METU Studies in Development, 30 (June), 2003, 35-60

Debt sustainability and the exchange rate: The case of Turkey

Nur Keyder*
Middle East Technical University, Department of Economics, 06531 Ankara.

Abstract

The paper attempts to estimate the primary surplus requirement for debt sustainability in Turkey, taking into consideration not only the operational deficit and seigniorage factors but also the exchange rate factor. In estimations, a modified version of the approach suggested by the World Bank (World Bank, 2000, "Turkey-Country Economic Memorandum-Structural Reforms for Sustainable Growth, Vol. I and II", Report No. 20657-TU, Washington, DC, 16-18; 121-4) is used. The analysis is carried out in two steps. First, the real interest rate is estimated and then the results are plugged into the primary surplus equation. The exchange rate factor is taken up during the estimation of the real interest rate in TL, on FX-related debt. The debt sustainability issue is evaluated by comparing the estimated primary surplus-to-GNP ratios required for debt sustainability, with the targeted primary surplus ratio, taking into consideration the real interest rate and composition of the existing debt stock.

1. Introduction

External debt sustainability, as stated in the World Bank and IMF (2001: 4) document, can be attained by "...bringing down the net present value of external debt down to about 150 percent of a country's exports", here the aim being "[elimination of] this critical barrier to longer term debt sustainability."[1] Similarly, in general, the ratio of the net present

* The author is most grateful to Prof. Oktar Türel for his constructive suggestions in connection to the graphical representation of the results. Sincere thanks are also due to Prof. Craig Burnside for his further elaboration of the primary surplus equation derivation given in World Bank (2000). The paper was prepared in June 2003 and updated in December 2003.

[1] For some of the literature, which analyzes the external debt sustainability issue using the 'present value constraint' approach, see World Bank and IMF (2000), Lachler (2001) and

value of external debt to GDP of 50%, is regarded as sustainable over the long run.

However, when fiscal sustainability is discussed, the aggregate public sector debt, both domestic and external, should be considered[2]. An economy is said to have achieved fiscal sustainability "...when the ratio of public debt to GDP is stationary, and consistent with the overall demand—both domestic and foreign—for government securities." (Edwards, 2002: 3). In other words, national and international creditors' desire to accumulate government debt instruments should grow at the same pace as the government's borrowing need. A concept closely related to the debt sustainability issue is the 'primary balance', which is expected to be compatible with a stable debt-to-GNP ratio. The primary balance is obtained by deducting government expenditures (excluding interest payments) from government revenues. Also highly significant is the concept of operational deficit, which is obtained by adding the real interest burden of the government on to the primary balance.

In our earlier study (Keyder, 2002), the primary surplus requirements for different growth rate (g), inflation rate (p) and real interest rate (r) scenarios were estimated, where for the real interest rate, the average real interest rate on total borrowing plus non-maturing debt (FX plus TL) was used. However there, the real interest rate on FX borrowing plus non-maturing debt was assumed to be the same when converted into real interest rate in TL terms, since the possible appreciation/depreciation of the TL over the year 2003 was ignored. However, as witnessed in 2002, TL's real appreciation/depreciation may play a crucial role in debt sustainability. In this paper we attempt to modify the formula used by the World Bank (2000: 16-8; 121-4) to estimate the primary surplus ratio, so as to take account of exchange rate movements. The 'non-maturing debt plus borrowing' is divided into two parts: the FX-linked part and the TL-denominated part. The real interest rate for the two categories are estimated separately (r_{FX} and r_{TL}); and in the formula used, they are weighted by the FX-linked and the TL-linked debt expressed as percentage of GNP (b_{FX} and b_{TL}), respectively. The Undersecretariat of Treasury (2003a: 93) has used a formula that takes exchange rate movements into account; however, in the scenarios presented, the exchange rate factor is ignored. The approach used here, is slightly different and does not take privatization revenues into account.

Edwards (2002). In Edwards' work (2002), the role of debt relief in debt sustainability analysis is emphasized in reference to Nicaragua, as a representative of the HIPC.

[2] On sustainability analyses see, for example, Edwards (2002), Milesi-Ferreti and Razin (2000) and Uçtum and Wickens (2000).

The rest of the paper is organized as follows: In the second section, as background information, the variables/indicators relevant to debt sustainability are discussed. In section three, the formula used to estimate the primary surplus ratio is presented. Section four gives the estimation of the real interest rate, first that on FX-related borrowing plus non-maturing debt, and then on TL-denominated borrowing plus non-maturing debt. In section five, using Turkish data, the primary surplus ratio requirement for the year 2003 to keep the debt ratio stable at its end-2002 level is estimated under different scenarios for experimental purposes. Later in the section, estimations are carried on scenarios that are most likely to be realized over the years 2003, 2004 and 2005. Section six gives graphical presentation of FX revaluation rate-real TL interest rate combinations that render debt sustainable. In section seven, we tried to answer the question "Will Turkey ever be able to reach the debt ratio accepted as the Maastricht criteria?" The last section is reserved for conclusions.

2. Background information on variables / indicators relevant to debt sustainability

2.1 Composition of the public debt stock

The composition of the outstanding central government debt stock (gross, consolidated budget based; involving general and annexed budget administrations only[3]) for December 2002, was as follows (Undersecretariat of Treasury, 2003a): The total was $148.5 billion, of which $91.7 billion was domestic and $56.8 billion was external. Hence, in 2002, external debt made up 38% and the domestic debt constituted 62% of the total central government debt stock. IMF[4] was the major lender among foreign institutions, with a $13.9 billion loan. The stock figures mentioned are gross and they do not include Turkish Central Bank's (CBRT) debt and Treasury guaranteed debt.

Looking at the composition of the $148.5 billion *central government total debt stock* by lenders, we see that 29% was to the market and 33%

[3] This part of the debt stock indicates direct indebtedness of the Treasury. SEE's and Central Bank's debts are excluded. As of end-2002, the Central Bank was not in a net-debtor position; and if SEEs are assumed to be able to pay their debts out of their earnings, the central government net debt stock is the part of the total debt stock that should be considered in connection to the debt sustainability issue. The estimations are based on the Net Debt Stock-to-GNP ratios, which are considerably below the gross debt stock-to-GNP ratios. The figures in Table 1 are 'gross' figures.

[4] In the $13.9 billion debt to IMF, IMF credit extended to CBRT is not included. The Central Bank gave $5.9 billion of the IMF credit it received to the Treasury to be used for budget financing. The Treasury gave the CBRT Treasury paper in return. Hence the $5.9 billion is seen as part of the $91.7 billion domestic debt stock.

was to the public sector. These made up the domestic component of the total. Again of the total public debt stock; 23% was in the nature of loans from foreign sources and 16% was external borrowing via bond issues (Table 1). The latter two make up the external debt, which accounted for 38% of the total consolidated budget gross debt stock in 2002.

Table 1
Consolidated Budget Total Debt Stock

	End-2002 Total ($Billion)	%	End-2003 Total ($Billion)	%
Debt by Lender	**148.5**	**100**	**202.7**	**100**
Domestic Debt Stock	**91.7**	**62**	**139.3**	**69**
Domestic Market	43.3	29	72.9	36
Public Sector	48.4	33	66.4	33
External Debt Stock	**56.8**	**38**	**63.4**	**31**
Loan	33.7	23	36.6	18
International Institutions	(20.6)	(14)	(23.5)	(12)
Foreign Governments	(6.8)	(5)	(6.9)	(3)
Commercial Banks	(6.3)	(4)	(6.2)	(3)
Bond Issues	23.1	16	26.8	13

Source: Undersecretariat of Treasury.

Considering domestic debt stock alone, we see that in 2002, 52.8% represents the Treasury's indebtedness toward other public institutions (18.8% to CBRT, 16.2% to State Banks, 7.4% to SDIF and 10.5% to other public institutions) and 47.2% represents the Treasury's indebtedness toward the market. The Treasury's debt to other public institutions can be restructured or consolidated with interest rates in favor of the debtor; also the interest payments among the public institutions are netted out when the public sector balance sheet is consolidated. Hence, in discussing the debt sustainability issue, the major concern is actually the public sector debt stock toward the market.

In 2002, 32% of the domestic debt stock was FX-related. This corresponds to 20% of the total stock. Hence 58% (= 38% + 20%) of the total stock was FX-related. The other components of the domestic debt stock by instruments were; 25% fixed and 43% Floating Rate Notes (FRNs).

As of the end of December 2003, the composition of the consolidated budget gross debt stock was as follows: The total public debt stock increased to $202.7 billion, 31% of which was external, and 69% domestic. 53.7% of the public debt was TL denominated and 46.3% FX

linked. 36% of the total debt stock was to the domestic market, 33% to the public sector, 13% to foreign markets against bond issue, 3% to commercial banks, 12% to multinational agencies, and 3% to foreign governments (Table 1). Looking at the domestic debt stock alone, of the $139.3 billion, 47.7% of the debt was to the public sector (13.8% to CBRT, 14% to state banks, 7.7% to SDIF and 12.1% to other public institutions) and 52.3% is to the market. As of December 2003, 22% of the domestic debt was FX-linked; 43% floating rate and 35% fixed rate.

2.2 Net public debt-to-GNP ratio

The net public debt-to-GNP ratio, which was 29% in 1990 and 57.7% in 2000, climbed up to 95% in 2001, and was back to 79.4% in 2002. The reasons behind the debt explosion experienced in 2001 can be summarized as follows:

- *Weak fiscal performance*: Over the period between 1990-94, the primary deficit-to-GNP ratio averaged 4.5%, while the operational deficit was on average 8.3% of GNP.
- *High real interest rates*: The primary deficit of the first half of the 1990s turned into a primary surplus (0.1% of GNP on average) over the 1995-2000 period. Yet, due to high real interest payments, the country's operational deficit was still high (5.8% of GNP on average). This contributed to the surge of the debt ratio.
- *Weak banking sector and 'duty losses':* The debt explosion experienced in 2001 was the outcome of the hidden Treasury debt, the so called duty losses, coming into the open and the rehabilitation costs of the ill-managed private banks that were turned over to the Saving Deposit Insurance Fund (SDIF). 'Duty losses', which accumulated in public banks, originated from uncompensated credit subsidies and payments for agricultural sector and small and medium sized companies. In 2001, the Treasury injected around $40 billion (around $1/4^{th}$ of the GNP of that year) for the rehabilitation and restructuring of these state and private banks.

2.3 Primary surplus-to-GNP ratio

The primary surplus-to-GNP ratio realized in 2002 was 4%, which fell behind the 6.5% target. In terms of actual size, the primary surplus realized at TL11.05 quadrillion levels was below the TL16.7 quadrillion target set for the year (The Undersecretariat of Treasury, 2003c). Even if the primary surplus target had been realized, when divided by the TL273 quadrillion realized GNP, it would have corresponded to 6.1%, instead of the targeted 6.5% primary surplus ratio. The primary surplus level

required is calculated by multiplying the targeted ratio by the *ex ante* estimate of the GNP (or its revised estimate). When the actual GNP (*ex post*) turns out to be much higher than the revised estimate, the primary surplus ratio falls behind the target. Hence, 0.4 [= 6.5%(target)-6.1%(realized)] percentage point of the shortfall was due to the better than expected growth rate (7.8% instead of 5%) in 2002. The rest of the shortfall in the realization of the primary surplus ratio was due to the weaker than expected revenues and expenditure overruns owing to early elections that took place in November 2002. Despite the shortfall in the primary surplus ratio, the debt-to-GNP ratio declined from 95% in 2001 to 79% in 2002. The favorable effects created on the debt ratio by growth and real appreciation of the TL are the responsible factors behind this drastic fall. Hence, in the case of a country where a significant portion of the public debt stock is FX-linked (58% as of end-2002; 38% originating from the external debt, 20% from FX-linked domestic debt), the effect of exchange rate movements should not be ignored in the debt sustainability discussions.

2.4 Exchange rate

Starting in May 2003, TL strengthened against foreign exchange. Appreciation was more pronounced against the US Dollar (USD) than against the Euro due to the change in USD/Euro cross rate against the dollar. TL's appreciation against the Euro was not so drastic in May 2003; however starting in July, TL started gaining further strength against both the dollar and the Euro due to increased FX supply, which generally is encountered during the summer months as a result of increased tourism revenues. Merrill Lynch (2003a), in its June 17, 2003 report, claims that in Turkey "... privatization, EU-inspired reforms, disinflation and high [real] interest rates remain supportive of a strong lira".

The Central Bank's direct interventions to prevent excess volatility as well as currency overvaluation were futile in reversing the overvaluation. The Central Bank's FX buying auctions resumed in May 6, 2003 (initially the daily ceiling was $20 million, which was raised to $30 million in June, $40 million in early July, $50 million on 17 July 2003, $75 million–$25 million of it being option buying–on 11 September 2003, and $120 million–$40 million of it being option buying–on 7 October 2003). The limit was reduced to $60 million ($20 million of it being option buying) on October 20, 2003 and temporarily suspended on October 23 since the exchange rate was rising on its own. Between May 6 and October 22, 2003, the Central Bank's FX buying auctions plus its six direct interventions resulted in $9.9 billion worth of purchases by the Central Bank. The TL expansion caused by these purchases was sponged

back through 2-4 week maturity daily TL buying auctions, interbank borrowing, outright open market sales and/or reverse repo transactions.

There is a widespread belief that the TL is highly overvalued. If this were true, one would expect a significant deterioration in Turkey's trade balance. However, Central Bank data reveal that both the export and import performance over the first eleven months of 2003 (January-November) when compared to the same period of 2002 have been extraordinary (29.2% growth in exports, fob, and 31.4% growth in imports, CIF, gold included)[5]. Over the first eleven months of 2003, the trade deficit was $11.2 billion and the current account deficit was $4.2 billion (in 2002, trade deficit for the same period was -$6.86 billion). The export-import ratio was around 69%. The negative effect on exports created by the real appreciation of the TL might have been partially offset by the improvements in the unit labor costs. A study conducted by the State Planning Organization estimates the productivity growth in the manufacturing sector as 18% over the 1999-2002 period; this, along with declining real wages in the sector, is claimed to have resulted in reduced unit labor costs. Only the strengthened TL also cannot explain the surge in imports since only 10.4% of imports comprise consumption goods and the rest are investment (15.4%) and intermediary goods (73.5%) (January-October, 2003). Hence, the strong demand for investment and intermediary good imports may be a signal of high growth in 2003. The 2003 first quarter year-on-year growth rate was 7.4% for GNP and 8.1% for GDP. GNP's 2003 first six months' year-on-year growth rate was 5.4%. The capacity utilization rate was 80% as of December 2003.

A strong TL, while easing debt sustainability, and creating a favorable impact on the inflation rate (pass-through effect of the exchange rate), may also create an adverse effect on the current account. The current account deficit of end-2003 will probably be around $5 billion (below the revised target of $7.7 billion or 3.5% of GDP—the original target was $3.5 billion). In light of the exchange rate developments as well as the growth factor. This is likely to be manageable since "the balance-of-payments data suggests that the deficit has so far been largely financed through capital repatriation" (Merrill Lynch, 2003b). It is worth noting that the 'net errors and omissions' item posted a surplus of $2.9 billion during the January-November 2003 period. This unrecorded foreign exchange inflow meets part of the demand for foreign exchange created by the current account deficit ($4.2 billion for January-November 2003), hence reduces the pressure on the exchange rate. In the event of a slow down or pause in the capital repatriation, however, the high current account deficit may cause

[5] See Central Bank, http://www.tcmb.gov.tr/bop.

increased demand for foreign currency and hence contribute to correction of the overvaluation of the TL. Actually, the overvaluation of the TL is not as drastic as suggested by the real exchange rate series posted by the Central Bank, which uses 1995 as the base year, and which we believe is a bad choice. When the same series is expressed as 1999(12) as the base period, for instance, the size of the overvaluation in October 2003 goes down from 43% to 12%.

2.5 Privatization

Privatization is moving at a very slow pace. The Government's 88.9% stake at Petkim, 65.8% stake at Tupras (the oil refinery) and 100% stake at TEKEL (the state tobacco and alcohol monopoly) are on the privatization agenda.

2.6 Inflation rate

The inflation rate is expected to fall below the 20% target set for end-2003, and it will probably reach one digit level by end-2005, if not sooner. The 2003 inflation rate is the lowest inflation rate since 1970.

3. Formula used to estimate the primary surplus ratio

The World Bank estimates the primary surplus needed to keep the debt ratio stable using a formula that takes growth, real interest rate and seigniorage factors into consideration (World Bank, 2000: 16-8, 121-124)[6]. At this point, we propose modifying the formula, by adding a third term to capture the effect of the exchange rate movements on debt and hence the primary surplus requirement. Actually, the exchange rate factor is handled during the process of the estimation of real interest rate on *FX* debt in *TL* (r_{FX}), which is later plugged into Equation (1)[7] below.

The formula used is as follows (all terms are at t except the primary surplus ratio (s), which is at $t+1$):

$$s(t+1) = [(r_{TL} - g)/(1 + g)]b_{TL} + [(r_{FX} - g)/(1 + g)]b_{FX} - [(p + g + p\,g) / (1 + p + g + p\,g)]\,m \qquad (1)$$

[6] We added *pxg* to both the numerator and the denominator of the seigniorage term (see Appendix A for derivation of the formula). Goldfajn (2002) and Goldstein (2003), in their primary surplus estimations, ignore the seigniorage factor and use a formula that accounts for real interest rate and the growth factor only.

[7] For the derivation of the World Bank (2000) formula on which Equation (1) is based, see Appendix A

where;

s = long-term primary surplus-to-GNP ratio required for debt sustainability at $t+1$
b_{TL} = public sector debt stock denominated in TL-to-GNP ratio, at the beginning of the period
b_{FX} = public sector debt stock denominated in FX-to-GNP ratio, at the beginning of the period
e = revaluation rate of FX (FX Basket = 0.5$+0.5Euro) (TL/FX)
r_{TL} = real interest rate on TL-denominated debt and borrowing
r_{FX} = real interest rate on FX-linked debt and borrowing in TL terms
g = growth rate
p = domestic inflation rate
m = reserve money-to-GNP ratio, which takes different values under different "real interest rate-inflation rate" combinations.

If the primary surplus-to-GNP ratio estimated for 2003 under different scenarios is found to be below the targeted 6.5%, the difference between the two figures will contribute to the gradual reduction of the government debt stock-to-GNP ratio.

The reserve money-to-GNP ratio (m) in equation (1) is estimated using the following regression equation[8] (1970-1999):

$\ln(m) = f(r + p) = f(i)$ where i is the nominal interest.

$$\ln(m) = -2.2555 - 0.6053\, i$$
$$(-70.1) \quad (-10.8)$$

$R^2 = 0.81$; SSR = 0.2946; DW = 1.6934

The term, $[(p + g + pg) / (1 + p + g + pg)\, m\,]$ gives the seigniorage amount expressed as percent of GNP. The first two terms of Equation (1), on the other hand, give the effect of growth and real interest rate on the primary surplus requirement. This part of the equation implies that the closer the real interest rate is to the growth rate, the more sustainable is the debt.

---

[8] To be able to apply this formula, it was necessary that real income (y) elasticity of real reserve money (rrm) (deflated by WPI) be close to unity. The OLS estimation result given below satisfies this condition. The reason why annual data over the period 1970-1999 was used is because the crises years (2000 and 2001) could not be accepted as normal years.

$$\ln(rrm) = -2.127 + 0.967 \ln(y) - 0.0057\, R$$
$$(-3.75) \quad (6.34) \quad (-3.54)$$

Adjusted $R^2 = 0.76$; SSR = 0.2975; DW-statistics = 1.676

(Note: R is the nominal interest rate on time deposits.)

4. The real interest rate

Real interest rate (r) is generated from two sources: FX-linked debt (comprising 58% of consolidated budget debt stock as of end-2002) and the TL-denominated debt (comprising 42% of the consolidated budget debt stock as of end-2002). Actually, from 1995 to 2002, the average effective real cost of public debt service was about 11.5%, but real interest rates have fluctuated considerably (World Bank, 2003: 22).

The real interest rate on FX-linked debt expressed in TL terms (r_{FX}) can largely be affected by real appreciation/depreciation of the TL. Hence, the real interest rate on FX-linked non-maturing debt plus borrowing in terms of TL, is estimated under scenarios that account for exchange rate variability. The procedure used to arrive at the real interest rate on FX-linked debt plus borrowing in terms of TL (r_{FX}) is as follows:

First, the interest rate in FX is converted into nominal interest rate in TL using Equation (2).

$$i_{FX}^{*} = [(1 + i_{FX})(1 + e)] - 1 \qquad (2)$$

where, i_{FX}^{*} is the average interest rate on FX-linked debt plus borrowing in TL (nominal); i_{FX} is the average interest rate on FX-linked debt plus borrowing in FX (nominal); and e is the revaluation rate of FX over the year.

Then, the nominal interest rate in TL terms (i_{FX}^{*}) is converted into real interest rate in TL terms (r_{FX}) on FX-linked debt, using the following equation.

$$r_{FX} = [(1 + i_{FX}^{*}) / (1 + p)] - 1 \qquad (3)$$

To be able to use realistic figures in our alternative scenarios, we need to have some idea on the current average interest rate on FX non-maturing debt plus new borrowing during rollover. As a 'financing requirement', the 2003 Program envisages $3,9 billion *borrowing from international institutions* (the World Bank and the IMF) and $6.2 billion *external borrowing*. The interest rate charged by the World Bank is Libor plus 0.75; For example, Libor was 1.44 (9 months) as of December 4, 2003, hence the interest rate on the World Bank credit would be around 2.19% if the repayment were due on this date. The rate charged by the IMF, on the other hand, is around 4-4.5%. A major portion of the current foreign debt stock is the debt to these international institutions, bearing 5-7 year maturities. Hence the interest service on this portion of the non-maturing debt over 2003 will also be at levels mentioned above. On

September 12, 2003, the 10-year Euro bond yield was 9.67%; but it is following a declining trend (on April 25, 2003 it was 11.7% and on March 25, 2003 it was 15%). The $8.5 billion credit offered by the USA as Iraq war compensation may carry an interest rate close to the 10-year term US Treasury bond rate, which is arround 4%. In the average interest rate estimations, this is not included. If and when realized, however, the interest rate on this credit will pull the average interest rate further down. In the real interest rate on the FX denominated debt estimations given in Table 2 below, for exercise purposes, the average interest rate on the new FX borrowing plus non-maturing FX-linked debt over 2003, is taken between 5 and 13%.

4.1 Real interest rate on FX-iinked debt in TL terms

As mentioned above, using Equation (2), first the FX-denominated interest rate was converted into TL-denominated nominal interest rate; and then, using Equation (3) the nominal rate was converted into real interest rate on FX-linked debt, in terms of TL. It is at this stage that the exchange rate factor enters the picture. Table 2 gives the real rates on FX-denominated debt in TL, under different scenarios, representing alternative 'FX revaluation rate, inflation rate, FX interest rate' combinations. For example, in reference to Table 2, if the inflation rate were 25%, the revaluation rate of FX were 15% and the interest rate on FX debt were 13%, then the real interest rate on the non-maturing FX debt plus borrowing would be 4%.

Table 2
Real Interest Rate on FX Debt Expressed in TL Terms

	Inflation Rate (%)											
	20						25					
	i_{fx}						i_{fx}					
e	**0.05**	**0.07**	**0.09**	**0.1**	**0.11**	**0.13**	**0.05**	**0.07**	**0.09**	**0.10**	**0.11**	**0.13**
0.15	0.006	0.025	0.045	0.054	0.064	0.083	-0.034	-0.016	0.003	0.012	0.021	0.040
0.2	0.050	0.070	0.090	0.100	0.110	0.130	0.008	0.027	0.046	0.056	0.066	0.085
0.25	0.094	0.115	0.135	0.146	0.156	0.177	0.050	0.070	0.090	0.100	0.110	0.130
0.3	0.138	0.159	0.181	0.192	0.203	0.224	0.092	0.113	0.134	0.144	0.154	0.175

4.2 Average real interest rate on TL-denominated debt (new borrowing plus non-maturing debt)

As of end-December 2003, 56% of the domestic debt stock was in the form of FRNs, paying interest on a quarterly basis. The FRNs sold to the

market bear a 2-year term and those in the hands of the public institutions bear 3-7 year terms, in the average. This means that, if the interest rate is following a downward trend, in the following quarters, the interest rate on this portion of the debt stock will decline parallel to the interest rate formed at the reference auctions. This will automatically bring down the average interest rate on the existing TL-denominated debt stock. The domestic debt carrying a fixed rate makes up only 44% of the total; and the maturity of this debt is relatively short. The average interest rate on the Treasury auctions held over the first 4 months of 2003, was around 53%, which implied a real rate above 25%. The Central Bank reduced its overnight lending rate by 3 percentage points on April 25, 2003, June 4th, August 6th, September 18th and October 15th, respectively (o/n borrowing/lending rate becoming 26% and 31%, respectively, on October 15, 2003). Because of this and the gradually increasing confidence, which reduces the risk premium, the interest rates have been following a declining trend. The Central Bank may go into further cuts in its o/n rates when the time is right. This move can be expected to lower the Treasury borrowing rates further. Hence a real interest rate on the TL-denominated debt/borrowing around 15-20% for 2003 as a whole would actually be a highly conservative assumption, considering the fact that the real interest rate on the domestic debt stock alone was announced by the Treasury as 11.0% for April, 11.38% for May, 13.12% for June and 12.87% for July, 15.11% for August and 12.88% for September, 2003.

5. Estimation of the primary surplus ratio required to keep the debt ratio stable

Real interest rates on FX-linked debt plus borrowing in TL terms (r_{FX}) given in Table 2 was plugged in the second term of Equation (1), along with the growth rate assumption (ranging from 3 to 7%) of the different scenarios. The weight (FX-linked debt-to-GNP ratio) (b_{FX}) used was 0.4582 [(= 0.79 (public debt-to-GNP ratio in 2002) x 0.58 (share of FX-linked debt in total public debt)]. The weights used are those of end-2002. The result gave the primary surplus requirement originating from FX-linked non-maturing debt plus borrowing.

Similarly, under different 'real interest rate (on TL denominated debt)-inflation rate-growth rate' scenarios, using the first term of Equation (1), the primary surplus requirement originating from TL-denominated debt was estimated. Here the weight (TL-denominated debt-to GNP ratio) (b_{TL}) used was 0.3318 [(= 0.79 (public debt-to-GNP ratio in 2002) x 0.42 (share of TL-denominated debt in total public debt)]. Then the primary surplus requirements in connection to the FX-linked debt and the TL-denominated debt were summed up. The final primary surplus-to-GNP ratio (s) was obtained by adding the seigniorage term's contribution

(which has a negative sign in the formula) to this total. The results are reported in Tables B-1, B-2 and B-3 in Appendix B, which are constructed under the assumptions of 9, 10 and 11% nominal FX rates. The estimations in the tables should be interpreted as follows: to keep the public debt-to-GNP ratio of end-2002 constant, the primary surplus-to-GNP ratio in end-2003 should be X% (here, X = the primary surplus-to-GNP ratio (s) mentioned in the table for different scenarios). Actually "revenue from privatization-to-GNP" ratio should be deducted from this result. In other words, a privatization term should be added to Equation (1) with a negative sign.

The scenarios used for the construction of Tables B-1, B-2 and B-3 are hypothetical, and these tables are constructed for exercise purposes only. The intention here is to show the effect of FX interest rate, real TL interest rate, revaluation/devaluation rate and the inflation rate on primary surplus requirement for the sustainability of the debt ratio. The results presented in Tables B-1, B-2 and B-3 can be evaluated as follows: At the higher inflation rate (25% instead of 20%), the favorable effect of seigniorage on the debt stock ratio is higher. The same is true for the growth rate. Similarly when the revaluation rate is below the inflation rate, it implies real appreciation of the TL over the period, leading to a lower real interest rate on the FX-linked debt in terms of the TL (holding the nominal interest rate on FX debt constant). This too eases debt sustainability. The real interest rate on the TL-denominated debt, on the other hand, has an adverse effect on debt sustainability. The shaded areas on the tables in Appendix B, point to the scenarios where debt sustainability becomes questionable, since in these cases the primary surplus requirement is above the targeted 6.5%. If we generalize; these specific scenarios implying unsustainability, display a high rate of revaluation of FX (25-30%), combined with a high real interest rate on the TL-denominated debt (20-25%). The situation gets worse as the growth rate declines. However, even when the r_{TL} is high, appreciation of the TL and/or a high growth rate, may lead to a primary surplus requirement below the 6.5% target.

Debt-to-GNP estimations based on the scenarios which are more likely to be realized over the 2003-2005 period are given below:

The most likely scenario for 2003 is assumed to have the following ingredients: p = 20%, e = -8%, r_{TL} = 15% and g = 5%. Based on end-2002 government debt-to-GNP ratio (79%) and taking the end-2002 TL-FX composition of public debt constant (42% and 58%, respectively; hence b_{TL} = 0.79 x 0.42 = 0.33 and b_{FX} = 0.79 x 0.58 = 0.46), for end-2003 we estimate the debt-to-GNP ratio as 66.3 %. However, this result is likely to be an underestimation; since the TL-FX composition of the debt stock which was assumed to remain constant, has changed considerably

in 2003. As the numbers are being released it is seen that, compared to end-2002, the share of TL denominated debt has increased from 42% to 53.7%, while that of FX-linked debt has decreased from 58% to 46.3% by end-2003. Hence we took the average of the TL and FX shares of public debt at the beginning and end of 2003 and applied it to 2002 year-end net debt ratio (0.79) to arrive at 2003 b_{TL} and b_{FX} (b_{TL} = {(0.537+ 0.42)/2} x 0.79 = 0.378; and b_{FX} = {(0.463 + 0.58)/2} x 0.79 = 0.412) and we used these ratios in the estimation of end-2003 net debt ratios. The results under different scenarios are reported in Table 3. For the scenario e = -8%; r_{TL} = 15%, g = 5%, p = 20%, i_{FX} = 9%, s = 6.5%, the end-2003 net debt ratio is estimated as 67%. Leaving room for possible under-estimation (for instance if the primary surplus should fall short of the target), we accepted the end-2003 ratio to be 69% and based the 2004 and 2005 estimations on this ratio, taking the FX-TL composition of the debt as 50% each. The results are reported in Tables 4, 5A and 5B. Tables 5A and 5B are both for the year 2005. The difference is that, while Table 5A assumes the targeted primary surplus ratio (s) to be 6.5%, Table 5B assumes the "s" commitment to be 5% in 2005.

In the accepted scenarios, Turkish Lira is assumed to lose value slightly against foreign exchange in 2004. The ingredients accepted for 2004 are: p = 12%, e = 15%, r_{TL} = 10% and g = 5%. For 2005, the accepted scenario has the following properties: g = 4%, p = 8%, e = 8%, r_{TL} = 10% and the targeted "s" is assumed to be lowered to 5%. The results indicate that, if the scenarios are realized, the public sector debt ratio will go down from 69% in end-2003, to 66% in 2004 and 64% in 2005, under the assumption that the primary surplus commitment "s" is lowered to 5% (if primary surplus commitment is kept at 6.5%, however, at end-2005 the debt ratio may go down further to 62.3%).

Table 3

Debt stock-to-GNP ratio in 2003(%)
(if b2002 = 79%; s target = 6.5%)

Inflation Rate = 20%		
		r_{TL} **(%)**
	e(%)	**15**
g = 4%	0	70.5
	-8	67.6
g = 5%	0	69.7
	-8	**66.9**
g = 6%	0	69.0
	-8	66.1

Table 4
Debt stock-to-GNP ratio in 2004(%)
(if b 2003=69%; *s* target = 6.5%)

	Inflation Rate =12%		
		r_{TL} **(%)**	
	e(%)	**10**	**15**
	0	61.7	63.4
	5	63.3	65.0
***g* = 4%**	10	64.9	66.6
	15	66.6	68.2
	0	61.0	62.7
	5	62.6	64.3
***g* = 5%**	10	64.2	65.9
	15	**65.8**	67.5
	0	60.3	62.0
	5	61.9	63.6
***g* = 6%**	10	63.5	65.1
	15	65.1	66.7

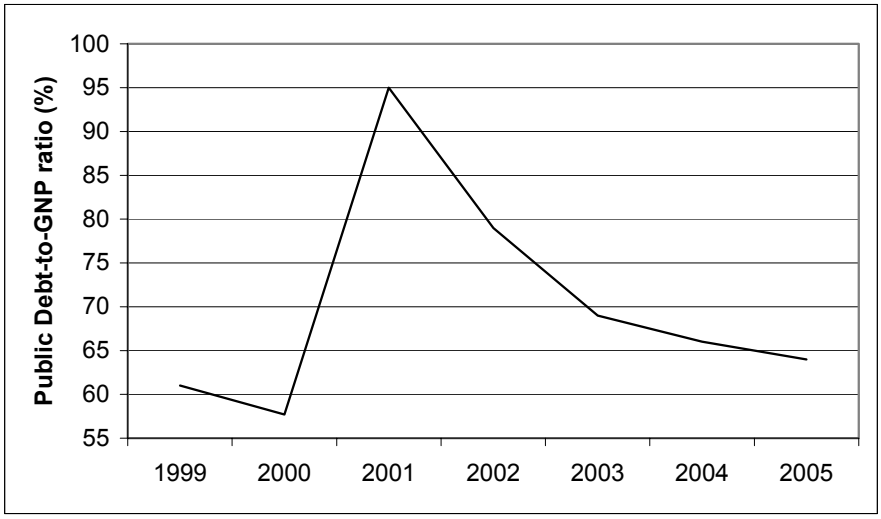
Table 5A
Debt stock-to-GNP ratio in 2005(%)
(if b2004 = 65.8%; *s* target = 6.5%)

	Inflation Rate = 8%	
	***e* (%)**	r_{TL} **(%)**
		10
***g* = 4%**	8	**62.3**
	10	63.0
***g* = 5%**	8	61.6
	10	62.3
***g* = 6%**	8	61.0
	10	61.6

Table 5B
Debt stock-to-GNP ratio in 2005(%)
(if b2004 = 65.8%; *s* target = 5%)

Inflation Rate = 8%		
	***e* (%)**	**r_{TL} (%)**
		10
***g* = 4%**	8	**63.8**
	10	64.5
***g* = 5%**	8	63.1
	10	63.8
***g* = 6%**	8	62.5
	10	63.1

Figure 1
Public Debt-to-GNP Ratio
(2004 and 2005 estimations are based on *b* = 69% for end 2003)



6. A graphical presentation of the revaluation rate-real TL interest rate combinations that render debt sustainable

To find the revaluation rate-real TL interest rate combinations that render the debt sustainable under different FX interest rate-growth rate-inflation rate scenarios, Equation (1) was transformed as follows:

The condition for a stable debt ratio was given in Equation (1);

$$s = (\frac{r_{TL} - g}{1+g})b_{TL} + (\frac{r_{FX} - g}{1+g})b_{FX} - \frac{(p+g+pg)}{(1+g)(1+p)}m \quad (1)$$

where $r_{FX} = i_{FX} + e - p$.

Thus,

$$s = (\frac{r_{TL} - g}{1+g})b_{TL} + (\frac{i_{FX} + e - p - g}{1+g})b_{FX} - \left[\frac{(1+p)(1+g)-1)}{(1+g)(1+p)}\right]m \quad (4)$$

As a result of the transformation of Equation (1), a term denoted by the letter "a" is derived, which encompasses all the ingredients of Equation (1), with the exception of 'e' and 'r_{TL}'. 'e' and 'r_{TL}' represent the X and Y-axis, respectively, in the figures below (i_{FX} and m taken as given and stable).

$$\begin{aligned} a &= s(1+g) + gb_{TL} + gb_{FX} - (i_{FX} - p)b_{FX} + (1 + g - \frac{1}{1+p})m \\ &= r_{TL}b_{TL} + eb_{FX} \end{aligned} \quad (5)$$

The Y intercept will be a/b_{TL} and the X intercept will be a/b_{FX}; the slope of the line denoting b_{FX}/b_{TL}. The locus of e and r_{TL} combinations in line with the target s = 6.5%, make up the boundary drawn (Figures 2 and 3).

The following conclusions can be drawn from the figures:

a. If the economy grows faster, *ceteris paribus*, an outward shift of the boundary is relevant.

b. If the inflation rate surges, *ceteris paribus*, an outward shift of the boundary is relevant. In such a case, higher seigniorage gains will enable policy makers to maintain the stable debt ratio even at higher r_{TL} and e combinations

c. *Ceteris paribus*, if $s < 6.5\%$, an inward shift of the boundary will take place. In such a case, only a *lower* r_{TL} *and/or* e can keep the debt ratio stable.

Figure 2
Revaluation Rate of FX, Real TL Interest Rate and
Debt Sustainability, 2003 (s = 6.5%; p = 20%; ifx = 9%)

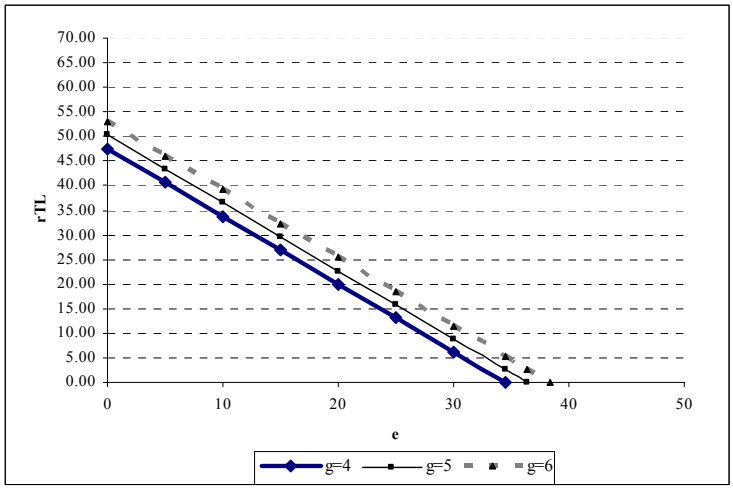
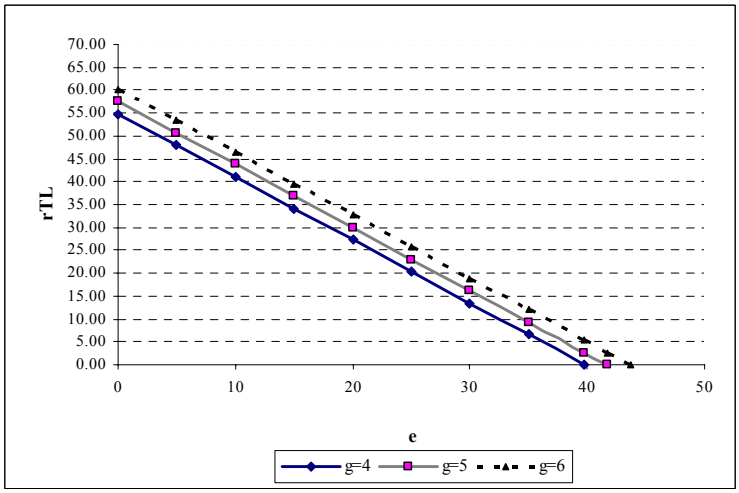


Figure 3
Revaluation Rate of FX, Real TL Interest Rate
and Debt Sustainability 2003 (s = 6.5%; p = 25%; ifx = 9%)



7. In Turkey can the debt ratio ever satisfy the Maastricht criteria?

Strictly interpreted, the Maastricht criteria require that the *public debt stock-GDP* ratio be 60%. Will Turkey ever be able to achieve this?

As the estimation results indicate, the debt ratio is likely to follow a declining trend, ultimately reaching the 60% level in the years to follow. Since in the estimations above privatization revenues are ignored, if and when privatization is realized, it may cause the ratios to improve further. It may be worth noting that, as the inflation rate ebbs, the contribution of the seigniorage factor to easing the debt ratio gets smaller.

8. Conclusion

In Turkey, the Strengthened Stabilization Program (The Undersecretariat of Treasury, 2001), adopted in May 2001, covering the period between 2001-2004, which is technically and financially supported by the IMF and the World Bank, started to give its fruits. The stability is gradually being achieved; along with it confidence is being restored and spreads are declining. Growth and inflation prospects are favorable and the PSBR is on the decline. Trade balance, however may close the year 2003 with an enlarged deficit due to the appreciation of the TL and around 5.5% growth. The current account deficit is $4.2 billion as of November 2003 and is likely to close the year at around $5 billion (as opposed to the $7.7 billion revised target of the Treasury). However there is a high inflow of unrecorded foreign exchange seen under "net errors and omissions" (2.9 billion over the first 11 months of 2003). Hence part of the demand for foreign exchange created by the current account deficit is being met by the supply of FX from this source. In the end, the current account deficit may not cause the expected depreciation of the TL against FX.

As the *risky country image* is being transformed into a *low-risk country image*, the real interest rates on the TL-denominated borrowing as well as spreads on foreign borrowing are expected to fall and foreign direct investment is expected to increase. The TL is claimed to be over-valued both in 2002 and 2003. Despite this development, however, Turkey's exports are reaching record high levels. We believe that the TL is not as over-valued as suggested by the Real Effective Exchange Rate Index estimated by the Central Bank.

The Central Bank of the Republic of Turkey (CBRT) conducted daily FX buying auctions between May 6, 2003 and October 23, 2002. Its primary aim was to enhance its FX reserves. Daily limit on the purchases was initially set as $20 million, which was gradually raised to $120 million ($40 million of it being option buying) between May 6th and

October 7th, 2003. However from time to time in the event of excess volatility in both directions, CBRT directly intervened in FX market. Between May 6-October 22, 2003, CBRT purchased $9.9 billion through daily FX buying auctions and six direct interventions conducted. The CBRT continues its TL deposit buying auctions with a standard of 2 to 4 week maturity, which was initiated in April 2002. The aim of this tool is to enhance the effectiveness of efforts to sterilize excess TL liquidity in the system. The TL injections during the FX purchases conducted by the Central Bank, were partially sterilized by these TL deposit-buying auctions.

The Central Bank's purchase of FX was expected to slow down TL's appreciation, while enhancing the official reserves. However it did not exert the anticipated effect on the exchange rate during the latter half of 2003, since the Lira seemed to be well supported by macro fundamentals. If the TL continues to appreciate, the Central Bank may consider additional corrective actions such as deeper rate cuts; however so far, the rate cuts have not produced the desired effect on keeping the Lira from appreciating. TL's appreciation is the outcome of mainly the reversal in currency substitution; but it is also affected by high real interest rates on the TL-denominated instruments, prospective privatizations (such as Petkim, the petro-chemical plant; Tupras, the oil refinery; and Tekel, the tobacco and alcohol monopoly), as well as foreign currency inflow from abroad. The excessive volatility in the exchange rates seen especially in May and June, 2003, was also the result of excessive FX selling because of the need for TL liquidity for tax payments. In the years ahead, once things turn back to normal, under the floating rate regime, the exchange rate may be expected to move parallel to the purchasing power parity, displaying much less volatility.

As the results of our analysis indicate, for Turkey the default risk is nill and there is no need for restructuring of the debt. Turkey is frequently being mentioned in the same pot with Argentina and Brazil and similar default risk is being implied for all three countries (e.g., Goldstein, 2003). We believe that a high-growth country under a floating rate regime, with no significant depreciation prospect, which has a good export performance and strong reserves (CBRT's gross FX reserves were $33.6 billion as of December 26, 2003), where the PSBR is declining, the banking sector is strengthened (CARs being much above legal requirements, and short positions being at zero or insignificant levels), should not be judged in the same category as Argentina and Brazil. In the medium run, Turkey's debt ratio is expected to follow a declining trend, reaching the 60% level (the Maastricht criteria) within a few years.

In sum, for Turkey debt sustainability is likely to be much less of a problem in the years ahead. Low spreads; low risk premiums and hence

low real interest rates along with longer maturity will make debt rollover much easier. Actually in Turkey, the debt-to-GNP ratio is not so high when compared to such countries like Belgium, Italy, Greece and Japan, just to name a few. But in those countries maturity is much longer and real interest rates are very low. The problem with Turkey's debt stock is its short maturity[9] and high real interest rates[10], which will be resolved as stability is gained and confidence is restored. The fall in the real TL interest rate, real exchange rate remaining strong and accelerated privatization can improve the debt profile even behind expectations. Lasting stability, however, can only be achieved if the present stabilization program is strictly enforced.

References

EDWARDS, S. (2002), "Debt Relief and Fiscal Sustainability", NBER Working Paper No. w8939, Cambridge, MA: National Bureau of Economic Research.

GOLDFAJN, I. (2002), "Are There Reasons to Doubt Fiscal Sustainability in Brazil?", Banco Central do Brasil Technical Notes No. 25, July.

GOLDSTEIN, M. (2003), "Debt Sustainability, Brazil and the IMF", Institute for International Economics Working Paper No. 03-1, February.

KEYDER, N. (2002), "A Note on the Debt Sustainability Issue in Turkey", *METU Studies in Development*, 29(3-4), 355-66.

LACHLER, U. (2001), "Nicaragua: Fiscal Sustainability after HIPC", World Bank, April.

MERRILL LYNCH (2003a), "Foreign Exchange Strategy; Cause and FX", report dated June 17.

MERRILL LYNCH (2003b), Emerging Markets Daily, September 29.

MILESI-FERRETI, G. M. and A. RAZIN (2000), "Current Account Reversals and Currency Crises: Empirical Regularities", in P. Krugman (ed.), *Currency Crisis*, Chicago, IL: University of Chicago Press.

THE UNDERSECRETARIAT OF TREASURY (T.C. Hazine Müsteşarlığı) (2001), "Türkiye'nin Güçlü Ekonomiye Geçiş Programı: Hedefler, Politikalar ve Uygulamalar", (The Strengthened Stabilization Program), press release dated April 14.

———— (2003), Kamu Borç Yönetimi Raporu (Public Debt Management Report), April 30.

————(2003a), "31.3.2003 İtibariyle Konsolide Bütçe Toplam Borç Stoku" (Domestic and External Debt Stock as of March 31, 2003), Press Release dated April 21.

————(2003b), IMF Letter of Intent (for the 4th review), April 5.

[9] Average maturity of total domestic debt stock was 25.1 months (12.4 months on cash sales, 51.2 months on non-cash sales) as of December 2003.

[10] Both the nominal and the real interest rates have been following a declining trend. In the secondary bond market the average compound nominal interest rate, which was 62.9% on April 11, 2003 decreased to 27% by December 19, 2003.

UÇTUM, M. and WICKENS, M. (2000), "Debt and Deficit Ceilings, and Sustainability of Fiscal Policies: An Intertemporal Analysis", *Oxford Bulletin of Economics and Statistics*, 62(2), 197-222.

WORLD BANK (2000), "Turkey-Country Economic Memorandum-Structural Reforms for Sustainable Growth, Vol. I and II", Report No. 20657-TU, Washington, DC, September 15.

————(2003), "Turkey – Country Economic Memorandum: Towards Macroeconomic Stability and Sustained Growth, Vol. II", Report No. 26301-TU, Washington, DC.

WORLD BANK and IMF (2000), "Nicaragua: Decision Point Document for the HIPC Initiative", December 7.

————(2001), "The Challenge of Maintaining Long Term External Debt Sustainability", April 20.

Appendix A

The government budget constraint can be expressed as follows:

$$B_t - B_{t-1} = I_t - S_t - (M_t - M_{t-1}) \tag{A.1}$$

Where subscript t stands for time, measured in years, B_t is the amount of public debt at the end of period t, I_t is interest payments, S_t is the primary surplus (revenue minus noninterest expenditure), and M_t is the base money and the end of period t, all measured in local currency units. If we assume that time is discrete, that all debt has a maturity of one period, and that debt is nominal and pays a constant nominat interest, R, then equation (A.1) can be rewritten as

$$B_t = (1+R)B_{t-1} - S_t - (M_t - M_{t-1}) \tag{A.2}$$

Dividing equation (A.2) by GNP, $(P_t y_t)$, we get

$$b_t = (1+R)\frac{P_{t-1}y_{t-1}}{P_t y_t}\bar{b}_{t-1} - s_t - (\bar{m}_t - \frac{P_{t-1}y_{t-1}}{P_t y_t}\bar{m}_{t-1}), \tag{A.3}$$

where $\bar{b}_t = B_t/(P_t\, y_t)$ and $\bar{m}_t = M_t/(P_t\, y_t)$.

Assume $\bar{s}_t = \bar{s}, \bar{b}_t = \bar{b}, \bar{m}_t = \bar{m}, P_t/P_{t-1} = 1+p$ and $y_t / y_{t-1} = 1 + g$ for all t. Then (A.3) becomes

$$\bar{s} = \left[\frac{(1+R)}{(1+p)(1-g)} - 1\right]\bar{b} - \frac{p+g+pg}{(1+p)(1+g)}\bar{m}$$

If we define the real interest rate, r, using $1+r = (1+R)/(1+p)$ then

$$\bar{s} = \frac{r-g}{(1+g)}\bar{b} - \frac{p+g+pg}{(1+p)(1+g)}\bar{m} \tag{A.4}$$

Appendix B

Table B.1
Primary Surplus Ratio Required (%); *ifx* = 9%

		Inflation Rate (%)					
		20			25		
		r_{TL} (%)			r_{TL} (%)		
	e(%)	15	20	25	15	20	25
g=3%	15	2.86	4.51	6.18	0.84	2.51	4.16
	20	4.96	6.61	8.28	2.74	4.41	6.06
	25	6.96	8.61	10.28	4.74	6.41	8.06
	30	8.96	10.61	12.28	6.64	8.31	9.96
g=4%	15	2.04	3.68	5.33	0.02	1.68	3.31
	20	4.04	5.68	7.33	1.92	3.58	5.21
	25	6.04	7.68	9.33	3.82	5.48	7.11
	30	8.04	9.68	11.33	5.72	7.38	9.01
g=5%	15	1.23	2.85	4.49	-0.89	0.76	2.38
	20	3.13	4.75	6.39	1.01	2.66	4.28
	25	5.13	6.75	8.39	2.91	4.56	6.18
	30	7.13	8.75	10.39	4.81	6.46	8.08
g=6%	15	0.32	1.93	3.56	-1.69	-0.06	1.55
	20	2.32	3.93	5.56	0.21	1.84	3.45
	25	4.32	5.93	7.56	2.11	3.74	5.35
	30	6.22	7.89	9.46	4.01	5.64	7.25
g=7%	15	-0.48	1.12	2.73	-2.49	-0.86	0.73
	20	1.52	3.12	4.73	-0.59	1.04	2.63
	25	3.42	5.02	6.63	1.31	2.93	4.53
	30	5.32	6.92	8.53	3.11	4.74	6.33

Table B.2
Primary Surplus Ratio Required (%); *ifx* = 10%

		Inflation Rate (%)					
		20			**25**		
		r_{TL} **(%)**			r_{TL} **(%)**		
	e(%)	**15**	**20**	**25**	**15**	**20**	**25**
***g*=3%**	**15**	3.36	5.01	6.68	1.24	2.91	4.56
	20	5.36	7.01	8.68	3.24	4.91	6.56
	25	7.46	9.11	10.78	5.14	6.81	8.46
	30	9.46	11.11	12.78	7.14	8.81	10.46
***g*=4%**	**15**	2.44	4.08	5.73	0.42	2.08	3.71
	20	4.44	6.08	7.73	2.32	3.98	5.61
	25	6.54	8.18	9.83	4.22	5.88	7.51
	30	8.54	10.18	11.83	6.22	7.88	9.51
***g*=5%**	**15**	1.63	3.25	4.89	-0.49	1.16	2.78
	20	3.63	5.25	6.89	1.51	3.16	4.78
	25	5.63	7.25	8.89	3.41	5.06	6.68
	30	7.63	9.25	10.89	5.31	6.96	8.58
***g*=6%**	**15**	0.72	2.33	3.96	-1.29	0.34	1.95
	20	2.72	4.33	5.96	0.61	2.24	3.85
	25	4.72	6.33	7.96	2.51	4.14	5.75
	30	6.72	8.33	9.96	4.41	6.00	7.65
***g*=7%**	**15**	-0.08	1.52	3.13	-2.09	-0.47	1.13
	20	1.92	3.52	5.13	-0.19	1.44	3.03
	25	3.82	5.42	7.03	1.71	3.34	4.93
	30	5.82	7.42	9.03	3.61	5.24	6.83

Table B.3
Primary Surplus Ratio Required (%); *ifx* = 11%

		Inflation Rate (%)					
		20			25		
		r_{TL} (%)			r_{TL} (%)		
	e(%)	15	20	25	15	20	25
g=3%	15	3.76	5.41	7.08	1.64	3.31	4.96
	20	5.86	7.51	9.18	3.64	5.31	6.96
	25	7.86	9.51	11.18	5.64	7.31	8.96
	30	9.96	11.61	13.28	7.54	9.21	10.86
g=4%	15	2.84	4.48	6.13	0.82	2.48	4.11
	20	4.94	6.58	8.23	2.72	4.38	6.01
	25	6.94	8.58	10.23	4.72	6.38	8.01
	30	9.04	10.68	12.33	6.62	8.28	9.91
g=5%	15	2.03	3.65	5.29	-0.09	1.56	3.18
	20	4.03	5.65	7.29	1.91	3.56	5.18
	25	6.03	7.63	9.29	3.81	5.46	7.08
	30	8.03	9.65	11.29	5.93	7.36	8.98
g=6%	15	1.22	2.83	4.46	-0.89	0.74	2.35
	20	3.22	4.83	6.46	1.01	2.64	4.25
	25	5.12	6.73	8.36	3.01	4.64	6.25
	30	7.12	8.73	10.36	4.91	6.54	8.15
g=7%	15	0.32	1.92	3.53	-1.7	-0.06	1.53
	20	2.32	3.92	5.53	0.21	1.83	3.40
	25	4.32	5.92	7.53	2.11	3.74	5.33
	30	6.32	7.92	9.53	4.01	5.64	7.23

Özet

Kamu Borç Stokunun Sürdürülebilirliği ve Kur: Türkiye Örneği

Yazıda, Net Konsolide Kamu Borç Stoku'nun sürdürülebilirliği tartışması, operasyonal açık, senyoraj faktörü ve büyümenin yanısıra, kur faktörünü de içerecek biçimde ele alınmaktadır. Dünya Bankası (2000: 16-18; 121-124) tarafından geliştirilen formül değiştirilmiş, kamu borç stoğu TL ve döviz cinsi şeklinde ayrıştırılarak ele alınmıştır. Böylece kur faktörünün borç stoğunu sürdürmekteki rolü modele dahil edilmektedir.

Analiz iki etapta yapılmaktadır. Önce reel faiz oranı hesaplanmakta, daha sonra hesaplanan bu oranlar ana formüle yerleştirilmektedir. Kur faktörü, döviz ile ilintili borç stokunun TL cinsi reel faizini hesaplama aşamasında ele alınmaktadır. Farklı enflasyon oranı-kur değişimi-büyüme-faiz oranı bileşimlerinden oluşan senaryolar için borcun sürdürülebilmesi için gereken faiz dışı fazla oranı hesaplanmakta ve elde edilen bu oranlar hedeflenen faiz dışı oranla karşılaştırılarak "sürdürülebilirlik" konusunda yorum yapılmaktadır. 2003-2005 yılı için kabul edilebilir senaryolar çerçevesinde kamu borç stoku-GSMH oranları hesaplanmıştır.