THE REPUBLIC OF TURKEY

BAHÇEŞEHİR UNIVERSITY

CAN STOCKS HEDGE AGAINST INFLATION?

Master's Thesis

GÜLŞAH TUĞCU

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THE REPUBLIC OF TURKEY

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THE GRADUATE SCHOOL OF SOCIAL SCIENCES

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ABSTRACT

CAN STOCKS HEDGE AGAINST INFLATION?

Tuğcu, Gülşah
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This thesis investigates the relationship between stock index returns and growth in consumer prices using industry level monthly stock index data in Turkey between January 1997 and December 2007. Stock index data are collected from Datastream; Istanbul Stock Exchange (ISE) All Share, ISE100, ISE30 and 18 industry groups as; Bank, Basic Materials, Chemicals, Electiricity, Food & Beverage, Holding & Investment, Insurance, Investment Trusts, Leasing & Factoring, Metal Goods, Machinery, National Financials, National Industrials, National Services, Textile & Leather, Tourism, Transportation, Wholesale & Retail Trade and Wood, Paper & Printing. The consumer price index (CPI) data are taken from IFS. The Augmented Dickey Fuller method is used to test the unit root and Engle-Granger Causality Test is used to analyze the cointegration of stock index returns and CPI. There are relatively limited works in the literature testing the relation between industry level stock index returns and inflation in Turkey. We fill this gap in the literature by testing whether ISE All Shares, ISE100, ISE30 and 18 industry group stock returns are a good hedge against inflation. The results show that except for national service index and basic materials index, for all of the indices there are cointegration between stock index and CPI. Also by using error correction mechanism the direction of the adjustmenst in the long run is analyzed. According to the results, stock indices follows CPI and the Transportation, Textile & Leather and Electricity stock indexes are comes back to the long run path or adjust more quickly than others.

Keywords: Stock Returns, Inflation, Hedging

ÖZET

HİSSE SENEDİ GETİRİLERİ ENFLASYONA KARŞI KORUR MU?

Tuğcu, Gülşah

Sermaye Piyasaları ve Finans

Tez Danışmanı: Doç. Dr. Aslı Yüksel

Haziran 2011, 49

Bu tez, Ocak 1997 ve Aralık 2007 dönemine ait aylık veriler kullanılarak Türkiye' de hisse senedi getirileri ve tüketici fiyatlarındaki büyüme arasındaki ilişkiyi incelemektedir. Hisse endeksi getiri verileri Datastream' den elde edilmiştir. Söz konusu hisse endeksleri; ulusal tüm hisseler, ulusal 100, ulusal 30 ve banka, hammadde, kimyasal madde, elektrik, yiyecek & içecek, holding&yatırım, sigorta, yatırım ortaklıkları, leasing & factoring, metal ürünler, makine, ulusal finansal, ulusal endüstri, ulusal servis, tekstil&deri, turizm, ulaşım, toptan&perakende satış, ahşap ve kâğıt & basımdır. Tüketici fiyat endeksi verileri ise IFS' den alınmıştır. Birim kök testi için Augmented Dickey Fuller testi kullanılmıştır. Hisse senedi endeksi ve enflasyon arasındaki eşbütünleşmeyi analiz etmek için ise Engle-Granger Causality Test kullanılmıştır. Daha önce literatürde Türkiye' de hisse endeks getirileri ve enflasyon arasındaki ilişkiyi sektörel olarak inceleyen çok az sayıda çalışma bulunmaktadır. Bu tezde ulusal tüm hisseler, ulusal 100, ulusal 30 ve 18 endüstri grubuna ait hisse endeks getirilerinin enflasyona karşı koruyup koruyamayacağı ve endüstri bazında hangilerinin koruyabileceği test edilerek literatürdeki boşluk doldurulmaya çalışılmıştır. Sonuçlar göstermektedir ki, ulusal servis ve hammadde endeksleri hariç tüm sektörler için hisse senedi endeksi ve tüketici fiyat endeksi arasında eşbütünleşme bulunmaktadır. Bunun yanı sıra, hata düzeltme modeli ile uzun dönemdeki düzeltmenin varlığı ve yönü analiz edilmiştir. Sonuçlara göre, hisse endeksleri CPI' ı takip etmektedir ve ulaşım, tekstil & deri ve elektrik endeks getirilerindeki kısa dönem sapmalar diğer endeks getirilerine kıyasla daha çabuk dengeye gelmektedir.

Anahtar Kelimeler: Hisse Senedi Getirileri, Enflasyon, Korunma

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ABBREVATIONS

Augmented Dickey Fuller	:	ADF
Auto-Regressive Integrated Moving Avarage	:	ARIMA
Bucharest Stock Exchange	:	BSE
Capital Asset Pricing Model	:	CAPM
Consumer Price Index	:	CPI
Databank Stock Index	:	DSI
Economic Tracking Portfolios	:	ETP
Emerging Stock Market	:	ESM
Error Correction Model	:	ECM
Exponential General Autoregressive Conditional Heterokedastic	:	EGARCH
Final Prediction Error	:	FPE
Gross Domestic Products	:	GDP
Istanbul Stock Exchange	:	ISE
Kwiatkowskiet-Phillips-Schmidt-Shin	:	KPSS
Morgan Stanley Capital International	:	MSCI
Momentum Threshold Autoregressive	:	M-TAR
Organization for Economic Cooperation and Development	:	OECD
Ordinary Least Squares	:	OLS
Phillips-Perron	:	PP
Producer Price Index	:	PPI
Stock Price Index	:	S&P
The Group of Seven	:	G7
Threshold Autoregressive	:	TAR
Treshold Autoregressive Conditional Heterokedastic	:	TARCH
United Kingdom	:	U.K.
United States	:	U.S.
Vector Autoregressive	:	VAR

SYMBOLS

Regression coefficients	:	β, μ , ψ_0
Summation	:	$\sum$
Short term coefficients	:	ϖ_i , ξ_i , θ_i , γ_i
The alternative hypothesis	:	H_1
The effective tax rate	:	T
The error terms	:	u, , ε_{it} , ω_t
The estimated error correction term	:	$\hat{\varepsilon}_t$
The expected inflation rate	:	π^e
The expected real interest rate	:	r^e
The log stock price on day t	:	P_t
The market interest rate	:	R
The null hypothesis	:	H_0
The number of the lagged difference terms	:	k, m, n
The speed of adjustment in prices	:	$\beta_{0,}$ ϕ_0

1. INTRODUCTION

The relationship between stock returns and inflation has been extensively studied in different kinds of capital markets. Since common stocks are expected to hedge inflation, return on common equity should keep pace with the inflation rate. Fisher hypothesis (1930) comprises that, the market interest rate includes the real interest rate and expected inflation. This hypothesis assume positive relationship between stock returns and inflation. According to the Fisher Hypothesis, nominal interest rates move directly with inflation, thus a permanent change in the inflation rate, do not affect real interest rate in the long run. That is, stocks must reimburse investors completely for increases in the general price level through corresponding increases in nominal stock returns.

Emprical evidence on the issue of whether the stock returns hedge against inflation is far from conclusive. Short and long term studies report different results about them. Even though the relation between stock returns and inflation are studied for many countries, number of studies conducted industry level for Turkey is very limited. Kutan and Aksoy (2003) investigate the impact of inflation on nominal stock returns and interest rates. They examine composite stock index, and two key individual sector indexes in Turkey: financials and industrials. They find financials sector provides to be the best hedging tool against anticipated inflation in Turkey. Duman and Karamustafa (2004) investigate the relationship between stock returns and inflation trend. Their results indicate that stocks are not good hedge against inflation. Spyrou (2004) investigates the relationship between inflation and stock returns for ten significant ESM markets. The result of the article shows that the relationship between stock returns and inflation is negative for Turkey. Aga and Kocaman (2006) and Kandir (2008) relate their result parallel to the results of Duman and Karamustafa (2004) and Spyrou (2004) as; CPI is not good to explain stock returns and volatility for Turkey and Turkish stocks can not be used as hedge against inflation. On the contrary, Horasan (2008) claims that there is a positive relationship between the stock indexes and inflation.

A crucial question would be whether stock index return and consumer price index exhibit long-run and short run relation. Earlier studies on this subject do not provide consistent results.

This thesis investigates the relationship between stock index returns and growth in consumer prices using industry level monthly stock index data between January 1997 and December 2007 in Turkey. There is relatively limited work in the literature testing the relation between industry level stock index returns and inflation in Turkey. We fill this gap in the literature by testing whether ISE All Shares, ISE100, ISE30 and 18 industry group stock returns are a good hedge against inflation.

The remainder of this paper is organized as following; Section two provides literature review. Section three describes the data. Section 4 discusses the methodology, unit root tests (4.1), co-integration analyses of the time series employed(4.2) and error correction model(4.3). Section 5 presents the results. Finally, section 6 concludes the thesis.

2. LITERATURE REVIEW

2.1 THE RELATION BETWEEN INDEX LEVEL STOCK RETURNS AND INFLATION

The relation between stock returns and inflation has been examined repeatedly since the 1970s. It was first examined by Jaffe and Mandelker (1976), Bodie (1976) and Nelson (1976), who found a significantly negative relation between inflation and stock returns. This finding which confirms the negative relation between inflation and stock returns is parallel to the findings of the study of Fama and Schwert (1977).

Feldstein (1980), who studied on the same subject, must have expanded his research and proposed the tax-effect hypothesis, arguing that inflation generates artificial capital gains due to the valuation of depreciation and inventories. This leads an increase on corporate tax liabilities and reduce real after-tax earnings. Rational investors would respond to this change by reducing stock valuation and in this sense inflation leads to movements in stock prices. This hypothesis is valid only for tax regimes that are similar to that of the U.S. For countries with different tax regimes, there is evidence for a negative relation between stock returns and inflation. As it is comprehended by Feldstein's work, with the same reasons Hooks (1993) rejects the tax effect hypothesis because of various tax regimes in different countries.

Fama (1981) has put forward the Proxy hypothesis, according to which negative correlation between stock returns and inflation is spurious, induced by the positive correlation between stock returns and real activity and the negative correlation between inflation and real activity. Because of the fact that the real agents demand for the flow of money, the hypothesis occur to be irrelevant and this perceives a fall in economic activity and consequently a decline in the demand for money. As a result, the lack occurs in monetary supply and thus inflation rates increase inevitably. Ram and Spencer (1983) believe that the proxy hypothesis is consistent with the conventional Phillips curve, which implies a positive rather than negative relation

between inflation and real activity. While Fama (1981) did not provide definite and clear-cut evidence on this hypothesis, Ram and Spencer (1983) found consistent evidence for a positive relation between real activity and inflation and a negative relation between real activity and stock returns. For example, supportive evidence found by Benderly and Zwick (1985), Wei and Wong (1992) and Lee(1992), but Park (1997) rejected the hypothesis.

Ratner (1990) reexamines the study of Fama and Schwert (1977) who analyze the asset returns and inflation between the years 1953 to 1971, and widened the consequences from 1970 through 1987. Monthly data are used between the years 1953 to 1987. The results indicate that government and corporate bonds creates slight hedges against expected inflation rates however the consequences are not drastical. In addition to results, the negative relationship between common stock returns and inflation seems not to be hedged and the early period 1950's and 1960's reflect the negative relationship between common stock returns and inflation. The claim is on the point of view that following studies are more reputable than the studies of Fama and Schwert because during their study there is a structural change in the U.S. Economy in 1970's.

Furthermore, Samarakoon (1996) examines the relationship between stock returns and inflation in Sri Lanka between January 1985 and August 1996. The study base on monthly and quarterly data for the purpose of underlining evidence on the generalized Fisher Hypothesis. The results of the study enables one to comprehend that there is a positive relationship between stock returns and both lagged inflation & expected inflation and also unexpected inflation related negatively with stock returns.

Groenewold, Rourke and Thomas (1997) examine the relationship between stock returns and inflation in the macroeconomic interactions. They claim that aggregating stock returns and inflation are both macroeconomic variables and it is the most effective way to analyze them with a macroeconomic prospect. As parallel to this theory, Australian data are used between the years March 1960 to September 1991. Dickey-Fuller test and Philips-Perron test are thought to be the necessary approaches for the result. This study analyzes the model at two stages. The first is based on a

single equation. The second stage is to estimate the individual equations of the model. As a result, the negative relationship between stock returns and inflation is the consequence of economic interactions.

Spyrou (2001) discusses whether equities are a good hedge against inflation for emerging economy of Greece or not. Monthly data are used from January 1990 to June 2000 and this study period is seperated into two parts. They used the Johansen technique (Johansen and Jeselius, 1990) for test the cointegration and Augmented Dickey Fuller (ADF) for testing unit roots. The results of this study indicate that between the years 1990 to 1995, the relationship between equities and inflation is negative and statistically significant and curiously there is a relation between inflation and long level of money supply as real activity. This result also directly related with Marshall' s argument. [1]

Sellin and Riksbank (2001) examine the relationship between real stock returns, inflation and money growth. Monetary economists have been interested in the question whether money has any effect on real stock prices while financial economists have argued whether equity is a good hedge against inflation. The results suggest that equity is not a good hedge against inflation in the short run but may be vice versa in the long run.

Madsen (2002) attempts to explore the relationship between inflation and share returns by using the monthly and annual data for 17 OECD (Organization for Economic Cooperation and Development) countries in the postwar and interwar period. The results indicate that, the relationship between stock returns and stock prices seem to be affected by the shock in the economy.

[1] Marshall argument indicate that Postwar U.S. data are characterized by negative correlations between real equity returns and inflation and by positive correlations between real equity returns and money growth. These patterns are closely matched quantitatively by an equilibrium monetary asset pricing model. The model also implies negative correlations between expected asset returns and expected inflation, and it predicts that the inflation-asset return correlation will be more strongly negative when inflation is generated by fluctuations in real economic activity than when it is generated by monetary fluctuations.

Wong and Wu (2003) examine the relation between long-horizon nominal stock returns and expected inflation by using the monthly data from G7 and eight Asian countries between the years 1960 to 1999. They use an ordinary least square estimation and instrumental variables regression. As a result of the study, findings support the Fisher hypothesis when the model is estimated by an instrumental variables estimation method using long horizon data rather than applying OLS with short-horizon data. In addition to this, the study indicates that in fact the real stock returns may be time-varying.

Hiraki (2003) studies correlation between common stocks and CPI inflation for the U.S. and Japanese markets between 1951–1981. They use a classification such as inflationary, noninflationary or indefinable to make a comparison for each country. Examining the case of the U.S. and Japan, this study brings up through evidences that both stock markets do not comply with hedging against inflation. In addition, the common stocks performance of U.S. and Japanese markets are disposed to be an inverse relationship with inflation.

Adams, McQueen and Wood (2004) focus on the study of the relationship between unanticipated inflation (news) and intraday stock returns with three questions. Initial question is; “Does news about inflation have an impact on stock returns?” According to their answer, there is an inverse relation between Producer Price Index (PPI), Consumer Price Index (CPI) and stock prices. Secondly; “How fast do stocks respond to inflation news?” Lastly; “Is the relationship between stocks and inflation indicate contingent?” They find that, the relationship of bad interest news and large stocks are more stronger when economy is strong.

Al-Khazali and Pyun (2004) point out that differentiation between long and short run effects are crucial to understand how inflation affects stock market returns. They use monthly data for nine countries between the years 1980–2001 in the Pasific-Basin; Australia, Hong Kong, Indonesia, Japan, South Korea, Malaysia, the Phillippines, Singapore, and Thailand. The analysis show that the nine markets have negative relationships between stock returns in real terms and inflation in the short run. On the other hand co-integration tests on the same markets show a positive relationship over

the long-run. Stock prices in Asia, like those in the U.S. and Europe, appear to reflect time-varying memory related with inflation shocks that make stock portfolios a rationally good hedge against inflation in the long run.

Ahmed and Cardinale (2005) examine the relationship between equity returns and inflation about four of the largest economies in the world: the US, Japan, the U.K. and Germany by using the long term historical data. The paper gives a new approach except from previous studies that the long term and short them extent of the correlation between equity returns and growth in consumer price. They use Granger causality framework. According to the short-term analysis, the result evolves that there is an asymmetric behaviour during different inflation regimes. Equity returns have been significantly higher at times of inflation up to 3 percent with the exception of Japan. On the other hand, in the long-term, mixed support are found for the hypothesis.

Kim and In (2005) give a new approach that states a positive relationship between stock returns and inflation in U.S. by using monthly data from January 1926 to December 2000. The new approach is different in terms of the period that is subjected in this work. The study maintains on a scale-by-scale basis and is based on wavelet multiscaling method. While a negative relationship is appeared between stock returns and inflation at the intermediate scale, emprical results indicate that there is a positive relationship at the short run and the long run.

Al-Rjoub (2005) analyzes the news effect on stock returns and inflation rate in five MENA countries named: Bahrain, Egypt, Jordan, Oman and Saudi Arabia. Data are managed as a tool differently for each country's changes between the years 1990 and 2001. They emerge with both Exponential General Autoregressive Conditional Heterokedastic (EGARCH) and Treshold Autoregressive Conditional Heterokedastic (TARCH) models. They conclude that the effect of inflation on stock returns is negative and strongly significant. The asymmetric news effect is absent.

Ortiz, Cabello and Jesus (2006) indicate the relationship between inflation and exchange rates and stock market performances based on the data for the two largest Latin America capital markets, Brazil and Mexico. They justify their work with monthly data between the years January 1968 and December 2002. The result of this study indicate that the short run relationship between stock prices and stock returns is weak, especially at the time of economic crises. On the other hand, in the long run local and foreign investors compensate the both Brazilian and Mexican stock markets against the inflation.

Maghyereh (2006) studies on the potential nonlinear long-run relationship between stock returns and inflation. Monthly data of 18 developing countries add depth to the study of Maghyereh. This study is analyzed with nonparametric cointegration model, Bieren' s approach and ADF test. The result of this study supports that there is a long-run relationship between stock returns and inflation in 14 developing countries out of the 18 and 13 of them have a nonlinear long-run relationship.

Ryan (2006) examines the relationship between compounded Irish stock returns and inflation not only long run but also at the short run between the years 1783 and 1998 via adapting the Granger causality test. The results indicate there is a positive relationship between stock returns and expected inflation in the long run.

Jones and Wilson (2006) study on the relationship between stock retursn and inflation between the years 1913 and 2004 in the U.S. . Then, the time period of this study is broadened from 1871 to 2004. They use the real standard deviation of stock returns and geometric mean of stock returns to analyze the effect of inflation. Thus, the result indicate that inflation adjustments have little impact on the real standard deviation of stock returns.

Raunig (2007) answers the question that whether economic tracking portfolios (ETP) are effective in terms of forecasting output and inflation in Austria. This study employs for the period that spans from November 1987 to June 2004. They make their analysis with seperation the period into two parts as in-sample and out-of-sample.

Emprical findings reveal that the ETPs follow both target variables in sample. On the other hand, ETPs follow annual industrial producting growth broader and annual inflation to a limited extent in an out-of-sample forecasting period.

Jung, Shambora and Choi (2007) study on whether expected inflation, unexpected inflation, economic growth and interest rates affect real stock returns in four European markets: France, Germany, Italy and U.K. . The data cover the period between first quarter of 1975 and the first quarter of 2001. Box-Jenkins methodology is used. The results indicate that unexpected inflation and unexpected interest rates have statistically significant impact on the real stock returns in France, Italy and the U.K. . Additionally, none of the variables have a significant effect on the real stock returns in Germany. Although inflation shows a positive effect on stock returns in France, unexpected inflation has a negative impact in Italy and U.K. and this result occurs to be same with Spyrou(2004).

Hoque, Silvapulle and Moosa (2007) examine the relationship between real stock prices and inflation in the G7 countries, namely; Canada, France, Germany, Italy, Japan, United Kingdom and United States. Hoque, Silvapulle and Moosa strech the period from January 1957 to January 2000. Consistent Threshold Autoregressive (TAR) and Momentum Threshold Autoregressive (M-TAR) models are equipped as tools for covering the relation. The real stock prices, which react differently, depend on the higher or lower inflation. There is also no relation between real stock returns and inflation in G7 countries.

S. Hasan (2008) analyzes the relationship between stock returns and inflation in the U.K. According to the Fisherian hypothesis, the relationship between stock returns and inflation suggested positively and statistically significant by the linear regression model. Monthly data are used between January 1968 and December 2003. The consequences on the basis of the unit root and cointegration test underline a long-run relationship between price levels, share prices, and interest rates. In which could be expounded as the long-run determinants of stock returns which also support that common stocks a good hedge against inflation.

Beirne and Bondt (2008) focuse deeply on the relationship between the equity premium and inflation between January 1973 and March 2007 in the post-Bretton Woods era which include Austria, Canada, Euro erea, France, Germany, Japan, Neterlands, Switzerland, United Kingdom and the United States. They use the methodology similar to growth model of Fama and French (2002). The crucial positive relation between the equity premium and inflation shows that stocks are preferred rather than Treasury Bills and government bonds and stocks are a better hedge against inflation than others.

Lee (2008) analyses the correlations of real stock returns and inflation in the U.K. . The sample period starts in 1830 and ends in 2000. According to the results, there is a break point in 1970 and at the same period which is between 1830-2000 needs to be analyzed seperately as post and pre-break. The analyse indicate that the unpredictable stock returns are negatively correlated with inflation between 1811 and 1969. Nevertheless, for 1970–2000, the correlation between unpredictable stock returns and inflation is weak. The results indicate that stock returns are not affected by a positive shock to inflation. These consequences are on the contrary of the well-known emprical results for the pre-break period.

Kolluri and Wahab (2008) consider the relationship between stock returns and inflation in their work via applying the asymmetric model. Their case of study differs from other studies. In this study inflation regimes are seperated such as high and low. Time period of this study is between the years January 1970 to December 2004. They use two basic model which is called Fama' s (1981) Money Demand Inflation Model and Geske/Roll's (1983) reverse causality inflation model. The result of this study supports the positive relationship between stock returns and inflation forecasts in high inflation periods and inverse relation that is found only low inflation periods.

Adrian and Codruta (2008) emprically assess the relationship between return series behaviour of the main index of the Bucharest Stock Exchange (BSE) – the BET index, and macroeconomic variables such as inflation rate, unemployment and interest rate in Romania. Time period of this study is between the 19th of September 1997 and the 7th of February 2008. Emprical findings indicate that there is an inverse relation between

inflaiton rate and stock market returns. On the other hand, decreasing of the uneployment rate cause the decreasing of the BET index return.

Knif, Kolaria and Pynnönen (2008) indicate how inflation affects the stock market returns by changing the inflation news such as good and bad. They use Schwert' s (1931) regression event study that analyzes the effect of measure of inflation shocks on stock market returns. The result shows that both good and bad news about macroeconomy affects on stock returns.

Atesoglu (2008) analyzes that whether the Fed is targeting the stock returns and monetary policy in U.S. Data which are used between the years 1985 and December 1999. They use the ordinary least squares and t statistic report techniques to regress the model. The result of Atesoglu's study supports that there is a positive relationship between nominal federal funds rate with nominal equity returns, real federal funds rate and real equity returns for 1987:8 – 2006:1 which is in Greenspan' s period and not in Martin, Burns and Volker's periods. In conclusion, stock markets and equity returns are crucial for monetary policy in the United States.

Lee (2009) examines the relation between stock returns and inflation based on an inflation targeting strategy. Not only monthly but also quarterly data are used for the countries; Austria, Canada, Chile, Israel, New Zeland, Sweden and United Kıngdom at 10 years perion of time. Stock returns and inflation rates are analyzed in two mutually exclusive periods, first; the period before inflation targeting monetary policy is adopted and the latter is the period since inflation targeting policy is adopted. They use Dickey and Fuller (1979,1981) model for the stationarity test. The result of this study analyzes that in inflation targeting adopted countries a change in inflation rate should have crucial and negative effect on real stock returns and it is also related with its inflation target, especially for Chile, Israel and Sweden.

Rao and Ramachandron (2009) point out the relationship between macroeconomic variables and stock returns. Their study, which analyzes the 78 selected stocks, is prepared for the period that spans from 1996 to 2003 and this model analyzed with the

Capital Asset Pricing Model (CAPM) model. Weighted avarage of 30 well traded stocks which named BSE SENSEX is affected by the cointegration shocks such as inflation, real returns and term premium. On the other hand individual stock returns are not directly affected by macroeconomic factors despite these factors affect the market return.

Alagidede and Panagiotidis (2010) make a study for six African stock markets to elucidate the relationship between stock markets and inflation. They use parametric and nonparametric cointegration procedures between the years 1990 to 2010. In this sense, this study analyzes monthly stock prices and consumer prices. They use the Phillips-Perron (PP) and Beitrung (2002) nonparametric test to test the unit root and Johansen cointegration test. The consequences of the cointegration test confirm the long-run relationship between stock prices and consumer prices. Exemption of Kenya and Tunisia, the long-run generalized Fisher elasticities of stock prices in point of consumer prices are positive and statistically significant.

Adam and Frimpong (2010) analyze the extent to which the stock market provides a hedge to investors against inflation for Ghana stock markets in the long run by employing cointegration analysis. Data are taken from Databank Stock Index (DSI) over the period January 1991-December 2007. Johansen cointegration test is used and more powerful than Engle-Granger approach. The key emprical results show that Ghana stock market provides full hedge against inflation. This study also put forth that current inflation may not particularly related with expectations of lower future returns in developing market.

Gregoriou and Kontonikas (2010) clearly signify that whether stock market investment can hedge against inflation in the long horizon. They use the data between the years 1970 and 2006 from 16 OECD countries via testing with panel unit root and panel cointegration econometric framework. They use the Johansen time-series cointegration test and Pedroni Fully Modified Ordinary Least Squares heterogeneous cointegrated panel methodology to estimate the long-run elasticity. The result of this study supports a positive long horizon relationship between good prices and stock prices.

Abd. Majid (2010) analyzes whether the stock market suggests a hedge to investors against inflation for Malaysian economy in the post-1997 Asian financial turmoil. They validate the data for their research between the years 1999 and 2008. This work examines the Fisherian hypothesis of asset returns and also Fama proxy effect framework. This study divides inflation into three types such as actual, expected and unexpected inflation. The results indicate that Malaysian stock market provides a perfect hedge against both expected and unexpected inflation. As a result of this stock returns are independent of inflation which is supported by Fisherian theory and regularly rejected by Fama' s proxy hypothesis. Auto-Regressive Integrated Moving Avarage (ARIMA) model is used to estimate expected inflation and forecast errors as the unexpected component of the inflation.

Alagidede (2010) examines the relationship between common stocks and inflation for 6 African countries; Egypt, Kenya, Morocco, Nigeria, South Africa and Tunusia. Time period is between the years 1997 and 2006 by using OLS regression model. The consequence of this paper support that in the long run, common stocks provide a hegde against inflation in Kenya, Nigeria and Tunisia.

Chimobi (2010) examines the relationship between money and inflation in the long term of Nigerian Economy. The data cover the period from 1970 to 2005. ADF and Phillips Perron (PP) are used to test the unit root. The Granger Causality Test is used to analyze the cointegration framework. The results support a long term relationship between money supply and inflation in Nigeria.

2.2 THE RELATION BETWEEN INDUSTRY LEVEL STOCK RETURNS AND INFLATION

Kavussanos, Marcoulis and Arkoulis (2002) analyze the long run effects of several sources of global risk on the excess returns of 38 international industries, as defined by Morgan Stanley Capital International (MSCI) between the period March 1987 and October 1997. They use a multi-factor time series model. Macroeconomic factors; the return on th MSCI World Equity Index, the Eurodollar-Treasury yield spread, oil

prices, an aggregate measure of exchange rate risk, industrial production and inflation. The results of this study indicate that the long run effects of macroeconomic news have different impacts in different industries.

Luintel and Paudyal (2006) examine the relationship between common stocks and inflation using a framework of the tax-augmented Fisher Hypthesis. The sample covers January 1955 to December 2002, yielding 576 monthly observations in the United Kingdom. The data including seven industry groups (retail price index, consumer goods, financial institutuions, investment trusts, general manufacturing, mineral extraction, services, utilities and Financial Times All Share Index). This study make two contributions to the literature. First, this study examines the long run relation between stock prices and good prices using industry-level stock indexes in a cointegration framework. Second, this study test for structural breaks in the cointegration relation between stock and goods price indexes. The results explore statistically significant cointegration relation between stock and goods price indexes in both aggregate and disaggregate (industry) data. They use Johansen's (1992,1995) multivariate method, Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992) and ADF test. Their results indicate that U.K. stock investments hedge tax-paying investor from inflation in the long run.

Ratanapakorn and Sharma (2007) analyze the long-term and short-term relationship between the U.S. stock price index (S&P 500) and six macroeconomic variables. These variables are long term interest rate, money supply, industrial production, inflation, the exchange rate, short term interest rate. Data are covers the period between January 1975 and April 1999. The Granger causality test is used under the floating exchange rate. The results support that there is a negative relationship between stock prices and long-term interest rates. On the other hand, there is a positive relation relation between stock prices and the money supply, industrial production, inflation, the exchange rate and short term interest rate.

Nishat and Mustafa (2008) investigate the relationship between asset return and inflation in Pakistan in the period from 1972 to 2006 by using the OLS simple techniques. Assets are including simple foreign currency, gold, real estate, saving

deposits, silver, stock prices, treasury bills and government securities. The emprical results suggest that most of the asset returns are hedging unexpected inflation and total inflation. The stock prices and gold prices do not hedge both total inflation, expected and unexpected inflation. Risk free investment and not risky investment are generally preferred by the Pakistani investors.

Rahman (2009) examines the relationship between time varying industry-level stock returns volatility and output growth, inflation and unemployment rate in Australian economy. Quarterly macroeconomic time series based the data of the study and counted data as variables between second quarter of 1973 and the second quarter of 2004. Vector Autoregressive (VAR) model and multi-step Granger causality test are used. The article indicates a result that an increase in industry-level volatility of stock market returns leads to a decline in output growth and an increase in both inflation and unemployment rates.

2.3 THE RELATION BETWEEN STOCK RETURNS AND INFLATION IN TURKEY

Kutan and Aksoy (2003) investigate the impact of inflation on nominal stock returns and interest rates. They examine composite stock index, and two key individual sector indexes in Turkey: financials and industrials by using asymmetric GARCH models. Data are used between the years December 1986 and March 2001. The result of this article indicate that the financials sector responses more strongly to the release of the CPI than do any other sectors. In addition to this, financials sector provides to be the best hedging tool against anticipated inflation in Turkey.

Duman and Karamustafa (2004) study on the relationship between stock returns and inflation trend and real level of output in Turkey. They examine whether stocks are a good hedge against inflation. The monthly ISE100 and CPI data between the period January 1990 and May 2002 are used in the study. The results indicate that stocks are not a good hedge against inflation.

Spyrou (2004) investigates the relationship between inflation and stock returns for ten significant Emerging Stock Market (ESM) markets. Data are used from four Latin American economies, named Chile, Mexico, Brazil and Argentina, five Asian economies, named; Thailand, S.Korea, Malaysia, Philippines, and Hong Kong and the one Mediterranean economy, named Turkey. Johansen technique is used for cointegration and Augmented Dickey-Fuller is used to test for unit root. The result of this article shows that the relationship between stock returns and inflation is negative for Turkey. Overall, the results of the study suggest that stock returns provide an effective hedge against inflation in emerging markets.

Aga and Kocaman (2006) investigate the relationship between current Price/Earnings ratios, Industrial Price Index (IPI), CPI and stock price behaviours. They use data between January 1986 and June 2000. This study analyzes whether there is a symmetry for Turkish stock market or not with using Exponential GARCH (EGARCH) model. The results show that IPI and CPI do not affect both stock return mean and volatility. As a result IPI and CPI are not good to explain stock returns and volatility for Turkey.

Horasan (2008) examines the relationship between stock returns and inflation in Turkey. The sample period starts in 1990 and ends in 2007. In this study independent variable is price index and dependent variable is ISE 100 stock returns. Time series analysis results indicate that there is a positive relationship between stock returns and inflation.

Kandir (2008) examines the act of macroeconomic factors (named as growth rate of industrial production index, change in consumer price index, growth rate of international crude oil price and return on the MSCI World Equity Index) in Turkish stock returns. This study uses data for all non-financial firms listed on the ISE. Data are cover the period July 1997 and June 2005. They use a multiple regression model whether twelve stock portfolio returns are related with seven macroeconomic factors. The results indicate that exchange rate, interest rate and world market return seem to affect all of the portfolio returns, while inflation rate is significant for only three of twelve portfolios. On the other hand, industrial production, money supply and oil

prices do not appear to have any significant impact on stock returns. Overall, the finding support Turkish stocks can not be used as hedge against inflation.

When the main argument is complied with such studies, it is obvious to state that there is limited work in the framework of testing the relation between industry level stock index returns and inflation in Turkey. The objective of this thesis is to this gap in the literature by testing whether ISE All Shares, ISE100, ISE30 and 18 industry groups stock returns are a good hedge against inflation.

3. DATA

This paper investigates the relationship between stock index returns and growth in consumer prices using industry level monthly stock index data in Turkey between January 1997 and December 2007. Stock data are collected from Datastream; ISE All Share, ISE100, ISE30 and 18 industry groups: Bank, Basic Materials, Chemicals, Electiricity, Food & Beverage, Holding & Investment, Insurance, Investment Trusts, Leasing & Factoring, Metal Goods, Machinery, National Financials, National Industrials, National Services, Textile & Leather, Tourism, Transportation, Wholesale & Retail Trade and Wood, Paper & Printing. The consumer price index (CPI) data are taken from IFS.

We use Augmented Dickey Fuller method to test the unit root and Engle-Granger Causality Test to analyze the cointegration of stock index returns and CPI. Error Correction model is also used to analyze the short term adjustments. E-views 6 is used to test the unit root, cointegration and error correction. [2]

Figure 3.1, 3.2, 3.3, 3.4 and 3.5 shows the relation between change in CPI and ISE National All Share Index return, ISE National Index return, ISE National 30 Index return, ISE National Financials Index return, ISE National Service Index return and ISE National Industrials Index return respectively.

Table 3.1 presents the descriptive statistics of monthly rate of returns of the Turkish stock indices and the table 3.2 presents the correlation of these rates with the rates of change in consumer price index. One can see that the highest mean monthly return for sample period is Insurance stock index with the 3.2 percent and the lowest is Electricity with the 0.3 percent.

Tourism sector stock index returns has the highest and the Food & Beverage sector stock index returns has the lowest standard deviation. For all of the indices, there is a

[2] EVIEWS® is an econometrics & Time Series Analysis software package by Quantitative Micro Software. http://www.eviews.com/index.html

positive relationship between stock index and CPI. The highest correlation is that of the Wholesale & Retail Trade and the lowest is that Leasing & Factoring.

4. MODEL AND METHOD

Before the observations on the long-run relationship, it is significant to ascertain that all individual time series of variables are stationary and integrated of the same order. First, we must check whether the stock index returns and CPI series appear to be stationary or nonstationary. If stock index and CPI series are stationary, the relationship between stock index and CPI will be analyzed with Ordinary Least Squares (OLS). On the other hand, if they are not stationary, we will analyze whether the series are cointegrated or not. Then, Granger causality test is used to examine the long-term relationship between stock index and CPI. If the time dependent lagged relationship between the two variables exists, we can talk about its direction. Granger Causality test is one of the tests to define this relationship statistically.

Fisher (1930) suggests that the market interest rate (R) reflects the expected real interest rate (r^e) and the expected inflation rate (π^e). In frictionless economy this can be expressed as:

$$(1 + R) = (1 + r^e)(1 + \pi^e) \tag{4.1}$$

If common stocks provide a full hedge against inflation, the application of this hypothesis in a perfect market yields a one-to-one relation between the inflation rate and stock returns. Generally, asset holders are liable for paying taxes on their income (regular income as well as capital gains). Therefore, for an investor to be fully compensated for inflation, the nominal stock return rate should include the effects of both taxes and inflation. Denoting *T* as the effective tax rate, equation (1) can be written as:

$$R = \frac{(1 + r^e)(1 + \pi^e)}{(1 - T)} - 1 \tag{4.2}$$

Given that $T > 0$, equation (2) implies that the return rate on common stocks should be higher than the inflation rate; therefore, the return rate on stocks must exceed the inflation rate to fully hedge investors from inflation.

4.1 LONG RUN RELATIONSHIP BETWEEN STOCK INDEX AND CONSUMER PRICE INDEX

4.1.1 Unit roots and stationarity test

If we mention about statistically significant the relation between the two time series, we have to assign whether the relation is superious or not. If two series are stationary at same level, the relation between them is not a superious relation. These series are named as cointegrated series. Time series stationarity is a statistical characteristic of series' mean, variance and covariance over time. If they are constant over time, then the series are said to be a stationary process, otherwise, the series is described as being a nonstationary process. Differencing techniques are normally used to transform a time series from a nonstationary to stationary by subtracting each datum in a series from its predecessors. A differenced stationary series is said to be integrated and is denoted as I(d) where "d" is the order of integration. The order of integration is the number of differencing operations it takes to make the series stationary.

One of the methods to test the stationarity is Dickey-Fuller (1979, 1981). DF test is crucial in terms of measuring which degree stationary series have, but it does not consider an autocorrelation in disturbance term. If disturbance term includes autocorrelation, DF test is invalid. In this situation, by adding the lagged terms of dependent variable to explanatory variable, Augmented Dickey Fuller is used. We test whether the assumed time series are I(1) or not. To do that, we employ ADF test. First, we test for the unit roots in the cases when intercept and trend is presented in the regression, then when there is the intercept only, and finally without intercept and trend. If we are not able to reject the null hypothesis about the unit root we run the ADF test on the first difference of the original time series.

The ADF test statistic is calculated using the following equation:

$$\Delta P_t = \beta_0 P_{t-1} + \sum_{i=1}^{n} \beta_i \Delta P_{t-i} + u_t \qquad (4.3)$$

where P_t represents the log stock price on day t and u_t is the error term. If the β_0 coefficient is significantly different from zero, then the null hypothesis that the price series contains a unit root is rejected.[3]

The model's hypotheses are: The β_0 *coefficient is*

Null hypothesis	H_0: $\beta_0=0$	Non-stationary
Alternative hypothesis	H_1: $\beta_0<0$	Stationary

If the null hypothesis can not rejected, and the stock indexes and consumer price index are non-stationary, we will difference each series once, create a set of lagged and differenced variables and finally carry out the ADF test (testing the series stationarity at its first-differenced value). Specifically we will be interested in examining the linear combination between the non-stationary stock index and CPI, if such a linear combination exists, then stock index and CPI series are said to be cointegrated. The linear combination between them is the cointegrating equation and may be interpreted as the long-run equilibrium relationship among the two variables.

4.2 COINTEGRATION

In order to be able to proceed with the causality analysis we need to establish that they are cointagrated. After examination of the stationarity of stock index and CPI, the second step is to determine whether these series are cointegrated.

[3] In this study, the number of the lagged difference terms, "n" is determined with Akaike Information Criterion (AIC). The Econometrics Program (E-Views 6.0) gives appropriate lag length automatically, according to criteria set by the user.

The concept of cointegration can be defined as a common stochastic trend and a systematic co-movement process among variables over the long run, and is first introduced by (Granger, 1969) and (Granger, 1981). Engle and Granger (1987) then provided a definition which adapted Granger's first work and that of Granger et al. (1983), which stated that y_t and x_t are said to be cointegrated if there exists a β such that $y_t - \beta x_t$ is $I(0)$. This means that the regression equation $y_t = \beta x_t + u_t$ makes sense, and y_t and x_t do not drift too far apart from each other over time.

After examination of the stationarity of stock index and CPI, the second step is to determine whether these series are cointegrated. If the stock index returns and CPI are linked to form an equilibrium relationship in the long-run, they will move together over time and the error term will be stationary, even though the individual series may be nonstationary. If there is no cointegration between the series, the variables have no long-run link. For cointegration analysis, first, the relationship between the stock index returns and CPI is analysed using the following regression equation, for each stock index:

$$P_{it} = a + \mu CPI_t + \varepsilon_{it} \tag{4.4}$$

Where P_{it} represent the stock index on month t. The stock indexes are defined as a dependent variable and log of the CPI is identified as an independent variable in the model. If the error correction term deviating from equilibrium relationship, ε_{it}, is stationary I(0) variable, the stock prices and the CPI are cointegrated. Then, as in Engle and Granger (1987), cointegration analysis is conducted by the regression of the predicted deviations obtained in equation (4.4), $\hat{\varepsilon}_t$, with the following structure of autoregression:

$$\Delta \hat{\varepsilon}_t = \psi_0 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{k} \psi_i \Delta \hat{\varepsilon}_{t-i} + \omega_t \tag{4.5}$$

The Augmented Dickey-Fuller test is used to examine the significance of ψ_0.[4] If ψ_0 is significantly different from zero, the null hypothesis that ψ_0 is zero will be rejected. That is, $\hat{\varepsilon}_t$ is stationary and the stock index and the CPI (i.e., P_{it} and CPI_t) are cointegrated. Hence, two variables are said to be cointegrated when their linear combination is stationary ($\Psi_0 \neq 0$), even though each variable is nonstationary.

4.3 ERROR CORRECTION MODEL (ECM)

The cointegration regression considers only the long-run property of the model, and does not deal with the short run dynamics explicitly.[5] Clearly, a good time series modelling should describe both short-run dynamics and the long-run equilibrium simultaneously. For this purpose we now develop an error correction model (ECM). Although ECM has been popularized after Engle and Granger, it has a long tradition in time series econometrics.

To analyze the long run relation, the following error correction models are employed in the analysis:

$$\Delta P_{it} = \lambda_0 + \beta_0 \varepsilon_{t-1} + \sum_{i=1}^{m} \varpi_i \Delta P_{t-i} + \sum_{i=1}^{n} \xi_i \Delta CPI_{t-i} + u_{1it} \tag{4.6}$$

$$\Delta CPI_t = \varphi_0 + \phi_0 \varepsilon_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta CPI_{t-i} + \sum_{i=1}^{n} \theta_i \Delta P_{t-i} + \nu_{1it} \tag{4.7}$$

where ε_{t-1} is lagged residual term. The coefficients are (ϖ_i, ξ_i, θ_i, γ_i) short term coefficients. β_0 and ϕ_0 indicate the speed of adjustment in prices in response to disequilibrium conditions on the P and CPI, respectively. Hence, these coefficients

[4] Similar to the previous procedure, "k" is determined with Akaike Information Criterion (AIC). The Econometrics Program (E-Views 6.0) gives appropriate lag length automatically, according to criteria set by the user.

[5] Here the long-run relationship measures any relation between the level of the variables under consideration while the short-run dynamics measure any dynamic adjustments between the first differences of the variables.

show direction adjustments in the long-run. The insignificance of β_0 coefficients suggests that the stock prices do not respond to the deviations and hence, the stock prices are exogeneous. Similarly, if θ_0 is found to be insignificant, it suggests that the CPI exogeneous because they do not respond to the changes in the stock prices.

If the coefficients of the lagged residual terms (β_0, ϕ_0) are negative and statistically significant, it suggest that the system comes back to the long run path or adjusts. The magnitude of the coefficient of the lagged residual term is an indicator of speed of adjustments in the long run. If the t-statistic of error correction parameter is significant, it shows that there is a causality relationship.

The equation 4.6 test the causality from change in CPI to change in stock index and the equation 4.7 test the causality from change in stock index (P) to change in CPI. The null hypothesis of equation 4.6 is CPI is not cause of P can be rejected if β is statistically significant. Thus, CPI is a cause of P. Similarly, the null hypothesis of equation 4.7 is P is not cause of CPI can be rejected if ϕ is statistically significant. This means P is a cause of CPI and also it is supported the Keynesian hypothesis. If both 4.6 and 4.7 equations' lagged residual term coefficients are statisticaly significant, it shows there is a dual causality.

For estimation of error correction, the lag lengths must be determined. In this study, the lag lengths (m and n) are allowed to vary up to 4 lags, and Akaike's final prediction Error (FPE) is calculated for each lag. The orders with the lowest FPE chosen an optimal. Standard errors are corrected for autocorrelation and heteroskedasticity (Newey and West, 1987).

5. RESULTS

In this section the stationarity test results, cointegration test results and error correction test results are presented.

5.1 UNIT ROOTS AND STATIONARITY TEST RESULTS

To test stationarity of the series ADF test is employed. The results in Table 5.1 show that for all of the series that the null hypothesis of unit roots can not be rejected at levels. The results of the first difference tests show that all stock index returns and CPI series are stationary at a 1 percent level of significance. The main messages from our unit root test results are as follows; first the ADF test confirm all stock index returns and CPI are I(1).

5.2 COINTEGRATION TEST RESULTS

The finding that many macro time series may contain a unit root has spurred the development of the theory of non-stationary time series analysis. Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. The stationary linear combination is called the cointegrating equation and may be interpreted as a long-run equilibrium relationship among the variables.

Table 5.2 shows the results of the cointegration test between the stock index and CPI. P_{it} represents the natural logarithm of stock index i traded on month t respectively.

First, we regress CPI_t on P_{it}

$$P_{it} = a + bCPI_t + \varepsilon_{it} \tag{5.1}$$

Where ε_{it} is the error correction term deviating from the equilibrium relationship. If it is a stationary I(0) variable, prices are cointegrated. All of the coefficients on CPI_t are found to be significant at 1 percent. Then, the following model is estimated:

$$\Delta \hat{\varepsilon}_t = \psi_0 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{k} \psi_i \Delta \hat{\varepsilon}_{t-i} + \omega_t \tag{5.2}$$

to determine whether ε_{it} is I(0). The Augmented Dickey-Fuller test is used to examine the significance of ε t-statistic (t-stat).

Cointegration is tested by Engle Granger methodology, the model is estimated with the non-stationary and same ordered series, and then fitted values of residuals are tested for stationary. Stationarity of the series is tested by comparing the ADF test statistic with McKinnon critical values and if the ADF test statistic is higher than the critical value, we reject the null hypothesis of unit root. In table 5.2, we have the result of cointegration for each sector at levels. The null hypothesis of unit root, H_0=0 can be rejected at the 10 percent level of significance for all stock returns with an exception of national services and basic materials. The cointegration test results indicate that there is cointegration between stock index and CPI with an exception of national services and basic materials.

5.3 ERROR CORRECTION TEST RESULTS

A particular advantage of the error-correction mechanism is that the extent of adjustment in a given period to deviations from long run equilibrium is given by the estimated equation without any further calculations.

The practice of exploiting information contained in the current deviation from an equilibrium relationship in explaining the path of a variable has benefited from the formalization of the concept of co-integration by Granger(1981) and Engle and Granger(1987).

The table 5.4 reports the estimated error correction models. The dependent variable is the change of CPI and ϕ represents the residual term coefficient. When the coefficients of the lagged residual term is negative, it suggests that the system comes back to the long run path or adjusts. The negative sign shows that the direction of correction is toward equilibrium, which is essential for ECM stability. Therefore, there exists an error correction mechanism.

When we estimate the equation 4.6, the results indicate that the coefficients of the lagged residual terms "β" are negative for all stock indices and they are statistically significant. The lagged residual terms of National Industrials, Chemicals, Holding and Investment, Investment Trusts, Metal Goods and Machinery, Textile and Leather, Transportation and Wood & Paper & Printing stock indexes are statistically significant at 1 percent level. Furthermore, β coefficient is statistically significant at 5 percent level for National All Share, National 100, National 30, National Financials, Food&Beverage, Insurance, Leasing and Factoring and Tourism stock indexes. For the rest of Bank and Wholesale & Retail Trade' lagged residual terms are statistically significant at 10 percent.

In this situation, the null hypothesis of equation 4.6, CPI is not cause of P can be rejected. Because β is statistically significant. Thus, CPI is a cause of P. According to the results, the Transportation, Textile & Leather and Electricity are comes back to the long run path or adjust more quickly than others because their lagged residual terms are bigger than others.

On the other hand, when we estimate the equation 4.7, the results indicate that the coefficients of lagged residual terms "ϕ " are negative for all stocks. Additionally, the coefficient of residual terms are not statistically significant for all stock indeces except investment trusts. So, the null hypothesis of equation 4.7, P is not cause of CPI can not be rejected. Because ϕ is not statistically significant. Thus, P is not a cause of CPI.

6. SUMMARY AND CONCLUSIONS

In this thesis we investigate the relationship between stock index and growth in consumer price using industry level monthly stock index data in Turkey between January 1997 and December 2007. There has been relatively limited work in the literature testing the relation between industry level stock returns and inflation in Turkey. We fill this gap in the literature by testing whether ISE All Shares, ISE100, ISE30 and 18 industry group stock returns are a good hedge against inflation. Stock data are collected from Datastream and the consumer price index (CPI) data are taken from IFS. We use Augmented Dickey Fuller method to test the unit root and Engle-Granger Causality Test to analyze the cointegration of stock index and CPI.

Even though the relation between stock index returns and inflation are studied for many countries, number of studies conducted industry level for Turkey is very limited. Kutan and Aksoy (2003) investigate the impact of inflation on nominal stock returns and interest rates. They examine composite stock index, and two key individual sector indexes in Turkey: financials and industrials. They find that financials sector index is the best hedging tool against anticipated inflation in Turkey. Duman and Karamustafa (2004) investigate the relationship between stock returns and inflation trend. Their results indicate that stocks are not good hedge against inflation. Spyrou (2004) investigates the relationship between inflation and stock returns for ten significant ESM markets. The result of the article shows that the relationship between stock returns and inflation is negative for Turkey. Aga and Kocaman (2006) and Kandir (2008) relate their result parallel to the results of Duman and Karamustafa (2004) and Spyrou (2004) as; CPI is not good to explain stock returns and volatility for Turkey and Turkish stocks can not be used as hedge against inflation. On the contrary, Horasan (2008) claims that there is a positive relationship between the stock indexes and inflation.

According to the ADF test results for all of the series that the null hypothesis of unit roots can not be rejected at levels. The results of the first difference tests show that all stock indices and CPI series are stationary at a 1 percent level of significance.

Additionally, investigating the cointegration between stock returns and inflation, Engle Granger methodology is used. The model is estimated with the non-stationary and then fitted values of residuals are tested for stationary. The results show that, there is a cointegration relation between the stock index and inflation with an exception of national service and basic materials. Also by using error correction direction of the adjustments for the deviations is analyzed. We test two equations whether stock index returns are a cause of inflation and inflation is a cause of stock index or not. The error correction test results indicate that inflation is a cause of stock index. According to the results, the Transportation, Textile & Leather and Electricity stock indexes are comes back to the long run path or adjust more quickly than others because coefficients on their lagged residual terms are bigger than others. On the other hand, the result of the study shows that stock index returns are not cause of inflation.

REFERENCES

Books

Johnston, J. & Dinardo, J., 1997. *Econometric methods.* Fourth Edition. Singapore: McGraw-Hill Companies, Inc.

Thomas, R.L., 2005. *Using statistics in economics*. Berkshire: McGraw-Hill Companies, Inc.

Periodicals

Adam, A.M. and Frimpong, S., 2010. Can Stocks Hedge Against Inflation in the Long Run? Evidence from Ghana Stock Market. *International Journal of Business and Management*, pp.188-194

Adams, G., McQueen, G. and Wood, R., 2004. The Effects of Inflation News on High Frequency Stock Returns. *Journal of Business.* **77**(3), pp.547-574

Aga, M. and Kocaman, B., 2006. An Emprical Investigation of the Relationship between Inflation, P/E Ratios and Stock Price Behaviours Using a New Series Called Index-20 for Istanbul Stock Exchange. *International Research Journal of Finance and Economics.* **6**, pp.133-165

Ahmed, S. and Cardinale, M., 2005. Does Inflaiton Matter fort he Equity Returns? *Journal of Asset Management*. Vol.**6**(4), pp.259-273

Alagidede, P. and Panagiotidis, T., 2010. Can Common Stocks Provide a Hedge Against Inflation? Evidence from African Countries. *Review of Financial Economics* **19**, pp.91-100

Al-Khazali, O. M.and Pyun, C., 2004. Stock Price and Inflation: New Evidence from The Pasific Basin Countries. *Review of Quantitative Finance and Accounting.* **22**, pp.123-140

Al-Rjoub, S. A. M., 2005. The Adjustments of Stock Prices to Information about Inflation: Evidence from MENA Countries. *Applied Economics Letters.* **12**, pp.871-879

Atesoglu, H. S., 2008. Equity Returns and Monetary Policy. *International Journal of PoliticalEconomy*. **37**(2), pp.71–81

Beirne, B. and Bondt, G., 2008. The Equity Premium and Inflation. *Applied Financial Economics Letters*. **4**, pp.439-442

Duman, M., Karamustafa, O., 2004. Türkiye' de Hisse Senedi Getirileri, Enflasyon ve Reel Üretim İlişkisi. *Muhasebe ve Finansman Dergisi.* **21**, pp.94-100

Chimobi, O. P., Causality between Money and Inflation in the Nigerian Economy. *International Journal of Economic Perspectives.* **4**(1), pp.363-370

Gregoriou, A. and Kontonikas, A., 2010. The Long-Run Relationship Between Stock Prices and Goods Prices: New Evidence from Panel Cointegration. *Journal of International Financial Markets, Institutions & Money*. **20**, pp.166-176

Groenewold, N. Rourke, O. and Thomas, S., 1997. Stock Returns and Inflation: A Macro Analysis.

Hasan, S. M., 2008. Stock Returns, Inflation and Interest Rates in the nited Kingdom. *The European Journal of Finance.* **14**(8), pp. 687–699

Hiraki, T. 2003. Common Stocks as Inflation Hedges in the United States and Japan. *American Business Review*. **12**, pp.58-64

Hoque, H. and Silvapulle, P. and Moosa, I., 2007. A Threshold Cointegration Approach to the Stock Prices-Inflation Puzzle. *International Journal of Economic Perspectives.* **1**(2), pp.83-101

Horasan, M., 2008. Enflasyonun hisse senedi getirilerine etkisi. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi.* **12**(2), pp.427-435

Jones, C. P. and Wilson, 2006. The Impact of Inflation Measures on the Real Returns and Risk of U.S. Stocks. *The Financial Review.***41**, pp.77–94

Jung, C., Shambora, W. and Choi, K., 2007. The Relationship Between Stock Returns and Inflation in Four Eurapean Markets. *Applied Economic Letters*. **14**, pp.555-557

Kandir, S. Y., 2008. Macroeconomic Variables, Firm Characteristics and Stock Returns: Evidence from Turkey. *International Research Journal of Finance and Economics.* **16**, pp.35-45

Kavussanos, M. G. Marcoulis, S. N. and Arkoulis, A. G., 2002. Macroeconomic Factors and International Industry Returns. *Applied Financial Economics.* **12**, pp.923- 931

Kim, S. and In, F., 2005. The Relationship Between Stock Returns and Inflation: New Evidence From Wavelet Analysis. **12**, pp.435-444

Knif, J. and Kolaria, J. and Pynnönen, S., 2008. Stock Market Reaction to Good and Bad Inflation News. *The Journal of Financial Research* .Vol.**XXXI**(2), pp.141–166

Kolluri, B. and Wahab, M., 2008. Stock Returns and Expected Inflation: Evidence from an Asymmetric Test Specification. *Review of Quantitative Finance & Accounting.* **30**, pp.371-395

Kutan, A. M. and Aksoy, T., 2003. Public Information Arrival and the Fisher Effect in Emerging Markets: Evidence from Stock and Bond Markets in Turkey. *Journal of Financial Services Research.* **23**(3), pp.225-239

Lee, K. Y., 2008. Causal Relationship Between Stock Returns and Inflation. *Applied*

*Economics Letters.***15**, pp.125-129

Lee, U., 2009. The Impact of Inflation Targeting on the Relationship Between Stock Returns and Inflation. *The International Journal of Finance.* **21**(3), pp.6124–6141

Luintel, K.B. and Paudyal, K., 2006. Are Common Stocks a Hedge Against Inflation? *The Journal of Financial Research.* Vol.**XXIX**(1), pp.1-19

Madsen, J.B., 2002. Share Returns and the Fisher Hypothesis Reconsidered, *Applied Financial Economics.* **12**, pp.565-574

Maghyereh, A., 2006. The Long-Run Relationship Between Stock Returns and Inflation in Developing Countries: Further Evidence from a Nonparametric Cointegration Test. *Applied Financial Economics Letters.**2***, pp.265-273

Majid, M. S., 2010. Stock Returns, Economic Activity and Inflationary Trends in Malaysia: Evidence from the Post-1997 Asian Financial Turmoil. *The IUP Journal of Applied Finance.* Vol.**16**, pp. 59-71

Marshall, D., 1992. Inflation and asset returns in a monetary economy. *Journal of Finance.***57**, pp.1315-42.

Ortiz, E. Cabello, A. and Jesus, R., 2006. Long-Run Inflation and Exchange Rates Hedge of Stocks in Brazil and Mexico. *Global Economy Journal.* **6**(3), pp. 1-29

Rahman, A., 2009. Industry-Level Stock Returns Volatility and Aggregate Economic Activity in Australia. *Applied Financial Economics.* **19**, pp.509–525

Ratanapakorn, O. and Sharma, S. C., 2007. Dynamic Analysis Between the US Stock Returns and the MAcroeconomic Variables. *Applied Financial Economics.* **17**, pp.369–377

Ratner, M., 1990. A Reexamination of Inflation and Asset Returns. *American Business Review.* **13**, pp.80-85

Ryan, G., 2006. Irish stock Returns and Inflation: A Long Span Perspective. *Applied Financial Economics.***16**, pp. 699–706

Samarakoon, L. P., 1996. Stock Market Returns and Inflation: Sri Lanka Evidence. *Sri Lankan of Management.* Vol. **1**(4), pp. 293-311

Sellin, P. and Riksbank, S., 2001. Monetary Policy and the Stock Market: Theory and Emprical Evidence. *Journal of Economic Surveys.* **15**(4), pp.491-541

Spyrou, S.I., 2004. Are Stocks a Good Hedge Against Inflation? Evidence from Emerging Markets. *Applied Economics.* **36**, pp.41–48

Spyrou, S. I., 2004. Stock Returns and Inflation: Evidence from an Emerging Market. *Applied Economics Letters.* **8**, pp.447-450

Wong, K. and H, Wu., 2003. Testing Fisher Hypothesis in Long Horizons for G7 and Eight Asian Countires. *Applied Economics Letters.* **10**, pp.917-923

Other Publications

Kim, J.H. and Ryoo, H. H., 2009. Common Stocks as a Hedge Against Inflation: Evidence from Centry-Long US Data. *Finance and Corporate Governance Conference.* 2010, Australia, Australia: School of Economics and Finance, pp. 1-15

Nishat, M. and Mustafa, K., 2008. Do Asset Returns Hedge Against Inflation in Pakistan. *21st Australasian Finance and Banking Conference.*16-18 December Sydney, Pakistan: University of Karachi, pp. 1-16

Rao, N. and Ramachandron, V.S., 2009. Stock Returns and Macro Variables: The Indian Evidence. *Conference on Finace and Economics.* 2004, Bangalore, Mumbai: Indian Institute of Technology, pp.29–38

APPENDICES

APPENDIX 1 – Table 3.1 Descriptive Statistics

This table presents the mean, standard deviation, skewness and kurtosis of monthly returns of Turkish stock indices on the Istanbul Stock Exchange.

	Mean Returns	Standard Deviation	Skewness	Kurtosis
ISE National All Share	0,0269	0,1403	0,0634	3,2788
ISE National 100	0,0271	0,1438	0,0995	2,9905
ISE National 30	0,0284	0,1473	0,1448	2,6149
ISE National Financials	0,0304	0,1573	0,0785	2,3157
ISE National Industrials	0,0245	0,1297	-0,0620	3,9570
ISE National Services	0,0234	0,1358	0,0046	2,3879
ISE Bank	0,0334	0,1625	0,1629	1,7807
ISE Basic Materials	0,0266	0,1561	-0,2024	1,5690
ISE Chemicals	0,0223	0,1384	-0,0262	3,3272
ISE Electricity	0,0035	0,1458	-0,0782	2,8041
ISE Food & Beverage	0,0272	0,1254	0,4878	3,4780
ISE Holding & Investment	0,0252	0,1643	-0,1000	2,6736
ISE Insurance	0,0327	0,1689	-0,5478	3,1707
ISE Investment Trusts	0,0183	0,1706	0,3370	2,0540
ISE Leasing & Factoring	0,0172	0,1715	-0,2066	2,2126
ISE Metal Goods, Machinery	0,0234	0,1546	0,0456	2,8090
ISE Textile & Leather	0,0119	0,1398	-0,2504	3,5088
ISE Tourism	0,0135	0,2096	-0,2336	3,2933
ISE Transportation	0,0173	0,1650	0,2906	2,6982
ISE Wholesale & Retail Trade	0,0267	0,1285	0,0151	2,0102
ISE Wood, Paper & Printing	0,0242	0,1536	-0,2740	2,2008
Δ in CPI	0,0254	0,0211	0,8098	0,1635

APPENDIX 2 – Table 3.2 Correlation between stock index returns and CPI

This table presents the correlation between stock index returns and CPI.

	Correlation Coefficient
ISE National All Share	0,1596
ISE National 100	0,1561
ISE National 30	0,1567
ISE National Financials	0,1662
ISE National Industrials	0,1486
ISE National Services	0,1629
ISE Bank	0,1645
ISE Basic Materials	0,0645
ISE Chemicals	0,1391
ISE Electricity	0,1200
ISE Food & Beverage	0,1607
ISE Holding & Investment	0,1689
ISE Insurance	0,1129
ISE Investment Trusts	0,1697
ISE Leasing & Factoring	0,0288
ISE Metal Goods, Machinery	0,1625
ISE Textile & Leather	0,1204
ISE Tourism	0,0919
ISE Transportation	0,1575
ISE Wholesale & Retail Trade	0,1841
ISE Wood, Paper & Printing	0,1575

APPENDIX 3 – Table 5.1 Unit root tests

The table presents the results of the Augmented Dickey-Fuller (ADF) unit root test. The natural logarithms of the montly stock indexes (P) are used in the analysis. ΔP is the change in the natural log of monthly stock index. In the ADF test, the following model is used:

$$\Delta P_t = \beta_0 P_{t-1} + \sum_{i=1}^{n} \beta_i \Delta P_{t-i} + u_t$$

	Augmented Dickey-Fuller Unit Root Test	
Stock Indexes	**Level**	**Difference**
ISE National All Share	-0.099	-1.026 ***
ISE National 100	-0.099	-1.041 ***
ISE National 30	-0.097	-1.067 ***
ISE National Financials	-0.096	-1.026 ***
ISE National Industrials	-0.108	-1.019 ***
ISE National Services	-0.083	-1.044 ***
ISE Bank	-0.096	-1.028 ***
ISE Basic Materials	-0.093	-0.979 ***
ISE Chemicals	-0.109	-1.104 ***
ISE Electricity	-0.102	-1.080 ***
ISE Food & Beverage	-0.107	-1.089 ***
ISE Holding & Investment	-0.097	-1.025 ***
ISE Insurance	-0.099	-0.998 ***
ISE Investment Trusts	-0.099	-0.958 ***
ISE Leasing & Factoring	-0.128	-1.021 ***
ISE Metal Goods, Machinery	-0.091	-1.024 ***
ISE Textile & Leather	-0.106	-0.938 ***
ISE Tourism	-0.098	-0.932 ***
ISE Transportation	-0.153	-1.071 ***
ISE Wholesale & Retail Trade	-0.076	-1.050 ***
ISE Wood, Paper & Printing	-0.142	-0.997 ***
CPI	-0.006	-0.461 ***

The numbers on the table refer to the estimated β_0 coefficients. *, **and *** refer to significance at 10, 5 and 1 percent levels respectively.

APPENDIX 4 – Table 5.2 Engle and Granger (1987) causality tests

This table shows the results of the cointegration test between the stock index and CPI. P_{it} represent the natural logarithm of stock index i on month t respectively. CPI_t represent the natural logarithm of inflation on month t. First we regress CPI_t on $P_{it:}$

$$P_{it} = a + \mu CPI_t + \varepsilon_{it}$$

where ε_{it} is the error correction term deviating from the equilibrium relationship. If it is stationary I(0) variable, prices are cointegrated. All of the coefficients on CPI_t are found to be significant at 1 percent. Then the following model is estimated:

$$\Delta \hat{\varepsilon}_t = \psi_0 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{k} \psi_i \Delta \hat{\varepsilon}_{t-i} + \omega$$

to determine whether ε_{it} is I(0). The Augmented Dickey-Fuller test is used to examine the significance of Ψ_0. t-statistic (t-stat) shows that Ψ_0 is significantly different from zero at 10 percent level of significance with an exception of national services and basic materials. For all of the stock index returns, the differences in stock index returns and CPI are stationary and they are cointegrated with an exception of national services and basic materials.

Stock Indexes	**μ**	**Ψ_0**	**t- stat**	
ISE National All Share	0.927	-0.057	-1.829	*
ISE National 100	0.927	-0.059	-1.875	*
ISE National 30	0.964	-0.063	-1.938	**
ISE National Financials	1.005	-0.055	-1.801	*
ISE National Industrials	0.929	-0.072	-2.160	**
ISE National Services	0.637	-0.046	-1.569	
ISE Bank	1.052	-0.045	-1.603	*
ISE Basic Materials	0.960	-0.035	-1.405	
ISE Chemicals	0.748	-0.089	-2.360	**
ISE Electricity	-0.125	-0.114	-2.809	*
ISE Food & Beverage	1.066	-0.093	-2.513	***
ISE Holding & Investment	0.924	-0.091	-2.465	**
ISE Insurance	1.142	-0.052	-1.772	*
ISE Investment Trusts	0.765	-0.089	-2.473	***
ISE Leasing & Factoring	0.732	-0.072	-2.253	**
ISE Metal Goods, Machinery	0.951	-0.112	-2.800	***
ISE Textile & Leather	0.523	-0.126	-3.016	***
ISE Tourism	0.456	-0.068	-2.105	**
ISE Transportation	0.641	-0.168	-3.432	***
ISE Wholesale & Retail Trade	0.775	-0.051	-1.742	*
ISE Wood, Paper & Printing	0.963	-0.109	-2.747	***

APPENDIX 5 – Table 5.3 Error correction test – ΔP_{it} dependent variable

This table shows the estimated error correction models. The dependent variable, ΔP_t, is the change in the stock index. P_t and CPI_t represent natural logarithm of stock index i on months t and CPI on month t respectively. The following model is estimated:

$$\Delta P_{it} = \lambda_0 + \beta_0 \varepsilon_{t-1} + \sum_{i=1}^{m} \varpi_i \Delta P_{t-i} + \sum_{i=1}^{n} \xi_i \Delta CPI_{t-i} + u_{1it}$$

	β_0	ϖ_1	ϖ_2	ϖ_3	ϖ_4	ξ_1	ξ_2	ξ_3	ξ_4
ISE National All Share	-0,0668	-0,0099	0,0032	0,1649	0,0004	0,8298	0,3689	-0,2413	
	(-2,1410) **	(-0,0915)	(-0,0427)	(1,8742) *	(0,0051)	(0,8125)	(0,2763)	(-0,2639)	
ISE National 100	-0,0691	-0,0239	0,0052	0,1622	0,0115	0,8873	0,3889	-0,2869	
	(-2,1490) **	(-0,2242)	(-0,0711)	(1,8885) *	(0,1309)	(0,8632)	(0,2815)	(-0,3021)	
ISE National 30	-0,0724	-0,0485	0,0019	0,1671	0,0370	0,9298	0,4390	-0,2819	
	(-2,1214) **	(-0,4672)	(0,0271)	(2,0355) **	(0,4121)	(0,9144)	(0,3092)	(-0,2893)	
ISE National Financials	-0,0614	-0,0090	-0,0023	0,1575	-0,0196	1,3333	0,3205	-0,4507	
	(-1,9666) **	(-0,0933)	(-0,0310)	(1,7720) *	(-0,2330)	(1,2435)	(0,2141)	(-0,4291)	
ISE National Industrials	-0,0870	0,0070	0,0263	0,1673	0,0082	0,2458	0,2738	0,1254	
	(-2,7995) ***	(0,0605)	(0,3175)	(2,1428) **	(0,0898)	(0,2273)	(0,2084)	(0,1645)	
ISE Bank	-0,0490	-0,0175	-0,0269	0,1361	0,0084	1,3338	0,5729	-0,6209	
	(-1,6723) *	(-0,1891)	(-0,3485)	(1,4544)	(0,0990)	(1,1980)	(0,3777)	(-0,6070)	
ISE Chemicals	-0,0935	-0,0690	-0,0336	0,1143	0,0319	-0,0880	0,7103	0,3285	
	(-2,4811) ***	(-0,6832)	(-0,3282)	(1,6141)	(0,3450)	(-0,0746)	(0,4850)	(0,3771)	
ISE Electricity	-0,1677	-0,0152	0,0744	0,1430	0,1026	0,2520	0,7618	-0,1822	
	(-3,3853) ***	(-0,1370)	(0,9143)	(1,7094) *	(0,9985)	(0,2433)	(0,5022)	(-0,1819)	
ISE Food & Beverage	-0,0906	-0,0680	-0,0313	0,0760	0,0584	0,1657	0,7490	-0,1184	
	(-2,3270) **	(-0.4920)	(-0,3495)	(1,0519)	(0,7149)	(0,1165)	(0,4763)	(-0,1789)	
ISE Holding & Investment	-0,1087	-0,0016	0,0868	0,1587	-0,0748	1,3978	-0,2196	-0,0276	
	(-3,0459) ***	(-0,0176)	(1,0250)	(1,9779) **	(-0,8857)	(1,2092)	(-0,1316)	(-0,0232)	
ISE Insurance	-0,0547	0,0264	0,0847	0,0358	-0,0976	0,7304	-0,4535	0,6418	
	(-2,0399) **	(0,2926	(1,1570)	(0,4162)	(-1,1125)	(0,6819)	(-0,3087)	(0,6124)	
ISE Investment Trusts	-0,0939	0,0720	-0,0082			0,5892	-0,3002	0,5785	
	(-2,8201) ***	(0,6505)	(-0,0836)			(0,5383)	(-0,2070)	(0,4782)	
ISE Leasing & Factoring	-0,0775	0,0069	0,0463	0,0486	-0,0210	-1,2894	0,0625	16.062	
	(-2,4684) **	(0,0529)	(0,6622)	(0,4792)	(-0,2158)	(-1,1688)	(0,0432)	(1,6145)	
ISE Metal Goods, Machinery	-0,1440	0,0267	0,0752	0,1708	0,0335	0,4949	0,5319	-0,2230	
	(-4,2290) ***	(0,2348)	(0,9040)	(1,9951) **	(0,3321)	(0,4518)	(0,3741)	(-0,2387)	
ISE Textile & Leather	-0,1715	0,1175	0,0827	0,1017	0,0630	0,4981	0,3087	-0,2290	
	(-2,5475) ***	(0,9569)	(0,9138)	(0,9124)	(0,6296)	(0,4865)	(0,2828)	(-0,2552)	
ISE Tourism	-0,0759	0,0832	0,1507	0,0431	-0,1294	1,0073	-0,4688	0,2370	
	(-2,1777) **	(0,7685)	(1,5995)	(0,5509)	(1,4043)	(0,7035)	(-0,2270)	(0,1497)	
ISE Transportation	-0,2007	0,0341	0,0514	0,1364	-0,0086	-0,1793	1,0562		
	(-3,2216) ***	(0,2280)	(0,5728)	(1,4952)	(-0,0798)	(-0,1464)	(0,8568)		
ISE Wholesale & Retail Trade	-0,0572	-0,0482	-0,0894	0,1102	0,6729	0,6023	-0,0614		
	(-1,7894) *	(-0,4347)	(-0,9061)	(1,4810)	(0,7227)	(0,4724)	(-0,0652)		
ISE Wood, Paper & Printing	-0,1159	0,0383	0,0082	0,1240	-0,0919	0,2262	0,4017	0,2245	
	(-3,0265) ***	(0,3301)	(0,0828)	(0,9670)	(-1,0838)	(0,1746)	(0,2781)	(0,2317)	

APPENDIX 6 – Table 5.4 Error correction test - ΔCPI_t dependent variable

This table shows the estimated error correction model. The dependent variable, ΔCPI_t, is the change in the consumer price indeces. CPI_t and P_t represent the natural logarithm of CPI and stock index i on months t respectively. The following model is estimated:

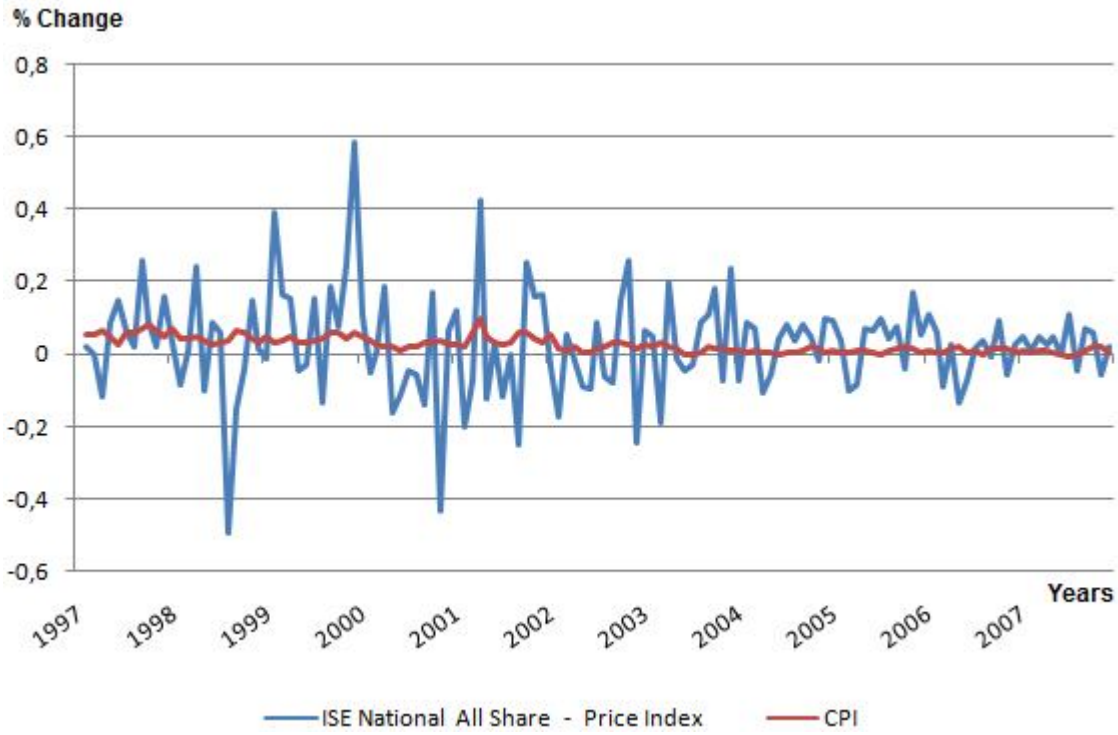
$$\Delta CPI_t = \varphi_0 + \phi_0 \varepsilon_{t-1} + \sum_{i=1}^{m} \gamma_i \, \Delta CPI_{t-i} + \sum_{i=1}^{n} \theta_i \Delta P_{t-i} + v_{1it}$$

*, **and *** refer to significance at 10, 5 and 1 percent levels respectively.

	ϕ	θ_1	θ_2	θ_3	θ_4	γ_1	γ_2	γ_3	γ_4
ISE National All Share	-0,0007	-0,0081	-0,0109			0,7845	0,0454		
	(-0,3370)	(-0,7034)	(-1,7669) *			(9,5134) ***	(0,5268)		
ISE National 100	-0,0006	-0,0080	-0,0105			0,7842	0,0457		
	(-0,3056)	(-0,7128)	(-1,7313) *			(9,5505) ***	(0,5322)		
ISE National 30	-0,0004	-0,0074	-0,0095			0,7848	0,0447		
	(-0,2255)	(-0,6617)	(-1,5422) *			(9,5899) ***	(0,5264)		
ISE National Financials	-0,0004	-0,0088	-0,0087			0,7819	0,0505		
	(-0,2242)	(-0,8517)	(-1,5620) *			(9,7494) ***	(0,6111)		
ISE National Industrials	-0,0014	-0,0046	-0,0105			0,7876	0,0349		
	(-0,5236)	(-0,3941)	(-1,6389) *			(9,1472) ***	(0,3737)		
ISE Bank	-0,0001	-0,0104	-0,0086			0,7771	0,0582		
	(-0,0889)	(-1,0193)	(-1,5567)			(10,0141) ***	(0,7255)		
ISE Chemicals	-0,0010	-0,0008	-0,0063	0,0067	-0,0047	0,8082	0,0070		
	(-0,3877)	(-0,0699)	(-1,0038)	(1,0378)	(-0,4985)	(8,3881) ***	(0,0674)		
ISE Electricity	-0,0041	-0,0047				0,7900	0,0281		
	(-0,9840)	(-0,4361)				(9,2159) ***	(0,2812)		
ISE Food & Beverage	-0,0011	-0,0083	-0,0095	0,0034	-0,0106	0,8077	0,0181		
	(-0,3194)	(-0,5842)	(-1,1627)	(0,5321)	(-1,0101)	(8,6230) ***	(0,1800)		
ISE Holding & Investment	-0,0012	-0,0038	-0,0059	0,0068	-0,0079	0,8139	0,0084		
	(-0,5489)	(-0,4068)	(-1,2659)	(1,0958)	(-0,9229)	(8,6344) ***	(0,0830)		
ISE Insurance	0,0000	-0,0052	-0,0067			-0,7847	0,0373		
	(0,0233)	(-0,6580)	(-1,1510)			(9,6622) ***	(0,4156)		
ISE Investment Trusts	-0,0032	-0,0028				0,7849	0,0223		
	(-1,4939) *	(-0,3318)				(8,7800) ***	(0,2258)		
ISE Leasing & Factoring	-0,0013	-0,0053				0,7911	0,0157		
	(-0,5648)	(-0,7404)				(9,3932) ***	(0,1548)		
ISE Metal Goods, Machinery	-0,0019	-0,0061	-0,0087			0,7808	0,0441		
	(-0,6979)	(-0,7219)	(-1,4863) *			(9,4285) ***	(0,4963)		
ISE Textile & Leather	-0,0036	-0,0056				0,7862	0,0274		
	(-1,0461)	(-0,5051)				(9,1416) ***	(0,2893)		
ISE Tourism	-0,0018	-0,0012				0,7836	0,0253		
	(-1,0300)	(-0,2564)				(9,2440) ***	(0,2616)		
ISE Transportation	-0,0032	-0,0025	-0,0075	0,0063		0,7982	0,0145		
	(-0,8962)	(-0,3682)	(-1,4971) *	(1,2667)		(8,6080) ***	(0,1437)		
ISE Wholesale & Retail Trade	-0,0005	-0,0010	-0,0114	0,0136	-0,0068	0,8247	-0,0040		
	(-0,2026)	(-0,0870)	(-1,5089) *	(2,0410) **	(-0,7537)	(8,7684) ***	(-0,0420)		
ISE Wood, Paper & Printing	-0,0037	-0,0083				0,7945	0,0150		
	(-1,0446)	(-0,7959)				(8,9042) ***	(0,1408)		

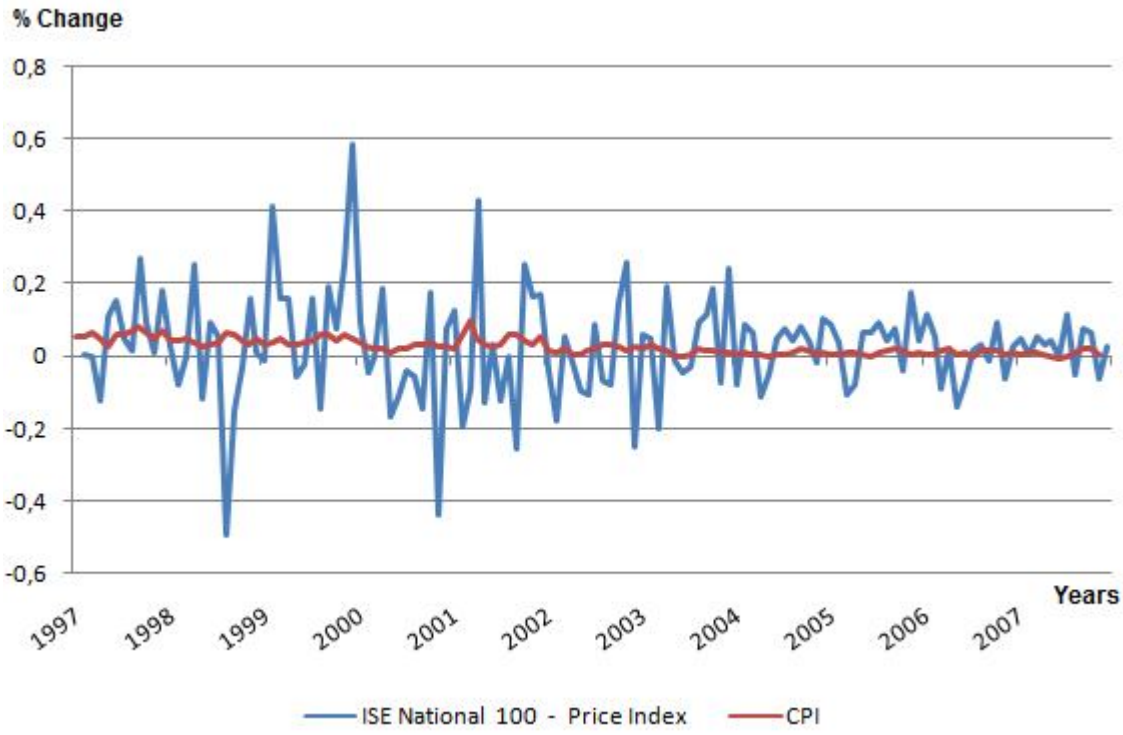
APPENDIX 7 – Figure 3.1 Percentage change in CPI and ISE national all share index return

This figure shows the percentage change in Consumer Price Index (CPI) and Istanbul Stock Exchange (ISE) National All Share Index Return between the years 1997-2007.



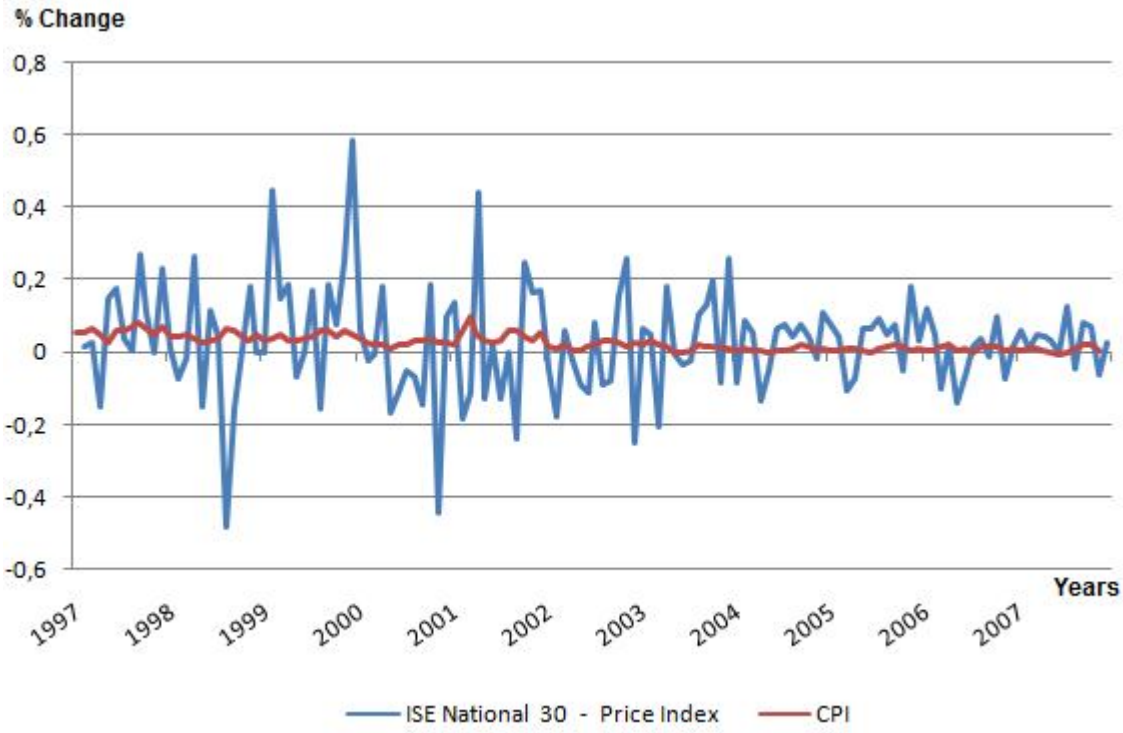
APPENDIX 8 – Figure 3.2 Percentage change in CPI and ISE national 100 index return

This figure shows the percentage change in Consumer Price Index (CPI) and Istanbul Stock Exchange (ISE) National 100 Index Return between the years 1997-2007.



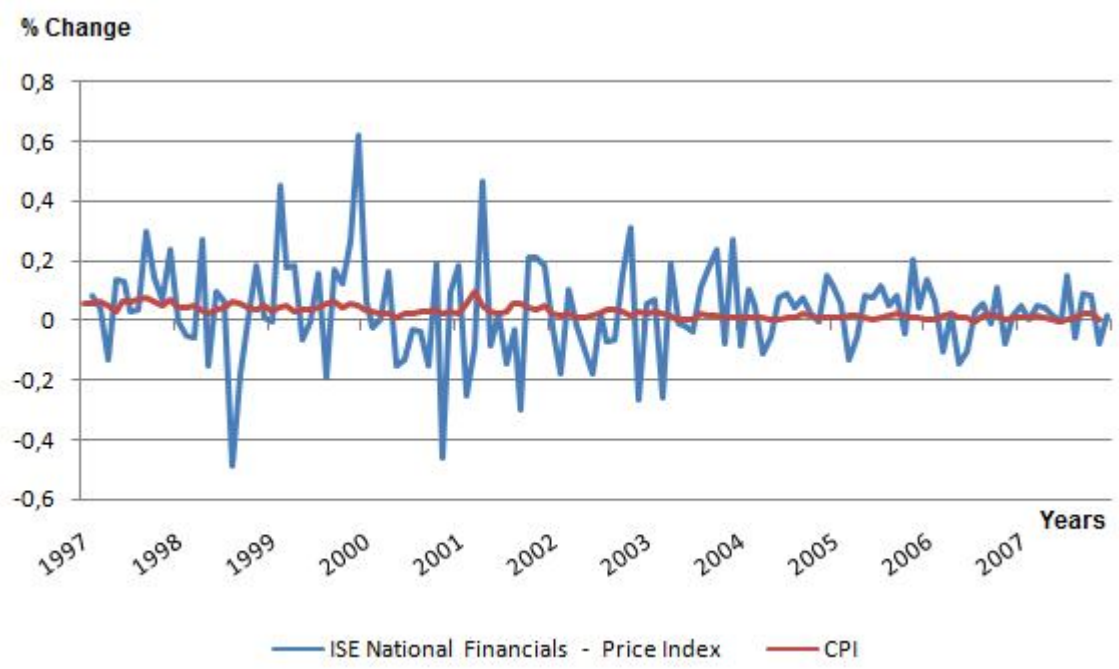
APPENDIX 9 – Figure 3.3 Percentage change in CPI and ISE national 30 index return

This figure shows the percentage change in Consumer Price Index (CPI) and Istanbul Stock Exchange (ISE) National 30 Index Return between the years 1997-2007.



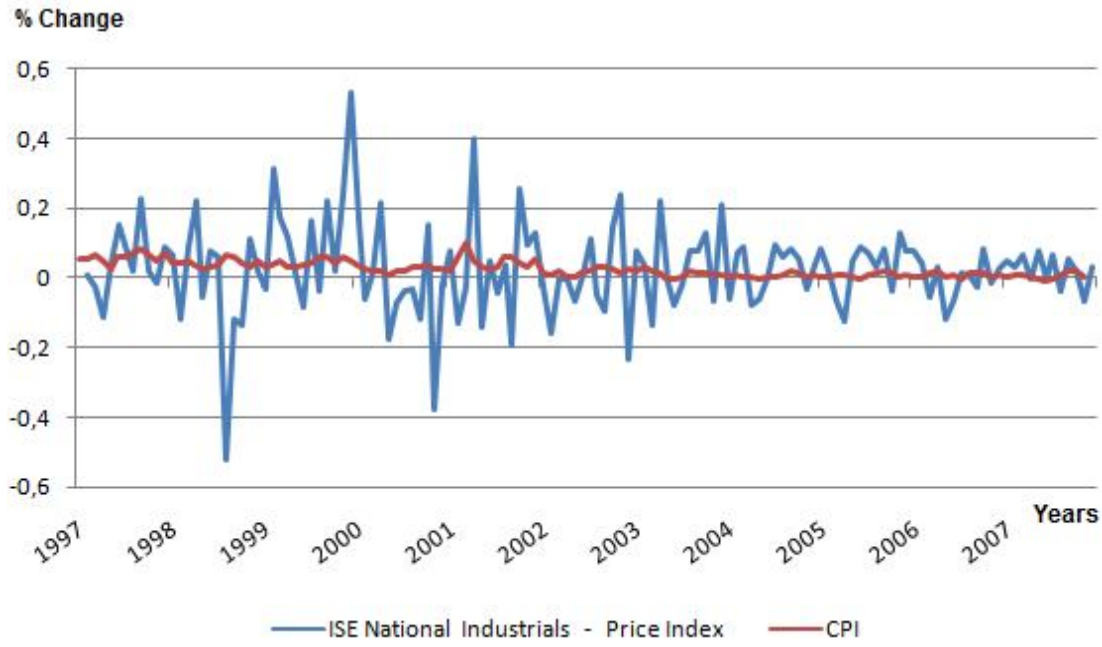
APPENDIX 10 – Figure 3.4 Percentage change in CPI and ISE national financials index return

This figure shows the percentage change in Consumer Price Index (CPI) and Istanbul Stock Exchange (ISE) National Financials Index Return between the years 1997-2007.



APPENDIX 11 – Figure 3.5 Percentage change in CPI and ISE national industrials index return

This figure shows the percentage change in Consumer Price Index (CPI) and Istanbul Stock Exchange (ISE) National Industrials Index Return between the years 1997-2007.



APPENDIX 12 – Figure 3.6 Percentage change in CPI and ISE national services index return

This figure shows the percentage change in Consumer Price Index (CPI) and Istanbul Stock Exchange (ISE) National Services Index Return between the years 1997-2007.