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Inflation, External Debt, and Financial Sector Reform

A Quantitative Approach to Consistent Fiscal Policy

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This new model uses an integrated framework to assess the consistency between fiscal deficits and other macroeconomic targets, such as output growth and the rate of inflation. It can be used to derive the financeable fiscal deficit, given inflation targets, or to derive an equilibrium inflation rate for which no fiscal adjustment would be necessary.

The "financeable deficit" is the deficit that does not require more financing than is compatible with sustainable external and internal borrowing and existing targets for inflation and output growth.

The model can assess how the relationship between fiscal adjustment and sustained inflation rates are affected by:

- Financial sector reforms that affect base money demand.
- Changes in interest rates paid on foreign and domestic public sector debt.
- Output growth targets.
- Exchange rate policy.

The model was used to analyze the relationship between inflation, external debt, and financial sector reform in Turkey.

The model can also be used to see what happens if the required fiscal adjustment is postponed. The authors explore two scenarios: one in which fiscal adjustment takes place eventually, and one in which the inflation tax is used eventually to close any financing gap.

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Inflation, External Debt, and Financial Sector Reform: A Quantitative Approach to Consistent Fiscal Policy

by
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Robert Rocha,
and
Ritu Anand

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1 Introduction

This paper presents and applies an integrated framework to assess the consistency between fiscal deficits and other macroeconomic targets, in particular output growth and the rate of inflation. The model centers around the government budget constraint and can be used to either derive the "financeable" deficit given inflation targets, or to derive an equilibrium inflation rate for which no fiscal adjustment would be necessary. The financeable deficit is defined as the deficit that does not require more financing than is compatible with sustainable external and internal borrowing, and existing targets for inflation and output growth. The model can assess the impact of financial sector reforms affecting base money demand, of changes in interest rates paid on foreign and domestic public sector debt, of output growth targets and of exchange rate policy on the relation between fiscal adjustment and sustainable inflation rates. Finally, the model can also be used to see what happens if the required fiscal adjustment is postponed. We explore two alternatives: one where fiscal adjustment takes place eventually, and one where the inflation tax is used eventually to close any financing gap once debt issue is discontinued. The model is applied to an analysis of inflation, external debt and financial sector reform in Turkey.

The framework is based on the public finance approach to inflation. In this approach (see Phelps (1973), Dornbusch (1977), and Buiter (1983, 1985), among others), inflation is interpreted as the residual tax. Residual because it restores balance between the expenditure plans of the public sector, its debt management and revenues from traditional sources of taxation. Inflation acts as a tax because it forces the private sector

to reduce expenditure just to maintain the real value of money balances it desires to hold for a given rate-of-return structure. It drives a wedge between income and expenditure not offset by any real accumulation of assets, just like any other tax does. Also, since its counterpart is Central Bank advances to the public sector, it allows the public sector to cover a matching excess of expenditure over more traditional sources of revenue.

This approach does not deny the fact that, in the short run, demand pressure or cost-push factors such as nominal exchange rate changes may be more important determinants of inflation. However, such factors contribute little to the understanding of sustained inflation. Excess demand pressure, as Friedman points out in his celebrated presidential address (Friedman (1968)), should lead to accelerating rather than sustained inflation. Cost-push factors such as wage or exchange rate changes can explain price level shifts but not really sustained inflation. Of course continued nominal devaluation could explain a matching excess of domestic over foreign inflation, but such an explanation begs the question of what is behind the apparent need to resort to such a continued policy of nominal devaluation. A similar objection can be raised against strict monetarist explanations of inflation. The claim that sustained inflation is not possible without a matching growth in nominal balances is almost tautologically true since otherwise the real money stock would go off towards zero or infinity. It however begs the question of what drives such a process of sustained monetization.

To explain sustained inflation rates, an analysis of the fiscal implications of sustained inflation is necessary, and this is what the fiscal apprcach to inflation does. This approach has received renewed

attention after an influential paper by Sargent and Wallace (1982), who used this view on inflation to explain paradoxical links between inflation and money growth sometimes observed in practice (cf Bruno et al. (1988) for several examples). The concept of sustainability plays an important role in their analysis. Sustainability of inflation targets requires consistency between those inflation targets and their implied consequences for revenues from the inflation tax on the one hand, and on the other hand the public sector's surplus of expenditure over other sources of revenues. This analysis has been extended to the open economy so as to allow discussion of exchange rate policy in Drazen and Helpman (1987) and van Wijnbergen (1986,1988).

It is arguable that the exchange rate policy followed in many moderate and high inflation countries has increased the relevance of the public finance approach to inflation. Moderate and high inflation has forced many countries to offset inflation differentials with trading partners by nominal devaluation to avoid disruption of real trade flows. However, such a policy eliminates the role of the exchange rate as a "nominal" anchor, since any blip in the price level will be offset automatically by a matching exchange rate adjustment. If in addition monetary policy is accommodating through the Central Bank's inability to resist monetization of fiscal deficits, no monetary anchors are left. In such circumstances the public finance approach to inflation might even become relevant for the explanation of short run inflation, not just for medium trends.

But even if a fixed exchange rate regime is adhered to, the approach suggested here is relevant. A fixed exchange rate regime (or, more generally, a predetermined exchange rate regime) implies a medium term

inflation rate: foreign inflation plus the rate of nominal devaluation embedded in the exchange rate regime (zero if it is a truly fixed regime). Consistency between the inflation rate implied by the exchange rate policy followed and fiscal policy is important. Empirical evidence shows conclusively that the absence of such consistency is an important determinant of lack of credibility and the eventual collapse of a fixed exchange rate regime (Cumby and van Wijnbergen (1987)). Hence the approach sugggested in this paper could be used to assess sustainability of a fixed exchange rate regime.

In what follows we first present the analytical framework that underlies the model. We then provide the empirical analysis necessary before the model can be applied. This analysis and the associated data requirements are greatly simplified by the approach's focus on consistency rather than on intertemporal optimality. We then proceed to apply the framework to an analysis of external debt, financial sector reform, inflation and fiscal policy in Turkey.

2 Analytical Framework

2.1 Fiscal Deficits, Money Creation and Debt.

This Section explores the link between fiscal deficits, money creation and debt. First, the analysis focuses on the precise measurement of the public sector's net claim on real resources (the "real" or "operational" deficit), and on the ways it can be financed. Then the implications for feasible financing of given macroeconomic targets for inflation and output growth, of changes in financial sector regulatory policies and of interest rates abroad and at home are explored.

To derive the relation between fiscal deficits, money creation and debt, start from the following relation:

$$(1a) \qquad D + i\,B + i^{*}B^{*}\,E \equiv \dot{B} + \dot{B}^{*}\,E + \dot{DC}_{g}$$

$$\equiv \dot{B} + (\dot{B}^{*} - \dot{NFA}^{*})E + \dot{DC}_{g} + \dot{NFA}^{*}E$$

The left hand side of (1) lists the expenses (net of taxes) of the public sector: its non-interest deficit D plus nominal interest payments on domestic and foreign debt. i (i^{*}) is the nominal interest rate on domestic (foreign) debt B (B^{*}). NFA is the dollar value of the Central Bank's net foreign assets. E is the nominal exchange rate (TL per dollar). These expenses need to be covered by the issue of domestic or foreign debt ($\dot{B}$ and $\dot{B}^{*}$), plus Central Bank advances to the public sector, $\dot{DC}_{g}$. The non-interest deficit D and the interest payments should include the non-interest deficit and interest obligations of all government entities: the central government, state enterprises, municipalities, local governments, and extra-budgetary funds. The proper treatment of the Central Bank is discussed below; its obligations too should be included.

Two changes to (1a) help to bring out the link between money financing and public sector deficits. First consider introducing base money. Increases in base money, $\dot{M}$, equal the increase in net domestic credit to the government, $\dot{DC}_{g}$, and increases in net foreign assets of the Central Bank, $\dot{nfa}\,E$, minus the increase in the Central Bank's net worth. Therefore base money can be seen as a source of revenue to the government.

This suggests the proper definition of money for an analysis of deficit finance. Clearly, revenue derived from inflationary erosion of the private sector's deposits that is offset by inflationary erosion of loans outstanding to the private sector does not increase NET revenue. Hence the need to use base money or "inside money" only (See Anand and van Wijnbergen (1989) on how to deal with such real world complications as Central Bank's credit to the private sector and so on). Reserve or base money equals currency in circulation and (net) reserves held by commercial banks at the Central Bank. These components form the net liabilities of the Central Bank towards the private sector. However, counting all of the Central Bank's liabilities (base money) as a public sector liability means that of the Central Bank's assets, the claims on non-government agents need to be subtracted from the public sector's debt. In particular, the public sector's foreign debt needs to be measured NET of the Central Bank's foreign assets (i.e. public sector foreign debt equals B^*-NFA^*).

The second change involves the Central Bank's profit and loss account. If in addition the Central Bank's profit and loss account is included into the definition of the public sector, the link between deficits and money financing becomes watertight. In a simplified set-up, the Central Bank's profits consist of interest earnings on reserves, i^*NFA^*, which it could either add to its foreign assets with as counterpart an increase in net worth, or transfer to the fiscal authorities. For presentational purposes we assume the first option in this Section, but alternatives are straightforward to work out. The first option implies: $i^*NFA^*E = \dot{NW}$. Subtracting that expression from the budget

identity yields:

$$(1b) \qquad D + i\,B + i^{*}(B^{*}-NFA^{*})\,E = \dot{B} + (\dot{B}^{*} - \dot{NFA}^{*})E + \dot{DC}_{g} + \dot{NFA}^{*}E - \dot{NW}$$

$$= \dot{B} + (\dot{B}^{*} - \dot{NFA}^{*})E + \dot{M}$$

The importance of the inclusion of the Central Bank in the comprehensive public sector accounts cannot be stressed enough. Examples are rife where countries run a balanced budget, sometimes under the force of a constitutional amendment, but in fact continue deficit spending by effectively shifting Treasury expenditure to the Central Bank.

Further modifications to (1) are necessary to tighten the link between the public sector's net claim on resources to increases in the real value of domestic and foreign debt, to inflation and to money creation. The most important one involves incorporating capital losses due to inflation and exchange rate changes into the accounting framework. Making this correction to equ. (1) results in the following link between deficits and inflation (see Anand and van Wijnbergen (1989) for a more detailed analysis of the steps involved):

$$(2) \qquad d + rb + (r^{*}+\hat{e})(b^{*}-nfa^{*})e = \dot{b} + ((\dot{b}^{*}-\dot{nfa}^{*})e) + \dot{M}/P$$

$$= \dot{b} + ((\dot{b}^{*}-\dot{nfa}^{*})e) + \dot{m} + \hat{P}m^{1}/$$

---

[1]We use the following identity in the derivation of (2):

$$((\dot{b}^{*}-\dot{nfa}^{*})e) = (\dot{b}^{*}-\dot{nfa}^{*})e + \hat{e}(b^{*}-nfa^{*})e$$

Lower case letters denote real variables, so d = D/P, the real value of the non-interest deficit; P (P^*) is the domestic (foreign) price level. $\hat{P}$ ($\hat{P}^*$) is the corresponding domestic (foreign) inflation rates. b (b^*) is the real value of domestic (foreign) debt in terms of domestic (foreign) goods, and m is the real money stock M/P. nfa^* is the real value of the banking system's net foreign assets in terms of foreign go· : $nfa^*=NFA^*/P^*$. r (r^*) is the real rate of interest: $r = i - \dot{P}$, $r^* = i^* - \hat{P}^*$. e is the real exchange rate, $e = EP^*/P$. $\hat{e}$ is the rate of depreciation of the : al exchange rate. A " ' " indicates changes in the variable below it. Finally, n denotes the real growth rate of the economy.

Equ (2) states that the fiscal deficit, inclusive of the Central Bank's profit and loss account, but counting REAL interest payments only, equals changes in the real value of domestic and foreign debt, plus revenue from the inflation tax ($\hat{P}m$) and from seignorage $\dot{m}$ (with unitary income elasticity of demand for m, $\dot{m} = nm$ in steady state). The sum of the latter two equal revenue from monetization, M/P. Outside steady state there could be other sources of revenue from monetization than these two: once-off changes in the real money stock because of changes in inflation or interest rates, or similar once-off changes due to financial innovations shifting money demand.

Equation (2) as it stands is nothing but accounting, but it is at the basis of most of the analysis to come. Macroeconomic variables such as growth and inflation have implications for the amount of money the private sector is willing to absorb for given interest rates. Similarly, changes in financial structure and regulation will also have an impact on the amount of revenue from monetization that can be expected. All such

restrictions can be incorporated in equ. (2). This is explored in Section 2.2. Section 2.3 then puts it all together to derive the constraints on fiscal policy that consistency with financial structure and macroeconomic targets implies.

2.2 Revenue from Monetization and the Structure of the Financial Sector.

The previous section argued that the appropriate money concept to use is net Central Bank liabilities to the private sector, or reserve money. It is thus important to understand how demand for base money responds to changes in financial sector regulation, to interest rates and inflation and so on. This creates a practical problem in that those liabilities are towards different agents in the economy. It is therefore unlikely that an aggregate money demand function would adequately capture the sensitivity of reserve money demand with respect to changes in the inflation rate, financial structure and interest rates. We use a more structural approach in this paper. Underlying this approach is a model describing private portfolio choice as a function of inflation, output growth and interest rates. This gives the amount of currency, demand deposits and time deposits the private sector is willing to hold given output, inflation and interest rates. This is coupled with a simple financial sector model incorporating reserve requirements and other bank regulatory policies to derive the demand for reserves by commercial banks. The demand for reserves is then added to the demand for currency already derived to get an estimate of the total demand for base money given inflation, interest rates and so on. All this is then used to calculate revenue from monetization for different inflation rates, output growth rates, interest

and inflation rates and different regulatory policies.

This indirect, structural approach has a number of advantages. It allows explicit calculation of the effects of changes in financial sector regulation on the financeable deficit through the impact of such regulation on the aggregate demand for base money. For the same reason, this approach is more likely to be stable across changes in financial sector regulation. Below we give an example for a simple fractional reserve banking system (ie a system where banks are required to hold a fraction of their deposits as reserves). More complicated regulatory systems are incorporated as an option in the LOTUS model that is available on diskette as a companion to this paper.

To analyse the determinants of the demand for the primary components of reserve money entering into such a financial sector model, consider first a simple portfolio approach to private sector asset demand:

$$(3a) \qquad (C_u/(PY)) = f_C(\hat{P}, i_{DD}, i_{TD})$$

$$(3b) \qquad (DD/(PY)) = f_{DD}(\hat{P}, i_{DD}, i_{TD})$$

$$(3c) \qquad (TD/(PY)) = f_{TD}(\hat{P}, i_{DD}, i_{TD})$$

Demand for currency C_u, demand deposits DD, and time deposits TD, all as a share of nominal GNP (PY in the formula), depend on inflation $\hat{P}$, and the interest rates paid on demand and time deposits, i_{DD} and i_{TD}. More sophisticated financial structures would introduce additional factors. For example, with foreign exchange deposits available one would expect exchange rate depreciation and foreign interest rates to influence demand

for domestic assets. However the time period since the introduction of foreign exchange deposits in Turkey has been too short to allow econometric analysis of the influence of such factors in the empirical application discussed below.

Under a fractional reserve system, with reserve requirement ratios RR_{DD} and RR_{TD} against demand and time deposits respectively, demand for base money M is:

$$(4) \qquad M/(PY) = C_U/(PY) + RR_{DD}DD/(PY) + RR_{TD}TD/(PY)$$

$$= f_{CU}(\hat{P}, i_{DD}, i_{TD}) + RR_{DD}f_{DD}(\hat{P}, i_{DD}, i_{TD}) + RR_{TD}f_{TD}(\hat{P}, i_{DD}, i_{TD})$$

(4) can be used to derive the impact of changes in inflation, interest rates and financial sector regulation on base money demand and their likely impact on the revenue the public sector can expect from monetization. Combining this information with equ. (2) then allows assessment of the fiscal consequences of inflation and of financial sector reforms affecting for example reserve requirements RR_{DD} and RR_{TD} or the interest rates paid on deposits.

2.3 Putting it all together: on the design of consistent fiscal policies

The cost and availability of foreign financing are clearly important determinants of what constitutes a consistent fiscal policy. Required financing depends on the cost of the existing foreign debt, $r^*(b^*-nfa^*)e$; in addition, for any total revenue requirement, the amount to be covered

from domestic sources depends on the amount of foreign financing $(\dot{b}^{*}-\dot{nfa})e$ that is desired, or, if less, available.

Assessing a country's room for external borrowing involves two considerations: solvency and creditworthiness. Solvency concerns ability to pay and is intricately linked to the non-interest current account, real interest and output growth rates, and, of course, the initial level of debt. Solvency is assumed to be in jeopardy if the discounted value of an estimate of minimum current and future consumption levels exceeds current wealth net of foreign debt. This is equivalent to calculating the discounted value of current and future feasible trade surpluses and compare that value with the current debt.

Creditworthiness may however be a constraint even if solvency is not. Creditworthiness depends on the lenders' perception of a country's ability AND willingness to pay. Therefore creditworthiness often imposes tighter constraints than solvency alone. Assessing the precise limits imposed by creditworthiness constraints is difficult for several reasons. First of all, it is extremely difficult to assess the costs of default. Cohen (1988) suggests a simple approach to this problem, by observing that, if a country has not defaulted yet, the current debt service burden must fall short of whatever the cost of default is. An obvious definition of a "prudent" debt strategy then is any borrowing path that will not, at any time, raise the debt service burden above its current value. This may sound almost tautologically true, but it has important implications. For example the trade surpluses that many Latin American countries had to run after 1982 in fact do not qualify under this approach. Clearly, being forced to run trade surpluses of around 8% of GNP raises the burden

associated with the current level of external debt and so might trigger default. We thus define unsustainable debt finance as any debt policy that implies debt issue at a rate in excess of the growth rate of the resources available for eventual debt service. This is in fact a more stringent requirement than solvency if the real interest rate exceeds the real growth rate of the economy.

If we take domestic output y as the resource base concept for foreign and domestic debt, we obtain the following restrictions on debt issue:

$$(5) \qquad \dot{b} = nb,\ \dot{b}^* - n\dot{f}a^* = n(b^* - nfa^*)$$

n is the growth rate of y.

We define a consistent fiscal policy as a policy that can be sustained over the medium term without compromising any other macroeconomic target and without reliance on unsustainable debt finance. We can, with this definition, insert the restrictions on debt issue (5) into equ. (2); expressing variables as percentages of GDP then yields the following expression for the deficit reduction required for consistency, $\tilde{rdr}$ (also expressed as a share of GDP):

$$(6) \qquad \tilde{rdr} = \{\tilde{d} + r\tilde{b} + (r^* + \hat{e})(\tilde{b}^* - n\tilde{fa}^*)e\}$$

$$- \{n\tilde{b} + n(\tilde{b}^* - n\tilde{fa}^*) + n\tilde{m} + \hat{P}\tilde{m}\}$$

A "~" above a variable indicates the variable is expressed as a share of GDP. $\tilde{rdr}$ equals the actual deficit inclusive of real interest payments on

foreign and domestic debt, minus the financeable deficit, $(n\tilde{b} + n_R(\tilde{b}^*-n\tilde{f}a^*) + n\tilde{m} + \hat{P}\tilde{m})$. A deficit reduction equal to $r\tilde{d}r$ will bring fiscal deficits in line with other macroeconomic targets in the sense defined before. Alternatively, (6) can be used to calculate "sustainable" inflation rates. In that case one simply equates $r\tilde{d}r$ to the actual deficit, and solves for the inflation rate that restores equality between that value and the right hand side of (6) [2]. Such an exercise faces a problem of multiple solutions if the functional form of the asset demand functions implies a dependence of the interest elasticity on inflation or nominal interest rates. An example where this occurs is the semi-logarithmic equation. This problem need not concern us here since it clearly does not arise if (6) is used, as is done in this paper, to derive a sustainable deficit for given inflation targets rather than the other way around.

Clearly, under a debt-output rule, a real depreciation ($\hat{e}>0$) increases the $r\tilde{d}r$, ie reduces the room for fiscal expansion. But this will in general not be the case if exports are chosen as benchmark. Under a debt-export rule, (6) becomes:

$$(7) \qquad r\tilde{d}r = (\tilde{d} + r\tilde{b} + (r^* + \hat{e})(\tilde{b}^* - n\tilde{f}a^*)e) - (n\tilde{b} + n_X(\tilde{b}^*-n\tilde{f}a^*) + n\tilde{m} + \hat{P}\tilde{m})$$

$$= (\tilde{d} + r\tilde{b} + r^*(\tilde{b}^* - n\tilde{f}a^*)e) - (n\tilde{b} + \epsilon^{X^*}_{Y^*} n^*(\tilde{b}^*-n\tilde{f}a^*) + (n + \hat{P})\tilde{m}) + (1 - \epsilon^{X^*}_{e}) \hat{e}(\tilde{b}^* - n\tilde{f}a^*)e$$

---

[2] See Melnick and Sokoler (1984) for an exercise along such lines.

Under this rule, real depreciation will relax the fiscal adjustment requirement if the export elasticity with respect to the real exchange rate exceeds one.

Cohen (1988) has argued that the proper resource base ought to be a weighted average of GDP and exports, with the weights chosen in such a way that the resulting ratio is insensitive to the real exchange rate. The actual choice does not matter too much unless changes in the real exchange rate are anticipated. In the empirical application presented below, we use the Cohen approach (see Anand and van Wijnbergen (1988) for details on the derivation of the weights).

3 Empirical Preliminaries: The Structure of Money Demand in Turkey

Reserve money consists of currency in circulation and reserves held by the commercial banks against demand and time deposits. To derive demand for base money we therefore estimate asset demand functions describing the private sector's portfolio choice over currency, demand deposits and time deposits as a function of inflation, income and interest rates. All data on prices and financial assets are taken from the Monthly Bulletin of the Central Bank of Turkey; real output data are from International Financial Statistics (IMF, various issues). All equations are estimated using OLS. Consider demand for currency first.

$$(8) \qquad \log(C_{U,t}/CPI_t) = \underset{(3.10)}{3.58} + \underset{(2.42)}{0.57}\log(y_t) - \underset{(3.67)}{0.69}i_{TD,t} - \underset{(3.01)}{1.07}i_{DD,t}$$

$$- 1.51\ \hat{P}^e_t + 0.28\ \log(C_{U,t-1}/CPI_{t-1})$$

(3.79) (1.77)

R^2=0.83 DW=2.08 Sample Period:1977.I-1986.IV

$\hat{P}^e_t$, the proxy for expected inflation, is approximated by the forecasts of an univariate VAR of inflation on its own past values. The results are reasonable, with all the coefficients of the right sign and almost all highly significantly different from zero. Seasonal dummies were also included but their coefficients are not reported here. Adjustment is quick, with a mean lag of less than 5 months (1/(1-0.28) quarter).

A similar equation for demand deposits yields the following results:

$$(9) \qquad \log(DD_t/CPI_t) = \underset{(6.71)}{8.90} - \underset{(2.86)}{0.55}\log(y_t) - \underset{(7.97)}{0.96}\, i_{TD,t} + \underset{(1.30)}{0.60}\, i_{DD,t} - \underset{(7.83)}{2.16}\,\hat{P}^e_t + \underset{(2.67)}{0.24}\log(DD_{t-1}/CPI_{t-1})$$

R^2=0.98 DW=1.85 Sample Period:1977.I-1986.IV

Again a reasonable equation, with a relatively high adjustment speed and strong sensitivity to interest rates and expected inflation.

Applied to time deposits, the portfolio approach yields:

$$(10) \qquad \log(TD_t/CPI_t) = \underset{(1.94)}{1.30} + \underset{(1.02)}{0.28}\log(y_t) + \underset{(4.61)}{1.18}\, i_{TD,t} + \underset{(1.21)}{0.38}\, i_{DD,t}$$

$$- 1.41\ \hat{P}^{e}_{t} + 0.68\ \log(TD_{t-1}/CPI_{t-1})$$
$$(2.41) \qquad (7.48)$$

R^2=0.99 DW=1.90 Sample Period:1977.I-1986.IV

The equation shows strong sensitivity with respect to the own interest rate $i_{TD,t}$ and to expected inflation. The coefficient of the interest paid on demand deposits is insignificant, low and of the wrong sign. Reestimating the equation excluding this variable yields:

$$(11)\ \log(TD_t/CPI_t) = 1.34 + 0.12\ \log(y_t) + 0.98\ i_{TD,t} - 1.02\ \hat{P}^{e}_{t}$$
$$(1.98)\ (0.51) \qquad (5.04) \qquad (2.09)$$

$$+ 0.76\ \log(TD_{t-1}/CPI_{t-1})$$
$$(11.7)$$

R^2=0.99 DW=1.90 Sample Period:1977.I-1986.IV

4 An Empirical Application: Deficits, Financial Sector Reform and Inflation in Turkey.

In Section 4.1 we use the framework presented above to assess the consistency of fiscal deficits with other macroeconomic targets for Turkey. Section 4.2 discusses the consequences of postponing fiscal adjustment and studies the interrelation between domestic debt issue, monetization and current and future inflation We then use the model to assess the fiscal impact of financial reforms in Section 4.3. Finally

Section 4.4 looks at the impact of the size and cost of foreign debt on the budget, and the fiscal implication of debt-substitution policies where external debt is in effect "swapped" for internal debt.

4.1 Inflation and the Consistency of Fiscal Policy

The results are summarized in Tables 1 and 2. Underlying these tables are various targets and assumptions. First, a 6 percent real growth rate of GNP. Second, the reserve requirements and nominal interest rates on demand and time deposits prevailing at the end of 1987 are used. As to liquidity requirements, only the part over which no interest is paid is included in the definition of base money.

Table 1 assesses potential revenues from seignorage and the inflation tax for various inflation rates. The table first lists demand for currency, demand deposits and time deposits for various inflation rates; these asset demands are derived using the empirical results of Section 3.1 and the model presented in Section 2. These are then used to calculate demand for base money as a function of reserve requirements and the liquidity ratio. In the next column, inflation tax revenue is presented, while the final column lists total revenue from monetization. Total demand for base money, the table shows, is sensitive to inflation. It falls from 7.8% of GNP at 15% inflation to 5.9% at 60% inflation. It is clear from the next column that higher inflation leads to higher revenue from inflation tax, be it at a declining rate. However, the marginal increase in inflation tax revenue becomes less and less as inflation rises; at 200% inflation (not shown in the table) inflation tax reaches its maximum value. Total revenue from monetization also rises, although at a slightly

lower rate, because the second component, seignorage, actually declines as inflation rises. This is a negligible effect, however.

TABLE 1: INFLATION TAX AND SEIGNORAGE AT VARIOUS INFLATION RATES

(percent of GNP)

Inflation	Demand for:			Inflation Tax Revenues	Monetization
	Cash	Deposits			
		Demand	Time		
15	3.0	7.5	17.5	1.0	1.4
20	2.9	7.3	16.7	1.2	1.6
30	2.8	6.9	15.3	1.6	2.0
40	2.7	6.5	14.1	2.0	2.3
50	2.6	6.1	13.0	2.2	2.6
60	2.5	5.8	12.1	2.5	2.8

This analysis covers one source of financing, monetization. In addition there is domestic debt issue and foreign borrowing. Under the assumption of a 6% real output growth, the government can borrow 2.5% of GNP a year without seeing its (foreign) debt output ratio increase. Furthermore we assume that all the additional foreign exchange is available to the government. This is probably reasonable, as not much private sector foreign borrowing is expected other than inflows into the commercial banking system through foreign exchange deposits owned by non-residents. These are in any case better seen as remittances in disguise and should possibly be counted as above the line inflows rather

than capital account transactions.

For domestic debt we assume that debt issue is restricted to whatever is compatible with maintaining the debt-output ratio constant. The reason for not allowing a faster rate of domestic debt issue is the high real rate it carries. At 12% a year it is well above the growth rate of the economy. At this rate, debt-service costs would escalate as a percentage of GNP if more extensive use is made of debt-issue to finance the deficit.

Table 2 shows, first of all, the financeable deficit as a function of the inflation rate. It arrives at that measure by adding up the three sources of financing: monetization, domestic debt issue and foreign borrowing. A target inflation rate of 50%, close to the year-end-to-year-end inflation rate in 1987, allows a deficit of 6% of GDP. A target of 20% would allow a deficit of 4.8% only.

TABLE 2 FINANCEABLE DEFICIT FOR VARIOUS INFLATION TARGETS

(percent of GDP)

Inflation Rate	Financeable Deficit	Actual Deficit in 1986	Required Deficit Reduction ($r\bar{d}r$)
15	4.4	5.7	1.3
20	4.6	5.7	1.5
30	5.0	5.7	0.7
40	5.3	5.7	0.4
50	5.6	5.7	0.1
60	5.8	5.7	-0.1

The next column shows the actual real deficit in 1986. If the actual deficit is subtracted from the financeable deficit, one arrives at the Required Deficit Reduction ($r\tilde{d}r$). This is the reduction necessary for consistency with the corresponding inflation rate. $r\tilde{d}r$ equals 1.1% for an inflation target of 20%, but is essentially zero for a 50% inflation target. In that sense, 50% can be considered as the equilibrium inflation rate, given the 1986 fiscal stance and financial structure

4.2 Domestic Debt, Money Creation and the Trade-off between Current and Future Inflation.

The previous Section discussed the fiscal adjustment necessary to achieve a given inflation target. The same tables could be used to derive, instead, the inflation rate compatible with no fiscal adjustment, given the current fiscal deficit. The current Section takes a different approach. What if adjustment takes place, but not instantaneously? In particular, what happens if the government pursues the monetary policy necessary to sustain a given inflation rate, fails to make the required deficit reduction and covers the resulting gap through debt issue? This in effect constitutes a debt substitution policy, similar to the one that is discussed in the original Sargent-Wallace (1982) paper. Consider a policy of strict adherence to monetary policy consistent with inflation targets of say the 1987 rate of 20%. But instead of making the required deficit reduction, the government issues interest bearing debt to cover the remaining financing gap.

Monetization implies debt issue at zero nominal rate, so such a policy of substituting interest bearing debt to replace revenue from

monetization will deteriorate the government's fiscal position. Figure 1 demonstrates the consequences. The base line in the diagram (labeled "Adjustment now") shows the inflation/deficit-reduction trade-off just discussed in Section 4.1. The figure gives the amount of fiscal adjustment necessary (listed on the vertical axis; the benchmark is 1986, in which year the real deficit was 5.7 percent of GNP) for given inflation rates (listed on the horizontal axis). The line cuts the axis at 50%, indicating that for that inflation target, the fiscal policy stance in 1986 required no further adjustment. In that sense, 50% was the equilibrium inflation rate in that year.

The second line in the graph shows how the trade-off shifts in an unfavorable direction if adjustment is postponed. The line, labeled "Adj.after six years", shows the additional fiscal adjustment necessary, or, alternatively, the increase in equilibrium inflation if no adjustment is taken. This line cuts the inflation axis at a rate in excess of 80 percent, an increase of 30 percentage points.

FIGURE 1 HERE

4.3 Fiscal Implications of Financial Sector Policies.

Financial sector reforms are usually undertaken with microeconomic efficiency as a predominating motivating factor. Advice to lower reserve requirements is a good example. The objective is to lower the wedge between lending and borrowing rates of the commercial banking system. At the same time, such measures have a direct impact on aggregate demand for reserve money and hence on the basis over which the inflation tax is

levied. This in turn implies that they have implications for the fiscal deficit that is consistent with inflation targets, or, alternatively, the inflation rate that will prevail eventually if no fiscal adjustment takes place. A fiscal deficit that was consistent with other macroeconomic targets before the reform may not be consistent anymore once the reform has been implemented. The model presented in this paper allows one to assess the need for fiscal policy adjustment along with such reforms.

Typical experiments one can perform with the model would involve changes in reserve requirements, decisions to pay interest rates on reserves, or changes in bank interest rates. We will only consider changes in time deposit rates here. The impact of deposit rate changes on demand for reserve money depends intricately on the structure of private asset demand. For example higher time deposit rates will lead to substitution out of cash into time deposits, thus reducing demand for base money by the amount shifted times one minus the reserve requirement ratio against time deposits; they will however also trigger shifts out of non-monetary assets, with a positive impact on reserve money demand since time deposits carry reserve requirements while non-monetary assets do not. The net effect will depend on the relative substitution effects, and on the level at which reserve requirements against time deposits are set (cf van Wijnbergen (1982)).

Table 3 shows that currency and demand deposits will increase after a cut in time deposit rates from 56 to 35 percent, but much less than time deposits fall. Apparently, a cut in time deposit rates triggers a larger shift into non-monetary assets than into currency in circulation or demand deposits. Thus base money demand declines. The empirical evidence thus suggests that the second effect mentioned in the previous paragraph

dominates, at least for the current level of reserve requirements on time deposits (van Wijnbergen (1984) reports similar results for South Korea). As a result, inflation tax revenues will decline at any given inflation rate once monetary equilibrium is restored. Therefore, the required deficit reduction, "$r\tilde{d}r$", necessary to achieve a target inflation rate of 35% increases from -0.9 percent of GNP to 1.1%.

TABLE 4 TIME DEPOSIT RATES AND BASE MONEY DEMAND

Time Deposit Rate:	56%	35%
Cash	3.1	3.7
Demand deposits	7.3	9.6
Time deposits	19.5	8.4
Total Base Money	7.1	6.4

Note: Asset demands are expressed as a percentage of GDP; they are evaluated at 35% inflation and a demand deposit rate of 10%.

Alternatively, look at the inflation rate that will make any deficit reduction unnecessary. Before the cut in deposit rates, this equilibrium inflation rate (equilibrium, that is, for given inflation rate) equaled 50 percent, as we saw in Table 3. After the cut in interest rates this equilibrium inflation rate increases to almost 85 percent. The large increase in equilibrium inflation for such a small increase in $r\tilde{d}r$ reflects the fact that at inflation rates close to triple digits, money demand becomes highly elastic. As a consequence, the additional revenue from higher inflation declines rapidly as inflation itself rises. This

necessitates bigger and bigger increases in inflation to cover a given increase in revenue requirements as base level inflation increases. Changes in demand deposit rates would have an even bigger impact, since demand deposits are closer money substitutes than time deposits.

It is important realise that these results do not tell us whether financial sector reform is desirable or not, but rather to what extent accompanying fiscal policy adjustment is necessary. Furthermore, we do not address the short term macroeconomic effects of changes in demand for base money given the supply of base money. With perfect capital mobility and a fixed exchange rate, capital inflows from abroad will immediately resolve any discrepancy between money demand and money supply. If capital mobility is less than perfect, however, such an increase of base money demand over base money supply may have a recessionary impact until price levels or reserve changes resolve any remaining imbalance between money demand and supply.

4.4 External Debt, Foreign Interest Rates and Sustainable Inflation

In this section we report on two experiments. First, we show the impact of foreign real interest rates, for a fixed level of foreign debt, on sustainable inflation and the consistency of fiscal deficits with any given inflation targets. We then analyse the consequences of "debt substitution": repaying foreign debt not by running a matching domestic fiscal surplus, (or reduced deficit), but by the issue of additional domestic public sector debt. The latter policy has been pursued extensively in many Latin American debtors (Cohen (1988)).

Consider first the impact of real interest rates on public sector

foreign debt. Figure 2 summarizes the results. The first experiment is a hypothetical return to the admittedly unsustainable late 1970s with zero real interest rates on foreign debt. The results are summarized by line RF0 in Figure 2. This line indicates that at a zero foreign real interest rate, no adjustment is necessary for any (positive) inflation rate. If such a reduction in real rates would take place, the financeable deficit would exceed the actual 1986 deficit for any positive inflation target.

The figure also shows the consequences of an increase in real interest rates to 8 percent (the line labeled RF8 in figure 2). Clearly, such an increase in real interest rates, if sustained, would push Turkey in Latin-America level inflation rates if no additional fiscal measures were taken. The intersection point shifts to 150 percent, indicating that the equilibrium inflation rate more than doubles in that case. The figure also shows another feature of the relation between fiscal policy and inflation. At inflation rates substantially above 200%, the $r\bar{d}r$ line starts sloping upward: at rates that high, increased inflation requires more rather than less fiscal adjustment. This is due to the fact that the maximum revenue from inflation tax in Turkey is reached at somewhat above 200 percent inflation a year. At higher inflation rates, the demand for base money declines so fast when inflation rises, that total inflation tax revenue actually falls, the higher inflation rate notwithstanding. As a consequence, the $r\bar{d}r$ becomes a rising rather than a declining function of inflation if the inflation rate exceeds 200 percent a year. We assume that the government follows money growth rules that will keep the economy at the lower rather than the higher rate equilibrium.

FIG 2 HERE

Consider next the debt substitution experiment. Under this experiment, the government retires foreign debt equal to 10 percent of GNP and raises the revenue by issuing an equivalent amount of interest bearing debt domestically. This clearly deteriorates its fiscal position, since the real interest cost of domestic debt is 6 percentage points higher (12 instead of 6) than the cost of foreign debt. Such a policy would increase the equilibrium inflation rate to over 150% . Clearly, at current interest rate differentials, a policy of retiring foreign public debt through issue of domestic debt will in fact deteriorate the fiscal position of the government.

5 Conclusions

We have designed a simple framework for the assessment of the consistency between fiscal policy and the requirements imposed by financial sector reform, external debt and medium run inflation targets. The framework draws on the public finance approach to inflation pioneered by Phelps (1973) and is designed with practical application in mind. The approach has relatively modest data requirements because of its focus on consistency rather than on intertemporal optimality. The design of an intertemporally optimal fiscal policy requires information about parameters such as the intertemporal elasticity of substitution, about which we do not even have ball park estimates. Data requirements for application of the framework set up here do not exceed routinely available financial sector and national accounts data. Extra effort is required, however, in obtaining detailed information about the regulatory framework for the financial sector and about the size of the actual deficit of the

public sector. The latter is defined in a comprehensive manner, in particular inclusive of the Central Bank's profit and loss account.

We demonstrate the usefulness of the model by using it in an empirical analysis of the implications of financial sector reform, inflation targets and external debt strategies for fiscal policy in Turkey. The application demonstrates, we hope, the usefulness of this approach for the analysis of the interactions between external debt and foreign interest rates, domestic debt servicing costs, fiscal policy and the sustainability of medium run inflation targets. In addition, we applied the model to an analysis of the fiscal implications of financial sector reform measures, showing the importance of such measures for fiscal policy and the sustainability of medium run inflation targets.

Many extensions are possible. Introducing explicit dynamics in the financial sector model would allow its use in year-to-year financial programming. An even more ambitious extension would explicitly explore the dynamics of inflation given the external debt and fiscal policy considerations embedded in this approach, as is done in Sargent and Wallace (1982). This would however require a much more substantial modeling effort, and would again lead to much more demanding data requirements, thus jeopardizing empirical applicability.

The model was designed to provide an easily applicable quantitative framework, of potential use in different countries without requiring too much of an effort for country-to-country transfer. We hope that the analysis of Turkey presented here, apart from being of interest in its own right, also demonstrates that the current version is a useful step in that direction.

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