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THE EFFECT OF MACRO ECONOMIC VARIABLES ON FOREIGN PORTFOLIO INVESTMENTS: AN IMPLICATION FOR TURKEY

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ABSTRACT

The aim of this study is to determine the effect of macroeconomic variables on foreign portfolio investments (FPI) in Turkey for the period of 1998-2012. We test stationarity of macroeconomic variables by using ADF and Zivot-Andrews unit-root tests with one structural break. We have used factor analysis for both reduction and classification of twenty three variables. To determine cointegration among variables, Johansen cointegration test was applied and we saw that variables are cointegrated. Finally, we used OLS with structural break model. We found that, deposit interest rate, gross national income and current account balance have had a positive effect on foreign portfolio investment. The effect of deposit interest rate on FPI has turned to negative, after 2003, because of structural break resulted from inflation targeting starting with The New Economic Stability Program in Turkey. We saw that with the start of the new economic stability program by Turkish government, dependent variable, average foreign portfolio investment growth has turned to positive post-2003.

1. INTRODUCTION

There is a common belief that foreign investments have been beneficial for economic growth of the countries. It is believed that increased international investments and capital flows to any country could increase overall efficiency of the country and help regulate the balance of payments and foreign trade deficits. Because of this reason a lot of countries, especially the developing countries, have liberalized, improved and deregulated their infrastructure (logistics, internet, roads, communication etc.), institutional organization, investment, banking and stock exchange environment to encourage international investments for getting more benefits from the global investments and resources.

According to the UNCTAD WIR report 2013, most investment policy measures remain geared towards investment promotion and liberalization[1].

The world has witnessed a rise of capital flows across the world in terms of financial integration before 2008 financial crisis. But foreign portfolio investments in debt and equity securities and cross-border flows capital have dramatically declined after 2008 crises. The share of regulatory or restrictive investment policies increased up to %27 in 2013. Some host countries have sought to prevent foreign investors' activities in their countries[2]. Uctum et al. (2011) found significant and positive relationship between crisis and foreign portfolio investments.

UNCTAD reported in 2014 WIR report overview that investment incentives mostly focus on economic performance objectives, less on sustainable development. In this context most of the scholars studied on economic performance objectives to examine determinants of foreign portfolio investments. James et al. (2014) indicated that lower capital flows have coincided with weak macroeconomic and financial conditions in many economies. This has affected both the demand and supply of capital, with households and businesses (including banks) in many countries which less willing or able to take on risk. Garg et al. (2014) explained the positive relationship between domestic output growth, exchange rate volatility and portfolio investments. Kinda (2013) studied on 58 developing countries, between 1970-2003 and showed a positive and significant relationship between inflation, financial structure and development and foreign portfolio investments.

Kaminsky and Schmukler (2003), Prasad et al. (2003), Campion and Neumann (2004) and Caprio et al. (2001) suggested that countries can increase incentives to attract more international capital flows by de-regulating activities in their domestic financial markets, and by liberalizing their capital account transactions and equity markets. They further explain that these policies can cause an increase in international capital inflows by reducing transaction costs and quantitative limits of ownership and investments, and by increasing returns on assets.

Another body of literature, including Baldwin (1997), Wakeman-Linn and Wagh (2008), and Garcia-Herrero and Wooldridge (2007) suggested that countries which are active members of regional blocs or signatories to regional free trade and investment agreements tend to attract more foreign investment flows. They further argue that this regional initiative can attract more foreign investments by producing benefits in terms of exploiting wide-ranging scale economies, expanded trade links and enhanced financial development within the regions concerned. Some academicians follow the pattern of liberalization of investments and trade. In this context many academic research and studies tried to explain the determinants of foreign portfolio investments. Researchers mostly focused on barriers for foreign portfolio investments such as transaction costs, different taxation, exchange rate, interest rates, capital market regulations, liberalization efforts and other restrictions for international investments, such as omitted assets, informational differences, and barriers due to investors' attitudes.

[1] WIR, 2013, Overview, UNCTAD, United Nations. New York and Geneva, 2014, p. ix.
[2] WIR, 2013, p. ix.

The aim of our study is to determine the effect of macroeconomic variables on foreign portfolio investment (FPI) in Turkey for the time period of 1998-2012. We firstly collected twenty-three macroeconomic and financial variables. Then we have used factor analysis for both reduction and classification of variables to get more reliable results. At the end of the factor analysis we selected deposit interest rate, current account balance and GNI growth rate to use in our model. We test stationarity of macroeconomic variables by using ADF and Zivot-Andrews unit-root tests with one structural break and we saw that all variables are stationary. Johansen cointegration test results showed that variables are cointegrated. We used OLS with structural break model which has been proposed by Onuorah and Akujuobi (2013). We found that deposit interest rate, gross national income and current account balance have had a positive effect on FPI. The effect of deposit interest rate on FPI has turned to negative from positive, after 2003, because of structural break resulted from inflation targeting starting with the new economic stability program in Turkey. We saw that with the impact of this new economic stability program, our dependent variable, average foreign portfolio investment growth has turned to positive after 2003.

2. LITERATURE REVIEW

In this part of the study, the recent literature on the determinants of foreign portfolio investments is analyzed in detail. We summarized the literature related to our study and our findings in the table 1. We gave also the name of the studies which we analyzed, methods used in the studies, country, time period of the analyzes, and coefficient signs in Table 1. In the literature, the relationship between interest rate and FPI was examined in five studies, Kreicher (1980), Eratas and Oztekin (2010), Korap (2010), Verma et al. (2011), and Onuorah and Akujuobi (2013). In all these studies the effect of interest rate on FPI was positive. Five studies including Verma et al. (2011), Kinda (2012), Gumus et al. (2013) Onuorah and Akujuobi (2013), Garg et al. (2014) economic growth effect on FPI was examined, except Onuorah and Akujuobi (2013), positive impact of economic growth on FPI was determined. Gumus et al. (2013), Yıldız (2012) and Korap (2010) investigated budget balance and current account balance effect on FPI. Gumus et al. (2013), and Korap (2010) concluded that these variables have positive effect on FPI however Yıldız (2012) found negative effect of current account balance on FPI.

Table 1: Literature Summary

Study	Method	Country	Period	Variables	Coef. Sign
Kreicher (1980)	OLS	USA, W. Germany, UK, Italy	1974-1976	Interest Rates	+
Brennan et al. (1997)	Dynamic generalization of the multi asset noisy rational expectations model	USA	1982q2-1994q4	Exchange rate	+
Verma et al. (2011)	VAR	India	2000-2009	Domestic output of OECD	+
				Growth rate of OECD	+
				Interest rate differentials	insignificant
				Nominal exchange	-
Kinda (2012)	SUR	58 developing countries	1970–2003	Inflation	+
				Growth Rate	+
				Financial Infrastructure and Financial Development.	+
Kodongo et al. (2012)	VAR	Egypt, Morocco, Nigeria, and South Africa	1997:1 to 2009:12	Foreign Real Exchange Rates	Morocco, - Nigeria, +
Gumus et al. (2013)	Granger Causality	Turkey	2006-2012	- Industrial Production Index - Budget Balance - Current Account Balance - ISE Price Index - Exchange Rate - Consumer Price Index - Interest Rates - Industrial Production Index	
Onuorah and Akujuobi (2013)	OLS with Structural Breaks	Nigeria	1980-2010	Interest rate	+
				Exchange rate	+
				Inflation	+
				Gross Domestic	-
				Money Supply	-
Garg et al. (2014)	GARCH	India	1995-2011	Emerging market	-
				Risk diversification	-
				Country risk	-
				Currency risk	-
				Domestic output	+
				Exchange rate	+
				Exchange rate	+
				Greater risk on return	+

				Regionalism	
Levent Korap (2010)	SVAR	Turkey	1992-2009	Real Interest rate Current Account Deficit	+ +
Erataş and Oztekin	ARDL	Turkey	1995-2009	- real interest rate - exchange rate	+ -

French (2011) determined particularly that unexpected shocks to returns, forecast greater net foreign equity flows into South Africa beyond what could be predicted from net flows in lagged periods. This result is consistent with broad literature insisting that foreign equity investors are 'return chasers'. French indicated that foreign equity investment does not appear to pressure prices upward in South Africa. Anoruo (2012) used multivariate cointegration test between investments and Canadian stock market returns, and the S&P 500 returns. Anoruo found that there is one significant cointegrating vector between investment, the Canadian stock market returns, and the S&P 500 returns. The finding of cointegration between the time series suggests that they share long run equilibrium relationship. Deviation from the equilibrium relationship is corrected in the subsequent period. Furthermore, the existence of cointegration among the series is important because it would affect the model setup. Gabor (2011) searched the relationship between emerging market stock returns and foreign investments flow for three emerging economies, Hungary, Turkey and Poland for different time periods. Gabor found that emerging market stock returns has positive effects on foreign portfolio investments for all three countries.

Ülkü and Weber (2014) stated that "evidently, the considered exogenous variables successfully cover the common factor influence such that no shock correlation remains". They mentioned that the spillover from returns to flows is highly significant. This suggests that the contemporaneous association between foreign flows and local returns is, to a larger extent, driven by returns affecting flows rather than vice versa.

Yıldız (2012) analyzed factors affecting foreign portfolio investments by using multiple regression models for the time period 1999-2009. The author analyzed the model for the time period of 1999-2002, 2003-2006, and 2007-2009 separately, and found that for all these three time period, stock returns for BIST (İstanbul Stock) and Dow Jones, has positive effects. The paper concluded that investors are not against higher risk for higher stock returns.

Kreicher (1980) investigate the empirical relationship between long-term portfolio capital flows and the real rate of interest for three European countries and the United States. Only long term portfolio flows into and out of the private sectors of the United Kingdom, West Germany, Italy, and the United States was examined. Stock-adjustment approach to capital flow modeling developed by Branson (1968) was used in this study. Real (long-term) interest rates, activity variables (industrial production indices), and dummy variables (seasonal and exchange market crises) were explanatory variables. Kreicher (1980) found positive effect of real interest rate on portfolio capital flows.

Verma et al. (2011) tried to find empirical evidence of sensitivity of capital inflows to interest rate differential in the India. The authors used causality and cointegration analyses, suggesting that FDI and FII equity flows, during the 10-year period from 2000-01

to 2009-10, are not sensitive to interest rate differentials. Verma et al. (2011) concluded that exchange rate, domestic output and growth rate of OECD economies are the other major factors having an impact on the net capital inflows to India. Both domestic output and OECD growth rate positively affect- the net capital inflows while nominal exchange rate impacts it negatively.

Korap (2010) analyzed factors affecting portfolio capital flows experienced by the Turkish economy in two categories, 'pull' and 'push' based factors. Korap used the domestic real interest rate, current account balance, domestic stock return and expected domestic inflation variables as 'pull' factors. The author applied structural identification methodology of vector autoregressive models (SVARs) between the time period of 1992-2009. The domestic real interest rate is found in a negative dynamic relationship with portfolio flows. This result is attributed to that the dynamic course of the portfolio flows should not be related to the excess return possibilities of the real interest structure of the Turkish economy. Rather, the dynamic behavior of the capital flows should be related to the risk considerations of the economic agents resulted from the negative fundamentals of the economy associated with high risk premiums.

Eratas and Oztekin (2010) investigate the relationship between short term capital flows (STCF) and real interest rate and exchange rate in Turkey for time period of 1995-2009 quarterly by using ARDL (autoregressive Distributed Lag) method. In long term they found positive relationship between STCF and real interest rate, and negative between STFC and exchange rate. In short term there is an insignificant relation between STCF and real interest rate, and negative and significant relationship between STCF and exchange rate.

Onuorah and Akujuobi (2013) examined the impact of macroeconomic variables on foreign portfolio investments in Nigeria between the time period of 1980-2010. They used Ordinary Least Square (OLS) model and found that money supply, gross domestic product growth, interest, inflation and exchange rates have directly impact on FPI in the country. Interest, inflation and exchange rates have positive effect and the other variables have negative effect on FPI.

3. DATA AND METHODOLOGY

3.1. Data

We used deposit interest rate (annual, %), gross national income (annual, % growth), and current account balance (annual, $) variables for Turkey as explanatory variables. We collected yearly data from World Bank, Central Bank of the Republic of Turkey for time period of 1998-2012. STATA and SPSS were used for econometric and statistical analysis. The explanatory variables examined in this study are given in Table 2, containing definition of variables, code and data sources. We generate dummy variables to investigate the effects of structural breaks for 2003, 2005 and 2008 (pre-0, post- 1).

Table 2: Variables

Variables	Code	Sources
Gross National Income (annual, growth %)	GNIG	World Bank
Deposit Interest Rate (annual, %)	DIR	World Bank
Foreign Portfolio Investment (annual, cumulative, billion US$, growth)	FPIG	CBRT
Current Account Balance (annual, cumulative, $, growth)	CADG	CBRT
Post-2003 Dummy Variable (2003=>T= 1, others=0)	DUM2003	Authors
Post-2005 Dummy Variable (2005=>T= 1, others=0)	DUM2005	Authors
Post-2008 Dummy Variable (2008=>T= 1, others=0)	DUM2008	Authors

3.2. Methodology

Econometric Model

In related literature, OLS model has been used by Kreicher (1980), Yıldız (2012), and Onuorah and Akujuobi (2013). Because our variables are stationary with structural breaks, we prefer using OLS with structural break model proposed by Onuorah and Akujuobi (2013). We estimated OLS with structural break model as below:

$$FPIG_t = \alpha_0 + \beta_0 \mathrm{DIR_t} + \beta_1 \mathrm{GNIG_{t-1}} + \beta_2 \mathrm{CADG_t} + \beta_3 \mathrm{GNIG}_{t-1} * S2008DUM$$

$$+\beta_4 DIR_t * S2003\mathrm{DUM} + \beta_5 \mathrm{S2003DUM} + \beta_6 \mathrm{S2005DUM} + \varepsilon_t \quad (1)$$

In our model, t refers to time series from 1 to 25, $\mathrm{FPIG_t}$ refers to portfolio investments changing (%, annual growth) variable at period t, $\mathrm{DIR_t}$ refers to deposit interest rate (%, annual) variable at period t, $\mathrm{CADG_t}$ refers to current account balance changing (%, annual growth) variable at period t, $\mathrm{GNIG_t}$ refers to GDP growth (%, annual growth) variable at period t, S2008DUM dummy refers to post--2008 mortgage crisis, S2005DUM dummy refers to post -2005, and S2003DUM dummy refers to post-2003. α_0, β_0, β_1, β_2, β_3, β_4, β_5, β_6 refer to sensitivity coefficient of variables, and ε_t the error terms.

3.3. Results

Factor Analysis

We set our model with twenty-three macroeconomic and financial variables in the beginning of the study. To classify and reduce these variables we first investigated multicollinearity. Multicollinearity occurs when there are high correlations among explanatory variables, causing unreliable estimates of regression coefficients.

Chatterjee et al (2000) suggest that multicollinearity is present if the mean of VIF (Variance Inflation Factor) is larger than 1. We test and found that multicollinearity exist in our model because the mean of VIF value was calculated 14.28 (> 1). The VIF value indicates that these variables are redundant. So we decided to use factor analysis to avoid multicollinearity.

Factor analysis method is commonly used for reduction of variables, scale development, avoiding multicollinearity and the assessment of the dimensionality of a set of variables. We applied the rules for factor analysis as follows. First we applied “eigenvalues greater than one rule” to determine the validity of factors. And then we used “convergent validity” proposed by Bogazzi and Yi (1988) to validate the importance of variables in factors. Convergent validity means that the variables within a single factor are highly correlated and it is verified that the factors show sufficient validity. According to this rule if the factor loading is greater than 0.7 we can mentioned about convergent validity. We test and factor loading exceed 0.7 in our model, this is an acceptable and strong evidence of convergent validity. We used Kaiser-Guttman rule to determine the optimal number of factors to extract for our model. The "eigenvalues greater than one" rule has been used due to its simple nature and availability in various computer packages. As a result of the tests in context of “eigenvalues greater than one” rule, we concluded that there are three factors in our model which we can use.

Factor analysis provided us three homogenous factors reduced from twenty-three variables and results were given in table 3. Fifteen variables are selected in factor 1, and taking into account the factor loadings we observe that twelve of these fifteen variables have exceeded 0,7 factor loading. Notice that the first factor accounts for 55% of the total variance. Six variables are selected in factor 2 and accounts for the 21% of the total variance, all of these six variables have exceeded 0,7 factor loading. Two variables are selected in factor 3, accounting for the 8.6% of the total variance and only current account balance variable exceeded 0.7 factor loading. Three factors totally account for 84.5% of total variance. Then we made another selection from these three factors. We selected one variable which has the highest factor loading from every each factor as proxy. Deposit interest rate (annual, %) for factor 1, GNI (annual, % growth) for factor 2, and current account balance (annual, % growth) for factor 3.

Table 3: Factor Analysis Result

Variable with Significant Factor Loading	Factor Loading	Factors	Eigenvalue	Percentage	Cum. Per.
Net National Saving (% of GNI)	0.9235*	Factor 1	12.5117	0.5440	0.5440
GDP per capita (current, $)	-0.8766*				
Gross savings (% of GDP)	0.8409*				
Gross savings (% of GNI)	0.8510*				
Domestic Credit to Private sector (% of GDP)	-0.7740*				
Domestic Credit to Private sector by banks (of % GDP)	-0.7215*				
Deposit Interest Rate (%, annual)	**0.9712***				
M2 (% of GDP)	-0.6438				
Current Account Balance (annual, $)	0.8606*				
Current Account Balance (% of GDP)	0.7992*				
Public Sector Borrowing Requirement (% of GDP)	0.8766*				
Government Bond Interest Rate (annual, %)	0.6869				
Consumer Price Index (annual, % growth)	0.9386*				
US Dolar Exchange Rate (annual, % growth)	0.7611*				
Foreign Direct Investment, net flow ($)	-0.6944				
GNI (annual, % growth)	**0.8106***	Factor 2	4.9367	0.2146	0.7586
Adjusted Net National Income (annual, % growth)	0.7792*				
GDP (annual, % growth)	0.7972*				
GNI per capita (annual, % growth)	0.8025*				
GDP per capita (annual, % growth)	0.8034*				

M2 (annual, % growth)	0.8002*				
Current Account Balance (annual, % growth)	**-0.7641***	Factor 3	1.9908	0.0866	0.8452
BIST-100 Stock Exchange (annual,% growth)	0.5609				

Note: *, represent statistical significant.

Stationarity

Cointegration analysis requires that the variables are first-order integrated. We investigated for the series' order of integration by using ADF unit-root tests. Table 4. shows the results of ADF applied to the variables in level. The main purpose of employing a unit root test is to pose whether or not the variables are stationary series. We employ one of the most applied approaches, the ADF unit root test. Dickey and Fuller (1979) present the ADF unit root test as:

$\Delta_{y_t} = \beta' Dt + \pi_{y_{t-1}} + \sum_{j=1}^{p} \varphi_j \Delta_{y_{t-j}} + \varepsilon_t$ where εt is a normally distributed white noise error term, D_t is a deterministic time trend, y_{t-1} is the laged value of the variable y_t , Δy_{t-j} are the lagged values of the first differences of the variable y_t, and β, π, ϕ are the estimated coefficients.

Tablo 4: ADF Unit-Root Test

	t istatistiği			
Değişkenler	None	Noconstant	Trend	Drift
Foreign Portfolio Investment (annual, % growth)	-6.825*	-4.553*	-6.691*	-6.825*
Deposit Interest Rate (annual, %)	-1.841	-2.139*	-2.442	-1.841*
GNI (annual, % growth)	-3.652*	-2.616*	-3.659*	-3.652*
Current Account Balance (annual, %	-4.932*	-4.939*	-5.786*	-4.932*
5% critic value	-3	-1.95	-3.6	-1.78

Note: *, represent statistical significant with 5% level.

As a result, the null hypothesis of unit-root is rejected for Deposit Interest Rate (annual, %), GNI (annual, % growth), and Current Account Balance (annual, % growth) variables, and all variables are stationary.

There are a lot of politic and economic changes, local and global crises in Turkey between 1998-2012. The composition of Turkish parliament has completely changed after 2002 general elections, and coalition era is over. This provided political and economical stability in Turkey. The Law of Central Bank of Turkey (CBT Law) which was amended in April 2001, having strengthened the independence of CBT by allowing the bank to be fully authorized to choose and apply monetary policy instrument. CBT implemented "Implicit Inflation Targeting" regime between 2002 and 2005. In 2003, New Stability Programme was

released, deposit insurance fund reserve rate was increased up to 100% and weaken dollar caused decreasing in interest rate. At the end of 2005, The CBT changed operational framework for the inflation targeting regime and have started to implement Full-Fledged Inflation Targeting. Because of 2008 mortgage crisis, economic growth of Turkey has fallen sharply to %0,9 in 2008 and % -4.8 in 2009 compared to previous years.

Whether these changes have impact on structure of our series, we searched structural breaks if any, by using Zivot-Andrews Unit-Root Test. Zivot and Andrews (1992) based on basically the Perron unit root tests. They used regressions below to test for a unit root against the alternative of trend stationarity process with a structural break both in slope and intercept:

$$Yt = \mu + \theta DUt(\tau b) + \beta T + \alpha Yt-1 + \sum \varphi i \Delta Yt-i + ut \quad (3)$$

$$Yt = \mu + \gamma DTt(\tau b) + \beta T + \alpha Yt-1 + \sum \varphi i \Delta Yt-i + ut \quad (4)$$

$$Yt = \mu + \theta DUt(\tau b) + \beta T + \gamma DTt(\tau b) + \alpha Yt-1 + \sum \varphi i \Delta Yt-i + ut \quad (5)$$

Where DUt and DTt are dummy variables for a mean shift and a trend shift respectively; DUt(τb) = 1 if t > τb and 0 otherwise, and DTt(τb) = t- τb if t > τb and 0 otherwise. In other words, DUt is a sustained dummy variable that captures a shift in the intercept, and DTt represents a shift in the trend occurring at time τ b. The breakpoint τ b can be found by using the Quandt-Andrews breakpoint test. The optimal lag length p is also determined by using the general to specific approach so as to minimize the AIC or SIC. The Zivot and Andrews (1992) unit root test suggests that we reject the null hypothesis of a unit root if computed tα^ is less than the left-tail critical t value. Eddrief-Cherfi and Kourbalı (2012)

Results of test are given at Table 5. The null hypothesis of unit-root is rejected for deposit interest rate (annual, %), GNI (annual, % growth), and current account balance (annual, % growth) variables. The series are stationary with one structural break. Deposit interest rate is stationary with structural break at both constant and trend in 2002. GNI (annual, % growth) is stationary with structural break at constant in 2008, and also at trend in 2005. Current account balance (annual, % growth) variable is stationary with structural break both constant and trend in 2005.

Table 5: Zivot-Andrews Unit-Root Test (with one structural break)

	t stat					
Değişkenler	Constant	Structural Break Point	Trend	Structural Break Point	Constant and Trend	Structural Break Point
Portfolio Investment (annual, % growth)	-9.898*	2003	-7.638*	2004	-7.112	2005
Deposit Interest Rate (annual, (%)	-5.152*	2003	-4.454*	2005	-5.529*	2002

Gross National Income (annual, % growth)	-5.046*	2008	-4.352*	2005	-4.862	2008
Current Account Balance (annual, % growth)	-13.466*	2006	-6.442*	2010	-16.144*	2006
5% critic value	-4.8		-4.42		-5.08	

Note: *, represent statistical significant with 5% level.

Co-integration Test

Co-integration implies that one or more linear combinations of the time-series variables are stationary even though they are individually non-stationary (Dickey et al., 1991). Before applying a co-integration test, we first should determine the optimal lag length by using selection-order criteria such as LR and AIC. For the case of Turkey the appropriate lag length is two. After determining the optimal lag length, the Johansen ML cointegration test presented by Johansen (1988, 1991) is applied to finalize whether or not variables are co-integrated.

What we need to know is the value of the rank, if the rank (r) is zero, there will be no co-integration. If the rank (r) is one there will be one co-integrating relation, if it is two there will be two co-integration and so on. When there is co-integration between two time series, these series will have a long-run relation and roughly follow the same patterns.

The Johansen ML co-integration test is based on the maximum likelihood estimation and two statistics: the maximum eigenvalue (Kmax) and the trace-statistics (λtrace), where the λtrace tests the null hypothesis that r is equal to zero (no co-integration) against a general alternative hypothesis of r>0. The Kmax tests the null hypothesis that the number of co-integrating vectors is r versus the alternative of r+1 co-integrating vectors. Doğan (2014) Johansen trace test were applied in a stepwise procedure for indicating the long-run relationships between series. Results of the Johansen trace test for cointegration are reported in Table 6. Series have a long-run relationship at the 5% significance level for full sample, meaning that there are three ranks and therefore cointegration relations between series.

Table 6: Johansen Test for Cointegration

Lags(2)	Null /Alternative	Trace Statistics	5% critical value	Max-Eigen Statistics	5% critical value
Full Sample	r=0 / r≥1	410.53	47.21	322.36	27.07
	r≤1 / r≥2	88.17	29.68	52.30	20.97
	r≤2 / r≥3	35.86	15.41	32.49	14.07
	r≤3 / r≥4	3.36*	3.76	3.36	3.76

Heterogeneity and Autocorrelation Tests

We used heterogeneity tests proposed by Breusch Pagan/Cook-Weisberg LM and White's (1980). The null hypothesis of Breusch-Pagan / Cook-Weisberg test indicates that the all error variances are equal against the alternative hypothesis that the error variances are a

multiplicative function of one or more variables. The results of tests shown in Table 7. The null hypothesis indicated that homoskedasticity cannot be rejected.

Table 7: Heterogeneity Tests

	Breusch Pagan/ Cook-Weisberg LM	White's Test
Chi-Square	0.5800 (0.4448)	13.0000 (0.3690)

Note: (), represent p value. Ho: homoskedasticity

Autocorrelation test developed by Wooldridge (2002) is used to investigate serial correlation. F statistics is 7.162 and p probability is 0.010. As a result of this, the null hypothesis "no serial correlation" can be rejected, meaning that error term has a serial correlation. We calculated "newey west error terms" to correct autocorrelation problem.

Table 8: OLS with Structural Break Model Estimation

Dependent Variable: Portfolio Investment (annual, % growth)			
Explanatory Variables	Coefficient	t stat.	Robust std. error
Deposit Interest Rate (annual, %)	12.308* (0.002)	5.78	7.431
Gross National Income (annual, % growth), t-1	23.133* (0.001)	6.49	16.408
Current Account Balance (annual, % growth)	0.485* (0.000)	9.32	0.171
Gross National Income (annual, % growth), t-1 *2008 Dummy Variable	41.683* (0.000)	5.87	32.102
Deposit Interest Rate (annual, %)*2003 Dummy Variable	-19.163* (0.003)	-3.75	10.119
2003 Dummy Variable	1050.147* (0.001)	6.02	870.560
2005 Dummy Variable	-173.690* (0.032)	-2.57	137.036
Constant	-1039* (0.000)	-8.43	663.975

Note: *, represent statistical significant with 5% level.

The effect of deposit interest rate (annual, %) on portfolio investment variable (annual, % growth) is positive and statistically significant. Before 2003, %1 increasing in deposit

interest rate (annual, %) caused %13 growth in portfolio investment (annual, % growth) variable. However after 2003, %1 increasing in deposit interest rate (annual, %) has caused %7 decreased in portfolio investment (annual, % growth) variable. So, although increasing in deposit interest rate (annual, %) has positive effect on portfolio investment (%) variable before 2003, its effect has shifted from positive to negative on the same variable after 2003. In case, all variables are constant during time period, the average portfolio investments growth was negative before 2003 and but it has been positive after 2003.

Higher risk appetite has increased inflow of money to emerging countries which have relatively higher risk and return in investments. %1 increasing in one period lagged GNI (annual, % growth) provides %23 growth in portfolio investment (annual, % growth). Positive impact of the economic growth on portfolio investments has increased its strength after the 2008 crisis. %1 increase in the current account balance (annual, % growth) variable provides increase of 0.48 units in foreign portfolio investments (annual, % growth). Yıldız (2012) revealed that the current account balance negatively affected portfolio investments during the 2001-2005 periods. In this study we concluded unlike Yıldız (2012) that the growth in current account balance has increased foreign portfolio investments. Risk appetite for Turkey is positive that means that foreign investors invest their funds in Turkey to get more return in investment thanks to the higher risk.

Onuroah and Akujuobi (2013) found that real interest rate has positive effect on foreign portfolio investments however GDP has negative effect. These results are unlike our results. Garg et al. (2014) found that domestic output growth for India has positive effect on FPI and this result is compatible with our result for GNI growth. The result of Korap (2010) on interest rate and current account balance has negative effect on FPI and supports our findings.

5. CONCLUSION

The aim of this study is to determine the effect of macroeconomic and financial factors on foreign portfolio investment for Turkey for the period of 1998-2012. For this purpose, twenty-three variables were evaluated and classified using by factor analysis method. This selection gave us three most important factors and variables for our model including deposit interest rate (annual, %), GNI (annual, % growth), and current account balance (annual, % growth). We investigated stationarity using by ADF unit-root and Zivot-Andrews unit-root with one structural break tests. Finally, we used OLS with structural break dummy variable model. As a result, we found that deposit interest rate (annual, %), gross national income (annual, growth %), and current account balance (annual, % growth) have a positive effect on foreign portfolio investment (annual, % growth) in Turkey. CBT implemented “implicit inflation targeting” regime between 2002 and 2005. This new regime for inflation targeting has changed the impact of deposit interest rate on foreign portfolio investment from positive to negative after 2003. Average foreign portfolio investment up to 2003 was negative in Turkey. But from 2003 foreign portfolio investment flows into Turkey began to increase because of economic and political developments and fiscal regime changing. We concluded that deposit interest rate, GNI growth and current account balance are the main determinants of foreign portfolio

investments in Turkey. Turkish government can determine and affect the amount and the direction of foreign portfolio investments by using monetary and fiscal policies.

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