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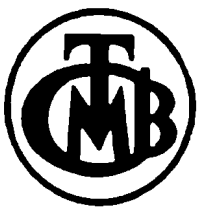

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Abstract: *Following Hamilton and Flavin (1986) this study introduces a model with two crucial assumptions (1) Creditors expect an event which increases governments indebtedness at some point in future, (2) Existing fiscal policies are unaffected by the expectation of the event. It can be shown that if the creditors internalize the event as a gift there will be a component in the real market value of public debts which forces it to grow at the real interest rate. With the occurrence of the event the debt level overshoots the level compared to the situation if the present value budget constraint was a valid hypothesis or if the increase in indebtedness occurred at time (t) rather than at some future period. The existence of a deterministic growth path and the jump in the Turkish debt/GDP ratio in 2001 are in line with the predictions of the model. After these findings the sustainability of fiscal policies in Turkey over the period 1988:q4- 2000:q4 is further tested by investigating the unit root behavior around a deterministic growth path by performing Mackinnon and Phillips-Schmidt tests.*

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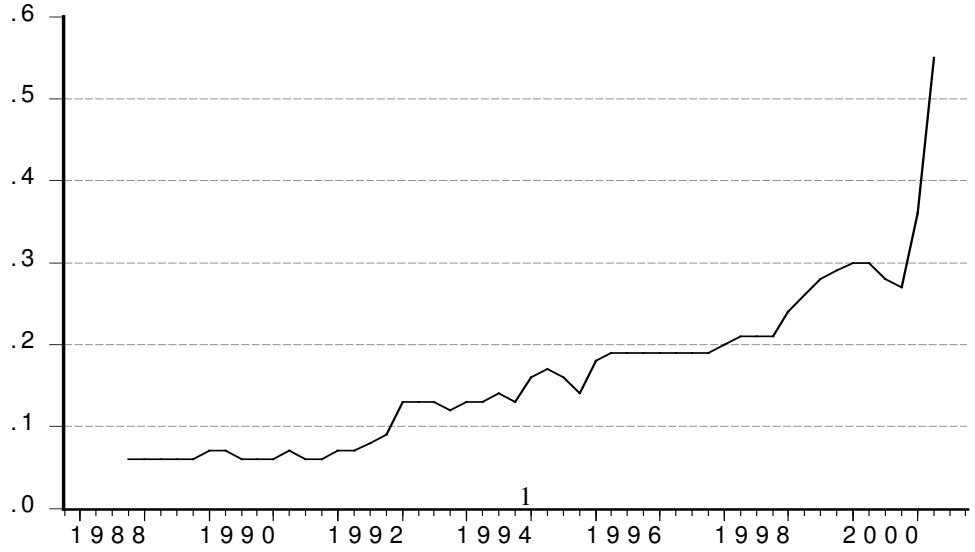
I- Introduction

Turkish public debt/GDP ratio exhibits a clear upward trend and some irregularities around this trend (see the graph-1). This kind of time path is not permissible in the long run since it is not practically possible for the debt/GDP ratio to increase forever. Moreover any presence of a trend component either stochastic or deterministic is also not consistent with the hypothesis of the present value budget constraint, which says that the market value of public debt should be equal to the present value of future surpluses. The question is then how it was possible for creditors to lend to governments with such an unsustainable fiscal outlook in Turkey. One approach to understanding this behavior of creditors might be to start thinking of the availability of financial sources other than taxes, which may compensate for some part of public debt in the future. If these kind of potential sources are expected by creditors then the limits on the government borrowings might be consistent with a hypothesis, which invalidates the argument of the present value budget constraint. Thus the market value of public debt need not be equal to the present value of the future surpluses. This proposition in the form of an alternative hypothesis was first formulated by Hamilton and Flavin (1986) to test the sustainability of fiscal policies in US. Their goal, however, is mainly to detect any sign of unsustainable fiscal policy implementation rather than explaining the behaviors of creditors. Another approach in understanding those behaviors is to think of a "Ponzi games" where governments pay out funds to creditors by borrowing from others. O'Connell and Zeldes (1988) investigate the feasibility of the game with a policy of rolling over all principal repayments and interest forever by issuing new debt. If government runs such a rational Ponzi game, they show that creditors will get a positive net present value by financing budget deficits.

Graph 1- Public Debt Stock as a Percent of GDP



In the literature, trends in public debt are analyzed together with the hypothesis of the present value budget constraint. Wilcox (1989) calculates the discounted value of debt and tests the resulting series to assess the sustainability of fiscal policies for the US economy. Since his approach allows the conversion of a sequence of public debt to a base year for which the discount factor is normalized to unity, it might be considered as an explanation and solution for long-run trends in public debt by linking them to interest rate movements. Buiter and Patel (1992) also carry out a similar calculation and tests for the Indian economy. On the other hand Trehan and Walsh (1988) investigate trends in public debt by arguing that expenditures inclusive of interest payments cannot drift too far away from revenues, which equivalently implies a relationship between public debt and primary surpluses. To test this long term relationship they carry out cointegration analysis for the US and the results support their hypothesis. By using a similar reasoning, Baglioni and Cherubini (1993) investigate trends in public debt and primary surpluses for Italy. They argue that if one of them is subject to a permanent shock, they should both have common trends and the relative magnitude of permanent changes should be consistent with real interest rates. Following their argument they concentrate on stationarity properties of those series in the presence of a deterministic trend by applying several tests.

This research explores the alternative hypothesis proposed by Hamilton and Flavin (1986) to answer the above question and to explain the existence of a deterministic trend in the path of the public debt/GDP ratio and the jump in 2001. It also draws attention to its implications on the limitations and sustainability of the debt. Turkey seems to be a realistic case to search for this alternative hypothesis since the model in the next section assumes (1) Creditors expect an event which will increase government indebtedness at some point in the future (2) Existing fiscal policies are unaffected by the expectation of this event. To illuminate those assumptions for Turkey it will be useful to give some crucial facts and search for the answer of some related questions about those facts. For this purpose the following section presents recent developments in the Turkish economy. Then section III develops the model. In section IV the model is estimated for Turkey. Section V discusses the test methods for the present value budget constraint in the presence of a deterministic trend and performs them for Turkish data. The final section gives the conclusion.

II- Background

The banking crisis in the first half of 2001 raised great concern for the sustainability of public debt in Turkey. Following the crisis the Turkish government took ownership of 4 private banks and the number of private banks under the government control increased to 13. To rehabilitate them extra bonds equivalent in value to 13 percent of GDP were issued by the government during the crisis period. A similar operation took place for the public banks as well. In this case the issued extra bonds amounted to 8 percent of GDP to compensate their losses. As a result of those operation public debt stock increased to the

record level, which was above 60 percent of GDP in the aftermath of these operations and it is still on increasing trend. In addition to those operations 30 percent of the public debt denominated in Turkish lira (TL) was converted into foreign exchange in the same period.

Related to this event are the questions whether creditors expected such a banking crisis and if it was expected when they perceived this possibility. Did they expect a change in the government's taxation policy including inflation tax, some kind of compensation through privatization or IMF rescue packages? If we search for answers to those questions, the following information should prove useful in the process: Firstly, the fragility of the banking sector in Turkey has been frequently expressed in the reports of international financial institutions[1]. Government reports also acknowledged this fragile financial condition. The Central Bank of the Republic of Turkey had announced its primary policy goal as to ensure the stability in the financial sector since 1994, which had generally meant to provide liquidity demanded by banks. Further the full cover of deposit insurance was introduced in 1994. However it is hard to claim that it solved the problems in the banking sector. Dowd (1993) argues that this kind of insurance for the banking sector deteriorates banks' capital and increases lending risk. He says:

"…The most perverse incentives are generated by deposit insurance which gives banks an incentive to compromise their financial health, and regulators and politicians incentives to hide the problem even though they know that doing so ultimately makes it worse." [Page:293]

As a realization of this prediction government had to eventually control the growing systemic risk in the sector by introducing a regulatory institution in 1999, the Banking Regulation and Supervision Agency. Therefore creditors in their risk assessments could not overlook the weakness and the existence of structural problems in the banking sector. Secondly, the Turkish economic agenda has relied on the income from privatization of public companies and real estate as a source of significant revenue for governments. To this end the Privatization Administration was established in 1994. Privatization revenues of 6.9 billion US$ have been realized since 1985 and 36 public companies and real estates are still in the portfolio of this institution. Moreover this agenda has been a part of the talks with the IMF and WB in finding financial support for the structural problems in the Turkish economy. Since 1996 talks with IMF has been going on in a friendly environment. By implementing IMF prescriptions the Turkish authorities utilized the credibility of the IMF as well as its credits. In addition to the previous credits the IMF extended 12 billion US$ in 2001 and it is expected this amount to grow in the near future. Therefore it was also not unrealistic to expect that any likely future problems in the banking sector would be treated by sources other than taxes. The recent IMF rescue packages actually gives some support to this argument. Thirdly, the expectation of this event should have not been associated with an expectation of radical fiscal policy

[1] For example, IMF press announcements as a result of Article IV consultations reports had been raising this issue since 1996. In those reports the main risk in banking sector was given as the short FX position of Turkish banks. However the perception of this risk goes back as early as to Gulf war, 1991, as some depositors run to their FX accounts and banks faced difficulties in the payments.

changes. To increase revenues through taxation seems to be not an easy task. An analysis of the budget reveals that it has already given primary surpluses since 1994 and tax revenues were around 30 percent of GDP in 2000. This ratio and expenditure policy should have left little room for creditors to expect any radical change in the government fiscal policy.

A final issue before introducing the model that might also explain a permanent deficit policy is the dynamic efficiency of the economy. McCallum (1984) presents the theoretical possibility for an economy for which this kind of policy is permissible. In dynamically inefficient economies where the marginal rate of return on capital is lower than economy's growth rate it is possible for governments to borrow more without effecting the setting of fiscal policies. Under such circumstances, government can issue new bonds only to finance interest payments and still observes a decreasing debt/GDP ratio[2]. However, the Turkish economy can be assumed to be a dynamically efficient economy since capital is a scarce resource which should be expected to contribute more to the productivity increases in the economy. Otherwise it would be possible to consume some of the capital without worsening the welfare of any generation, which is clearly a luxury for the Turkish economy.

III- Development of the Model

The model presented here assumes that creditors expect that government indebtedness will increase at some point in the future. It is also assumed that expectations about the size of the increase in indebtedness and the future primary surpluses are perfect. The only uncertainty remaining is the timing of the event. Creditors also see this event is not a reason for governments to change their existing expenditure and taxation policy until the time of the event. Instead they expect the government will be able to introduce some extra amount of bonds when it occurs. In the case of developing countries, such as Turkey, this might be caused by the expectation of revenues from other sources such as privatization or some kind of external financial support. The conclusion of the analysis does not change if bonds are introduced at time *(t)* instead of at some future periods provided that the creditors expect that some part of debt need not be paid for with taxes. In this case it produces similar conclusions as in the model presented by Hamilton and Flavin (1986).

Bonds are discount bonds and the analysis is carried out by investigating the convergence of the real market value of debt, B_t, when the perspective N for the expectation of real market value of bonds denoted by $E_t B_N$ tends to infinity[3]. The government budget constraint at period *(t)* can be written as follows;

[2] For a similar discussion see Elmendorf and Mankiw (1999) page: 1619.

[3] It makes no difference if we express as a percent of GDP or use nominal values of variables in the analysis.

$$B_t = B_{t-1} + R_t - S_t \tag{1}$$

Where B_t is the real market value of bonds at period *(t)*. B_{t-1} is the real market value of bonds available from period (t-1). $R_t = r_{t-1}B_{t-1}$ is the net interest payment made to the public by issuing new bonds or retiring them at period *(t)*. After subtracting real government expenditures S_t stands for the net real government revenues, which also includes seigniorage revenues.

As it is expressed above creditors expect an event will occur at a future period *(n),* but the exact timing of this event may or may not be known. Under the assumptions of the model, the present value borrowing constraint would mean the following null hypothesis to hold;

> H_0 : Creditors internalize the event as a burden, which is incorporated in the setting of fiscal policies at time *(t)*. In this case the expected market value of bonds at time *(n)* will be equal to;

$$E_t B_n = (1 + r_0)B_{n-1} + E_t d_n - E_t S_n \tag{2}$$

where $E_t d_n$ represents the expected monetary size of the event. If we recursively substitute equation (1) forward and let the perspective tends to infinity, the market value of bonds at time *(t)* can be written as follows:

$$B_t = \sum_{i=t+1}^{\infty} \frac{1}{(1+r_0)^{i-t}} E_t S_i - \frac{1}{(1+r_0)^{n-t}} d_n \tag{3}$$

which says that the market value of bonds at time *(t)* and thereafter accommodate the event by the amount of its present value at each period. When the event occurs at time *(n)* the decrease in the real market value of bonds will be exactly matched by the increase in the outstanding amount of bonds as a result of the introduction of bonds. Therefore the present value budget constraint will not be violated with the expectation of the event and after the event the real market value of bonds is equal to the present value of future surpluses. However, one of the alternative hypotheses that violates the present value budget constraint can be formulated as follows[4];

[4] The same conclusions of this hypothesis apply for the cases if the creditors discount the burden effect of the event more than gift effect. If they equally discount the burden and gift effects, then the analysis collapse into the standard analysis of the government budget constraint.

H_1 : Creditors internalize the event as a gift. The reason is that creditors see the event as the cause of new financial sources for governments. In this case the expected market value of bonds at time *(n)* will be equal to;

$$E_t B_n = (1 + r_0) B_{n-1} - E_t d_n - E_t S_n \tag{4}$$

If we again recursively substitute equation (1) forward and let the perspective tends to infinity, the market value of bonds at time *(t)* can be written as follows:

$$B_t = \sum_{i=t+1}^{\infty} \frac{1}{(1 + r_0)^{i-t}} E_t S_i + \frac{1}{(1 + r_0)^{n-t}} d_n \tag{5}$$

In contrast to the conclusion that results from the null hypothesis, this last equation tells that the market value of bonds at time *(t)* is equal to the sum of the present value of future surpluses and the present value of the event that is expected to be the source of an equivalent amount of financial sources at time *(n)*. Since *(n)* is not fixed, the equation above also suggests that if the creditors see the event as a financial burden for governments in future and can be potentially dealt with by financial sources other than taxes, governments will be able to delay the solution at the cost of increasing the debt level.

In this alternative case creditors value the event as a gift before it takes place. One of the implication of this behaviour is that the debt level overshoots the level with the occurrence of the event compared to the situation implied by the null hypothesis or if the introduction of bonds were unanticipated in the sense that if it was associated with no expectation of the event and/or the rescue packages before it happens. This overshooting phenomenon can be shown in a simple way by the following equation. If we let $\hat{B}_t$ denotes the outstanding amount of bonds after the event, then it will be equal to;

$$\hat{B}_n = B_n + E_t d_n + n \tag{6}$$

note that shortly before the event at time *(n)* the market value of bonds as given by equation (5) will be equal to;

$$B_n = E_t d_n + \sum_{i=t+1}^{\infty} \frac{1}{(1 + r_n)^{i-t}} E_n S_i \tag{7}$$

and n in equation (6) is an error term which accounts the difference between $E_t d_n$ and d_n. Since $E_t d_n$ already appears in the market value of bonds before the event at time *(n)*

as shown by equation (7), with the event available bonds in the market increase once more by the amount d_n, which must be equal to sum of the error in the size of expectation of the event and the expected value of the event expressed in equation (6). Therefore it overshoots the level implied by the situation of no expectation and no rescue packages or if the present value borrowing constraint was a valid hypothesis.

After this time the solution will depend on whether creditors expect any other similar future events or not. If governments compensate those bonds with the expected sources at period *(n)* or even if they are not compensated but the expectation cease to exist, it can be shown that the market value of bonds available at that period should imply a higher present value of future surpluses[5]. If this is not the case then the government borrowing will continue to violate the present value budget constraint even after the event.

IV- Estimation

The estimation of the model differs from Hamilton and Flavin in the sense that the information regarding to the present value of the expected surpluses are derived from the calculation of the within sample present values of actual surpluses for each period rather than conditioned on the past values. We also assume a deterministic version of d_n rather than the stochastic version by assuming that the size of the event was at some degree certain for creditors. By using the OLS method we fit the equation below to data to assess the adequacy of the model for the Turkish public debt. After removing autocorrelation with a lagged term the equation assesses the significance of both the force generated by the expectation of the event and within sample calculation of the present values of surpluses in explaining the real value of public debt. The estimated form of the equation is as follows;

$$B_t = \beta_0 + d_0^e (1+r_0)^t + \beta_1 \bar{S}_t + \beta_2 B_{t-1} + \varepsilon_t \qquad (8)$$

Where d_0^e is the present value of the monetary size of the expected event and $E_t d_n = d_0^e = (1+r_0)^{n-t} d_0$, r_0 is the average quarterly real interest rate in the sample period, $\bar{S}_t$ is the within sample calculation of the present value of future surpluses, ε_t is the residual which is serially independent and $\beta_0, \beta_1, \beta_2$ together with d_0^e are coefficients to be estimated.

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[5] After the introduction of bonds, the present value budget constraint should imply $B_t = \sum_{i=t+1}^{\infty} \frac{1}{(1+r_0)^{i-t}} E_t S_i$. Therefore decreases in real interest rate, increases in future surpluses or both will result a higher present value of future surpluses.

Table 1 reports the estimated coefficients and the diagnostic test results. The estimation period is 1992:q1-1998:q4. We preferred a shorter estimation period than the data available since the calculation of the within present value surpluses gets worse towards the end of the period. The value of r_0, the average real interest rate for a quarter over the estimation period 1988:q4-2000:q4, was taken 0.0264. The coefficients are all statistically significant at the 5 percent level. The coefficient of the trend term indicates that the Turkish public debt actually had a component, which grew at the average real interest rate. The average value of the expected event as given by this coefficient is about 14 percent of GDP. Moreover the discounted value of the event at time zero, 1992:q1, amounts to 10 percent of GDP. This coefficient also predicts extra bonds amounted to 36 percent of GDP to be introduced in 2000:q4. If we compare this prediction with the issued initial amount of 21 percent of GDP and the conversion of some bonds denominated in TL into foreign exchanges in the first half of 2001, it seems a good approximation in predicting the size of the event. On the other hand the coefficient of the present value surpluses, which can be interpreted as the extent of the internalization of future surpluses, indicates that one percent increases in the present value of the expected future surpluses creates 0.46 percent increase in the market value of bonds in a quarter. Further the diagnostic test statistics do not detect any dynamic misspecification for the model.

Table 1- Estimation Results for the Debt/GDP Ratio

	B_t	β_0	$(1+r_0)^t$	$\bar{S}_t$	B_{t-1}	ε_t
Coefficients		-0.2967	0.1369	0.4552	0.3943	
t-values		-3.35	3.85	3.24	2.55	
σ	0.0108					
LM_2	0.56 (0.58)					
$ARCH$	0.34 (0.57)					
DW	1.95					
$Chow_1$	0.66 (0.63)					

B_t is the ratio of Debt/GDP. r_0 is the average real interest rate for a quarter (0.0264) $\bar{S}_t$ is the four quarter moving average of the within sample calculation of the present value of the future primary surpluses including seigniorage (as a percent of GDP). ε_t is the residuals. Tests are as follows; t is for the t-test, σ is the standard error of regression, $Chow_1$ is Chow's breakpoint test (1994:q3), LM_2 is the Breusch Godfrey test for serial correlation of order 2, $ARCH$ is the LM test for autoregressive conditional Heteroscedasticity of order 1, DW is the Durbin-Watson. Values within parentheses show probabilities of statistics.

V- The Present Value Budget Constraint

The model presented in equation (5) suggests that the appropriate way to test the present value budget constraint before the event is to allow the presence of a deterministic trend. This test can be carried out by searching the unit root behavior of public debt. However, the standard unit root tests proposed by Fuller (1976), Dickey and Fuller (1979) and Phillips and Perron (1988) are not appropriate for the purpose. If we consider the model;

$$y_t = \psi + \varphi y_{t-1} + \delta t + \varepsilon_t \tag{9}$$

where $\{y_t\}$ is a sequence of a random variable, subscript t shows time, t=1,…….T, ψ and δ are nuisance parameters, ε_t is an IID process, the standard unit root tests are the test for the joint hypothesis H_0 : $\varphi = 1$ and $\delta = 0$ against the alternative hypothesis that the series is stationary around a linear deterministic trend. Therefore it excludes the unit root behavior around the trend which is the case when $\varphi = 1$ and $\delta \neq 0$. This property of the time series is important for us since the unit root behavior around a trend may indicate government borrowings are not constrained by the present value of budget, as there is no trend reversion. Schmidt and Phillips (1989) and Mackinnon (1991) take account this possibility and provide a new set of critical values. Schmidt and Phillips's test is derived from score principle while Mackinnon's test is based on the regression surface. In both cases the null hypothesis $H_0 : \varphi = 1$ is tested in the presence of nuisance parameter δ. Moreover Schmidt and Phillips' test can be extended to allow higher order polynomial trends. If we apply the form of representation used by Schmidt and Phillips (1989) for testing unit root behavior, the Turkish public debt in equation (5) can be approximated as follows;

$$B_t = \alpha + d_0 \ln(1 + r_0)t + \frac{1}{2} d_0 (\ln(1 + r_0))^2 t^2 + e_t \tag{10}$$

$$e_t = \varphi e_{t-1} + \varepsilon_t \tag{11}$$

The critical values for the above model to test the null hypothesis $H_0 : \varphi = 1$ are provided by Schmidt and Phillips (1989) on page 265 and the reported test statistics are derived from the OLS estimation of the following equation,

$$\Delta B_t = \sum_{j=0}^{p-1} c_j t^j + \phi \bar{e}_t + error \tag{12}$$

where c_j corresponds to the coefficients of trends in equation (10), p is the order of trend which is quadratic in our case and the residuals, $\bar{e}_t$ is the calculated residuals of

equation (10) by obtaining the OLS coefficients in difference form. In this case unit root behavior is tested by the least square estimates of ϕ for the hypothesis $\phi = 0$. In addition to this test the quadratic trend version can be also modified to linear trend under the assumption of unit root. This kind of reparameterization to linear trend enables us to see the robustness of Phillips and Shcmidt's test results by performing an additional test, Mackinnon test. Baglioni and Cherubini (1993) carry out this modification. They show that the model given by equation (10) and (11) can be alternatively written in the linear form by assuming $\varphi = 1$. In this case the representation of the model is;

$$B_t = B_{t-1} + d_0 \ln(1+r_0)(1-\frac{1}{2}\ln(1+r_0)) + d_0(\ln(1+r_0))^2 t + \varepsilon_t \qquad (13)$$

This equation imposes the restriction that the coefficient of B_{t-1} must be equal to unity. If we do not reject this restriction, the public debt should also exhibit unit root behavior around the quadratic trend since it encompasses the case $\varphi = 1$.

Table-2 presents the results for the above tests. For comparison, Phillips-Perron and Dickey-Fuller tests are also provided in the same table. The results show that the null hypothesis of unit root behavior cannot be rejected for the Turkish public debt. Test statistics for both Phillips-Shcmidt and Mackinnon tests are lower than the critical values at 10 percent level. It is important to note that one would reject the null hypothesis if Dickey-Fuller and Phillips-Perron tests were used for the Turkish public debt. Therefore the presence of trend in the Turkish public debt makes significant differences for the results of unit root tests obtained from those two set of tests. As a conclusion, those findings suggest that governments in Turkey have not been constrained by the present value of budget.

Table 2- Unit Root Tests

	Trend	$\hat{\tau}$	**Critical Value 5 %**	**Critical Value 10 %**
Phillips-Schmidt	quadratic	-2.73	-3.65	-3.34
Mackinnon	linear	-2.78	-3.50	-3.18
Augmented Dickey-Fuller	exponential	-3.21	-2.92	-2.60
Phillips-Perron	exponential	-2.82	-2.92	-2.60

$\hat{\tau}$ is the estimated test statistics. Test statistics are calculated for Debt/GDP ratio over the period 1988:4-2000:4

VI- Conclusion

The model presented in this paper extends Hamilton and Flavin's alternative hypothesis that government deficit need not be balanced with future surpluses if a certain amount of public debt at period *(t)* need never be paid for with taxes. It can be shown that the form and timing of this certain amount is not important. Any expectation of future events that is associated with some kind of compensation other than taxes such as, revenues from privatization, rescue packages etc., will be also valued at period *(t)* if the setting of fiscal policies does not encompass this event. Moreover when the event materialize itself, the market value of bonds shortly after the event overshoots the level implied by the size of event at time *(t)*.

The existence of a deterministic growth path and the jump in Turkish debt/GDP ratio in the first half of 2001 are in agreement with the conclusions of the model. The estimated growth path predicts the overshooting phenomenon to be 36 percent of GDP for the first half of 2001. The observed initial jump of 21 percent in the debt/GDP ratio and the conversion of some bonds into FX denomination support this prediction. Moreover the unit root behavior around this deterministic growth path can not be rejected for the Turkish debt/GDP ratio. These results can be also interpreted as a piece of evidences, which supports the alternative hypotheses in the literature that the borrowing of governments are not constrained by the present value of budget.

Following these findings our model has two implications for the afterwards of the crisis in Turkey: (1) To stop the forces behind deterministic growth in debt/GDP ratio any reform programs should not be associated with the expectations of further rescue packages and (2) Since we cannot reject the unit root behavior in the debt/GDP ratio, fiscal policies implemented in the estimation period are not consistent with a sustainable debt/GDP ratio. Therefore any reform program should also involve additional fiscal measures to bring stability to the debt/GDP ratio. If creditors continue to expect any further event and associated rescue packages the model predicts that it may be difficult to stop the trend components in the dynamic of public debt. Even if governments continue to borrow in excess of the limits drawn by the present value of the budget in the short-run, it will be at the cost of increasing debt to GDP ratio than necessary in the long run.

References:

Baglioni, A. and U. Cherubini (1993) "Intertemporal budget constraint and public debt sustainability: the case of Italy" Applied Economics, Vol.25, Page: 275-283

Buiter, W.H. and U.R. Patel. (1992) "Debt, deficits, and inflation: An application to the public finances of India" Journal of Public Economics, Vol.47, Page:171-205

Dickey, A.D. and W.A. Fuller (1979) " Distribution of the Estimators for Autoregressive Time Series With a Unit Root" Journal of the American Statistical Association, Volume 74, Issue 366 (Jun.), Page: 427-431

Dowd, K. (1993) *Laissez-faire Banking* Routledge Press.

Elmendorf, D. and N.G. Mankiw. (1999) "Government Debt" Handbook of Macroeconomics, Volume 1, *Edited by J.B. Taylor and M. Woodford,* Page:1615-1669

Hamilton J. D. and M.A. Flavin (1986) "On the Limitations of Government Borrowing; A Framework for Empirical testing" The American Economic Review, Volume 76, Issue 4 (Sep.), Page; 808-819

Fuller, W.A. (1976) *Introduction to Statistical Time Series* , John Wiley and Sons, New York.

McCallum, B.T(1984) "Are Bond-financed Deficits Inflationary? A Ricardian Analysis" The Journal of Political Economy, Volume 92, Issue 1 (Feb), Page: 123-135

McKinnon, J. (1991) "Critical Values for Cointegration Tests" in *Long-Run Economic Relationships; Reading in Cointegration* Edited by R.F Engle and C.W.J. Granger, Oxford University press.

O'Connell, S.A and S. Zeldes (1988) "Rational Ponzi Games" International Economic Review, Vol 29, No:3, Page: 431-450

Phillips, P.C.B. and P. Perron (1988) "Testing for a Unit Root in Time Series Regression" Biometrika, Vol.75, Page: 335-346

Schmidt, P. and P.C.B. Phillips (1992) "LM Tests For a Unit Root in the Presence of Deterministic Trends" Oxford Bulletin of Economics and Statistics, Vol.54 (3), Page: 257-287

Trehan, B and C.E. Walsh (1998) "Common Trends, the Government's Budget Constraint, and Revenue Smoothing" Journal of Economic Dynamics and Control, Vol.12, No:2-3, Page: 425-444

Wilcox, D.W. (1989) "The Sustainability of Government Deficits: Implications of the Present-Value Borrowing Constraint" Journal of Money, Credit and Banking, Vol.21, No:3 (August), Page 291-306