The Effect of Macroeconomic Variables on Stock Prices:

A Conceptual Framework of the Arbitrage Pricing Theory

Singh Shivangi
Research Scholar
Institute of Management
Nirma University

Jotwani Naresh
Research Scholar
Institute of Management
Nirma University
dhirenjotwani@hotmail.com

The relationship between fundamental macroeconomic variables of the economy and stock markets is an essential one. It affects the perspective of monetary and fiscal policy decisions, portfolio management and economic development. It has been studied that macroeconomic variables can influence investors' investment decisions. Over the world, many researchers have investigated the relationships between stock market prices and various macroeconomic variables. The focus of the current paper is to investigate whether the share price index can be considered as a reflection of economic activities in India. This study investigates the impact of five selected macroeconomic variables on Stock Market Liquidity of S&P CNX Nifty. As a result of this analysis, a simple model of the influence of macroeconomic fundamentals on the stock market index has been suggested. For better stock market performance, policy makers should put in place measures that will ensure a stable macroeconomic environment.

Keywords: Arbitrage Pricing Theory, Macroeconomic Fundamentals, Stock Price Movement.

INTRODUCTION

The financial sector and the economy are always inter-related. Studies of the banking sector and stock market are quite common. Stock prices and their relationships with macroeconomic variables draw much attention from policy makers, academicians and practitioners. This relationship is an important area to study, especially from the perspective of monetary and fiscal policy decisions, portfolio management, and economic development. Stock markets enable public trading of listed shares. Thus, they help transfer funds from surplus spenders (economic agents with excess current income over spending) to deficit spending units (economic agents with current income falling short of spending). This is done with higher efficiency as compared to traditional financial intermediaries, through a range of complex financial products called securities.

Well developed stock markets accelerate economic growth – this is done by providing liquidity, risk management tools, reducing information asymmetries and rewarding performance and efficiency. They also help raise foreign funds.

The securities that are being traded in stock markets are existing ones – hence it is called the secondary market – these securities are issued by deficit units in the real or financial sector, to the surplus spenders in the new issue market. Thus idle and surplus funds are channelled to productive activities. According to Galbraith (1955), *"the stock market is but a mirror, which provides an image of the underlying or fundamental economic situation"*.

Well developed stock markets accelerate economic growth – this is done by providing liquidity, risk management tools, reducing information asymmetries and rewarding performance and efficiency. They also help raise foreign funds.

Households with surplus funds are provided with an additional financial instrument that offers more flexible risk and liquidity dynamics. For example, an individual investor has the option of investing for

just one day, in a project that may last ten years. He or she may invest a small sum, while the project itself may be worth millions. A well developed market can serve all types of lenders and borrowers.

THEORETICAL BACKGROUND:

LITERATURE REVIEW

The financial literature has included various theoretical and empirical studies analysing the relationship between stock market returns and macroeconomic forces during the last few decades. The basic premise of this argument lies in the famous "*Arbitrage Pricing Theory*" given by Ross (1976). It broadly speaks that stock prices are determined by some fundamental macroeconomic variables – which can influence investors' investment decisions. Many authors have selected various macroeconomic variables seeking to detect their relationship with stock market prices in several countries. Concurrently, a number of econometric techniques can be used, which include: impulse response functions, error variance decomposition analysis, vector error correction model, co-integration analysis, Granger causality tests and others. These may be to check the existence of relationship between stock market prices and macroeconomic variables.

The basic premise of this argument lies in the famous "*Arbitrage Pricing Theory*" which broadly speaks that stock prices are determined by some fundamental macroeconomic variables – which can influence investors' investment decisions.

The focus of the present study is not new; it is a well-researched area and some studies obviously deserve special attention. Aggarwal (1981) found that US stock prices are positively correlated with the 'trade weighted' dollars. Soenen and Hennigar (1988) have found a strong negative correlation between US stock prices and '15-currency-weighted value' of the dollar. Ma and Kao (1990) provided some explanations for these contradictory evidences. Their study, based on six industrially developed economies, suggests that the currency appreciation has a negative effect on the stock market of export-dominant economies and boosts the stock market of import-dominant economies.

Recently, there is a shift in the attention of researchers who are not only interested to study the link but also the direction of the causality between some of the key macroeconomic variables and stock prices. Using co-integration and Granger causality, Bahmani-Oskooee and Sohrabian (1992) have shown that there is bidirectional causality between stock price index (S&P 500) and effective exchange rates of dollar. Ajayi and Mougoue (1996) examined the relationship between the two variables and found that especially in the short-run for the markets in the US and the UK, an increase in stock prices causes the currency to depreciate. The study concluded that a rising stock market is an indicator of an expanding economy which goes together with higher inflation expectations. Foreign investors discount this signal negatively and their demand for the currency of the economy with a booming stock market falls and it depreciates.

Granger et al. (2000) investigated the bidirectional causality between currency depreciation and declining stock prices, in the context of the great Asian Crisis of 1997. They have argued that in the markets with high capital flows and not the trade daily demand for currency. particular currency fall, assets, hence leading to Hence, they hypothesized if stock market declines, expected to react rates. This is because

> Economic literature widely supports the existence of joint determination between stock prices and exchange rates.

mobility, it is the capital flows that determine the As stock prices in a foreign investors sell these currency depreciation. that currency will depreciate and the stock prices are ambiguously to exchange depreciation of currency could either rise or lower the value of a company depending on whether the company mainly imports or exports.

In addition, Granger et al. (2000) found a strong relationship between the exchange rates and stock prices but found no certain net effect to predict the relationship when the 'index' of stock prices is considered. The causality is unidirectional with negative relationship for some countries and bidirectional for some others without a definite vector. The wide disparity of the empirical results amongst the seven Asian countries under their study points to the fact that there is no definite clue for the direction of causality between the two markets. Economic literature widely supports the existence of

joint determination between stock prices and exchange rates. However, there is little consensus on the form of relationship (positive or negative) or the direction of causality. (Mok, 1993; Mukharjee and Naka, 1995; Abdalla and Murinde, 1997; Chiang et al., 2000; Nieh and Lee, 2001; and Dimitrova, 2005)

The studies in Indian context have been relatively fewer. Abdalla and Murinde (1997) suggest that exchange rates lead stock prices. Pethe and Karnik (2000) considered the exchange rates along with other macroeconomic variables to study the stock market behavior and found no co-integrating or causal relations between the two variables. Bhattacharya and Mukherjee (2003) investigated the direction of causality between exchange rates and stock prices by using the methodology of Granger non-causality test proposed by Toda and Yamamoto (1995). On the whole, early studies suggest that there is scope for further research to reveal the elaborate relationship between macroeconomic variables and stock market.

Some considerations

If pricing is efficient and transparent, and there are no information asymmetries, any new information will reflect in the share prices instantly. In perfect markets, with no information asymmetries or transaction costs, asset price is determined by fundamental economic data. However, such perfect conditions don't exist. Keynes (1936) and many of his followers, argue that stock market prices do not aggregate or communicate information well. The role of divergent expectations and other factors bias the fundamentals (Aivazian, 1998). Due to such imperfections, the development of stock markets doesn't always directly correlate with economic development. In practice, the pricing mechanism does have flaws.

Froot and Obstfeld (1992) studied stock markets in the US, and identified "intrinsic bubbles". Normally bubbles can't easily be predicted beforehand. Prices suddenly drop and the market crashes. Bubbles can exist in the most developed of markets. This contradicts the Efficient Market Theory (EMT) which assumes rational investor behaviour. While it is tempting to believe that we no longer have inefficiencies in the market, this is far from true. This can only lead to further crises. Market valuation must be differentiated from market fundamentals (Koller et al, 2005). According to the Koller team, market valuation levels are determined by the company's absolute level of long-term performance and

growth, that is, expected revenue and earnings growth and return on invested capital (ROIC). TRS is measured by changes in the market valuation of a company over some specific time period and is driven by changes in investor expectations for long-term future returns on capital and growth. Their work showed that the relative market value of a company as measured by the market-value-to-capital ratio is determined by the company's growth and its spread of ROIC over the weighted average cost of capital (WACC). These discussions are generally captured under three approaches to stock valuation given as Fundamental, Technical and Efficient Market Approaches (Okafor, 1983).

A clear message from these reviewed works is that there is some relationship between the stock market and both firm-level and macroeconomic fundamentals. Thus it is important to study how the stock market, and in turn the capital market, perceivably benefit the economy and represent the sentiments of the business community.

Classification of macroeconomic variables according to the business cycle:

Variables that indicate macroeconomic trends are statistical in nature, and they reflect the situation of an economy during some period of time (Rogers, 1998). This may also be data issued by state institutions that indicate the welfare of a country (Mohr, 1998; Darnay, 1998; Ciegis, Ramanauskiene and Startiene, 2009; Kumpikaite and Ciamiene, 2008). The first attempts to calculate macroeconomic variables could be dated as back as the First World War when warring countries wanted to measure the strength of their enemies.

Nowadays, agencies and institutions issue and publish a number of macro-indicators. According to the business cycle, it is possible to distinguish the following groups of macroeconomic variables (Rogers, 1998):

1. *Procyclic macroeconomic variables* are positively correlated with the overall state of the economy, i.e. they tend to increase when the overall economy is growing. Gross domestic product is considered to be a classical example of procyclic macroeconomic variables.

2. *Countercyclic macroeconomic variables*, on the contrary, move in the opposite direction of the overall economic cycle: rising when the economy is weakening, and falling when the economy is strengthening. The unemployment rate gets larger when the economy gets worse that's why it is attributed to this group.

3. Acyclic macroeconomic variables have no relation to the health of the economy and are generally of

   little use.

The National Bureau of Economic Research offers another classification, which is based on the timing of changes in the macro-indicators (Shiskin and Moore, 1968):

1. Leading macroeconomic variables are indicators which change before the economy changes. Stock

   market returns are considered as a leading indicator, as they usually begin to decline before the

   economy declines and they improve before the economy begins to pull out of a recession.

2. Lagged macroeconomic variables are ones that do not change direction until a few quarters after the

   economy does. The unemployment rate is a lagged economic indicator as unemployment tends

   to increase for 2 or 3 quarters after the economy starts to improve.

3. Coincident macroeconomic variables are ones that simply move at the same time the economy does

   and, for example, the gross domestic product is attributed to this group of indicators.

Leading macroeconomic variables are usually preferred by researchers – this is obviously because they signal oncoming events and help in predictions (Chen, 2009; Dua, 2004). A single macroeconomic variable cannot precisely capture diverse economic conditions; hence we need to study a set of such variables.

Selection of macroeconomic variables by estimating their relationship with stock market prices:

Economic theory – Classical, Keynesian, Monetary and others – is divided on the importance to be allotted to different macro-indicators (Dritsaki and Adamopoulos, 2005). Therefore, it is difficult to select appropriate variables that could of causality. The been investigated for and Modigliani, and Ross (1986) selection of macro-

A single macroeconomic variable cannot precisely capture diverse economic conditions; hence we need to study a set of such variables.

macroeconomic add meaning to tests current issue has a long time (Miller 1961). As Chen, Roll state, proper indicators is not an

easy task – it requires a comprehensive review of theory and empirical work (Humpe and Macmillan, 2007). Dritsaki (2005) states the chosen macro-variables should reflect the financial sector. For this, valuable indicators measure economic output of the country which is measured either by *gross domestic product or industrial production volumes* (Fama, 1981; Chen, Roll and Ross, 1986; Cheung and Ng, 1998; Binswanger, 2000; Lakstutiene 2008).

The choice of data frequency is still open – some prefer industrial production index to gross domestic product since it is calculated every month (not every quarter) and, thus, more often reflects economic situation (Padhan, 2007). This is better used when the industrial sector prevails in the country under analysis (Agrawalla and Tuteja, 2008).

As DeFina (1991) points out, there is a negative influence of inflation on the industry. In many studies, *inflation* is measured by *consumer price index* (Atmadja, 2005; Dritsaki, 2005; Laopodis, 2007), though we may use the producer price index (Teresienè, Aarma and Dubauskas, 2008).

One of the most important macro-variable is *interest rates.* We may use both short term (Dritsaki, 2005; Atmadja, 2005) and long term (Siliverstovs and Doung, 2005) rates, or both (Chen, Roll and Ross, 1986; Mukherjee and Naka, 1995). While short-term interest rates are influenced by business cycles and monetary policies, long-term interest rates are more related to long-term economic perspectives of the country (Humpe and Macmillan, 2007).

Money supply is another important macro-variable (Urich and Wachtel, 1981; Chaudhuri and Smiles, 2004). We are once again faced with choice – Tan and Baharumshah (1999) favour narrow money Ml while others favour broad money supply M2 (Tursoy, Günsel and Rjoub, 2008). Yet another school uses both concepts of money supply in their empirical investigations.

Stock prices can be influenced by *exchange rate fluctuations.* Currency devaluation leads to inflation – this reduces consumer expenditure and firms' profits. This area of empirical analysis is quite exhaustive (Adam and Tweneboah, 2008; Ahmed, 2008; Ibrahim, 2003; Kwon and Shin, 1999). The last important macro-variable is *unemployment* (Tursoy, Günsel and Rjoub, 2008) – which is often used in economic jargon along with GDP and inflation.

All these variables, apart from exchange rate fluctuations, are robust indicators of the domestic economy. Theoretical and empirical studies in India and abroad have focused on these important variables.

METHODOLOGY

For the secondary data concerning the stock prices, National Stock Exchanges` website has been used while the macroeconomic fundamentals have been taken from website of the Reserve Bank of India and government sources. For the time series estimation, a single equation regression model of the relationship between the share price index and related macro indicators shall be specified and estimated. This section is expected to capture the impacts of the broad macroeconomic indicators with monthly data from the year 1999 through 2009.

A time series analysis of the determinants of stock prices employing selected macroeconomic fundamentals like Inflation Rate (measured by CPI for urban labourers), Foreign Exchange reserves, Money Stock (Only Net Bank credit to Government Sector included), Exchange Rate (INR/USD), and Index of Industrial Production (used as a proxy for gross domestic product) shall be specified and estimated. Activities in the Indian stock exchange shall be proxied by the share price index – S&P CNX Nifty.

The relationship between output and stock market indices is well documented in the literature, both theoretical and empirical (as outlined in the review of literature). This relationship is obviously bidirectional. For example, growth translates to increased savings which makes resources available for investment in the stock market. It also leads to economic diversification and therefore a deepening of the stock market. However, stock market deepening leads to more efficient resource mobilization which in turn makes available long term funds for increased investment and growth. However, the focus in this study is limited to the impact of growth on stock prices, which is theoretically transmitted through a number of ways – the most important being through increased savings. Increased income leads to increased availability of investible savings and availability of such investible funds determine demand and supply of stocks which in turn affects stock prices and other indices. Therefore, economic growth

shall be brought in as one of the explanatory variables for the share price index. The relationship is proposed to be positive. Given the above, the final model can be mathematically represented as follows:

$$NSPI = f\ (INF,\ FXR,\ MS,\ ER,\ IIP)\ \text{---------------}\ (1)$$

Where NSPI is the Nifty share price index, INF is the Inflation Rate, FXR is the Foreign Exchange reserves, MS is the Money Stock, ER is the Exchange Rate, and IIP is the Index of Industrial Production.

Functionally, the model is given as:

$$NSPI = C + \alpha\ INF \pm \beta\ FXR \pm \acute{\omega}\ MS \pm v\ ER \pm \eta IIP + \mu\ \text{---------------}\ (2)$$
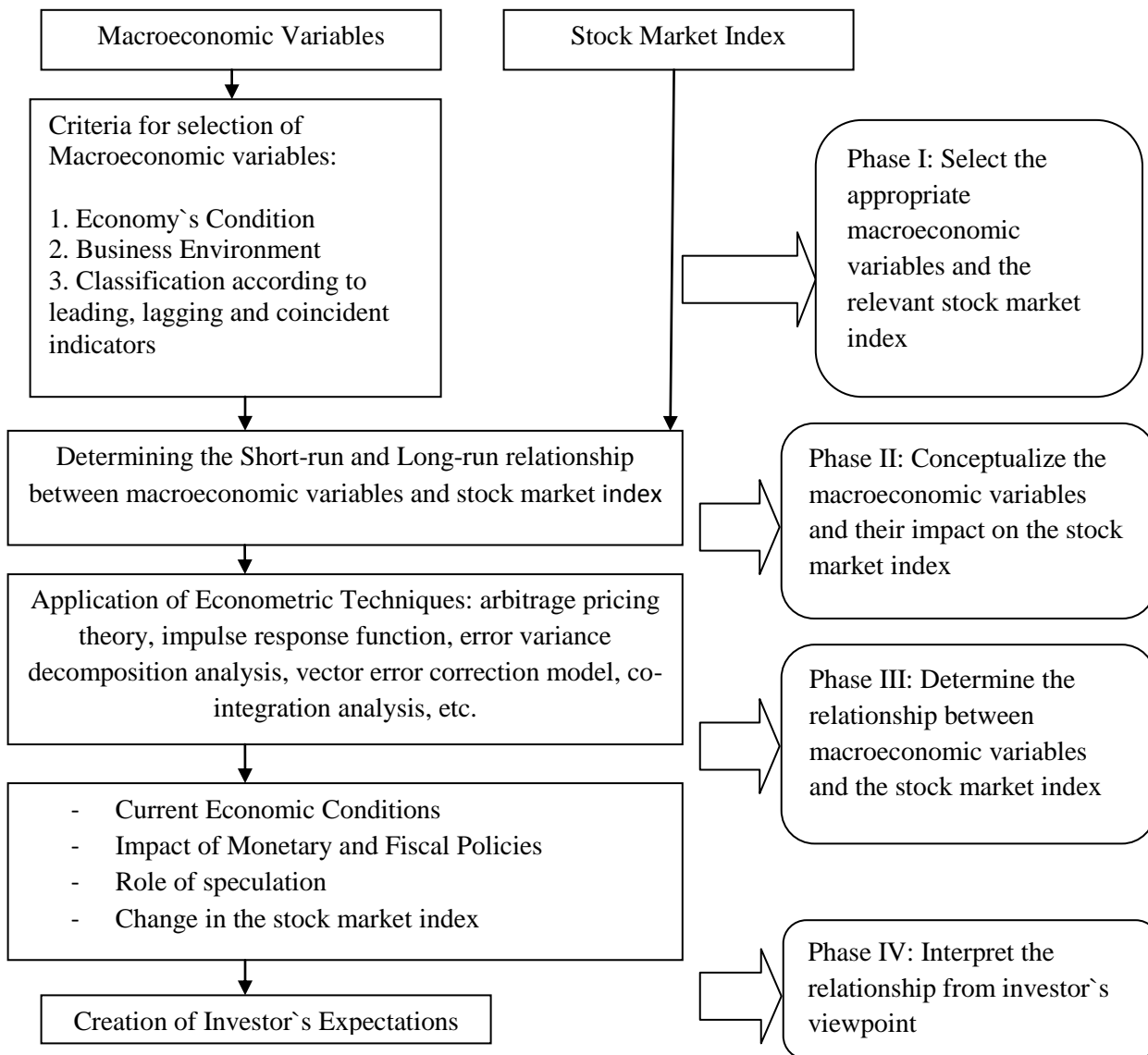
All variables are as earlier defined; α, β, $\acute{\omega}$, v and η are coefficients while μ is a randomly distributed error term. It is worth mentioning here that almost all the macroeconomic variables of an economy are closely interrelated to each other and any attempt to measure the exclusive influence of any single variable on currency prices or asset prices is a redoubtable task.

DATA ANALYSIS

The focus of the current research is to investigate whether the share price index can be considered as a reflection of economic activities in India. It thus, proceeds with a distinct question – what is the relationship between the health of the real economy and the health of the stock market? Does an upsurge in share prices reflect better health of the economy or it is the rosy economic health that causes share prices to rise? In addition to being a theoretical study, this study tries to empirically investigate the impact of five selected macroeconomic variables on stock market liquidity of the premier stock index of India, the S&P CNX Nifty. The summary output of the times series regression model indicates that FXR, ER and IIP are significant in explaining the variability in stock market return while INF and MS came out to be statistically insignificant. The value of adjusted R square (91.5260%) and that of the significance F (8.6770) clearly reveals the robustness of the model.

The analysis carried out in this paper reveals that there are many works in economic literature analyzing methodological viewpoints towards the idea of assessing the stock market. While analyzing the relation between the country's macroeconomic factors and stock market index, researchers have mostly focused on the well developed stock markets. Investors may use macroeconomic data to forecast stock market volatility. This is because macroeconomic variables may serve as a guide in forecasting stock market volatility.

Figure 1 A simple model of the influence of macroeconomic fundamentals on the stock market index:

Macroeconomic Variables	Stock Market Index

Criteria for selection of Macroeconomic variables:

1. Economy`s Condition
2. Business Environment
3. Classification according to leading, lagging and coincident indicators

Phase I: Select the appropriate macroeconomic variables and the relevant stock market index

Determining the Short-run and Long-run relationship between macroeconomic variables and stock market index

Phase II: Conceptualize the macroeconomic variables and their impact on the stock market index

Application of Econometric Techniques: arbitrage pricing theory, impulse response function, error variance decomposition analysis, vector error correction model, co-integration analysis, etc.

Phase III: Determine the relationship between macroeconomic variables and the stock market index

- Current Economic Conditions
- Impact of Monetary and Fiscal Policies
- Role of speculation
- Change in the stock market index

Phase IV: Interpret the relationship from investor`s viewpoint

Creation of Investor`s Expectations

Source: Created by Author

It is therefore clear, that for a better stock market performance, policy makers should put in place measures that will ensure stable macroeconomic environment, since any disturbances in the macroeconomic environment may affect the stock market's activities.

As a result of this analysis, a simple model of the influence of macroeconomic fundamentals on the stock market index has been suggested.

CONCLUSION

The study was conducted to examine whether macroeconomic variables have explanatory power over stock returns in India based on the stock returns response to macroeconomic fundamentals. The use of the times series regression model gives evidence that stock returns are co-integrated with a set of macroeconomic variables, namely: industrial production, foreign exchange reserves of the country and the real exchange rate. The results lend evidence of the existence of a positive relationship between stock returns and the above mentioned macroeconomic variables. Therefore, the Indian stock market does signal changes in the country's real activities. This study has important implications for policymakers and fund managers. The analysis carried out in this paper reveals that scholars and practitioners offer different classifications of macroeconomic variables. No matter what the classification is, macroeconomic variables are relevant indicators of movements in equity markets.

REFERENCES

Abdalla, I. S. & Murinde, V. (1997), Exchange Rate and Stock Price interactions in emerging financial markets: Evidence on India, Korea, Pakistan and Philippines. *Applied Financial Economics*, 7, 25-35.

Adam, A. M. and Tweneboah, G. (2008), Macroeconomic Factors and Stock Market Movement: Evidence from Ghana. Social Science Research Network (available at: <http://ssrn.com/abstract=1289842>)

Agrawalla, R.K. & Tuteja, S.K. (2008), Share Prices and Macroeconomic Variables in India. *Journal of Management Research*, Vol 8 No.3.

Aggarwal, R. (1981), Exchange rates and stock prices: A study of the US capital markets under floating exchange rates. *Akron Business and Economic Review*, 12, 7-12.

Ahmed, S. (2008), Aggregate economic variables and stock markets in India, *International Research Journal of Finance and Economics* 14: 141–163.

Aivazian, V. A. (1998), Microeconomic Elements and Perspectives from Finance Theory, in Fanelli, J. M. and Medhora, R. (eds.), *Financial Reform in Developing Countries*, International Development Research Centre, Ottawa, Canada.

Ajayi, R. A. & Mougou, M. (1996), On the dynamic relation between stock prices and exchange rates. *The Journal of Financial Research*, 19, 193-207.

Atmadja, A.S. (2005), Accounting Innovation Analysis for the Stock Prices and Macroeconomic Factors of Five Asian Countries during and Post the 1997 Asian Financial Crisis. *Jurnal Akuntansi & Keuangan*, 6(1), 55-76.

Bahmani, O. M. & Sohrabian, A. (1992), Stock Prices and the effective exchange rate of the dollar. *Applied Economics*, 24, 459-464.

Bhattacharya, B. & Mukherjee, J. (2003), Causal Relationship Between Stock Market and Exchange Rate. Paper presented at the Fifth Annual Conference on Money and Finance in the Indian Economy, January 2003.

Binswanger, M. (2000), Stock market booms and real economic activity: Is this time different? *International Review of Economics and Finance*, 9, 387–415.

Chaudhuri, K. and Smiles, S. (2004), Stock Market and aggregate economic activity: evidence from Australia. *Applied Financial Economics*, 14(2), 121 -129.

Chen, N. F., Roll, R. and Ross, S. A. (1986), Economic Forces and the Stock Market, *Journal of Business*, 59: 383-403.

Chen, S. S. (2009), Predicting the bear stock market: macroeconomic variables as leading indicators, *Journal of Banking & Finance,* 33(2): 211–223.

Cheung, Y. W. and Ng. L. K. (1998), International Evidence on the Stock Market and Aggregate Economic Activity, *Journal of Empirical Finance*, 5: 281-96.

Chiang T C, Yang S Y and Wang T S (2000), Stock Return and Exchange Rate Risk: Evidence from Asian Stock Markets Based on a Bivariate GARCH Model, *International Journal of Business*, Vol. 5, No. 2, pp. 97-117.

Čiegis, R., Ramanauskienė, J. and Startienė, G. (2009), Theoretical reasoning of the use of indicators and indices for sustainable development assessment, *Inzinerine Ekonomika – Engineering Economics* (3): 33–40.

Darnay, A. J. (1998), Economic Indicators Handbook: Time Series, Conversions, Documentation. Detroit: Gale.

Dimitrova D (2005), The Relationship between Exchange Rates and Stock Prices: Studied in a Multivariate Model, *Issues in Political Economy*, Vol. 14 (August).

Dritsaki, C. and Adamopoulos, A. A. (2005), Causal relationship and macroeconomic activity: empirical results from European Union, *American Journal of Applied Science,* 2(2): 504–507.

Dua, P. (2004), Business Cycles and Economic Growth: an Analysis Using Leading Indicators. Oxford University Press.

Fama, E. (1981), Stock returns, real activity, inflation, and money. *American Economic Review*, 71, 545–565.

Froot, K. and M. Obstfeld (1992), "Intrinsic Bubbles: the Case of Stock Prices", NBER Working Paper Series, w3091: SSRN: http://ssrn.com/abstract=304858

Galbraith, J. K. (1955), *The Great Crash*, Penguin Books.

Granger, C. W. J., Huang, B. & Yang, C. (2000), A bivariate causality between stock prices and exchange rates: Evidence from recent Asian flu. *The Quarterly Review of Economics and Finance*, 40, 337-354.

Humpe, A. & Macmillan, P. (2007), Can Macroeconomic Variables Explain Long-Term Stock Market Movements? A Comparison of the US and Japan, *Applied Financial Economics*, 19.

Ibrahim, M. H. (2003), Macroeconomic variables and stock prices in Malaysia: an empirical analysis. *Asian Economic Journal*, 13, 219-231.

Keynes, J. M. (1936), The General Theory of Employment, Interest and Money, Macmillan, London.

Koller, T, M Goedhart, D Wessels, TE Copeland, McKinsey and Company (2005), "Valuation – Measuring and Managing the Value of Companies" 4th edition, John Wiley and sons Inc

Kumpikaitė, V. and Čiarnienė, R. (2008), New training technologies and their use in training and development activities: Survey evidence from Lithuania, *Journal of Business Economics and Management* 9(2): 155–159.

Kwon, C.S., & Shin, T.S. (1999), Co-integration and causality between macroeconomic variables and stock market return. *Global Finance Journal*, 10, 78-81.

Lakštutienė, A. (2008), Correlation of the indicators of the financial system and gross domestic product in European Union countries, *Inzinerine Ekonomika – Engineering Economics* (3): 7–18.

Laopodis, N. T. (2007), Fiscal policy, monetary policy, and the stock market. Annual International Conference on Macroeconomic Analysis and International Finance.

Ma, & Kao, G. W. (1990), On Exchange Rate Changes and Stock Price Reactions, *Journal of Business Finance & Accounting*, 17, 441-449.

Miller, M. and Modigliani, F. (1961), Dividend policy, growth, and the valuation of shares, *Journal of Business*, 34(4), 411A33.

Mohr, P. (1998), Economic Indicators. Pretoria: Unisa Press.

Mok H M K (1993), Causality of Interest Rate, Exchange Rate and Stock Prices at Stock Market Open and Close in Hong Kong, *Asia Pacific Journal of Management*, Vol. 10, No. 1, pp. 123-143.

Mukherjee, K. Tarun and Naka, Atsuyuki, (1995), Dynamic Relations between Macroeconomic Variables and the Japanese Stock Market: An Application of a Vector Error Correction Model, *Journal of Financial Research*, 18, pp. 223-237.

Nieh, C. C. & Lee, C. F. (2001), Dynamic relationship between stock prices and exchange rates for G-7 countries. *The Quarterly Review of Economics and Finance*, 41, 477–490.

Okafor F.O. (1983), "Investment Decisions: Evaluation of projects and securities" Cassell: London.

Padhan, P. C. (2007), The nexus between stock market and economic activity: an empirical analysis for India, *International Journal of Social Economics*, 34(10): 741–753.

Pethe, Abhay and Karnik, Ajit (2000), Do Indian Stock Markets Matter? Stock Market Indices and Macro-Economic Variables, *Economic and Political Weekly*, 35(5): 349-356.

Rogers, R. M. (1998), Handbook of Key Economic Indicators. New York: McGraw-Hill.

Ross, S.A. (1976), The Arbitrage Theory of Capital Asset Pricing, *Journal of Economic Theory*, 13(3), 341-360.

Shiskin, J. and Moore, G. H. (1968), Composite Indexes of Leading, Coincident and Lagging Indicators, 1948-67, Supplement to NBER Report One.

Siliverstovs, B. and MH Duong, (2005), On the Role of Stock Market for Real Economic Activity: Evidence for Europe. DIW Berlin Discussion Paper 559, German Institute for Economic Research.

Soenen, L. A. & Hennigar, E. S. (1988), An analysis of exchange rates and stock prices: The US experience between 1980 and 1986. *Akron Business and Economic Review*, Winter, 7-16.

Tan, H.B. and Baharumshah, A.Z. (1999), Dynamic causal chain of money, output, interest rate and prices in Malaysia: evidence based on vector -error correction modelling analysis. *International Economic Journal*, 13(1), 103-120.

Teresiene, D., Aarma, A., & Dubauskas, G. (2008), Relationship between stock market and macroeconomic volatility, *Transformations in Business & Economics*, 7(2), Supplement B, 102-114.

Toda, H.Y. and Yamamoto, T. (1995), Statistical inferences in vector autoregressions with possibly integrated processes, *Journal of Econometrics*, 66, 225-50.

Türsoy, Turgut, Günsel, Nil and Rjoub, Husam (2008), "Macroeconomic Factors, the APT and the Istanbul Stock Market", *International Research Journal of Finance and Economics*, 22, pp. 49-57.

Urich, T., Wachtel, P. (1981), Market response to the weekly money supply announcements in the 1970s, *Journal of Finance,* 36, 1063-1072.