

ECONOMIC GROWTH AND FOREIGN INDEBTEDNESS IN TURKEY: AN EMPIRICAL STUDY

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Abstract

It is often argued that external debt service burden has a negative impact on investment and capital accumulation. Hence, debt service causes a slowdown in economic growth. The main reason is that the greater percentage of foreign exchange reserves goes to meet debt service and there will be a reduction in external capital because of a decrease in credit-worthiness. All of these make it difficult to continue with large infrastructural investments, both new projects and old. In this study we have investigated a series of unit root, co-integration and causality tests to ascertain the direction of causality between the economic growth and external debt service in Turkey for the period 1965-2001 employing the Final Prediction Error (FPE) method for determining the optimal lag length of the explanatory variables. Moreover, the information on co-integration (Johansen, 1988 and Johansen and Juselius, 1990) in variables is taken into consideration in specifying the correct model. The results show that short-run uni-directional causality running from economic growth to external debt service but not vice versa.

Özet

TÜRKİYE'DE EKONOMİK BÜYÜME VE DIŞ BORÇLANMA : AMPİRİK BİR ÇALIŞMA

Dış borç yükünün yatırım ve sermaye birikimi üzerinde negatif etkisi olacağı iddia edilir. Bu yüzden dış borç ödemeleri ekonomik büyümenin yavaşlamasına sebep olur. Bunun başlıca nedeni kaynakların büyük bir oranının dış borç ödemelerine gittiği ve bunun ülkenin kredi derecelendirmesinde olumsuz etki yapmasıdır. Tüm bu zorluklar ülkede altyapı yatırımlarının yapılmasını, yeni projelerin başlatılmasını ve devam eden yatırımları olumsuz yönde etkiler. Bu çalışmada birim kök, kointegrasyon ve nedensellik testleri ile 1965-2001 döneminde Türkiye'de ekonomik büyüme ile dış borç ödemeleri arasında nasıl bir ilişki olduğu araştırılmıştır. Bunun yanında (Johansen, 1988 and Johansen

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& Juselius, 1990) tekniđi kullanılarak gerek modelin kurulması sađlanmıřtır. Sonular ekonomik byme ile dıř bor demeleri arasında tek ynl (ekonomik bymeden dıř bor demelerine dođru) bir iliřki olduđunu gstermiřtir.

1. Introduction

In this paper we will investigate the causality between external debt service and economic growth for Turkey during the period 1965-2001. It is often argued that debt service burden has a negative effect on investment and capital accumulation. Hence, debt service causes a slowdown in output. The main reason is that the greater percentages of foreign exchange reserves go to meet debt service and there will be a reduction in external capital because of a decrease in credit-worthiness. All of these make it difficult to continue large infrastructural investments, both new projects and old. The main reasons are lack of foreign currency, necessary capital goods and raw materials. There are several studies in the literature to test whether indebtedness has an impact on the economic activity of developing countries. It is argued that if foreign loans are converted into capital and other necessary inputs, growth and development will occur. On the other hand, if the borrower countries misallocate resources or waste them on consumption, then economic development is negatively affected (Afxentiou and Serletis, 1996).

In order to maintain sustainable economic development, Turkey had to use external financing for the period 1950-1970. The foreign exchange crisis in the 1950s led to the IMF conditionality requirements in 1958 (Ceyhun, 1992). The sharp devaluation of the Turkish Lira led to a moratorium on the country's debt service obligations. Therefore, external debt stock showed a rising trend. The first oil shock resulting in the quadrupling of oil prices devastated the Turkish economy very strongly. Due to heavy reliance of energy needs on imported oil, this caused a sharp deterioration in the terms of trade and a sharp rise in external debt. The economic embargo, which imposed by USA and the first oil crisis of 1973, had negative effects on the external balance. The high and variable interest rates with limited repayments terms, the borrowing of money from Eurocurrency markets caused a substantial accumulation of external debt in the late of 1970s (nis and zmur, 1991). The World Bank Country Study (1990) indicates that short-term borrowing has greatly affected Turkish economy during the 1970s. The abundant increase in the short-term borrowing caused an increase in the external debt burden. This in turn, caused a loss in credit-worthiness and hence balances of payments crisis in 1977. These

conditions forced Turkey to reschedule its debt with consecutive agreements signed with OECD countries in 1978, 1979 and 1980. In order to solve the foreign exchange crisis, the government determined to start a new stabilization program in 1980. The government tried to solve these problems by increasing exports through various measures (export subsidies, tax rebates etc). Önis and Özmucur(1991) indicate that Turkey's debt performance during the first half of the 1980's was affected by a fall in debt-exports ratio. Due to the absence of any repayment difficulties during the late of 1980 and the beginning of 1990s, Turkey regained credit-worthiness in the international markets, and has been able to borrow at market interest rates.

In this study, a vector auto-regression model has been estimated employing certain policy variables in order to investigate the dynamics of external debt in the economy. The direction and magnitude of causal relationship between debt service and economic growth will be examined in four possible forms: uni-directional causality from economic growth to debt service; the reverse; bi-directional causality between debt service economic growth; and finally no causal relationship at all. When the direction and magnitude of causality between the two variables is analyzed properly, some policy implications can then be drawn.

We proceed in this paper as follows: Following the introductory Section 1, in Section 2 we survey the existing studies on the causality analysis of external debt service and economic growth. We deal with objectives and methodology in Section 3. We present the data in Section 4. Section 5 gives empirical analysis of co-integration analysis using the Johansen method. Finally, Section 6 offers concluding remarks.

2. The Existing Studies on the Causality Analysis of External Debt Service and Economic Growth

The causality between external debt and economic growth has been examined in several studies. Amoateng and Amoako (1996) examined the relationship between external debt servicing, economic growth and exports for a total sample of 35 African countries. These countries are grouped into sub-samples of 31 south of Sahara countries, 24 low- income African countries and 11 middle-income countries. Granger's causality test is employed to analyse the interrelationship between exports, GNP growth and foreign debt servicing during 1971-1990 for the south of Sahara countries. The authors examined the

joint effect of two variables on the third variable. The empirical results indicate that there is a uni-directional and positive causality relationship between foreign debt service and GDP growth after excluding export revenue growth for Africa, south of Saharan countries during 1983-1990. The authors find that foreign debt service has a positive causal relationship with GDP growth. When they applied empirical tests to the low-income African countries, they found the same result for the 1971-1982 sub-periods. Their findings showed that there is a uni-directional and positive causality relationship between GDP growth and foreign debt service after excluding export revenue growth. This indicates that foreign loans had a positive impact on economic growth before the 1982 debt crisis in these countries. The result for the period 1983-1990 indicates that there is a bi-directional and positive causality between foreign debt service and GDP growth after excluding export revenue growth. Moreover, foreign debt service is included as a third variable with a trivariate causality analysis of exports and economic growth for 35 African countries. The evidences show that there is a joint feed- back relationship between export revenue, external debt service and economic growth. Moreover, Afxentiou and Serletis (1996) investigated 55 countries for the period 1970 - 1980 periods and employed the Granger causality test. The Granger causality test results show debt overhang is exaggerated and there is no causal relationship between debt and income in a sample of 55 developing countries. Hence, foreign resources can have a positive effect on the economic development if resources are transferred into investment.

Chowdhury (1994) tried to resolve the controversy about the cause and effect relationship between external debt and economic slowdown. The author tried to examine the Bullock and Rogoff's (1990) proposition for Bangladesh, Indonesia, Malaysia, Philippines, South Korea, Sri Lanka, and Thailand during the period 1970-1988. Bullock and Rogoff (1990) argue that the external debts of developing countries are a symptom rather than a cause of economic slowdown. External debt leads to bad management in highly indebted countries, such as exchange rate mismanagement. Firstly, the author employed the causality tests and hypothesized that accumulation of external debt does not affect the GNP growth rate. It is interesting that the long-term effect of external debt accumulation rate on the GNP growth rate is found to be positive in Bangladesh, Indonesia and South Korea. For example, an increase of 1% in the external debt caused an increase of the GNP by 20% in Bangladesh. Secondly, the effect of GNP growth rate on the external debt accumulation is examined. It is found that GNP growth rate affect the external debt accumulation rate of

Philippines only. For the Philippines, a 1% increase in the GNP leads to 1.25 % increase in external debt in the long run. The results of the Granger causality tests show that the Bullow-Rogoff (1990) propositions that external debts of developing countries are a symptom of economic slowdown were rejected. The results also show that a feedback or bi-directional relationship exists between external debt accumulation rate and GNP growth rate for Malaysia and Philippines.

Afxentiou (1993) has examined the effect of foreign indebtedness on the growth of GNP for twenty middle-income developing countries between 1971 and 1988. Statistical evidences show that there is a strong debt overhang effect that took place in the sampled countries in the sample period of 1971-1988. These test results support inferentially that source mismanagement caused negative effects on GNP. If foreign resources were not productively used, GNP growth rate would be negatively affected by indebtedness. Karagöl (2002) investigated the long-run and short-run relationship between economic growth and external debt service for Turkey during the 1956-1996. This study used multivariate co-integration techniques and employed a standard production function model. The VAR (Vector Auto-Regression) estimates of the system showed that there is a one co-integrating relationship in the long-run. Debt service is negatively related to economic growth in the long-run. Granger causality test results showed a uni-direction causality running from debt service to economic growth.

3. Objectives and Methodology

Debt service can theoretically have an impact on output through a variety of venues. On the one hand, if converted into capital and other domestically unavailable inputs, which are productively used, the development benefits will soon manifest themselves. If, on the other hand, the borrowed resources are misallocated or wasted on consumption the negative effects on productivity will, in time, haunt the economy (Afxentiou and Serletis, 1996). Debt burden has an output retarding effect through investment crowding-out, and reduction of available public expenditures funds in areas such as education, health and infrastructural work all of which have an output promoting impact.

Karagöl (2002) expected that the debt overhang effects should be particularly strong when a country is not fully servicing its debt, because in this case the amount of debt service is likely to be related to a country's

performance, so that part of the marginal return to investment accrues to external creditors. Disincentive effects are, therefore, related not only to the size of debt, but also to the existence of debt-servicing problems. When the government holds foreign debt, the debt overhang problem may spill over to private saving and investment. This is because the government would have little incentive to pursue policies that stimulate private savings and investment when debt payments absorb most of the gains to the country. By the same token, the government would experience a weakened resolve to undertake any adjustment policy that implies a reduction in current consumption (public and private) or other politically costly measures in exchange for improvements in future growth and export earnings. All these channels through which external debt service can influence output, assume that such debt service is causally prior to output.

To test whether debt service has an impact on the economic performance of Turkey from 1965-2001, we employ the framework of Granger causality (see Engle and Granger, 1987). In this framework, debt service influences the development process and ultimately economic growth. Under *ceteris paribus* conditions, it is hypothesized that debt service is inversely related to economic growth. We test Granger causality by using bivariate autoregressive models and testing whether a block of lagged variables is significant. Our objective is to investigate whether observations of a variable like debt service is potentially useful for anticipating future movements in Y. In the context of Granger causality, it is hypothesized that debt service (represented by DS) causes economic growth (Y) with respect to a given information set that includes the relevant variables (*i.e.* DS and Y), if Y is better predicted by adding the past time series for debt service than by using the past Y series alone.

This step is the employment of an error-correction model derived from the long-run co-integrating relationship of the following form. The specification incorporates the above rationale with variables expressed in logarithms level terms, is given by;

$$DLY = \alpha_0 + \sum_{i=1}^m \beta_i DLY_{t-i} + \sum_{j=1}^n \gamma_j DLDS_{t-j} + \theta ECT_{t-1} + \varepsilon_t \quad (1)$$

$$DLDS = a_1 + \sum_{i=1}^q b_i DLY_{t-i} + \sum_{j=1}^r c_j DLDS_{t-j} + \theta ECT_{t-1} + u_t \quad (2)$$

Where α_0 and α_1 are constants, DLY and DLDS are first differences of GNP and debt service respectively, m, n are the optimal lag length of series DLY and q, r are the optimal lags of series DLDS, ECT_{t-1} and ECT_{t-1} are the error correction terms that are from the long-run co-integration regressions:

$$LY_t = \psi_0 + \psi_1 LDS + \mu_t \quad (3)$$

The inclusion of the error correction term in the equation (1) and (2) give an extra channel through which causality may be observed. The error-correction coefficient ECT_{t-1} is expected to capture the adjustment of DLY and DLDS to their long-run equilibrium. DLY and DLDS are the first differences of the logarithm of Y and DS. On the other hand, u_t is the error term where u_t zero mean, serially uncorrelated random distributance term. Thus, given the foregone discussion, there are four possible outcomes when the determination of the causal ordering between Y and external debt service is the task at hand, namely uni-directional causality from external debt servicing to growth or vice versa: bi-directional causality between the two variables and finally lack of any causal ordering. Gujarati (1995) indicates four possible causal relationships:

i) Equation (1) is used to test causality runs from debt service to economic growth, If debt service Granger-causes Y the null hypothesis that the sum of the coefficients γ_i ($i=1...n$) equal zero is rejected. The causality test to be performed can be written simply: DS causes Y if $H_0: \gamma_i = 0, i=1, .., n$ can be rejected.

ii) Equation (2) tests that causality runs from Y debt service. If Y Granger-causes debt service then the null hypothesis that sum of the coefficients b_i ($i=1...q$) equal zero is rejected. Y causes DS if $H_0: b_i = 0, i=1, .., q$ can be rejected.

iii) Feedback or bilateral causality is suggested when the sets of DS and Y coefficients are statistically significant different from zero on both regressions.

iv) If DS and Y are causally independent, all the coefficients of DS in equation (1) and of Y in equation (2) should be statically insignificant. Both DS and Y may grow, or even appear to move together, but neither influences the other and changes in both occur due to other independent factors.

4. Data

The estimation of the economic growth and the external debt service and the regression analysis in the various stages of the causality test employs the logarithmic transformations of the time series data on Y in domestic prices of 1987 and the external debt service in domestic currency of 1987 for Turkey during the period 1965-2001. The data are obtained from the SPO (1998) Turkey and the SIS (1993) Turkey. Since some of the basic properties of a time series are preserved by a logarithmic transformation, logarithm forms of variables LDS (debt service) and LY (GNP) are used in our estimation.

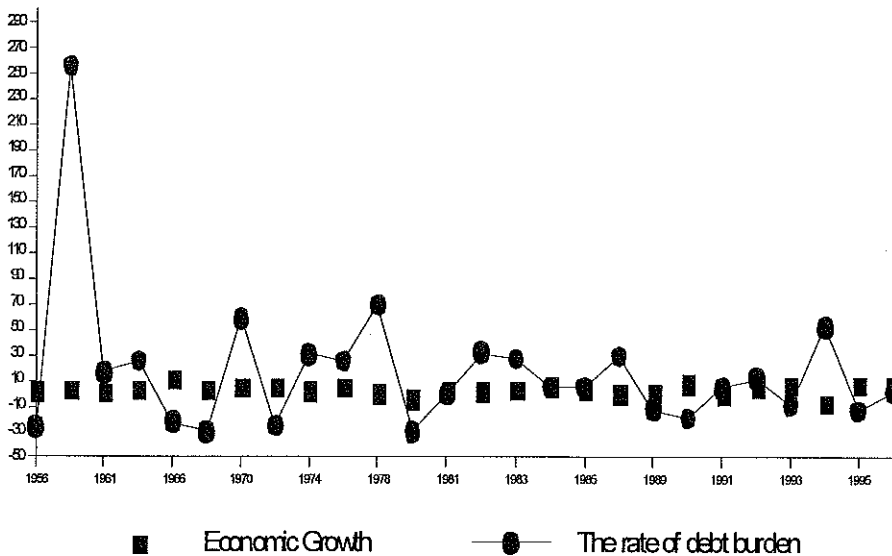


Figure 1. The Economic Growth and Debt Burden

5. The Empirical Analysis

Before conducting causality test, the variables must be found to be stationary individually. If both are not stationary, they must be cointegrated. The series, say Y_t will be integrated of order d , that is, $Y_t \sim I(d)$, if it is stationary after differencing d times, so Y_t contains d unit roots. Testing for causality or co-integration between the two variables is done in three steps. The first step is to confirm the order of integration of the variables, since the

causality tests are valid only if the variables have the same order of integration. This study uses the augmented Dickey-Fuller test (ADF) (1979). Table 1 presents the ADF test results for the log levels of and first differences of logs of Y and DS. The result of the ADF test shows that the calculated values of LY and LDS are -1.556 and -0.3584 respectively. These are less than the critical value of -3.581 and -2.927 at the 1% of and 5% significance level respectively. Thus, the time series for LY and LDS are not stationary. Furthermore, we calculated ADF test for first differences. The calculated values are -3.155 and -2.990 for DLY and DLDS respectively. These values are greater than the critical value of -2.294 at the 5% significance level. On the basis of Table 1 DLY and DLDS are stationary in first differences. Hence, both DLY and DLDS are I(0).

Table 1. Augmented Dickey- Fuller Test Results For Unit Roots

Variables	Test Results For levels			Test Results For First Differences		
	Calculated	Critical Values		Calculated	Critical Values	
		1 %	5 %		1 %	5 %
LY	-1.556	-3.581	-2.927	-3.155*	-3.597	-2.934,
LDS	-0.3584	-3.581	-2.927	-2.990*	-3.597	-2.934

*, ** indicates the 5 % and 1 % significance level respectively.

The second step indicates to test the co-integration using the Johansen maximum likelihood approach (Johansen, 1988 and Johansen and Juselius, 1990) if there is co-integration the either uni-directional or bi-directional Granger causality must exist, at least in the I(0) variables. Table 2 indicates the results of co-integration using Johansen maximum likelihood approach employing maximum eigenvalue statistic for VAR=1. We report the results of co-integration analysis obtained by the estimation (a) with the lag length k=1. The maximal eigenvalue (λ max) statistic rejects the null of no co-integration ($r=0$) but not the null of at most one cointegrating vector ($r=1$) so there appears to be a single cointegrating vector for the system. Table 2 gives the co-integration analysis, where Max denotes the associated maximum eigenvalues.

Table 2. Johansen and Juselius Co-integration Test Between LY and LDS 1965-2001

<i>r</i>	(<i>λ</i> Max)	Probability (95%)
<i>r</i> =1	23.554 *	(0.015)
<i>r</i> =2	7.1025	(0.124)

This results are carried out by PC-Fiml 8 version. See Doornik, A. J. and Hendry, F. D. (1995)
 * denotes for 5% significance level.

In several studies of causal relationship between economic growth and external debt the lag lengths of lagged or lead terms of explanatory variables are chosen arbitrarily. The arbitrariness of lag lengths may affect the reliability of the statistical tests of causality. In order to remove arbitrariness one may use the Final Prediction Error (FPE) method to determine the optimal lag of the explanatory variables, instead of the arbitrariness. In our own study Granger causality test in this section, we employ the FPE method to determine the appropriate lag length on the basis of minimizing Akaike Final Prediction error (FPE). The results of Granger causality tests rely on the choice of lag length. Lag length should be chosen appropriately, if the chosen lag length is less than the appropriate lag length is greater than the appropriate lag length, the using of irrelevant lag causes the estimates to be inefficient (Lacivita *et al.*, 1991). We start with a lag length 4 on both variables for each equation and work down. The appropriate values of *m*, *n*, *q*, *r* are (4,1,1,3) respectively.

Following the detection of the cointegrating relationship between external debt service (LDS) and GNP (LY), an ECM was set up for investigating short-run causality. In the ECM, the first difference of each endogenous variable (external debt service (DLDS) or GNP (DLY)) was regressed on a one period lag of the co-integrating equation and lagged first differences of all the endogenous variables in the system. Source of causation can be identified by testing for significance of the coefficients on the dependent variables in Equation (1) and (2). First by testing $H_0 : y_i = 0$ for all *i* in Equation (1) or $H_0 : b_i = 0$ for all *i* Equation (2), we evaluate Granger weak causality. This can be implemented using a standard Wald test. Table 3 shows the result of a Granger causality test between external debt service and economic growth. As we find the coefficients on lagged external debt service in the DLY equation are not significant, we conclude that there is no short-run causal relationship running from external debt service to economic growth.

Using a Wald test, we find a uni-directional long run causality running from economic growth to external debt serviced because we cannot reject the null hypotheses that the coefficients on lagged Y are jointly zero in external debt service equation.

Table 3. Granger- Type Causality Tests Based on OLS Estimation

<i>Equations</i>	<i>Direction</i>	<i>Lag -length</i>	<i>Wald Test</i>	<i>Causality</i>
<i>Equation (1)</i>	<i>DLDS → DLY</i>	<i>(4, 1)</i>	0.134409 [0.8748]	No
<i>Equation (2)</i>	<i>DLY → DLDS</i>	<i>(1, 3)</i>	2.72669 [0.0816]*	Yes

*, ** indicates the 5 % and 1 % significance level respectively.
 These results are carried out by PC-Give 8 version. See Doornik, A. J. and Hendry, F. D. (1995)

6. Conclusion

This study has investigated a series of unit root, co-integration and causality tests to ascertain the direction of causality between the growth of GNP (Y) and external debt service in Turkey employing the FPE (Final Prediction Error) method for determining the optimal lag length of the explanatory variables. Moreover, the information on co-integration in variables is taken into consideration in specifying the correct model. The main conclusion of this study is that there is a long-run equilibrium relationship, as detected by co-integration vectors, between Y and debt service. Furthermore, the short run causality test indicates that output is the cause of external debt service in Turkey. There is uni-direction causality between the variables. Employing Granger causality in a sample of Turkey we found uni-direction causal relation from economic growth to debt service. This result, coupled with the comprehensive coverage of our investigation, suggests that debt overhang is an important factor for Turkey. Our test result indicates that debt service is a deciding determinant of economic growth and the existence of causality in debt service and output relationship may be due to the fact that borrowed resources are misallocated or wasted on consumption. The negative effects on productivity will haunt the economy as it agonizes over debt servicing in the future (Karagöl, 2002).

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