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Impact of the Real Effective Exchange Rate (Reer) on Turkish Agricultural Trade

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***Abstract*—In this work, the autoregressive vectors are used to know dynamics of the Agricultural export and import, and the real effective exchange rate (REER). In order to analyze the interactions, the impulse- response function is used in decomposition of variance, causality of Granger as well as the methodology of Johansen to know the relations co integration. The REER causes agricultural export and import in the sense of Granger. The influence displays the innovations of the REER on the agricultural export and import is not very great and the duration of the effects is short. It displays that REER has an immediate positive effect, after the tenth year it displays smooth results on the agricultural export. Evidence of a vector exists co integration, In short run, REER has smaller effects on export and import, compared to the long-run effects.

***Keywords*—Agricultural import, agricultural export, autoregressive causality of granger, impulse-response function, long run, short run.

I. Introduction

EXCHANGE rate is an important economic variable influencing the export, import, and prices of Turkish agricultural products world wide. While stronger Turkish Lira makes Turkish Exports more expensive in other countries, it also reduces the cost of imported products, resulting in lower prices for Turkey. A weaker Turkish Lira has the opposite effects, leading to increased exports and higher producer prices, but lower imports and higher prices for consumers. Both currency depreciation and a currency appreciation are, in most cases, short term in nature. Their effects occur during the first several months after the exchange rate change.

During the past five years, there has been considerable debate about stronger Turkish Lira, Turkey's exchange rate and its currency regime. Exchange rate of the Turkish Lira against US dollars has appreciated so much (19 percent) since September 2003. Turkish export has also increased, in spite of appreciating exchange rate of the Turkish Lira against the US dollars. Properly, this process is opposite to economic theory.

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One of the affecting factors which also decrease the exchange rate on foreign trade is lost about reflection. Adjustments of exchange rate frequently done takes progress in favor of exporter for relative price and against importer. This, increase exporter's revenue and importer's cost. At the sane time, this stimulates export, dissuading an import.

Exchange rate is important economic variable because it is used to convert foreign prices into domestic currency and vice versa. These prices determine which goods are traded and where they are shipped or sourced. Being able to convert one currency into another at the prevailing exchange rate is crucial to international business and decision making. The difference in relative prices determines the flow of agricultural products and the patterns of trade.

In Turkey, at several times, exchange rate policy, which is valued low, is applied for ameliorating equilibrium of foreign trade. This enables the decreasing of the export price and increasing of the import price. On the other hand, one of the important variables affected import and export is gross product. Increasing the domestic gross product grows import demand. Hence, the relationship between import, export, exchange rate, relative price and gross product is important for foreign trade.

Whether the relationship between these variables is available or not can be understood by causality analysis correlations between them. Thus, the relationship that shows no effect between the variables can be determined. The fluctuation of Turkey's exchange rate, import, export, the prices and the gross products are *not* simply a reflection of scapegoat, policy failures, and a lack of strategic planning outside Turkey. Turkey's exchange rate itself is seriously flawed given its current foreign trade circumstances and its longer-term policy objectives. Turkey has been following to IMFs (International Monetary Fund) rules on monitory policy. These policies' effects are important for foreign trade and exchange rate.

The objective of the study is to determine empirically the dynamic effects of the real effective exchange rate fluctuations on Turkish agricultural export and import markets to examine the relevance of exchange rate in agricultural trade flows. Specifically the study intends to:

- Evaluate the nature and extent of the impact of price, gross product and REER on agricultural trade flows

- Estimate the relationships between price, gross product and REER and analyze their effects on exports and imports.
- Investigate the dynamic characteristics of the adjustments of agricultural exports and imports to price, gross product and REER fluctuations.
- Estimate relationship of causality between fluctuations of REER, the relative price index, gross product on export and import.

II. Literature Review

At the several countries, there are generally many literatures about effect of exchange rate, the relative price, gross product on national export and import. These studies are generally concerned to the general national economy. These studies show that there is a relationship between exchange rate and foreign trade. For example, Cushman [1], Caballaro and Corbo [2], Lastrapes and Koray [3] indicated a significant effect of exchange rate on foreign trade.

There is also a vast body of empirical literature on exchange rate effects on agricultural trade and it is reasonable to focus on the most relevant ones. Most of these researches concentrated on the manufactured goods trade and also produced inconclusive results Hooper and Kohlhagen [4], Gotur, [5], Lastrapes and Koray [3]. Maskus [6] however, provided a link between his study and previous work by comparing the effects of exchange rate across major sectors of an economy, e.g., manufactured goods, agriculture, chemicals and others.

There are few studies relating to only agricultural sector about the effect of exchange rate on agricultural trade. For example, Oyejide [7], Huges and Penson [8] studies have shown a marked increase in volume of agricultural exports over the years. However, the volatility, frequency and instability of the exchange rate movements since the beginning of the floating exchange rate raise a concern about the impact of such movements on agricultural trade flows. Vellianitis-Fidas [9] tested the hypothesis that exchange rate changes have a significant effect on the demand for U.S. agricultural exports. Johnson, Grennes, and Thursby [10] compared the impact of exchange rate versus the impact of foreign commercial policy in the pricing of U.S. wheat. Chambers and Just [11] noted that while some research found that exchange rates play a role in agricultural exports, still others found that the exchange rate has relatively small impact on the agriculture sector of the economy. Paarlberg, et al. [12] detail the economic theory behind the impact of exchange rates on prices, production, and consumption. The authors report the research of other studies that have measured the effects of exchange rate movements on agriculture. Schwartz [13] compared the effects of changes in exchange rate (and other macroeconomic variables) in a simple competitive versus a noncompetitive market for wheat. Bradshaw and Orden [14] tested the Granger Causality of exchange rates on agricultural prices and exports. Robertson and Orden [15] examined quarterly data for money, agricultural prices, and manufacturing prices for 1963-1987 in New Zealand. Babula, Ruppel, and Bessler [16] found no cointegration between exchange rates, price, sales, and shipments in regard to United States corn exports. Dorfman and Lastrapes [17] disaggregated U.S. agricultural data into crop and livestock data and used interest rate, output, prices received by farmers, total livestock and products and total crops, real energy price, real exchange rate, and money supply for the months from February 1952 to November 1993. Orden [18] revisits the question of exchange rate impacts on agriculture. He shows that agricultural trade is affected in exchange rate. Kidane [19] define the relationship between REER, price and supply response of coffee is described in detail. He underline to see if devaluation affects REER agricultural price and supply of coffee—a perennial crop that is the major source of foreign exchange of Ethiopia. Lamb [20] estimates supply functions for total agricultural output, food crops, and export crops in fourteen African countries in the period of 1975-1999. Sheldon [21] show that the effect of medium to long-run exchange rate uncertainty on agricultural trade is examined and compared to the impact in other sectors.

In Turkey, the studies of exchange rate generally concerned general economic sector. For example, Sivri and Usta [22] examine the structural export and import of Turkish economy, using VAR model. Akbostancı [23] determine the structural of Turkish trade. Doganlar et all [24] estimate the Turkish export demand function. Aydın et all [25] determine Turkish export and import demand with the cointegration approach.

III. Exchange Rates and Agricultural Trade

The relationship between the real effective exchange rate of the Turkish Lira and Turkish agricultural exports and import didn't appear to be quite strong (Fig. 1). Between 1990 and 1995, the REER index appreciated 94 percent while Turkish agricultural exports declined 12 percent. Then, REER index declined 20 percent between 1995 and 1997 as Turkish agricultural exports didn't change.

When the Turkish Lira reached its lowest level in 2004, Turkish agricultural exports decline 4 per cent .Between 1990 and 1995, decreasing value of Turkish Lira, Turkish agricultural import declined 8 percent, later, in 2004, increasing value of Turkish Lira, Turkish agricultural import rose 34 percent.

IV. Turkish Exchange Rate Policy

The best exchange rate policy that Turkish economy made for foreign trade is the balanced exchange rate policy. This policy will not cause negative effects on import and export, decreasing or increasing of Turkish Lira [26].

In 1946, Turkish Lira was devaluated 53 percent against US $. In 1947, the free exchange rate was put in to practice. It has been devaluated at the different time from 1948 to 1980. Devaluations occurred at the different time were regulated in January 24, 1980 decrements and revised 6 times until May 1981. Hence, the difference between real exchange rate and nominal exchange rate was strived to appease. From 1981 to 1988, exchange rate has been determined daily. In April 1994, the free exchange rate system was applied, Turkish economy survived economic crisis. At this period, policy of devaluation as far as inflation was followed. The floating exchange rate system was applied and The Turkish Central Bank interfered the exchange market In February 2001.

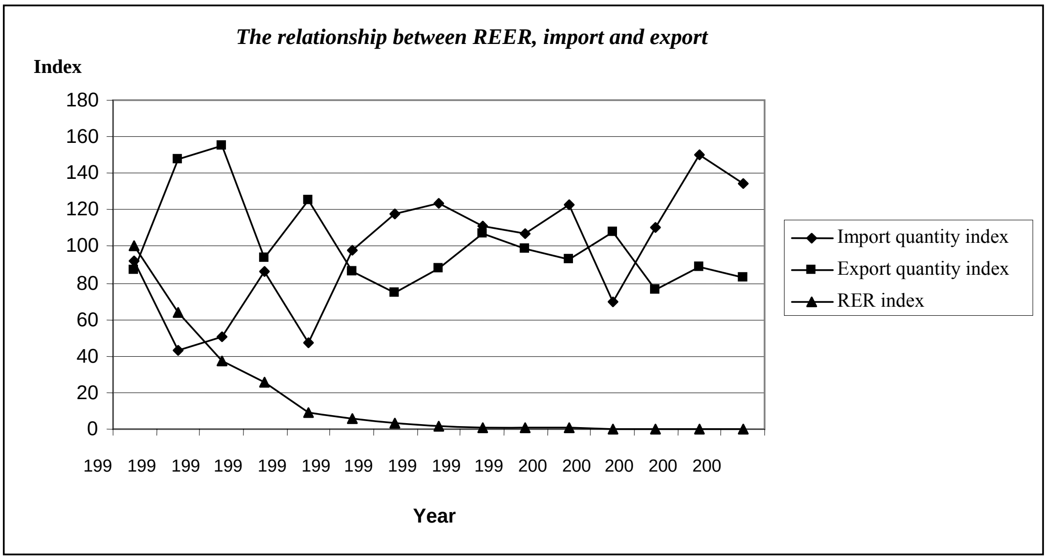

Fig. 1 The relationship between REER, import and export

V. Material and Methods

Annual data from 1970 to 2004 were used for this study. Data on import and export indexes were obtained from the Food Agriculture Organization (FAO) [27]. The world export price indexes were calculated weightily, considering the countries that Turkey mostly exports to (15 countries), using FAO data. Turkey's annual Gross Product index and World's Gross products index (15 Countries) were obtained in United

National Statistics Division [28] and World's Gross products index was calculated weightily from 15 country's GP data.

The real effective exchange rate (REER) data and Consumer Price index were obtained from the International Financial Statistics of the IMF [29]. The series generated were adjusted according to the basic year (1990=100). Then, some series were transformed to the real series, using CPI. The series' name used in this study was shortened. M (import quantity index), X (export quantity index), PM (import price index, multiplying import price by import quantity index), PD (the world import price index, multiplying each countries import price by each courtiers import quantity index), PX(export price index, multiplying export price by export quantity index) PXPXW (the world export price index, multiplying each countries export price by each countries export quantity index), INDE (real effective exchange rate), INY (the national gross product index, dividing the national gross product to CPI), INDYW (the world gross product index, dividing gross products of each countries (CPI)).

In this study, it is based on a linear regression, for determining short run and long run elastic ties. It has been shown that the analytical framework and testing procedure have been used to measure the effects of REER on the Turkish agricultural export and import .

$$\log M_t = \alpha + \alpha_1 \log\left(\frac{PM}{PD} \right)_t + \alpha_2 \log INDE_t + \alpha_3 \log INY_t + \varepsilon_t \qquad (1)$$

$$\log X_t = \beta + \beta_1 \log\left(\frac{PX}{PXPXW} \right)_t + \beta_2 \log INDE_t + \beta_3 \log INDYW_t + \varepsilon_t \qquad (2)$$

where M, is the import quantity index, PM/ PD is the import relative price index, INDE is the real effective exchange rate, INY is the national gross product index, X is the export quantity index, PX/PXPXW is the world export relative price index, INDYW is the world gross product index.

In this study, first, all series were transformed to stationary. While transforming to stationary, first, Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF) were tested, looking at the correlograms output.

$$\mathrm{var}(\rho_k) = \left[1 + 2\sum_{j=1}^{k-1} \rho_j^2 \right] / T \quad k>1 \qquad (3)$$

Where Pk can be accepted to have a zero meaning, a normal distribution and standard deviation that is equal to $1/\sqrt{T}$. This view displays the autocorrelations and partial autocorrelations of the equation residuals up to the specified number of lags. Further details on these statistics and the Ljung-Box Q-statistics that are also computed are provided in Series, Q-Statistics. Sometimes, all values of Autocorrelation Function can not be zero. All values of Autocorrelation whether be zero or not can be understood with test of Q – statistics [30].

$$Q = T\sum_{k=1}^{K}\rho_k^2 \quad (4)$$

This will display the autocorrelation and partial autocorrelation functions of the residuals, together with the Ljung-Box Q-statistics for high-order serial correlation. If there is no serial correlation in the residuals, the autocorrelations and partial autocorrelations at all lags should be nearly zero, and all Q-statistics should be insignificant with large p-values.

Then, all series were determined characteristic of unit root. In this sense, Dickey-Fuller (ADF) tests were got by Dickey-Fuller [31] and Phillips-Perron (PP) test was got by Perron [32] were used.

These tests are available as views of a series.

$$dX_t = \alpha_0 + \alpha_1 X_{t-1} + \alpha_2 trend + \sum_{k=1}^{m} dX_{t-k} + \varepsilon_t \text{ (ADF)} \quad (5)$$

$$dX_t = \alpha_0 + \alpha_1 X_{t-1} + \alpha_2 trend + \varepsilon_t \text{ (PP)} \quad (6)$$

Where αs parameters and E are assumed to be white noise. X is a stationary series if $-1< \alpha_1<1$. If $\alpha_1=1$, X is a no stationary series (a random walk with drift); if the process is started at some point, the variation of increases steadily with time and goes to infinity. If the absolute value of α_1 is greater than one, the series are explosive. Therefore, the hypothesis of stationary series can be evaluated by testing whether the absolute value of α_1 is strictly less than one. Both the DF and the PP tests take the unit root as the null hypothesis H_0: $\alpha_1=1$. Since explosive series do not make much economic sense, this null hypothesis is tested against the one-sided alternative H_1: $\alpha_1<1$.

Dickey and Fuller [31] showed that the distribution under the null hypothesis is nonstandard, and simulated the critical values for selected sample sizes. More recently, MacKinnon [33] has implemented a much larger set of simulations than those tabulated by Dickey and Fuller. In addition, MacKinnon estimates the responsible surface using the simulation results, permitting the calculation of Dickey-Fuller critical values for any sample size and for any number of right-hand variables.

The above models were estimated on three forms. This is no constant, no trend and with constant, with trend models [34].

If an ADF model includes a constant in the test regression, the t-statistic has a nonstandard distribution if the underlying process contains a unit root with a zero constant.

If an ADF model includes a constant and linear trend in the test regression, the t-statistic has a nonstandard distribution if the underlying process contains a unit root with a zero linear trend.

The asymptotic distribution changes when these assumptions are not satisfied. For example, if you include a constant in the test regression and if the underlying process contains a unit root with a nonzero constant, then the t-statistic has an asymptotic standard normal distribution under the null hypothesis of a unit root.

There still remains the problem of whether to include a constant, a constant and a linear trend, or not in the test regression. One approach would be to run the test with both a constant and a linear trend since the other two cases are just special cases of this more general specification. However, including irrelevant regressors in the regression reduces the power of the test, possibly concluding that there is a unit root when, in fact, there is none. The general principle is to choose a specification that is a plausible description of the data under both the null and alternative hypotheses [35].If the series contain a trend (whether deterministic or stochastic), you should append both a constant and trend in the test regression. If the series does not exhibit any trend and have a nonzero meaning, you should only include a constant in the regression, while if the series seems to be fluctuating around a zero mean, you should include neither a constant nor a trend in the test regression.

While the ADF test corrects for higher order serial correlation by adding lagged differenced terms on the right-hand side, the PP test makes a correction to the t-statistic of the coefficient from the regression to account for the serial correlation in . The correction is nonparametric since we use an estimate of the spectrum of at frequency zero that is robust to heteroskedasticity and autocorrelation of unknown form.

The asymptotic distribution of the PP t-statistic is the same as the ADF t-statistic and the reports got again by MacKinnon critical values. As using the ADF test, it has to specify whether to include a constant, a constant and linear trend, or not to the test regression. For the PP test, it also has to specify the truncation lag for the Newey-West correction, that is, the number of periods of serial correlation to include.

The null hypothesis of a unit root is rejected against the one-sided alternative if the t-statistic is less than (lies to the left of) the critical value. In this example, the test fails to reject the null hypothesis of a unit root in the series at any of the reported significance levels.

Granger Causality method was used for determining the direction of causality between export and REER. The Granger [36] approaches to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. y is said to be Granger-caused by x. if x helps in the prediction of y, or equivalently if the coefficients on the lagged x s are statistically significant. Note that two-way causation is frequently the case; x Granger causes y and y Granger causes x.

It is important to note that the statement "x Granger causes y" does not imply that y is the effect or the result of x . Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

$$X_t = \alpha_0 + \sum_{i=1}^{m}\beta_i X_{t-i} + \sum_{j=1}^{q}\lambda_j INDE_{t-j} + \varepsilon_t \quad (7)$$

$$H_0 = \sum_{j=1}^{q}\lambda_j INDE_{t-j} = 0$$

$$H_1 = \sum_{j=1}^{q}\lambda_j INDE_{t-j} \neq 0$$

TABLE I
THE RESULTS OF ADF AND PP TESTS

Variables	ADF			PP		
	N	C	C+T	N	C	C+T
M	-6.12+ r=0 (0.50)	-6.09+ r=0 (0.55)	-6.02+ r=1 (0.46)	-6.60+ (0.51)	-6.59+ (0.51)	-8.62+ (0.61)
PM	-2.08* r=1 (-0.39)	-4.16+ r=0 (-0.50)	-4.38+ r=0 (-0.49)	-2.82+ (-0.35)	-4.11+ (-0.50)	-4.35+ (-0.49)
INY	-3.66+ r=0 (-4.57)	-3.15+ r=1 (-4.84)	-6.39+ r=0 (-4.96)	-3.75+ (-4.57)	-6.43+ (-5.01)	-6.41+ (-4.96)
INDE	-1.84- r=0 (-1.62)	-3.57* r=0 (-1.80)	-3.71* r=0 (-1.78)	-1.60- (-1.62)	-3.60* (-1.81)	-3.82* (-1.78)
X	-7.19+ r=0 (-1.32)	-5.81+ r=1 (-1.29)	-6.08+ r=1 (-1.29)	-7.61+ (-1.32)	-7.72+ (-1.29)	-12.46+ (-1.26)
PXPW	-7.08+ r=0 (-2.01)	-6.97+ r=0 (-1.96)	-6.18+ r=1 (-1.99)	-7.68+ (-2.01)	-7.52+ (-1.95)	-12.29+ (-1.93)
INDYW	-1.65- r=1 (-6.99)	-3.93+ r=1 (-7.30)	-4.12* r=0 (-7.29)	-1.37- (-7.03)	-3.75+ (-7.30)	-3.94* (-7.28)

In level of + 1%, * 5 %, - 10 % are stationary
Optimal lag according to AIC show r
Values in parenthesis is AIC
İn the pp test of optimal lag is the same ADF
N: no constant C: intercept (no trend and with constant), C+T: Trend and intercept (with trend models)

In Granger Causality test, the independent variable determined its own optimal lag, helping AIC and Schwarz. Then, it determined the dependent variable's optimal lag. At length, it is decided between the two series whether relationship of Granger Causality has existed or not, helping F test.

The vector autoregression (VAR) is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. The VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system.

Impulse and response functions were estimated with VAR model below.

$$X_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i X_{t-i} + \sum_{j=1}^{m} \beta_j INDE_{t-j} + \varepsilon_t \qquad (8)$$

$$INDE_t = \eta_0 + \sum_{i=1}^{q} \delta_i INDE_{t-i} + \sum_{j=1}^{m} \lambda_j X_{t-j} + \omega_t \qquad (9)$$

A shock to the i-th variable not only directly affects the j-th variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VAR. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables.

If the innovations error terms are contemporaneously uncorrelated, interpretation of the impulse response is straightforward. The i-th innovation error terms are simply a shock to the j-th endogenous variable.

VI. Results And Discussion

All series were made standard tests for the significance of autocorrelation at an individual lag, helping correlograms (like the Box-Pierce *Q-test*) were rejected the null hypothesis of absence of serial correlation. The commonly used approximations will be maintained. Therefore, to make a 95% confidence test of the null hypothesis of no autocorrelation or partial autocorrelation at lag *k*, the value of the sample coefficient with the critical values *±1.96/T½* are needed to be compared. If the value falls outside the bands, the null hypothesis is rejected at the 95% level. Then, the same test was done at several the lags. At all series, the best choice was the 1st difference (level 1). Inspecting to correlograms and the above test (Q test) it was understood that all series were stationary at the first difference.

Series or Statistical variables Statistical ADF and PP of unit root tests were similarly derivated. Series of no stationary included α intercepted Includes tendency order of the level. If α (0) critical Values of MacKinnon to reject the hypothesis by unitary root. Significant to 1%, 5% and Significant 10% Own elaboration to analyze the order of stationary of the series of variable of the three types of assumption, were used the tests of Dickey-Fuller and Phillips Person. In first instance the tests in levels were made including α intercepted and considering a tendency term since the series display periods. The null hypothesis for these tests was that the series were non-stationary or that it displayed a unitary root. The test resulted in levels proving different were that the null hypothesis was not rejected, was to say the series were not stationary since the value of the statistical ADF and PP in absolute terms is minor which the critical value of MacKinnon to 5% of significance. Then it was come to use first differences, using the same model was to say including α intercepted and a term of tendency with zero. In this case, all the series were stationary with the first difference of confidence of 90% or 95 %, because the calculated value was superior to the critical values of MacKinnon to 1%, 5% and 10%. I found that their first difference didn't include a unit root. The results of ADF and PP tests can be seen in Table I at the first difference.

Fig. 2 presents actual, fitted and residual values of Perron model, where the upper part of graph shows fitted and actual values; residuals are at the bottom of the graph. Fig. 2. Answer of all series at the first difference, using intercept.

Granger allows us to know the direction of causality of the series. The null hypothesis is that no causality exists. The decision rule is to reject the null hypothesis if prob. is smaller or equal to 0.05%. With observing the results of Table II, The İNDE cause M, but, M doesn't cause İNDE. INY also cause to M, but, M does cause INY. This is consistent because the domestic gross products affects generally to the imports in the world-wide market by its great weight within the international trade. On the other hand PXPXW causes X, but, X doesn't cause PXPXW. In the other combinations of INDE does not exist causality evidence on X. Table II shows that Test of Causality of Granger Null Hypothesis: Obs. F-Statistic Probability

Analyses of Model VAR the considered coefficients of a VAR are difficult to interpret because too many coefficients take part and it is not reasonable to suppose that a certain delay of a variable moves whereas the other delays remain constant, as it is required to interpret the coefficients of a regression, for such reasons it is preferable to make use of the representation of average moving bodies of the considered VAR, to observe the function of impulse-response and decomposition of the variance of the system certain

We can examine implications about the VAR for making evaluation of policies. The impulse function answer describes to the answer of an endogenous variable to each one of the innovations or shocks of the other variables of the model, showing therefore the effect on the present and future values of the endogenous variable before a shock through the standard deviation of the other variables and she herself. With the analysis of the graphs of these relations, it is possible to identify if the effects are of transitory nature and if it exist behind in the interrelations between the variables of the model in addition of which it is allowed to appreciate the pattern of behavior of the series before the random disturbances generated by the vector.

Fig. 3 Response of M, smooth on İNDE. Fig. 3 shows to the response of the M "a other smooth" (INDE) when applying innovation on M and INDE smooth A current effect exists during the last years on M when it is applied to a shock of a standard deviation to the innovations of the INDE is positive until the fifth years soon to descend and to return smooth during the eighth years. İNDE, it displays an immediate positive effect and later in the second year it displays negative effect reaching his Maxima action during the fifth year and soon to have a smooth result in the fifth year. The effect that has the innovation of X declares to first years, reaches a maximum one during the second years, continuous

TABLE II
PAIR WISE GRANGER CAUSALITY TESTS (LAGS: 1, DIFFERENCE 1)

Null Hypothesis:	Obs.	F-Statistic	Probability	Decision
INDE does not Granger Cause M	33	3.04691	0.09113	Acceptable
M does not Granger Cause INDE		0.17532	0.67841	Reject able
INY does not Granger Cause M	33	7.76490	0.00915	Acceptable
M does not Granger Cause INY		0.06669	0.79798	Reject able
PM does not Granger Cause M	33	0.49827	0.48571	Reject able
M does not Granger Cause PM		6.82931	0.01388	Acceptable
INY does not Granger Cause INDE	33	2.29658	0.14013	Reject able
INDE does not Granger Cause INY		0.26363	0.61140	Reject able
PM does not Granger Cause INDE	33	1.11814	0.29876	Reject able
INDE does not Granger Cause PM		10.4304	0.00300	Acceptable
PM does not Granger Cause INY	33	0.54120	0.46765	Reject able
INY does not Granger Cause PM		4.82642	0.03589	Acceptable
PXPXW does not Granger Cause X	33	0.91112	0.03744	Acceptable
X does not Granger Cause PXPXW		2.44652	0.12827	Reject able
INDE does not Granger Cause X	33	0.75242	0.39260	Reject able
X does not Granger Cause INDE		6.15322	0.01895	Acceptable
INDYW does not Granger Cause X	33	2.98691	0.09458	Acceptable
X does not Granger Cause INDYW		0.44610	0.50947	Reject able
INDE does not Granger Cause PXPXW	33	1.40136	0.24579	Reject able
PXPXW does not Granger Cause INDE		5.38961	0.02723	Acceptable
INDYW does not Granger Cause PXPXW	33	0.82026	0.37257	Reject able
PXPXW does not Granger Cause INDYW		0.31590	0.57840	Reject able
INDYW does not Granger Cause INDE	33	0.43745	0.51358	Reject able
INDE does not Granger Cause INDYW		0.52048	0.47641	Reject able

with a reduction until the fourth years but always it is not positive. In general terms, it is possible to observe that a shock in the X, smooth X does not cause very important changes X. On the other hand, Response of X on INDE, when X is applied to a shock of a standard deviation, displays an immediate negative effect, after the tenth year it displays smooth results.

The economists have developed certain tools to examine or to analyze if the economic variables display common tendencies, as it is predicted in the economic theory. One of those tools is the call test of cointegration. In Literature basically two approaches of cointegration exist; one developed by Engle-Granger [37] that is applicable to uniecuacionales models of two or more variable and based on the method of two stages on considered remainders; alternatively S. Johansen [38] develops a method based on models VAR and applied to system of equations, a test of Maxima is used probability and require great samples, the existence of multiple vectors of cointegration between variables is proven using the test of Plan and the maximum Eigen-value. As one is system of equations it will use the procedure of Johansen that is a popular method to prove the existence of cointegration in the variables $\alpha_i(1)$ and $\&_i(1)$, is to say variable that they are integrated of first and second order. As previous step is necessary to analyze the series if they display or unitary no roots, later it is come to specify an autoregressive vector with the series that are integrated from order one. Within this process also one selects to the variables of the model, the transformations of the respective variables if there will be them and later an important aspect is to determine and to select the optimal lag of the VAR to assure that the remainders of the model are white noise; that is to say, that does not exist problems of autocorrelation, heteroskedasticity and normality. On the other hand it is also necessary to include within the specification of the model variable deterministic Once made α diagnose of the model is come to apply to the procedure of Maxima probability to the autoregressive vector with the purpose of determining the rank of cointegration of the system using the test of plan and of the maximum Eigen-value. The theoretical exposition of the proposal of Johansen considers an order model VAR

Test of Cointegration of Johansen In this part is made the test of cointegration for vectors VAR with the purpose to know there is some relation between long term and three series. The series in first difference were included. As the previous one was in the integration tests, the series were stationary in first difference. The model was used by defect uses EViews 4,0, It considers that the series have tendency and the equations of single cointegration include independent term. The number of lag to use was determined with the statistical LR, in this case included one and two lag. In the Table III the results are reported, in the first part of the Table III the statistical plan and in the second statistical one of maximum Eigen value is reported. The first column indicates the number of relations of cointegration under the null hypothesis; the second column is the ordering of Eigen values of the matrix. The third column is the statistical test and the two last columns contain the critical values to 5 and 1% of significance. The statistical one draws up reported in the first column under the null hypothesis of r cointegration relations, against the alternative of k relations, where k is α number of endogenous variables, for r = 0.1..., k-1. The alternative of k cointegration relations corresponds for the case where no of the series a unitary root has and a stationary VAR can be specified in terms of first difference of all the seven series. The statistical one draws up for the null hypothesis of r cointegration relations.

In the second block of the existing reports, one of the maximum statistical Eigen-value where the null hypothesis is r, relations of cointegration against the alternative of r+1 relations of cointegration exists. According to the result the first test, as the value of the probability reason is greater than the critical value at the level of 0.05% of significance assumed that there is a single vector of cointegration and that relations of long term exist. In Table III of annexed the 2 one appears the estimations of the relations of cointegration of α and the adjustment parameter. As known, the cointegration vector is not identified at least we impose some arbitrary normalization. The first block reports estimations of α and & based on the normalization by b*S11*b=I .

The cointegration equation is the following one:

M = -1.48 INDE   Others: X= 0.081 INDE

These equation indicates that for X a positive relation between the REER with the agricultural export, whereas between agricultural import and REER exists an inverse relation.

Results linear model to know between the import and import relative price, domestic gross product, REER, as well as the existence of structural changes; a linear model sets out using the series, estimating by OLS. The interaction between the relative price, domestic gross product and REER with the variable was included in to the first deference and lag 1. The first model considers like dependent variables the series of the relative price (PM), Domestic gross product (INY) and the real effective exchange Rate (REER), independent variable the import quantity index (M). On the other hand, the regression for export, independent variable X (export quantity index), dependent variables PXPXW (the world relative prices), INDYW (the world gross product) and REER. The results of the regressions are the following each two (Table IV). The coefficient of the variables for import equation indicates that there was a change in the levels of M (import). The PM Coefficient is observed that chancing a unit in PM

TABLE III
TEST OF CO - INTEGRATION OF JOHANSEN INCLUDED OBSERVATIONS

Included observations: 31 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: M INDE
Exogenous series: INY PM
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigen-value	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.700732	39.69807	15.41	20.04
At most 1	0.071484	2.299188	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Trace test indicates 1 co-integrating equation(s) at both 5% and 1% levels

Hypothesized No. of CE(s)	Eigen-value	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.700732	37.39888	14.07	18.63
At most 1	0.071484	2.299188	3.76	6.65

Included observations: 31 after adjusting endpoints
Trend assumption: Linear deterministic trend
Series: X INDE
Exogenous series: INDYW PXPXW
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test

Hypothesized No. of CE(s)	Eigen-value	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.506686	23.29012	15.41	20.04
At most 1	0.067352	2.091838	3.76	6.65

Hypothesized No. of CE(s)	Eigen-value	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.506686	21.19828	14.07	18.63
At most 1	0.067352	2.091838	3.76	6.65

*(**) denotes rejection of the hypothesis at the 5%(1%) level
Max-Eigen-value test indicates 1 co-integrating equation(s) at both

change to M - 1.54 unities. This is short run price elasticity. This one (INDE) indicates to us that there is affect on M 1.21. On the other hand, the coefficients of the export equation indicate that there were changes on the export of PXPXW, INDE and INDYW. The changes are negative on PXPXW and INDE is significant, whereas the PXPXW is not significant. A second considers, long run elasticity, like a generalization of the first model to examine if the possibility including the change in d1 had changed the structure of the effects of the lag of M in magnifying glass, estimating by GLS. The results of long run elasticity are in Table V.

VII. Conclusion

The dynamics that show the series of M (import), İNDE (REER) and X export analyzed with linear methodology VAR and indicate to us that a similar behavior exists, that is to say

The REER in general respond almost in the same way before diverse shocks, which reveals to us that the foreign market and REER are related. Sample of this behavior is the result that is obtained from the analysis of the cointegration relations where it indicates to us that they include a vector cointegration between the series. If the relation of long term between series is analyzed, cointegration evidence exists. If the direction of causality in the sense of Granger found that character between the series of export with REER exists, this also indicates that it is observed the export cause to the REER, but not vice versa. On the other hand also evidence of which exists the REER cause import, but not vice versa. This implication is also consistent with the equation of cointegration found when using the test of Johansen where it indicates that a positive correlation between export and REER, whereas between import and REER exists an inverse relation. With the use of the function impulse-response REER was that before innovations or shocks on the agricultural export and import, Response of X on INDE, when X is applied to a shock of a standard deviation, it displays an immediate negative effect, ten years later it displays smooth results. Import when it is applied to a shock of a standard deviation to the innovations of the REER is positive until the fifth years soon to descend and to return smooth during the eight years. REER, it displays an immediate positive effect and later in the second years it displays negative effect reaching his Maxima action during the fifth years and soon to have a smooth result in the fifth years.

In short run, one can expect that REER has smaller effects on export and import, compared to the long-run. This can be seen by comparing the Table IV and V. REER experience a greater increase or greater decrease in export and import in the short-run compared to the long run. Because of the REER expansion in agricultural export, there is -0.053 smaller increases in agricultural export and approximately 5% smaller decrease in agricultural export in the short-run. However, due to the low-value REER, this is not always the case. For example, the decrease in the REER is larger in the short-run than in the long-run. This is because of a insignificant on REER and its effect is inverse in the short-run REERs results in the import. This results in an increase in the Agricultural import in short run. Agricultural import increases by 1.2 unities. Because height-value Turkish Lira accounts for the majority of agricultural import in the base case, approximately 1.2 of agricultural import increases. The impacts depend on import and export patterns of that region and on the magnitude of liberalization. For example, Turkey is a larger exporter of low-value REER, but does not every time, as seen here. Export liberalization results in an increase in Turkey low-value REER by 5 % in long run. The rise in agricultural exports is from Turkey, which has the largest REER reduction, followed by an increase in agricultural exports to the world in long run. If the expansion in REER is greater than the agricultural export, then the agricultural export will rise.

TABLE IV
COEFFICIENTS OF IMPORT AND EXPORT MODEL

Dependent Variable: M
Method: Least Squares
Date: 06/02/06 Time: 11:25
Sample(adjusted): 2 35
Included observations: 34 after adjusting endpoints

Variable	Coefficient and short run elastic ties	Std. Error	t-Statistic	Prob.
PM	-1.542470	0.171651	-8.986100	0.0000
INDE	1.205976	0.389124	3.099209	0.0042
INY	1.096850	0.860384	2.589582	0.0333
C	-0.038141	0.082610	-0.461696	0.6476
R-squared	0.733363	Mean dependent var.		0.024296
Adjusted R-squared	0.706700	S.D. dependent var.		0.304556
S.E. of regression	0.164939	Akaike info criterion		-0.656352
Sum squared resid.	0.816146	Schwarz criterion		-0.476780
Log likelihood	15.15798	F-statistic		27.50424
Durbin-Watson stat	1.475137	Prob.(F-statistic)		0.000000

Dependent Variable: X
Method: Least Squares
Date: 06/02/06 Time: 11:28
Sample(adjusted): 2 34
Included observations: 33 after adjusting endpoints

Variable	Coefficient and short run elastic ties	Std. Error	t-Statistic	Prob.
PXPXW	-1.150305	0.157807	-7.289338	0.0000
INDE	-0.053727	0.141870	-0.378703	0.7077
INDYW	0.204130	1.199108	7.092824	0.0267
C	0.002292	0.040839	0.056115	0.9556
R-squared	0.668355	Mean dependent var.		0.016194
Adjusted R-squared	0.634047	S.D. dependent var.		0.125560
S.E. of regression	0.075956	Akaike info criterion		-2.204108
Sum squared resid.	0.167311	Schwarz criterion		-2.022713
Log likelihood	40.36779	F-statistic		19.48100
Durbin-Watson stat	2.788082	Prob.(F-statistic)		0.000000

TABLE V
COEFFICIENTS OF DYNAMIC VARIABLES AND LONG RUN ELASTICITIES

M MODEL

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Long run elastic ties
PM	-1.180848	0.205248	-5.753283	0.0000	-0.9211
INY	1.215603	0.680225	3.723477	0.1954	0.9482
INDE	0.829643	0.376446	2.203881	0.0359	0.6471
DM	0.220002	0.075286	2.922230	0.0068	0.1716
C	-0.045999	0.074601	-0.616600	0.5425	-0.0359
R-squared	0.794673	Mean dependent var.		0.030702	
Adjusted R-squared	0.765341	S.D. dependent var.		0.306943	
S.E. of regression	0.148688	Akaike info criterion		-0.835201	
Sum squared resid.	0.619031	Schwarz criterion		-0.608457	
Log likelihood	18.78082	F-statistic		27.09199	
Durbin-Watson stat	1.420330	Prob.(F-statistic)		0.000000	

X MODEL

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Long run elastic ties
PXPXWL	-0.768428	0.127696	-6.017631	0.0000	-0.5125
INDE	0.088849	0.101410	0.876132	0.3887	0.0593
INDYW	0.979296	0.340255	5.635801	0.0603	0.6532
DX	0.333013	0.057577	5.783813	0.0000	0.2221
C	0.015381	0.028374	0.542078	0.5922	0.0103
R-squared	0.851609	Mean dependent var.		0.015219	
Adjusted R-squared	0.829625	S.D. dependent var.		0.127442	
S.E. of regression	0.052603	Akaike info criterion		-2.909471	
Sum squared resid.	0.074712	Schwarz criterion		-2.680449	
Log likelihood	51.55153	F-statistic		38.73796	
Durbin-Watson stat	2.173355	Prob.(F-statistic)		0.000000	

Long run elasticity was calculated following formula [39]:

$$\beta_1(1-DMorDX),\beta_2(1-DMorDX)$$

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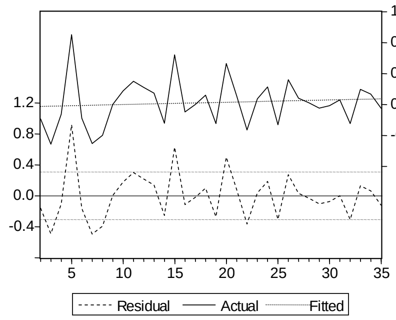
APPENDIX



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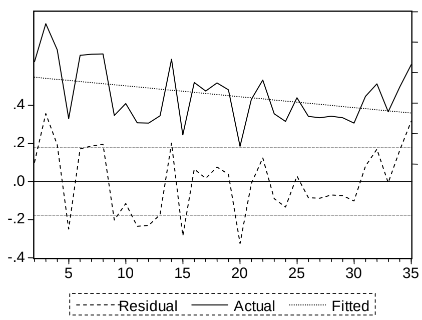

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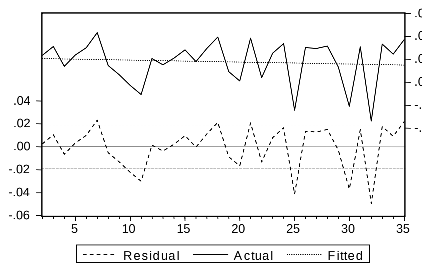

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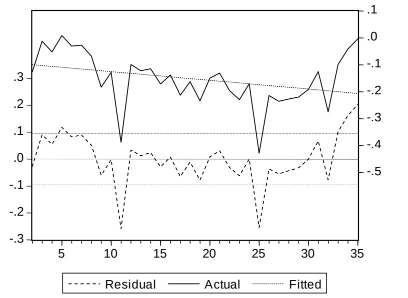

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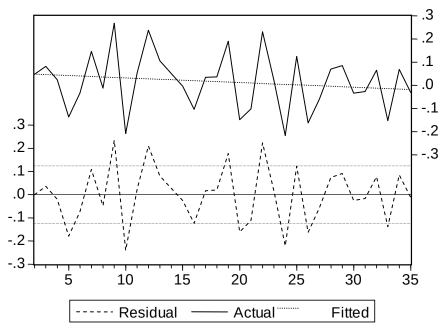

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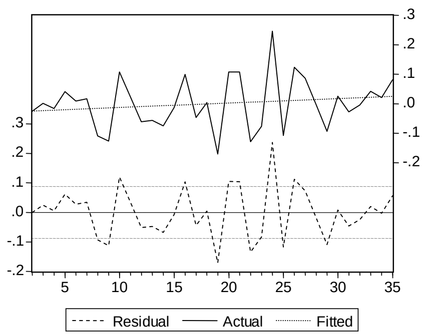
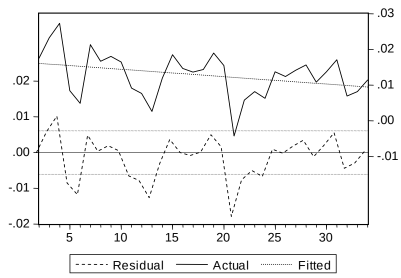


PXPXW



INDYW

Fig. 2 Actual, fitted and residual values of Perron Model

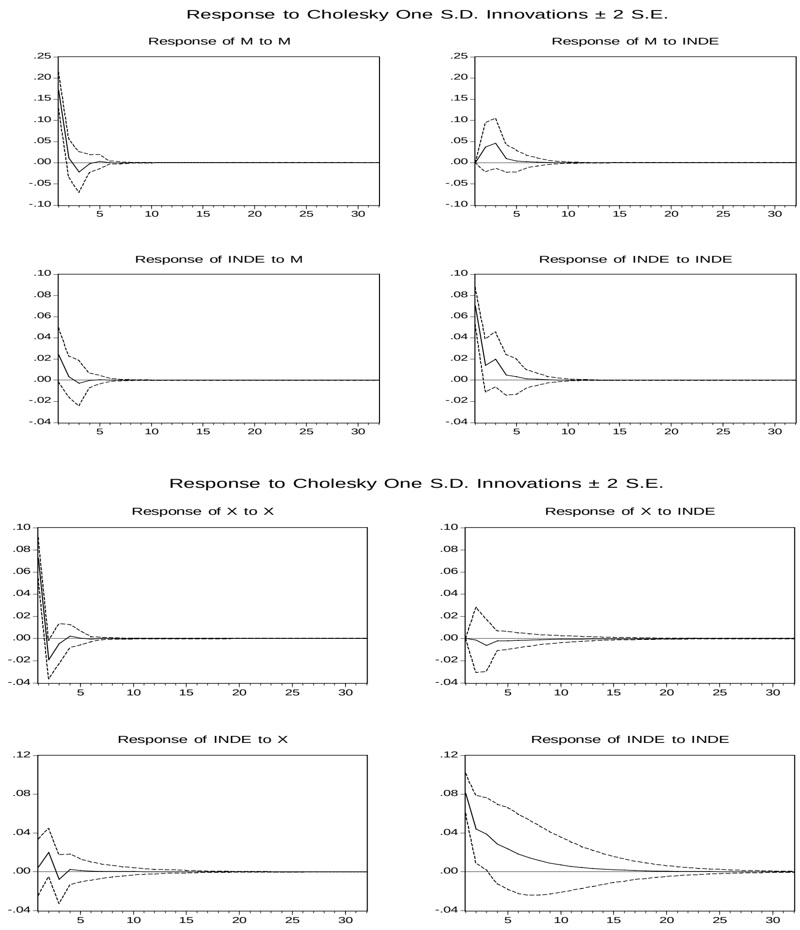


Fig. 3 Impulse- response functions of the series