Exports and Economic Growth of Turkey:
Co-integration and Error-Correction Analysis

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ABSTRACT: This paper employs modern econometric time series methods such as cointegration and error-correction to analyze the dynamic relationship between export growth and economic growth in Turkey, using quarterly data from 1980 to 2004. From the theoretical point of view, the export growth should contribute positively to economic growth. In fact, this point is the rational behind the export-led growth hypothesis. The empirical research conducted here shows that a uni-directional long term causality exists from export growth to economic growth in Turkish Economy. In terms of error correction models, there is evidence for short-run Granger causality running from export growth to economic growth. However, there is as well evidence for short-run causality running from economic growth to export growth.
KEY WORDS and PHRASES: Causality, Export-led Growth, Cointegration, Error Correction, Turkish Economy.

ÖZET: Bu makalede 1980'den 2004'e kadar çeyrek yıllık verilerle Türkiye'de ihracat ile iktisadi büyüme arasındaki dinamik ilişki koentegrasyon ve hata düzeltme gibi modern ekonometrik yöntemler kullanılarak analiz edilmektedir. Teorik olarak ihracatın büyümeye olumlu etki etmesi gerekir. İhracat öncülüğünde büyüme hipotezi mantığı da buna dayanmaktadır. Burada gerçekleştirilen amprik araştırma, Türkiye'de ihracattaki büyümeden ekonomik büyümeye tek yönlü uzun dönem nedenselliği olduğunu göstermektedir. Hata düzeltme modellerinde ise hem ihracattan büyümeye hem de büyümeden ihracata kısa dönemli nedensellik gözlenmiştir. **ANAHTAR KELİME ve DEYİMLER:** Nedensellik, İhracat kaynaklı büyüme, Koentegrasyon, Hata düzeltme, Türk ekonomisi

1. Introduction

The hypothesis of uni-directional causality from export growth to economic growth is popularly known as export-led growth hypothesis (ELGH for short). There is a growing body of literature examining the EGLH in developing countries both in theoretical and empirical terms. According to Ekanayake (1999) these studies can be classified in four main groups both from historical and methodological point of view. The early studies regarding the ELGH, examined the simple correlation coefficient between export growth and economic growth. Among these studies Michaely (1977), Balassa (1978), and Kormendi and Mequire (1985) are counted. These studies are generally based on some descriptive statistics and concluded that there is strong evidence in favor of ELGH depending on the fact that export growth and economic growth are highly correlated. The main

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weakness of this group of studies is that a high degree of positive correlation between the two variables was used as evidence supporting the ELGH.

The second group of studies took the approach of whether or not exports are driving output by estimating output growth regression equations based on the neoclassical growth accounting techniques of production function analysis, augmented by exports or export growth as an explanatory variable. To mention but a few of the studies done on this line include Balassa (1985), Lucas (1990), and Sprout and Weaver (1993). In this group of studies, a highly significant positive value of the coefficient of export growth variable in the growth accounting equation and a significant improvement in the coefficient of determination with the inclusion of the export growth variable in the regression equation are shown as evidences for ELGH. As pointed out by Ekanayake (1999) this group of models criticized for making *a priori* assumption that export growth causes output growth and do not consider the possibility of bi-directional causality between the two variables.

The third group of studies makes a strong emphasis on causality between export growth and economic growth. This approach has been taken in Jung and Marshall (1985), Bahmani-Oskooee *et al*. (1991), and Holman and Graves (1995) and designed to assess whether or not individual countries exhibit evidence for ELGH using Granger or Sims causality tests. The major drawback of these studies is that the Granger or Sims tests used in these studies are only valid if the original time series are cointegrated. Therefore, cointegrating properties of original export and output series should be checked first before using Granger or Sims tests.

The final group of studies, that has been relatively new which involve the application of techniques of cointegration and error-correction models includes Bahmani-Oskooee and Alse (1993), Sengupta and Espana (1994), Ghatak, Milner and Utkulu (1997), Ekanayake (1999), Richards (2001), Ngoc *et al* (2003). The present study as well can be counted as a member of this last group.

The aim of this study is to investigate the dynamic relationship between export growth and economic growth (in terms of output growth) in Turkish economy using cointegration and error-correction models. There are already several studies that employed this methodology to investigate the dynamic relationship between export growth and economic growth in developing economies.

Considering the relative scarcity of using this methodology in empirical investigation of export-growth relationship, we hope that this study will make a modest but certain contribution to the empirical literature.

The main body of the study is organized as follows. The methodology of cointegration and error-correction models is presented in section 2. The sources and properties of data and the empirical results are reported in section 3. In the final section of 4, a discussion of implications of results and some summary conclusions are presented.

2. A Brief Account of Employed Methodology

This study employs relatively new methods of time series econometrics, such as cointegration and error-correction models, to test the dynamic relationship between exports and economic growth. The popularity of these methods in recent empirical research depend on a number of reasons among which the simplicity and relevance in analyzing time-series data of paramount importance. Moreover they ensure stationarity and further possibilities through which Granger-causality could be investigated in the face of cointegration. Although these techniques are widely used in a VAR (vector autoregressive) context, here we use these methods in a bivariate modeling framework.

Granger (1969) developed a test to check whether or not the inclusion of past values of a variable X improves the prediction of present values of variable Y. If the prediction of Y is improved by including past values of X relative to only using the past values of Y, then X is said to Granger-cause Y. In the same manner, if the past values of Y improve the prediction of X relative to using only the past values of X, then Y is said to Granger-cause X. If both X is found to Granger-cause Y and Y is found to Granger-cause X, then there is said a feedback relationship. Yet there is a possibility of spurious causality. To avoid it, both series need to be stationary. The property of non-spurious long-run equilibrium (stationary) relationship among economic variables is referred to in the literature as cointegration. Granger (1988) asserts that, standard tests for causality are valid only if there exits a cointegrating relationship. That is, to check the cointegrating properties of the variables under consideration is a necessary precondition for causality testing.

The cointegration and error-correction methodology is briefly outlined as follows. Granger (1986), Engle and Granger (1987), have investigated the causal relationship between two variables when a

common trend exits between them. A non-stationary time series Y_t is said to be integrated of order d, if its stationarity is achieved after being differenced d times. Equilibrium theories regarding the non-stationary variables require a linear combination of the variables to be stationary. The deviations from equilibrium must be temporary. If two series Y_t and X_t are both $I(d)$, a linear combination, $Y_t - aX_t = u_t$, is integrated of order $(d-b)$, and $b > 0$, then Y_t and X_t are said to be cointegrated.

Cointegration test between the two variables can be done in four steps (Enders, 2004, p.335). First, pretest the time series for their order of integration. The number of unit roots in each variable should be determined by performing the augmented Dickey-Fuller (ADF) test. The ADF test is based on the regression equation with the inclusion of a constant and a trend of the form

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \varepsilon_t, \qquad (1)$$

where $\Delta Y_t = Y_t - Y_{t-1}$ and Y_t is the variable under consideration, p is the number of lags in the dependent variable, is chosen so as to induce a white noise term and ε_t is the stochastic error term. The stationarity of the variable is tested using the null hypothesis of $\beta = 0$ against the alternative hypothesis of $\beta < 0$. Reject the null hypothesis if the test statistic is less than the critical value in real terms. If the null hypothesis cannot be rejected, it implies that the time series is non-stationary at the level and therefore it requires taking first or higher order differencing of the level data to establish stationarity. As it is obvious from the alternative, ADF is a one-sided test and one can use three types of ADF regression of (1), that is, intercept and/or deterministic time trend can take place or not. Engle and Granger (1987) prefer the ADF test due to the stability of its critical values as well as its power over different sampling experiments. The optimum lag length in the ADF regression insures the residuals not to be serially correlated. To have a reliable test result, all the coefficients in the regression must be significant and residuals should imitate a white noise process.

Standard time series econometric methodologies assume stationarity in the variables. Otherwise the usual statistical tests are inappropriate and the inferences drawn will be misleading. As Granger and Newbold (1974) rightfully pointed out, the ordinary least squares (OLS) estimation of regressions

for example, in presence of non-stationary variables give rise to spurious regressions if the variables are not cointegrated. Therefore testing the economic time series for stationarity is of great importance.

Having tested the stationarity of each time series, and confirmed that each series have the same order of homogeneity (*d*), the next step is to search for cointegration between *X* and *Y*. In this step we investigate whether there is a long run relationship between the stochastic trends of *X* and *Y*. In order that *X* and *Y* have any type of causality, they must be cointegrated in the Granger sense. This precondition can be confirmed by using either the Engle-Granger two-step cointegration procedure or Johansen-Juselius rank-based cointegration test. The Engle-Granger procedure involves two steps. In the first step, for an economic model based on two time series Y_t and X_t, stationarity of each variable are examined by unit root tests. Following the stationarity tests, if the two series have the same order of integration, then either one cointegrating regression which is a linear combination of the series or two cointegration regressions (direct and reverse) between the two variables can be estimated using the OLS. Direct and reverse regressions are obtained by normalizing for respective selected dependent variables. The second step involves directly testing the stationarity of error processes of cointegration regressions estimated in previous step. In the third step the error correction models are estimated. If the variables are cointegrated there must exist an error-correction representation that may take the following form:

$$\Delta Y_{t1} = \alpha_1 + \beta_1 e_{t-1} + \sum_{i=1}^{k} \gamma_{1i} \Delta Y_{1t-i} + \sum_{i=1}^{k} \gamma_{2i} \Delta Y_{t2-i} + \varepsilon_{1t}, \qquad (2)$$

$$\Delta Y_{t2} = \alpha_2 + \beta_2 e_{t-1} + \sum_{i=1}^{k} \delta_{1i} \Delta Y_{t1-i} + \sum_{i=1}^{k} \delta_{2i} \Delta Y_{t2-i} + \varepsilon_{2t}, \qquad (3)$$

where e_{t-1} is the residuals of, or discrepancies from the, long-run (cointegrating) relationship and β_1 and β_2 are the error-correction coefficients. The inclusion of error-correction terms in equations (4) and (5) introduces an additional channel through which Granger causality could be detected. According to Granger (1986), the error-correction models produce better short-run forecasts and provide the short-run dynamics necessary to obtain long-run equilibrium. However, in the absence of cointegration, a vector autoregression (VAR) in first-differences form can be constructed. In this

case, the error-correction terms will be eliminated from equations (4) and (5). If the series are cointegrated, then the error-correction models given in equations (4) and (5) are valid and the coefficients β_1 and β_2 are expected to capture the adjustments of ΔY_{1t} and ΔY_{2t} towards long-run equilibrium, while ΔY_{1t-i} and ΔY_{2t-i} are expected to capture the short-run dynamics of the model.

It might be the case that while one regression residuals are stationary the other one may not be. The test for cointegration should be robust to the choice of the variable selected for normalization. In the case of three or more variables, there may be more than one cointegrating regression. But most important defect of Engle-Granger procedure is its reliance on two-step estimation.

Fortunately, Johansen (1988), and Johansen and Juselius (1990) have developed a maximum likelihood testing procedure on the number of cointegrating vectors which also include testing procedures for linear restrictions on the cointegrating parameters, for any set of variables. Two test statistics that are used to identify the number of cointegrating vectors, namely the trace test statistic and the maximum eigenvalue test statistic, are given here. For the null hypothesis that there are at most r distinct cointegrating vectors, the test statistic is

$$\lambda_{trace}(r) = T \sum_{j=r+1}^{p} ln(1-\lambda_j), \tag{4}$$

where λ_j's are the $p-r$ smallest squared canonical correlations between Y_{t-k} and ΔY_t (where $Y_t = (Y_{1t}, Y_{2t})$ and where all variables entering Y_t are assumed to be $I(1)$, corrected for the effects of the lagged differences of the Y_t process. The maximum likelihood ratio or put another way, the maximum eigenvalue statistic, for testing the null hypothesis of at most r cointegrating vectors against the alternative hypothesis of $r+1$ cointegrating vectors, is given by

$$\lambda_{max}(r) = -T ln(1-\lambda_{r+1}) \tag{5}$$

Some econometric software may not produce this last statistics, but it can be calculated by the first one as follows,

$$\lambda_{max}(\,r\,) = \lambda_{trace}(\,r\,) - \lambda_{trace}(\,r+1\,) \qquad\qquad (6)$$

Johansen (1988) argues that, λ_{trace} and λ_{max} statistics have non-standard distributions under the null hypothesis, and provides approximate critical values for the statistic, generated by Monte Carlo methods.

3. Data and Empirical Results

Quarterly data for the period 1989Q1-2004Q4 were used for estimation. The data on exports and gross national product (GDP) for Turkey are obtained from CBRT website.
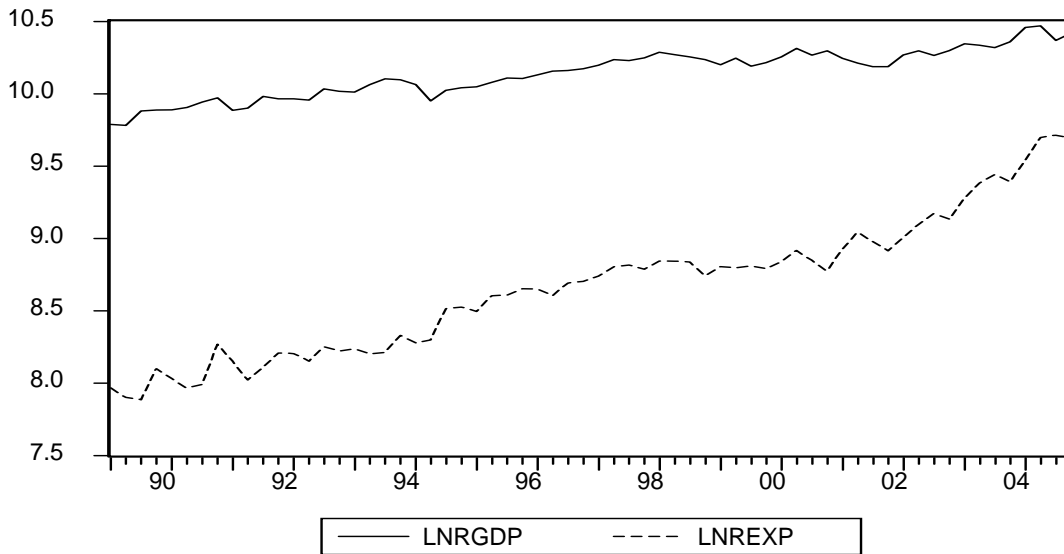

Figure 1. Seasonally Adjusted Logarithmic Real GDP and Export Series

As a precondition of the employed methodologies, stationarity of the series are examined and the empirical results are discussed in this section. In Table 1 we present the results of unit root tests obtained using the augmented Dickey-Fuller test. The results are based on quarterly series of export and GDP for Turkey. The span of 1989Q1-2004Q4 reflects data availability.

Table 1. Augmented Dickey-Fuller Unit Root Tests

Dependent Variable	Number of Lags	Deterministic Regressors	5 % Critical Value	ADF Test Statistic	Durbin-Watson stat	Prob (F-statistic)
D(LNREXP)	0	none	-3.4812	-2.552545	2.224597	0.011400
D(LNREXP)	2	none	-1.9458	5.027337	1.985117	0.000019
D(LNREXP)	2	intercept	-2.9092	1.532499	2.036994	0.000038
D(LNREXP)	0	trend + int.	-3.4812	-2.552545	1.972689	0.030927
D(LNREXP)	2	trend + int.	-3.4836	-0.007810	2.015096	0.000123
D(LNREXP,2)	0	intercept	-2.9084	-8.814804	2.142681	0.000000
D(LNRGDP)	0	none	-1.9456	1.828417	2.20514*	0.072300
D(LNRGDP,2)	0	none	-1.9457	-8.182530	1.915015	0.000000

Notes: All the first difference ADF regressions have a significant unit root coefficient at the 5% levels, a DW statistic nearing to the value of 2 means no autocorrelation in ADF regression. A significant F statistics shows the overall performance of ADF regression. * shows that this ADF regression is significant only at 10 % level.

The results points to the presence of unit roots in both series. More specifically, the null hypothesis that the series are non-stationary is not rejected at the levels of both variables. However, when the first differences of the variables are considered, the null hypothesis is rejected in favor of alternative hypothesis which state that the series are stationary. Thus, their first difference is found to be stationary and hence *LNREXP* and *LNRGDP* are both integrated of order one, *I(1)*.

The next step involves applying Engle-Granger two-stage cointegration procedure and Johansen-Juselius cointegration test to check whether the two variables are cointegrated. The optimum lag lengths are determined using the Akaike final prediction error (FPE) criterion. The results of the ADF test applied to residuals of the cointegration equations are presented in Table 2. The results indicate that the estimated ADF statistics for the residuals are greater than their corresponding critical values for both series.

Table 2. Results of Engle-Granger Test

Cointegrating Equation	slope	st. error	t-values	ADF for Residuals
LNREXP=f(LNRGDP)	2.685313*	0.120056	22.36710	-3.455812
LNRGDP=f(LNREXP)	0.331334*	0.014813	22.36710	-3.954602

Notes: * indicate the statistical significance at the 1% level of significance. 1% critical values of ADF statistic for residuals is -2.5994 . Sample period: 1989:1 2004:4, Included observations: 64

The residuals of cointegrating equations are plotted in Figures 2 and 3. From the inspection of these figures it is obvious that these two residuals are symmetrical and corresponding regressions are in fact identical.
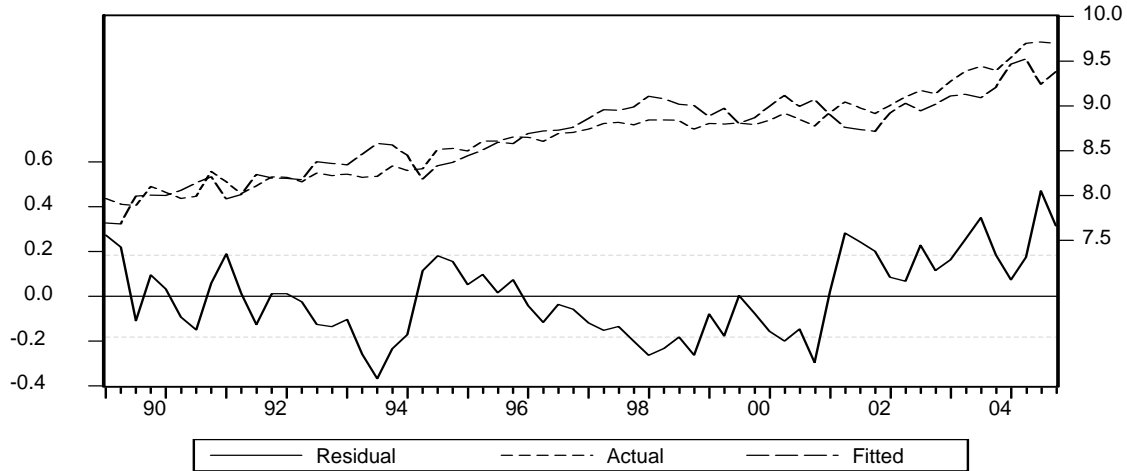

Figure 2. Residual Plots For the Cointegrating Equation LNREXP=f(LNRGDP)
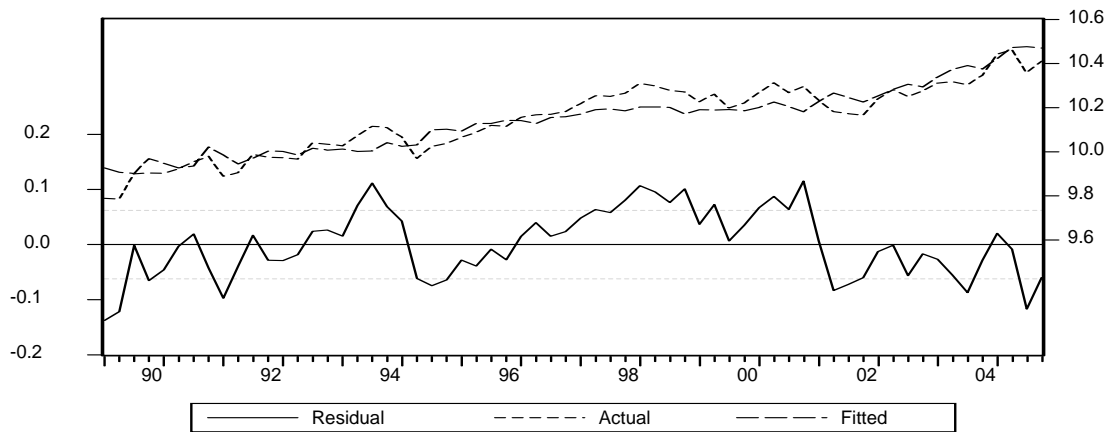

Figure 3. Residual Plots For the Cointegrating Equation LNRGDP=f(LNREXP)

Secondly, the Johansen-Juselius cointegration test has been performed for this two series and the results of this test which has been presented in Table 3 below, also provide evidence for the existence of one cointegration vector implying that the two variables are cointegrated.

Table 3. Johansen Cointegration Tests Results

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)

| 0.379718 | 30.63548 | 15.41 | 20.04 | None * |
| 0.024338 | 1.502992 | 3.76 | 6.65 | At most 1 |

Unnormalized Coint. Coefficients		Normalized Cointegrating Coefficients:		
LNRGDP	LNREXP	LNRGDP	LNREXP	C
-2.563230	0.930551	1.000000	-0.363038	-7.005177
(0.812615)	(0.027396)		(0.02058)	

Notes: Sample period: 1989:1 2004:4, Included observations: 61, Test assumption: Linear deterministic trend in the data, Lags interval: 1 to 2, * denotes rejection of the hypothesis at 1% significance level, Standard errors are in parentheses.

From Table 3 above, we see that the likelihood ratio test indicates 1 cointegrating equation at 5 % significance level. This result confirms the Engle-Granger two stage test for cointegration. Thus, the results of both Engle-Granger two-step procedure and Johansen-Juselius cointegration test imply a long-run association between real exports and real GDP series for Turkey.

Therefore, equations (2) and (3) have been estimated including the error-correction terms. The empirical results of the estimated error-correction models are presented in Table 4. The results show that bi-directional causality exists between export growth and GDP growth. This is based on the statistical significance of the error-correction coefficients (b_1 and b_2) of the error-correction (EC) terms. The error-correction terms e_{t-1} represents the long-run impact of one variable on the other while the changes of the lagged independent variable describe the short-run causal impact. The results presented in Table 4 provide evidence on long-run impact from export growth to economic growth as well as from economic growth to export growth. The short-run dynamics of the error-correction processes can be identified by examining the statistical significance of the values given in these two columns. The optimum lag lengths for autoregressive terms in equations (2) and (3) were identified using the Akaike final prediction error criterion. The statistically significant non-zero coefficients show that the short-run Granger causality runs from GDP growth to export growth. Similarly, the statistically significant non-zero coefficients reflect feedback between current changes in real exports and its own lagged values. Further, the results presented in the bottom part of Table 4 indicate that the non-zero coefficients reflect feedback between current changes in real GDP and its own lagged values. The statistically significant non-zero coefficient show that the short-run Granger causality runs from export growth to GDP growth.

Table 4. Estimation Results of Error Correction Model

Error Correction:	D(LNRGDP)			D(LNREXP)		
Variables	Coefficients	St. Error	t-Values	Coefficients	St. Error	t-Values
C	0.022224	(0.00496)	(4.48057)	0.049651	(0.01032)	(4.81205)
EC	-0.421084	(0.08334)	(-5.05244)	-0.410910	(0.17337)	(-2.37017)
D(LNRGDP(-1))	0.088485	(0.10981)	(0.80581)*	0.588656	(0.22842)	(2.57706)
D(LNRGDP(-2))	0.067606	(0.11942)	(0.56614)*	0.217018	(0.24840)	(0.87365)*
D(LNREXP(-1))	-0.296220	(0.06156)	(-4.81215)	-0.375992	(0.12805)	(-2.93631)
D(LNREXP(-2))	-0.233705	(0.06109)	(-3.82589)	-0.590700	(0.12707)	(-4.64870)

Notes: Sample(adjusted): 1989:4 2004:4, Included observations: 61 after adjusting endpoints. EC denotes the error-correction term and critical values for which is -2.02 at the 5% level of significance. * These values are not significant at 5% significance level.

Error-correction results of Table 4 shows that in both equations the error correction terms are significant. The other coefficients are significant in general significant. All these results confirms that, beside of long-term, there is a significant short term relationship as well between export and growth.

Table 5. Pairwise Granger Causality Tests Results

Null Hypothesis:	Obs	F-Statistic	Probability
LNREXP does not Granger Cause LNRGDP	60	8.91701	0.000
LNRGDP does not Granger Cause LNREXP	60	2.00626	0.107

Notes: Sample: 1989:1 2004:4, Number of Lags: 4.

In Table 5 we present Granger causality test result. As it is obvious from the table, there is a significant Granger-causality from export to growth, but the reverse is not significant. This result confirms that there is no feedback relationship between these two variables. Since we have established the direction of the long-run (equilibrium) relationship, in Table 6 below we have tried several equilibrium models.

Table 6. Long-run Relationships from LNREXP to LNRGDP

	Model 1			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.419567	0.143487	51.70882	0.0000
LNREXP	0.314638	0.016539	19.02412	0.0000

R-squared	**0.853745**	Mean dependent var		10.14528
Adjusted R-squared	0.851386	S.D. dependent var		0.161350
S.E. of regression	0.062201	Akaike info criterion		**-2.686139**
Sum squared resid	0.239876	Schwarz criterion		-2.618674
Log likelihood	87.95646	F-statistic		361.9173
Durbin-Watson stat	0.550531	Prob(F-statistic)		0.000000

Model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.846245	0.494647	17.88396	0.0000
LNREXP	0.132558	0.062694	2.114372	0.0386
TREND	0.004783	0.001595	2.998144	0.0039
R-squared	0.872529	Mean dependent var		10.14528
Adjusted R-squared	**0.868350**	S.D. dependent var		0.161350
S.E. of regression	0.058544	Akaike info criterion		**-2.792352**
Sum squared resid	0.209068	Schwarz criterion		-2.691154
Log likelihood	92.35525	F-statistic		208.7701
Durbin-Watson stat	0.533932	Prob(F-statistic)		0.000000

Model 3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.380164	0.448493	18.68515	0.0000
LNREXP	0.206114	0.050412	4.088628	0.0001
AR(1)	0.801968	0.078529	10.21232	0.0000
R-squared	0.933499	Mean dependent var		10.15095
Adjusted R-squared	**0.931283**	S.D. dependent var		0.156093
S.E. of regression	0.040918	Akaike info criterion		**-3.508032**
Sum squared resid	0.100458	Schwarz criterion		-3.405978
Log likelihood	113.5030	F-statistic		421.1240
Durbin-Watson stat	2.015835	Prob(F-statistic)		0.000000

Among the alternatives Model 3 seems to be the best one in terms of both coefficients of determination (R-squared) and AIC (Akaike's Information Criteria). The residuals plot of this final model is presented in Figure 4 below. The plot of residuals imitates a white noise process. In fact the ADF test of residuals has shown no sign of unit roots.
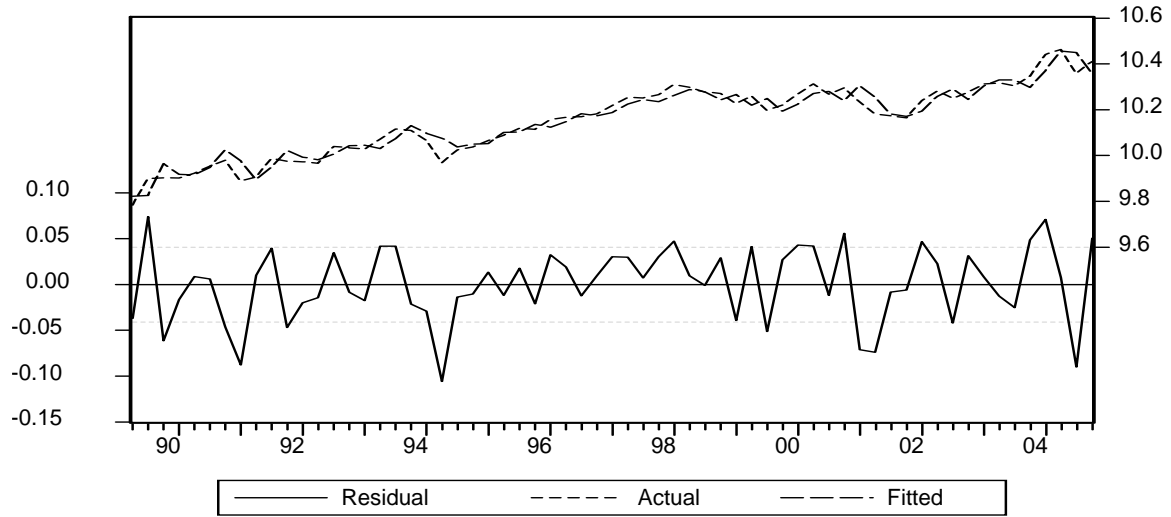
Figure 4. Residuals of Model 3.

4. Conclusions

This study uses time series econometric tools such as causality, cointegration and error-correction models to investigate the dynamic relationship between export growth and economic growth in Turkish economy. The applied economics literature regarding ELGH studies have reached mixed results for different economies. These studies employed simple descriptive statistics, Granger-causality, Cointegration and error correction methodologies.

The cointegration modeling techniques used in this paper have revealed that there is a uni-directional causality from export growth to economic growth in Turkey. There is evidence for long-run Granger causality running from economic growth to export growth in Turkey. Error-correction analysis confirms bi-directional short-run relationship, that is, gives evidence for short-run Granger causality running from export growth to economic growth, and evidence of short-run causality running from economic growth to export growth.

References

Bahmani-Oskooee, M., H. Mohtadi, and G. Shabsigh (1991), "Export Growth and Causality in LDCs: A Reexamination," *Journal of Development Economics*, Vol. 36, 405-415.

Bahmani-Oskooee, M., and J. Alse (1993), "Export Growth and Economic Growth: An Application of Cointegration and Error-Correction Modeling," *Journal of Developing*

Areas, Vol. 27, No. 4, 535-542.

Balassa, B. (1978), "Exports and Economic Growth: Further Evidence," *Journal of Development Economics*, Vol. 5, 181-189.

_____ (1985), "Exports, Policy Choices and Economic Growth in Developing Countries after the 1973 Oil Shock," *Journal of Development Economics*, Vol. 18, No. 2, 23-25.

Dickey, D., and W. Fuller (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," *Econometrica*, Vol. 49, 1057-1072.

Enders, W. (2004), Applied Econometric Time Series, Wiley, New York.

Engle, R.F., and C.W.J. Granger (1987), "Cointegration and Error-Correction: Representation, Estimation and Testing," *Econometrica*, Vol. 55, 251-276.

Ghatak, S., C. Milner, and U. Utkulu (1997), "Exports, Export Composition and Growth: Cointegration and Causality Evidence for Malaysia," *Applied Economics*, Vol. 29, N0. 2, 213-223.

Granger, C.W.J. (1969), "Investigating Causal Relations by Econometric and Cross-Spectral Method," *Econometrica*, Vol. 37, No. 3, 424-438.

_____ (1986), "Development in the Study of Cointegrated Economic Variables," *Oxford Bulletin of Economics and Statistics*, Vol. 48, 213-228.

_____ (1988), "Some Recent Developments in a Concept of Causality," *Journal of Econometrics*, Vol. 39, 199-211.

Granger, C.W.J., and P. Newbold (1974), "Spurious Regression in Econometrics," *Journal of Econometrics*, Vol. 2, 111-120.

Holman, J.A., and P.E. Graves (1995), "Korean Exports Economic Growth: An Econometric Reassessment," *Journal of Economic Development*, Vol. 20, No. 2, 45-56.

Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors," *Journal of Economic Dynamics and Control*, Vol. 12, 231-254.

Johansen, S., and K. Juselius (1990), "Maximum Likelihood Estimation and Inference on Cointegration with Application to the Demand for Money," *Oxford Bulletin of Economic and Statistics*, Vol. 52, 169-210.

Kormendi, R.C., and P.G. Mequire (1985), "Macroeconomic Determinants of Growth: Cross-Country Evidence," *Journal of Monetary Economics*, Vol. 16, No. 2, 141-163.

Lucas, R.E. (1990), "Why does not capital flow from rich to poor countries", American

Economic Review, 80, 92-6.

Michaely, M. (1977), "Exports and Growth: An Empirical Investigation," *Journal of Development Economics*, Vol. 4, 49-53.

Ngoc, P. M., N. T. P. Anh, and P. T. Nga. (2003)" Exports and Long-run Growth in Vietnam, 1975-2001", ASEAN Economic Bulletin. Singapore:Vol.20, Iss. 3; pg. 211, 22 pgs.

Richards, D.G. (2001),"Exports as a Determinant of Long-Run Growth in Paraguay, 1966-96", The Journal of Development Studies, Vol.38, No.1, pp.128-146.

Sengupta, J.K., and J.R. Espana (1994), "Exports and Economic Growth in Asian NICs: An Econometric Analysis for Korea," *Applied Economics*, Vol. 26, 41-51.

Sprout, R.V.A., and J.H. Weaver (1993), "Exports and Economic Growth in a Simultaneous Equations Model," *Journal of Developing Areas*, Vol. 27, No. 3, 289-306.