Debt Sustainability and the Exchange Rate: The Case of Turkey

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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 (2000:16-18; 121-124) is used (see Appendix A for the derivation of the original formula, which is slightly different from the one in the document mentioned). 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.

Key words: Turkey, Debt Sustainability, Debt Stock, Exchange Rate, Stabilization.

Note: The paper was prepared in June 2003 and updated in September 2003.

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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 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. 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)-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 (2003: 93) has used a formula, which takes the exchange rate movements into account; however, in the scenarios presented, the exchange rate factor is ignored. Privatization The approach used here, however, is slightly different and does not take privatization revenues into consideration.

The rest of the paper is organized as follows: In section one, as background information, the variables/indicators relevant to debt sustainability are discussed. In section two, the formula used to estimate the primary surplus ratio is presented. Section three 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 four, 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. The results are evaluated in Section five. Section six gives graphical presentation of FX revaluation rate-real TL interest rate combinations that render debt sustainable. In section seven the debt ratio in the medium run is estimated. The last section is reserved for conclusion.

1. Background Information on Variables/Indicators Relevant to Debt Sustainability

1.1 Composition of the Public Debt Stock

The figures announced for the outstanding central government debt stock (consolidated budget based; involving general and annexed budget administrations only[3]) for December 2002, are as follows (Undersecretariat of Treasury (2003)): 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 made up 62% of the total central government debt stock. 48% ($27.4 billion) of the $56.8 billion external debt was to international agencies, ($13.9 billion to the IMF[4], $6.8 billion to foreign government agencies and $6.7 billion to international institutions); 52% (29.4 billion) was to foreign markets ($6.2 billion to commercial banks and $23.1 billion to the bond market). (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% is to the market and 29% to the public sector; 20% is owed to the foreign markets against money collected via bond issue (16%) or other means (4%); 9% of the debt is owed to international institutions and the remaining 13% ($19.9 billion) is owed to the IMF (Table 1).

Considering domestic debt stock alone, we see that 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.

Table 1 –Consolidated Budget Total Debt Stock

	End-2002 Total ($ Billion)	(%)	July 2003 Total ($Billion)	%
Debt by Lender	148.5	100	185.4	100
Domestic Market	43.3	29	65.4	35
Public Sector	42.5	29	54.1	29
Foreign Market	29.4	20	31.0	17
Bond Issue	23.1	16	25.1	14
Other	6.3	4	5.9	3
International Institutions	13.5	9	13.4	7
IMF Credit	19.9	13	21.5	12
Source: Treasury.				

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

As of the end of July 2003, the composition of the consolidated budget debt stock has not changed much. The total public debt stock has increased to $185.4 billion, 32% of which is external, and 68% domestic. 50.3% of the public debt is TL denominated and 49.7% FX linked. 35% of the total debt stock is to the Domestic Market, 29% to the Public Sector, 17% to Foreign Markets, 7% to International Institutions and 12% to the IMF (Table 1). Looking at the domestic debt stock alone, of the $126 billion, 48.1% of the debt is to the public sector and 51.9% is to the market.

1.2 Debt-to-GNP Ratio

The debt-to-GNP ratio, which was 29% in 1990 and 57% in 2000, climbed up to 92% 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 close to $40 billion (around 1/4th of the GNP of that year) for the rehabilitation and restructuring of these state and private banks.

1.3 Primary Surplus-to-GNP Ratio

The primary surplus-to-GNP ratio realized in 2002 was 3.9%, which fell behind the 6.5% target. In terms of actual size, the primary surplus realized at TL9.881 quadrillion levels was below the TL16.715 quadrillion target set for the year (The Undersecretariat of Treasury, 2003b). Even if the primay 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 92% 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 58% (as of end-2002; 38% originating from the external debt, 20% from FX-linked domestic debt) of the public debt stock is FX-linked, the effect of exchange rate movements should not be ignored in the debt sustainability discussions.

1.4 Exchange Rate

Starting May 2003, TL strengthened against foreign exchange. Appreciation was more pronounced against the US Dollar (USD) than against Euro due to the change in USD:Euro cross rate against the dollar over May and June 2003. 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 Euro, due to increased FX supply, which generally is encountered during the summer months due to increased tourism revenues. Merrill Lynch (2003), 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."

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 daily ceiling being $20 million, which was raised to $30 million in June, $40 million in early July, $50 million on July 17, 2003 and $75 million ($25 million of it being option buying) on September 11, 2003). Central Bank's FX buying auctions plus its 5 direct interventions resulted in total dollar purchases equivalent to $6 billion by September 10, 2003.

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, the export and import performance over the first six months of the year when compared to the same period of 2002 (32% growth in exports (fob) and 34.4% growth in imports (cif, gold included) –Source: Central Bank - *http://www.tcmb.gov.tr/bop* **statistics-**, does not reveal such an adverse effect yet. Over the first six months of 2003, the trade deficit was $5.4 billion and the current account deficit was $4 billion (the figures for the same period in 2002 were $3.15 billion and $1.4 billion, respectively). 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 Organisation 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. The surge in imports also cannot be explained only by the strengthened TL. Only 10% of imports comprise consumption goods (January-June, 2003), the rest are investment (15%) and intermediary goods (75%). Hence, the strong demand for investment and intermediary good imports may be a signal of high growth in 2003, like in 2002 (the 2003 first quarter year-on-year growth

rate was 7.4% for GNP and 8.1% for GDP. GNP's 2003 1st six months' year-on-year growh has been 5.4%).

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. In August 2003, the current account deficit target for end-2003 was revised by the authorities as $7.4 billion (the original figure was $3.5 billion), in light of the exchange rate developments as well as the growth factor. High current account deficit may cause increased demand for foreign currency and hence contribute to correction of the overvaluation of the TL.

1.5 Privatization

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 of 2003. Tekel alone is expected to generate a significant portion of the privatization revenues targeted at around $4 billion. Privatization revenues expected in 2003 are equivalent to 1-2% of GNP.

1.6 Inflation Rate

It is almost certain that the 20% inflation target will be attained by end-2003. This is the lowest inflation rate since 1970.

2. 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)[5]. 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 later is plugged into Equation (1). The formula used is as follows (all terms are at (t) except the primary surplus ratio (s), which is at (t+1)):

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

where;

s = long-term primary surplus-to-GNP ratio that is required for debt sustainability at (t+1)

b_{TL} = "public sector debt stock denominated in TLs-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 = $\{[(1+i_{fx})(1+e)]/(1+p)\}-1$

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.

i_{fx} = nominal interest rate on FX-denominated debt in FX.

(Note: for the derivation of the World Bank (2000) formula on which Equation 1 is based, see Appendix A)

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[6] (1970-1999):

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

$$\ln m = -2.2555 - 0.6053\, i$$
$$(-70.100)(-10.790)$$

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

The term,

$$[(p + g + pxg) / (1 + p + g + pxg)]\, m$$

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.

3. 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).

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).

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

where,

i_{FX}^* = average interest rate on FX-linked debt plus borrowing in TL (nominal)

i_{FX} = average interest rate on FX-linked debt plus borrowing in FX (nominal)

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e= 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 Equation (3).

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

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* (theWorld Bank and the IMF) and $6.2 billion *external borrowing*. The interest rate charged by the World Bank is Libor plus 0.75; currently Libor is 1.34, hence the interest rate on the World Bank credit is around 2.09%. 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 April 25, 2003, the 10-year Euro bond yield was 11.7%; but it is following a declining trend (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 currently is close to 4%. In the average interest rate estimations, this is not included. 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 below, the average interest rate on the new FX borrowing plus non-maturing FX-linked debt over 2003, ranges from 9 to 13%, in the different scenarios constructed. Actually, these rates are highly cautious since they are much above the average interest rate on the current FX-linked debt.

3.1 Real Interest Rate on FX-Linked 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, when 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 of 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	0,1	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

3.2 Average Real Interest Rate on TL-Denominated Debt (new borrowing+non-maturing debt)

As of end-March 2003 (like in end-2002), 43% 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. 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 25% of the total; and the maturity of this debt is relatively short (in the average 9.2 months). The average

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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, another 3 percentage points on June 4, 2003, and another 3 percentage points on August 6,2003 (o/n borrowing/lending rate becoming 32% and 38%, respectively, as of August 6, 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 is expected to cut its o/n lending rate further 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 as 11% by the Treasury.

4. 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 3, 4 and 5 in Appendix B, which are constructed under the assumptions of 9, 10 and 11% nominal FX rate. The estimations in the tables should be interpreted as follows: To keep the public debt-to-GNP ratio of end-2002 level, 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.

5. Evaluation of the Results

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 a 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 Tables 3, 4 and 5 given 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 high a real interest rate on the TL-denominated debt (20-25%), which is highly improbable. 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.

The most likely realizations anticipated for the year 2003 are:

Inflation Rate (p) = 20;
Average real interest rate on the TL-denominated debt (r_{TL}) = 15 or 20%;
Revaluation rate of foreign currency (basket comprising 0.5$+0.5Euro) (e)= 15, 20 or 25%;
Growth rate (g) = 4, 5 or 6%;
Average interest rate on FX borrowing and non-maturing debt (i_{FX})= 9%.

Under these circumstances, debt sustainability does not seem to be a problem and in all cases public debt ratio is likely to decline since the primary surplus requirement is below the 6.5% target level. Now let us estimate the debt-to-GNP ratio in end-2003, under the specific scenarios that are most likely to be realized: (all expressed in %; estimations are based on the information given in Table 3 in Appendix B)

g= 5, e=20, p=20, r_{TL}=20, i_{FX}=9; s=4.75, s(target)=6.5; b(2003)=79-(6.5-4.75)=77.25
g= 5, e=20, p=25, r_{TL}=20, i_{FX}=9; s=2.66, s(target)=6.5; b(2003)=79-(6.5-2.66)=75.16
g= 5, e=15, p=20, r_{TL}=20, i_{FX}=9; s=2.85, s(target)=6.5; b(2003)=79-(6.5-2.85)=75.35
g= 5, e=20, p=25, r_{TL}=15, i_{FX}=9; s=1.01, s(target)=6.5; b(2003)=79-(6.5-1.01)=73.5
g= 6, e=15, p=20, r_{TL}=20, i_{FX}=9; s=1.93, s(target)=6.5; b(2003)=79-(6.5-1.93)=74.43
g= 6, e=20, p=25, r_{TL}=15, i_{FX}=9; s=0.21, s(target)=6.5; b(2003)=79-(6.5-0.21)=72.71

(Note: By September 2003, it was almost certain that the 20% inflation target would be realized. However, to show the effect of inflation on primary surplus requirement, 25% inflation is also included in estimations for exercise purposes.)

The results indicate that small changes in the assumptions for variables such as growth, the real TL interest rate, the revaluation/devaluation rate and the inflation rate, yield widely different primary surplus requirements for the debt to be sustainable. However, under fairly conservative, but realistic assumptions about the variables mentioned above, the model used points to a relatively stable debt-to-GNP ratio, displaying a downward trend. The fall in the real TL interest rate and the real exchange rate remaining strong, can improve the debt profile even behind expectations.

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);

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

where,

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

Thus,

$$s = (\frac{r_{TL} - g}{1 + g})b_{TL} + (\frac{i_{FX} + e - p - g}{1 + g})b_{FX} - \left[\frac{(1 + p)(1 + g) - 1)}{(1 + g)(1 + p)}\right]m \qquad (4)$$
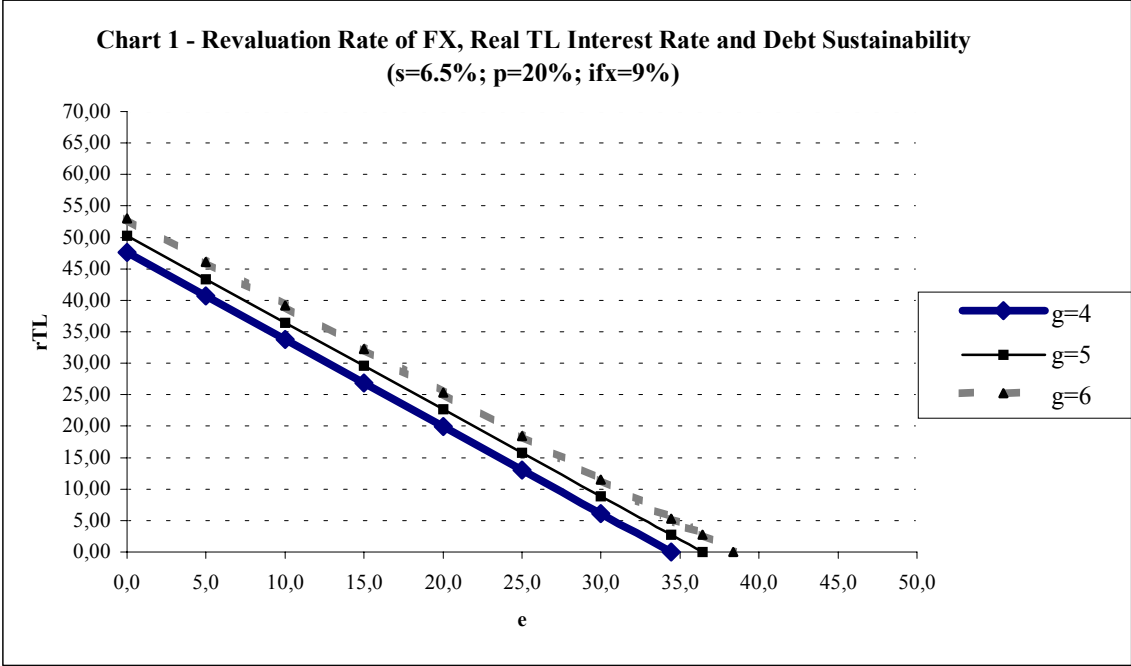
As a result of the transformation of Equation (1), a term denoted by the letter "a" is derived, which encompasses all the ingredients of Equation (1), with the exception of 'e' and 'r_{TL}'. 'e' and 'r_{TL}' represent the X and Y-axis, respectively, in the charts below (i_{FX} and m taken as given and stable).

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

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.

The following conclusions can be drawn from the charts:

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

b. If 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 *lower r_{TL} and/or e* can keep the debt ratio stable.

Chart 1 - Revaluation Rate of FX, Real TL Interest Rate and Debt Sustainability (s=6.5%; p=20%; ifx=9%)

Chart 2 - Revaluation Rate of FX, Real TL Interest Rate and Debt Sustainability
(s=6.5%; p=25%; ifx=9%)
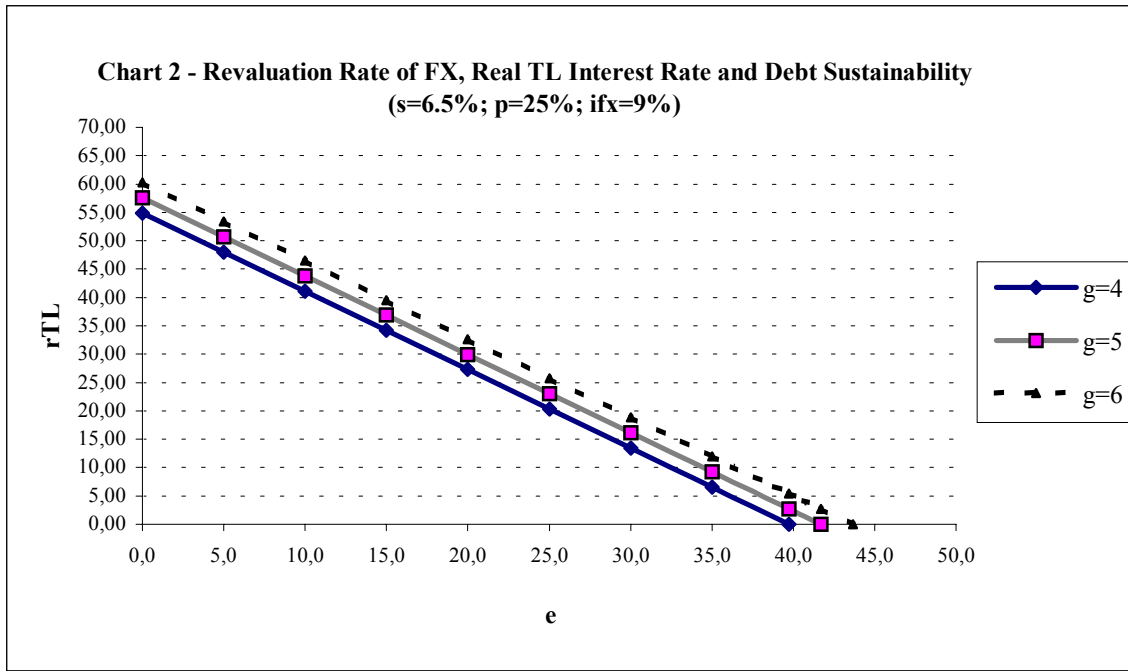
7. In Turkey, can the Debt Ratio Ever Satisfy the Maastricht Criteria?

Strictly interpreted, the Maastricht criteria require that the ***public debt stock-GDP*** ratio be 60%. Will Turkey ever be able to achieve this? In order to extend the analysis presented earlier, to forecast the relevant ratios over the 2004-2005 period, it is necessary to make certain assumptions.

The inflation target for 2004 is 12%. The primary surplus ratio targeted remains at 6.5% and the FX borrowing rate remains at 9% during 2004. The composition of public debt stock with respect to its FX and TL-denominated parts is assumed to remain the same (58% and 42%, respectively); "m" equals 4%. The end-2003 debt ratio estimated earlier was somewhere between 72 and 75%. Acting conservatively, the starting point for the 2004 projections is accepted as 75% (debt ratio of end-2003). Under alternative scenarios, the debt ratio at end-2004 can take values ranging between 70-73% (privatization revenues excluded). An estimation of the debt ratio for end-2004 and 2005, under selected scenarios is given below:

Debt Ratio at End- 2004 Under Selected Scenarios:

$g=4$, $e=10$, $p=12$, $r_{TL}=15$, $i_{FX}=9$; $s=4.75$, s(target)=6.5; b(2004)=75-(6.5-4.04)=72.5
$g=5$, $e=10$, $p=12$, $r_{TL}=15$, $i_{FX}=9$; $s=2.66$, s(target)=6.5; b(2004)=75-(6.5-3.25)=71.8
$g=6$, $e=10$, $p=12$, $r_{TL}=15$, $i_{FX}=9$; $s=2.85$, s(target)=6.5; b(2004)=75-(6.5-2.48)=71.0
$g=4$, $e=12$, $p=10$, $r_{TL}=10$, $i_{FX}=9$; $s=1.01$, s(target)=6.5; b(2004)=75-(6.5-2.30)=72.7
$g=5$, $e=12$, $p=10$, $r_{TL}=10$, $i_{FX}=9$; $s=1.93$, s(target)=6.5; b(2004)=75-(6.5-3.10)=71.9
$g=6$, $e=12$, $p=10$, $r_{TL}=10$, $i_{FX}=9$; $s=0.21$, s(target)=6.5; b(2004)=75-(6.5-3.80)=71.2

To forecast the end-2005 debt ratio, we assume the starting point debt-ratio (that of end-2004) to be 71% (privatization revenues excluded). The inflation rate for 2005 is assumed to be 8% or 7%, in the different scenarios adopted. The primary surplus ratio targeted remains at 6.5% and the FX borrowing rate remains at 9% during 2005. The composition of public debt stock with respect to its FX and TL denominated parts is assumed to remain the same (58% and 42%, respectively). "m" is 4% in all cases. An estimation of debt ratio for end-2004, under selected scenarios is given below (privatization revenues not considered):

Debt Ratio at End-2005 Under Selected Scenarios (all in %):

$g=4$, $e=8$, $p=8$, $r_{TL}=15$, $i_{FX}=9$; $s=3.21$, s(target)=6.5; b(2004)=71-(6.5-3.21)=67.7
$g=5$, $e=8$, $p=8$, $r_{TL}=15$, $i_{FX}=9$; $s=2.46$, s(target)=6.5; b(2004)=71-(6.5-2.46)=67.0
$g=6$, $e=8$, $p=8$, $r_{TL}=15$, $i_{FX}=9$; $s=1.73$, s(target)=6.5; b(2004)=71-(6.5-1.73)=66.2
$g=4$, $e=7$, $p=7$, $r_{TL}=10$, $i_{FX}=9$; $s=2.72$, s(target)=6.5; b(2004)=71-(6.5-2.72)=67.2
$g=5$, $e=7$, $p=7$, $r_{TL}=10$, $i_{FX}=9$; $s=1.98$, s(target)=6.5; b(2004)=71-(6.5-1.98)=66.5
$g=6$, $e=7$, $p=7$, $r_{TL}=10$, $i_{FX}=9$; $s=1.26$, s(target)=6.5; b(2004)=71-(6.5-1.26)=65.8

The debt ratio is expected to fall to a level somewhere between 66-68% by end-2005. If privatization revenue-to-GNP ratio is deducted from the final figures obtained, the ratio may go down further by an additional 1 or 2 percentage points in all end-2003, end-2004 as well as end-2005 (Chart 3).

Chart 3 - Debt-to-GNP Ratio (%)
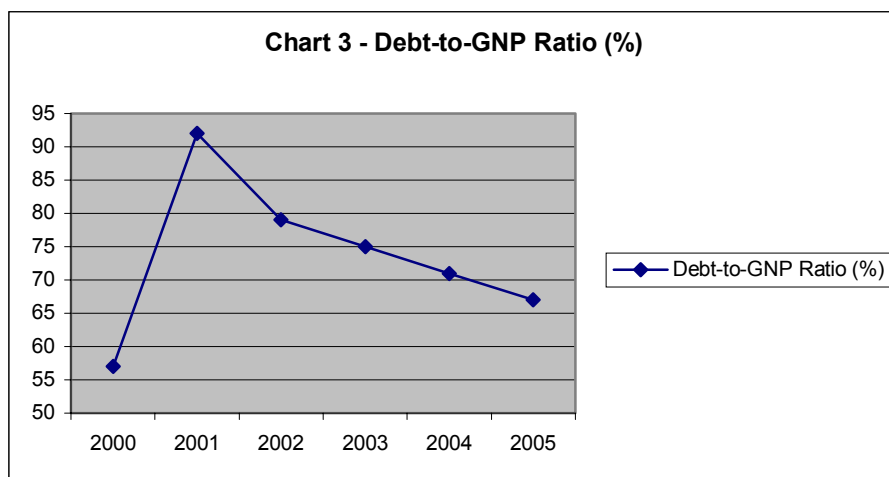
As the estimation results indicate, the debt ratio is likely to follow a declining trend, ultimately reaching the 60% level in the years to follow. Since the estimations above are based on conservative assumptions, the 60% level may be reached sooner than expected. It may be worth noting that, as the 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 better than expected growth. In the aftermath of the Iraq war, Tourism revenues were also adversely affected.

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 have been on the rise. We believe that the TL is not as over-valued as suggested by the Real Effective Exchange Rate Index published regularly by the Central Bank of the Republic of Turkey (CBRT). The index mentioned uses 1995 as the base year, which we believe is a poor choice, considering the BOP performance in that year. As a result, the index indicates an exaggerated appreciation of the Turkish Lira.

The Central Bank of the Republic of Turkey (CBRT) resumed its FX buying auctions on May 6, 2003, its primary aim being enhancing its FX reserves. Daily limit on the purchases was set as $20 million, which was raised gradually to $75 million ($25 million of it being option buying) between May and September 2003. However from time to time in the event of excess volatility in both directions, CBRT directly intervenes in FX market. Between May 6-September 10, 2003, CBRT purchased $6 billion through daily FX buying auctions and five direct interventions conducted. 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. The appreciation of the TL may be cut back as a result of the increased demand for FX resulting from enlarged current account deficit in 2003. If the TL continues to appreciate, Central Bank may consider additional corrective actions such as deeper rate cuts. 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 assets, as well as prospective 2003 privatizations (such as Petkim, the petro-chemical plant; Tupras, the oil refinery; and Tekel, the tobacco and alcohol monopoly). The excessive volatility in the

exchange rates seen especially since the end of April 2003 was also the result of excessive FX selling because of the need for TL liquidity for tax payments. The CBRT continues its TL deposit buying auctions with a standard of 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 maximum amount at each auction is limited to TL200 trillion. Hence while the TL injection results as CBRT purchases FX, the TL deposit buying auctions may sterilize part of this TL expansion. In the years ahead, 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 very low 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 $29.8 billion as of September 5, 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 with 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[7] and high real interest rates, which will be resolved as stability is gained and confidence is restored. Lasting stability can be achieved only if the present stabilization program is strictly enforced.

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Notes

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

[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.

[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.

[5] 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.

[6]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.

$$\ln rrm = -2.1268 + 0.967 \ln y - 0.0057 R \quad (R \text{ is the nominal interest rate on time deposits})$$
$$\quad\quad (-3.7513) \; (6.3432) \quad\quad (-3.5370)$$
$$\text{R-Bar-Squared} =0.76; \; \text{SSR}= 0.0.2975 \; ; \text{DW-statistics}=1.676$$

[7] Average maturity of total domestic debt stock was 27.1 months (12.9 months on cash sales, 56.2 months on non-cash sales) as of July 2003.

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Appendix A

The government budget constraint can be expressed as follows:

$$B_t - B_{t-1} = I_t - S_t - (M_t - M_{t-1}) \tag{0.1}$$

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 0.1 can be rewritten as

$$B_t = (1 + R)B_{t-1} - S_t - (M_t - M_{t-1}) \tag{0.2}$$

Dividing Equation 0.2 by GNP, $(P_t y_t)$, we get

$$b_t = (1+R)\frac{P_{t-1}y_{t-1}}{P_t y_t}\bar{b}_{t-1} - s_t - (\bar{m}_t - \frac{P_{t-1}y_{t-1}}{P_t y_t}\bar{m}_{t-1}), \tag{0.3}$$

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 (0.3) 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

$$\bar{s} = \frac{r-g}{(1+g)}\bar{b} - \frac{p+g+pg}{(1+p)(1+g)}\bar{m} \tag{0.4}$$

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Table 3 - Primary Surplus Ratio Required (%)   iFX = 9%

		Inflation Rate (%)					
		20			25		
		rTL (%)			rTL (%)		
	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 4 - Primary Surplus Ratio Required (%)   iFX = 10%

		Inflation Rate (%)					
		20			**25**		
		rTL (%)			**rTL (%)**		
	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	-1,294	0,344	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	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 5 - Primary Surplus Ratio Required (%)   iFX = 11%

		Inflation Rate (%)					
		20			25		
		rTL (%)			rTL (%)		
	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	3,4
	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, operasyonel açık, senyoraj faktörü ve büyümenin yanısıra, kur faktörünü de içerecek biçimde ele alınmıştır. Kullanılan model, Dünya Bankası (2000:16-18; 121-124) tarafından geliştirilen formüle dayanmaktadır. 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.