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The Relationship between Stock Returns and Macroeconomic Factors: Evidence for Turkey

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THE RELATIONSHIP BETWEEN STOCK RETURNS AND MACROECONOMIC FACTORS: EVIDENCE FROM TURKEY

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I certify that all material in this dissertation which is not my own work has been identified and that no material is included for which a degree has previously been conferred upon me.

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ABSTRACT

In the literature, there are many empirical studies to explore the causal side of relationship between stock returns and macroeconomic variables. However, neither the signs relationship nor the direction of causality is resolved both in theory and in empirics. This study seeks to address the causal relationship between stock prices and macroeconomic factors such as interest rate, inflation, exchange rates, money supply and real economy, applying monthly data covering the period of 1998:01 to 2008:12 from Turkey. Granger causality model is employed to explore such relationships. The results of the study indicate that interest rate (OIR), inflation (CPI), CD/GDP, and foreing sale do Granger cause stock returns, while stock returns do Granger cause money supply (M1, M2, and M2Y), exchange rate, interest rate (OIR and TIR) inflation (PPI), foreign transactions. Industrial production is indicated as neither the result variable nor the cause variable of stock price movement. Furthermore, the analysis of the results infers that interest rates (CPI and PPI) are the negative determinants of stock prices, while foreign transactions are the positive determinants of stock prices in Turkey. Finally, the evidence related to predict macroeconomic factors by using stock returns is somewhat stronger than the evidence related to predict stock returns by applying macroeconomic variables.

Key words: stock returns, macroeconomic factors, Granger causality,

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I would like to dedicate this dissertation to my all family.

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ABBREVIATIONS

CB	: Currency Basket
CBM	: Central Bank Money
CBRT	: Central Bank of the Republic of Turkey
CPI	: Consumer Price Index
EDDS	: CBRT Electronically Data Dissemination System
FP	: Foreign Purchase
FS	: Foreign Sale
IPI	: Industrial Production Index
ISE	: Istanbul Stock Exchange
ISE 30	: Istanbul Stock Exchange National 30 Index
ISE 100	: Istanbul Stock Exchange National 100 Index
OIR	: Overnight Interest Rate
PPI	: Producer Price Index
TIR	: Treasury Interest Rate

I. INTRODUCTION

Investment is briefly defined as the commitment of funds. In investment profession, investors or portfolio managers struggle to determine the value of a particular financial asset in which funds are invested for a period to assess whether or not a potential investment is worth of its price. When deciding how to allocate funds among investment opportunities, it is very crucial to correctly estimate intrinsic value of the investments to compare the estimated value to the prevailing market prices. Due to the difficulty in estimating the value of financial assets, various valuation methods for accomplishing this task have been devised over time. These valuation models utilise several inputs such as required rate of return, growth rate, cash flow, sales, inflation rate, interest rate, exchange rate, and risk premium. All of these variables perceived to be related to the future investment returns are heavily affected by the economic outlook. Furthermore, due to operating in different industries of the same economy, firms have varied sensitivities to economic variables such as economic growth, inflation, interest rates, and exchange rates. Therefore, a firm's both the economic and industry environment should be taken into account during the valuation process.

Macroeconomic factors are theorically deemed as the sources of stock market volatility. Therefore, these variables are regarded as the leading indicator of stock returns. Binder and Merges (2001) state that the volatility of the return on the market portfolio is inversely related to the ratio of expected profits to expected revenues for the economy. Nardari and Scruggs (2005) infer that high uncertainty regarding future returns are mainly associated with recessions. However, Moore (1983) and Schwert (1989) indicate stock prices as leading indicators, reporting that the turn in stock prices takes place prior to the turn in business activity. In literature, the relationship between economic variables and stock returns are well-documented, specially for developed markets. Even though significant relationships between stock prices and economic variables are

commonly found out both in developed and in emerging markets, there is yet no consensus regarding neither the signs of relationship nor the direction of causality.

In order to determine the macroeconomic causes of the Istanbul Stock Exchange (ISE) 30 Index that observed in period of 1998-2008, the relationship between stock returns and macroeconomic variables such as inflation, interest rate, money supply, real economy, and exchange rate are tested in this study by using monthly data. The findings of the study based on correlation analysis indicate negative significant relations between stock returns and interest rates (OIR and TIR) and positive significant relationship between stock returns and foreing investors transactions (FP and FS). Contrary to previous studies, the results of the study indicate insignificant relationships between stock returns and other factors such as inflation, exchange rate, money supply, and industrial productions.

As to causal relationships, the results of the study based on Granger causality test indicate that the bidirectional causal relationship exists between and overnight interest rate (OIR) and stock returns, which means that if interest rates fall and everything else is held constant, stock price will increase because the required rate of return has dropped. The study also shows the unidirectional causal relationship running from stock returns to treasury interest rate. As stock returns increase investors purchase shares by borrowing, which will lead to increase interest rate due to increasing in demand for fund.

The study points out that inflation (CPI) does Granger cause stock returns. As inflation goes up, nominal interest rate will increase as well. An increase in interest rate will affect stock returns. The study also indicates stock returns do Granger cause inflation (PPI). Flannery and Protopapadakis (2001) indicate both the CPI and the PPI are strong risk factor candidates for NYSE-AMEX-NASD.

However, Ozturk (2008) for Turkey shows that there is no causal relationship between inflation (CPI and PPI) and stock returns.

As for money supply, stock returns do Granger cause monetary variables (M1, M2, and M2Y) but the reverse causality is not observed in case of money supply and stock returns. However, according to empirical result of the study, it can be inferred that money supply affects stock returns via CPI and OIR.

The findings of the study indicate unidirectional casual relationship running from both the CD/GDP and foreign sale to the stock returns. An increase the current deficit to gross domestic production ratio causes economy to deteriorate, which decrease the investment opportunity for companies. This results in an decrease in returns; thus the reduction of stock returns cause foreign investors to sale their shares. In addition, industrial production is indicated as neither the result variable nor the cause variable of stock price movement.

The study shows the unidirectional causal relationship, finding stock returns do Granger couse exchange rate. This is consistent with Ozturk (2008). However, Aydemir and Demirhan (2009) indicate bidirectional the causality exists between stock returns and exchange rate for Turkey.

According the results of the study, it may be concluded that the casual relationship running from stock returns is stronger than the casual relationship running from macroeconomic variables to stock returns. This is consistent with Schwert (1989). So, stock market index can be regarded as the leading indicator of the performance of the economy as well as an important signal for changes in the economic situation.

The researcher has been a member of enforcement statt of the Capital Markets Board of Turkey since 2001. The findings of this research will also be presented to the directors of the CMBT and it is expected that the results would be kindly

considered at the management level of the CMBT for the regulatory purposes in the future. Therefore, this research will contribute to the researcher's individual career development as well as it is mainly concerned for the academic purpose. In addition, the findings of the study may have important implications for investors, fund managers and portfolio managers as well.

This dissertation is arranged in different chapters and each chapter covers some areas of the research. Structure of the dissertation is as follows.

Chapter 1. This chapter contains introduction

Chapter 2. In this chapter, the relevant literature of the research is reviewed, clarifying financial theory regarding relationship between economic factors and stock returns.

Chapter 3. This chapter is relevant to Istanbul Stock Exchange used as a proxy for stock returns.

Chapter 4. It clarifies methodology applied to explore casual relationship between stock returns and macroeconomic variables.

Chapter 5 and 6. These chapters analyse data and how to minimise the problems.

Chapter 7: It explains an empirical study that investigates the relationship between economic factors and stock returns. The results obtained from the empirical reseach are analysed in this chapter as well.

Chapter 8. The empirical results of casual relationships between stock returns and macroeconomic variables are analysed in this chapter.

Chapter 9. It is all about conclusions of the study, and recommendation about the future study on the research area.

Last chapters contain bibliography and all relevant appendices of the dissertation respectively.

II. THE RELATIONSHIP BETWEEN MACROECONOMIC FACTORS AND STOCK RETURNS

On the valuation process, economic and industry environment should be concerned as well as analysis of individual companies or stocks. Psychologists suggest that success or failure of an individual can be caused as much by his or her social, economic, and family environment as by genetic gifts. Extending this idea to the valuation of securities means that a firm's economic and industry environment should be taken into account during the valuation process (Reilly and Brown 2006, p. 361). Therefore, the top-down (the three-step) approach discerns the importance of the economic and industry environment on the valuation process contrast to the bottom-up approach.

The top-down approach believes that both the economy and industry significantly affect the total returns for individual stocks, regardless of the qualities of a firm, while the bottom-up approach contends that it is possible to find stocks to provide superior returns regardless of the economy and industry outlook. The results of several academic studies investigating the effects of economic variables on stock returns have supported the top-down investment process. In addition to a firm's individual quality and profit potential, it is also taken into account that the economic environment and the performance of a firm's industry influence the value of a security and its rate of return. Thereby, some macroeconomic variables would be regarded as a priori of risk that are common to all companies.

The relationship between stock prices and macroeconomic variables is well illustrated by theoretical stock valuation models such as Dividend Discount Model (DDM), Free Cash Flow Valuation, and Residual Income Valuation. According to the models, the current prices of an equity share is approximately equal to the present value of all future cash flows; thus any economic variable affecting cash flows and required rate of return in turn influences the share value as well.

Additionally, it is theoretically postulated that the volatility of stock returns increase during economic contractions and decrease during recoveries. Schwert (1989) reports that stock market volatility is higher during recessions. Nardari and Scruggs (2005) reveal that many, but not all, episodes of high uncertainty regarding future returns are associated with recessions. Moore (1983) shows that in most cases, the general level of stock prices has been much higher at the top of a boom than at the bottom of a recession in the USA. The study indicates that typically, the turn in stock prices occur prior to the turn in business activity. According the findings of Schwert (1989), there is weak evidence that macroeconomic volatility can help predict stock volatility, whereas the evidence is somewhat strong that financial asset volatility helps predict future macroeconomic volatility. Hence, stock prices are stated to lead the swing in the business cycle, and stock price indices are "leading indicators." This means that stock prices have already started to decline at the peak of the business cycle, while at the bottom of the business cycle, stock prices have already started to rise.

II.1. Relationship between Interest Rate and Stock Price

In literature, a negative relationship between interest rates and stock prices is hypothesized due to several reasons. In an equity valuation process, at first a discount rate is determined. A chosen discount rate reflects both the time value of money and the riskiness of the stock. The risk free rate represents the time

value of money. A risk premium represents compensation for risk, measured relative to the risk free rate. A decided discount rate is perceived by an investor as a required rate of return (Stowe *et al*. 2007, p. 47). The CAPM is one of methods to determine the required rate of return[1].

$$E(Ri) = RF + \beta i\,[E(RM) - RF] \qquad \text{Equation (1)}$$

Where;

$E(R_i)$ = the expected return on asset i given its beta
R_F = the risk-free rate of return
$E(R_M)$ = the expected return of the market portfolio
β_i = the asset's sensitivity to returns of the market portfolio.

The model describes the relationship between risk and expected return, and calculated required rate of return is applied to the pricing of risky securities. That is, it is very crucial to determine the required rate of return in the process of stock value. Because, changes in interest rates affect the theoretical value of shares via affecting the investor's required rate of return. DDM can be applied to determine the value of shares.

$$\boldsymbol{V_0} = \sum_{\boldsymbol{t=1}}^{\boldsymbol{\infty}} \frac{\boldsymbol{D_t}}{\boldsymbol{(1+r)^t}} \qquad \text{Equation (2)}$$

V_0 = the present value of dividends
r = the required rate of return

As the government adjusts key interest rates, the risk-free rate will change. If interest rate increases, the risk-free rate will rise as well. This would result in the

[1] The required rate of return might be made up of two parts: the risk-free rate and the risk premium.

higher market rate. If nothing else changes, the stock's target price should drop due to the higher the required rate of return. The reverse is true. If interest rates fall and everything else is held constant, the stock's target price should rise because the required rate of return has dropped. Furthermore, the required rate of return will rise if the risk premium increases.

In addition, interest rates has impact on a company's operations. Any increase in the interest rates, *ceteris paribus,* will raise the cost of capital. Therefore, a company has to work harder to generate higher returns in a high interest environment. Otherwise, the inflated interest expense will eat away at its profits. The lower profits, the lower cash inflows and the higher required rate of return for investors that all translate into depressed fair value of the company's stock. Moreover, if interest rate costs shoot up to such a level that the company having problems paying off its debt, then its survival may be threatened. In that case, investors will demand an even higher risk premium. As a result, the fair value will fall even further.

Interest rates are expected to be negatively related to market returns either through the inflationary or discount factor effect. Choi and Jen (1991) report that the expected returns on common stocks are systematically related to the market risk and the interest-rate risk. The findings of the study indicate that the interest-rate risk for small firms is a significant source of investors' portfolio risk and the interest-rate risk for large firms is "negative". The study also shows that the interest-rate risk premium explains a significant portion of the difference in expected returns between the top quintile and the bottom quintile of the the NYSE and the MEX firms. Humpe and Macmillan (2007) also indicate both US and Japan stock prices are negatively correlated to a long term interest rate.

The affect of interest rate on stock returns has been studied over emerging markets as well. Al-Sharkas (2004) for Jordan and Adam and Tweneboah (2008)

for Ghana indicate the relationship between stock prices and interest rates is negative and statistically significant. Maysami *et al.* (2004) reveal that short- and long-term interest rates repectively have significant positive and negative relations with the Singapore's stock market. According to the results of Abugri (2008), the responses of stock returns to interest rate is negative and significant in Brazil, Argentina, and Chile, but the response of returns in Mexico to interest rates appears to be insignificant in explaining the movement of returns.

As to Turkey case, the empirical results of Muradoglu and Metin (1996) indicate that growth rates of interest rates negatively affect stock returns with a significant lag in short run dynamic model. Yildirtan (2007) indicates the real interest rate on deposits and interest rate differential variables have an extremely weak, negative relation with stock returns. Analysis of Kandir (2008), based on stock portfolios rather than single stocks, point out interest rate seems to negatively affect all of the portfolio returns, while the regression results of Tursoy *et al*. (2008) indicate that there is no significant pricing relationship between the stock return and interest rate. Ozturk (2008) reports that only the lagged overnight interest rate does Granger cause stock returns while stock returns do Granger causes treasury interest rate and overnight interest rate. The studies for both developed and emerging markets report negative relationship between stock returns and interest rate, which is consistent with the theory.

II.2. Relationship between Money Supply and Stock Price

Monetary policy influences the general economy through a transmission mechanism. Both a restrictive and an expansionary monetary policy might have bilateral effects. In case of expansionary monetary policy, the government creates excess liquidity by engaging in open market operation, which results in an increase in bond price and lower interest rates. The lower interest rate would lead to the lower required rate of return and thus, the higher stock price.

Additionally, an increase in monetary growth indicates excess liquidity available for buying stocks, eventually resulting in higher stock prices due to an increase of demand to both common stocks and the real good markets. However, monetary growth might result in higher inflation and hence, higher nominal interest rate according to Fisher equation. The higher interest rate leads to the higher required rate of return, which will result in the lower stock price.

In case of a restrictive monetary policy, to reduce the growth rate of money supply would result in a decrease in the supply of funds for working capital and expansion for all business. Additionally, a restrictive monetary policy would raise market interest rate and hence firm's cost of capital. Furthermore, an increase in interest rate would make it more expensive for individuals to finance mortgage patments and the purchase of other durable goods. However, an decrease in money supply might result in the lower inflation, hence the lower required rate of return via the lower nominal interest rate. Thus, this would lead to the higher stock prices.

In literature, the initial studies generally imply that changes in the growth rate of the money supply could serve as a leading indicator of stock price changes, while subsequent studies questioned these findings (Reilly and Brown 2006, p. 362).

Beltratia and Morana (2006) indicate a twofold linkage between stock market (S&P 500) and macroeconomic volatility. They suggest that discrete changes in monetary policy, affecting the volatilities of interest rates and money growth, seem to be the best candidate to account for breaks in the volatility of stock returns and therefore to explain the level and discrete jumps in volatility. Furthermore, while stock market volatility also affects macroeconomic volatility, the causality direction is strong from macroeconomic to stock market volatility. Flannery and Protopapadakis (2001) studying NYSE-AMEX-NASD point out that

money supply is a strong risk factor candidate. A monetary aggregate (generally M1) affects both returns and conditional volatility. Fama (1981), Geske and Roll (1983) point out that stock returns are negatively related to money supply. Errunza and Hogan (1998) indicate money supply volatility does Granger cause return volatility for German and France but not for Italy, Netherlands, UK, Switzerland and Belgium. Humpe and Macmillan (2007) report that Japan stock prices are influenced negatively by the money supply, while there is an insignificant (although positive) relationship between US stock prices and the money supply.

The result of studies for emerging markets are contradictory. For Amman Stock Exchange, Maghayereh (2002) indicates the coefficient of money supply (M1) is negative but not statistically significant at the 10 % level, whereas Al-Sharkas (2004) shows that money supply (M2) has a positive effect on stock returns. Maysami *et a*l. (2004) reveal the positive correlation between changes in money supply (M2) and Singapore's stock returns. Abugri (2008) reports that the responses of returns to money supply are negative and significant in Brazil and Argentina, while the responses of returns in Mexico and Chile to money supply appear to be insignificant in explaining the movement of returns. Nishat and Shaheen (2004) indicate that Karachi Stock Exchange Index and money supply (M1) are cointegrated and two long-term equilibrium relationships exist between these variables. Additionally, the results of the study indicate money supply does Granger-causes stock price movements.

The result of studies relevant Turkey are contradictory, too. The empirical results of Muradoglu and Metin (1996) indicate that money supply is positively related to stock returns in short run dynamic model. Yildirtan (2007) reveals that an increase in money multiplier positively and strongly affects ISE 100 Index. However, Karamustafa and Kucukkale (2003), Kandir (2008), and Tursoy *et al*. (2008) indicate that there is no significant pricing relationship between the stock

return and money supply. Additionally, the results of Muradoglu *et al*. (2001) display no cointegrate relationship between stock prices and any of monetary variables or groups of variables of concern for whole research period (1988-1995).

Furthermore, Karamustafa and Kucukkale (2003) point out the stock price is neither the result variable nor the cause variable of money supply, while the results of Ozturk (2008) indicate that money supply does not Granger cause the stock returns but the stock returns do Granger causes Central Bank Money.

As the result of studies are conflicting, the actual relationship between money supply and stock prices is an empirical question and the effect varies over countries and time.

II.3. Relationship between Inflation and Stock Price

At the process of stock valuation, it is important to consider the effects of inflation on stock prices because inflation rates vary around the world and over time. In theory, stocks should be inflation neutral, and rising inflation should have no impact on stock valuations. Fisher (1930) noted that the nominal interest rate r can be expressed as the sum of expected real return ρ and expected inflation rate E(I).

Linear approximation: $r \approx \rho + E(I)$

Exact methodology: $(1+r) = (1+\rho) * (1+(E(I))$

The nominal interest rate is observed in the marketplace and is usually referred as the interest rate, while the real interest rate is calculated from the observed interest rate and the forecasted inflation. It is argued that real interest rates are stable over time. Therefore, fluctuations in interest rates are caused by revision

in inflationary expectations, not by movements in real interest rates. As Irving Fisher (1930) noted, nominal interest rate is decomposed into an expected real rate and an expected inflation component. Fisher argued that the expected real return is determined by real factors, and is unrelated to expected inflation. That is, real rates of return on common stocks and expected inflation rates are independent and that nominal stock returns vary in a one-to-one correspondence with expected inflation. Gultekin (1983) testing the generalized Fisher hypothesis for 26 countries for the period of 1947-1979, could not find a reliable positive relation between nominal stock returns and inflation rates. Moreover, the findings of the study reveals that regression coefficients are predominantly negative.

A negative relationship between inflation and stock prices is contended in literature because an increase in the rate of inflation is accompanied by both lower expected earnings growth and higher required real returns. In the US, there is substantial empirical evidence that high inflation is associated with a high equity risk premium and declining stock prices (Hoguet, 2008). Rising inflation is apt to restrictive economic policies, which in turn increases the nominal risk-free rate and hence raises the required rate of return in valuation models.

Additionally, inflation has a distorting effect on reporting earnings when historical costs are used in accounting. Reported earnings based on depreciation recorded at historical cost as an estimate of replacement costs gives an overstatement of earnings. Similarly, a first in first out (FIFO) inventory system leads to understatement on inventory costs and an overstatement of reported earnings. So, a company operating in a high-inflation environment will be penalized if it cannot pass through inflation (Solnik and McLeavey 2009, pp. 242-244). Sharpe (1999) argued that “A one percentage point increase in expected inflation is estimated to raise required real returns about one percentage point, which amounts to about a 20% decrease in stock prices.”

Fama and Schwert (1977) show that the USA common stock returns are negatively correlated to the expected component of the inflation rate, and probably also to the unexpected component. Fama (1981) hypothese that the negative relations between real stock returns and inflation observed during the post-1953 period were the consequence of proxy effects. Stock returns are determined by forecasts of more relevant real variables, and negative stock return-inflation relations are induced by negative relations between inflation and real activity. Saunders and Tress (1981) indicate that Australian nominal stock returns and inflation are related in a significantly negative fashion, implying that stocks are extremely poor inflationary hedges for the investor. In addition, the study indicates a mainly unidirectional relationship between inflation and stock returns, with price level charges leading the equity index in time. Flannery and Protopapadakis (2001) indicate the CPI and the PPI are strong risk factor candidates for NYSE-AMEX-NASD. Humpe and Macmillan (2007) report that both US and Japan stock prices are negatively related to the consumer price index.

Similar to developed markets, Naka, Mukherjee and Tufte (1998) for India and Nishat and Shaheen (2004) for Pakistan indicate that inflation is the largest negative determinant of stock prices. Additionally, Nishat and Shaheen (2004) indicate inflation does Granger-causes stock price movements in Pakistan. Maghayereh (2002) and Al-Sharkas (2004) also show reliable negative relationship between Jordanian stock prices and inflation.

However, Firth (1979) for UK, Maysami *et al.* (2004) for Singapore, and Adam and Tweneboah (2008) for Ghana report a significant positive relationship between inflation (CPI) and stock returns. These results of provides a sharp contrast to empirical works that have found a significant negative relationship between stock returns and expected inflation.

As for Turkey case, the long-run steady state results of Muradoglu and Metin (1996) indicate that the negative relation between stock prices and inflation persists when other monetary variables are included in the model. Ozturk (2008) shows that there is no causal relationship between inflation and stock returns. Analysis of Kandir (2008) points out that inflation rate is significant for only three of the twelve portfolios, while the regression results of Tursoy *et al.* (2008) indicate that there is no significant pricing relationship between the stock return and inflation. Erbaykal *et al.* (2008) investigating the relationship under "Proxy hypothesis" developed by Fama (1981) reveal a negative long term relationship between the stock prices and inflation. The study concludes that under the light of this evidence, Proxy hypothesis developed by Fama (1981) is valid for Turkey and that the variables which are the indicators of real economic activity such as industrial production index, employment level and fixed investments are effective on stock prices through inflation. Rjoub *et al*. (2009) indicate the unanticipated inflation has a positive effect on the returns of the constructed portfolios.

As Gultekin (1983) indicates, the relationship between stock returns and inflation is not stable over time and that there are differences among countries regardless of either developed or emerging markets.

II.4. Relationship between Exchange Rate and Stock Price

There is no theoretical consensus neither on the existence of relationship between stock prices and exchange rates nor on the direction of the relationship. However, in the literature, two approaches have been asserted to establish a relationship between exchange rate and stock prices: The goods market model[2] and the portfolio balance model[3].

2 Goods market models are also known as 'flow-oriented' models
3 Portfolio balance models are also known as 'stock oriented' models

First approach is referred to Dornbusch and Fisher (1980) focusing on the association between the current account and the exchange rate. Dornbusch and Fisher (1980) developed a model of exchange rate determination that integrates the roles of relative prices, expectations, and the assets markets, and emphasis the relationship between the behaviour of the exchange rate and the current account. Dornbusch and Fisher (1980) argue that there is an association between the current account and the behaviour of the exchange rate. It is assumed that the exchange rate is determined largely by a country's current account or trade balance performance. These models posit that changes in exchange rates affect international competitiveness and trade balance, thereby influencing real economic variables such as real income and output. That is, goods market model suggests that changes in exchange rates affect the competitiveness of a firm, which in turn influence the firm's earnings or its cost of funds and hence its stock price. On a macro level, then, 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. Thus, goods market models represent a positive relationship between stock prices and exchanges rates with direction of causation running from exchange rates to stock prices[4]. The conclusion of a positive relationship stems from the assumption of using direct exchange rate quotation[5] (Stavarek, 2004).

On the other hand, portfolio balance models put much more stress on the role of capital account transactions (Tahir and Ghani, 2004). Portfolio balance model assumes a negative relationship between stock prices and exchange rates. A rise in domestic stocks prices would attract capital flows, which increase the

4 Causation can be explained as follows: domestic currency depreciation makes the local firms more competitive, making their exports cheaper in international comparison. Higher exports lead to higher incomes and increase in firms' stock prices.

5 Direct quotation defines exchange rate as the price of one unit of foreign currency in domestic currency terms. Thus domestic currency depreciation means an increase in exchange rate.

demand for domestic currency and cause exchange rate to appreciate. A rising stock market leads to the appreciation of domestic currency through direct and indirect channels. A rise in prices encourages investors to buy more domestic assets simultaneously selling foreign assets to obtain domestic currency indispensable for buying new domestic stocks. The described shifts in demand and supply of currencies cause domestic currency appreciation. The indirect channel grounds in the following causality chain. An increase in domestic assets prices results in growth of wealth that leads investors to increase their demand for money, which 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 (Stavarek, 2004).

Actually, changes in exchange rate affect exporter and importer firms conversely. In case of a depreciation of the domestic currency, imported products suddenly become more expensive in terms of the home currency. If this price increase can be passed through to customers, earnings will not suffer from the currency adjustment. But this is often not the case. First, the price increase will tend to reduce demand for these imported products. Second, locally produced goods will become more attractive than important goods, and some substitution will take place (Solnik and McLeavey 2009, p. 244). Therefore, the shares of importer firms will decrease, whereas the shares of exporter become more valueable.

Stavarek (2004) reports that neither the intensity nor direction of causal relationship is the same in the developed economies and the new EU-member countries. Obben *et al*. (2006) imply that there is bidirectional causality in the foreign exchange and New Zealand stock markets both in the short run and in the long run.

As to emerging markets, the results of Abugri (2008) reveal that the response of Brazilian and Mexican stock returns to an exchange rate shock are negative and

significant, while neither in Argentina nor Chile stock returns respond significantly to exchange rates. Adam and Tweneboah (2008) show that there is negative relationship between Ghana stock market and exchange rate, while the results of Maysami *et al*. (2004) for Singapore support the hypothesis of a positive relationship between exchange rate and stock returns.

Tabak (2006) indicates that there is no long-run relationship, but there is linear Granger causality from stock prices to exchange rates, in line with the portfolio approach Brazilian stock prices to exchange rates with a negative correlation. Furthermore, the study shows evidence of nonlinear Granger causality from exchange rates to stock prices. The study of Horobet and Ilie (2007) offer contradictory results for Romania. While the application of the Engle-Granger methodology indicates no cointegration between the exchange rates and the stock prices, the use of the Johansen-Juselius procedure suggests the presence of cointegration between the two stock market indices and the exchange rates, either nominal bilateral, nominal effective or real effective rates.

As for Turkey case, the empirical results of Muradoglu and Metin (1996) indicate stock returns are expected to increase as exchange rates increase. The findings of the Yucel and Kurt (2003) reveal that export companies' mean exposure coefficient is higher than non-export companies' mean exposure, indicating that exposure pattern of export and non-export companies are different. Furthermore a depreciation of domestic currency (TL) leads to an increase in the value of export firms. The results of Kasman (2003) provide evidences that a log-run stable relationship between stock indices and exchange rates ($) exists. Furthermore, the study reports inconclusive evidence where causality relationship exists for both ways between the composite index and exchange rates, financial sector index and exchange rates, and service sector index and exchange rate. Additionally, causality relationship exists from the exchange rate to the industry index in a unique direction. Karamustafa and Kucukkale (2003)

point out that the relations between stock returns and exchange rate is uncertain, indicating that the ISE is neither the result variable nor the cause variable of exchange rate variable. Likewise, the findings of Ozturk (2008) point out there is no causal relationship between stock retuns and exchange rate. The empirical results of Aydemir and Demirhan (2009) indicate that there is bidirectional causal relationship between exchange rate and all stock market indices. While the negative causality exists from the ISE-100, services, financials and industrials indices to exchange rate, there is a positive causal relationship from technology indices to exchange rate. On the other hand, negative causal relationship from exchange rate to all stock market indices is showed. Yildirtan (2007) shows that there is no relation between the deviations of real exchange rate from trend, average deviation of real exchange rate variables and the ISE-100. The real exchange rate also point out an extremely weak, negative relation. Analysis of Kandir (2008) points out that exchange rate seems to affect all of the portfolio returns, while the regression results of Tursoy *et al*. (2008) indicate that there is no significant pricing relation between the stock return and exchange rate.

Likewise money supply and inflation, the relationship between stock returns and exchange rate is not stable over time and that there are differences among countries regardless of either developed or emerging markets.

II.5. Relationship between Real Economy and Stock Price

The industrial production index is typically used as a proxy for the level of real economic activity. It is theoretically shown that the industrial production increases during economic expansion and decreases during a recession, and thus a change in industrial production would signal a change in economy. The productive capacity of an economy indeed rises during economic growth, which in turn contributes to the ability of firms to generate cash flows. That is why the industrial production would be expected to act beneficially on expected future

cash flows, hence a positive relationship between real economy and stock prices exist. Furthermore, the volatility of stock returns increases during economic contractions and decreases during recoveries. Fama (1981) indicates that the growth rate of industrial production had a strong contemporaneous relation with stock returns. Many studies show that large fractions (often more than 50%) of annual stock-return variances can be traced to forecasts of variables such as real GNP, industrial production, and investment that are important determinants of the cash flows to firms (Fama, 1990).

Foresti (2007) indicates that stock market prices can be used in order to predict growth, but the opposite is not true. Fama (1990) reports that a large fraction of the variation of stock returns (the NYSE) can be explained primarily by time-varying expected returns and forecasts of real activity. Nardari and Scruggs (2005) report that stock market (CRSP NYSE) volatility changes over time primarily because of changes in the volatility of "news about future returns." Errunza and Hogan (1998) show that industrial growth rate volatility does Granger cause return volatility for Italy and the Netherlands but not for Germany, France, UK, Switzerland and Belgium.

The findings of Flannery and Protopapadakis (2001) indicate that three real factor variables (Balance of Trade, Employment/Unemployment, and Housing Starts) are strong risk factor candidates, and these real factor candidates affect only the returns' conditional volatility for NYSE-AMEX-NASD. Furthermore, it is reported that remarkably, two popular measures of aggregate economic activity (Real GNP and Industrial Production) do not appear as risk factors, as well as that Real GNP announcements are associated with lower rather than higher return volatility. Humpe and Macmillan (2007) indicate both US and Japan stock prices are positively related to industrial production.

As to emerging markets, Nishat and Shaheen (2004) infer that industrial production is the largest positive determinant of stock prices in Pakistan, as well as bilateral Granger cause between industrial production and stock prices. Naka, Mukherjee and Tufte (1998) indicate that industrial production is the largest positive determinant of Indian stock prices. Additionally, domestic output growth is its predominant driving force to Indian stock market performance. Maghayereh (2002) and Al-Sharkas (2004) for Jordan and Maysami et al. (2004) for Singapore indicate that industrial production is positively and significantly related to the stock returns. Abugri (2008) reports that the response of stock returns to industrial production are positive and significant in Brazil and Chile, while industrial productions do not appear to exert a significant impact on the expected stock returns in Argentina and Mexico. Adam and Tweneboah (2008) indicate the positive relationship between foreign direct investments and Ghana stock index.

For Turkey case, Karamustafa and Kucukkale (2003) show that the relation between stock returns and industrial production is positive and the relation between stock returns and trade balance is negative. Furthermore, the findings of the study indicate that the ISE is neither the result variable nor the cause variable of any macroeconomic variable. The results of Yildirtan (2007) evidence that there is a linear relation between imports, exports and the stock returns. According to the results of Ozturk (2008), the stock returns do Granger causes foreign investor transactions, current account deficit/GNP and industrial production index. Kandir (2008) and Tursoy *et al.* (2008) indicate that industrial production does not appear to have any significant affect on stock returns. According to the result of Kaplan (2008), the stock prices have a positive and statistically significant long-run effect on out level implying that stock prices lead real economic activity in Turkey. Furthermore, the direction of the causality between variables is only from stock market price to real economic activity. Erbaykal *et al.* (2008) reveal a positive and statistically significant long term relationship between stock prices and independent variables which are industrial

price index, employment level and fixed investments under “Proxy hypothesis” developed by Fama (1981). The study concludes that under the light of this evidence, Proxy hypothesis developed by Fama (1981) is valid for Turkey and that the variables which are the indicators of real economic activity such as industrial production index, employment level and fixed investments are effective on stock prices via inflation.

The results of studies for both development and emerging markets generally indicate positive relationship between real economy and stock returns, as hypothesised.

III. THE ISTANBUL STOCK EXCHANGE

The Istanbul Stock Exchange was established on December 26, 1985 for the purpose of ensuring that securities are traded in a secure and stable environment, and commenced to operate on January 3, 1986. The ISE has contributed to the development of modern Turkish capital markets and Turkish economy since the date of its establishment.

The daily average traded value of the equity market decreased by 13.91 per cent to YTL 1.32 billion in 2008, from its level of YTL 1.54 billion in 2007. By the same token, the daily average number of contracts, which stood at 192,000 in 2007, fell to 183,000 and the daily average number of shares traded registered a slight decrease from its level of 464 million in 2007 to 457 million in 2008. The total traded value in the ISE equity market amounted to $ 261 billion in 2008 whereas that this figure was $ 300 billion in 2007. The ISE Indices were influenced by the domestic economic developments as well as the global economic and financial crises (ISE Annual Report 2008).

Table 1: Total Market Values of Companies Traded on the ISE (US$ million)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1986	657	797	632	611	661	672	685	843	844	824	878	938
1987	1,195	1,505	1,326	1,329	1,913	2,353	4,895	5,479	4,692	3,440	4,417	3,125
1988	3,569	2,905	2,674	2,107	2,020	1,696	1,783	1,578	1,374	1,293	1,237	1,128
1989	1,100	1,384	1,267	1,450	1,790	2,205	2,134	2,487	4,254	4,781	4,459	6,756
1990	10,911	10,269	9,353	9,500	10,706	15,493	26,355	25,438	25,915	23,917	18,742	18,737
1991	21,391	23,147	18,624	15,136	15,145	14,556	12,800	12,745	11,632	10,560	14,945	15,564
1992	16,613	11,679	12,329	10,411	9,060	11,936	11,315	11,329	10,824	9,604	9,444	9,922
1993	10,784	14,266	13,668	19,443	18,728	22,689	20,274	24,345	30,488	28,529	34,248	37,824
1994	31,401	22,014	16,253	11,191	11,802	16,290	18,646	20,967	21,019	20,017	23,119	21,785
1995	19,360	21,575	28,196	31,315	31,879	32,433	34,304	27,949	26,151	29,038	22,597	20,782
1996	26,644	30,568	31,480	29,404	26,220	29,390	27,804	26,546	28,043	29,157	31,510	30,797
1997	45,595	44,374	44,891	37,093	39,632	43,846	45,221	44,334	55,702	56,415	54,540	61,879
1998	63,311	53,235	51,680	64,753	57,935	61,442	62,991	37,453	33,900	31,002	34,485	33,975
1999	31,863	45,034	50,223	55,124	50,741	47,425	56,188	48,292	55,801	56,408	66,012	114,271
2000	121,703	111,897	109,197	125,445	105,211	94,117	106,412	97,456	82,400	95,778	62,723	69,507
2001	7,669	46,893	39,260	52,133	43,703	43,152	36,702	36,207	25,008	31,383	39,506	47,689
2002	50,344	39,979	43,254	42,704	36,556	31,436	32,905	31,892	29,106	33,394	46,924	34,402
2003	36,966	39,274	30,570	39,916	43,122	41,258	39,724	44,125	48,906	54,865	51,659	69,003
2004	66,811	74,258	79,981	66,604	60,003	64,347	69,753	70,140	77,500	84,940	84,679	98,073
2005	108,472	116,312	99,866	89,504	98,309	106,038	118,349	121,234	129,965	125,063	154,583	162,814
2006	18,453	199,367	177,180	185,923	138,896	128,268	138,031	148,641	142,721	162,626	153,906	163,775
2007	172,119	175,002	186,493	193,310	218,185	221,689	250,031	234,898	268,871	292,938	280,786	289,986
2008	227,258	232,190	187,969	209,831	223,656	193,695	245,899	231,737	198,668	121,327	112,717	119,698

Source: ISE

ISE Stock Market Indices are designed to measure the price and return performances of the stocks traded on the Exchange on an aggregate and sectoral basis. The ISE-100 Index is the benchmark index for the National Market. At studies for Turkish market, the ISE-100 Index has been heavily used the as a proxy of stock prices. However, the ISE-30 Index is used in this study.

The ISE -30 Index consists of 30 stocks which are selected amongst the biggest companies, except investment trusts, traded on the National Market in accordance with the criteria set by the ISE. In 2008, the markets value ISE-30 and ISE-100 are 118,214,950,000 YTL and 154,943,234,000 YTL respectively,

which means that the market value of the ISE-30 is equal to 76.3% of the market value of the ISE-100. Because the structure of the ISE-30 differs from that of the ISE-100, the ISE-30 price movements may be different. As compared to the ISE-100, the ISE-30 Index may be less subject to speculative activities and manipulations because the ISE-30 consists of the biggest 30 companies among all companies traded on the ISE. That is why ISE-30 is considered as better proxy for stock returns. Additionally, that ISE-30 is applied as proxy for stock returns helps us compare our results with the previous studies using ISE-30.

IV. METHODOLOGY

To analyse the relationship between macroeconomic factors and the ISE-30 Index, the study focuses on causality among these variables applying the method developed by Granger. The Granger causality test (Granger, 1969) is devised to analyse the causal order in such VAR models.

We say that Y is causing X, denoted by Y_t=>X_t. We say that Y_t is causing X_t if we are better able to predict X_t using all available information than if the information apart from Y_t had been used.

X_t and Y_t are two stationary time series with zero means. The simple causal model is

$$\boldsymbol{X_t} = \sum_{\boldsymbol{j=1}}^{\boldsymbol{m}} \boldsymbol{a_j X_{t-j}} + \sum_{\boldsymbol{j=1}}^{\boldsymbol{m}} \boldsymbol{b_j Y_{t-j}} + \boldsymbol{\varepsilon_{t,}} \qquad \text{Equation (3)}$$

$$\boldsymbol{Y_t} = \sum_{\boldsymbol{j=1}}^{\boldsymbol{m}} \boldsymbol{c_j X_{t-j}} + \sum_{\boldsymbol{j=1}}^{\boldsymbol{m}} \boldsymbol{d_j Y_{t-j}} + \boldsymbol{\eta_{t,}} \qquad \text{Equation (4)}$$

Where ε_t and η_t are taken to be two uncorrelated white-noises series. All variables used in the empirical analysis are transformed variables by the use of natural logarithms.

In order to answer whether the macroeconomics variables cause the stock returns, the hypothesis test is used as shown below;

H_0: The macroeconomics variables do not Granger cause the ISE 30 Index

H_1: The macroeconomics variables do Granger cause the ISE 30 Index

If we reject the null hypothesis, then we conclude that macroeconomic factors does Granger-cause the stock index.

V. DATA AND PRELIMINARY STATISTICAL ANALYSIS

In the finance literature, various economic series are considered when attempting to determine the relationship between macroeconomic factors and stock market index. The study utilises Industrial Production Index (IPI), Current Deficit to Gross Domestic Production (CDGDP), foreign transactions (FP and FS) and price index (Producer Price Index PPI, Consumer Price Index CPI) to proxy the goods market, money supply (M1, M2, M2Y, Central Bank Money) and nominal interest rate (Overnight Interest Rate, Treasury Bill Interest Rate) to proxy the money market, currency basket to proxy the exchange rate, and Istanbul Stock Exchange National-30 Index to proxy stock market.

Turkey's exchange and trade system have been liberalised extensively since 1980's. Because Turkish economy suffered from economic crises at beginning of 2001, exchange rate regime was determined as floating at 23 February 2001. Turkey now follows a floating exchange rate policy. this is one of limitations for the study because during sample period exchange rate regime is not same. A currency basket functions as a benchmark for regional currency movements,

hence currency basket is used as a proxy for exchange rate. In this study, currency basket consists of the weighted average of US$, Mark and Euro: 1 US$ and 1.5 DEM over the period 1998:01 - 2001:12 and 1 US$ and 0.77 EUR over the period 2002:01-2008:12. In the model exchange rate quotation is direct quotation for Turkey. In other words, it is shown as TL per one unit of the foreign currency.

Simple interest rate weighted average overnight is used for overnight interest rate. Additionally, yearly compounded interest rates of treasury discounted auctions is used for treasury interest rate.

M1, M2, M2Y, CBM, IPI, CPI, PPI, CD-GDP, OIR, CB data are extracted from Central Bank of the Republic of Turkey's Electronically Data Dissemination System (EDDS)[6]. TIR is obtained from the website of Turkish Treasury.[7] FP, FS, and daily closing values of the ISE National 30 Price Index are obtained from Istanbul Stock Exchange database[8]. The closing prices of the last trading day in each month are determined as monthly stock prices of the ISE-30.

Monthly data is used to answer to what extent the ISE-30 reflects the real economic improvements in Turkey case. Except CD/CDP, the natural logarithms of the variables have been taken and all the variables are used in their logarithmic form. The sample period covers the period of 1998:01-2008:12. Table 2 presents the summary statistics on the levels of the variables and Table 3 represents their first differences.

6 http://evds.tcmb.gov.tr
7 http://www.treasury.gov.tr/irj/portal/anonymous?guest_user=treasury
8 http://www.ise.org/Data/StocksData.aspx

Table 2: Descriptive Information (Level Specifications)

Series	LISE30	LCB	LCBM	CDGDP	LCPI	LFP	LFS	LIPI	LM1	LM2	LM2Y	LOIR	LPPI	LTIR
Mean	9.88	0.61	2.52	(0.02)	8.68	7.21	7.19	4.75	2.68	4.12	4.68	3.48	8.51	3.65
Median	9.91	0.95	3.15	(0.03)	9.03	7.15	7.16	4.72	2.87	4.24	4.91	3.48	8.88	3.54
Maximum	11.20	1.15	3.99	0.17	9.55	9.41	9.36	5.05	4.09	5.64	6.02	6.08	9.39	5.27
Minimum	7.86	(0.95)	(3.53)	(0.21)	6.82	4.11	4.29	4.43	0.39	1.74	2.39	2.58	6.73	2.63
Std. Dev.	0.86	0.62	1.43	0.05	0.79	1.39	1.38	0.17	1.09	1.08	1.00	0.69	0.80	0.75
Skewness	(0.48)	(1.18)	(1.05)	0.74	(0.88)	(0.31)	(0.27)	0.07	(0.54)	(0.51)	(0.73)	0.53	(0.84)	0.31
Kurtosis	2.43	2.87	3.91	6.76	2.47	2.07	2.02	1.80	2.08	2.22	2.45	2.93	2.29	1.69
Jarque-Bera	6.88	30.33	28.62	89.05	18.63	6.78	6.87	7.98	11.14	9.07	13.43	6.23	18.26	11.49

Table 3: Descriptive Information (First Difference)

Series	DLISE30	DLCB	DLCBM	CDGDP	DLCPI	DLFP	DLFS	DLIPI	DLM1	DLM2	DLM2Y	DLOIR	DLPPI	DLTIR
Mean	0.014	0.015	-0.007	0.001	0.020	0.020	0.019	0.002	0.028	0.030	0.027	-0.011	0.019	-0.008
Median	0.021	0.010	0.020	0.000	0.016	-0.008	0.014	0.000	0.030	0.028	0.023	-0.001	0.018	-0.018
Maximum	0.586	0.263	1.135	0.177	0.078	1.180	1.146	0.224	0.142	0.130	0.145	2.336	0.096	0.649
Minimum	-0.483	-0.060	-4.445	-0.142	-0.007	-0.900	-1.204	-0.213	-0.094	-0.012	-0.028	-1.672	-0.036	-0.553
Std. Dev.	0.145	0.044	0.439	0.040	0.018	0.387	0.377	0.074	0.044	0.025	0.025	0.324	0.020	0.132
Skewness	0.048	1.665	-7.956	0.329	0.906	0.276	0.036	0.130	-0.042	1.206	0.821	1.297	0.422	0.945
Kurtosis	5.463	9.540	82.685	6.869	3.294	3.177	3.415	4.054	3.207	5.052	5.184	32.092	3.966	10.022
Jarque-Bera	32.65	289.51	35,490.65	82.76	18.11	1.80	0.95	6.34	0.27	53.89	40.13	4,585.18	8.84	284.27

The average monthly nominal return on stocks is 1.4%. Also, Turkey has experienced relatively high inflation (about 25% annually) for the period of the study. This inflation rate is quite high compared to the inflation rates in developed countries; however inflation rate has falled to around 10% recently. The graphics of the series are given at appendix 1.

VI. UNIT ROOT TESTS

In literature, time series data are often assumed to be non-stationary and differenced price series (return series) are used in traditional stock market

studies. Non-stationarity is mentioned to arise from the accumulation over time of stationary and invertible first differences. Likewise, many financial variables are known to exhibit unit roots and thus, it is necessary to carry out a univariate analysis to ensure whether a stationary cointegrating relationship exists among variables to avoid the problem of spurious regression before analysing the relationships.

In order to conduct valid statistical inference, we must make a key assumption in time series analysis: We must assume that the time series we are modelling is covariance stationary[9]. A time series is stationarity if its properties, such as mean and variance, do not change over time. A stationarity series must satisfy three principal requirements.

First, the expected value of the time series must be constant and finite in all periods.

Second, the variance of the time series must be constant and finite in all periods.

Third, the covariance of the time series with itself for a fixed number of periods in the past of future must be constant and finite in all periods.

If a time series that we model is not stationarity, the estimation results will have no economic meaning. For a nonstationarity time series, spurious results will be yielded. However, we can attempt to convert the data to a stationarity time series if the time series is nonstationarity. In statistical terms, we can differentiate it. Before that, we must determine whether a time series is stationarity. Currently, most popular test for nonstationarity is the DickeyFuller test for a unit root (DeFusco *et al* 2007, p. 405). Therefore, the Augmented Dickey-Fuller (ADF) test is employed to determine whether there is a unit root in economic variables used

9 The terms “stationary” or “stationarity” are often used to mean “covariance stationary” or “covariance stationarity”.

in the study. ADF is applied to the level variables as well as to their first differences in logarithmic terms. The null hypothesis tested that the variables under investigation have a unit root, against the alternative that they do not have.

Augmented Dickey_Fuller tests whether ρ is equal to 0 or not.

$$\Delta Yt = \alpha + \gamma Trend + \rho Yt\text{-}1 + \Sigma\delta\, \Delta Yt\text{-}1 + \varepsilon t \qquad \text{Equation (5)}$$

the ADF tests the null hypothesis (H_0) against the alternative (H_1) hypothesis;

H_0: Each economic variable has a unit root

H_1: Each economic variable does not have a unit root

At first, ADF test was performed on the variables in levels to determine the presence of unit roots. The results of the ADF test are reported in Table 3. The second column of Table 4 presents the test statistics for each variable for a unit root in levels.

Table 4: Augmented Dickey-Fuller Test Results

Series	t-Statistic	Prob	α=0,05 t= -2.89 Ho L(0)	Series	t-Statistic	Prob	α=0,05 t= -1.94 Ho L(1)
LISE 30	-1.993831	0.599	Not Rejection	DLISE 30	-11.94859	0.0000	Rejection
LFP	-1.735305	0.4112	Not Rejection	DLFP	-11.55639	0.0000	Rejection
LFS	-2.154431	0.2241	Not Rejection	DLFS	-13.51816	0.0000	Rejection
LOIR	***-3.555722***	***0.0379***	***Rejection***	DLOIR	-6.056104	0.0000	Rejection
LTIR	-3.1340	0.1029	Not Rejection	DLTIR	-8.296529	0.0000	Rejection
LCB	0.569215	0.7388	Not Rejection	DLCB	-7.91870	0.0000	Rejection
LCBM	0.551314	0.9994	Not Rejection	DLCBM	-3.25984	0.0013	Rejection
LM1	-1.322382	0.8779	Not Rejection	DLM1	-11.18399	0.0000	Rejection
LM2	-3.351118	0.0627	Not Rejection	DLM2	-5.638119	0.0000	Rejection
LM2Y	-2.704687	0.2366	Not Rejection	DLM2Y	-6.909828	0.0000	Rejection
LCPI	-1.839154	0.6800	Not Rejection	DLCPI	-7.179098	0.0000	Rejection
LPPI	-0.643445	0.9744	Not Rejection	DLPPI	-6.364823	0.0000	Rejection
LIPI	-1.834148	0.6158	Not Rejection	DLIPI	-3.546745	0.0390	Rejection
CD/GDP	***-4.950416***	**0.0004**	***Rejection***	DCD/GDP	-19.35534	0.0000	Rejection

The reported results in first section of Table 3 indicate the presence of a unit root in log levels of all variables except overnight interest rate and currency deficit, thus the null hypothesis that each of the economic variable has a unit root cannot be rejected except for OIR and CD/GDP[10].

If a time series appears to have a unit root, we should decide to how to model it. One method that is often successfully is to first-difference the time series and try to model the first-differenced series as an autoregressive time series (DeFusco *et al* 2007, p. 405).

We difference a time series by creating a new series, say y_t[11] that each period is equal to the difference between x_t and x_{t-1}. This transformation is called first-differencing because it subtracts the value of the time series in the first prior period from the current value of the time series.

The results of the Dickey-Fuller test for the first-difference of variables are presented at the second section of Table 3. The sixth column demonstrates the same statistics when the test is repeated for first differences of the variables that have a unit root in the level specification.

No evidence is found against the unit root hypothesis and in all cases the first differenced series do not exhibit a unit root. That is, there is no evidence from test to support a unit root in first difference of all the variables. Since the calculated Dickey-Fuller test statistics for all variables are less than the 5%

[10] For example in case of stock exchange index variable, since the calculated Dickey-Fuller test statistic (-1.9938) is greater than the 5% critical value of (-2.89), do not reject the null of nonstationarity. In other words, the variable LISE30 is nonstationarity series. We could not reject the null of nonstationarity at 5% significance levels.

11 We denote this adding D, for example DLISE30 for LISE30 series.

critical value, do not reject the null of nonstationarity. In other words, the first-difference variables are stationarity series.

VII. CORRELATION ANALYSIS

It is often necessary to examine the relationship between two or more financial variables. There are many ways to examine how sets of data are related. Two of the most useful methods are scatter plots and correlation analysis.

A scatter plot is a graph that graphically depicts the relationship between the observations for two data series in two dimensions. In contrast to a scatter plot, correlation analysis expresses this same relationship using a single number. The correlation coefficient is a measure of how two data series are closely related. In particular, the correlation coefficient measures the direction and extent of linear association between two variables. A correlation coefficient can have a maximum value of 1 and a minimum value of -1. The correlation cannot exceed 1 in absolute value. A correlation coefficient greater than 0 indicates a positive linear association between the two variables: When one variable increases (decreases), the other also tends to increase (decrease). A correlation coefficient less than 0 indicates a negative linear association between the two variables: When one variable increases (decreases), the other also tends to decreases (increase). A correlation coefficient of 0 indicates no linear relation between the two variables. The closer the coefficient is to either −1 or 1, the stronger the correlation between the two variables. The correlation coefficient is the covariance of two variables (X and Y) divided by the product of their sample standard deviations (s_x and s_y).

The formula for computing the sample correlation coefficient is

$$\mathbf{r} = \frac{\mathbf{Cov(X,Y)}}{\mathbf{s_x\, s_y}} \qquad \text{Equation (6)}$$

r= The sample correlation coefficient

Cov(X,Y) = The sample of covariance X and Y

s_x = The sample standard deviation of X

s_y = The sample standard deviation of Y

Correlation measures the linear association between two variables, but it may not always be reliable. Two variables can have a strong nonlinear relation and still have a very low correlation (DeFusco *et all* 2007, p. 287). This is onether limititation of our study.

Table 5 is a correlation matrix of selected macroeconomic factors and the ISE-30. The second column demonstrates the results of correlation test log data in levels.

Estimated correlation coefficient should be tested to determine these results show either random or real relationships. Significance tests allow us to assess whether apparent relationship between random variables are the results of chance. If we decide that the relationships do not result from chance, we will be inclined to use this information in predictions because a good prediction of one variable will help us predict other variable.

If the estimated correlation coefficient is significantly different from 0 can be tested. We propose two hypotheses: the null hypothesis (H_0) and the alternative hypothesis (H_1)

H_0: The correlation coefficient is equal to 0 (r=0)

H_1, The correlation coefficient is not equal to 0 ($r \neq 0$)

The alternative hypothesis is a test that the correlation coefficient is different from 0; therefore, a two tailed test is appropriate. We can test to determine whether the null hypothesis should be rejected using the sample correlation, r.

The formula for t-test is

$$\mathbf{t} = \frac{\mathbf{r}\sqrt{\mathbf{n}-\mathbf{2}}}{\sqrt{\mathbf{1}-\mathbf{r^2}}} \qquad \text{Equation (7)}$$

This test statistic has a t-distribution with n-2 degrees of freedom if the null hypothesis is true. The fourth column at the first section of Table 5 represents the result of correlation test. The results indicate that the relationship exist between economic factors and the ISE 30 National Index.

Table 5: Correlations between ISE 30 Index and Macroeconomic Series

Series	Correlation Coefficient LISE30	t Statistic	Ho Hypothesis	Series	Correlation Coefficient DLISE30	t Statistic	Ho Hypothesis
LCB	0.78	14.16	Reject	DLCB	-0.11	-1.31	Not Reject
LCBM	0.82	16.31	Reject	DLCBM	0.12	1.40	Not Reject
LCPI	0.89	22.25	Reject	DLCPI	0.04	0.48	Not Reject
LFP	0.98	51.19	Reject	DLFP	0.56	7.71	***Reject***
LFS	0.97	48.63	Reject	DLFS	0.41	5.07	***Reject***
LIPI	0.80	15.08	Reject	DLIPI	-0.11	-1.23	Not Reject
LM1	0.93	27.98	Reject	DLM1	0.01	0.10	Not Reject
LM2	0.93	28.80	Reject	DLM2	0.08	0.87	Not Reject
LM2Y	0.91	25.42	Reject	DLM2Y	-0.02	-0.24	Not Reject
LOIR	-0.87	-19.78	Reject	DLOIR	-0.19	-2.16	***Reject***
LPPI	0.88	21.19	Reject	DLPPI	0.09	1.03	Not Reject
LTIR	-0.93	-28.15	Reject	DLTIR	-0.39	-4.80	***Reject***
CDGDP	-0.46	-5.91	Reject	DCDGDP	-0.06	-0.69	Not Reject

The study found strong relationship between stock returns and macroeconomic factors used in the study. However, these series calculated at this study generally increase or decrease in long-term even though they may seasonally or periodically change. In such case, there is a danger of obtaining apparently significant correlation results from unrelated data. Such correlations are said to

be spurious. In order to avoid from spurious correlations, we repeated same analysis using the first-differenced log data. The fourth columns at the second section of Table 5 represents the results of correlation test. Additionally, the dual graphics of ISE-30 and macroeconomic factors are given at appendix 2.

Money Supply and Stock Returns

According to the results of study, there are low positive relationships between DLISE30 and respectively DLCBM, DLM1, DLM2 and low negative relationship between DLISE30 and DLM2Y used as proxies for money supply. Nevertheless, the relationship between stock returns and money supply is found insignificant. That is, the results of the study indicate there is no relationship between stock returns and money supply in Turkey case. This result is consistent with Karamustafa and Kucukkale (2003), Ozturk (2008), Kandir (2008), Tursoy *et al*. (2008) for Turkey and Humpe and Macmillan (2007) finding positive but an insignificant relationship between US stock prices and the money supply. Moreover, Abugri (2008) for Mexico and Chile and Maghayereh (2002) Jordan found negative but not statistically significant relationship stock returns and money supply.

On the other hand, Abugri (2008) for Brazil and Argentina, Humpe and Macmillan (2007) for Japan and Nishat and Shaheen (2004) for Pakistan report a negative significant relationship, whereas Al-Sharkas (2004) for Jordan, Maysami *et al*. (2004) for Singapore, Muradoglu and Metin (1996), and Yildirtan (2007) for Turkey indicate a positive significant relationship between stock returns and money supply.

In theory, it is argued that created excess liquidity results in either lower interest rates, which decreases the cost of companies' investment or higher inflation rate. This change in liquidity eventually affects common stocks. However, the actual relationship between money and stock returns is an empirical question and the

effect varies over time. Therefore, although there has generally been a significant negative relationship between money supply and the returns on stock, this is not always corretct as shown above.

Inflation and Stock Returns

Contrary to results from developed countries, where a negative relationship has been established, the study indicates a low positive and (but insignificant) linear association exist between stock index and inflation rates, as predicted by the Fisher hypothesis. The correlation coefficients between DLISE30 and DLCPI or DLPPI used as proxies for inflation are respectively 0.04 and 0.09. The results of the study indicate there is no relationship between stock returns and inflation in Turkey case. This result is consistent with Ozturk (2008).

In literature, the correlation of returns with inflation has implications regarding the ability of an asset class to be an inflation hedge, and a good hedge should have strong positive correlation with inflation. Reilly and Brown (2006, pp.93-94) show many Stock Indies[12] have negative correlations in developed markets, which implies that they are poor inflation hedges.

Fama and Schwert (1977), Fama (1981), Saunders and Tress (1981), Humpe and Macmillan (2007) for industrialized countries and Nishat and Shaheen (2004), Maghayereh (2002), Al-Sharkas (2004) Muradoglu and Metin (1996), Erbaykal *et al.* (2008) for emerging markets report negative relationship between stock returns and inflation, while Firths (1979) for UK Adam and Tweneboah (2008), Maysami *et al.* (2004) for emerging markets report positive relationship between stock returns and inflation.

12 Correlation Among Global Capital Market Asset Monthly Returns: 1980-2001 for example S&P 500, Wilshire 500, Russell 1000, Russell 2000, Russell 3000, IFC Emerging Market, MSCI EAFE, M-S World Index, Toronto Stock Exchange 300, Financial Times All Share, Frankfurt (FAZ) Index, Nikkei Index, Tokyo Stock Exchange Index;

The actual relationship between inflation and stock prices is also an empirical question and the effect varies over time. Therefore, although there has generally been a significant negative relationship between inflation and the returns on stock, this is not always true. In addition, even while it is true for overall market, certain industries may have earnings, cash flows, and dividends that react positively to inflation. In such an instance, their stock prices would be positively correlated with inflation (Reilly and Brow 2006, p. 414).

Real Economy and Stock Returns

Stock returns and industrial production have a low positive relationship, while stock returns and the current deficit to gross domestic production ratio have a low negative relationship of 0.09 and -0.06 respectively. Nevertheless, the relationship between stock returns and real economy is found insignificant. That is, the results of the study indicate there is no relationship between stock returns and real economy in Turkey case. This result is consistent with Karamustafa and Kucukkale (2003), Kandir (2008), Tursoy *et al.* (2008), and Ozturk (2008).

On the other hand, Humpe and Macmillan (2007) for US and Japan, Naka, Mukherjee and Tufte (1998), Nishat and Shaheen (2004), Maghayereh (2002), Al-Sharkas (2004), Maysami *et al.* (2004), Abugri (2008) for Brazil and Chile, Erbaykal *et al.*(2008) report stock returns are positively related industrial production, while Flannery and Protopapadakis (2001), Abugri (2008) for Mexico and Argentina indicate no significant relationship.

In the literature, industrial productivity growth may be seen as an indication of higher future cash flows, and so leads to an increase in stock returns. This follows from the argument that financial securities are claims against future outputs, therefore any increase in expected level of economic activity should induce a higher level of return. Because any increase in industrial production results in an increase the profitability of companies. Additionally, the relationships

between stock returns and foreign transactions (DLFP and DLFS) are a fairly strong positive and significant. This means that as industrial production increases foreign investors transact much more. On the other hand, the relationship between DLISE30 and DCD/GDP is negative but insignifcant. It can be stated that an increase the current deficit to gross domestic production ratio causes economy to deteriorate, which decrease the investment opportunity for companies.

Exchange Rate and Stock Returns

The study indicates the relationship between stock returns and currency basket (DLCB) used as a proxy for exchange rate is negative but insignificant. This result is consistent with Karamustafa and Kucukkale (2003), Yildirtan (2007), Ozturk (2008), Abugri (2008) for Argentina and Chile.

However, Tabak (2006), Abugri (2008) for Brazil and Mexico, Adam and Tweneboah (2008) report negative significant relationship between stock prices and exchange rate whereas Maysami *et al.* (2004), Muradoglu and Metin (1996), Kasman (2003) and Kandir (2008) indicate positive significant relationship between stock prices and exchange rate.

There is no strong evidence to conclude whether the relationship between exchange rate and stock returns are positive or negative. That is, there are various evidences supporting both the goods market model and the portfolio balance model.

Interest Rate and Stock Return

The study indicates significant negative relationship between DLISE30 and both DLOIR and DLTIR -0.19 and -0.39 respectively. The results of the study show there is negative and significant relationship between stock returns and interest

rate in Turkey case. This result is consistent with Muradoglu and Metin (1996), Humpe and Macmillan (2007), Abugri (2008) for Brazil, Argentina, Chile, Maghayereh (2002), Al-Sharkas (2004), Maysami *et al.* (2004) for long-term negative, Kandir (2008) and Ozturk (2008).

The negative sign can be explained by either the discount rate effect. The changes in interest rates impact the theoretical value of companies and their shares via the changes in required rate of return. Additionally, interest rates impact a company's operations. Any decrease in the interest rates will decrease the cost of capital. Therefore, firms are able to generate higher returns in a low interest environment.

VIII. GRANGER CAUSALITY TEST

It has been argued that certain macroeconomic variables such as money supply, exchange rate, industrial production, interest rate, and inflation have significant impact on stock prices. Therefore, it is important for investors to take account macroeconomic variables as risk factors while investing. So, determining the effects of macroeconomic variables on stock prices and investment decisions has been studied across stocks exchanges over the world.

In the literature, even though there are many empirical studies to discover the relationship between macroeconomic variables and stock prices, the direction of causality still remains unsolved both in theory and in empirics. Thus, it is important to empirically test whether certain economic indicators have significant impacts on the Istanbul Stock Exchange as one of developing stock markets.

We implement the Granger causality test to answer whether changes in macroeconomic variables cause changes in stock prices or changes in stock prices cause changes in macroeconomic variables, applying firs-differenced log data.

Before moving to Granger causility test, it is needed to clarify limitations relavant model. It is supposed that the model finds money supply and interest rate both cause stock movement, but it might me the case that only interest rate is the cause not money supply, we have such finding only because interest rate and money supply are highly correlated. Additionally, it is necessary to take into account that the results from Granger causality test may be sensitive to the selection of the lag legntht. To avoid these limitations, Vector Autoregression Estimates (VAR estimation) should be run for each macroeconomic variable one by one. Therefore, we run separately VAR estimation test to discover optimal the lag length. Akaike information criterion (AIC) is used to select an optimal lag length for each macroeconomic variable. Estimated lag length for each macroeconomic variable is applied one by one to Granger causality test.

At first we try to answer whether the macroeconomic variables cause to the ISE-30, testing as shown below;

H_0: The macroeconomic variables do not Granger Cause the ISE National 30 Index

H_1: The macroeconomic variables do Granger Cause the ISE National 30 Index

If $F_{table} > F_{calculated}$ H_0 is not rejected.

Then, we would test causality running from stock market return to macroeconomic variables.

VIII.1. Granger Causality Test between Money Supply and Stock Price

Table 6 represents the empirical results of Granger causality test between money supply and stock price. Monetary variables are proxied by M1, M2, M2Y, and Central Bank Money.

Table 6: Granger causality test between money supply and stock price

Lag	Null Hypothesis	F-Statistic	Probability	α = 0.05
3	DLCBM does not Granger Cause DLISE30	1.6938	0.1722	Not Reject
3	DLM1 does not Granger Cause DLISE30	0.0339	0.9916	Not Reject
3	DLM2 does not Granger Cause DLISE30	0.9776	0.4057	Not Reject
2	DLM2Y does not Granger Cause DLISE30	2.2684	0.1078	Not Reject
3	DLISE30 does not Granger Cause DLCBM	6.1952	0.0006	***Reject***
3	DLISE30 does not Granger Cause DLM1	2.8479	0.0404	***Reject***
3	DLISE30 does not Granger Cause DLM2	0.9776	0.4057	Not Reject
2	DLISE30 does not Granger Cause DLM2Y	5.4819	0.0052	***Reject***

The empirical results of the study reveal that the monetary variables do not Granger cause the stock returns. The study infers that monetary expansion does not lead to increase investments in stocks. So, any monetary variable questioned in this study is not the indicator for the share returns for the Turkish case. This result is consistent with those reported in Errunza and Hogan (1998) for Italy, Netherlands, UK, Switzerland and Belgium, Karamustafa and Kucukkale (2003), Tursoy *et al.* (2008) and Ozturk (2008) for Turkey. However, Errunza and Hogan (1998) for German and France Beltratia and Morana (2006), Nishat and Shaheen (2004) indicate that money supply does Granger cause return.

However, the study indicates the stock returns do Granger causes the monetary variables except M2. That is, the causality is running from stock returns to money supply; hence it can be inferred that the ISE30 index might be considered as a leading indicator for money supply.

On the other hand, money supply is found to do Granger cause consumer price index. In addition, monetary variables (M2 and M2Y) do Granger cause overnight interest rate. So, it can be inferred that money supply affect stock returns via CPI and OIR.

VIII.2. Granger Causality Test between Inflation and Stock Price

The casual relations between inflation and stock returns are reported in Table 7.

Table 7: Granger Causality between stock returns and inflation

Lag	Null Hypothesis	F-Statistic	Probability	α = 0.05
1	DLCPI does not Granger Cause DLISE30	4.1244	0.0444	***Reject***
4	DLPPI does not Granger Cause DLISE30	1.6140	0.1753	Not Reject
1	DLISE30 does not Granger Cause DLCPI	0.3436	0.5588	Not Reject
4	DLISE30 does not Granger Cause DLPPI	3.7497	0.0066	***Reject***

The findings of the study are contradictory. The study indicates that the consumer price index does Granger cause the stock returns. It is consistent with Fama and Schwert (1977), Saunders and Tress (1981), and Nishat and Shaheen (2004) finding unidirectional causality from inflation to stock returns. Therefore, the inflation (CPI) can be considered as leading indicator in estimating the stock returns. On the other hand, the study indicates unidirectional causality from stock returns to the producer price index. In this case, the stock prices can be regarded as leading indicator in estimating inflation (PPI). However, Ozturk (2008) indicates that the casual relationships do not exist between stock returns and inflation (CPI and PPI). We think that the these differences stem from different stock indies used as proxies for stock returns.

VIII.3. Granger Causality Test between Real Economy and Stock Price

The table 8 represents the empirical results of Granger causality between stock returns and real economic variables.

Table 8: Granger causality test between real economy and stock price

Lag	Null Hypothesis	F-Statistic	Probability	α = 0.05
12	DLIPI does not Granger Cause DLISE30	0.7719	0.6776	Not Reject
1	CD/GDP does not Granger Cause DLISE30	13.4629	0.0004	***Reject***
8	DLFP does not Granger Cause DLISE30	1.3290	0.2371	Not Reject
8	DLFS does not Granger Cause DLISE30	2.3064	0.0255	***Reject***
12	DLISE30 does not Granger Cause DLIPI	1.5754	0.1122	Not Reject
1	DLISE30 does not Granger Cause CD/GDP	1.0212	0.3142	Not Reject
8	DLISE30 does not Granger Cause DLFP	4.0081	0.0003	***Reject***
8	DLISE30 does not Granger Cause DLFS	7.3114	0.0000	***Reject***

The findings of the study indicate that the industrial production is neither the result variable nor the cause variable of stock returns, which means neither stock prices nor industrial production can be used as leading indicators to estimate each other. These results are supported by Karamustafa and Kucukkale (2003) finding no causal relationship between stock prices and industrial production. The results of study are also consistent with Errunza and Hogan (1998) for Germany, France, UK, Switzerland and Belgium.

On the other hand, Erbaykal *et al.* (2008) report that industrial production index is effective on stock prices via inflation, indicating that industrial production can be used as leading indicators in estimating the stock prices. Similarly, Errunza and Hogan (1998) report that industrial growth rate volatility does Granger cause return volatility for Italy and Netherlands. Conversely, Ozturk (2008) and Kaplan (2008) report that stock prices lead real economic activity in Turkey. Furthermore, the direction of the causality between variables is only from stock market price to real economic activity. However, Nishat and Shaheen (2004) infer bilateral Granger cause between industrial production and stock prices.

Additionally, the study indicates that unidirectional causality exists from the CD/GDP to the the stock returns. The findings of the study imply that a decrease

of current deficit contributes to economic growth, thus stock markets grow as economy develops.

Finally, the study reports causality relationship running stock returns to foreign investors purchase, and bidirectional causality between the stock returns and the foreign sales. This means that as stock markets develop foreign investors trade increasingly. Moreover, foreign sales cause the stock returns. Because intense foreign sales may be perceived as a signal of upcoming recession in Turkey, which would result in decrease of stock prices.

VIII.4. Granger Causality Test between Exchange Rate and Stock Price

As globalization expand trade, capital movements intensely increases over the world; hence, the exchange rate become one of the main determinants of business profitability and equity prices. The table 9 represents the empirical results of Granger causality between exchange rate and stock prices.

Table 9: Granger causality test between exchange rate and stock prices

Lag	Null Hypothesis	F-Statistic	Probability	α = 0.05
2	DLCB does not Granger Cause DLISE30	1.1143	0.3314	Not Reject
2	DLISE30 does not Granger Cause DLCB	10.5315	0.0001	***Reject***

The findings of the study show the unidirectional causal relationship, finding stock returns do Granger couse exchange rate. This is consistent with Ozturk (2008). The result of this study infers that share returns are the indicator to exchange rate for the Turkish case. The reverse is not valid. However, Aydemir and Demirhan (2009) indicate bidirectional the causality exists between stock returns and exchange rate. Kasman (2003) reports that causality relation exist from the exchange rate to the industry index in a unique direction. The findings of Karamustafa and Kucukkale (2003) indicate that the stock returns are neither the result variable nor the cause variable of exchange rate.

Stavarek shows the bidirectional causalities exist in the USA. Furthermore, the study reports that neither the intensity nor direction of causal relations is the same in the developed economies and the new EU-member countries. Tabak (2006) indicates linear Granger causality from stock prices to exchange rates and nonlinear Granger causality from exchange rates to Brazilian stock prices.

Single currency like Euro abolishes exchange rate risk across the Union countries. On the other hand, as emerging and developed markets become more interdependent the growing international trade would result in increasing exchange rate risk over the world. At the same time, increasing international trade provides various investment opportunities for firms, investors, portfolio managers etc. Therefore, exchange rate should be considered at valuation process to hedge and to diversify investments. Nevertheless, despite many empirical studies about the relationship between exchange rate and stock returns, any consensus regarding the direction of causality is not reached yet. Moreover, it is controversial whether the relationship between stock returns and exchange rate is positive or negative.

VIII.5. Granger Causality Test between Interest Rate and Stock Price

The empirical results of Granger causality test between interest rate and stock price are represented by table 10.

Table 3: Granger causality test between interest rate and stock price

Lag	Null Hypothesis	F-Statistic	Probability	α = 0.05
7	DLOIR does not Granger Cause DLISE30	3.7547	0.0011	***Reject***
4	DLTIR does not Granger Cause DLISE30	1.5073	0.2045	Not Reject
7	DLISE30 does not Granger Cause DLOIR	4.0333	0.0006	***Reject***
4	DLISE30 does not Granger Cause DLTIR	8.6126	0.0000	***Reject***

The findings of the study show that the bidirectional causalities exist between the overnight interest rate and the stock returns, as well as stronger evidence of

causality running from the stock price to the treasury interest rate in a unique direction. These results are supported by Ozturk (2008). Similarly, the results of the previous empirical studies related to the industrial economies such as Beltratia and Morana (2006), Humpe and Macmillan (2007) and emerging markets such as Al-Sharkas (2004) Adam and Tweneboah (2008), Abugri (2008) for Brazil, Argentina, Chile, Muradoglu and Metin (1996) Yildirtan (2007) Kandir (2008), Rjoub *et al.* (2009) report that interest rate has a significant effect in explaining the stock market returns.

Theoretically, an increase in interest rate is expecte to cause a decline in all asset values. As expected, the study indicates that there is a direct causative effect running from overnight interest rate to stcok returns. In Turkey case, some investors fund their share purchase by daily or short term credits. As overnight interest rate decreases the cost of buying share with credit and demand for shares increases, which results in an increase in stock prices. Thus, overnight interest rate can be used as an indicator for stock returns. Additionally, in the study stock returns are inferred as an indicator for both overnight interest rate and treasury interest rate. That is, stock prices do Granger cause interest rates.

IX. CONCLUSION

A number of studies have tried to find out whether a relationship exists between economic factors and stock returns for both developed and emerging markets. It is important to understand the influence of macroeconomic factors on stock prices, because at valuation process variables such as interest rate, growth rate, inflation are used to estimate instrinc value of financial instruments. In this study, the relationship between Turkish stock prices and macroeconomic variables such as inflation, interest rate, money supply, industrial production, exchange rate are investigated over the period of 1998-2008. According to the findings of the study, stock prices are positively related to foreign investor transactions and negatively

related to interest rate. However, the relationship between stock returns and other macroeconomic variables such as money supply, inflation, industrial production and exchange rate are statistically insignificant.

According to the results of the Granger-causality test carried out in order to assess whether there is any potential predictability power of one indicator for the other, interest rate (OIR), inflation (CPI), CD/GDP, foreing sale do Granger cause stock returns, while stock returns do Granger cause money supply (M1, M2, and M2Y), exchange rate, interest rate (OIR and TIR) inflation (PPI), foreign transactions. Industrial production is indicated as neither the result variable nor the cause variable of stock price movement.

The results of study indicate that interest rate (OIR) and inflation (CPI) directly and money supply via CPI and OIR affect stock returns, while exchange rate and industrial production have no influence on stock price movement. A decrease in interest rate (OIR) is expected to contribute in profitability of firms by reducing the cost of capital, which results in an increase in stock returns. As for inflation (CPI), it is thought that stock returns reflect an increase in inflation. An increase the current deficit to gross domestic production ratio causes economy to deteriorate, which decreases the investment opportunity for companies. This results in an decrease in returns. The reduction of stock returns cause foreign investors to sale their shares. Moreover, foreign sales would lead to decline stock prices. A decrease of current deficit contributes to economic growth, thus stock markets grow as economy develops. This results in an increase in foreign investment.

According to the results of the study, it can be inferred the future stock returns can be estimated by using the time paths of the questioned macroeconomic variables such as overnight interest rate, consumer price index, the current deficit to gross domestic production ratio, foreign sale. In addition, stock returns might be used to estimate interest rate, exchange rate, inflation (PPI), money supply

(M1, M2, M2Y), and foreign transactions. So, it may be concluded that the casual relationship running from stock returns is stronger than the casual relationship running from macroeconomic variables to stock returns. This is consistent with Schwert (1989) arguing that there is weak evidence that macroeconomic volatility can help predict stock volatility, whereas the evidence is somewhat strong that financial asset volatility helps predict future macroeconomic volatility.

Finally, the results of the study are not consistently stable with the results of the previous studies due to differences between the macroeconomic factors used, the period covered, the research methodology employed and the countries examined. For the future research, it is recommended that there is need to repeat this study taking into account these kind of differences to make the result of studies more comparable.

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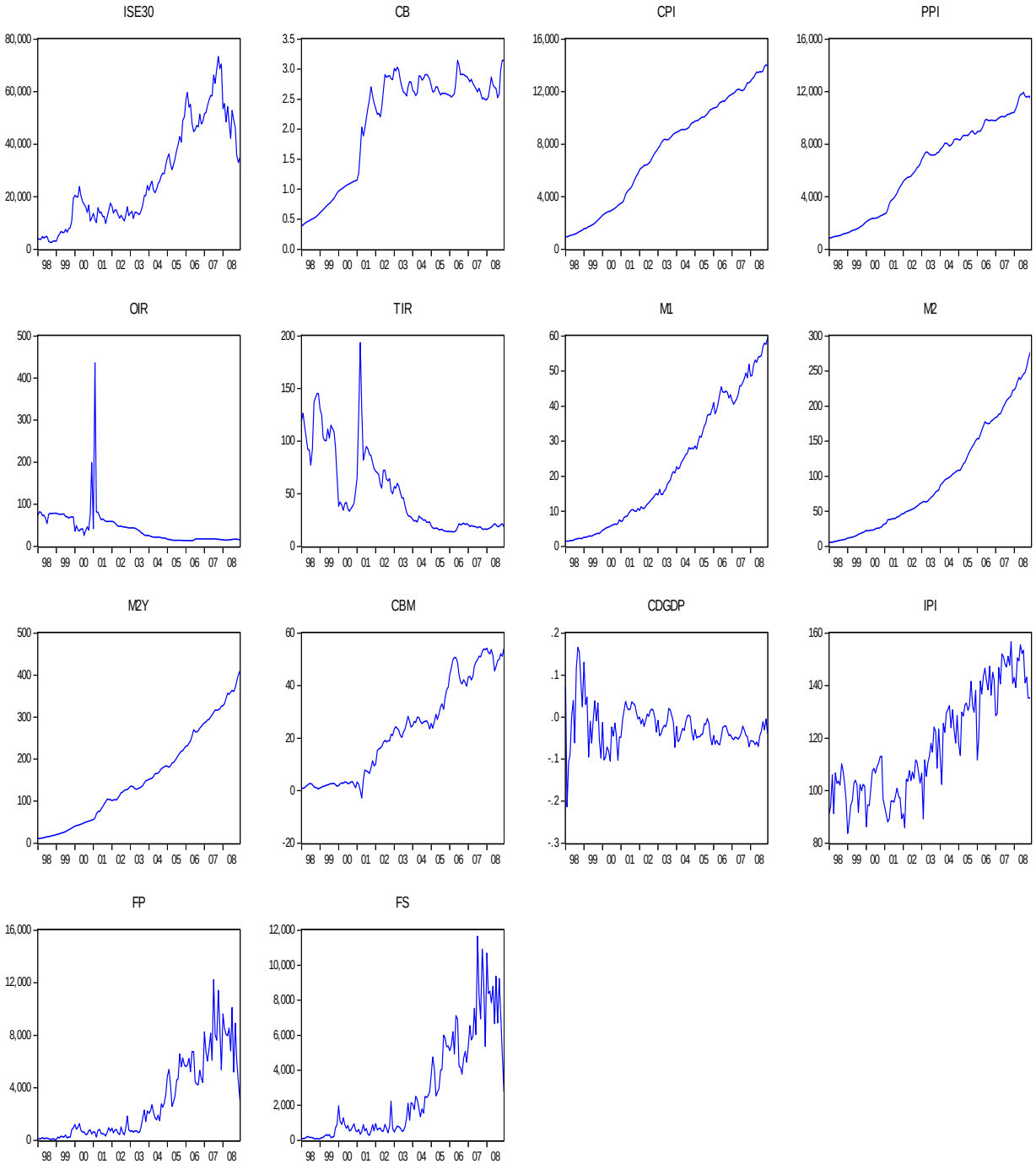
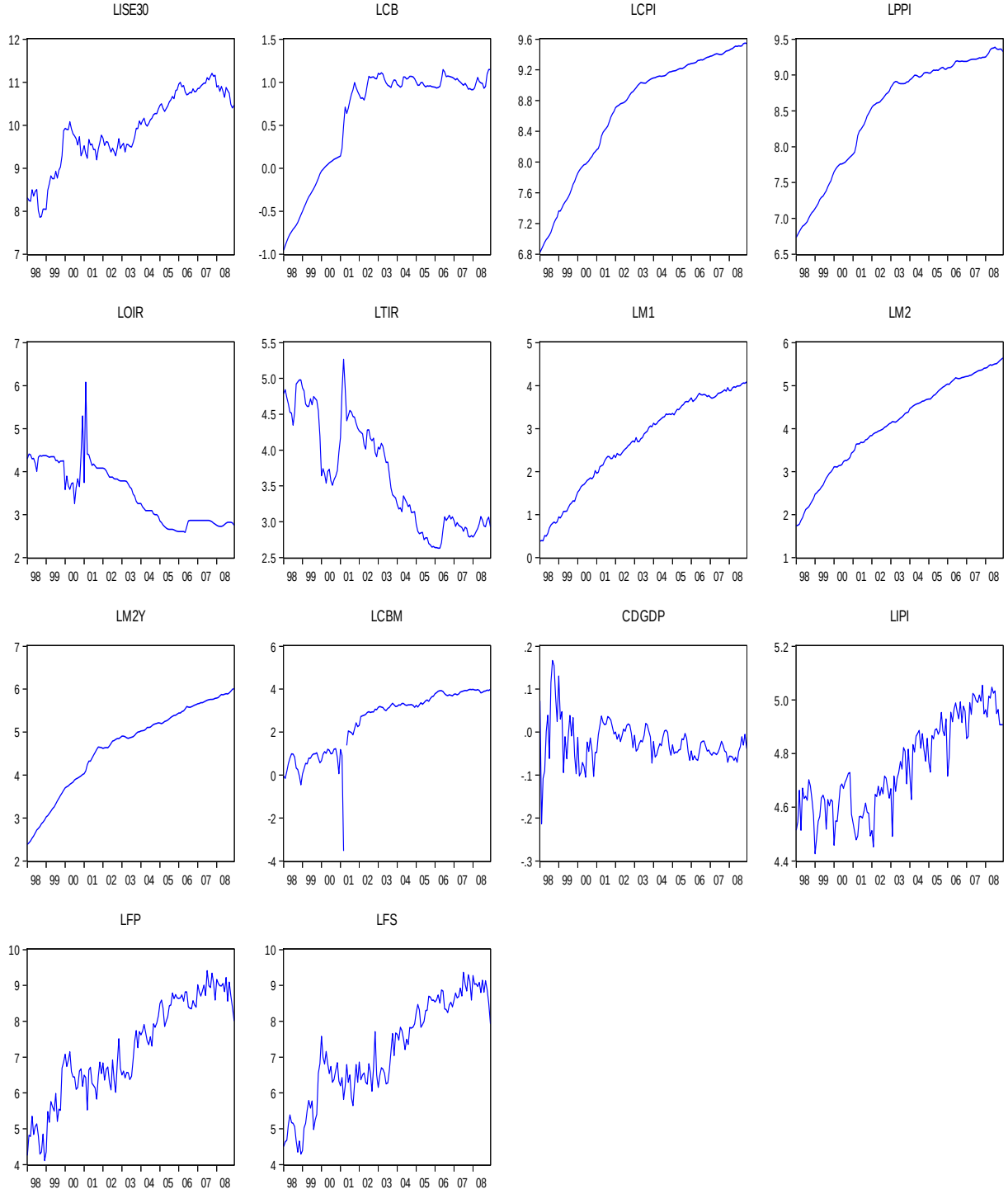
APPENDIX 1: The Graphics of Series

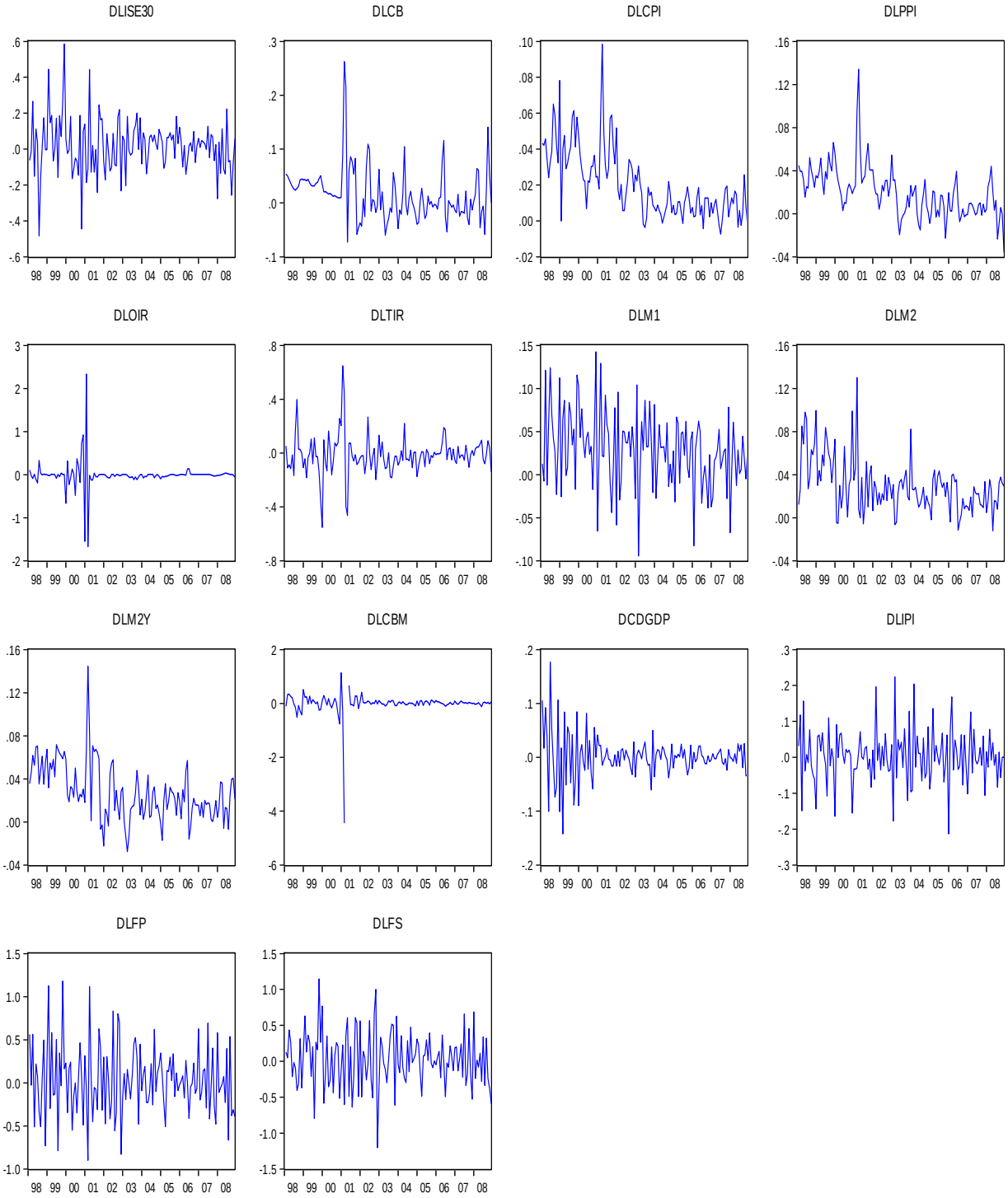
A. The Series



B. The Logarithmic Series

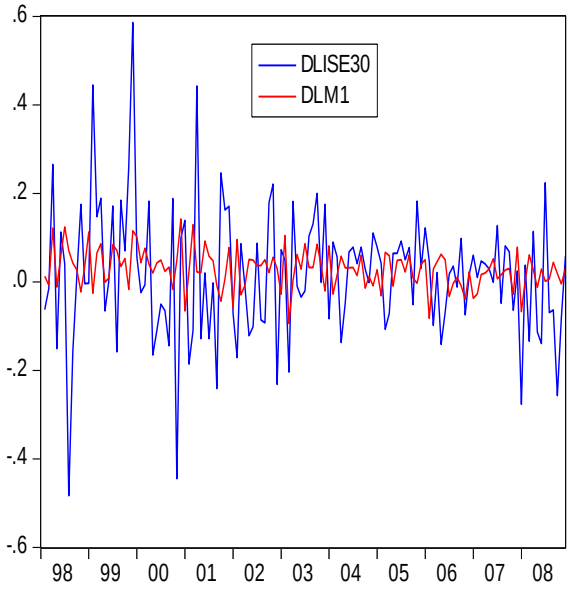


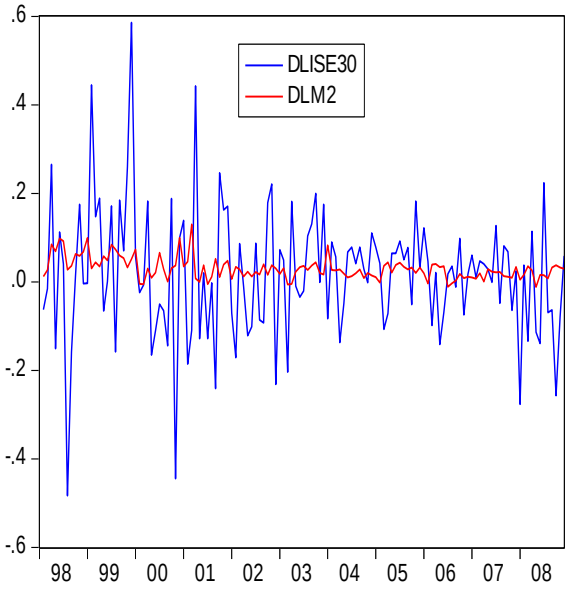
C. The First-difference Logarithmic Series

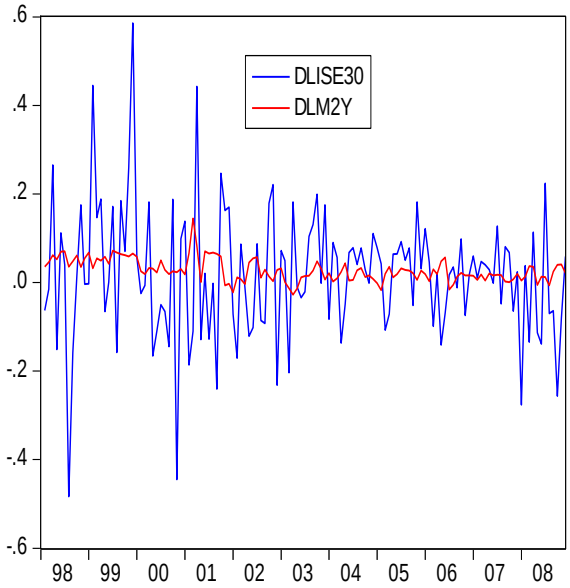


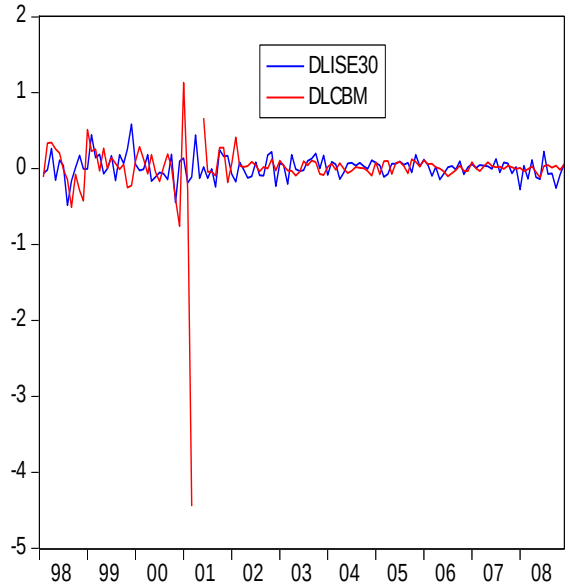
APPENDIX 2: The Dual Graphics

A. Monetary variables and ISE-30

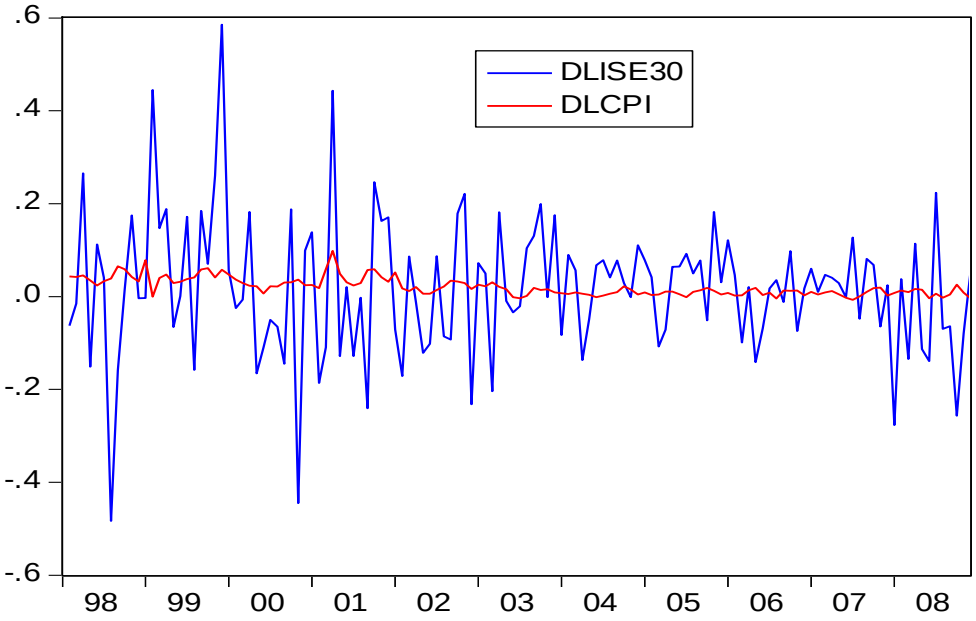


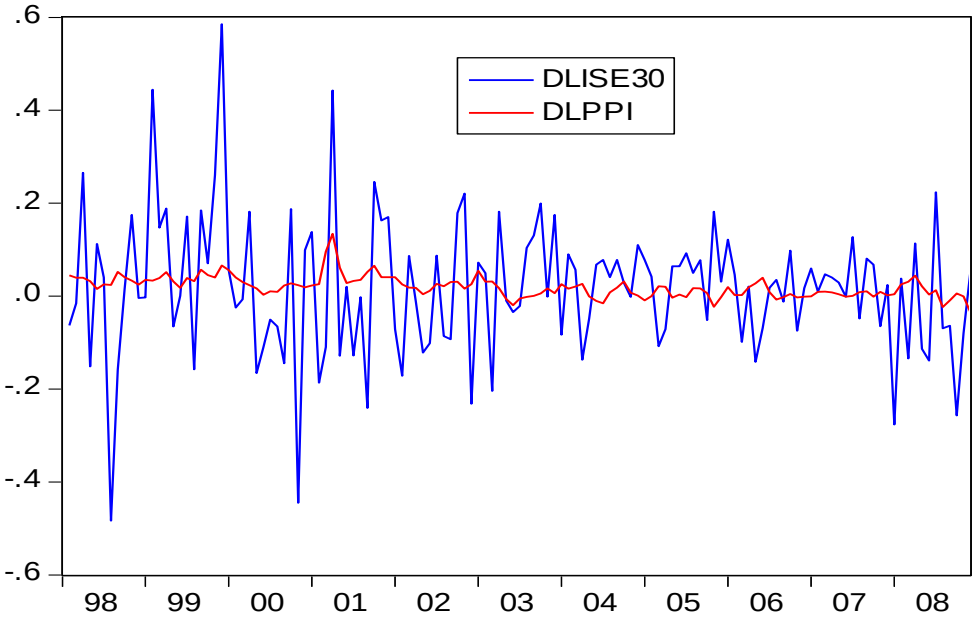




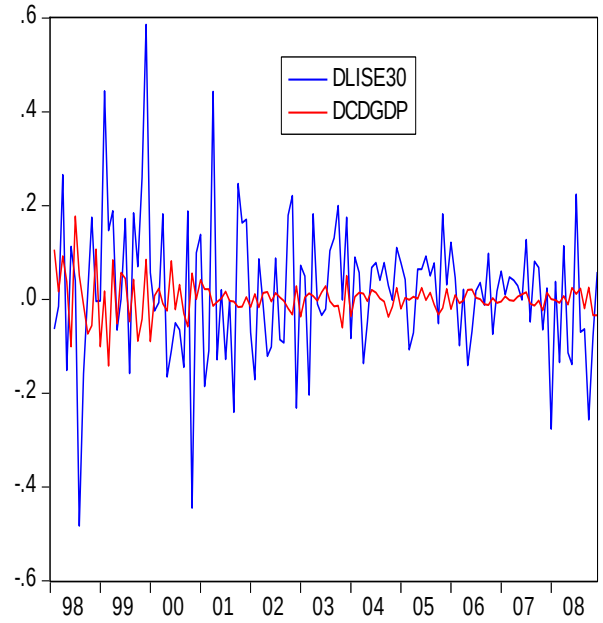


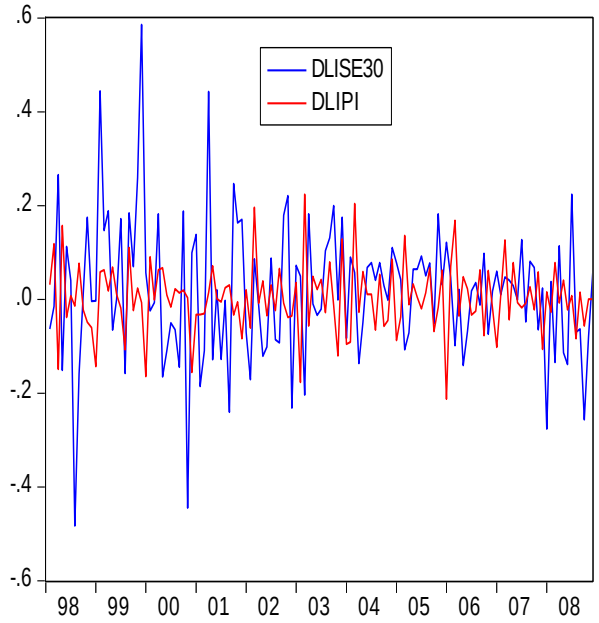
B. Inflation and ISE-30

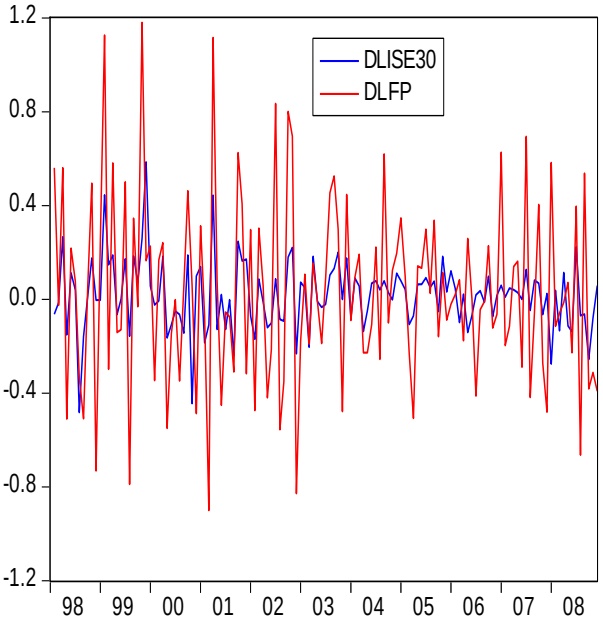


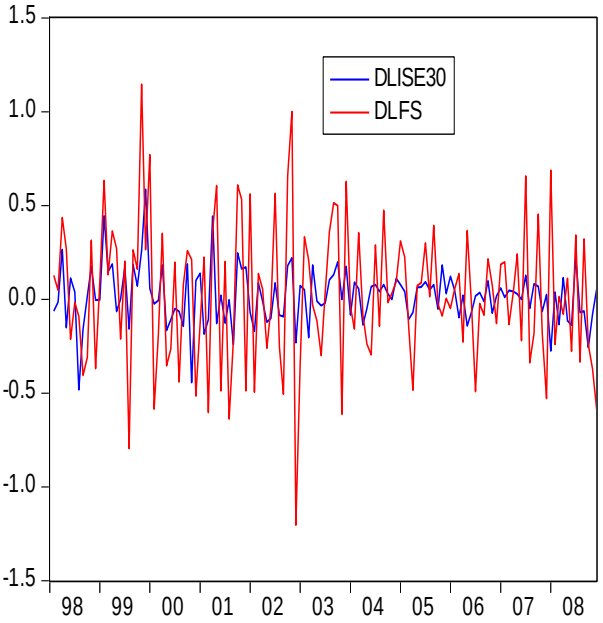


C. Real Economy and ISE-30

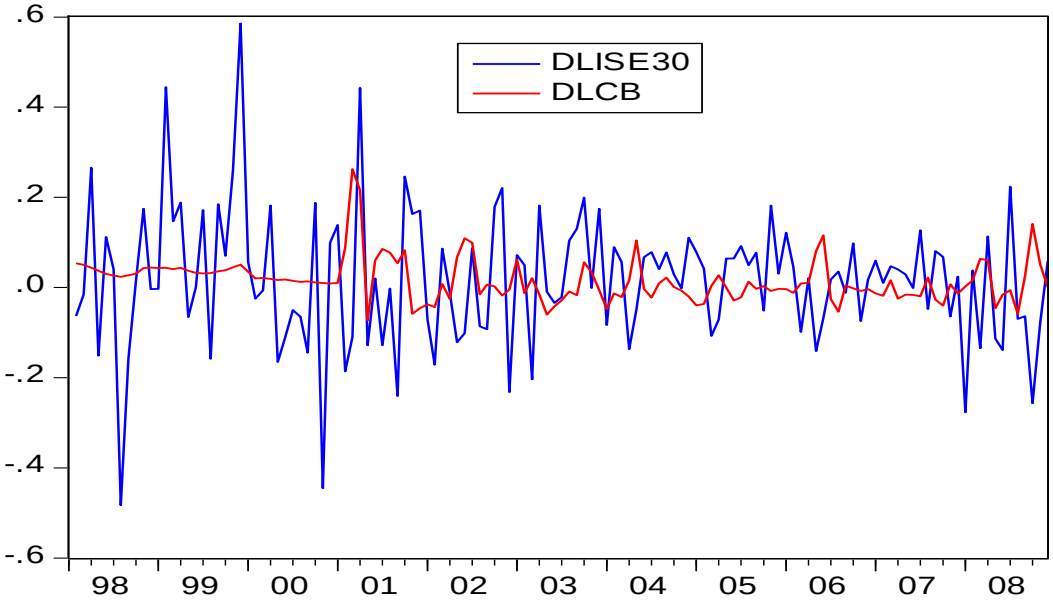








D. Exchange Rate and ISE-30



E. Inflation and ISE-30