THE EFFECTS OF MACROECONOMIC VARIABLES ON THE BANKING SECTOR INDEX: EVIDENCE FROM TURKISH STOCK MARKET

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ABSTRACT

This study investigates the dynamic interactions between the Banking Return Index and selected macroeconomic variables in Turkey taking in consideration the transition in the Turkish economy. The study was implemented using cointegration test; Granger causality test based on vector error correction model, variance decomposition analysis and impulse response functions. First cointegration test revealed the existence of a long-run relationship among the variables during the period of study. Second Granger causality test indicated that Bank stock returns index Granger-cause the exchange rate, indicating a portfolio balance approach in the Turkish market.

Keywords: *Macroeconomic variables, Banking Index, Causality, Cointegration, Turkey*

JEL classification code: E44.

ÖZET
MAKROEKONOMİK DEĞİŞKENLERİN BANKACILIK SEKTÖRÜ ENDEKSİ ÜZERİNDEKİ ETKİLERİ: TÜRKİYE HİSSE SENEDİ PİYASASINDAN DELİLLER

Bu çalışma Türkiye ekonomisindeki değişimi gözönünde bulundurarak Türkiye'deki Bankacılık Getiri endeksi ile seçilmiş makroekonomik değişkenler arasındaki dinamik ilişkiyi incelemektedir. Çalışmada Eşbütünsellik testi, Vektör Hata Düzeltme Modeli temel alınarak Granger Nedensellik testi, Varyan Ayrıştırma Analizi ve Dürtü Tepki Fonksiyou Analizi uygulanmıştır. Eşbütünsellik testi ilk olarak calişma periyodu süresince değişkenler arasında uzun dönemli bir ilişkinin varlığını ortaya konmaktadır. İkinci olarak Granger Nedensellik testi bankacılık getriri endeksinin döviz kuruna neden olduğunu ve Türkiye piyasa içerisinde portföy yaklaşımının geçerli olduğunu göstermektedir.

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1. Introduction

Financial intermediaries are intimately involved in the development of any economy. This involvement is illustrated by looking behind the changes of the business cycle of any given economy, as various financial intermediaries represent the linkage between the ones who possess surpluses in their money and the ones who lack money in order to satisfy their needs. Hence channeling surpluses or excessive money from saving units of the economy to deficit units of the economy will increase the economy's output and therefore make changes in the business cycle of that economy. Two of the most widely known financial intermediary institutions which play this role are the bank and the stock market. The main function of any bank is to consolidate deposits from savers and use these funds to transform them into loans whereby they are consumed by householders and investors (Siklos, 2001). From this intermediary role of the banking sector the stability of the banking sector and the financial sector as whole to the overall economy is vital. Economic theory as well as empirical evidence indicates that instability in the macro economy of a country affect or may be associated with instability in the banking sector (Yildirim, 2002). For example the Turkish exchange rate based disinflation program launched at December 1999 led to a financial turmoil with a liquidity crisis in Feburary 2001 (Kayıkçı, 2013).

To date, a considerable body of research has sought to investigate the factors affecting the bank's stock returns (Choi, 1992; Chen, 1989). Regards the Turkish Economy many studies have been implemented investigating the relationship between the macroeconomic variables and its stock market[1], these studies used an overall index like ISE 100 Index, Index 30 or ISE composite index. This paper contributes to the literature by analyzing the effect of macroeconomic variables particularly on the Banking sector of Turkey in review of the IMF stabilization program in the period of study. Considering that the banking sector represents 114.1% of the Turkish GDP and plays the most significant role in the financial system approximated by 87%, moreover it was a major sector exposed by the 2001-2002 financial

[1] Rjoub (2012), Ahmet and Abdioglu (2010), Buyuksalvarci (2010), Çağli and Halaş (2010), Zugul and Sahin (2009), Ozbay (2009), Kandir (2008), Erbaykal et al (2008), Kaplan (2008), Erdem et al (2005), Kasman (2003), Paul and Malik (2003), Muradoglu et al (2001).

crises and the restructuring process of the Turkish Economy. This study seeks to examine the existence of Cointegration and Granger causality between Banking sector's return Index (XBNK) and three macroeconomic variables namely, Short-term interest rate (LIN), Money supply (LM2), and Exchange rate (EX). Thereby, identifying the affect of the stabilization program on the banking sector and relevant macro economic variables that bank policy makers should take in consideration.

2. A Review of Theoretical and Empirical Literature

Many theories have been given in the literature discussing the relation between the stock market and the economic activity. Upon these theories are the Present Value Model (PVM), the Efficient Market Hypothesis (EMH) and different asset pricing theories such as the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). The EMH implies the prices of assets or stock should be based on all the market information at any particular time. In other words the present price of a stock must reflect all the present related information to this stock (Fama, 1965). Asset pricing theory such as the Arbitrage Pricing Theory (APT) and the Present Value Model (PVM), illustrates the relationship between the stock market and economic activities (Ross, 1976).

From the time of the first studies examining the relationships between stock market and economic activity done by Fama (1981, 1990) numerous empirical studies have been done, mainly for developed stock markets such as the United States (US) and the United Kingdom (UK) due to their economic stability and technological development compared to other countries; examples of pioneer studies are Fama (1981, 1990), Geske and Roll (1983), and Chen, Roll, and Ross (1986). Various studies assumed various hypotheses and applied various methods respectively. Some studies investigated the predictive power of stock returns for real economic activity, in other words investigated the existence of the efficient market hypothesis (Fama, 1970; Estrella, and Hardouvelis, 1991; Estrella, and Mishkin, 1996). Other studies examined the short-run relationship, long-run relationship or both relationships between the stock market prices or returns and selected macroeconomic variables.

Our study is concerned on the banking sector in which gets influenced by the macroeconomic variables, some previous studies in which focused on this sector are, Mohan et al. (2014), investigated the long-run relations between macroeconomic factors and CNX Bank returns Index. Macroeconomic variables such as the foreign exchange rate, short term interest rate and inflation rate were chosen for the

analysis. The study was conducted on monthly time series data gathered from the related Institutions for the time span of 2004 to 2013. ADF Unit root test, Johansen Cointegration test and Granger causality test were implemented on the data. The findings revealed from the analysis were that the Bank stock returns have a long-run relationship with the selected macroeconomic factors. No Granger causality linkages between CNX Bank index and both the short-term Interest rate and Inflation. In contrast, unidirectional Granger causality existed between CNX Bank's return Index and exchange rate. Moreover exchange rate and Interest rate both affected positively on the CNX Bank's Index stock returns.

Saeed & Akhter (2012), the purpose of the study was to know the impact of the macroeconomic factors on the Pakistani banking index. The macroeconomic environment was comprised of money supply, exchange rate, short term interest rate and industrial production and oil prices. The banking index comprised twenty nine banks listed in the Karachi stock exchange. Econometric Diagnostic tests namely Autocorrelation, Multicollinearity and Heteroscedasticity were performed which indicated that the data had no econometric problems. The Regression results indicated that industrial production, short-term interest rate, exchange rate, and money supply affected the banking index negatively whereas oil prices had a positive impact on the banking index.

Foong et al. (2012) the study examined the impact of macroeconomic variables on Malaysia's bank industry's stock returns. The empirical analysis was carried out by using monthly data for the period from Jan 2006 to Dec 2010 and the study used stock prices which were collected from Bank Negara of Malaysia. The Economic factors selected were the consumer price index, interest rate, money supply, exchange rate and the KLSE index. Ordinary least squares was applied and showed that four economic variables showed statistical significant relationship to the volatility to banks' stock returns. Exchange rate was affecting all the banks' stock returns while money supply had the biggest effect on banks' stock returns.

Shahbaz et al. (2010) sought the interactions among Pakistan's financial sector's performance and macroeconomic factors using both the Fully Modified Ordinary Least Square (FMOLS) method to test for Cointegration in the long-run and the Error Correction method to test for the existence of a short run relation. Ng-Perron unit root test initially was used to define the stationarity of the data before further analysis. Findings reveal that a rise in both government spending's and foreign remittances increased the performance of the financial sector. Moreover trade openness associated with capital inflows opened new

opportunities to improve the development of the Pakistani financial markets. On the contrarily, appreciation in inflation rates and the high savings rate decreased the efficiency in the overall financial sector.

Sohail and Zakir (2010) explored the long run and short run impact of five macroeconomic variables on the General Index of Karachi stock exchange. The analysis used to investigate this long run and short run relationship were Johansen Cointegration technique and the Vector Error Correction model (VECM). This study used monthly data from November 1991 to June 2008. Results of the study revealed that the consumer price index and the real effective exchange rate, and the industrial production index all had a positive impact on the stock prices. In contrast, money supply and the three month treasury bills rate had a negative effect in the long run. VECM demonstrated that it took more than eight months to eliminate the disequilibrium. The variance decompositions showed that consumer price index and money supply had greater forecast error than the industrial production index, the three month treasury bills rate and the real effective exchange rate for the General Index.

Wiboonprapat (2005) analyzed the stock price movement of the financial industry in which fall into three sectors that were tracked by the following indexes: (a) Banking sector index, (b) Finance and Securities sector index, and (c) Insurance sector index, on the Stock Exchange of Thailand (SET) over a 10-year period starting in January 1995 to December 2004. This study employed three major analysis techniques. The three techniques were (a) Durbin-Watson test statistic, (b) Generalized Autoregressive Conditional Heteroscedasticity in Mean methodology (GARCH-M), and (c) the Granger causality test. First, the Durbin-Watson test statistic was used to analyze the autocorrelation within each sector. Second, the GARCH-M model was used to analyze the relationship between the variances of each financial sector series and the SET Index. Third, the Granger causality test was used to analyze Granger causality among sectors in the financial industry.

Paul and Mallik (2003) investigated the relationship between macroeconomic factors and the banking and finance's stock prices using quarterly data during the period Q1/1988 to Q2/1990. The study conducted Cointegration tests and an error correction model to examine the long run relationship. The results revealed that the banking and finance stock prices were cointegrated with the three economic factors. The interest rate had a negative effect and in contrast the GDP had a positive effect on the stock prices moreover inflation did not show any significant effect.

Issahaku and Ustarz (2013), investigated the macroeconomic indicators of Ghana's economy and its effect on the stock market over the period starting from Jan 1995 to Dec 2010. After applying the Vector Error correction model to the selected variables namely: exchange rate, money supply, inflation rate and foreign direct investment, the results revealed the existence of a long run relation between the stock price and foreign direct investment, also the existence of a short run relation with the interest rate. More over inflation and money supply showed both long and short run relationships with the stock price of Ghana.

Rjoub (2012), examined the dynamic relationship between exchange rates, US stock prices as a world market and the Turkish stock prices index, for the period span from August 2001 to August 2008. By applying Vector Autoregression (VAR) framework, the finding revealed that there was a long run relationship. Also Granger causality test indicated that there are bidirectional relationships between exchange rates and stock prices. Also the shocks were temporary on the Turkish stock prices; US stock price and exchange rates as indicated by the impulse responses.

Ahmet and Abdioglu (2010) empirically examined the linkage between the stock price of (ISE-100) and a set of macroeconomic variables namely: Consumer price index, the Foreign exchange rate, Broad money supply, Industrial production index and the Gold prices. The study was applied From March 2001 to June 2010 on a monthly basis. By using long run Granger non-causality techniques, the result showed that there is long run causality from (ISE-100) to all macroeconomic variables selected in one direction.

Çağli and Halaş (2010), investigate the relationship between stock price index (ISE-100) and a set of macroeconomic variables namely: exchange rate, GDP, industrial production index, inflation rate, money supply (M2), interest rate and oil price. By applying Gregory-Hansen test for the period span from January 1998 to December 2008. The result indicates that there is a long run relationship, between (industrial production index, GDP and oil price) and ISE100 for the tested period with a presence of structured break.

Zugul and Sahin (2009), investigated whether there is a relationship between (ISE-100) index and macroeconomic variables as; exchange rate, money supply (M1), deposits interest rate and inflation for the period spans from January 2004 to December 2008. The findings revealed that money supply, exchange rate and interest rate have a negative relationship with stock return index. On the other hand, the findings reveal a positive relationship between inflation rate and (ISE-100) index

for the analyzed period.

Ozbay (2009) investigated the casual relationship between stock price (Index 30) and macroeconomic factors as; interest rate, inflation, and exchange rate, money supply and the real economy covering the period of January 1998 to December 2008 of ISE. The findings revealed that overnight interest rate, consumer price index, current deficit as percentage of GDP and foreign sales do granger-cause stock prices. Moreover, it indicated that stock prices do granger-cause money supply, overnight interest rate, and exchange rate. Also revealed negatively that the purchase price index and positively that the foreign transactions determined the stock price in Turkey. While, industrial production was indicated as neither the result variable nor the cause variable of stock price movements.

Kaplan (2008) investigated the relationship between the stock market performance, real economic activity and the dynamic response of real economic activity to shocks in the stock prices of the Turkish economy from the period of 1987 to 2006 on a quarterly basis. The study concluded that there was a long-run relationship among the real economic activity of Turkey and its stock prices over the studied period.

Kandir (2008) investigated the role of macroeconomic factors on Istanbul stock exchange's returns for the period of July 1997 to June 2005 on a monthly basis by applying multiple regression models. The study tested seven macroeconomic variables namely: the growth rate of all the following (industrial production, consumer price index, M1, crude oil price, exchange rate, interest rate and the world market index returns) all against non-financial firms. The study stated that the interest rate, exchange rate and the world market index returns all had a significant effect on the entire selected portfolio returns, while inflation rate was significant only for three portfolios out of the twelve analyzed. In contrast, industrial production, money supply and oil prices didn't have any significant effect on stock returns.

Erbaykal et al, (2008), investigated the relationship between the stock price (ISE-100) Index and real macroeconomic variables as; consumption expenditure, industrial production, employment level, fixed investment and consumer price index, covering the period from January 1989 to February 2006. The findings revealed that a negative relationship exists between the stock price and inflation. Moreover, the other macroeconomic variables have a positive relationship with the stock price. While, industrial production index, employment level and fixed

investment were statistically significant.

Ewing (2002), examined the relationship between the NASDAQ financial 100 index and several macroeconomic factors from January 1988 to September 2000, via applying generalized impulse response analysis. The study showed that a monetary policy shock reduces the financial sector's returns having a significant initial impact effect which continues to affect returns for around two months. Moreover, unexpected changes in economic growth had a positive influence, but exhibit no persistence. Inflation shock has a negatively and statistically significant initial influence which lasts for up to one month after the shock accurse.

3. Data, Methodology and Empirical Results

3.1 Data

All data are monthly observations for the period January 2002 to December 2013. The National Banks Index LXBNK data is taken from the Borsa Istanbul website and used in natural logarithm form. The macroeconomic variables used include LIN is the Inter-Bank Interest Rate, EX is the real exchange rate and LM2 is the natural logarithm of Money supply which were collected from the International Financial Statistics and World Bank data sets. The choice of these macroeconomic variables came from the essence of previous groundwork like Ahmet and Abdioglu (2010), Buyuksalvarci (2010), Çağli and Halaş (2010), Zugul and Sahin (2009), Ozbay (2009). Nevertheless the change in Turkey's exchange rate regime and using the interest rate as an anchor to stabilize the inflation gave a sincere motive to take these variables understudy. Also the interest rate and the exchange rate are vital influencers on banks operations.

3.2 Unit Root Tests

In this study both Augmented Dickey-Fuller (ADF) and Philip Perron (PP) test are used to determine the stationary characteristics of the data both have a null hypothesis of non-stationary data. Also, Kwiatkowski-Phillips-Schmidt-Shin (KPSS) and Zivot-Andrews (1992) unit root tests are applied for crosscheck and determine the structural breaks. The ADF test is based on equation (1):

$$\Delta Y_t = \mu + \beta Y_{t-1} + \sum_{j=1}^{n} a_t \Delta Y_{t-j} + \varepsilon_t \qquad (1)$$

Where Y_t differenced variables in question, μ is a constant term. $\boldsymbol{\varepsilon_t}$ is a white

noise residual and n is the lagged values of ΔY_t to control for higher-order correlation. ADF test, is done under the assumption that a unit root exists β= 0 and the alternative hypothesis states that the series are stationary. As a crosscheck and confirmation the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test is used for which the null hypothesis is the existence of stationary data.

The finding reveals as shown in Table 1. The time series are non-stationary at the level by using both ADF and Phillips Perron (1988, 335), unit root tests, meaning the tests fail to reject the null hypothesis of the existence of unit root. The lag length was determined for every variable at the length where the residual is white noise. KPSS test confirms that the time series are stationary at the first difference as shown below.

Table 1: ADF, PP Unit Root Tests

Variables	Lag	Form	ADF		PP	
			C	CT	C	CT
ΔLXBNK	2	Level	-1.41668	-1.41668	-1.28765	-1.56450
		1st Difference	-6.03976*	-6.080250*	-12.44280*	-12.4657*
ΔLIN	2	Level	-2.59565	-2.00385	-2.36870	-1.86299
		1st Difference	-7.57295*	-7.96024*	-12.5892*	-12.8323*
ΔEX	4	Level	-0.68609	-1.646873	-0.842173	-1.745156
		1st Difference	-5.80531*	-5.98935*	-8.397185*	-8.41087*
ΔLM2	2	Level	-2.05489	-0.91872	-2.17321	-1.00900
		1st Difference	-6.05538*	-6.32487*	-12.66319*	-12.9300*

C, CT denote constant, constant and trend respectively, * denotes Significance at 1% level based on critical values.

Table 2: KPSS Unit Root Test

Variables	Lag	Form	KPSS	
			C	CT
ΔLXBNK	2	Level	3.967330	0.702669
		1st Difference	0.129103*	0.066728*
ΔLIN	2	Level	6.608237	0.459772
		1st Difference	0.052817*	0.048039*
ΔEX	4	Level	1.455759	0.514121
		1st Difference	0.140996*	0.038590*
ΔLM2	2	Level	4.677419	1.069252
		1st Difference	0.501683*	0.071600*

* C, CT denote constant, constant and trend respectively, * denotes Significance at 1% level based on critical values.

Moreover, Zivot-Andrews (1992) unit root test with structural break was implemented to verify the each possible structure break point in the series; as expressed in equation (2):

$$x_t = a_0 + a_1 DU_t + d(DTB)_t + \gamma DT_t + \rho X_{t-1} + \sum_{i=1}^{p} \delta_i \Delta X_{t-1} + \varepsilon_t \qquad (2)$$

Where, dummy represent a change in the level =1 if (t >TB) and zero otherwise, the slope dummy DT_t the change in the slope of the trend function, dummy =1 if t=TB+1 and zero otherwise, and TB represents the break data. This formula expresses the time series that has both intercept and trend. Zivot-Andrews unit root test revealed the following structural break points in the series; a dummy variable has been added to the model in which corresponds the break point.

Table 3: Zivot-Andrews Unit Root Test

variable	Break point	t-stat.	Prob.	1% critical value	5% critical value	10% critical value
LM2	2005M12	-15.79965	5.91E-28	-5.57	-5.08	-4.82

3.3 Cointegration

To recognize the long-run relationships between the variables, Johansen and Juselius (1991, 1995, 1551), cointegration test was applied. The JJ approach is based on a Vector Autoregressive (VAR) model of order *k* to examine the long run relationships that may exist among representative variables. The VAR model is represented as equation (3):

$$x_t = A_0 + \sum_{j=1}^{k} A_j \, x_{t-j} + \varepsilon_t \qquad (3)$$

Where x_t is an (*n* x *1*) vector of non-stationary I (1) variables, A_0 is an (*n* x *1*) vector of deterministic variables, A_j is a coefficients matrix (*n* x *n*) where k is the maximum number of lags in the VAR model and ε_t is a (*n* x *1*) vector of error terms. The Johansen methodology uses two likelihood ratios (LR) test statistics to determine the unique cointegration vectors (rank). A dummy variable for the break point in (LogM2) was added in the estimated VAR model as an exogenous variable. The chosen lag length was two lags, which confirmed a white noise residual for our estimated VAR model.

Table 4: Johansen Cointegration Test

Hypothesis	R = 0	R = 1	R = 2	R = 3
Trace	0.178269*	0.09453	0.037528	0.005512
Critical value	47.8561	29.7970	15.49471	3.841466
Max, Eigen	0.17826*	0.09453	0.03752	0.00551
Critical value	27.5843	21.1316	14.2646	3.84146

* rejecting the null hypothesis of no cointegration at 5% level.

The cointegration vector representing the long-run relationship is in the following model:

$$\mathbf{LXBNK = -3.90\ LIN - 2.422\ EX - 1.42\ LM2} \qquad (4)$$

Table 4 report the analysis of the two conducted test used to determine the rank of cointegration between the variables namely the Trace statistics test and the Max-eigenvalue statistics both tests at 5% significance level. The findings reveal that there is one cointegration vector at 5% significance level corresponding to the trace test.

Subject to the cointegration model the findings reveal a negative long-run relationship between the short-run interest rate LIN and the banking sector return index. We can interpret it as if we increase LIN by one percent, we'd expect LXBNK to decrease by 3.9 percent. An explanation in the case of Turkey, the short-term interest rate was used as an anchor to fight inflation in the Turkish economy. This might increase the real interest rate and consequently would increase the required return on stocks and tighten the willing of investors to pay for these stocks. Hence it increases the cost of capital thereby decreasing the stock return. These findings are also consistent with the findings of (Buyuksalvarci, 2010: Zugul and Sahin, 2009; Ozbay, 2009) from the Turkish stock market. Moreover the result is consistent with Saeed and Akhter (2012) regards the Pakistani banking index and with Paul and Malik (2003) regards the Australian banking index.

The results also indicated there is negative long-run relationship between LXBNK and EX through the tested period. a justification of this relation regards the Turkish banking sector is that depreciation in the local currency tends to affect the expectations of investors whom hold bank stock's portfolios, by exposing these portfolios to more exchange rate risk investors require a higher rate of return which increases the price of banks stocks consequently its returns. These investors assume that the bank has a negative net FX position in its balance sheet therefore a negative impact of Turkish lira depreciation on banks stocks returns is expected. And this assumption is significant in terms of Turkish banks net FX position. This result is consistent with Atindehou, and Gueyie (2001) regards the Canadian banking returns. The negative long-run relation is consistent with previous empirical literatures such as: (Kasman, 2003; Rjoub, 2012; Zugul and Sahin, 2009) which these studies has been conducted in Turkish stock market; further, Raymond (2009) for Jamaican stock market.

More over the cointegration equation indicates that there is negative long-run relationship between LXBNK and LM2. It is expect that an increase in LM2 by one percent, LXBNK will decrease by 1.42 percent. Economists and policymakers in Turkey started to pay attention to control the economy performance right after 2001 crises (restructuring period 2002-2007), through the changes in the monetary policy

mechanism in that period to fight the inflation "inflation target" where the inflation rate reached 35% for 2002 approximately; that implies an increase in the money supply might increase and generate inflation and participate to inflation uncertainty. Hence, any increase in money supply generate risk premium, led up to equity prices to fall thereby exert a negative influence on Turkish stock market. The findings reveal consistent with Zugul and Sahin (2009), and Ozbay (2009) has been conducted in Turkish stock market; also, Raymond (2009) for Jamaican stock market, and Ibrahim el al. (2003) for Malaysian stock market.

3.4 Causality Test

Granger Causality is a test intended to check for the relationship between time series variables. Specifically, this test it is heavily employed in economic literature to test the direction and magnitude of the relationship between two variables. The Granger test examines whether including lags of one variable have predictive power for another variable. Engle and Granger (1987) advocate the implication of a Granger causality test on the basis of a Vector Error Correction Model (VECM) instead of a Vector Autoregressive Model (VAR) in cases where cointegration exists between the variables. They state that if a set of variables happen to be cointegrated, then the short-term dynamics among the variables in this system happen to be influenced by the deviation of the existing long-term equilibrium. Therefore, we apply a Causality Block Exogenity Wald Test based on the estimated VECM[2] with the results given as in table 5 below.

Table 5. VECM Causality Test / Block Exogenity Wald Test.

Dependent variable	**Independent Variables**			
	D(LBNK)	**D(LIN)**	**D(EX)**	**D(LM2)**
D(LBNK)	-	0.91776 (0.6320)	0.657783 (0.7197)	1.996187 (0.3686)
D(LIN)	2.082348 (0.3530)	-	2.162735 (0.3391)	0.139376 (0.9327)
D(EX)	13.64731 (0.0011)**	0.172264 (0.9175)	-	0.204462 (0.9028)
D(LM2)	0.164335 (0.9211)	1.116103 (0.5723)	2.413263 (0.2992)	-

**denotes significance level at 5%. Optimal lag length was confirmed by a white noise residual at 2 lags. In the Granger Causality test, the error correction terms are restricted.

[2] VECM estimatios are implemented with the same lag lengh structure that is determined in VAR framework which the residuals are white noise.

Our results of conducting Granger causality/Block Exogenity Wald test based on the VECM reveal the rejection of the null hypothesis at 5%. This indicates the existence of a unidirectional Granger causality between Bank Index Returns and the Exchange rate. This confirms that Bank stock returns Granger-cause (lead) the Exchange rate in the Turkish market. This result is consistent with Smith's (1992b, 471) finding that equity prices have an influence (negative) on exchange rate determination in Germany, Japan, and the USA. Hence this implies stock returns help predict exchange rate (EX) in the short-run. In contrast to flow oriented models, 'stock oriented' or 'portfolio balance approaches', (Branson et al, 1977) suggest that movements in stock prices Granger-cause movements in the exchange rate via capital account transactions. Findings of studies supporting this model were from (Ajayi et al., 1998, 241; Granger et al., 2000, 337; Ramasamy and Yeung , 2005, 162). The different findings of the previous empirical results indicates that the interaction between stock markets and currency are influenced by the business cycle (prosperity or recession) and different economic structures (developed or emerging), meaning causality between the variables is sensitive to the time period in which the analysis is undertaken.

3.5 Impulse Response Functions

This paper continue to investigate the short-run dynamics between the variables by implementing the Impulse Response Function (IRF). This test gives an advantage over the Granger causality test not in just defining the direction of the short-run relation but also tracing it through time. Merely IRF traces the impact of a given shock on the dependent variables and shows exactly at what period the variable was affected, moreover showing if this shock from the independent variables is permanent or it dies out over time. Our IRF test results are shown in Figure 1.1 in the appendix. From figure 1 it is clearly confirmed that EX has a positive response to a one-standard-deviation shock from LBNK at the 3rd period and died out at the 5th period, confirming the results we achieved by Granger causality test before. Similarly our results indicate that LBNK response to a shock from its own is significant and negative in the 2nd period. Moreover a response of LIN to a negative shock from EX is shown in the 3rd period in which later dies out after the 5th period. Similarly a response of LM2 in the 2nd period from a one standard deviation to LBNK is revealed. A negative response is shown from LM2 to a shock from EX also in the 2nd period, dying out later in the 4th period.

3.6 Variance Decomposition

The Variance decomposition is implemented to confirm the change in a variable due to its own shock and the effects of shocks to other variables. The results of Variance

Decomposition analysis for the selected macroeconomic variables over a 10-months horizon are presented in Table 6.

Table 6. Variance Decomposition Test Results

Variance Decomposition of D(LBNK):					
Period	S.E.	D(LBNK)	D(LIN)	D(EX)	D(LM2)
1	0.117644	100	0	0	0
5	0.118829	98.44654	0.526860	0.314579	0.712018
10	0.118831	98.44492	0.527349	0.315170	0.712566
Variance Decomposition of D(LIN):					
Period	S.E.	D(LBNK)	D(LIN)	D(EX)	D(LM2)
1	0.057112	2.843157	97.15684	0	0
5	0.058095	3.645066	94.10446	2.012540	0.237937
10	0.058096	3.645026	94.10247	2.012574	0.239926
Variance Decomposition of D(EX):					
Period	S.E.	D(LBNK)	D(LIN)	D(EX)	D(LM2)
1	0.046329	28.95036	0.401055	70.64858	0
5	0.052824	40.07413	1.035825	58.82105	0.068999
10	0.052826	40.07344	1.036293	58.82046	0.069805
Variance Decomposition of D(LM2):					
Period	S.E.	D(LBNK)	D(LIN)	D(EX)	D(LM2)
1	0.023286	2.153176	0.670643	4.381267	92.79491
5	0.024240	4.373060	3.661602	4.428642	87.53670
10	0.024245	4.398039	3.663725	4.426836	87.51140

The findings reveal that LBNK was 100 percent explained by its own shock on the first month, but it continued to reduce to 98.44492 percent on the 10th month. The shock explained by changes in interest rate variable LIN on LBNK is only about 0.527349 percent on the 10th month. Moreover, the results confirm that variables under consideration: Interest rate (94.10247 percent) followed by exchange rate (58.82046 percent) and money supply (87.51140 percent) are said to be fairly exogenous variables, as they are explained by their own shock on the 10th months horizon. Furthermore, the exchange rate accounts for 40.07344 percent of the shock explained by the Banking Index on the long-run, again confirming our previous results of this relation between LBNK and EX in the Turkish market.

4. Conclusion

To conclude, this paper indicated a long-run and short-run relation between the Turkish Banking Index and selected macroeconomic variables namely "short-term interest rate, exchange rate and money supply". Johansen and Juselius Cointegration test indicated at least one cointegrated vector in association by a long-run relation with the Turkish Banking Index.

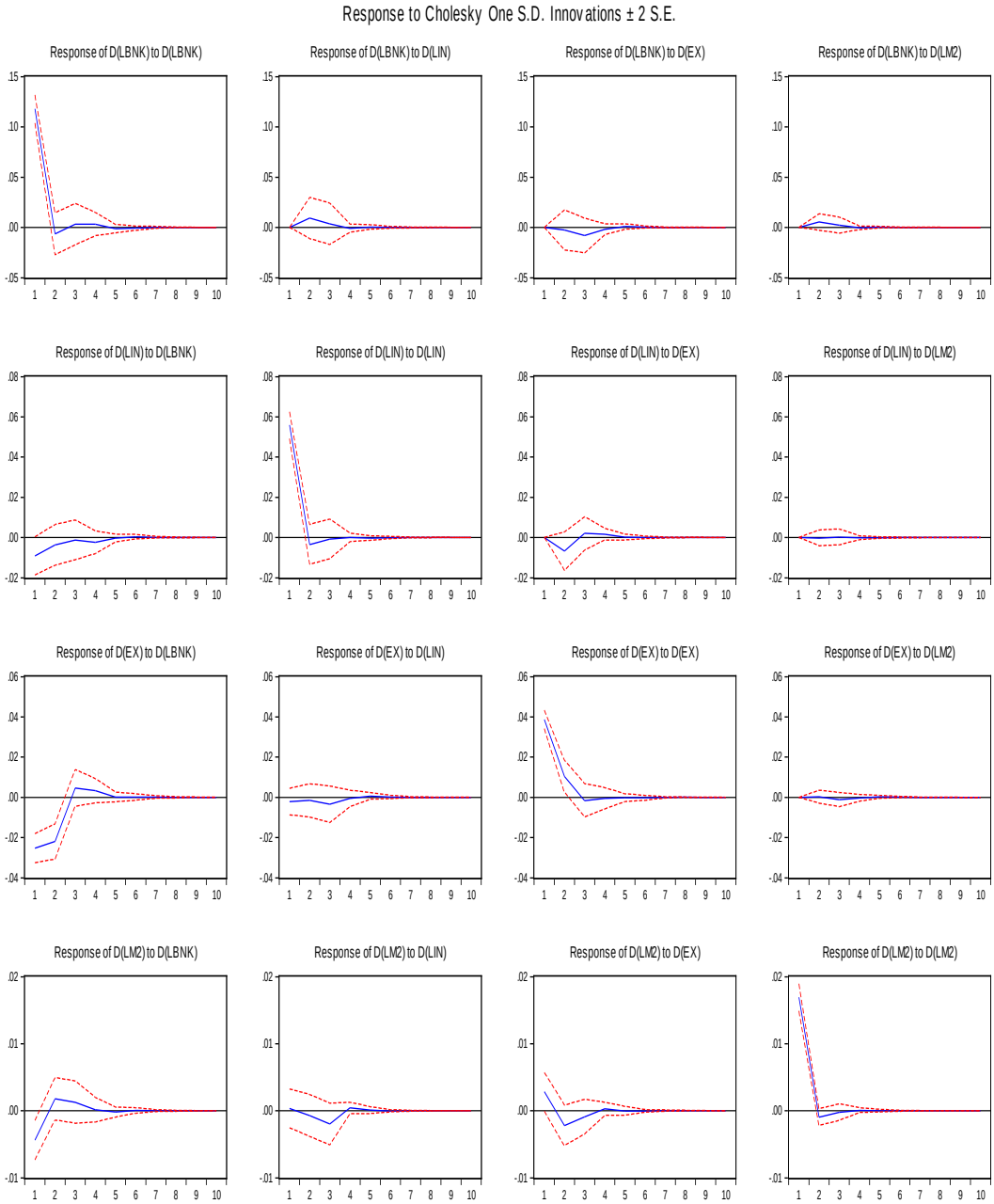
Most importantly, the results show a unidirectional Granger causality between Bank Index Returns and the Exchange rate. This means that the Bank stock returns Granger-cause (lead) the Exchange rate in the Turkish market. This paper is distinguished in its findings by which it does not support the theory of the flow oriented models as most of the previous research in the Turkish stock market. Alternatively, the study's findings support the view of 'stock oriented' or 'portfolio balance approaches', in which suggest that movements in stock prices Granger-cause movements in the exchange rate via capital account transactions. This was also confirmed by the impulse response shocks to LBNK and its effect on EX through time.

The paper confirms that the Turkish banking draws attention across the globe thanks to the structural change that it underwent following the 2001 crisis and its successful performance even during the 2008 global financial crisis. The results of this paper reveal that the selected macroeconomic factors have a long-run relationship with Turkish Banking Index returns. The identification of the macroeconomic variables impact facilitates investors in making effective investment decisions as by estimating expected trends of the Turkish Banking sector's index by observing changes in exchange rates; interest rate, and money supply, thus allocating investors resources more efficiently. From the perspective of

the Banks managers, they should pay more attention to the risks of these variables on the long run especially because there significant effect on the bank's balance sheet structure. Moreover considering that Turkey over the years endure from current account deficits, this is consistent with the results of this study that more attention should be given to exchange rate due to its significant impact on the stock market thus exports volume of Turkey.

APPENDIX

Figure1: Impulse Response Function Results



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