error in the model. The computed F-statistic of 0.7330 did not exceed the critical F-statistic of 1.775. Therefore, the null hypothesis that the model is not misspecified was accepted. Moreover, with a p-value of 0.3959, the null hypothesis of no specification error in the model can be rejected at 39.59 percent, but not at a lower significance level such as 5.0 percent.

4.4 Test for the Presence of Structural Change

Structural changes in the relationship between LnPSEI and the independent variables LnFOREX, LnCRUDE, and LnM2MONEY and their lagged values may occur given a long quarterly time frame covering 1992 to 2010. Such structural changes may come from a number of factors such as geopolitical, social, and economic. The structural stability of the model has to be established so that the parameters of the coefficients would be the same between different time periods. Thus, the

model can be utilized as a reliable basis for forecasting and policy formulation.

To formally determine whether structural changes occurred in the model, the Chow Breakpoint Test was employed. This was done by dividing the sample quarterly period from 1992 to 2010 into two periods. The breakpoint 2001:Q2 divided the data into sub-periods 1992:Q4 to 2001:Q1 and 2001:Q2 to 2010:Q4.

Table 4.11
Results of the Chow Breakpoint Test

Chow Breakpoint Test: 2001Q2
Null Hypothesis: No breaks at specified breakpoints

F-statistic	1.360896	Prob. F(20,32)	0.2131
Log likelihood ratio	44.31515	Prob. Chi-Square(20)	0.0014
Wald Statistic	27.21792	Prob. Chi-Square(20)	0.1292

The outcome of the Chow Breakpoint Test showed that the p-value of the F-statistic (0.2131) is higher than the chosen level of significance (0.05). Therefore, the null hypothesis stating that there is no structural instability was accepted. In other words, the parameters of the model remain the same throughout the period 1992 to 2010.

4.5 Testing for Cointegration – Johansen Procedure

In order to investigate the possible long-term relationship between the PSEI and the explanatory variables peso–dollar exchange rates, crude oil prices, and money supply, a cointegration test was used. Specifically, the Johansen Cointegration Methodology was applied. Note that other cointegration tests are available such as the Engle-Granger Two-Step Approach. However, the Engle-Granger method is normally strong when using only one or two explanatory variables. Given three explanatory variables in the research, a more powerful test known as the Johansen Cointegration Procedure was chosen.

Aside from its ability to determine long-term equilibrium relationships, the cointegration test may also provide information on the possibility of obtaining spurious regression results. When the regressors are integrated of the first order I(1) and are not cointegrated, then spurious regression may arise.

Under the Johansen Procedure, two types of tests for the cointegration rank (r) can be used: the Trace Test and the Lambda (λ) Max Test. In order to perform the Johansen test, the following assumptions were applied: (Option 2) intercept (no trend) in CE – no intercept in VAR; (Option 3) intercept (no trend) in CE and test VAR; and

(Option 4) intercept and trend in CE – no trend in VAR. Of these three models, Option 2 has been considered as the most restrictive. To select the most appropriate model, a sequential approach known as the Dickey–Pantula Principle was used. The number of lags for the Johansen Cointegration Test was set to three, as specified by the AIC.

4.5.1 Trace Statistic Test

The Trace Test of the Johansen Procedure has the following hypotheses:

Ho: The number of cointegrating vectors $\leq$ r

Ha: The number of cointegrating vectors > r

The following table presents the results of the Trace Statistic Test, with critical values at 5.0 percent. Based on the Dickey–Pantula principle, the most appropriate model is Option 2 (Intercept (no trend) in CE – no intercept in VAR). For comparison purposes, the Trace Statistic Test results using Options 3 and 4 were also summarized in the following table.

Table 4.12
Results of the Trace Test

Ho	Option 2		Option 3		Option 4	
	Trace Statistic	5% Critical Value	Trace Statistic	5% Critical Value	Trace Statistic	5% Critical Value
r = 0	65.96315	54.07904	51.24439	47.85613	66.92621	63.8761
r = 1	41.50442	35.19275	26.85410	29.79707	41.08347	42.91525
r = 2	22.91383	20.26184	10.90362	15.49471	23.45268	25.87211
r = 3	6.971208	9.164546	2.463675	3.841466	7.503545	12.51798

The null hypothesis that there is no cointegrating vector among the independent variables and the dependent variable was rejected. Based on the results of the Trace Test, the computed trace (65.96315) is greater than the 5.0 percent critical value (54.07904). This provided evidence on the presence of a cointegrating relationship among the variables in the model. The sequential test showed that there were at least three cointegrating vectors. In the first stage (r = 0), second stage (r = 1), and third stage (r = 2), the Trace Test statistics exceeded the corresponding critical values at 5.0 percent. It was only in the last stage (r = 3) when the trace statistic (6.971208) was lower than the 5.0 percent critical value (9.164546).

4.5.2 Maximum Eigenvalue Test

The second type of test in the Johansen methodology called the Maximum Eigenvalue or the Lambda (λ) Max Test was also used. Under this particular test, the null and alternative hypotheses are stated as:

Ho: There are r cointegrating vectors

Ha: There are (r+1) cointegrating vectors

Table 4.13
Results of the Maximum Eigenvalue Statistic Test

Ho	Option 2		Option 3		Option 4	
	Max-Eigen Stat	5% Critical Value	Max-Eigen Stat	5% Critical Value	Max-Eigen Stat	5% Critical Value
r = 0	24.45873	28.58808	24.39029	27.58434	25.84274	32.11832
r = 1	18.59059	22.29962	15.95048	21.13162	17.63078	25.82321
r = 2	15.94262	15.89210	8.439945	14.26460	15.94914	19.38704
r = 3	6.971208	9.164546	2.463675	3.841466	7.503545	12.51798

Similar with the Trace Test, a sequential approach was also applied in the λ Max Test. In the first hypothesis, the Max-Eigen statistic (24.45873) is lower than the selected critical value of 5.0 percent (28.58808); thus r = 0 was accepted. This means that, under the λ Max Test, cointegrating vectors are absent. Nevertheless, the outcome provided evidence that the variables are cointegrated since the Trace Test has been considered more superior than the Maximum Eigenvalue Test. Therefore, it was established that there exists a long-term equilibrium relationship between the PSEI, peso–dollar exchange rates, Dubai Fateh

crude oil prices, broad money supply, and their lagged values. On this basis, the possibility that the regression results are spurious was further eliminated. Therefore, the model can be estimated and tested for validity.

4.6 Granger Causality Test

As emphasized by Gujarati (2003), regression analysis pertains to the dependence of one variable on other variables, but it does not refer to causation or the direction of influence. In order to prove the direction of causality among the variables, the Granger Causality Test was used. The concept of Granger Causality states that if variable X Granger-causes Y, then X contains information that can be useful in forecasting Y, beyond the information included in the past values of Y alone. As determined by the AIC, the optimal number of lags is two. Since the variables were found to be cointegrated, the Vector Error Correction was used instead of the Vector Autoregression. A summary of the Granger Causality Test results was presented in Table 4.14. The full outcome of the procedure including its details can be reviewed in the appendix section of the paper (please refer to Appendix 22).

Table 4.14
Results of the Granger Causality Test

Causality	Probability Values
LNFOREX to LNPSEI	0.0157
LNCRUDE to LNPSEI	0.2945
LNMONEY to LNPSEI	0.4427
LNPSEI to LNFOREX	0.0564
LNPSEI to LNCRUDE	0.2244
LNPSEI to LNMONEY	0.8818

Based on the probability values specified in Table 4.14, the variable LnFOREX Granger-causes LnPSEI. This means that the previous values of the peso–dollar exchange rates contain information that can be useful in forecasting the future values of the PSEI. This outcome provided valuable support to the results of the regression analysis wherein a relationship between LnPSEI and LnFOREX was established.

The absence of causality between the variables LnCRUDE and LnPSEI further supported the multiple regression result that Dubai Fateh crude oil price changes do not have a significant influence on the performance of the Philippine stock market. Finally, the results also showed that LnM2MONEY does not Granger-cause LnPSEI. Note that even if the current and one period-lagged values of LnM2MONEY were found to have a significant relationship with the LnPSEI based on the

multiple regression analysis, the absence of causality from LnM2MONEY to LnPSEI does not contradict the regression outcome. From a causal point of view, the values of money supply in the previous quarters, say two to four quarters ago, may not contain information that can be used to forecast the future values of PSEI. However, in a shorter period (e.g., current quarter), previous quarter changes in the money supply may contribute to the movements in the PSEI.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of the research and the conclusions that were derived from the results of the econometric tools applied in the study. Moreover, it specifies the recommendations that were based on the empirical results discussed in the preceding chapters. The findings outlined in this study hope to serve as an informative contribution to the existing literature concerning stock markets, exchange rates, crude oil prices, and money supply. It also aims to provide relevant information

that can be utilized for better economic policy planning and formulation and medium- to long-term investment decision-making.

5.1 Summary and Conclusions

Through the ADF Test, it was established that the variables are integrated at the same order at I(1). Thus, the variables utilized were at the levels form. Given these, the regression results are non-spurious provided that the variables are cointegrated. Three cointegrating vectors were found based on the results of the Trace Test of the Johansen Cointegration Procedure. The presence of the cointegrating vectors provided evidence that the regression results are meaningful and that a long-term relationship exists between the dependent and explanatory variables.

Note that the regression model includes the PSEI as the dependent variable and the lagged values of the PSEI and the current and lagged values of the peso–dollar exchange rates, crude oil prices, and money supply. The optimal lag length was determined to be 4 based on the AIC. In the case of the peso–dollar exchange rates, the current up to two-period lags were found to exert an influence on the PSEI. Meanwhile, the current value and one-period lag of the money supply have an effect

on the PSEI, based on the results of the regression. Thus, it can be generally stated that the PSE capture most of the influence of government monetary policies and changes concerning the peso–dollar exchange rates and money supply within the quarter and up to the first or second quarter of its implementation.

The primary regression equation (4.3.2.1) was estimated by means of the OLS method. The estimation provided evidence that economic variables such as the lagged values of the PSEI, current and several lagged values of the peso–dollar exchange rates, and money supply have an influence on the PSEI. The signs of these variables were also found to be in accordance with the theoretical expectations of the model. Meanwhile, Dubai Fateh crude oil prices did not appear to have a significant influence on the PSEI. Broadly, the model itself and several parameters obtained were found to be statistically significant.

Specifically, a 1.0 percent increase in the previous quarter's PSEI, holding other variables constant, on the average, will result to an increase in the current PSEI by less than 1.0 percent (0.788328). Thus, the responsiveness of the PSEI to its one-quarter-lagged value is considered inelastic. Meanwhile, the current and lagged values of the

peso–dollar exchange rates were found to have a stronger influence on the PSEI. A 1.0 percent increase in the peso–dollar exchange rates, on the average, will lead to a decrease in the PSEI by 1.642584 percent, ceteris paribus. A 1.0 percent increase in the previous quarter's peso–dollar exchange rates, holding other variables constant, will result to an increase in the PSEI by 2.597803 percent, on the average. In the case of the peso–dollar exchange rates lagged by two quarters, a 1.0 percent increase in the particular variable will translate to a decrease in the PSEI by 1.826704 percent, ceteris paribus.

While the PSEI itself and the current and several lagged values of the peso–dollar exchange rates were found to influence the PSEI, Dubai Fateh crude oil price changes do not appear to significantly affect the dependent variable. A plausible explanation for such is that the listed companies in the exchange, particularly those that were included in the PSEI during the time frame considered, were not primarily affected by crude oil price fluctuations. Energy-intensive firms included in the PSEI may have resorted to hedging in order to protect their positions from wide price movements. Moreover, some firms could have become more efficient in their operations, therefore, reducing the impact of substantial crude oil price changes.

Finally, the current and one quarter-lagged values of the monetary aggregate M2 were found to exert a significant influence on the PSEI. Specifically, a 1.0 percent increase in the money supply, on the average, will lead to an increase in the PSEI by 1.067615 percent, ceteris paribus. When lagged by one quarter, a 1.0 percent increase in the money supply will translate to a decrease in the PSEI by 1.454776, holding the other variables constant. It is noteworthy that the money supply lagged by one quarter has a slightly higher coefficient than the current money supply. This suggests that the monetary actions by the central bank tend to have a delayed spillover effect on the performance of the stock market.

Since the model passed the following tests, namely, Jarque–Bera, White's Heteroskedasticity, ARCH, Breusch–Godfrey, and Ramsey's RESET, it can further be concluded that the parameters of the regression equation (4.3.2.1) were statistically reliable. The outcome of the Chow Breakpoint Test showed that there is no structural instability; hence, the model can be useful for policy formulation and forecasting.

The possibility of obtaining spurious regression results is further ruled out through the Johansen Cointegration Test. The procedure also provided evidence of a long-term equilibrium relationship between the PSEI and the explanatory variables, namely, the peso–dollar exchange

rates, Dubai Fateh crude oil prices, and monetary aggregate M2. The two types of testing for the cointegration rank, the Trace Test and the Lambda Max Test, were both used. While the Trace Test showed that there are at least three cointegrating vectors, the Lambda Max results failed to identify cointegrating vectors. However, since the Trace Test is theoretically accepted to be superior compared to the Lambda Max, it was therefore concluded that there is a long-term equilibrium relationship between the dependent and explanatory variables.

Finally, the Granger Causality Test was employed in the study in order to prove the direction of causality among the variables. Given that the variables are cointegrated, as evidenced in the Johansen Cointegration Procedure, the Vector Error Correction was used. The results showed that LnFOREX causes LnPSEI, which means that the previous values of peso–dollar exchange rates contain information that can be valuable in forecasting the future values of the stock index. Meanwhile, no causality was found between LnCRUDE and LnPSEI, further supporting the outcome of the regression analysis wherein Dubai Fateh crude oil prices have insignificant influence on the PSEI. The explanatory variable LnM2MONEY also does not Granger-cause LnPSEI. As discussed in the previous section, the absence of causality from LnM2MONEY to LnPSEI does not oppose the results of the regression.

The regression analysis showed that the current and one quarter-lagged values of the monetary aggregate M2 have a statistically significant influence on the index. However, from a causal point of view, the values of money supply in the previous quarters, say two to four quarters ago, given that two lags were used in the Granger Causality Test, may not contain information that can be helpful in forecasting the future values of the index.

5.2 Recommendations

This study analyzed the potential influence of the peso–dollar exchange rates, Dubai Fateh crude oil prices, and broad money supply on the PSEI. It also examined the long-run relationship between the PSEI and the given regressors and investigated on the direction of causality among these variables. On the basis of the findings derived from the various econometric analyses and insights gained from the review of related literature, the following recommendations are modestly presented:

1. The Philippine government, specifically economic managers, should continuously strive for stability in the economy. Macroeconomic policies should not only be geared toward general economic growth. It

should also take the necessary steps to improve consumer and investor confidence.

a) The results of the study consistently emphasized the important role played by the current and lagged values of the peso–dollar exchange rates on the PSEI. On this basis, the government, particularly the central bank, should vigilantly observe the movements of the Philippine peso relative to the U.S. dollar (and other foreign currencies). As the Philippines adopts a managed floating exchange rate system, the BSP has the ability to exert some influence on the peso–dollar exchange rates and act correspondingly to any signs of excessive exchange rate fluctuations that may be detrimental to the economy.

b) Changes in the Dubai Fateh crude oil prices were found to be statistically insignificant to the performance of the stock market. Nevertheless, the Philippine government should ensure that the country has sufficient supply of the commodity in order to prevent shortages that could bring about elevated inflation rates in the future. Since, crude oil reserves are continuously depleting resources, the use of renewable energy should also be considered.

c) Changes in the current and one quarter-lagged values of the broad money supply were found to exert an influence on the PSEI. Once again, monetary authorities as represented by the BSP, have the capacity to influence the amount of money in circulation. The BSP should continue its stance against 'inflationary' pressures in the Philippine economy. Appropriate and timely monetary policies should be deployed once unfavorable changes in the money supply level are projected.

2. Participants in the stock market may be short-term traders or medium- to long-term investors. Given the exposure of the instruments to various economic and non-economic factors, market participants are strongly encouraged to practice diversification.

Diversification reduces the risks that come naturally when an investor opts to "keep all the eggs in one basket". Within his portfolio, an investor should maintain an array of investments so that when the value of one type of asset performs poorly, other investments can neutralize the incurred losses. Investors may also diversify across various trading time frames. Several stocks in the portfolio may be traded on a daily or short-term basis, while others may be kept in a longer-term basis, say a quarter or a year. Note that the latter trading style may reduce the frequency of

trades, hence lower commission costs and time allocated on analysis and trading.

3. Through collaborative efforts with the concerned government agencies, the PSE should continue to intensify its market awareness initiatives in order to encourage the general public to invest in the stock market. Research and development programs should also be implemented to further enhance the operational systems of the PSE and make it more competitive on a global scale.

4. If feasible, the private sector should continuously offer affordable investment products and services to the general public.

5. To assist in educating the public on the available investment options and to encourage them to place their funds in the stock market, the Department of Education and the Commission on Higher Education should incorporate relevant and practical investment and finance topics in their basic study programs. The National Government should continuously prioritize the development of the education system in the country.

6. The local bourse, investment firms, and government agencies that are particularly tasked with statistical data gathering should continue to maintain a statistical database that can be useful in research undertakings related to finance and investments. The availability and accuracy of these statistics can also be helpful in the decision-making processes of the government and private entities.

7. Researchers and students who are interested in conducting a study with a similar theme in the future may adopt other economic variables and financial variables as explanatory variables and relate it to stock market performance. Since stocks are primarily short-term investments, high-frequency time series data e.g. daily, monthly may also be utilized, if available.

8. With all humility, the researcher acknowledges the fact that this particular research remains inadequate in terms of the needed literature that can fully contribute to the development of the Philippine stock market. However, this study is deemed functional as a guide toward the creation of more sophisticated and comprehensive research undertakings that could encourage the involvement of the public in the stock market, as well as in the design of appropriate monetary policies by the Philippine government.

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APPENDIX

Appendix 1. Summary of Reviewed Journals

AUTHOR	TITLE	JOURNAL	METHODOLOGY
1.) Abugri, B.A. (2008)	Empirical Relationship between Macroeconomic Volatility and Stock Returns: Evidence from Latin American Markets	International Review of Financial Analysis	Vector Autoregression
▸ Global variables (MSCI world index and the 3-month T-bill yield) played a substantial role in explaining returns in all the stock markets considered. ▸ Interest rates and exchange rates were found to have important impact on three of the four markets included. ▸ Country-specific factors affected these markets at different degrees and significance.			
2.) Aghion, P., Bacchetta , P., Ranciere, R., and Rogoff, K. (2009)	Exchange Rate Volatility and Productivity Growth: The Role of Financial Development	Journal of Monetary Economics	GMM Dynamic Panel Estimation
▸ Using cross-country panel data, the authors found that excessive fluctuations in the exchange rate can negatively affect economic growth, especially in the long run. ▸ Financial development is necessary in the linkage between the exchange rate regime choice and long-run economic growth.			
3.) Arratibel, O., Furceri, D., Martin, R., and Zdzienicka,A. (2011)	The Effect of Nominal Exchange Rate Volatility on Real Macroeconomic Performance in the CEE Countries	Economic Systems	Panel Estimations
▸ Lower exchange rate volatility was linked to higher economic growth, higher stocks of foreign direct investments, higher current account deficits and excess credit.			
4.) Azeez, A.A. and Yonezawa, Y. (2006)	Macroeconomic Factors and the Empirical Content of the Arbitrage Pricing Theory in the Japanese Stock Market	Japan and the World Economy	Multivariate Non-Linear Regression
▸ Macroeconomic variables such as money supply, inflation, exchange rate, and industrial production have significant influences on the expected returns of Japanese stocks. ▸ During the bubble period, the variances of the macroeconomic factors are relatively the same.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
5.) Bachmeier, L. (2008)	Monetary Policy and the Transmission of Oil Shocks	Journal of Macroeconomics	Multiple Regression
▸ Oil prices are significantly affected by oil price shocks but monetary policy does not play an important role in the transmission mechanism.			
6.) Baharumshah, A.Z., Mohd, S.H., and Yol, M.A. (2009).	Stock Prices and Demand for Money in China: New Evidence	Journal of International Financial Markets, Institutions, & Money	Cointegration, Error Correction Model
▸ Real money demand (M2) is cointegrated with key variables including real income, real interest rates, and stock prices. ▸ Stock prices are important for the stability of long-run broad money (M2) demand and omission of such variable could result to significant misspecification errors in the money demand function in the short- and long-term.			
7.) Balke, N.S. and Wynne, M.A. (2007)	The Relative Price Effects of Monetary Shocks	Journal of Macroeconomics	Vector Autoregression
▸ Using producer price indexes, the study found that monetary shocks have a significant impact on the prices of goods. ▸ A substantial number of prices went up in the short run in response to a contractionary monetary shock.			
8.) Basher, S.A. and Sadorsky, P. (2006)	Oil Price Risk and Emerging Stock Markets	Global Finance Journal	International Multifactor Model
▸ Under the unconditional risk analysis, it was found that the relationship between market beta and emerging stock market returns is statistically significant and negative. ▸ Employing daily and monthly data, there exist a significant and positive relationship between market betas and returns in up markets and significant and negative relationships in down markets. ▸ Oil price risk affects stock price returns in emerging economies but their precise relationship is reliant on the kind of data frequency being utilized.			
9.) Basistha, A., and Kurov, A. (2008)	Macroeconomic Cycles and the Stock Market's Reaction to Monetary Policy	Journal of Banking & Finance	Event Study Approach, Regression
▸ Stock returns respond more than twice as large during economic recessions and when firms experience constrained credit conditions than in favorable economic and credit settings. ▸ Sectoral heterogeneity was found (industry response to monetary policy shocks are diverse) owing to the various sensitivities of products to interest rate changes.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
10.) Bjornland, H.C. (2009)	Oil Price Shocks and Stock Market Booms in an Oil Exporting Country	Scottish Journal of Political Economy	Structural Vector Autoregression
▸ An increase in oil prices result to a positive impact on the economy of Norway, an oil-exporting country. ▸ Rising oil prices translate to an increase in stock returns with a 10.0 percent oil price hike immediately increasing stock returns by 2.0 to 3.0 percent. After about 14 to 15 months, the impact of oil price increases on stock returns slowly fades out. ▸ Monetary policy shocks were also found to contribute to the variations in stock returns in the case of Norway.			
11.) Bodenstein, M., Erceg, C.J., and Guerrieri, L. (2010)	Oil Shocks and External Adjustment	Journal of International Economics	Dynamic Stochastic General Equilibrium (DSGE) Model
▸ There is a weak correlation between oil prices and the overall trade balance. ▸ Oil demand and supply shocks that increases oil prices lead to a wealth transfer from the oil importer toward the exporter. ▸ Consumption is reduced in the oil-importing country given price increases.			
12.) Chen, S. (2009)	Oil Price Pass-through into Inflation	Energy Economics	State Space Framework, Rolling Regression
▸ The authors found evidence of a decline in the inflation pass-through of oil price shocks for most of the 19 industrialized countries. ▸ The decline was due to domestic currency appreciation, effective anti-inflation monetary policy, and higher level of trade openness.			
13.) Chen, S. (2009)	Predicting the Bear Stock Market: Macroeconomic Variables as Leading Indicators	Journal of Banking & Finance	
14.) Chen, S. (2010)	Do Higher Oil Prices Push the Stock Market into Bear Territory?	Energy Economics	Markov-Switching Model
▸ With higher oil prices, the stock market will most likely move into a bear (recession) phase. Albeit weaker evidence, the increase in oil prices will also influence the stock market to stay in the bear territory.			
15.) Chen, M., Kim, W.G., and Kim, H.J. (2005)	The Impact of Macroeconomic and Non-Macroeconomic Forces on Hotel Stock Returns	International Journal of Hospitality Management	Regression Analysis
▸ Changes in the unemployment rate and money supply were found to significantly influence hotel stock returns in the Taiwan bourse. ▸ Non-macroeconomic factors such as political events and international sports events also affected hotel stock returns.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
16.) Chiou, J. and Lee, Y. (2009)	Jump Dynamics and Volatility: Oil and the Stock Markets	Energy	Autoregressive Conditional Jump Intensity Model
▸ "High fluctuations" in oil prices lead to asymmetric unexpected effects on S&P 500 returns. On the other hand, the magnitude of the impact is not the same when in an environment of "low fluctuations". ▸ Oil price volatility has a significant and negative effect on stock returns.			
17.) Choi, K. and Hammoudeh, S. (2010)	Volatility Behavior of Oil, Industrial Commodity and Stock Markets in a Regime-switching Environment	Energy Policy	Markov-switching GARCH models: Univariate MS Heteroskedasticity Model, Dynamic Conditional Correlation (DCC) Multivariate GARCH model
▸ Commodities have different sensitivities to volatility regimes. ▸ Brent & WTI crude oils were found to be more volatility persistent over time in effect of geopolitical crises while the S&P 500 is sensitive to both geopolitical and financial crises.			
18.) Cong, R., Wei, Y., and Fan, Y. (2008)	Relationships between Oil Price Shocks and Stock Market: An Empirical Analysis from China	Energy Policy	Cointegration Test, Vector Autoregression
▸ Except for the manufacturing index and stock returns of some oil companies, oil price shocks do not have a statistically significant effect on stock market indices. ▸ There is no evidence of an asymmetric impact of oil price shocks on the stock returns of oil companies. ▸ Rise in the volatility of oil does not impact on most stock market returns but does increase returns on mining and petrochemicals index due to speculations. ▸ The importance of oil price shocks and interest rates varies across indices.			
19.) Cooray, A. (2010)	Do Stock Markets Lead to Economic Growth	Journal of Policy Modeling	Ordinary Least Squares, GMM Estimation, Regression
▸ Long-run economic growth is determined by human capital and stock market development policies. ▸ Physical capital was found to have a positive effect on economic growth while population growth has a negative impact.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
20.) Diamandis, P.F. and Drakos, A.A. (2011)	Financial Liberalization, Exchange Rates and Stock Prices: Exogenous Shocks in Four Latin America Countries	Journal of Policy Modeling	Cointegration Analysis and Multivariate Granger Causality Tests
▸ Stock and foreign exchange markets in the four Latin American countries are positively related and that the U.S. stock market acts as a channel for these links. ▸ Instability in these long-run relationships is evident during the Mexican currency crisis of 1994 to 1995, the Asian crisis of 1997 and the 2007 to 2009 credit and financial crisis.			
21.) Du, D. (2006)	Monetary Policy, Stock Returns, and Inflation	Journal of Economics and Business	Bai and Perron Procedure, Vector Autoregression
▸ Given four regimes, the relationship between stock returns and inflation are not stable, positive on the first regime and negative on the third regime.			
22.) Du, L., Yanan, H., and Wei, C. (2010)	The Relationship between Oil Price Shocks and China's Macroeconomy: An Empirical Analysis	Energy Policy	Vector Autoregression
▸ Pricing mechanism reforms in China had changed the correlation between world oil prices and China's macroeconomy. ▸ China's macroeconomy still fails to have a significant impact on world oil prices. ▸ On the contrary, world oil prices were found to affect the GDP of China in the second sub-sample 2002:1 to 2008:12. ▸ China's GDP and consumer price index were found to have a positive correlation with world oil prices. Despite the fact that China is a net oil importer, its GDP rises along with world oil prices due to the dependence of its economy on exports, with the United States and European Union countries as its major markets.			
23.) Enisan, A.A. and Olufisayo, A.O. (2009)	Stock Market Development and Economic Growth: Evidence from Seven Sub Sahara African Countries	Journal of Economics and Business	ARDL Bounds Test, Granger Causality
▸ The level of stock market development has a significant positive long term effect on economic growth. ▸ Causality between stock market development and economic growth was found in seven Sub-Sahara countries but a long-run cointegrating link between the two was observed only in Egypt and South Africa.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
24.) Farka, M. (2009)	The Effect of Monetary Policy Shocks on Stock Price Accounting for Endogeneity and Omitted Variable Biases	Review of Financial Economics	Regression, GARCH
▸ The volatility effect of policy shocks by the Federal Reserve is tent-shaped, spiking during the policy announcements and falling before and after the announcements. ▸ The level and volatility of stock returns responds asymmetrically, depending on the type of policy shocks and policy actions.			
25.) Farzanegan, M.R. and Markwardt, G. (2009)	The Effects of Oil Price Shocks on the Iranian Economy	Energy Economics	Unrestricted Vector Autoregression
▸ Positive oil price shocks were found to increase the real effective exchange rate and cause the appreciation of the rial. In turn, imports become cheaper while export prices increase. ▸ However, inflation is not significantly affected by both positive and negative oil price shocks in Iran. ▸ Note also that negative oil price shocks have a more pronounced effect on Iran compared to positive oil price shocks.			
26.) Favara, G. and Giordani, P. (2009)	Reconsidering the Role of Money for Output, Prices, and Interest Rates	Journal of Monetary Economics	Vector Autoregression
▸ Shocks to broad monetary aggregates have significant and continual impact on output, prices, and interest rates. ▸ The outcome contradicted theoretical expectations which perceive monetary aggregates as non-substantial in the determination of the mentioned economic variables.			
27.) Fofana, I., Chitiga, M., and Mabugu, R. (2009)	Oil Prices and the South African Economy: A Macro-Meso-Micro Analysis	Energy Policy	Input-Output Model with Household Survey
▸ Sustained high oil prices mostly affect the transport services and primary plastics industries in South Africa owing to larger input costs. ▸ The varying distributional effects of high oil prices among expenditure groups or households are largely explained by the impact of the price increases on transport services.			
28.) Hafer, R.W., Haslag, J.H., and Jones, G. (2007)	On Money and Output: Is Money Redundant	Journal of Monetary Economics	Regression Analysis
▸ Money supply is not considered redundant. Specifically, movements in real monetary aggregate M2 are found to have a significant impact on the output gap, independent of the real federal funds rate. ▸ This provides evidence that the real interest rate is not the only meaningful indicator of monetary policy.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
29.) He, L.T. (2006)	Variations in Effects of Monetary Policy on Stock Market Returns in the Past Four Decades	Review of Financial Economics	Multiple Regression
▸ Using the S&P 500 Index as a measure of stock market returns, the research concluded that stock prices are sensitive to changes in the monetary policy of the Federal Reserve System. ▸ However, these sensitivities are not stable over time with variations dependent on the target of monetary policy and the transparency of the monetary authorities regarding their decisions.			
30.) Heimonen, K. (2010)	Money and Equity Returns in the Euro Area	Global Finance Journal	Vector Autoregression, Granger Causality
▸ Euro stock returns were not granger-caused (much of its variation is not explained) by monetary policy variables and euro stock returns do not have an impact on liquidity. ▸ A change in M3 monetary aggregate produces a negative effect (that lasted for two years) on equity returns during the first quarter.			
31.) Henriques, I. and Sadorsky, P. (2010)	The Effect of Oil Price Volatility on Strategic Investment	Energy Economics	Generalized Method of Moment (GMM) Estimation
▸ There is no linear relationship existing between oil price volatility and firm investment. The linkage was described to be "complex" owing to the impact of different interacting options. ▸ There is a U-shaped relationship between oil price volatility and investment. Investors tend to wait for situations to become more certain until such a time that the potential benefits of investing outweigh the value of delaying the investments.			
32.) Iwayemi, A. and Fowowe, B. (2011)	Impact of Oil Price Shocks on Selected Macroeconomic Variables in Nigeria	Energy Policy	Unrestricted Vector Autoregression
▸ Oil price shocks do not have a significant influence on a majority of macroeconomic factors in Nigeria such as output, government expenditures, inflation, and the real exchange rate. ▸ The asymmetric impact of oil price shocks was found, with negative oil shocks significantly affecting output and the real exchange rate in Nigeria.			
33.) Jammazi, R. and Aloui, C. (2010)	Wavelet Decomposition and Regime Shifts: Assessing the Effects of Crude Oil Shocks on Stock Market Returns	Energy Policy	Wavelet Analysis and Markov Switching Vector Autoregressive (MS-VAR)
▸ Oil prices have a long-run impact on stock prices before 1999, but such effect diminished after 1999. ▸ Stock market variables react to crude oil price changes during moderate and expansion phases but not in a degree that will bring them toward the recession stage. ▸ After the information technology bubble of 1999, the stability of the negative relationship between oil price shocks and stock market returns became difficult to maintain.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
34.) Jayaraman, T.K. and Choong, C. (2009)	Growth and Oil Price: A Study of Causal Relationships in Small Pacific Island Countries	Energy Policy	ARDL Bounds Testing
▸ Oil prices and GDP have a unidirectional relationship, which means that the linkage runs only from oil prices to international reserves to GDP but not otherwise. ▸ Oil prices were found to have an inverse relationship with economic growth.			
35.) Jbir, R. and Zouari-Ghorbel, S. (2009)	Recent Oil Price Shock and Tunisian Economy	Energy Policy	Vector Autoregression
▸ The effect of oil price shocks is indirectly transmitted via government subsidy policies, represented by the budget deficit. ▸ The impact of oil price shocks on the CPI was minimal and insignificant.			
36.) Jimenez-Rodriguez, R. (2008)	The Impact of Oil Price Shocks: Evidence from the Industries of Six OECD Countries	Energy Economics	Recursively Identified Bivariate VAR
▸ Across four EMU countries, industrial output response to oil price shocks differ owing to industrial structure variety. ▸ A common monetary policy should be taken with critical care among these economies since it may bring about asymmetric effects due to the diverse responses of these countries to oil price shocks.			
37.) Kasman, S., Vardar, G., and Tunc, G. (2011)	The Impact of Interest Rate and Exchange Rate Volatility on Banks' Stock Returns and Volatility: Evidence from Turkey	Economic Modelling	OLS Method, Generalized Autoregressive Conditional Heteroskedasticity (GARCH)
▸ Interest rate and exchange rate fluctuations were found to be important determinants of the volatility of conditional bank stock returns. ▸ Changes in the interest rates and exchange rates have a negative and significant effect on the conditional bank return.			
38.) Kholodilin, K., Montanoli, A., Napolitano, O., and Siliverstovs, B. (2009)	Assessing the Impact of the ECB's Monetary Policy on the Stock Markets: A Sectoral View	Economics Letters	Heteroskedasticity-Based Estimator, Event Study Approach
▸ European Central Bank's (ECB) monetary policies were found to have heterogeneous effects on sectoral indices. Not all sectors respond to monetary policy announcements. ▸ Affected sectors respond with an index decrease to interest rate hikes. Overall, the aggregate stock market index also decreases when interest rates are adjusted upwards.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
39.) Kormilitisina, A. (2011)	Oil Price Shocks and the Optimality of Monetary Policy	Review of Economic Dynamics	Dynamic Stochastic General Equilibrium
▸ Monetary policy plays an important role in the transmission of the impact of oil price shocks to the GDP. ▸ Incorrect monetary polices could have exacerbated past recessions that followed oil price shocks. ▸ Using monetary policy, the optimal response to an oil price shock is to raise inflation and interest rates (higher than what has been actually done by the government in response to the oil price shock).			
40.) Kurov, A. (2010)	Investor Sentiment and the Stock Market's Reaction to Monetary Policy	Journal of Banking & Finance	Markov-Switching Model, Multiple Regression
▸ Monetary policy shocks significantly affect investor sentiments, with the impact seen as more pronounced during bear market periods. ▸ Stocks deemed more sensitive to changes in investor sentiments have a stronger response to monetary policy news. ▸ Changes in the timing, even of expected monetary policy decisions, have a significant impact on investor sentiment as well as on stock prices in bear markets. Such was attributed to the possibility that changes in the timing of expected monetary policies carry essential information in bear market periods and that stock investors tend to overreact to timing shocks during these times.			
41.) Lee, Y. and Chiou, J. (2011)	Oil Sensitivity and its Asymmetric Impact on the Stock Market	Energy	Markov-Regime Switching Model, ARMA-GARCH Model, ARJI Model
▸ Oil prices have a significant negative impact on stock returns using the S&P 500 as the index. ▸ However, such asymmetric unexpected changes in oil prices only hold in a high oil fluctuation regime. In other words, the anticipated, unexpected, and asymmetric unexpected changes in the prices of oil spot and futures do not have an effect on the S&P 500 given a low oil price fluctuation setting.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
42.) Li, Y.D., Iscan, T.B., and Xu, K. (2010)	The Impact of Monetary Policy Shocks on Stock Prices: Evidence from Canada and the United States	Journal of International Money and Finance	Structural Vector Autoregression
▸ In Canada, the immediate reaction of stock prices to monetary policy shocks is described as small and brief whereas in the United States, the immediate response of U.S. stock prices is large and prolonged. Such response differences are attributed to the financial market openness of the two countries. Canada is considered as a small open economy while the United States is taken as a relatively large and closed economy. ▸ The overall effect of the external demand shocks on Canadian stock prices is small owing to the floating exchange rate regime which served as a "protection" against the transmission of the external demand shocks to the real sector.			
43.) Lim, K., Brooks, R.D., and Kim, J.H. (2008)	Financial Crisis and Stock Market Efficiency: Empirical Evidence from Asian Countries	International Review of Financial Analysis	Rolling Bicorrelation (H-Statistic)
▸ The 1997 Asian financial crisis was found to have an adverse effect on the stock markets of Asian countries that were included in the study. ▸ The stock indices of these countries registered negative returns during the crisis. In terms of market efficiency, Hong Kong was observed to suffer the most among the countries considered, followed by Philippines. ▸ For the post-crisis sub-sample, market efficiency improved in these Asian markets.			
44.) Liu, L. and Zhang, W. (2010)	A New Keynesian Model for Analysing Monetary Policy in Mainland China	Journal of Asian Economics	GMM
▸ Given the current economic and financial market development of China, a hybrid monetary policy (interest rate and money supply) is more effective than one which uses a single instrument alone. ▸ A severe appreciation of the renminbi may stabilize inflation risks, but may also distort the growth of the economy.			
45.) Lorde, T., Jackman, M., and Thomas, C. (2009)	The Macroeconomic Effects of Oil Price Fluctuations on a Small Open Oil-producing Country: The Case of Trinidad and Tobago	Energy Policy	Vector Autoregression
▸ Oil prices were found to have an influence on the economy of Trinidad and Tobago. ▸ A positive oil price shock results to a decline in output in the first two years, followed by an increasing and positive reaction to the shock. ▸ Price level and government revenues significantly responded to unexpected oil price volatility shocks.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
46.) Maysami, R.C. and Koh, T.S. (2000)	A Vector Error Correction Model of the Singapore Stock Market	Review of Economics & Finance	Vector Error Correction Model, Johansen's Methodology for Multivariate Cointegration Analysis
▸ The Singapore stock market is sensitive to changes in the interest rates and exchange rates. However, money supply growth and inflation do not have a significant cointegrating relationship with the changes in the levels of the Singapore stock market. ▸ The Singapore stock market has significant and positive cointegrating relationships with the U.S. and Japanese stock markets. As a small open economy that is export-dependent, Singapore was found to be sensitive to external shocks.			
47.) Milani, F. (2009)	Expectations, Learning, and the Changing Relationship between Oil Prices and the Macroeconomy	Energy Economics	Structural General Equilibrium Model
▸ Oil price shocks have an additional impact on output growth via their effect on agents' expectations building regarding output, inflation, as well as monetary policies. ▸ Since agents were able to learn from historical data that the impact of oil price shocks is not as large compared to their initial expectations, they likewise reduced their perceived magnitude of the effect of oil price shocks on the given macroeconomic variables.			
48.) Miller, J.I. and Ratti, R.A. (2009)	Crude Oil and Stock Markets: Stability, Instability, and Bubbles	Energy Economics	Vector Error Correction Model
▸ The study found a long -run relationship between crude oil prices and stock prices. ▸ Over the long run, stock prices decrease as oil prices go upwards. However, after 1999, there appears to be a change in the relationship between oil and stock prices, with the possible presence of stock market and/or oil price bubbles in the recent years.			
49.) Mun, K. (2007)	Volatility and Correlation in International Stock Markets and the Role of Exchange Rate Fluctuations	Journal of International Financial Markets, Institutions and Money	Exponential GARCH
▸ Higher exchange rate fluctuations tend to heighten the volatility of domestic stock markets and decrease that of the U.S. bourse. ▸ This was attributed to the fact that exchange rate movements are more strongly correlated to local stock market returns than U.S. stock returns.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
50.) Naccache, C. (2010)	Slow Oil Shocks and the "Weakening of the Oil-Price Macroeconomy Relationship"	Energy Policy	Vector Autoregression, Recursive Exclusion Test
▸ The weakening of the oil price-macroeconomy relationship in the recent years was attributed to the emergence of slow or non-accelerating oil price shocks during the seventies and the eighties. ▸ These non-accelerating oil price shocks were believed to come from progressive demand shocks due to the increasing oil requirements of rapidly growing economies such as China and India. ▸ By removing these non-accelerating oil price shocks, the study was able to restore the relationship between oil prices and the macroeconomy.			
51.) Nagayasu, J. (2007)	Empirical Analysis of the Exchange Rate Channel in Japan	Journal of International Money and Finance	Stability Tests, Markov Switching-Vector Error Correction Model
▸ In the case of Japan, no evidence was found to support the perception that the depreciation of the yen aided in the growth of the economy. ▸ Therefore, the exchange rate as a transmission mechanism of monetary policy was dubbed as ineffective in removing Japan from the liquidity trap.			
52.) Nandha, M. and Faff, R. (2008)	Does Oil Move Equity Prices? A Global View	Energy Economics	Standard Market Model augmented by the oil price factor
▸ No evidence was found for the asymmetric impact of oil prices on equity markets. ▸ Oil price shocks have a negative effect on stock market returns, except in the mining, oil, and gas sectors. ▸ It suggested diversification involving the inclusion of assets with positive oil price sensitivity and the utilization of oil-based derivatives.			
53.) Nandha, M. and Hammoudeh, S. (2007)	Systematic Risk, and Oil Price and Exchange Rate Sensitivities in Asia-Pacific Stock Markets	Research in International Business and Finance	International Factor Model
▸ A significant but minimal relationship was found to exist between the domestic beta risk and the stock markets in China and Thailand, regardless of whether oil prices are in US dollars or in their respective domestic currencies. ▸ Only the Philippines and South Korea were found to be sensitive to oil prices in the short run when oil is expressed in the local currency, but none of these countries were sensitive to oil price changes when using the U.S. dollar. ▸ Oil sensitivity may vary when the oil market is categorized into "up" and "down" markets. The Philippines is seen to be oil price-sensitive whether it is in an "up" or in a "down" oil market.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
54.) Narayan, P.K. and Narayan, S. (2010)	Modelling the Impact of Oil Prices on Vietnam's Stock Prices	Applied Energy	Long-run Elasticities, Error Correction Model
▸ Stock prices in the Vietnam Stock Exchange (VN-index), oil prices, and nominal exchange rates are cointegrated (have long-run relationships). ▸ Estimating long-run elasticities, oil prices and exchange rates have a positive influence on stock prices while for the short-run elasticities, neither of the two independent variables has a statistically significant effect on the VN-index.			
55.) Prasad, A., Narayan, P.K., and Narayan, J. (2007)	Exploring the Oil Price and Real GDP Nexus for a Small Island Economy, the Fiji Islands	Energy Policy	Granger Causality, Impulse Response Function, Variance Decomposition
▸ The study found a positive relationship between oil prices and GDP in the case of Fiji, an oil-importing country. ▸ The positive relationship was attributed to the possibility that the Fijian economy has not yet reached the threshold where oil prices will negatively affect output (similar to the case of developed economies).			
56.) Qianqian, Z. (2011)	The Impact of International Oil Price Fluctuation on China's Economy	Energy Procedia	Cointegration, Error Correction Model
▸ A long-run equilibrium relationship exists between oil prices and China's output, CPI, net exports, and monetary policy. ▸ Surging oil prices have an inverse influence on net exports and real output while it causes the CPI to increase. ▸ Monetary authorities tend to implement tight monetary policy given the inflationary risks brought about by rising oil prices.			
57.) Rafiq, S., Salim, R., and Bloch, H. (2009)	Impact of Crude Oil Price Volatility on Economic Activities: An Empirical Investigation in the Thai Economy	Resources Policy	Vector Autoregression
▸ A unidirectional causality running from oil price volatility toward investment, unemployment rate, interest rate, and trade balance was found. ▸ The largest impact of oil price volatility was on investments and unemployment rate. ▸ After the financial crisis, the effect of oil price volatility was lessened but mostly affected the budget deficit, which may be due to the introduction of the floating exchange rate regime, post-crisis.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
58.) Rousseau, P.L. and Xiao, S. (2007)	Banks, Stock Markets, and China's 'Great Leap Forward'	Emerging Markets Review	Vector Autoregression
▸ Improvements in the size and level of sophistication in the China's banking sector have positive and significant impact on output and fixed investment. ▸ However, developments in the stock market do not have an effect on both output and investment which may be attributed to economic activities mostly occurring outside the Chinese stock market.			
59.) Scharler, J. (2008)	Bank Lending and the Stock Market's Response to Monetary Policy Shocks	International Review of Economics & Finance	Limited Participation Model
▸ Bank-dependent firms were found to respond slightly stronger to monetary policy shocks (interest rate changes) compared to bond-issuing firms. Thus, the study concluded that the banking channel contributes significantly to the variation in the stock returns of companies.			
60.) Schnabl, G. (2008)	Exchange Rate Volatility and Growth in Small Open Economies at the EMU Periphery	Economic Systems	Generalized Least Squares Estimation
▸ Exchange rate stability has a favorable impact on EMU periphery countries with underdeveloped capital markets. ▸ However, the advantages of exchange rate stability were weaker in industrialized non-EMU countries which may be attributed to the lower vulnerability of its developed capital markets to exchange rate fluctuations.			
61.) Tang, W., Wu, L., and Zhang, Z. (2010)	Oil Price Shocks and their Short- and Long-Term Effects on the Chinese Economy	Energy Economics	Structural Vector Autoregressive Model
▸ An oil price increase results to a decline in output and investment but a rise in inflation and interest rate in China. ▸ However, the effect of oil price shocks appear to have a more lasting effect on real output and investment compared to monetary (price) variables. This was attributed to the presence of price controls in the Chinese economy.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
62.) Walid, C., Chaker, A., Masood, O., and Fry, J. (2011)	Stock Market Volatility and Exchange Rates in Emerging Countries: A Markov-state Switching Approach	Emerging Markets Review	Markov-Switching EGARCH
▸ The relationship between stock and foreign exchange markets are regime-dependent. ▸ The volatility of stock prices has asymmetric reaction to foreign exchange market activities. ▸ Foreign exchange rate movements have an important role in determining the shift of emerging stock markets from calm to turbulent period and vice versa.			
63.) Wongbangpo, P. and Sharma, S.C. (2002)	Stock Market and Macroeconomic Fundamental Dynamic Interactions: ASEAN-5 Countries	Journal of Asian Economics	Vector Error Correction Model, Granger Causality
▸ Through the Granger Causality Test, a causal relationship was established between the macroeconomic variables included and the stock prices in all the five ASEAN countries. ▸ The influences of the macroeconomic variables on the stock prices differ on a per country basis.			
64.) Wu, J., Hou, H., and Cheng, S. (2010)	The Dynamic Impacts of Financial Institutions on Economic Growth: Evidence from the European Union	Journal of Macroeconomics	Panel Mean Group estimators
▸ A long-run equilibrium relationship among banking development, stock market development, and economic growth was found. ▸ Stock market capitalization and liquidity both have positive long-run effects on economic growth. However, in the short run, stock market liquidity was found to have a negative relationship with GDP growth owing to its positive effect on return on investment that decreases precautionary savings and savings growth. It also results to a decreased effort on cooperative management in the short run, thus affecting GDP growth in an inverse manner.			
65.) Yang, Y. and Chang, C. (2008)	A Double-threshold GARCH Model of Stock Market and Currency Shocks on Stock Returns	Mathematics and Computers in Simulation	Double Threshold GARCH Model
▸ Interaction of information derived from the local stock markets and foreign exchange markets resulted to the asymmetric responses in stock returns and its associated volatility. ▸ Exchange rate news was found to have a more pronounced influence on the subject stock markets than domestic news. Thus, the foreign exchange market plays a significant role in local stock returns.			

AUTHOR	TITLE	JOURNAL	METHODOLOGY
66.) Zhang, D. (2008)	Oil Shock and Economic Growth in Japan: A Nonlinear Approach	Energy Economics	Multiple Regression, Granger Causality
▸ Using post-war data, the research found a non-linear asymmetric relationship between economic growth and oil price shocks in Japan. ▸ It also described a unidirectional relationship between GDP growth and oil price changes, which means that GDP growth does not contribute to oil price changes but oil price changes have an impact on economic growth. ▸ Moreover, there appears to be an immediate, as well as postponed impact of oil price changes on the economy.			
67.) Zhang, W. (2009)	China's Monetary Policy: Quantity Versus Price Rules	Journal of Macroeconomics	Dynamic Stochastic General Equilibrium
▸ Between the money supply (quantity) and interest rate (price) rule, the study concludes that the impact of the interest rate rule on the economy (inflation and output gap) appear to be more significant than the money supply rule. ▸ Given shocks, the economy experienced fewer fluctuations when the price rule was applied. Moreover, a more aggressive interest rate reaction to inflation was shown to indicate lower economic fluctuations.			
68.) Zhao, H. (2010)	Dynamic Relationship between Exchange Rate and Stock Price: Evidence from China	Research in International Business and Finance	Vector Autoregression and GARCH Models
▸ Using the Johansen test for cointegration, the author concluded that there is no long-term equilibrium relationship between the renminbi real effective exchange rate and stock prices in China. ▸ The presence of bi-direction volatility spillover effects were found which indicates that the past changes in the stock market have an influential power on the future volatilities in the exchange rate market and vice versa.			

Appendix 2. Formulas of Statistical and Econometric Tests

Statistical/ Econometric Tests	Formula
Akaike Information Criterion (AIC)	lnAIC = (2k/n) + ln(RSS/n) where: lnAIC = natural logarithm of AIC 2k/n = penalty factor RSS = residual sum of squares
R^2	$R^2 = \frac{ESS}{TSS}$ where: ESS = explained sum of squares TSS = total sum of squares
Adjusted R^2	$1 - \frac{RSS/(n-k)}{TSS/(n-1)}$ where: k = number of parameters
F-test	$F = \frac{R^2/k-1}{(1-R^2)/n-k}$ where: R^2 = coefficient of determination
t-Test	$t = \frac{B}{s.e.(B)}$ where: B = beta coefficient s.e.(B) = standard error of the beta coefficient
Jarque–Bera Test	$JB = n[(s^2/6)+(K-3)2/24]$ Where: n = number of observations s = skewness K= kurtosis
Variance Inflationary Factor (VIF)	$VIF = 1/1-R^2i$ where: R^2i = coefficient of determination of the auxiliary regression
Ramsey's RESET	$F = \frac{(R^2new–R^2old)/ \text{no. of new regressors}}{(1-R^2new)/(n-\text{no. of k in the new model})}$

Statistical/ Econometric Tests	Formula
Chow Breakpoint Test	$F = \frac{[RSS-(RSS1+RSS2)]/k}{(RSS_1+RSS_2)/n-2k}$ where: RSS = residual sum of squares for the entire observation RSS_1 = residual sum of squares for n_1 observations RSS_2 = residual sum of squares for n_2 observations

Appendix 3. Data Table for PSEI, Real Foreign Exchange Rates, Inflation-adjusted Crude Oil Prices, and Real Money Supply

PERIOD		PSEI	EXCHANGE RATES	CRUDE OIL PRICES	MONEY SUPPLY
1992	Q1	1105.73	63.76	27.31	587,213.11
	Q2	1566.87	62.61	30.82	604,637.52
	Q3	1421.14	58.91	30.80	581,920.43
	Q4	1272.40	59.04	28.82	608,069.83
1993	Q1	1471.34	59.35	26.38	605,523.13
	Q2	1593.41	62.58	26.10	620,158.04
	Q3	1998.90	63.82	22.80	615,299.36
	Q4	3241.86	64.42	20.92	695,739.18
1994	Q1	2711.50	59.55	19.03	671,262.22
	Q2	2746.36	58.38	21.98	679,802.84
	Q3	2908.24	56.00	22.96	720,279.04
	Q4	2785.81	52.61	22.51	800,298.27
1995	Q1	2392.25	52.87	23.04	869,382.96
	Q2	2766.45	53.91	23.56	878,531.34
	Q3	2629.25	52.53	20.58	871,148.63
	Q4	2594.18	52.90	21.00	948,096.67
1996	Q1	2900.75	52.03	21.39	977,057.33
	Q2	3275.26	51.89	22.03	975,417.02
	Q3	3169.78	51.59	23.89	982,197.65
	Q4	3170.56	51.67	26.80	1,040,283.27
1997	Q1	3222.98	51.07	23.67	1,077,184.38
	Q2	2809.21	50.78	21.25	1,099,110.80
	Q3	2057.39	56.77	21.13	1,152,529.69
	Q4	1869.23	66.71	21.12	1,200,334.38
1998	Q1	2238.42	74.45	14.22	1,187,064.71
	Q2	1760.13	70.38	13.23	1,173,914.20
	Q3	1259.64	75.37	13.50	1,147,462.85
	Q4	1968.78	70.57	12.37	1,174,059.91
1999	Q1	2028.21	66.00	11.45	1,173,550.79
	Q2	2486.96	65.46	15.92	1,202,968.23
	Q3	2096.20	67.42	20.21	1,229,038.05
	Q4	2142.97	69.20	23.31	1,306,225.95

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2000	Q1	1681.72	69.87	24.81	1,294,323.12
	Q2	1533.99	72.13	25.26	1,306,170.10
	Q3	1434.49	76.77	27.47	1,294,225.61
	Q4	1494.50	82.56	26.74	1,333,830.15
2001	Q1	1446.40	81.40	22.45	1,358,535.32
	Q2	1410.07	84.15	23.66	1,385,968.88
	Q3	1126.63	85.31	22.22	1,346,440.66
	Q4	1168.08	84.03	16.85	1,366,517.56
2002	Q1	1403.62	82.78	18.38	1,404,442.91
	Q2	1156.35	81.84	22.16	1,425,238.59
	Q3	1129.34	83.22	23.14	1,414,966.53
	Q4	1018.41	86.04	22.61	1,460,941.69
2003	Q1	1039.67	87.28	25.47	1,449,998.22
	Q2	1222.80	84.74	21.49	1,433,765.73
	Q3	1297.42	86.96	23.15	1,414,342.94
	Q4	1442.37	87.58	23.89	1,458,168.55
2004	Q1	1424.33	88.23	24.99	1,456,042.53
	Q2	1579.40	87.90	27.77	1,452,027.50
	Q3	1761.57	85.74	29.49	1,403,958.59
	Q4	1822.83	85.27	28.58	1,449,772.36
2005	Q1	1954.69	82.39	32.43	1,503,288.76
	Q2	1924.23	81.84	37.13	1,509,117.54
	Q3	1942.07	83.28	42.22	1,507,898.27
	Q4	2096.04	80.33	39.59	1,507,836.25
2006	Q1	2195.95	75.10	42.57	1,503,633.55
	Q2	2178.79	76.10	47.10	1,563,371.84
	Q3	2556.71	74.36	47.36	1,595,679.29
	Q4	2982.54	71.14	41.11	1,711,152.96
2007	Q1	3203.55	69.98	39.75	2,039,392.85
	Q2	3660.86	68.59	46.04	2,123,779.94
	Q3	3572.90	66.34	49.07	2,032,254.56
	Q4	3621.60	62.10	57.76	2,076,793.15
2008	Q1	2984.67	58.26	61.87	2,038,095.10
	Q2	2459.98	59.88	75.63	1,990,311.37
	Q3	2569.65	61.84	70.93	1,974,224.21
	Q4	1872.85	64.56	33.97	2,167,652.95

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2009	Q1	1986.22	63.34	28.25	2,192,594.55
	Q2	2437.99	63.71	37.03	2,184,017.18
	Q3	2800.82	64.03	42.43	2,205,286.52
	Q4	3052.68	61.55	46.42	2,322,843.55
2010	Q1	3161.80	60.14	46.11	2,285,736.00
	Q2	3372.71	59.28	46.95	2,318,305.79
	Q3	4100.07	58.77	44.49	2,320,907.79
	Q4	4201.14	56.55	50.45	2,452,035.98

Sources:

PSEI – Philippine Stock Exchange

FOREX – (in Philippine Pesos per U.S. Dollar), BSP

CRUDE – (in U.S. Dollar per Barrel), IMF International Financial Statistics

M2MONEY – in Philippine Pesos, BSP

Appendix 4. Data Table for LnPSEI, LNFOREX, LNCRUDE, and LNM2MONEY

PERIOD		PSEI	EXCHANGE RATES	CRUDE OIL PRICES	MONEY SUPPLY
1992	Q1	7.01	4.16	3.31	13.28
	Q2	7.36	4.14	3.43	13.31
	Q3	7.26	4.08	3.43	13.27
	Q4	7.15	4.08	3.36	13.32
1993	Q1	7.29	4.08	3.27	13.31
	Q2	7.37	4.14	3.26	13.34
	Q3	7.60	4.16	3.13	13.33
	Q4	8.08	4.17	3.04	13.45
1994	Q1	7.91	4.09	2.95	13.42
	Q2	7.92	4.07	3.09	13.43
	Q3	7.98	4.03	3.13	13.49
	Q4	7.93	3.96	3.11	13.59
1995	Q1	7.78	3.97	3.14	13.68
	Q2	7.93	3.99	3.16	13.69
	Q3	7.87	3.96	3.02	13.68
	Q4	7.86	3.97	3.04	13.76
1996	Q1	7.97	3.95	3.06	13.79
	Q2	8.09	3.95	3.09	13.79
	Q3	8.06	3.94	3.17	13.80
	Q4	8.06	3.94	3.29	13.86
1997	Q1	8.08	3.93	3.16	13.89
	Q2	7.94	3.93	3.06	13.91
	Q3	7.63	4.04	3.05	13.96
	Q4	7.53	4.20	3.05	14.00
1998	Q1	7.71	4.31	2.65	13.99
	Q2	7.47	4.25	2.58	13.98
	Q3	7.14	4.32	2.60	13.95
	Q4	7.59	4.26	2.52	13.98
1999	Q1	7.61	4.19	2.44	13.98
	Q2	7.82	4.18	2.77	14.00
	Q3	7.65	4.21	3.01	14.02
	Q4	7.67	4.24	3.15	14.08

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2000	Q1	7.43	4.25	3.21	14.07
	Q2	7.34	4.28	3.23	14.08
	Q3	7.27	4.34	3.31	14.07
	Q4	7.31	4.41	3.29	14.10
2001	Q1	7.28	4.40	3.11	14.12
	Q2	7.25	4.43	3.16	14.14
	Q3	7.03	4.45	3.10	14.11
	Q4	7.06	4.43	2.82	14.13
2002	Q1	7.25	4.42	2.91	14.16
	Q2	7.05	4.40	3.10	14.17
	Q3	7.03	4.42	3.14	14.16
	Q4	6.93	4.45	3.12	14.19
2003	Q1	6.95	4.47	3.24	14.19
	Q2	7.11	4.44	3.07	14.18
	Q3	7.17	4.47	3.14	14.16
	Q4	7.27	4.47	3.17	14.19
2004	Q1	7.26	4.48	3.22	14.19
	Q2	7.36	4.48	3.32	14.19
	Q3	7.47	4.45	3.38	14.15
	Q4	7.51	4.45	3.35	14.19
2005	Q1	7.58	4.41	3.48	14.22
	Q2	7.56	4.40	3.61	14.23
	Q3	7.57	4.42	3.74	14.23
	Q4	7.65	4.39	3.68	14.23
2006	Q1	7.69	4.32	3.75	14.22
	Q2	7.69	4.33	3.85	14.26
	Q3	7.85	4.31	3.86	14.28
	Q4	8.00	4.26	3.72	14.35
2007	Q1	8.07	4.25	3.68	14.53
	Q2	8.21	4.23	3.83	14.57
	Q3	8.18	4.19	3.89	14.52
	Q4	8.19	4.13	4.06	14.55
2008	Q1	8.00	4.06	4.13	14.53
	Q2	7.81	4.09	4.33	14.50
	Q3	7.85	4.12	4.26	14.50
	Q4	7.54	4.17	3.53	14.59

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2009	Q1	7.59	4.15	3.34	14.60
	Q2	7.80	4.15	3.61	14.60
	Q3	7.94	4.16	3.75	14.61
	Q4	8.02	4.12	3.84	14.66
2010	Q1	8.06	4.10	3.83	14.64
	Q2	8.12	4.08	3.85	14.66
	Q3	8.32	4.07	3.80	14.66
	Q4	8.34	4.04	3.92	14.71

*Values are computed by the author

*Exchange rates in Peso per US Dollar, Crude oil prices in US$ per barrel

Appendix 5. OLS Results for Log-Lin Model of LNM2MONEY

Dependent Variable: LNM2MONEY

	Coefficient	Std. Error	t-Statistic	Prob.
C	13.39832	0.022796	587.7575	0.0000
TIME	0.017238	0.000514	33.50779	0.0000

R-squared	0.938167	Mean dependent var	14.06198
Adjusted R-squared	0.937331	S.D. dependent var	0.393010
S.E. of regression	0.098385	Akaike info criterion	-1.773894
Sum squared resid	0.716291	Schwarz criterion	-1.712559
Log likelihood	69.40796	Hannan-Quinn criter.	-1.749381
F-statistic	1122.772	Durbin–Watson stat	0.148771
Prob(F-statistic)	0.000000		

Appendix 6. Augmented Dickey–Fuller Test Results on LNPSEI

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-1.445372	0.5555
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Included observations: 74 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
LNPSEI(-1)	-0.073265	0.050689	-1.445372	0.1528
D(LNPSEI(-1))	0.060289	0.116395	0.517973	0.6061
C	0.571580	0.386907	1.477305	0.1440

R-squared	0.029067	Mean dependent var	0.013328
Adjusted R-squared	0.001717	S.D. dependent var	0.152019
S.E. of regression	0.151888	Akaike info criterion	-0.891648
Sum squared resid	1.637973	Schwarz criterion	-0.798240
Log likelihood	35.99096	Hannan-Quinn criter.	-0.854386
F-statistic	1.062766	Durbin–Watson stat	1.930931
Prob(F-statistic)	0.350930		

Appendix 7. Dickey–Fuller Test Results on the First-Difference of LNPSEI

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-6.020749	0.0000
Test critical values:	1% level	-3.522887	
	5% level	-2.901779	
	10% level	-2.588280	

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

Included observations: 73 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
D(LNPSEI(-1))	-0.990308	0.164483	-6.020749	0.0000
D(LNPSEI(-1),2)	0.036203	0.116217	0.311515	0.7563
C	0.014796	0.018223	0.811976	0.4196

R-squared	0.480007	Mean dependent var	0.001671
Adjusted R-squared	0.465150	S.D. dependent var	0.211123
S.E. of regression	0.154401	Akaike info criterion	-0.858294
Sum squared resid	1.668786	Schwarz criterion	-0.764166
Log likelihood	34.32775	Hannan-Quinn criter.	-0.820783
F-statistic	32.30865	Durbin–Watson stat	2.001376
Prob(F-statistic)	0.000000		

Appendix 8. Dickey–Fuller Test Results on LNFOREX

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-1.400336	0.5777
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Included observations: 74 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
LNFOREX(-1)	-0.038163	0.027253	-1.400336	0.1658
D(LNFOREX(-1))	0.392191	0.110325	3.554879	0.0007
C	0.159974	0.115024	1.390790	0.1686

R-squared	0.159505	Mean dependent var	-0.001376
Adjusted R-squared	0.135829	S.D. dependent var	0.042835
S.E. of regression	0.039819	Akaike info criterion	-3.569227
Sum squared resid	0.112577	Schwarz criterion	-3.475819
Log likelihood	135.0614	Hannan-Quinn criter.	-3.531966
F-statistic	6.736999	Durbin–Watson stat	1.979032
Prob(F-statistic)	0.002094		

Appendix 9. Dickey–Fuller Test Results on the First-Difference of LNFOREX

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-4.903876	0.0001
Test critical values:	1% level	-3.522887	
	5% level	-2.901779	
	10% level	-2.588280	

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

Included observations: 73 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFOREX(-1))	-0.653038	0.133168	-4.903876	0.0000
D(LNFOREX(-1),2)	0.026616	0.118493	0.224617	0.8229
C	-0.000263	0.004699	-0.055919	0.9556

R-squared	0.322811	Mean dependent var	0.000307
Adjusted R-squared	0.303463	S.D. dependent var	0.048084
S.E. of regression	0.040130	Akaike info criterion	-3.553156
Sum squared resid	0.112729	Schwarz criterion	-3.459028
Log likelihood	132.6902	Hannan-Quinn criter.	-3.515644
F-statistic	16.68428	Durbin–Watson stat	1.960667
Prob(F-statistic)	0.000001		

Appendix 10. Dickey–Fuller Test Results on LNCRUDE

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-1.756582	0.3990
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Included observations: 74 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
LNCRUDE(-1)	-0.075847	0.043179	-1.756582	0.0833
D(LNCRUDE(-1))	0.270663	0.115858	2.336149	0.0223
C	0.256028	0.143796	1.780492	0.0793

R-squared	0.091078	Mean dependent var	0.006660
Adjusted R-squared	0.065475	S.D. dependent var	0.149071
S.E. of regression	0.144108	Akaike info criterion	-0.996807
Sum squared resid	1.474472	Schwarz criterion	-0.903399
Log likelihood	39.88185	Hannan-Quinn criter.	-0.959545
F-statistic	3.557271	Durbin–Watson stat	1.841522
Prob(F-statistic)	0.033705		

Appendix 11. Augmented Dickey–Fuller Test Results on the First-Difference of LNCRUDE

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-7.002439	0.0000
Test critical values:	1% level	-3.522887	
	5% level	-2.901779	
	10% level	-2.588280	

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

Included observations: 73 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
D(LNCRUDE(-1))	-0.995270	0.142132	-7.002439	0.0000
D(LNCRUDE(-1),2)	0.293387	0.114579	2.560551	0.0126
C	0.007438	0.016611	0.447792	0.6557

R-squared	0.435836	Mean dependent var	0.001731
Adjusted R-squared	0.419717	S.D. dependent var	0.186031
S.E. of regression	0.141712	Akaike info criterion	-1.029818
Sum squared resid	1.405752	Schwarz criterion	-0.935690
Log likelihood	40.58837	Hannan-Quinn criter.	-0.992306
F-statistic	27.03873	Durbin–Watson stat	1.934825
Prob(F-statistic)	0.000000		

Appendix 12. Augmented Dickey–Fuller Test Results on LNMONEY

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-1.074336	0.7219
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Included observations: 74 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
LNMONEY(-1)	-0.012672	0.011795	-1.074336	0.2863
D(LNMONEY(-1))	0.070188	0.118254	0.593531	0.5547
C	0.195835	0.166093	1.179067	0.2423

R-squared	0.021885	Mean dependent var	0.018920
Adjusted R-squared	-0.005667	S.D. dependent var	0.038144
S.E. of regression	0.038251	Akaike info criterion	-3.649573
Sum squared resid	0.103886	Schwarz criterion	-3.556165
Log likelihood	138.0342	Hannan-Quinn criter.	-3.612311
F-statistic	0.794313	Durbin–Watson stat	1.921719
Prob(F-statistic)	0.455866		

Appendix 13. Augmented Dickey–Fuller Test Results on the First-Difference of LNMONEY

		t-Statistic	Prob.*
Augmented Dickey–Fuller test statistic		-6.317897	0.0000
Test critical values:	1% level	-3.522887	
	5% level	-2.901779	
	10% level	-2.588280	

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

Included observations: 73 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
D(LNMONEY(-1))	-1.007544	0.159475	-6.317897	0.0000
D(LNMONEY(-1),2)	0.099703	0.117880	0.845806	0.4005
C	0.019881	0.005348	3.717076	0.0004

R-squared	0.468360	Mean dependent var	0.001277
Adjusted R-squared	0.453171	S.D. dependent var	0.051398
S.E. of regression	0.038008	Akaike info criterion	-3.661821
Sum squared resid	0.101122	Schwarz criterion	-3.567692
Log likelihood	136.6565	Hannan-Quinn criter.	-3.624309
F-statistic	30.83406	Durbin–Watson stat	1.955725
Prob(F-statistic)	0.000000		

Appendix 14. OLS Results of the Initial Regression without Lags (with AR (1))

	Coefficient	Std. Error	t-Statistic	Prob.
C	8.758177	2.491527	3.515185	0.0008
LNFOREX	-1.335140	0.339097	-3.937335	0.0002
LNCRUDE	0.111404	0.110544	1.007779	0.3170
LNMONEY	0.296175	0.183427	1.614676	0.1109
AR(1)	0.737685	0.088825	8.304906	0.0000

R-squared	0.851408	Mean dependent var	7.643700
Adjusted R-squared	0.842917	S.D. dependent var	0.367155
S.E. of regression	0.145517	Akaike info criterion	-0.952705
Sum squared resid	1.482267	Schwarz criterion	-0.798206
Log likelihood	40.72645	Hannan-Quinn criter.	-0.891016
F-statistic	100.2723	Durbin–Watson stat	1.797751
Prob(F-statistic)	0.000000		

Inverted AR Roots	.74

Appendix 15. Full Results of White's General Heteroskedasticity Test (no cross terms)

Heteroskedasticity Test: White

F-statistic	1.325337	Prob. F(19,52)	0.2085
Obs*R-squared	23.49090	Prob. Chi-Square(19)	0.2164
Scaled explained SS	16.10187	Prob. Chi-Square(19)	0.6505

Included observations: 72

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.168920	0.120645	-1.400138	0.1674
LNPSEI(-1)^2	0.004524	0.001557	2.905930	0.0054
LNPSEI(-2)^2	-0.002852	0.001984	-1.437537	0.1566
LNPSEI(-3)^2	-0.000763	0.001829	-0.417241	0.6782
LNPSEI(-4)^2	0.000887	0.001304	0.679918	0.4996
LNFOREX^2	0.011841	0.009755	1.213824	0.2303
LNFOREX(-1)^2	0.007933	0.014876	0.533280	0.5961
LNFOREX(-2)^2	-0.028989	0.015593	-1.859106	0.0687
LNFOREX(-3)^2	0.014395	0.016356	0.880119	0.3828
LNFOREX(-4)^2	-0.002001	0.010607	-0.188605	0.8511
LNCRUDE^2	-0.007368	0.003428	-2.149110	0.0363
LNCRUDE(-1)^2	0.003516	0.004972	0.707177	0.4826
LNCRUDE(-2)^2	-0.001021	0.005473	-0.186582	0.8527
LNCRUDE(-3)^2	0.002382	0.005182	0.459661	0.6477
LNCRUDE(-4)^2	-0.000991	0.003038	-0.326273	0.7455
LNMONEY^2	-0.001609	0.002760	-0.582900	0.5625
LNMONEY(-1)^2	-0.000878	0.003775	-0.232598	0.8170
LNMONEY(-2)^2	0.002860	0.003909	0.731730	0.4676
LNMONEY(-3)^2	-0.003435	0.003797	-0.904819	0.3697
LNMONEY(-4)^2	0.003379	0.002607	1.296260	0.2006

R-squared	0.326263	Mean dependent var	0.013097
Adjusted R-squared	0.080089	S.D. dependent var	0.021382
S.E. of regression	0.020508	Akaike info criterion	-4.705919
Sum squared resid	0.021869	Schwarz criterion	-4.073511
Log likelihood	189.4131	Hannan-Quinn criter.	-4.454155
F-statistic	1.325337	Durbin–Watson stat	1.971206
Prob(F-statistic)	0.208537		

Appendix 16. Full Results of Autoregressive Conditional Heteroskedasticity Test

Heteroskedasticity Test: ARCH

F-statistic	1.206177	Prob. F(1,69)	0.2759
Obs*R-squared	1.219815	Prob. Chi-Square(1)	0.2694

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/21/11 Time: 17:10
Sample (adjusted): 1993Q2 2010Q4
Included observations: 71 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011523	0.002994	3.848560	0.0003
RESID^2(-1)	0.130942	0.119226	1.098261	0.2759

R-squared	0.017180	Mean dependent var	0.013252
Adjusted R-squared	0.002937	S.D. dependent var	0.021493
S.E. of regression	0.021461	Akaike info criterion	-4.817362
Sum squared resid	0.031781	Schwarz criterion	-4.753625
Log likelihood	173.0164	Hannan-Quinn criter.	-4.792016
F-statistic	1.206177	Durbin–Watson stat	1.997476
Prob(F-statistic)	0.275908		

Appendix 17. Full Results of Breusch–Godfrey/Lagrange Multiplier Test

Breusch–Godfrey Serial Correlation LM Test:

F-statistic	0.141602	Prob. F(4,48)	0.9658
Obs*R-squared	0.839702	Prob. Chi-Square(4)	0.9330

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.521104	2.264752	-0.230093	0.8190
LNPSEI(-1)	0.263933	0.451531	0.584530	0.5616
LNPSEI(-2)	-0.282438	0.585361	-0.482502	0.6316
LNPSEI(-3)	0.066910	0.385107	0.173745	0.8628
LNPSEI(-4)	0.000545	0.189474	0.002876	0.9977
LNFOREX	-0.053192	0.605174	-0.087895	0.9303
LNFOREX(-1)	0.550108	1.311516	0.419444	0.6768
LNFOREX(-2)	-0.982089	1.889049	-0.519886	0.6055
LNFOREX(-3)	0.859925	1.864568	0.461193	0.6467
LNFOREX(-4)	-0.334579	0.943734	-0.354526	0.7245
LNCRUDE	-0.003765	0.168128	-0.022391	0.9822
LNCRUDE(-1)	-0.048618	0.251116	-0.193607	0.8473
LNCRUDE(-2)	0.054964	0.275748	0.199327	0.8428
LNCRUDE(-3)	0.031141	0.251492	0.123827	0.9020
LNCRUDE(-4)	-0.051811	0.158497	-0.326890	0.7452
LNMONEY	0.040333	0.569468	0.070826	0.9438
LNMONEY(-1)	-0.353669	0.957143	-0.369505	0.7134
LNMONEY(-2)	0.497386	1.148914	0.432919	0.6670
LNMONEY(-3)	-0.366298	1.088714	-0.336450	0.7380
LNMONEY(-4)	0.185124	0.645803	0.286656	0.7756
RESID(-1)	-0.306042	0.473319	-0.646587	0.5210
RESID(-2)	0.085061	0.373318	0.227850	0.8207
RESID(-3)	-0.004493	0.302597	-0.014849	0.9882
RESID(-4)	0.035814	0.211096	0.169656	0.8660

R-squared	0.011663	Mean dependent var	-3.20E-15
Adjusted R-squared	-0.461916	S.D. dependent var	0.115245
S.E. of regression	0.139342	Akaike info criterion	-0.842563
Sum squared resid	0.931983	Schwarz criterion	-0.083674
Log likelihood	54.33226	Hannan-Quinn criter.	-0.540447
F-statistic	0.024626	Durbin–Watson stat	2.008580
Prob(F-statistic)	1.000000		

Appendix 18. Full Results of Ramsey's RESET

Ramsey RESET Test:

F-statistic	0.733045	Prob. F(1,51)	0.3959
Log likelihood ratio	1.027521	Prob. Chi-Square(1)	0.3107

Included observations: 72

	Coefficient	Std. Error	t-Statistic	Prob.
C	4.148757	1.563585	2.653362	0.0106
LNPSEI(-1)	2.400368	1.889234	1.270551	0.2097
LNPSEI(-2)	-0.162997	0.235529	-0.692045	0.4920
LNPSEI(-3)	0.274065	0.280230	0.978000	0.3327
LNPSEI(-4)	-0.572600	0.475066	-1.205306	0.2336
LNFOREX	-5.109179	4.085566	-1.250544	0.2168
LNFOREX(-1)	7.935018	6.291527	1.261223	0.2130
LNFOREX(-2)	-5.475324	4.353153	-1.257784	0.2142
LNFOREX(-3)	1.063708	1.251706	0.849807	0.3994
LNFOREX(-4)	0.182604	0.628379	0.290594	0.7725
LNCRUDE	0.723998	0.591756	1.223474	0.2268
LNCRUDE(-1)	-0.797388	0.664681	-1.199655	0.2358
LNCRUDE(-2)	0.189613	0.287357	0.659853	0.5123
LNCRUDE(-3)	-0.396989	0.395262	-1.004368	0.3199
LNCRUDE(-4)	0.665142	0.541218	1.228972	0.2247
LNMONEY	3.312743	2.670661	1.240421	0.2205
LNMONEY(-1)	-4.457052	3.575377	-1.246597	0.2182
LNMONEY(-2)	3.114589	2.568164	1.212769	0.2308
LNMONEY(-3)	-2.869603	2.344632	-1.223903	0.2266
LNMONEY(-4)	0.985788	0.877549	1.123343	0.2666
FITTED^2	-0.135268	0.157990	-0.856181	0.3959

R-squared	0.901953	Mean dependent var	7.659900
Adjusted R-squared	0.863503	S.D. dependent var	0.365431
S.E. of regression	0.135010	Akaike info criterion	-0.928436
Sum squared resid	0.929619	Schwarz criterion	-0.264408
Log likelihood	54.42370	Hannan-Quinn criter.	-0.664085
F-statistic	23.45787	Durbin–Watson stat	2.077292
Prob(F-statistic)	0.000000		

Appendix 19. Full Results of Johansen Cointegration Test

Option 2 - Intercept (no trend) in CE – no intercept in VAR

Trend assumption: No deterministic trend (restricted constant)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.291418	65.96315	54.07904	0.0031
At most 1 *	0.230365	41.50442	35.19275	0.0091
At most 2 *	0.201120	22.91383	20.26184	0.0211
At most 3	0.093520	6.971208	9.164546	0.1279

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.291418	24.45873	28.58808	0.1543
At most 1	0.230365	18.59059	22.29962	0.1523
At most 2 *	0.201120	15.94262	15.89210	0.0491
At most 3	0.093520	6.971208	9.164546	0.1279

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	C
5.264090	9.932630	-3.872665	1.242245	-86.77364
1.471863	2.068999	-0.964934	-1.129219	0.610022
6.650462	10.89815	1.819515	-3.903152	-47.35028
1.545006	-4.196608	-1.871182	0.568407	4.165269

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Unrestricted Adjustment Coefficients (alpha):

D(LNPSEI)	-0.018094	0.018226	-0.014749	-0.036859
D(LNRFOREX)	-0.006648	0.005482	-0.008143	0.006127
D(LNCRUDE)	0.043565	0.002187	-0.035246	-0.002808
D(LNM2MONEY)	-0.001171	0.016256	0.003894	0.000680

1 Cointegrating Equation(s): Log likelihood 398.3929

Normalized cointegrating coefficients (standard error in parentheses)

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	C
1.000000	1.886865	-0.735676	0.235985	-16.48407
	(0.31539)	(0.18326)	(0.18587)	(2.10233)

Adjustment coefficients (standard error in parentheses)

D(LNPSEI)	-0.095251
	(0.09570)
D(LNRFOREX)	-0.034994
	(0.02230)
D(LNCRUDE)	0.229331
	(0.07478)
D(LNM2MONEY)	-0.006162
	(0.02513)

2 Cointegrating Equation(s): Log likelihood 407.6882

Normalized cointegrating coefficients (standard error in parentheses)

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	C
1.000000	0.000000	-0.421610	-3.697971	49.78268
		(2.99884)	(2.86997)	(34.2087)
0.000000	1.000000	-0.166448	2.084916	-35.12002
		(1.60871)	(1.53958)	(18.3511)

Adjustment coefficients (standard error in parentheses)

D(LNPSEI)	-0.068425	-0.142017
	(0.09844)	(0.18272)
D(LNRFOREX)	-0.026924	-0.054685
	(0.02279)	(0.04231)
D(LNCRUDE)	0.232550	0.437241
	(0.07763)	(0.14409)
D(LNM2MONEY)	0.017765	0.022007
	(0.02313)	(0.04292)

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3 Cointegrating Equation(s):		Log likelihood	415.6595	
Normalized cointegrating coefficients (standard error in parentheses)				
LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	C
1.000000	0.000000	0.000000	-3.831033	50.06530
			(1.90848)	(26.9831)
0.000000	1.000000	0.000000	2.032384	-35.00844
			(1.12242)	(15.8694)
0.000000	0.000000	1.000000	-0.315604	0.670342
			(0.30361)	(4.29267)
Adjustment coefficients (standard error in parentheses)				
D(LNPSEI)	-0.166511	-0.302750	0.025652	
	(0.15407)	(0.26649)	(0.07850)	
D(LNRFOREX)	-0.081081	-0.143432	0.005637	
	(0.03461)	(0.05986)	(0.01763)	
D(LNCRUDE)	-0.001853	0.053125	-0.234954	
	(0.11508)	(0.19904)	(0.05863)	
D(LNM2MONEY)	0.043660	0.064441	-0.004068	
	(0.03613)	(0.06250)	(0.01841)	

Appendix 20. Full Results of Johansen Cointegration Test

Option 3 - Intercept (no trend) in CE and test VAR

Trend assumption: Linear deterministic trend

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.290734	51.24439	47.85613	0.0232
At most 1	0.201208	26.85410	29.79707	0.1053
At most 2	0.112079	10.90362	15.49471	0.2175
At most 3	0.034105	2.463675	3.841466	0.1165

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.290734	24.39029	27.58434	0.1217
At most 1	0.201208	15.95048	21.13162	0.2278
At most 2	0.112079	8.439945	14.26460	0.3357
At most 3	0.034105	2.463675	3.841466	0.1165

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY
-5.344232	-10.05474	3.936228	-1.159610
6.720869	10.97117	1.759514	-3.972232
1.634816	-2.677770	-2.000520	-0.488519
0.304223	-5.071483	-0.388097	3.053384

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Unrestricted Adjustment Coefficients (alpha):

D(LNPSEI)	0.015563	-0.013882	-0.025335	-0.018313
D(LNRFOREX)	0.006073	-0.007777	0.007967	0.000281
D(LNCRUDE)	-0.043716	-0.035168	-0.001891	-0.001208
D(LNM2MONEY)	-0.000530	0.004800	0.006668	-0.004229

1 Cointegrating Equation(s): Log likelihood 405.7181

Normalized cointegrating coefficients (standard error in parentheses)

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY
1.000000	1.881419	-0.736538	0.216984
	(0.31410)	(0.18251)	(0.18511)

Adjustment coefficients (standard error in parentheses)

D(LNPSEI)	-0.083170
	(0.09602)
D(LNRFOREX)	-0.032454
	(0.02274)
D(LNCRUDE)	0.233627
	(0.07658)
D(LNM2MONEY)	0.002835
	(0.02363)

2 Cointegrating Equation(s): Log likelihood 413.6933

Normalized cointegrating coefficients (standard error in parentheses)

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY
1.000000	0.000000	6.806329	-5.887909
		(1.80386)	(1.72635)
0.000000	1.000000	-4.009137	3.244833
		(1.02313)	(0.97916)

Adjustment coefficients (standard error in parentheses)

D(LNPSEI)	-0.176469	-0.308780
	(0.15340)	(0.26586)
D(LNRFOREX)	-0.084724	-0.146385
	(0.03536)	(0.06128)
D(LNCRUDE)	-0.002731	0.053719
	(0.11585)	(0.20077)
D(LNM2MONEY)	0.035096	0.057996
	(0.03755)	(0.06507)

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3 Cointegrating Equation(s):		Log likelihood	417.9133
Normalized cointegrating coefficients (standard error in parentheses)			
LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY
1.000000	0.000000	0.000000	-0.803505
			(0.35423)
0.000000	1.000000	0.000000	0.249964
			(0.20119)
0.000000	0.000000	1.000000	-0.747011
			(0.16723)
Adjustment coefficients (standard error in parentheses)			
D(LNPSEI)	-0.217887	-0.240940	0.087514
	(0.15317)	(0.26496)	(0.08329)
D(LNRFOREX)	-0.071700	-0.167719	-0.005719
	(0.03470)	(0.06003)	(0.01887)
D(LNCRUDE)	-0.005823	0.058783	-0.230169
	(0.11790)	(0.20396)	(0.06411)
D(LNM2MONEY)	0.045997	0.040141	-0.006981
	(0.03737)	(0.06465)	(0.02032)

Appendix 21. Full Results of Johansen Cointegration Test

Option 4 - Intercept and Trend in CE – No Trend in VAR

Trend assumption: Linear deterministic trend (restricted)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.305096	66.92621	63.87610	0.0271
At most 1	0.219890	41.08347	42.91525	0.0754
At most 2	0.201193	23.45268	25.87211	0.0971
At most 3	0.100291	7.503545	12.51798	0.2949

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.305096	25.84274	32.11832	0.2400
At most 1	0.219890	17.63078	25.82321	0.4060
At most 2	0.201193	15.94914	19.38704	0.1474
At most 3	0.100291	7.503545	12.51798	0.2949

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	@TREND(92Q2)
-4.741774	-6.874882	5.927274	8.353442	-0.202402
2.861745	8.274009	3.072906	20.54541	-0.428645
6.651375	10.77485	1.668242	-4.555598	0.012149
-1.219567	3.514701	3.219643	7.358105	-0.132538

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Unrestricted Adjustment Coefficients (alpha):

D(LNPSEI)	-0.008150	-0.059450	-0.012171	0.005699
D(LNRFOREX)	0.007951	0.003659	-0.007914	-0.006464
D(LNCRUDE)	-0.043761	0.008195	-0.035307	0.001285
D(LNM2MONEY)	-0.002875	-0.004203	0.004914	-0.009008

1 Cointegrating Equation(s): Log likelihood 406.4443

Normalized cointegrating coefficients (standard error in parentheses)

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	@TREND(92Q2)
1.000000	1.449854	-1.250012	-1.761670	0.042685
	(0.49955)	(0.35455)	(1.08286)	(0.02356)

Adjustment coefficients (standard error in parentheses)

D(LNPSEI)	0.038648
	(0.08563)
D(LNRFOREX)	-0.037704
	(0.01989)
D(LNCRUDE)	0.207503
	(0.06794)
D(LNM2MONEY)	0.013633
	(0.02089)

2 Cointegrating Equation(s): Log likelihood 415.2597

Normalized cointegrating coefficients (standard error in parentheses)

LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	@TREND(92Q2)
1.000000	0.000000	-3.587454	-10.75516	0.236284
		(0.75136)	(2.32985)	(0.04661)
0.000000	1.000000	1.612191	6.203032	-0.133530
		(0.41436)	(1.28488)	(0.02571)

Adjustment coefficients (standard error in parentheses)

D(LNPSEI)	-0.131482	-0.435853
	(0.08921)	(0.17327)
D(LNRFOREX)	-0.027234	-0.024394
	(0.02307)	(0.04481)
D(LNCRUDE)	0.230956	0.368657
	(0.07911)	(0.15365)
D(LNM2MONEY)	0.001606	-0.015009
	(0.02419)	(0.04698)

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3 Cointegrating Equation(s):		Log likelihood	423.2343	
Normalized cointegrating coefficients (standard error in parentheses)				
LNPSEI	LNRFOREX	LNCRUDE	LNM2MONEY	@TREND(92Q2)
1.000000	0.000000	0.000000	-10.69170	0.183212
			(2.72769)	(0.04790)
0.000000	1.000000	0.000000	6.174514	-0.109680
			(1.51211)	(0.02655)
0.000000	0.000000	1.000000	0.017689	-0.014794
			(0.73648)	(0.01293)
Adjustment coefficients (standard error in parentheses)				
D(LNPSEI)	-0.212434	-0.566990	-0.251297	
	(0.13866)	(0.24391)	(0.11024)	
D(LNRFOREX)	-0.079873	-0.109667	0.045171	
	(0.03480)	(0.06122)	(0.02767)	
D(LNCRUDE)	-0.003886	-0.011772	-0.293098	
	(0.11628)	(0.20455)	(0.09245)	
D(LNM2MONEY)	0.034289	0.037936	-0.021760	
	(0.03734)	(0.06569)	(0.02969)	

Appendix 22. Full Results of Granger Causality Test

VEC Granger Causality/Block Exogeneity Wald Tests
Sample: 1992Q1 2010Q4
Included observations: 73

Dependent variable: D(LNPSEI)

Excluded	Chi-sq	df	Prob.
D(LNRFOREX)	8.305262	2	0.0157
D(LNCRUDE)	2.444722	2	0.2945
D(LNM2MONEY)	1.629839	2	0.4427
All	8.853130	6	0.1820

Dependent variable: D(LNRFOREX)

Excluded	Chi-sq	df	Prob.
D(LNPSEI)	5.750381	2	0.0564
D(LNCRUDE)	6.182563	2	0.0454
D(LNM2MONEY)	0.555128	2	0.7576
All	11.73116	6	0.0682

Dependent variable: D(LNCRUDE)

Excluded	Chi-sq	df	Prob.
D(LNPSEI)	2.988696	2	0.2244
D(LNRFOREX)	22.28204	2	0.0000
D(LNM2MONEY)	1.383160	2	0.5008
All	38.53923	6	0.0000

Dependent variable: D(LNM2MONEY)

Excluded	Chi-sq	df	Prob.
D(LNPSEI)	0.251630	2	0.8818
D(LNRFOREX)	1.144919	2	0.5641
D(LNCRUDE)	3.702932	2	0.1570
All	4.666115	6	0.5873