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FACULTY OF BUSINESS STUDIES

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RELATIONSHIP BETWEEN STOCK RETURN AND MACROECONOMIC VARIABLES IN VIETNAMESE STOCK MARKET - AN APPLICATION OF VAR AND VECM

Master's Thesis in
Accounting and Finance

Line: Finance

VAASA 2008

Faculty of Business Studies	
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Topic of the Thesis:	Relationship between stock return and macroeconomic variables in Vietnamese Stock market-An application of VAR and VECM
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Department:	Department of Accounting and Finance
Major Subject:	Accounting and Finance
Line:	Finance
Year of Entering the University:	2006
Year of Completing the Thesis:	2008 **Pages: 68**

ABSTRACT

This study examines the long-run equilibrium relationships and the short-run dynamic adjustment between four of domestic macroeconomic variables and stock returns of Vietnamese stock market. The macroeconomic variables analyzed are interest rate, inflation rate, exchange rate, and the industrial productivity using monthly observations from September 2000 through December 2006. In addition, the relationship of Vietnam index with Chinese index is examined. The approaches applied in this paper are co-integration test, variance decomposition and impulse response function. Econometric results support the existence of long-run equilibrium relationships between the macroeconomic variables and the Vietnamese stock market. The short-run dynamic adjustment between macroeconomic variables and Vietnamese Stock market is weak and statistically insignificant based on empirical results. Empirical results support that Chinese Stock market index is the main driven of Vietnamese Stock Market.

KEYWORDS: Relationship, VAR, VECM

1. INTRODUCTION

In the last decade, relationship between stock return and economic variables came into the focus of financial and economic researchers. Plenty amount of studies exam the relationship between stock return and economic variables at both theoretical and empirical level. There are many directions of studying. Some researches focus on testing relationship between stock market return and one or few macroeconomic variables, and testing respectively theory in particular stock market. For example, the relationship between stock market return and inflation in US market. While some other researchers focus on testing the effect of macroeconomic variables on stock price, or exam the role of stock plays in real economic. While others study the long-run equilibrium relationship as well as short-run dynamic adjustment between stock return and macroeconomic variables. The study of this paper belongs to the latter type; the long-run equilibrium relationship and short-run dynamic adjustment between stock return and macroeconomic variables for Vietnamese Market will be examined using co-integration study, relationship between stock return and macroeconomic variables will be further analysed based on results of Granger-Causality test, Variance decomposition and Impulse Response function.

1.1 Research problem

The purpose of this paper is to analyse the interrelation between stock returns and relevant macroeconomic variables for Vietnamese stock market. It attempts to find whether there exists long-term equilibrium relationship as well as short-run dynamic adjustment between the Vietnamese stock market return and selected macroeconomic factors, which are exchange rate, inflation real economic activity, interest rate and Chinese stock market index. Whether stock market index and macroeconomic factors have effect on each other will be analysed based on empirical results. Hence a research question of this paper is: How are the dynamic relationship and the interaction between:

Vietnam Stock market index and its exchange rate?
Vietnam Stock market index and its inflation?
Vietnam Stock market index and its interest rate?
Vietnam Stock market and its real economic activity?

Vietnam Stock market and Chinese Stock market?

The affecting factors on Vietnamese stock market return and the role of stock market play on real economic factors will be found out through result analysis. The empirical results are obtained from co-integration test, Granger-Causality test, Variance decomposition and Impulse Response function.

1.2 Hypothesis

Five hypotheses will be tested in this paper regarding the long-term equilibrium relationship between stock return and each selected macroeconomic variable.

Hypothesis 1: There is a positive relation between the exchange rate (EX) and stock prices (VNI). When the VND depreciates against the U.S. dollar, which means an increase of exchange rate (USD/VND), Vietnam products become cheaper in the foreign countries. As a result, if the demand for these goods is elastic, the volume of Vietnam exports should increase, causing higher VND denominated cash flows to Vietnamese companies and thus leading an increase of stock price. The opposite should hold when the VND appreciates against the U.S. dollar. Alternatively, if the VND is expected to appreciate, which means a decrease of exchange rate, the market will attract investments. This rise in demand will push up the stock market level, suggesting that stock market returns will be positively correlated to the changes in the exchange rates (Mukherjee and Naka (1995)).

Hypothesis 2: There is a negative relation between inflation and stock prices. An increase in inflation increases the nominal risk-free rate. If cash flows increase with inflation, the effect of a higher discount rate would be neutralized. However, cash flows may not rise at the same rate as inflation. Thus an increase of nominal risk-free rate will raise the discount rate in the valuation model, which in term reduce stock price. DeFina (1991) attributes this to nominal contracts that disallow the immediate adjustment of the firm's revenues and costs.

Hypothesis 3: There is a negative relationship between interest rate and stock return.

Interest rates can influence the level of corporate profits, which in turn influence the price that investors are willing to pay for the stock, through expectations of higher future dividends payment. Most companies finance their capital equipments and inventories through borrowings. A reduction in interest rates reduces the costs of borrowing and thus serves as an incentive for expansion. This will have a positive effect on future expected returns for the firm. As substantial amount of stocks are purchased with borrowed money, hence an increase in interest rates would make stock transactions more costly. Investors will require a higher rate of return before investing. This will reduce demand and lead to a price depreciation.

Hypothesis 4: there is a positive effect between the level of real economic activity (proxied in this study by the Industrial Production Index) and stock price. stock valuation involves discounting cash flows or expected dividend streams over long periods in the future, the price of a firm's stock reflects investor's expectations of future earnings, which are likely to be influenced by measures for real activity. A higher lever of IP has impact on stock return through its effect on expected future cash flows, will likely affect stock prices in the same direction.

Hypothesis 5, there is a positive relationship between Chinese stock index and Vietnam stock market index. The close relationship between Vietnamese Stock market and Chinese stock market may due to the close relationship of both countries in many disciplines. For instance, Vietnam is closely following China's economic reforms and transformation, Vietnam is rapidly adopting Chinese-style economic reforms, especially regarding the transformation of state-owned enterprises, the establishment of a stock market and the restructuring of wages and social policies in its run up to membership in the World Trade Organization.

1.3 Contribution

Three decades after the end of the Vietnam War, corks are popping. Vietnam's stock market is the second-best-performing exchange in the world in year 2006. The booming and the fast development of Vietnamese Stock market have made it different from other developed markets. The relationship between stock market return and domestic economic factors is supposed to show different characteristics. For example, for the relationship between stock market return and real economic activity, positive long-run relationship and negative short-run relationship is expected. It is generally observed from emerging countries that in short-run the development of real economic will have a negative effect on stock market. Economists call such situation as “Short-termism Trap”. Meanwhile, stock market may not play the role of being predictors of real economic for such fast developing countries like Vietnam and China, so the effect of Vietnamese Stock return on real economic may be statistically insignificant both in short-term and long-term, which is quite different from developed market and from general recognized theory.

This study extends the literature by examining the long-run equilibrium relationship as well as short-run dynamic adjustment between stock return and short-run dynamic adjustment between stock return and macroeconomic variables for the case of Vietnamese Stock market. Beside generally tested macroeconomic variables, Chinese Stock Market index is also employed as one of the examining factor, and the relationship between Vietnamese Stock market and Chinese Stock Market is fully analyzed, which has never been tested before by other researchers in such kind of study.

1.4 Literature review

To exam relationship between stock return and macroeconomic variables, methodologies are developing from time to time. Empirical results are obtained based on analysed based on applied models.

Before regressing financial time series in applying econometric, it is commonly assumed that means and variances are constant while not dependent on time, or stationary. Based on this assumption, the method commonly used is Vector Autoregression (VAR). For example, Darrat and Mukherjee (1987) applied VAR model along with Akaike’s final prediction-error based on the Indian data over 1948-84, and results showed that there was a significant causal relationship between stock returns and certain macroeconomic variables. Darrat (1990) apply in examining the relation between stock returns and macroeconomic variables. Using the multivariate Granger-causality approaches, he tested the joint hypothesis that the stock market of Canada was efficient and the expected returns were constant over time. The main finding of his research was that the Canadian stock prices fully reflect all available information on monetary policy moves. Lee (1992) investigated the causal relationship and dynamic interaction among asset return, interest rates, real activity and inflation, using a multivariate VAR model with post-war U.S. data. It was found that prior stock returns were the Granger-cause of real stock returns. However VAR approach is deficient in its failure to incorporate potential long-term relations and, therefore, may suffer from misspecification bias.

Later the stationary assumption is suspected and proved to be unsatisfied by many evidences. For example, Nelson and Posser (1982) and Perron (1988) reported that a large number of macroeconomic time series data for the U.S. are characterized by unit root non-stationary processes. To avoid this conflict, many development and revolution on models and techniques has been made. Cointegration analysis (Granger, 1986; Engle and Granger, 1987; Johansen, 1988; Johansen and Juselius, 1990) has been regarded as perhaps the most revolutionary development in econometrics since the mid 1980s. It refers to a group of variables that drift together, although individually they are non-stationary in the sense that they tend upwards and downwards over time. This common drifting of variables makes linear relationships between these variables over long period of time thus translating into equilibrium relationships of economic variables. If these linear relationships do not hold over long period of time then the corresponding variables are 'not-cointegrated'. In other word a necessary condition to conclude that a long-term relationship exists is that the series must be cointegrated.

Generally, cointegration analysis is a technique used in the estimation of the long-run or, equilibrium parameters in a relationship with non-stationary variables and is used for testing the dynamic (error-correction) models (ECM) in order to verify the validity of underlying economic theories. The four desirable features of ECM summarized by Augustine and Shwiff (1993) are: (i) it avoids the possibility of spurious correlation among strongly trended variables; (ii) the long-run relationships that may be lost by expressing the data in differences to achieve stationary are captured through inclusion of lagged levels of the variables on the right-hand side; (iii) the specification attempts to distinguish between short-run (first- differences) and long-run (lagged-levels) effects; and (iv) it provides a more general lag structure, and does not impose too specific of a structure on the model.

The development of cointegration technique has encouraged many researchers to examine the relationships between economic growth and stock markets. However, most of results found that the relation is not significant. For example, Poon & Taylor (1991) based on the analysis on monthly and annual growth rate of industrial production, the unanticipated inflation, risk premium, term structure and return on value weighted market index of UK stock market, there was no significant relationship between British stock market price and economic growth. Leigh (1997) observed that stock returns were Granger causal for industrial production growth in Singapore while Singapore stock market could predict the future directions of the economy but it didn’t run in the reverse direction.

Long-run relationships between the stock market index and various macroeconomic variables are commonly observed. Mukherjee and Naka (1995) examined the dynamic relationship between six macroeconomic variables and the Japanese stock market, by applying a vector error correction to a model of seven equations. It was found that there was a long-term equilibrium relationship between the Japanese stock market and the six macroeconomic variables such as exchange rate, money supply, inflation, industrial production, long-term government bond rate and call money rate.

Mookerjee &Yu (1997) tested for the presence of informational inefficiencies in the Singapore stock market. A subset of macroeconomic variables that are especially pertinent in the context of a small open economy were used in their researched, which were narrow and broad money supply, nominal exchange rates and fused in foreign currency reserves. The techniques of co integration and causality together with forecasting equations were applied to test for informational inefficiencies in both the long and short run respectively. Results indicated that three of the four macro-variables are co-integrated with stock prices, suggesting potential inefficiencies in the long run. The causality tests and forecasting equations provide conflicting evidence on the informational efficiency of the stock market in the short run. Finally, the implications of these findings at both the macro and micro level are discussed. It was indicated from the findings that not all macroeconomic variables were co-integrated with stock prices in Singapore.

Cheung & Ng (1998) obtained evidence of co-integration between stock market indices and various macroeconomic variables, including oil prices. They found empirical evidence of long run co-movements between five national stock market indexes and measures of aggregate real activity including the real oil price, real consumption, real money, and real output, using the Johansen co-integration technique. Real returns on these indexes were typically related to transitory deviations from the long run relationship and to changes in the macroeconomic variables. Further, the constraints implied by the co-integration results yield some incremental information on stock return variation that is not already contained in dividend yields, interest rate spreads, and future GNP growth rates.

Co-integration between stock market returns and several macroeconomic variables also observed in South Korea. o investigate whether current economic activities in Korea can explain stock market returns, a co-integration test and a Granger causality test from a vector error correction model were applied by Kwon & Shin (1999). It was found that the Korean stock market reflects macroeconomic variables on stock price indices. The co-integration test and the vector error correction model illustrate that stock price indices are co-integrated with a set of macroeconomic variables, which is, the production index, exchange rate, trade balance, and money supply. Results indicated a direct long-run equilibrium relation with each stock price index. However, the stock price indices are not a leading indicator for economic variables, which is inconsistent with the previous findings that the stock market rationally signals changes in real activities.

Ibrahim (1999) investigated the dynamic interactions between seven macroeconomic variables and the stock prices for an emerging market, Malaysia, using co-integration and Granger causality tests. Results strongly suggested informational inefficiency in the Malaysian market. The bivariate analysis suggested co-integration between the stock prices and three macroeconomic variables – consumer prices, credit aggregates and official reserves. From bivariate error-correction models, reactions of the stock prices to deviations from the long run equilibrium were observed. These results were further strengthened when the analysis was extended to multivariate settings. Further more, it was noticed that the stock prices were Granger-caused by changes in the official reserves and exchange rates in the short run.

Ibrahim & Aziz (2003) analysed dynamic linkages between stock prices and four macroeconomic variables for the case of Malaysia using co-integration and vector Autoregression. Empirical results suggested that there was a long-run relationship between these variables and the stock prices and substantial short-run interactions among them. Particularly, positive short-run and long run relationships between the stock prices and two macroeconomic variables were documented. The exchange rate was negatively associated with the stock prices. Moreover immediate positive liquidity effects and negative long-run effects of money supply expansion on the stock prices were observed. Also the predictive role of the stock prices for the macroeconomic variables was noticed. The disappearance of the immediate positive liquidity effects of the money supply shocks and unstable interactions between the stock prices and the exchange rate over time was also indicated from the empirical results.

Groenewold (2004) analysed the interrelationships between the share market and the macro economy within the framework of a structural vector autoregressive (SVAR) model. The model applied in the paper had just two variables, which were real share prices and real output. A distinction between temporary and permanent shocks was also used to identify macroeconomic and share market-shocks. The identification of the SVAR was based on a simple theoretical model of the two-way linkage between output and share prices. In one direction a version of the net-present-value model is used and in the other direction the wealth effect is relied on as the basis for the influence of share prices on output. The estimated model is used to examine the dynamic interaction between the two variables. One of the major results showed that a macroeconomic boom caused an overvaluation in stock prices.

So far, most of the literature is rich in developed, it can be easy to find mainly about material markets such as the U.S., U.K., Japan, Singapore, Hong Kong and others. However, in emerging markets, such as Vietnam, research is still scarce. Few researches have been done based on Vietnam market due to its less development and unavailability of stock data. Only some papers based on other markets may show some similarity with Vietnam. For instance, Habibullah (1996) tried to find out whether macroeconomic variables, in particular money supply and output were important in predicting stock prices in Malaysia. Monthly data on stock price indices, money supply and output were employed in his study. The stock price indexes used were Composite, Industrial, Finance, Property, Plantation and Tin. For money supply we used both M1 and M2, and output was measured by real Gross Domestic Product (GDP). Results suggested that Ma1aysia's stock market is informationally efficient with respect to money supply as well as output.

Tsuyoshi (1997) examines the relationship between stock prices and macroeconomic variables in Zimbabwe, which is somehow at the same situation in Vietnam. He shows, using the revised dividend discount model, error correction model, and multi factor return generating model that recent increases of stock prices in the Zimbabwe Stock Exchange can be explained by the movements of monetary aggregates and market interest rates.

1.5 Structure of the paper

The paper is set up as follows. Section 2 will present an introduction of theoretical and empirical background of relationship between stock return and macroeconomic variables. Methodologies used in this paper will be introduced in section 3. Section 3 presents a short introduction of development of Vietnamese economic and stock market. Empirical part in section 5 introduces data and regression models. Results and findings of assessment will be presented and analyzed in section 6. Conclusions, limitations and propose for future research are offered in Section 7.

2. THEORETICAL AND EMPIRICAL BACKGROUND

It is generally recognized that stock returns are affected by economic variables; movement of stock market index is used as representation of stock market return. Although stock return consists of price change and dividend, usually stock index is not adjusted for dividend payments since dividends are considered to be stable in absolute term, only price variation component is considered as stock return. One way of linking macroeconomic variables and stock market returns is through arbitrage pricing theory (APT) (Ross, 1976), where multiple risk factors can explain asset returns. A change in a given macroeconomic variable could be considered as reflecting a change in an underlying systematic risk factor influencing future returns. Most of the empirical studies based on APT theory link the state of the macro economy to stock market returns, those studies are characterized by modeling a short run relationship between macroeconomic variables and the stock price in terms of first differences, assuming trend stationary. The form of APT model concerning one risky asset return with multiple-macroeconomic factors can be expressed as:

(1) $$R = E(R) + b_1F_1 + b_2F_2 + ... + b_nF_n + \varepsilon$$

Where: E(R) is the risky asset's expected return,
F_k is the macroeconomic factor,
b_k is the sensitivity of the asset to factor k (k=1…n)
ε is the risky asset's idiosyncratic random shock with mean zero.

From the APT model, the uncertain return of an asset is a linear relationship among n factors. For a selection of relevant studies see Fama (1981, 1990), Fama and French (1989), Schwert (1990), Ferson and Harvey (1991) and Black, Fraser and MacDonald (1997). Generally, these papers found a significant relationship between stock market returns and changes in macroeconomic variables, such as industrial production, inflation, interest rates, the yield curve and a risk premium.

Another approach to link macroeconomic variables and stock market returns is discounted cash flow (DCF) method. This model relates the stock return to future expected cash flows and the future discount rate of these cash flows. The theory behind this brief is that according to the standard stock valuation model, the determinants of stock price are the expected cash flows from the stock and the required rate of return commensurate with the cash flows' risk. Macroeconomic factors influence future expected cash flows, or the discount rate by which these cash flows are discounted. Thus they should have an influence on the stock price, involving discounting the profits that stock will bring to the stockholder in the foreseeable future, and a final value on disposition. The discount rate normally includes a risk premium, which is commonly based on the capital asset pricing model. While among DCF methods, The Gordon model or Gordon's growth model is the best known of a class of discounted dividend models. It assumes that dividends will increase at a constant growth rate forever. The valuation is given by formula (2):

(2) $P=D*(1+g)/(r-g)$

Where: P is the estimated stock price,
D is the last dividend paid,
r is the discount rate,
g is the growth rate of dividend
And $r<g$.

The advantage of the PVM model is that it can be used to focus on the long run relationship between the stock market and macroeconomic variables.
Chen, Roll, and Ross (1986) demonstrate that economic state variables, via their effect on future dividends and discount rates, exert systematic influence on stock returns. They examine the effect of a set of selected economic state variables on returns of stocks listed on the New York Stock Exchange (NYSE) and conclude that these returns are priced in accordance with their exposures to systematic economic news, which are measured as innovations in state variables. Chen, Roll, and Ross provided the foundation of the belief that there is a long-term equilibrium relation between stock prices and relevant macroeconomic variables.

Generally, the most common examined economic variables in determining stock return are real interest rate, inflation, real economic development and foreign exchange rate. Beside research works examining relationship between stock return and all the economic variables, many studies focus on one or some of the above-mentioned variables only. The relationship between each economic variable and stock return has its own theory assumption and empirical evidence support.

2.1 Relationship between Stock Return and Exchange Rate

Exchange rate Theory suggests that the relationship between exchange rate and stock prices is interactive. One is the effect from exchange rate to stock price and the other is the effect from stock market to exchange rate. This interactive relation can be explained by different approaches. First one is known as goods market approach, or "flow oriented" models to explain the effect from exchange rate to stock market (e.g. Dornbusch & Fischer (1980)) and the others are portfolio balance approach (e.g. Frankel (1993)) and monetary models to explain the causality effect from stock market to exchange rate.

2.1.1 From exchange rate to stock market

Goods market approach affirms that movements of currency affect international competitiveness and the balance of trade position, and consequently affects the real output of the country, which in turn affects current and future cash flows of companies and their stock prices. This process can be expressed as figure 1:

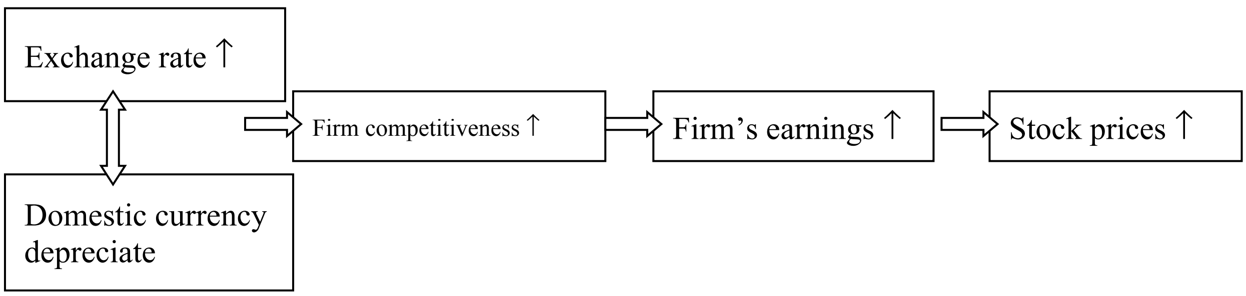

Figure 1. Good Market Approach.

Figure 1 gives an expression of a positive effect from Exchange rate to stock price based on good market approach. On a macro basis, the impact of exchange rate fluctuations on stock market would depend on both the degree of openness of domestic economy and the degree of the trade imbalance.

2.1.2 From stock market to exchange rate

1. Portfolio balance approach (Frankel (1993)) suggests that movements in the stock market may also affect exchange rates, which means that there is a causality effect from stock market to exchange rate; this causality effect is assumed to be negative in portfolio balance approach. The presumption of portfolio balance approach is international diversification of portfolio, and the role of exchange rates to balance the demand for and the supply of domestic and foreign assets. A rise in domestic stocks prices causes appreciation of domestic currency through direct and indirect channel. A rise in domestic stocks prices encourages investors to buy more domestic assets and selling foreign assets simultaneously, to obtain domestic currency indispensable for buying new domestic stocks. Described shifts in demand and supply of currencies lead to appreciation of domestic currency. The indirect channel grounds in the following causality chain. An increase in domestic assets prices results in growth of wealth, which leads investors to increase their demand for domestic currency, this increase of demand in turn raises domestic interest rates. Higher interest rates attract foreign capital and initiate an increase in foreign demand for domestic currency and its subsequent appreciation. The causality effect from stock market to exchange rate can be expressed by figure 2:

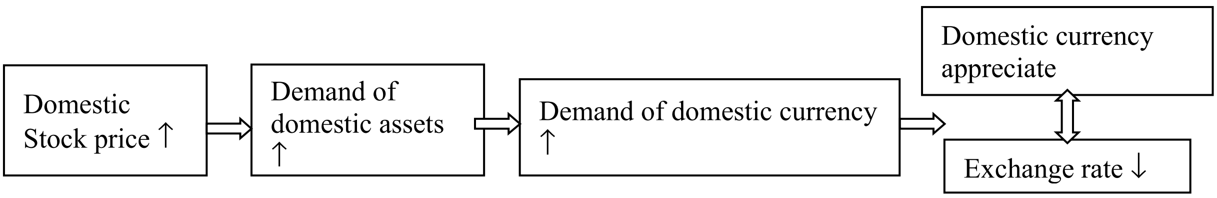

Figure 2. Causality effect from stock market to exchange rate.

Figure 2 gives an expression of the negative causality relationship from stock price to exchange rate based on Portfolio balance approach.

2. Monetary approach suggested that there is no causality effect from stock market to exchange rate. According to monetary approach, an exchange rate is the price of an asset (one unit of foreign currency). Therefore the actual exchange rate has to be determined by expected future exchange rate, similarly like prices of other assets (Frenkel (1976), Dornbusch (1976) and Frankel (1979)). The only factor that influences the actual exchange rate is that affects future value of exchange rate. Since

developments of stock prices and exchange rates may be driven by different factors, the asset market approach suggests there is no linkage between stock prices and exchange rates.

The theories to explain the relationship between exchange rate and stock price are diversified and lead to different conclusion, evidences from empirical researches also provide more than one single result. Ajayi and Mougoue (1996), using daily data from eight countries, found out that there were significant interactions between foreign exchange and stock markets. They proved that when domestic stock price increased, there would be a negative short-run and positive long-run effect of domestic stock prices on domestic currency value. However, for the effect of exchange rate on stock market, an increase of exchange rate (domestic currency depreciation) caused a decrease of stock market, which means that exchange rate affected the stock market in a negative way in the short-run. While Abdalla and Murinde (1997) applied co-integration approach to examine stock prices – exchange rates relationship in four Asian countries using data form 1985 to 1994. Their results rejected an occurrence of causality in Pakistan and Korea but support its existence in Indian and Philippines. However, the direction is different. While results for India show causality from exchange rates to stock prices, and a reverse causation was found for Philippines. Ramasamy & Mathew (2001) noted that whether stock price movements cause exchange rate volatility or vice versa is depend on country and time. Some other studies find that the impact of exchange rate on stock return is negative. On the macro level, Ma & Kao (1990) found that an increase of exchange rate (domestic currency depreciation) negatively affects the domestic stock market for an export-dominant country and positively affects the domestic stock market for an import-dominant country, which appeared to be consistent with goods market theory. Some results showed that exchange rate does not have significant effect on stock return at a micro level. For US firms, Jorion (1990, 1991), Bodnar and Gentry (1993) were unable to find a significant relationship and for Japanese firms, He & Ng (1998) found that only 25 percent of their sample of 171 Japanese multinationals has significant exchange rate exposure on stock returns.

2.2 Relationship between Stock Return and Inflation

The relationship between stock return and inflation is one side, namely the effect from inflation to stock return. This effect of inflation on stock return is realized through the effect of real interest rate on stock return. The effect from inflation to stock return is usually discovered by testing the Fisher hypothesis that stock market serves as a hedge against inflation.

The Fisher hypothesis is the proposition by Irving Fisher that the real interest rate is independent of monetary measures, especially the nominal interest rate. The Fisher equation is

(3) $R_r = R_n - \pi^e$. or

(4) $R_r = (1 + R_n) / (1 + \pi^e) - 1$

Where: R_n is normal interest rate,
π^e is expected rate of inflation
R_r is real interest rate.

When nominal interest rate stays unchanged, the raise of inflation will lead to a decrease of real interest rate thus reduce the discount rate and increase the stock return. Generalized Fisher hypothesis indicates that there is a positive causality effect from inflation to stock market returns.

However empirical evidence is mixed and could be classified into three categories. One type of finding is consistent with the generalized Fisher hypothesis, which confirms that there is a positive relationship between inflation and stock market returns. Firth, (1979) and Gultekin (1983) conclude that the relationship between nominal stock returns and inflation in the United Kingdom is relative positive. Boudhouch and Richarson (1993) employed data sets covering the period from 1802 to 1990 for the U.S and from 1820 to 1988 for Britain. The results that they obtained suggest a positive relationship between inflation and nominal stock returns over long horizons. Ioannidis et al. (2004) also found evidence of positive correlation between inflation and stock market returns in Greece between 1985 and 2003.

Another type of studies provides evidence of a negative relationship between the inflation rate and the stock market returns. Four hypotheses have been advanced in the literature to explain the negative relation between inflation and stock returns. Those are: Proxy hypothesis suggested by Fama (1981); Investors irrationally discount real cash flows using nominal interest rates (Modigliani and Cohn, 1979); The equity risk premium; The inflation non-neutralities tax code distorts accounting profits (Feldstein, 1980).

The proxy hypothesis was introduced by Fama (1981). He suggested that there was a negative correlation between stock returns and the level of inflation. The negative relationship resulted from the correlation between inflation and future output. In particular, since stock prices reflect firms' future earnings potential, an economic downturn predicted by a rise in inflation will depress stock prices. Spyrou (2001) suggests that there is a negative relationship between stock market returns and inflation in Greece for period 1990 to 1995. Another explanation on the negative relationship is the information that inflation brings. Day's (1984) analysis suggests that the negative correlation between real stock returns and the expected and unexpected component of inflation is driven by shocks to the production process. These shocks contain information about the distribution of future economic events. Boudoukh and Richardson (1993) find that the negative relation between stock return and inflation decreases to some extent when longer time horizons are considered. The import of those studies is that real rates of return cannot be considered as independent of inflation as suggested by the Fisher hypothesis.

While other studies provide mixed results, Pearce and Roley (1988) found mixed empirical evidence. Anari and Kolari (2001) found out negative correlations between stock prices and inflation in the short run, which are followed by positive correlations in the long run. Boudoukh and Richardson (1993) investigate the relation between stock returns and inflation at both short (1 year) and long (5 year) horizons using long-term annual US and UK data, and obtain the quite interesting result that at the 1-year horizon nominal stock returns and inflation are approximately uncorrelated, while at the 5-year horizon the Fisher equation holds.

2.3 Relationship between Stock Return and Interest rate

2.3.1 From interest rate to stock price.

In financial theory, interest rate as a measurement of time value of money is one of the main determinants in stock returns. Its impacts on stock returns derive from two well-known theories of finance, that is expectations theory and theory of valuation.

1. Expectations theory

In terms of expectations theory in behavioural finance, the expected future cash flows of the firms are affected by the future aggregate demand; while stock prices reflect those expected future cash flows. Hence, expectations of economic recession have a crucial negative impact on stock prices. According to this theory, longer-term rates are determined by investor expectations of future short-term rates.

There are some evidences that confirm the expectations theory. For example Andreou, Elena, DeSiano and Sensier (2000) show that value of the stock return in S&P before the recession in the US, and FTSE decreases before recession and reaches its maximum after 10 week from more intense period of the recession in the UK.

2. Theory of valuation

The simple dividend-discount valuation model may be used to explain the impact of economic factors on stock returns. Assuming constant growth in dividends:

(5) $P=D_1/(k-g)$

Where: P is stock price,
D_1 is dividends after first period,
g is constant growth rate of the dividends
And k= required rate of return on the stock.

Theory of valuation suggested that the causality effect from interest rate to stock return is negative. This causality effect is realized though dividend-discount valuation model. Changes in both short-term and long-term rates are expected to affect the discount rate in the same direction via their effect on the nominal risk-free rate (Mukherjee and Naka, 1995). Geske and Roll (1983) showed that the real interest rate affect on stock return was significant but often small in most countries of their studies. The findings of Asprem (1989), Fama (1990, Bulmash and Trivoli (19991) show that there is a negative relationship between interest rates and stock returns in Korea.

2.3.2 From stock return to interest rate

Sheridan Titman and Arthur Warga (1989) found that there was a statistically significant positive relation between stock returns and future interest rate changes. The thought behind this finding was that stock return reacted to the changes in expected inflation, while future interest rate changes was a good proxy for changes in expected inflation, thus stock return should provide prediction of interest rate changes. This implication was supported by the findings of Sheridan Titman and Arthur Warga's study that future changes in interest rates are positively correlated with current stock return.

2.4. Relationship between Stock Return and Real Economic

Different researchers use different indicators as representation of economic development, such as industrial production, GDP or other kind of similar indicator. The relationship between economic development and stock price is two sides.

2.4.1 From real economic to stock returns

Many researches prove the positive relationship between economic development and stock return .For example; Schwert's (1981) study shows that growth of industrial production is a major determinant of long-run stock returns. Significant positive relationship is observed between industrial production and Japanese stock returns in the long-run by Gjerde and Sattem (1999), fama (1990) and Asprem (1989). Asprem (1989) compared the effects of economic factors on the stock markets of 10 European countries while Bulmash and Trivoli (1991) did similarly in the US market. Peiro (1996) tested and compared such relationships in three European countries with the U.S. Cheng (1995) and Poon and Taylor (1991) examined the UK market, and Gjerde and Settem (1999) researched on Norwegian data. Maysami and Hui (2001)'s findings of the positive relationship between industrial production and Korean stock returns are similar to those of Kwon et al. (1997).

However, some other studies investigating the link between stock market and real economic activity have produced conflicting evidence. Some researches find that many existing evidences indicate a weak link between stock return and real economic activity at a micro level or have a mix finding. Many papers prove that there is no significant relationship between these two variables. For example, Binswanger (2000) connected the U.S. stock returns to production growth rate and real GDP growth rate and found no evidence of relationship for the sample period 1980 to 1995.

2.4.2 From stock return to economic development

There are three opinions about the role that market stock return plays on economic. One is that stock market return provides a predictor of economic growth; another is that stock return plays wealth effect on real economic and the other is the q-theory q-theory advanced by Brainard and Tobin (1968).

1. Stock market return provides a predictor of economic growth

Financial domain is the most important one of an economy, so the stock market performance works as an indicator of the overall health of the economy or "predictor " of the economic. Stock Market Indexes typically tells the overall performance of the market, thus stock price movement and index movements show the general economic trend of a country. It is commonly believed that large decreases in stock prices are reflective of a future recession, whereas large increases in stock prices suggest future economic growth. As "asset prices are forward-looking, they constitute a potentially useful predictor of economic growth" (Stock and Watson, 2003), the long run relationship between economic growth and stock prices has been frequently analyzed in the literature. As Stock and Watson (2003) explains, last two decades have seen considerable research on forecasting economic activity using asset prices. The literature on forecasting using asset prices has pointed out a number of asset prices as leading indicators of economic activity (Stock and Watson, 2003). Other studies employing U. S. data such as Laurent (1988, 1989), Harvey (1988, 1989), Stock and Watson (1989), Chen (1991), and Estrella and Hardouvelis (1991) mainly focused on using the term spread to predict output growth. Several studies found that stock returns precede output changes. Fama (1990), Schwart (1990), and Barro (1990) confirmed that substantial portions of stock value variations could be explained by future value of real activity in the United States and that stock return were highly correlated with future economic growth. However, Hassapis and Kalyvitis (2002) contended that such evidence might indicate that stock returns were a good proxy for future activity and could only act as a leading indicator due to the fact that these studies did not conduct any causality test. In addition, they developed a model of stock price changes and economic growth that showed that there was a positive relationship between stock price changes and future growth. Using data for the G-7 countries in a VAR model, they found that real stock price changes served as a useful predictor of output for these countries with the exception of Italy. Levine and Zervos (1996) examined whether there is a strong empirical association between stock market development and long-run economic growth based on data from forty-one countries. The study tow the line of Demirgüç-Kunt and Levine (1996) by conglomerating measures such as stock market size, liquidity, and integration with world markets, into index of stock market development. The finding was that a strong correlation between overall stock market development and long-run economic growth existed. A number of studies based their studies on major non-OECD economies. Harvey (1991), Hu (1993), Davis and Henry (1994), Plosser and Rouwenhorst (1994), Bonser-Neal and Morley (1997), Kozicki (1997), Campbell (1999), Estrella and Mishkin (1997), Estrella *et al.* (2003), and Atta-Mensah and Tkacz (2001) found evidence that the term spread had predictive content for real output growth.

There exists, however, some articles provide opposite results, which means that stock return may not be a predictor of real economic. Binswanger (2000) found evidence that the strong relationship between stock returns and real activity in the United States disappeared in the early 1980s. He asserted that although such relationship held in the first stock market boom that lasted from the late 1940s to the mid-1960s, stock returns did not lead real activity any longer. He pointed out that there was a breakdown in the relationship between stock prices and future real activity in the United States since the early 1980s. In a subsequent study, Binswanger (2003) extended this analysis to the other G-7 countries and found that similar breakdowns occurred in Japan and in the aggregate European economy. He concluded that since the 1980s, stock markets did not lead real income activity and that this held even when the 1987 episode was excluded. Laopodis and Sawhney (2002) reach similar conclusions. Kassimatis and Spyrou (2001) explored the relationship between equity, credit-market, and economic growth in several emerging markets. Based on causality tests, they found that in financially repressed markets, the stock market had either a negative impact on economic growth or had no impact on growth at all.

2. Wealth effect of stock return plays on real economic activity

The proponents of positive relationships between stock market development and economic growth have also argued that as stock prices increase, people feel rich and they spend more on consumption and thus drive real economic. This is the wealth effect that shifts the consumption function and, through the Keynesian multiplier effect further increases the national income. Empirical studies of the wealth effect, however, suggest that this gain is rather small. A dollar increase in wealth is likely to lead to a three-to-four cent increase in consumption (Ludrigson and Steindel, 1999; Mehra, 2001). Further changes in wealth are not found to be helpful in predicting changes in consumer spending in the future, implying that however small the effect on consumption, it is largely contemporaneous.

3. q-theory

It can also be argued that the increases in stock prices lead to increases in investment. The q-theory advanced by Brainard and Tobin (1968) strongly suggests the relationship between asset prices and real investment. Rising stock prices increases the market value of the firm's capital that exceeds its replacement cost, and managers react by undertaking additional investment projects, therefore increasing the total outlays on investment in the economy. Therefore, as pointed out by Malkiel (1998), stock market moves the economy in at least three ways. First, it works as an indicator of real economic and hence good performance of stock market improves the business and consumer confidence for the future. Second, the higher stock value creates the usual wealth effect. Third, for many large corporations, the stock price increases lower their cost of new capital.

3. METHODOLOGY

The relationship between the stock market index and crucial macroeconomic variables can be applied if all variables are stationary in level or trend. If they are not stationary in level, but stationary in first differences, they may or may not be co-integrated. If they are co-integrated, the error correction mechanism (ECM) can be used to determine the short-run deviation from the long-run equilibrium. If they are not co-integrated, the Granger causality can be employed to navigate direction of causation. In practice, the most widely used method of estimation is based on the condition that many economic variables are known to be integrated of order one or I (1), with or without co-integration. The PP unit root test (Phillips and Perron, 1988) for time series is performed to determine the order of integration of each variable. Furthermore, Johansen co-integration tests (Johansen, 1991 and 1995) are conducted to determine whether the stock market index and a set of macroeconomic factors are co-integrated. If co-integration exists, there is a long-run relationship among the variables in question. If co-integration does not exist, Granger causality tests are employed to determine the direction of causation between stock market returns (stationary first differences of stock market index, ΔLVNI) and each of the relevant macroeconomic variables. The Johansen's co-integration test employs the maximum likelihood procedure to determine the existence of co-integrating vectors in non-stationary time series as a vector autoregressive (VAR).

3.1 VAR and Granger causality

Vector auto regression (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables, The VAR approach sidesteps the need for structural modelling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system.
The mathematical representation of a VAR is:

(6) $$Y_t = C + \sum_{i=1} A_i Y_{t-i} + \varepsilon_t$$

Where $p+1 \leq t \leq T$, in this paper Y_t=($LVN_{t,}$ LEX_t, $LCPI_t$, LIRt, LIP_t, LCI_t), c is a 7×1 vector of constants, A_1,…, A_p are 7×7 matrices of lag coefficients and ε_t is a 1×7 vector of errors having the properties.

VECM model

If it is proved that cointegrating relationships exist among a set of 1(1) variable, then Granger Representation Theorem suggests there is a dynamic error correction representation of the data. This implies one can estimate an ECM that takes into account the short-run dynamics of all variables included in the cointegrating regression.

(7) $$\Delta Y_t = C + \beta' Y_{t-1} + \sum_{i=1} A_i \Delta Y_{t-i} + \varepsilon_t$$

Where: ΔY_t is the first difference of Y_t

And β' is the regression parameter of Y_{t-1}.

The long-run equilibrium stock return (co-integration equation) that may be written as follows：

(8) $$LVN_t = \beta_0 + \beta_1 LEX_t + \beta_2 LCPI_{t+}\beta_3 LIR_t + \beta_4 LIP_t + \beta_5 LIP_t + \beta_6 LCI_t$$

where: VNI is the stock return,
EX is exchange rate,
CPI is inflation,
IR is interest rate,
IP is industrial production.
CI is Shanghai Composite index
L is the natural log.

Intuitively, actual stock prices do not always equal what investors wish to hold on the basis of long-run factors specified in the above equation. Therefore, the second part of our stock price model is a dynamic error-correction equation (ECM) of the form, which is showed as:

$$\Delta LVN_t = \sum_{i=1}^{n} C_{11,i}\Delta LVN_{t-i} + \sum_{i=1}^{n} C_{12,i}\Delta LIR_{t-i} + \sum_{i=1}^{n} C_{13,i}\Delta LIP_{t-i} + \sum_{i=1}^{n} C_{14,i}\Delta LEX_{t-i} + \sum_{i=1}^{n} C_{15,i}\Delta CPI_{t-i} + \sum_{i=1}^{n} C_{16,i}\Delta CI_{t-i} + DM + A_1 ECM_{t-1} + C_{16} + \varepsilon_{1,t} \quad (9)$$

$$\Delta LIR_t = \sum_{i=1}^{n} C_{21,i}\Delta LIR_{t-i} + \sum_{i=1}^{n} C_{22,i}\Delta LVN_{t-i} + \sum_{i=1}^{n} C_{23,i}\Delta LIP_{t-i} + \sum_{i=1}^{n} C_{24,i}\Delta LEX_{t-i} + \sum_{i=1}^{n} C_{25,i}\Delta CPI_{t-i} + \sum_{i=1}^{n} C_{26,i}\Delta CI_{t-i} + A_2 ECM_{t-1} + C_{26} + \varepsilon_{2,t} \quad (10)$$

$$\Delta LIP_t = \sum_{i=1}^{n} C_{31,i}\Delta LP_{t-i} + \sum_{i=1}^{n} C_{32,i}\Delta LVN_{t-i} + \sum_{i=1}^{n} C_{33,i}\Delta LIR_{t-i} + \sum_{i=1}^{n} C_{34,i}\Delta LEX_{t-i} + \sum_{i=1}^{n} C_{35,i}\Delta CPI_{t-i} + \sum_{i=1}^{n} C_{36,i}\Delta CI_{t-i} + A_3 ECM_{t-1} + C_{36} + \varepsilon_{3,t} \quad (11)$$

$$\Delta LEX_t = \sum_{i=1}^{n} C_{41,i}\Delta LEX_{t-i} + \sum_{i=1}^{n} C_{42,i}\Delta LVN_{t-i} + \sum_{i=1}^{n} C_{43,i}\Delta LIR_{t-i} + \sum_{i=1}^{n} C_{44,i}\Delta LIP_{t-i} + \sum_{i=1}^{n} C_{45,i}\Delta CPI_{t-i} + \sum_{i=1}^{n} C_{46,i}\Delta CI_{t-i} + A_4 ECM_{t-1} + C_{46} + \varepsilon_{4,t} \quad (12)$$

$$\Delta LCPI_t = \sum_{i=1}^{n} C_{51,i}\Delta LCPI_{t-i} + \sum_{i=1}^{n} C_{52,i}\Delta LVN_{t-i} + \sum_{i=1}^{n} C_{53,i}\Delta LIR_{t-i} + \sum_{i=1}^{n} C_{54,i}\Delta LIP_{t-i} + \sum_{i=1}^{n} C_{55,i}\Delta LEX_{t-i} + \sum_{i=1}^{n} C_{56,i}\Delta CI_{t-i} + A_5 ECM_{t-1} + C_{56} + \varepsilon_{5,t} \quad (13)$$

$$\Delta LCI_t = \sum_{i=1}^{n} C_{61,i}\Delta LCI_{t-i} + \sum_{i=1}^{n} C_{62,i}\Delta LVN_{t-i} + \sum_{i=1}^{n} C_{63,i}\Delta LIR_{t-i} + \sum_{i=1}^{n} C_{64,i}\Delta LIP_{t-i} + \sum_{i=1}^{n} C_{65,i}\Delta LEX_{t-i} + \sum_{i=1}^{n} C_{66,i}\Delta CPI_{t-i} + A_6 ECM_{t-1} + C_{66} + \varepsilon_{6,t} \quad (14)$$

Where $\varepsilon_{p,t}$ (p=1,…6) is the short-run random disturbance term, Δ refers to the first-difference operator, i represents the number of lags, and ECM_{t-1} is the lagged value of the long-run random disturbance term. Equation (2) t0 (7) yields the short-run determinants of stock returns, which include among others, current and past changes in the macroeconomic variables and the lagged value of the residual from long-run stock price function from equation (1), The parameter A_p (p=1,…6) which appears with

ECM_{t-1} in equation (1) is the error-correction coefficient. The presence of ECM_{t-1} reflects the presumption that actual stock price does not always equal what the investor expects on the basis of long-run macroeconomic factors. In the short-run, the stock price attempts to correct any short-run disequilibrium and adjusts to its long-run equilibrium. The parameter A_p measures the role such disequilibrium play in explaining the short-run movements in stock price (speed of adjustment) and it is expected to be negative.

3.3 Co-integration

Granger (1986) showed that a necessary condition to conclude that a long-term relationship exists is that the series must be cointegrated. Consider a simple two variables example, two time series $\{x_t\}$ and $\{y_t\}$, both of which are individually non-stationary or 1(1). if there exists a non-zero constant ß such that x_t - ßy_t is a stationary or 1(0) process, then x_t and y_t are said to be cointegrated with a cointegrating parameter ß. This implies that the set of 1(1) variable (x_t, y_t) does not diverge over time since x_t - ßy_t has no trend in mean. Combined with ECM, cointegration provides the tools to quantify both the long-run relationship and the short-run deviations from equilibrium. If cointegrating relationships exist among a set of 1(1) variable, then Granger Representation Theorem suggests there is a dynamic error correction representation of the data. This implies one can estimate an ECM that takes into account the short-run dynamics of all variables included in the cointegrating regression. The forms of the error correction models are showed from equation (2) to (7) in the above content.

4. DEVELOPMENT OF VIETNAM STOCK MARKET

Vietnam is a densely populated developing country that in the last 30 years has had to recover from the ravages of war and the rigidities of a centrally planned economy. The country has made many important changes to turn its economy into a market-oriented one, including reforming the banking system, adding more financial components, which had never been in place before the beginning of the reform. GDP growth averaged above 7% per year since 1992 even against the background of the Asian financial crisis and a global recession. Since 2001, the government have reaffirmed the commitment to economic liberalization and international integration. The structural reforms needed to modernize the economy and to produce more competitive, export-driven industries. Vietnam's membership in the ASEAN Free Trade Area (AFTA) and entry into force of the US-Vietnam Bilateral Trade Agreement in December 2001 have led to even more rapid changes in Vietnam's trade and economic regime. Vietnam joined the WTO in January 2007, following over a decade long negotiation process. WTO membership has provided Vietnam an anchor to the global market and reinforced the domestic economic reform process. This period of time witness the booming of the stock market that represented by the Vietnam Stock Index is up 60%.

The Stock Trading Center of Vietnam (‘HSTC’), located in Ho Chi Minh City, was officially inaugurated on July 20, 2000, and trading commenced on July 28, 2000. The based value is 100. Initially, two equity issues were listed. It is the smallest stock exchange in Southeast Asia by the time of inaugurating. The Vietnam stock exchange is both operated and regulated by the State Securities Commission.

The Stock Trading Center of Vietnam is also the official mechanism through which new government bonds are issued, and it functions as the secondary market for a number of existing bond issues. All securities traded on the Stock Trading Center of Vietnam are denominated in Vietnamese Dong. Par valued is standardized at VND10,000 (approximately 0,657 USD) for equities and VND100,000 for bonds.

In order to be listed, a company must have been profitable for at least 2 years, have a minimum capitalization of VND 5 billions (approximately US$318,000), and have at least 50 shareholders who are not employees of the company, holding at least 20% of stake. Foreign invested joint venture companies are technically qualified to list, but in order to do so, they must be reorganized into joint stock company status. Companies intending to list must also submit to audit by an approved, independent auditing company.

At the beginning, an overall foreign ownership limit of 20% for equities and 40% for bonds were implemented. In July 2003, in a bid to improve liquidity, the government raised the foreign ownership limit for equities to 30% (and 49% in October 2006) and totally removed foreign ownership limit of a particular issuer's bonds. Figure3 and Figure4 show the development of Vietnam stock market.

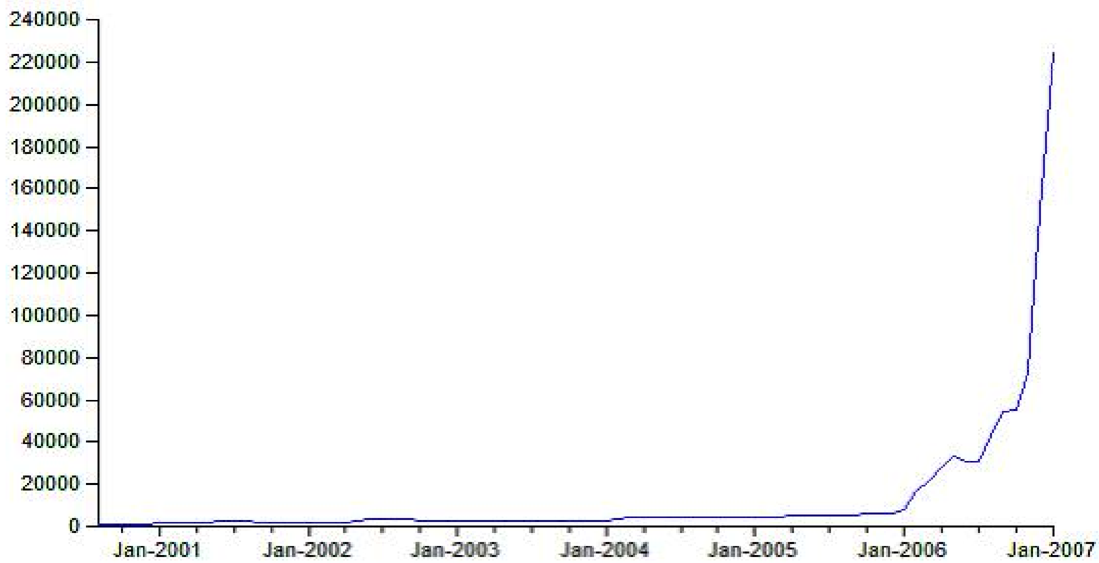

Figure3. The development of Vietnam Stock market (market capitalization in billion VND).

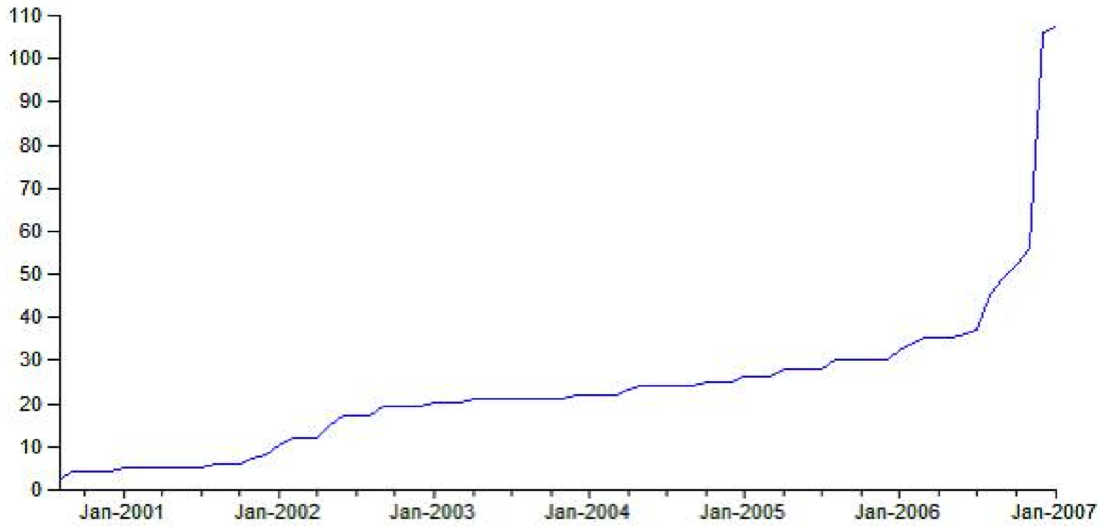

Figure 4. The development of Vietnam Stock market (Listed companies).

HSTC began with two listed companies and a total of VND270 billion (US$16.87 million) in listed value but as of March 31, 2005 it developed to reach a total listed value of VND 27,500 billion (US$1.71 billion), including nearly VND 1,500 billion ($93.75 million) worth of stocks of 28 current listed companies and over VND 26,000 billion ($1.62 billion) worth of bonds issued by the Central Government, local governments and the Bank for Investment and Development of Vietnam (BIDV). In the initial days, HSTC carried out only three transactions a week but from March 2002 it made five transaction sessions a week. Until March 31, 2005, HSTC held 1,000 sessions with an aggregate transaction value of VND 25,000 billion, of which bond transaction made up 82 per cent and stock transaction accounted for 18 per cent. (In 2004 alone, securities trading value increased 6.6 folds compared with that in 2003, of which the Stock transaction quadrupled and bond trading rose over seven times.)

Some of the factors fuelling Vietnam's stock boom (the 4th quarter of 2006) include a fast-growing economy (above 8% for several previous years); reforms allowing foreigners to hold 49% of public companies; and a push to encourage state-owned companies to go public. In the period of booming of the stock market, Vietnam Stock Index is up 60%. Stock market capitalization surged from under 0.5 billion dollars in December 2005 to 13.8 billion (22.7 percent of GDP) by December 2006. The number of listed firms rose from about 40 to nearly 200. December alone witnessed more than 100 new listings. The stock price index shot up 144 percent in 2006. One factor to show the boom in stock price is the median (P/E) price-earnings ratio stood at 21 by the end of 2006, with about a quarter of the firms over 30.

5. EMPIRICAL PART

5.1Data description

The data on these variables consists of monthly series from 30th September 2000 to 31th December 2006.

Stock return of market index is used as a representation of market stock price based on the assumption that the stock index is not adjusted for dividend payments. Because stock returns consist of both price change and dividends, the study considers only the price variation component since dividends in absolute terms tend to be stable over time. It is the movements in price, which constitute the volatile component of the stock returns. Since the objective of this study is to explain the variability in stock returns, the omission of the dividend payments should not be a problem. It is calculated as the logarithm difference of monthly VN index.

LVNI: Natural logarithm of the VN index (VNI), it denotes the market index of overall market value of listed stocks in the Stock Exchange of Vietnam. This is the sum of market value (share outstanding multiplied by market price) of all stocks being traded. A change in the index represents capital gains/losses. Rate of return (ΔLVNI) is measured as the sum of capital gains/losses for each period. Dividends are not available for inclusion in this study.

LEX: Natural logarithm of the month-end the USD/VND

INF: Natural logarithm of the month-end Consumer Price Index.

LIR: Natural logarithm of the month-end interbank offer rate.

LIP: Natural logarithm of the month-end industrial production index. We used the change in industrial production as a proxy for GDP growth rate since monthly series for GDP is not available.

LCI: Natural logarithm of Chinese stock market

Descriptive statistics of all the series in first difference Table 1

Table 1. First difference of descriptive statistics.

	DLVN	DLIR	DLIP	DLCPI	DLER	DLCI
Mean	0.024355	-0.0058	0.014241	0.032068	0.00213	0.004493
Median	0	0	0.018289	0.029559	0.001133	0.001932
Maximum	0.253891	0.091808	0.181345	0.090754	0.043774	0.242526
Minimum	-0.42099	-0.26236	-0.20799	-0.01613	-0.04245	-0.16428
Std. Dev.	0.11801	0.046957	0.047932	0.026987	0.014518	0.06825
Skewness	-0.37679	-2.7348	-1.12939	0.293827	0.020018	0.386082
Kurtosis	4.619446	14.68948	10.76016	2.295436	6.895378	4.067733
Jarque-Bera	9.970286	520.5012	204.1319	2.630464	47.42367	5.425908
Probability	0.006839	0	0	0.268412	0	0.066341

The Jarque-Bera results of all series and the relatively probability value indicate that except for series DLCPI, DLCI all the other series don't follow normal distribution assumption. An examination of Skewness figures show that series DLVN, DLIR and DLIP are negative skewed and series DLCPI, DLER and DLCI are positive skewed. This indicates that for series DLVN, DLIR and DLIP, they have more numbers of large values, which means that the negative skewed variables have been on the increase during the sample period. As far as LVN is concerned, it is an indication that investors earning more positive returns than negative returns. While when we consider about the negative Skewness of LIR, it is a favourable signal for investors. The negative Skewness of DLIP indicates that there have been more months with positive growth in IP than the numbers of months with negative growth, which is also a favourable indication for foreign investors. A graph of LIP also shows a main growth change trend during the sample period. From the point of DLCPI, a positive Skewness shows that the numbers of periods with high inflation is less then the one with low inflation. The positive Skewness figure for the US dollar exchange rate indicates that the VND has been depreciating against the US dollar by large amounts; this provides incentives to foreign investors as their investment incomes go up. While it is good for companies have large amount of export.

5.2 Data adjustment

The seasonal effect of the time sequence should be eliminated because monthly series data usually exhibit cyclical movements that recur every month. X11 method is used to adjust each series seasonally and then Holt-Winter-No seasonal method is used to smooth all the series. The following graphs show the series of LVNI, LEX, LCPI, LIR, LIP and LCI both before and after seasonal adjustment.

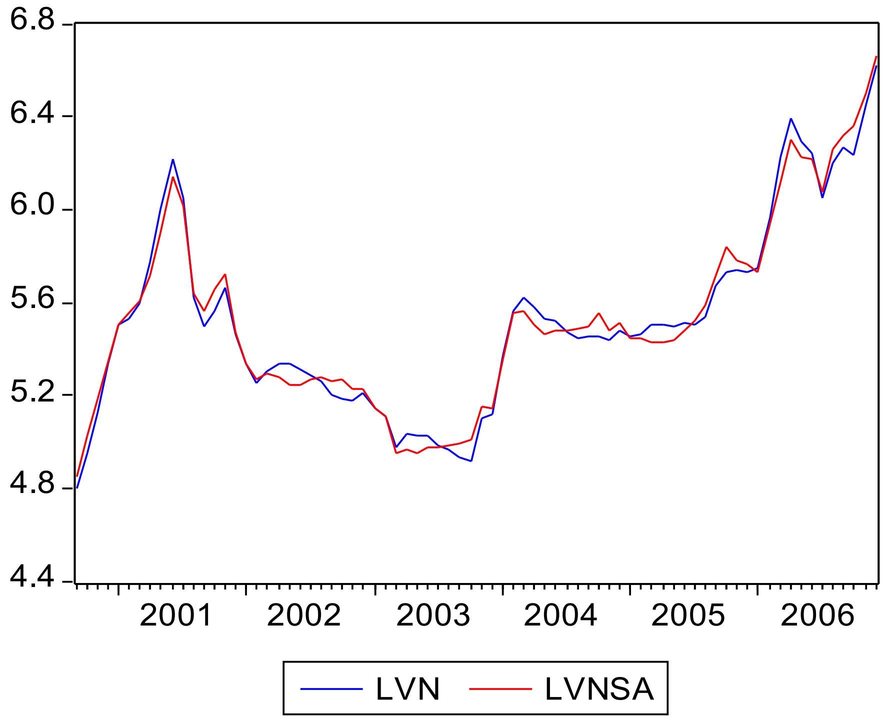

Figure 5. LVN and LVN after adjustment (LVNSA).

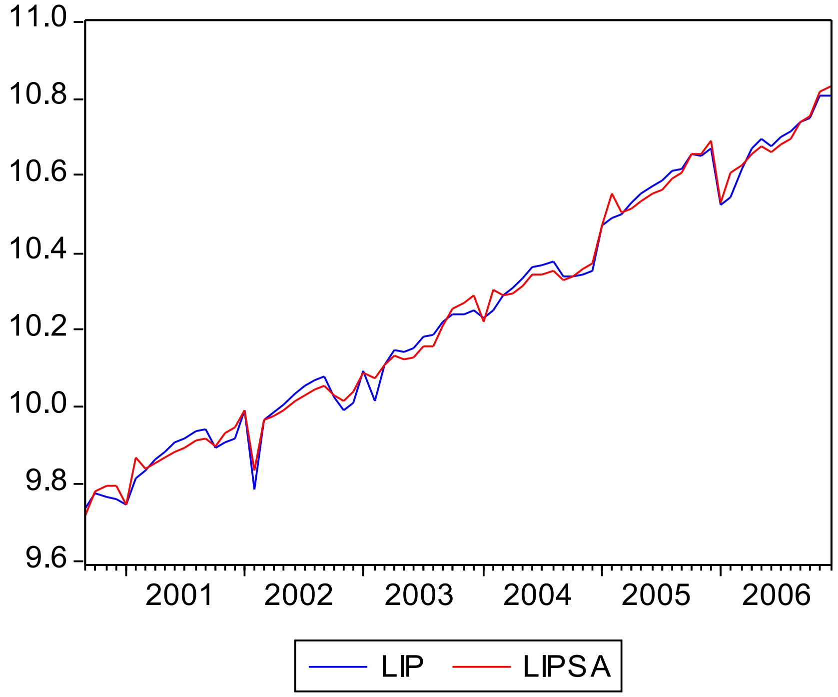

Figure 6. LIP and LIP after seasonal adjustment (LIPSA).

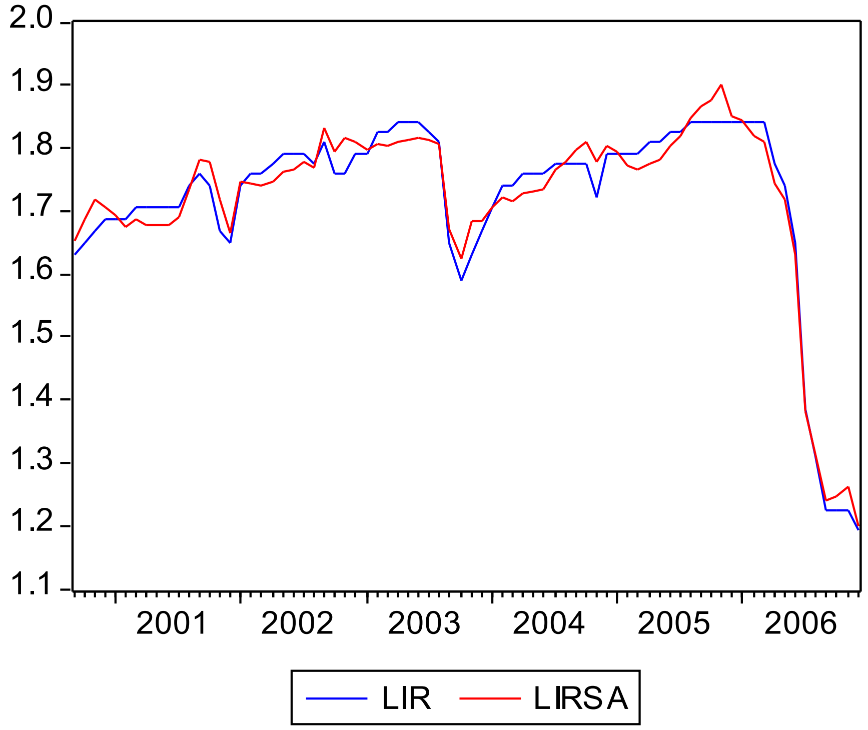

Figure 7. LIR and LIR after seasonal adjustment.

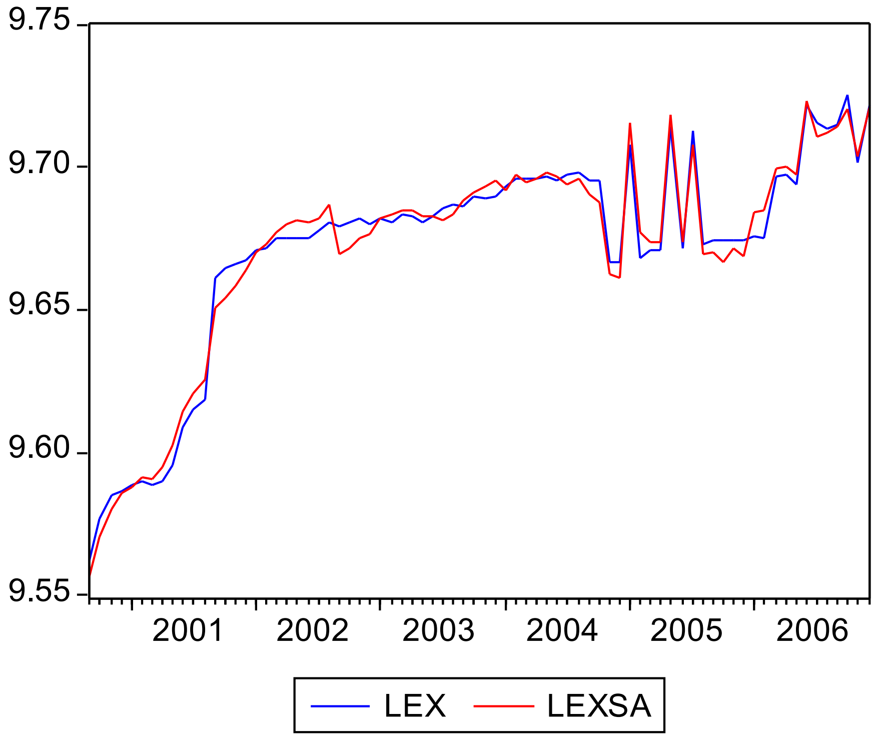

Figure 8. LEX and LEX after seasonal adjustment (LEXSA).

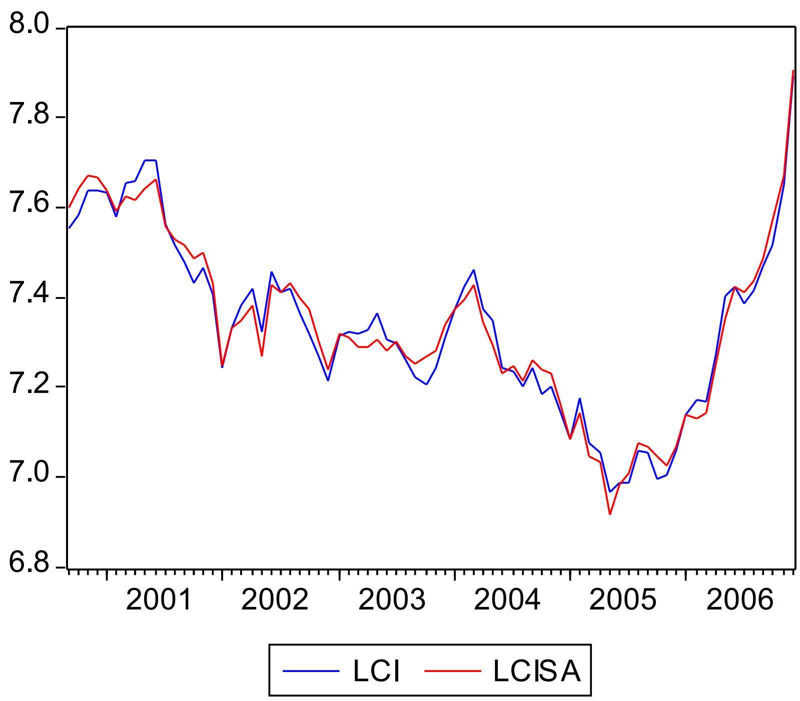

Figure 9. LCI and LCI after seasonal adjustment (LCISA).

5.3 Unit root test (ADF)

After seasonal adjustment, exponential smoothing, a unit root test will be performed to test the stationary of all the logarithmic series. The results of unit root test are showed in the following table.

Table 2. Results of unit root test.

		Test critical value		
	t-Statistic	1% level	5% level	10% level
LVN	-1.60279	-3.52158	-2.90122	-2.58798
LEX	-3.10848	-3.52031	-2.90067	-2.58769
LCPI	2.382936	-3.52158	-2.90122	-2.58798
LIP	0.082324	-3.52031	-2.90067	-2.58769
LIR	-1.12589	-3.52158	-2.90122	-2.58798
LCI	-1.20273	-3.52031	-2.90067	-2.58769

Except series LEX, the ADF statistic value of all other series are much greater than test critical value at 1%, 5% and 10% level. The ADF test of series LEX show that LEX can still be considered as unit root at 1% level. The results indicated that the exam series in this paper are non-stationary. To test whether all the series are integrated at order 1, we perform a unit root test on the first difference of all series, which are expressed as DLVNI, DLEX, DLCPI, DLIR, DLIP, and DLCI. Results are showed in the following table:

Table 3. Results of unit root test on first order series.

		Test critical values		
	t-Statistic	1% level	5% level	10% level
DLVN	-5.17802	-3.52158	-2.90122	-2.58798
DLEX	-8.36897	-3.52158	-2.90122	-2.58798
DLCPI	-4.30948	-3.52158	-2.90122	-2.58798
DLIP	-8.07164	-3.52158	-2.90122	-2.58798
DLIR	-5.73457	-3.52158	-2.90122	-2.58798
DLCI	-7.86338	-3.52158	-2.90122	-2.58798

As showed from the table, the ADF value of all the series are much smaller than the critical value at 1%, 5%, 10% level. From the result, we can say that series LVNI, LEX, LIR, LIP, LCI and LCPI are integrated at order one. The vector of variables to be included is:

$Y_t = (LVN_t\ LEX_t\ LCPI_t\ LIR_t\ LIP_t\ LCI_t)$

(14) $LVN_t= \beta_0+\beta_1 LEX_t+ \beta_2\ LCPI_{t+}\beta_3 LIR_t+ \beta_4 LIP_t + \beta_5 LCI_t$

5.4 Co-integration test

This paper use Johansen testing (JJ) method to perform co-integration test. JJ testing method is developed by Johansen（1988，1991）, Johansen and Juselius（1990）and it is derived from VAR model. Before co-integration test, we need to choose the optimal lag length for VAR model. Hannan-Quinn information criteria suggest lag length of 1, while sequential modified LR test statistic, Final prediction error and Akaike information criterion suggeste2. The adequacy of the lag length is confirmed by using residual test. The LM tests of the residuals indicate residuals of VAR (2) model is not highly significantly correlated. Thus, lag length of 2 is chosen which means that further analysis in the study is based on the VAR system described by Equation Y with p=2.

The lag selecting result is showed in table 4.

Table 4. Optimal length of VAR model.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	305.3625	NA	7.77E-12	-8.553213	-8.36049	-8.476659
1	854.8292	989.0401	3.32E-18	-23.22369	-21.87459*	-22.68781*
2	894.1172	63.98334*	3.09e-18*	-23.31763*	-20.8122	-22.32243
3	926.2666	46.84627	3.65E-18	-23.20762	-19.5458	-21.75309
4	957.3234	39.93017	4.71E-18	-23.06638	-18.2482	-21.15253
5	994.2984	41.2007	5.59E-18	-23.09424	-17.1197	-20.72107
6	1027.762	31.55116	8.27E-18	-23.02176	-15.8908	-20.18927

(*: The suggested length is statistically significant under respective criteria)

Then we can test whether there is co-integration relationship among the variables. Both trace test and Max-Eigenvalue Test are used to test the co-integration rank hence we can determine the number of co-integration relationship. When the results obtained from trace test and Max-Eigenvalue Test yield different conclusions, the trace test statistic is preferred. This is supported by Cheung and Lai (1993) who found that the trace test shows more robustness to both Skewness and excess kurtosis in the residuals than that of the Max-Eigenvalue Test. The results of co-integration test are showed in table 5.

Results and Critical Values for the trace test and Max-Eigenvalue Test

Table 5. LVNI and Macroeconomic Variables based on p=2.

Hypothesized		Trace	0.01		Max-Eigen	0.01
No. Of CE(s)	Eigenvalue	Statistic	Critical Value	Eigenvalue	Statistic	Critical Value
None *	0.396445	113.825	104.9615	0.396445	36.859	45.869
At most 1	0.325023	76.96601	77.81884	0.325023	28.69455	39.37013
At most 2	0.295379	48.27146	54.6815	0.295379	25.5569	32.71527
At most 3	0.190121	22.71456	35.45817	0.190121	15.39356	25.86121
At most 4	0.088879	7.321004	19.93711	0.088879	6.794773	18.52001
At most 5	0.007183	0.526231	6.634897	0.007183	0.526231	6.634897

Trace test indicates 1 co-integrating equations at the 0.01 level, while Max-eigenvalue test indicates no co-integration at the 0.01 level. We thus conclude that there is one co-integrating Vector.

5.5 VECM model

The normalized co-integrating coefficients and the t-statistic for LVN_t are showed in table 6

Table 6. Co-integrating coefficients and the t-statistic.

	LVN	LEX	LCPI	LIR	LIP	LCI	C
Coefficients	1	16.39802	1.103076	-4.84695	-7.78855	-6.19837	-36.5042
T-statistic		2.79316	1.38016	-4.04358	-3.25625	-5.55996	

These values represent long-term elasticity measures, due to logarithmic transformation of VN (normalized), EX, CPI, IR, IP, CI Thus, the co-integration relationship can be re-expressed as:

(15) LVN_t=-16.39802LEX_t-1.103076$LCPI_t$+4.846953LIR_t+7.788547LIP_t+6.198366LCI_t

The intercept term is 36.5042

The regression results of ECM model are showed as following:

(16) ΔLVN_t=0.4231ΔLVN_{t-1}-0.2504ΔLVN_{t-2}-0.0226ΔLIR_{t-1}-0.0917ΔLIR_{t-2}-0.5043ΔLIP_{t-1} -0.5557ΔLIP_{t-2}-1.1254ΔLEX_{t-1}-0.7821ΔLEX_{t-2}-0.6867$\Delta LCPI_{t-1}$+0.3356$\Delta LCPI_{t-2}$+0.3888ΔLCI_{t-1}+0.0202ΔLCI_{t-2}+0.0467-0.0163ECM_{t-1}.

(17) ΔLIR_t=-0.0560ΔLVN_{t-1}+0.1589ΔLVN_{t-2}+0.3373ΔLIR_{t-1}+0.0663ΔLIR_{t-2}+0.1601ΔLIP_{t-1}-0.1166ΔLIP_{t-2}-2.0587ΔLEX_{t-1}-1.1375ΔLEX_{t-2}-0.3209$\Delta LCPI_{t-1}$-0.0822$\Delta LCPI_{t-2}$+0.0507ΔLCI_{t-1}-0.1427ΔLCI_{t-2}+0.0129+0.0279ECM_{t-1}

(18) ΔLIP_t=0.0033ΔLVN_{t-1}+0.0516ΔLVN_{t-2}-0.0633ΔLIR_{t-1}+0.0169ΔLIR_{t-2}+0.0592ΔLIP_{t-1} +0.0280ΔLIP_{t-2}-0.1164ΔLEX_{t-1}-0.9172ΔLEX_{t-2}+0.0941$\Delta LCPI_{t-1}$-0.2123$\Delta LCPI_{t-2}$+0.0382 ΔLCI_{t-1}-0.0026ΔLCI_{t-2}+0.0172+0.0060ECM_{t-1}

(19) ΔLEX_t=-0.0119ΔLVN_{t-1}-0.0016ΔLVN_{t-2}+0.0210ΔLIR_{t-1}-0.0364ΔLIR_{t-2}-0.0372ΔLIP_{t-1}-0.0684ΔLIP_{t-2}-0.0335ΔLEX_{t-1}+0.0526ΔLEX_{t-2}-0.005$\Delta LCPI_{t-1}$-0.0776$\Delta LCPI_{t-2}$-0047ΔLCI_{t-1}-0.0239ΔLCI_{t-2}+0.0060-0.0045ECM_{t-1}

(20) $\Delta LCPI_t$=0.0326ΔLVN_{t-1}-0.0162ΔLVN_{t-2}-0.066ΔLIR_{t-1}+0.0569ΔLIR_{t-2}+0.1190ΔLIP_{t-1} +0.1206ΔLIP_{t-2}-0.1067ΔLEX_{t-1}+0.6462ΔLEX_{t-2}+0.4267$\Delta LCPI_{t-1}$+0.3219$\Delta LCPI_{t-2}$-0122ΔLCI_{t-1}+0.0055ΔLCI_{t-2}+0.0048+0.0023ECM_{t-1}

(21) ΔLCI_t=0.1487ΔLVN_{t-1}-0.0094ΔLVN_{t-2}+0.1755ΔLIR_{t-1}+0.0033ΔLIR_{t-2}+0.3872ΔLIP_{t-1}+0.0862ΔLIP_{t-2}+2.2433ΔLEX_{t-1}+1.1990ΔLEX_{t-2}-0.2202$\Delta LCPI_{t-1}$+0.7226$\Delta LCPI_{t-2}$+0.1434ΔLCI_{t-1}+0.14086ΔLCI_{t-2}-0.029+0.0337ECM_{t-1}

Where:

(22) ECM_{t-1}=LVN_t+16.39802LEX_t+1.103076$LCPI_t$-4.846953LIR_t-7.788547LIP_t-6.198366LCI_t

5.6 Granger-Causality test

Granger-Causality test results can be applied as within sample causality test and can be used to make inferences about casual relationships within the sample period only.
The results of Granger-Causality are show in table in Appendix two, according to the results, we can divide the results into four types of causality effect: 1) one term causality relationship only. 2) Both long term and short term relationship 3) short term relationship only. 4) No causality relationship. Here we only choose the ones with causality relations and present them in table 7.

Table 7. Statistically significant causality relations.

	F-Statistic	Probability	Causality nature
LIR → LVN	2.49052	0.09029*	Long term
LCPI→ LVN	5.4061	0.00659**	Long term
LCI→ LVN	2.68331	0.07547*	Long term
DLCI → LVN	2.68712	0.0753*	Short and long
LVN→ LIR	2.7499	0.07095*	Long term
LCI → DLVN	2.74408	0.07144*	Short and long
DLCI → DLVN	2.82208	0.06647*	Short term

* Means significant at 10% level.
** Means significant at 5% level.

Although it is not hypothesized, some causality relationships among economic factors are observed from the results.

Table 8. Causality relationships among economic factors.

	F-Statistic	Probability	Causality nature
LIR → LCI	4.63978	0.01287**	Long term
LIP → LCPI	6.99963	0.00171**	Long term
LIP → DLCPI	2.83933	0.06542*	Short and long
LCPI → LCI	3.00206	0.05622*	Long term
LCPI → DLCI	3.46385	0.03694**	Short and long
DLEX → LCI	2.65302	0.07772*	Short and long

DLCPI → DLEX	3.72726	0.02911**	Short term

* Means significant at 10% level.
** Means significant at 5% level.

5.7 Variance decomposition

Variance decomposition analysis was used to supplement the Granger causality results to exam the out of sample causality. In variance decomposition analysis, variance of the forecast error of a particular variable is proportioned into proportions attributable to innovations in each variable in the system, including its own. If a variable can be optimally forecasted from its own lags, then it will have all its forecast variance accounted for by its own disturbances (Sims, 1982)

Results reported in the following table show how much of LVN's own shock can be explained by movement in its own variance and those of the macroeconomic variables over the 10 months of forecast horizon.

Table 9. Variance decomposition of LVN by macroeconomic variables.

Period	LVN	LIR	LIP	LEX	LCPI	LCI
1	100	0	0	0	0	0
2	96.1786	0.055411	0.437899	0.061311	1.071305	2.19548
3	92.31903	0.068458	1.454096	0.048907	2.027689	4.081817
4	90.16742	0.053866	2.165531	0.034157	2.222281	5.356742
5	89.26631	0.043776	2.581938	0.03487	2.110718	5.962388
6	88.96555	0.037494	2.863403	0.039317	1.921022	6.173212
7	88.83992	0.034634	3.083625	0.041861	1.752866	6.247096
8	88.74825	0.033274	3.248294	0.043716	1.614927	6.311539
9	88.66845	0.031932	3.356216	0.045218	1.500921	6.397262
10	88.61384	0.030275	3.417555	0.046233	1.404412	6.487683

The following table of variance decomposition results shows the proportion of forecast variance of the macroeconomic variables and Chinese stock market index explained by LVN.

Table 10. Variance decomposition of macroeconomic variables by LVN.

Period	LIR	LIP	LEX	LCPI	LCI
1	7.657482	0.059873	2.485682	0.218398	13.81287
2	5.075502	0.062435	4.140513	0.766792	22.10927
3	5.990384	1.775631	8.545221	0.940297	25.56783
4	7.319676	3.272748	8.796051	0.871829	26.3306
5	6.783078	3.92649	7.999278	0.760827	25.06246
6	5.618211	3.834998	6.669208	0.705972	22.92742
7	4.638689	3.594205	5.451964	0.667391	20.84499
8	3.983664	3.305388	4.544315	0.64762	19.18773
9	3.537779	3.03925	3.892641	0.64031	17.96498
10	3.202936	2.809153	3.395	0.642796	17.1326

5.8 Impulse Responds function

A shock to the variable at time period t not only directly affects the variable but is also transmitted to all of the other endogenous variables through the dynamic structure of the VAR. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables.

Figure 11 shows the impulse respond function for LVN with respect to a standard deviation shock in each of the economic variable and Chinese stock market index.

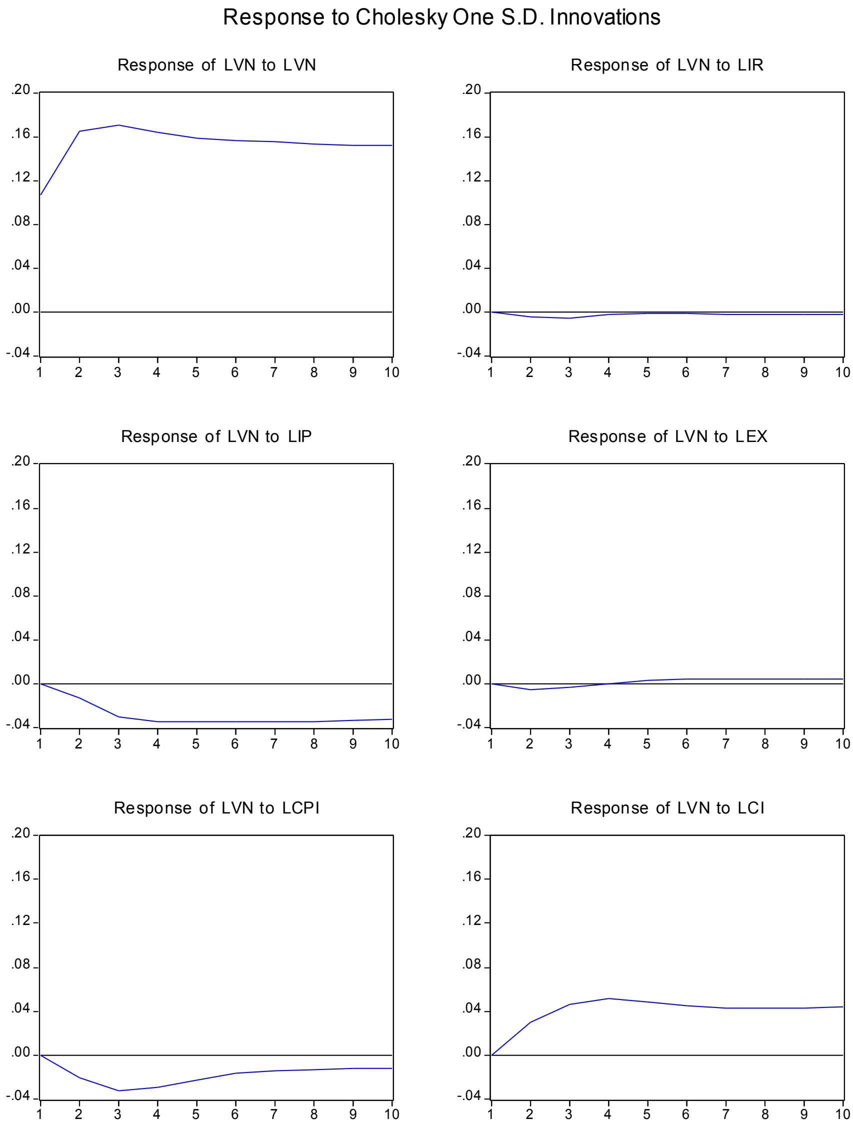

Figure 10. Impulse respond function of LVN to economic variables.

Figure 12 depicts impulse response functions for the economic variables and Chinese stock market index when a standard deviation shock is given to the equation for the stock price, the LVN.

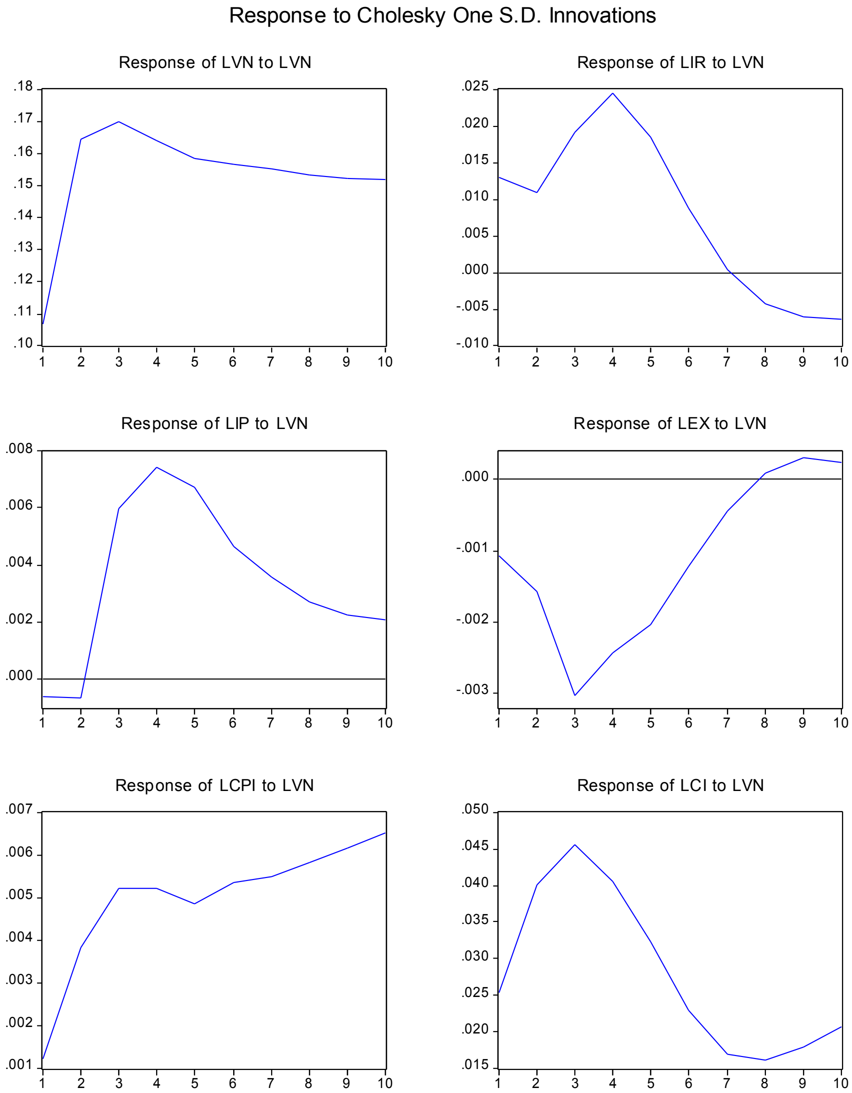

Figure 11. Impulse response of economic variables on shock to LVN.

6. RESULTS AND MAIN FINDINGS

6.1 Main findings on long term relationship and short term dynamic

6.1.1 LVN and LEX

There is statistically significant negative relationship between LVN and LEX in long term, the regressed parameter is -16.39802 with a t statistic of 2.79316, and hypothesis 1 is rejected by the empirical result. Results show that there is a negative long-term equilibrium relationship between stock market return and exchange rate. Since Vietnam follows the exchange policy to promote export, the exchange rate is fixed with standard deviation no greater than 1% from the previous day. This might be the reason that exchange rate does not have much influence on stock price.

6.1.2 LVN and LCPI

Results show that there is a negative relationship between LVN and LCPI in long run. However, the relationship is statistically insignificant, the t statistic for the regressed parameter is 1.38016. The negative long-term relationship between stock price and inflation is not obvious in Vietnam Stock market; hypothesis 2 is not supported by empirical results.

6.1.3 LVN and LIR

There is a statistically significant positive relationship between LVN and LIR in long run, the regressed parameter is 4.846953 with a t statistic of -4.04358, and this result is significant but contrasts to hypothesis 3. It is hypothesized that the relationship between stock price and interest rate is negative in long run. The possible reason for the finding of a positive relation may be that one year Treasury bill yield is not a good representation of long-term interest rate but a short-term interest rate. It is also found that in short run, there is significant positive relation between ΔLVN_{t-2} and ΔLIR_t, the regressed parameter in front of ΔLVN_{t-2} for ΔLIR_t is 0.1589, with a t statistic of 2.76001*, it is indicated from the results that there is a statistically significant positive relation between stock returns and future interest rate changes. This finding is consistent with the findings of Sheridan Titman and Arthur Warga's study (1989) that future changes in interest rates are positively correlated with current stock return.

6.1.4 LVN and LIP

The regressed parameter before LIP is 7.788547 with a t statistic of -3.25625, it is showed from the results that there is statistically significant positive relationship between LVN and LIP in long run. Hypothesis 4 is supported by the empirical results, which indicated that there is a positive relationship between stock price and real economic activity in long run. For long-term relationship, from equation (1), it is noticeable that the elasticity of stock on economy is 7.788547, which means that whenever real economic change for 1%， stock market will react in about 7.8%. This reflects the long-term equilibrium relationship between stock market and real economic.

The short-term relation between stock price and real economic activity is negative; however, the relation is not obvious since the t statistics are statistically insignificant. However, the finding of a negative relation between stock price and real economic activity is not surprise, especially in emerging countries such as Vietnam and China. For short run, it may be possible that the stronger the real economic developed, the weaker the stock market. This kind of special phenomenon observed in some emerging market can be called as "short-termism Trap". For Vietnamese Stock market, the absolute values of regressed parameters are relatively great, which shows that the negative causality effect of real economic on stock market cannot be ignored.

6.1.5 LVN and LCI

Empirical result showed that relationship between LVN and LCI is positive in long-term, this positive relation is statistically significant; the coefficient is 6.198366 with a t statistic of -5.55996. It is showed from the result that when Chinese stock market changes for 1%, Vietnamese stock market will change for about 6.2%. It indicated that besides domestic real economic, Chinese stock market is another main driven of Vietnamese Stock market. Hypothesis 5 is confirmed by empirical results. For short run, the relationship between LVN and LCI is also positive but statistically insignificant. For the impact of Vietnamese stock market on Chinese market, it can be showed from the results that the impact is statistically insignificant.

6.1.6 Error correction term

The error correction term indicates the speed of adjustment towards the long-rum equilibrium, and is found to be negative in the stock return but this finding is statistically insignificant since the t statistic is -0.7386. The larger the value of the error-correction term, the faster the disequilibria is adjusted in the short -run so that long-run equilibrium relationship holds. The speed of adjustment is -0.0163, implying that about 1.6 percent of the previous deviation between the actual and the desired stock prices are corrected in each month. This adjustment power is relatively week based on the empirical result.

6.2 Main findings of Granger-Causality relationship

The results of Granger-causality test show that there are four long-term causal relationships among the stock market prices and macroeconomic variables. Those are: causality runs from one-year T-bill rates (LIR) to LVN, from LCPI to LVN, from LCI to LVN and causality from LVN to LIR. It shows from the results that interest rate and LVN has long-term causality effect to each other. It also shows that LCPI, which is a representation of inflation, is the causality effect of stock market price in long run. The significance of the existence of causality relationship from LCI to LVN indicates that Chinese stock market has long-run causality effect on Vietnamese Market.

There are two short and long-term relationships between stock price and Chinese stock market index, these causalities are from the change of Chinese stock market index (DLCI) to Vietnamese stock market price, and from Chinese stock market index (LCI) to the change of Vietnamese stock market price. There is one short-term causality relationship, which runs from the change of Chinese stock market index price (DLCI) to the change of Vietnamese Stock market price (DLVN)

These results strongly indicate that Chinese stock market index has both long-term effect and short-term effect on Vietnamese Stock market.

It is worth to notice that there is neither long-term nor short-term causality relationship exists between Vietnamese stock price and the other two domestic macroeconomic variables, LIP and LEX. There is no causality effect from IP to VN, which means that real economic activity is not the causality factor of stock price for Vietnamese market.

In reserve way, there is no causality effect from VN to IP, which means stock market is not the causality factor of real economic neither. Such kind of capital market is called as "Phony Capital Market", which doesn't have predicting ability towards real economic. It can be said that Vietnamese Stock market has the name of being a capital market but doesn't perform the function as being a capital market. It distributes part of capital that can be used for economic development but it cannot be feedback by real economic. The absorb capital seemed to be isolated with real economic. Such phenomenon is called as "Black Hole Effect".

And it is also worth to notice that except the causality relationship between LCPI and LVN (significant at 5% level) all the other observed causality relationships are significant at 10% level.

Besides the above results that related to the hypothesized problems, which are mainly about the relationship between stock markets and macroeconomic variables, there is also some other causality relationships observed among macroeconomic variables themselves. Results show that there are three long-term causality relationships among macroeconomic variables. Those are causality run from LIR to LCI, from LIP to LCPI, and from LCPI to LCI. The results imply that in long run, the interest rate of Vietnam is a causality factor of Chinese stock market, this may due to the reason that nowadays the business connection and investment relations between Vietnam and China are much closed. Industrial production index has causality effect on LCPI, which shows that real economic activity has causality effect on inflation. While the causality effect from LCPI to LCI indicates that in long run, inflation in Vietnam will also has effect on Chinese Stock market.

There are three short and long term causality relationships among economic factors, these causality relationships are running from LIP to DLCPI, from LCPI to DLCI, and from DLEX to LCI. Results prove that the real economic activity has also causality effect on the short run change of domestic inflation. Meanwhile, inflation in Vietnam is the Granger-causality factor of Change of Chinese stock market index. Furthermore, the change of exchange rate has Granger-causality effect on Chinese stock market index.

There are one short-term causality relationship between DLCPI and DLEX, which shows that the fluctuation of Chinese stock market has causality effect on the change of exchange rate.

From the results of Granger-causality test, we can conclude that economic of Vietnam is much closed to China both in the level of real economic and finance market. And Chinese stock market index can be considered as a main influencing factor on Vietnamese stock market.

6.3 Main finding of variance decomposition

6.3.1 From macroeconomic factors to stock market index

Results of variance decomposition analysis in table 9 report how much of LVN's own shock is explained by moments in it own variance and those of the macroeconomic variables over the 10-month forecast horizon. According to the results showed in column two of the table, the amount of variance of the LVN explained by it goes down when the time horizon increases. At horizon one all variance is explained by itself. At horizon 10, only 88% of it variance is explained by itself. This indicates that in long term, variance of LVN is caused by the variance in other variables. It means that there are causal relationship between the LVN and the other variables at long horizons.

From the last column of table 5, we can see that out of the 5 macroeconomic variables, the Chinese stock index is the one that explains most of the variance of LVN. At horizon 2, it explains 2.18548% of the variance of LVN, when the time horizon goes up to 10, the percentage of variance that it can explain increases to almost 6.5%. This results prove that the longer the time horizon, the larger the amount of variance in LVN will be explained by LCI. The greatest amount of variance that can be explained by LCI indicates that, in out of sample period, Chinese stock market is the most important causality factor of Vietnamese stock market; this finding is consistent with the results of Granger-Causality tested above.

The second variable that causes the variance in LVN is industrial product index. Its influence is relatively small in short horizon but increases quickly when the time horizon goes up. Until period 10, it can explain 3.417555% of variance of LVN. This shows real economic factor is also one key causality factor for stock market, but the effect is reflected in long run. This can also explain the reason why there is no significant causality relationship observed between LIP and LVN in the in-sample Granger-Causality test above.

The Consumer Price index also plays some role in explaining the variance of LVN, but this role is not as prominent as those of LCI and LIP in long run. In horizon 2, LCPI explains about 1% of variance in LVN, when time horizon extends to10, the figure increase to 1.404412%, which indicates that there may be some causality effect from LCPI to LVN, but is not so strong.

The interest rate, exchange rates play a small role in explaining the variance of LVN. The above discussion indicates that the most influential determinants of the stock price in Vietnam are Chinese stock market index and the real economic of domestic.

6.3.2 From stock market index to macroeconomic variables

Table 10 presents the proportions of forecast variance of the macroeconomic variables explained by LVN. A perusal of column six shows that LVN can explain significant amount of variance in Chinese stock index. This indicates that Vietnamese stock market has causality effect on Chinese market as well. The explanation abilities of LIR, LIP and LEX towards the variance in LVN are quite similar in long rum. But LVN has stronger ability to explain LIR's variance than the other two variables in the first two horizons. It shows that in short run, the causality effect of LVN on LIR is strong. And it becomes weaker when horizon increases. While for LIP, the situation is on the opposite; LVN has more and more explaining ability towards the variance of LIP when time goes up. In long run, the causality effect of stock market on real economic is significant. The causality effect of LVN on LEX is most significant at horizon 4, which is about 8.8% of the variance. It shows that the causality effect of LVN is relatively weak in both short term and long term but stronger in mid term. The ability of LVN in exploring variance in LCPI is weak from the results reported.

6.4 Main findings of impulse respond functions

6.4.1 Responds of LVN to the shock on economic variables

Figure 8 presents the impulse response functions for the LVN with respect to standard deviation shock in each of the six variables. A standard deviation shock in the equation for LVN increases the LVN till horizon three. Then the LVN starts decreasing till horizon eight after which a standard deviation shock to the equation for the LVN does not introduce any variable impact on the LVN.A standard deviation shock to the equation for LCI increases the LVN until horizon 4. After that the LVN begins to decline slighting until horizon 7. At all horizons after 7, a shock to the equation for LCI does not produce any volatility in the LVN. When a shock is given to the equation for LIP, LVN decrease until horizon 3 and after that there is no volatility in LVN in respond of the shock for equation LIP. However when an innovation is given to the equation for LCPI, there is a decrease for LVN until horizon 3 and after that, LVN slightly increase until horizon 7 later, a standard deviation shock to the equation for the LCPI does not cause any variability. For the standard deviation shock to equation for the LIR and LEX, there is only very little volatility in all horizon.

6.4.2 Responds of economic variables to the shock on LVN

Figure 12 depicts impulse response function for the five macroeconomic variables when a standard deviation shock is given to the equation for the stock price, the LVN. A standard shock to the stock price leads to a negative impact on the interest rate LIR until horizon 2, after that, LIR starts to rise till horizon 4 and begins to decline again after that. The volatility in LIR lasts until horizon 9 and becomes weaker and weaker. When a standard shock is given to stock price, there is no volatility observed for LIP in the first two horizons. But after horizon 2, there is a rapid positive reaction of volatility in LIP to the standard shock given to the equation for LVN. This rapid positive respond lasts until horizon three, the volatility keep going until horizon four with a slower increasing rate. The after the, the impact becomes negative, the volatility of LIP in respond to the standard shock on the equation LVN declines gradually after horizon 4. As far as LEX is concerned, a standard shock on the equation of LVN will lead to a negative respond of volatility in LEX until horizon 3. Then the impacts turn out to be positive after horizon 3 and keep going until horizon 9. When considering about the respond of LCPI, when a standard shock is given to the equation of LVN, the impact on the volatility of LCPI is positive for most of time horizon. The increase from horizon 1 to 3 is rapid and after that there is a slightly decrease until horizon 5. Then the volatility of LCPI keeps going up again. The LCI responds positively in the first three horizons, and after horizon three there is decline for the volatility of LCI in respond of a standard shock to the equation of LVN, the decrease lasts until horizon 8 and impact turns to positive again after that.

7. CONCLUSION AND SUGGESTION FOR FUTURE RESEARCH

7.1 Conclusion

This paper exams the relationship between stock index and macroeconomic factors for Vietnamese Stock market, as well as relationship between Vietnamese stock market index and Chinese stock market index. The main findings are such that there is significant long-term equilibrium relationship between stock return and most of the macroeconomic factors (including Chinese stock market index). The short-term dynamic adjustment between stock return and macroeconomic variables is weak and statistically insignificant. The results of co-integration test, variance decomposition and Granger-Causality test all show that Chinese stock market index (LCI) is the main driven of Vietnamese stock market, and there is close relationship between these two stock markets.

7.2 Limitation and Suggestion for future research

Due to the short history of Vietnamese market, data of stock market return on monthly basic is limited. This will somehow affect the accuracy of empirical results and relative conclusion. However, most of the domestic economic factors are release monthly or even quarterly. Also, the domestic macroeconomic factors tested in this paper are limited. There may be some other economic factors that have strong relationship with stock market return but is not tested in this paper. For future study, more domestic macroeconomic factors such as money supply can be employed and tested. This potentially will provide a better and fully understand of relationship between stock market return and domestic economic variables. Moreover, due to the openness of Vietnamese economic and the closer coordinate of stock market with foreign countries. More stock market index such as index of Singapore Market can be employed to exam their relationship with Vietnamese market. Also, the relationship between Vietnamese Stock Market Index and Asian Pacific Index can also be examined, which will have to provide an understanding of both the role of Vietnamese Stock play in Asian Pacific Area and the effect of Asian Pacific index on Vietnamese Stock Market Index.

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APPENDICES

APPENDIX 1. Regression results and t-statistic of ECM

Appendix 1.1 Regression coefficient of the relationship between ΔLVN_t and it's own lags and the lag of other economic variables.

$\Delta LVN_t \Leftarrow (\Delta LVN_{t-1}, \Delta LVN_{t-2}, \Delta LIR_{t-1}, \Delta LIR_{t-2}, \Delta LEX_{t-1}, \Delta LEX_{t-2}, \Delta LCPI_{t-1}, \Delta LCPI_{t-2}, \Delta LCI_{t-1}, \Delta LCI_{t-2}, ECM_{t-1}, C_{16})$

	Coefficients	t-statistic
ΔLVN_{t-1}	0.4231	3.1178**
ΔLVN_{t-2}	-0.2504	-1.9121
ΔLIR_{t-1}	-0.0226	-0.0855
ΔLIR_{t-2}	-0.0917	-0.3442
ΔLIP_{t-1}	-0.5043	-0.9191
ΔLIP_{t-2}	-0.5557	-0.9799
ΔLEX_{t-1}	-1.1254	-0.5683
ΔLEX_{t-2}	-0.7821	-0.3745
$\Delta LCPI_{t-1}$	-0.6867	-1.3017
$\Delta LCPI_{t-2}$	0.3356	0.6252
ΔLCI_{t-1}	0.3888	1.8032
ΔLCI_{t-2}	0.0202	0.0933
ECM_{t-1}	-0.0163	-0.7386
C_{16}	0.0467	1.7113

Appendix 1.2 Regression coefficients of the relationship between lags of each economic factor and lags of ΔLVN_t

$$\begin{array}{l} \Delta LIR_t \\ \Delta LIP_t \\ \Delta LEX_t \\ \Delta LCPI_t \\ \Delta LCI_t \end{array} \Leftarrow (\Delta LVN_{t-1}, \Delta LVN_{t-2})$$

	□LVN_{t-1}	t-statistic	□LVN_{t-2}	t-statistic
□LIR_t	-0.05601	-0.93911	0.158863	2.76001*
□LIP_t	0.003264	0.10254	0.051613	1.68030
□$LCPI_t$	0.032606	0.98500	-0.01624	-0.50849
□LCI_t	0.148688	1.72052	-0.00943	-0.11311
□LEX_t	-0.01188	-1.37456	-0.00159	-0.19060

APPENDIX 2. Granger-Causality test

	F-Statistic	Probability
LIP does not Granger Cause LCPI	6.99963	0.00171
LCPI does not Granger Cause LVN	5.4061	0.00659
LIR does not Granger Cause LCI	4.63978	0.01287

DLCPI does not Granger Cause DLEX	3.72726	0.02911
LCPI does not Granger Cause DLCI	3.46385	0.03694
LCPI does not Granger Cause LCI	3.00206	0.05622
LIP does not Granger Cause DLCPI	2.83933	0.06542
DLCI does not Granger Cause DLVN	2.82208	0.06647
LVN does not Granger Cause LIR	2.7499	0.07095
LCI does not Granger Cause DLVN	2.74408	0.07144
DLCI does not Granger Cause LVN	2.68712	0.0753
LCI does not Granger Cause LVN	2.68331	0.07547
DLEX does not Granger Cause LCI	2.65302	0.07772
LIR does not Granger Cause LVN	2.49052	0.09029
DLVN does not Granger Cause LIP	2.27313	0.11076
DLVN does not Granger Cause DLIP	2.26969	0.11112
LCPI does not Granger Cause DLVN	2.19897	0.11874
DLVN does not Granger Cause LIR	2.16954	0.12207
DLEX does not Granger Cause LIR	2.16151	0.123
LCPI does not Granger Cause LIR	2.10236	0.12993
LIR does not Granger Cause DLCI	2.08477	0.13221
DLVN does not Granger Cause DLIR	2.0555	0.13591
DLCPI does not Granger Cause DLCI	2.00639	0.14236
DLEX does not Granger Cause DLIR	1.9327	0.15263
LCI does not Granger Cause DLEX	1.79167	0.17446
LIP does not Granger Cause LVN	1.77403	0.1773
LVN does not Granger Cause LCI	1.75393	0.18072
DLCPI does not Granger Cause LCI	1.67508	0.19493
DLCI does not Granger Cause LIR	1.64737	0.20015
LCPI does not Granger Cause DLIR	1.63976	0.2016
LVN does not Granger Cause DLIR	1.62179	0.20509
DLVN does not Granger Cause LCI	1.56666	0.21618
DLEX does not Granger Cause DLCI	1.54411	0.22089
LCPI does not Granger Cause LIP	1.52453	0.22497
LIP does not Granger Cause LIR	1.47364	0.23621
DLCI does not Granger Cause DLIR	1.46756	0.23769
LIP does not Granger Cause DLCI	1.46349	0.23862
DLIR does not Granger Cause DLEX	1.45765	0.23996

LCPI does not Granger Cause DLEX	1.26405	0.28906
LIP does not Granger Cause DLIR	1.23663	0.29681
DLVN does not Granger Cause DLCI	1.22056	0.30145
DLEX does not Granger Cause DLCPI	1.17678	0.31447
LVN does not Granger Cause DLCI	1.16673	0.31754
LIR does not Granger Cause DLVN	1.15563	0.32097
DLIP does not Granger Cause LCI	0.97009	0.38423
LVN does not Granger Cause DLEX	0.91249	0.40638
LVN does not Granger Cause DLIP	0.88377	0.41791
DLIP does not Granger Cause LVN	0.877	0.42068
LVN does not Granger Cause LIP	0.85126	0.43131
DLIP does not Granger Cause DLCI	0.8434	0.4347
LIP does not Granger Cause DLEX	0.8212	0.44422
LIR does not Granger Cause DLEX	0.81533	0.44677
DLCPI does not Granger Cause LIP	0.81141	0.44848
DLCPI does not Granger Cause DLIP	0.80648	0.45065
DLIR does not Granger Cause DLCPI	0.78393	0.46069
DLIR does not Granger Cause LCPI	0.78015	0.4624
DLEX does not Granger Cause LIP	0.7793	0.46278
DLEX does not Granger Cause DLIP	0.77606	0.46425
DLCPI does not Granger Cause DLVN	0.76256	0.47042
LCI does not Granger Cause LCPI	0.71955	0.49059
LIP does not Granger Cause DLVN	0.71253	0.49403
LIP does not Granger Cause LCI	0.71056	0.49493
DLIP does not Granger Cause LIR	0.68753	0.50628
DLIP does not Granger Cause DLIR	0.65889	0.5207
DLCPI does not Granger Cause LVN	0.64604	0.5273
LIR does not Granger Cause DLCPI	0.63649	0.53227
DLIP does not Granger Cause DLVN	0.62012	0.54089
LCI does not Granger Cause DLCPI	0.58626	0.55919
DLCI does not Granger Cause LCPI	0.51367	0.6006
DLCI does not Granger Cause DLIP	0.49081	0.61428
DLCI does not Granger Cause LIP	0.48374	0.61858
DLIP does not Granger Cause DLCPI	0.44986	0.6396
LCI does not Granger Cause LIP	0.40469	0.66876

DLIP does not Granger Cause LCPI	0.33483	0.71664
LCI does not Granger Cause DLIP	0.32254	0.72541
LCI does not Granger Cause LIR	0.26445	0.76841
DLEX does not Granger Cause LCPI	0.25251	0.77757
DLCI does not Granger Cause DLEX	0.24103	0.78649
DLIR does not Granger Cause LVN	0.23953	0.78766
LVN does not Granger Cause DLCPI	0.22228	0.80127
LIR does not Granger Cause LIP	0.21692	0.80554
LIR does not Granger Cause DLIP	0.19844	0.82048
DLIR does not Granger Cause DLIP	0.19514	0.82318
DLIR does not Granger Cause DLCI	0.19476	0.82349
DLIR does not Granger Cause LCI	0.19318	0.82479
DLIR does not Granger Cause LIP	0.18677	0.83006
LIR does not Granger Cause LCPI	0.18403	0.83232
DLVN does not Granger Cause LCPI	0.17001	0.84402
DLCPI does not Granger Cause LIR	0.15251	0.85884
DLEX does not Granger Cause DLVN	0.14034	0.86931
LCPI does not Granger Cause DLIP	0.13135	0.87713
DLVN does not Granger Cause DLEX	0.11991	0.88718
LVN does not Granger Cause LCPI	0.11949	0.88756
DLCPI does not Granger Cause DLIR	0.11397	0.89245
DLIP does not Granger Cause DLEX	0.0855	0.91815
DLVN does not Granger Cause DLCPI	0.0807	0.92256
DLCI does not Granger Cause DLCPI	0.05529	0.94625
DLIR does not Granger Cause DLVN	0.05355	0.9479
DLEX does not Granger Cause LVN	0.05322	0.94821
LCI does not Granger Cause DLIR	0.02504	0.97528