Institut für Höhere Studien (IHS), Wien
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Abstract

The main objective of this paper is to explain the phenomena of persistent inflation in Romania through the use of a simple empirical model which highlights the links between inflation and the government budget deficit. We discuss the importance of using a proper definition of the public sector when calculating the public sector deficit and illustrate the impact of using different measures of public sector deficits on the assessment of consistency between monetary and fiscal policy. We then discuss the effect of switching to market interest rates on domestic debt as well as the impact of real exchange rate depreciation and financial sector reform on the financeable deficit and the required deficit reduction for given inflation targets.

Keywords

Monetary and fiscal policy, inflation, Romania, real exchange rate dynamics

JEL-Classifications

E31, E63

Comments
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1. Introduction

Developing a quantitative approach to what consistency between fiscal policy and inflation targets amounts to is particularly difficult because of the problematic quality of the available data and the rapidly shifting economic structure. In this paper we apply a simple framework, designed to minimize these problems[1], assessing consistency between inflation, monetary reform and fiscal policy for Romania. Data requirements are kept to a minimum by focusing on medium term consistency relations at the expense of short term predictive power. Moreover, since most of the empirical work required is in the financial area where markets operate much faster than in commodities markets, the relatively short period of time that has passed since price liberalization poses less of a problem.

In addition, we discuss the importance of using a proper definition of the public sector when calculating the public sector deficit and we illustrate the impact of using different concepts of public sector deficits on the consistency between monetary and fiscal policies in Rumania. First, we use not the central government budget deficit but the general government budget including all the local governments budgets and the extra-budgetary accounts, which might hide a significant part of the government expenditures. Furthermore, we are still missing a very important part of the public sector expenditures and revenues, we include the Central bank profit and loss accounts. This part of the public sector is especially important for the countries facing severe fiscal restraints since the governments are tempted to shift a part of their fiscal expenditures to the central bank balance sheets. Therefore, we have to incorporate the Central Bank's profit and loss account into our measure of public sector deficit.

We proceed with a two step approach: first we calculate the nominal deficits of the general government, Central Bank, and then the total nominal public sector deficit; and second, we calculate the real general government, Central Bank, and public sector deficits as a percentage of GDP.

We then illustrate the impact of using the two different measures of real public sector deficit (the general government budget deficit and the quasi-fiscal deficit) for assessing the

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[1] See Anand, R. and S. van Wijnbergen (1989), and Budina N. and S. van Wijnbergen for more details on the theoretical framework.

consistency between monetary and fiscal policies for the case of Romania. Through use of the general government real budget deficit in our simulation model, we find that at the 1994 actual inflation rate, there is no need of any fiscal adjustment to be done. However, when we use the total real public sector deficit in the model (incorporating Central bank profit and loss account), we obtain a very large measure of inconsistency between fiscal and monetary policy - there is no inflation rate which can close the gap between financeable and actual deficit for the Romanian economy. This has been a central result in the case of the Romanian economy, illustrating the importance of using the quasi-fiscal deficit which incorporates the total assets and liabilities of the public sector.

We also assess the impact of switching to market interest rates on domestic debt as well as the impact of real exchange rate depreciation, and financial sector reform on the financeable deficit and the required deficit reduction.

In what follows, section 2 outlines the theoretical framework employed. Section 3 contains some preliminary empirical results, in particular, calculations of the public sector deficit for the Romanian economy. The results of estimated asset demand equations are presented in Section 4. In section 5, the model is put together and applied to a series of policy issues, most of which have been mentioned in the preceding paragraphs. Section 6 concludes.

2. Monetary Demand, Seigniorage Revenue and Fiscal Deficit – A Theoretical Framework

Following Anand, R. and van Wijnbergen (1989), and Budina and van Wijnbergen (1995) we apply a simple framework which links debt, deficit and inflation to the Romanian economy.

In the model the primary deficit is taken to be a policy parameter. Debt management is summarized by targets for the debt to GDP ratio for both foreign and domestic debt. Implicit in this approach is the view that lenders will impose such a constraint because potential tax revenues, the ultimate source from which debt will need to be serviced, is obviously limited as a share of GDP. Base money growth, for any given inflation target, is endogenously determined by the path of the primary deficit, debt policy, the real rate of

interest, the financial structure and the growth rate of GDP. The model is designed to indicate whether any given inflation target is consistent with the other policy parameters and structural characteristics of the economy; alternatively, consistency can be imposed which yields the inflation rate consistent with structural stability, other policy variables and the financial structure of the economy.

A central of this framework is deriving the measure of the required deficit reduction, representing the difference between funding requirements and funding sources given the target debt-output ratios.

A key design feature of this framework is parsimonious data requirements, for obvious reasons. A second necessary feature should be the ability to capture the type of monetary reform transition economies are going through; otherwise much of the analysis would suffer from structural instability.

To fully capture all the public sector assets and liabilities, a proper definition of the government that includes all its components has to be used. Therefore, we define government budget not as a central government budget, but also include in our definition the budgets of all local governments, as well as the extrabudgetary accounts, which might hide a significant part of the government expenditures. Therefore the sum of the budgets of all the levels of government, plus extrabudgetary accounts gives us the consolidated government budget deficit constraint:

$$D + iB_{-1} + iDC^{g}_{-1} - iDEP^{g}_{-1} + ((1 + \hat{E})(1+i^{*})-1)B^{*}_{-1}E_{-1} = \Delta B + \Delta(B^{*}E) + \Delta DC^{g} - \Delta DEP^{g} \quad (1)$$

On the left are the funding requirements: the public sector primary deficit (D) plus the interest payments on the domestic debt (iB) plus interest payments on domestic credit to the government (iDC^{g}) minus interest payments of governments' deposits at the NBR ($iDEP^{g}$) and plus interest payments, expressed in terms of domestic currency, on foreign debt; on the right the different sources of financing: domestic domestic debt issue (d B), foreign borrowing (d B*E), changes in domestic credit to the government (d DC^{g}) minus changes in government deposits held in the NBR (d DEP^{g}).

Changes in value of the government foreign liabilities can be broken down into two components, not counting the cross-product term (dB*dE):

$$\Delta(B^*E) = E_{-1}\Delta B^* + B^*_{-1}\Delta E + \Delta B^*\Delta E \tag{2}$$

the first term on the RHS represents the change in stock of foreign debt, the second term represents exchange rate changes, and the last term is just the cross product.

Analogously, changes in value of interest payments on the foreign debt equal:

$$((1 + i^*)(1 + \hat{E})-1)B^*_{-1}E_{-1} = (1 + \hat{E})i^*B^*_{-1}E_{-1} + B^*_{-1}\Delta E \tag{3}$$

After substitution of eq. 2 and 3 into eq. 1, we get:

$$\begin{aligned} D + iB_{-1} + iDC^g_{-1} - iDEP^g_{-1} + (1 + \hat{E})i^*B^*_{-1}E_{-1} = \\ = \Delta B + \Delta B^*E_{-1} + \Delta B^*\Delta E + \Delta DC^g - \Delta DEP^g \end{aligned} \tag{4}$$

An important point here is that valuation changes due to exchange rate changes do not have any impact on the government budget deficit as conventionally recorded, since any increase of interest costs on foreign debt due to exchange rate changes, will be capitalized and result in a higher stock of foreign debt expressed in domestic currency.

Furthermore, even if we include the budgets of all the public government entities in our measure of Public Sector Deficit, there is still an important part missing here, namely, the Central bank profit and loss account. This part of the public sector is especially important for the countries facing severe fiscal restraints. In that case the governments are tempted to shift part of their fiscal expenditures to the central bank. An important example is when foreign debt interest payments are switched to the Central bank without being accounted for in the government budget. Therefore, it is necessary to incorporate the Central Bank's profit and loss account into our measure of public sector deficit (cf Anand and van Wijnbergen (1989)).

The Central bank profit and loss account can be derived by using the Central bank balance sheet:

$$\Delta M - \Delta C^p = \Delta DC^g - \Delta DEP^g + \Delta NFA\ E - \Delta NW \tag{5}$$

The left hand side represents the change in net interest free Central bank liabilities to the private sector and is equal to the sum of the change in currency in circulation plus the change in required reserves held by commercial banks at the Central bank minus the change

in refinancing credit to the commercial banking sector. The right hand side represents the change in the Central bank's assets, net of its profits (change in its net worth, dNW); The change in domestic credit extended to the government less the change in government deposits held in the Central bank plus change in Central bank's Net Foreign Assets (or liabilities with the opposite sign). The Central bank profits consist of interest earnings on its net credits (refinancing and credit to the government) plus interest earnings on its foreign assets (or alternatively minus interest expenditures on its Net foreign liabilities):

$$iDC^{g}_{-1} - iDEP^{g}_{-1} + iC^{p}_{-1} + ((1+i^{*})(1+\hat{E})-1)NFA^{*}_{-1}E_{-1} = \Delta NW \qquad (6)$$

Combining eq.3 and eq.4 gives us the Central bank profit and loss account:

$$\begin{aligned} iDC^{g}_{-1} - iDEP^{g}_{-1} + iC^{p}_{-1} + ((1+i^{*})(1+\hat{E})-1)NFA^{*}_{-1}E_{-1} = \\ = \Delta DC^{g} - \Delta DEP^{g} + \Delta(NFA^{*}E) - \Delta M + \Delta C^{p} \end{aligned} \qquad (7)$$

In the countries with large changes of inflation and exchange rate, valuation effects might be substantial. Therefore we have to single out changes due to quantity and to valuation effects (due to inflation and exchange rate changes). In this case, all calculations have to be done on a month-by-month basis, in order to exclude the monthly valuation effects. The yearly quantity effect, in which we are interested, is obtained by summing the monthly quantity effects. Note, that the changes of interest earnings on the Central bank Net Foreign assets due to the exchange rate changes (LHS) will result in the same changes in the Net Foreign Assets (RHS), so they will cancel out. We also take into account that the change in the value of NFA, expressed in domestic currency, can be due to the change in the dollar value of NFA, change in the exchange rate, or the cross effect of the two. Using the eq. 2 and 3, replacing B* by NFA*, and substituting back into eq.7, we get:, we can rewrite the NBR profit and loss account in the following way:

$$\begin{aligned} iDC^{g}_{-1} - iDEP^{g}_{-1} + iC^{p}_{-1} + (1+\hat{E})i^{*}NFA^{*}_{-1}E_{-1} = \\ = \Delta DC^{g} - \Delta DEP^{g} + E_{-1}\Delta NFA^{*} + \Delta E\Delta NFA^{*} - \Delta M + \Delta C^{p} \end{aligned} \qquad (8)$$

Now note that as in the case of the government budget constraint, the valuation changes due to changes in the exchange rate do not affect the central bank profit and loss accounts because the exchange rate effect is cancelled out.

Furthermore, subtracting eq. 8 from eq. 4, we obtain the integrated Government and Central bank budget constraint:[2]

$$D + iB_{-1} - iC^{P}_{-1} + (1 + \hat{E})i^{*}(B^{*}_{-1} - NFA^{*}_{-1})E_{-1} = \tag{9}$$
$$= \Delta B + E_{-1}(\Delta B^{*} - \Delta NFA^{*}) + \Delta E(\Delta B^{*} - \Delta NFA^{*}) + \Delta M - \Delta C^{P}$$

Note, that the integration of the Central Bank requires two changes in our framework: First, we switch to a net concept of foreign debt, foreign debt minus net foreign assets of the Central Bank. Secondly, we find that the Central bank credit to the government, (DC^{g}), and the government deposits held at the Central bank (DEP^{g}) disappear when the Central bank's account is integrated with those of the Government, since it is just a claim of one public entity on another.

Every variable from eq.7 can be expressed in the following way:

$$\frac{\Delta Y}{P} = \Delta y + \frac{\pi}{1 + \pi} y_{-1} \tag{10}$$

Furthermore we define the link between current domestic and foreign price levels and those one period past, the real exchange rate, and the exchange rate depreciation:

$$P = (1+\pi)P_{-1} \qquad e = \frac{EP^{*}}{P} \qquad (1 + \hat{e}) = \frac{(1 + \hat{E})(1 + \pi^{*})}{(1 + P)} \tag{11}$$

Dividing eq. 9 through by P (domestic price level) and using the above definitions, we obtain a measure of the real integrated general government and Central bank budget contraint:

$$d + \frac{(i - \pi)}{(1 + \pi)} b_{-1} - \frac{(i - \pi)}{(1 + \pi)} c^{P}_{-1} + (1 + \hat{e})\frac{(i^{*} - \pi^{*})}{(1 + \pi^{*})} e_{-1}(b^{*} - nfa^{*}) = \tag{12}$$
$$= \Delta b + (1 + \hat{e})e_{-1}(\Delta b^{*} - \Delta nfa^{*}) + \Delta m + \frac{\pi}{(1 + \pi)} m_{-1} - \Delta c^{P}$$

Subtracting the right from the left hand side of eq.10, dividing by the real GDP, and defining a debt policy in terms of target debt output ratios where real debt increases are tied to the growth rate of GDP, we obtain the measure for the required deficit reduction expressed as a

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[2] See Budina N., and S. van Wijnbergen, Fiscal deficits, Monetary Reform and Inflation in Transition Economies: The Case of Bulgaria, 1995, p. 3.

percentage of GDP:

$$rdr = [d + r(b - c^P) + (r^* + \hat{e})(b^* - nfa^*)e] - [nb + n(b^* - nfa^*)e + (n + \pi)m - \Delta c^P] \quad (13)$$

where r and r* stand for domestic and foreign real interest rates, respectively, and e is the real exchange rate P/(EP*). Lower case variants of variables already defined as upper case indicate the corresponding ratios to GDP. For example, *b* is the ratio of domestic debt to GDP, B/(PY). The first term between square brackets represents the actual public sector deficit, inclusive of real interest payments on domestic and (net) foreign debt. The second term states the financeable deficit using the two constraints for the growth rate of the domestic and foreign debt (which should not grow faster than the growth of the real resources available for its servicing) plus the resources collected through the increase in the monetary base (seigniorage), minus the real credit to non-public sector over GDP ratio. *n* is the real growth rate of the economy and π the target inflation rate. Therefore, $(n+\pi)m$ equals the real value of the nominal increase in base money, dM/P.

Since the Romanian economy has experienced very sharp changes of inflation and exchange rates, we have calculated the deficit on a month-by-month basis and then summed up the quantity effects over all 12 months. The derivation of Romanian real quasi-fiscal deficit is presented in the next section.

3. Calculation of the Romanian Operational Deficit

Since large inflation and exchange rate changes are a typical feature of economies in transition, valuation effects in measuring fiscal deficits might be substantial. Therefore, for the case of Romanian economy we have calculated the deficit as monthly changes in domestic and foreign liabilities, distinguishing between quantity and valuation effects and then summed the individual monthly changes yielding the Dec- to- Dec change in public sector liabilities. We proceed in two step approach, first we calculate nominal deficits of the general government, central bank, and then we calculate the total nominal public sector deficit. Note first, when calculating the total public sector deficit, we do not take into account the liabilities of one public entity to another, since they will cancel each other out, and second, we are

interested only in the net debt concept, the difference between general government foreign liabilities and the Central Bank's net foreign assets. Then the second step consists of calculation of the real general government, Central Bank, and public sector deficit as a percentage of GDP. Next, we illustrate the importance of the proper measure of real public sector deficit for assessing the consistency between monetary and fiscal policies for the case of Romania.

3.1. Nominal quasi-fiscal deficit

To derive the operational measure of the deficit for Romanian economy, we have used the balance sheet of the National Bank of Romania, following the World Bank study.
There are two sources of financing which could be extracted from the Balance sheet of NBR: money financing, accounting for the NBR refinancing credit to the commercial banks and foreign financing. The domestic financing is obtained from the aggregate balance sheet of the commercial banks, since in Romania the commercial banking sector was the main source of domestic financing for the public sector. As for the net foreign government liabilities we have used approximation from the world debt tables.

Money financing As discussed in Anand and van Wijnbergen (1989), the proper definition of monetary base is the one which consists of all net interest free liabilities of the central bank to the non-public sector, which is the sum of currency in circulation and the commercial banks' required reserves, held in the central bank, net of Central bank refinancing to the commercial banking system:

$$M0 = Cu + RR - Cp \tag{14}$$

Therefore, we extract the money financing from the liability side of the balance sheet of the NBR, as the sum of the following items: "currency" and "deposits of future banks" (representing currency in circulation) and "interbanking liabilities" (representing the commercial banks' obligatory reserves, held in the National Bank of Romania).
To get the net money financing, however, we have to subtract the NBR refinancing credit for the commercial banks (Cb) (for detail explanation see section 2).

Foreign financing The NFL have been aggregated in three main categories: dollar denominated liabilities ("Deposits of BIS") and assets (NBR's foreign exchange holdings); SDR denominated liabilities ("Use of Fund Resources"; there are no SDR assets); and gold holdings (assets side).

The change in the value of Net Foreign Liabilities (NFL) of the NBR can be due to the change in quantity of foreign financing as well as exchange rate changes, resulting in capital gains or losses. When calculating the change in NFL, however, we are interested in quantity rather than valuation effects. The division of the two effects is done on a month-by-month basis:

$$\Delta G = G - G_{-1} \tag{15}$$

Eq. 7 represents the total monthly change in gold holdings, including the quantity effect and capital gains or losses, resulting from the change in the price of gold.

Eq. 8 represents the quantity effect of the change in the value of gold, which is equal to the change in the quantity of the gold, times the NBR price of gold one period ago:

$$\Delta G^q = (G - G_{-1})Pg_{-1} \tag{16}$$

Eq. 9 and 10 represent the valuation and cross effects:

$$\Delta G^v = G_{-1}(Pg - Pg_{-1}) \tag{17}$$

Now, we would like to extract the profit loss account of the Central bank (see eq. 3), which can be obtained as the difference between money financing and domestic credit to the government and the net foreign assets.

$$\Delta G^c = (G - G_{-1})(Pg - Pg_{-1}) \tag{18}$$

In analogous way we have calculated these effects for the rest of the net foreign liabilities:

- dollar NFL equals to the dollar liabilities ("Deposits of the BIS") minus the dollar assets (NBR's foreign exchange holdings). Here we have used the end of the month nominal exchange rate (Lei per 1 USD)
- SDR NFL are just equal to the SDR liabilities ("Use of Fund Resources"), since there are no assets here. We have used the internal NBR SDR rate (Lei per 1 SDR) as well.

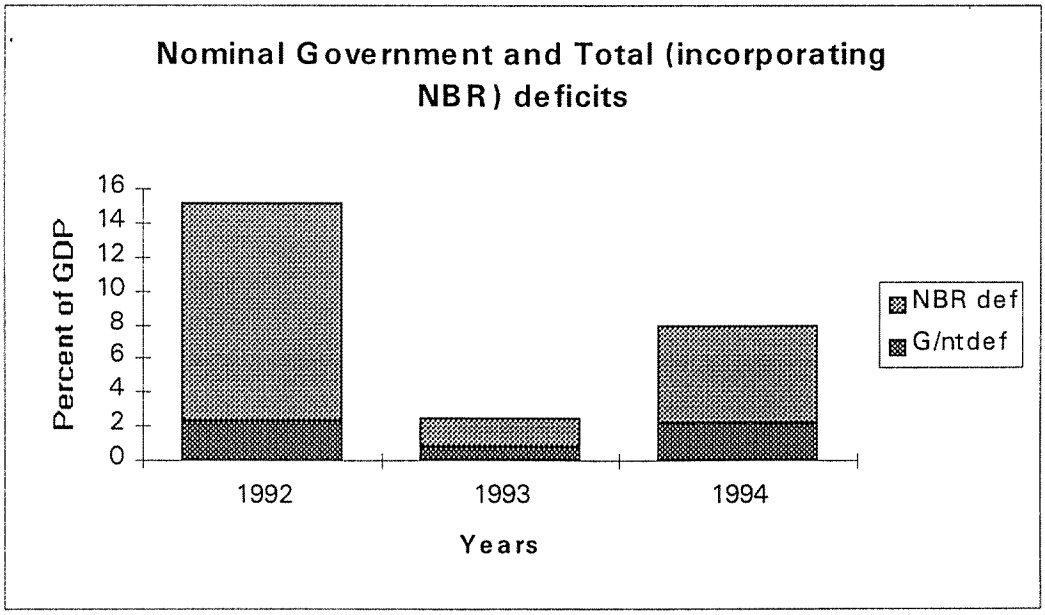
Domestic financing The last item which we have to extract from the NBR Balance sheet is domestic financing. As it was pointed out by Anand and van Wijnbergen (1989), the source of domestic financing in Romanian is the commercial banking sector. Therefore, the estimate of net domestic financing can be obtained from the Aggregate balance sheet of the commercial banks, as a difference between "public debt", or DC^g and "government deposits", or DEP^g. The item "public debt" is net of "public debt by law 7", which resulted as an exchange of government debt for non-performing loans held by the commercial banks, which will thus measure only the credit to the government used for its deficit financing.

Table 3.1. represents the measures for the Nominal Public sector deficit, which is also divided on two parts: Nominal Government budget deficit, and Nominal deficit, at the banking sector. The estimates of the deficits are obtained on a month-by-month basis, and the annual figure is obtained as a sum of the monthly changes. Because of the large price and exchange rate changes, the calculation of the deficit on December-to-December basis, will differ from the calculation of the deficit on a month-by-month basis.

Table 3.1. Nominal Public Sector deficit for the Romanian Economy

Nominal deficit as a percent of GDP	1992	1993	1994
1. dM-dCp Net change in monetary base	8.40%	0.62%	3.31%
1.1. dM Change in monet. base	7.77%	8.73%	4.38%
1.2. dCp Change in refinan. credit	-0.63%	8.11%	1.07%
2. NFL NBR's Net foreign liabilities	0.51%	-1.71%	1.44%
3. dB* Change in G/nt's NFL	5.49%	2.58%	2.90%
4.1. dB Change in G/nt dom. debt	0.72%	1.06%	0.24%
4.3.dDepg Change in G/nt deposit at NBR	3.89%	2.80%	0.86%
I. Government deficit 3+4.1.-4.3.	2.32%	0.84%	-2.28%
II. NBR deficit 1+2+4.3.	12.80%	1.71%	5.61%
III. Total Public sector deficit 1+2+3+4.1	15.11%	2.55%	7.89%

Figure 1



3.2. Real quasi-fiscal deficit

Calculation of the real general government, real NBR and real quasi-fiscal deficits is presented in table 3.2. These deficits are estimated by using the same items in the NBR and aggregate commercial banks balance sheets. An important difference, however, is that the real deficits' components exclude the inflationary component of public sector liabilities, except for the change in money financing part. Therefore all the changes in public sector liabilities are broken down into real and inflationary components:

$$\frac{\Delta G}{P_t} = \left(\frac{\Delta G}{P_t}\right) - \frac{\pi}{1+\pi}\left(\frac{G_{t-1}}{P_{t-1}}\right) \qquad (19)$$

where G is any asset (liability) of the NBR or the general government. The second term from the RHS of eq.16 is subtracted when calculating the final figure for the deficit, except for the base money financing, since the inflation tax also provides real resources for the deficit financing. When calculating Net foreign liabilities of the government and the NBR, valuation changes caused by the exchange rate changes and foreign inflation component are also subtracted, and we have used the real exchange rate for the final figure of the deficit. This decomposition of the change in liabilities is made also on a month-by-month basis, and the total yearly change is obtained as a sum of the monthly changes to avoid the inflationary distortions.

A comparison of general government budget deficit figure with the quasi-fiscal deficit reveals the fact, that nearly half of the total Romanian deficit for all the three years, is switched to the NBR, which leaves a room for possible inconsistency and unsustainable fiscal policies driving up the inflation rate. Base money financing, net of commercial banks refinancing accounts for the whole real NBR deficit. The main channels of the NBR deficit are extending cheap credits (at a below the market interest rates) to the Government and to some economic sectors.[3] Government foreign liabilities have the largest share in the real general government deficit.

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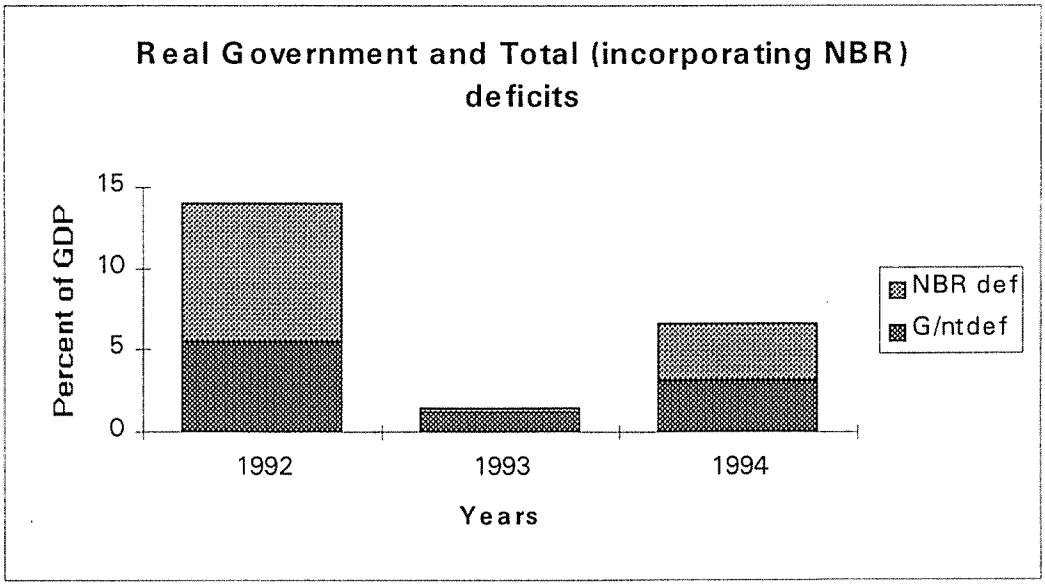
[3] See Balino, T. and V. Sundararajan for this point, Sep. 1994.

Table 3.2. Real Public Sector Deficit for the Romanian Economy

Real Public sector deficit	1992	1993	1994
1. dM-dCp	8.39%	0.62%	3.31%
1.1.dM/P	7.77%	8.73%	4.38%
1.2.dCp/P	-0.62%	8.11%	1.07%
2. NFL/GDP	0.11%	-0.24%	0.07%
3. dB*/GDP	5.36%	1.09%	3.22%
4.1.dB	0.15%	0.02%	-0.00%
4.2.dDepg	-0.05%	-0.14%	-0.00%
I. General government deficit 3+4.1.-4.3.	5.55%	1.26%	3.22%
II. NBR deficit 1+2+4.3.	8.46%	0.23%	3.37%
III. Total def 1+2+3+4.1	14.02%	1.49%	6.59%

Figure 2.



4. Estimation of the Assets Demand for Romanian Economy

Under a fractional reserve system, demand for monetary base equals:

$$\frac{M_0}{PY} = \frac{Cu}{PY} + \sum_{i=1}^{s} RR_{D_i} \frac{D_i}{PY} \tag{20}$$

M0 is the monetary base, P is the price level and Y is real income (GDP). Di are commercial bank deposits against which reserves have to be held at the Central Bank (in Bulgaria's case s=4: demand, time, savings and foreign currency deposits). RRDi are the respective reserve requirements against these deposits. Cu is currency in circulation.

To evaluate the monetary base as a function of the variables mentioned we have used a portfolio choice model of the demand for Currency (Cu), Demand deposits (DD), Time deposits (TD), Savings deposits (SD), and Foreign currency deposits (FD). In standard portfolio theory fashion, these asset demands are a function of interest rates on the various deposits and inflation:

$$\frac{A_i}{PY} = f(\hat{P}, i_{TD}, i_{FD}) \tag{21}$$

where Ai for i from 1 to 5 are CU, DD, TD, SD, and FD.

Furthermore, we have used a simple financial sector model (eq.7) incorporating reserve requirements, and other bank regulatory policies to derive the demand for reserves by commercial banks.The total demand for base money is then equal to:

$$\frac{M_0}{PY} = \frac{Cu}{PY} f(\hat{P}, i_{TD}, i_{FD}) + \sum_{i=1}^{s} RR_{D_i} \frac{D_i}{PY} f(\hat{P}, i_{TD}, i_{FD}) \tag{22}$$

The demand for reserves is then added to already estimated demand for currency, to get an estimate of total demand for base money, used to calculate the seigniorage revenues for different inflation rates, real output growth rates, interest rates, and for different regulatory policies. Seigniorage revenues is derived as:

$$SR=(\hat{P} + n)\frac{M_0 f(\hat{P},i_{TD},i_{FD},RR_{D_t},i_{RR_{D_t}})}{PY} \tag{23}$$

An extensive overview on money demand estimation for the developing countries is found in Ghatak (1994). Thus we have used the following variables as an opportunity cost of holding financial assets:

nominal interest rate, i In the orthodox money demand function, the interest rate is regarded as the opportunity cost of holding money. Because of the thin and inefficient capital markets and pegging of the nominal interest rates, they play a limited role in equilibrating supply and demand for money. Moreover, although the important element of stabilization programs in Eastern Europe was sharp increase of nominal interest rates in order to eliminate an excess demand for money, taking into account the prevailing high inflation rate during the transitional period, their value in real terms was often negative. Therefore we would expect in most of the cases small and insignificant in some cases reverse in sign coefficient of the effect of interest rates on money demand. However, to the extent to which borrowing plays a role in financing investments, the interest rate can be used as an explanatory variable;

expected inflation, p^e Economic agents can choose between holding real assets, domestic or foreign currency cash, and deposits in domestic or foreign currency. Therefore, the expected rate of inflation can be regarded as the opportunity cost of holding money (Deaver, 1970; Hynes, 1967; Campbell, 1970). Expected inflation would affect the demand for domestic money negatively and the demand for foreign currency deposits positively. Because of the backward and inefficient capital markets in Eastern Europe, interest rates are not expected to measure expected inflation adequately, and therefore the inflation rate is added to the set of explanatory variables. The empirical measure of expected inflation could be either actual inflation, thus assuming rational expectations, or adaptive behaviour through taking the weighted average of all past rates of inflation with geometrically declining weights.

*interest rate on foreign currency denominated assets, i** Agents will choose between assets in domestic and foreign currency, depending on their rate of return and risk. To compare rate of return in foreign and domestic currency, we have used a domestic to foreign interest rate differential, expressed in terms of domestic currency. By using the foreign interest rate,

denominated in domestic currency, the expected currency depreciation enters indirectly as an opportunity cost variable. The interest rate differential is important for holding deposits in domestic or foreign currencies, which can be regarded as opportunity cost of holding money as well.

Inflation uncertainty (Ghatak, 1994), $d(p^e)$ Another important determinant for the choice between foreign and domestic money could be the uncertainty of agents about the expected future inflation rate. Therefore, high inflation uncertainty would increase the risk of holding assets in domestic currency, which makes these assets less attractive for the economic agents, and in turn reduces both their short and long term demand and substitute them with assets, denominated in foreign currency. The inflation uncertainty is measured empirically by the absolute value of the change in inflation. In the case of adaptive expectations, inflation uncertainty influences money demand indirectly by altering the adaptive expectations parameter in the adjustment of inflation expectation.

lags in money demand adjustment, $(M/YP)_{t-1}$ Due to high uncertainty and risks, involved in money markets in Eastern Europe, there could be an expectation lag, since it takes time for the risk-averse agents to adjust their portfolio. Therefore, this could be an argument for including the dependent lagged variable into the short run money demand function.

shift variable Specific dummy variables have been used in conventional money demand equations to account for macroeconomic stabilisation programs, including restrictive monetary policies and price liberalisation. Including shift dummies is particularly important for former centrally planned economies, to account for the removal of price and exchange rate controls. In Romania, price liberalization has taken place more gradually. A sharp change in the monetary policy occurred in the beginning of 1992.

Money demand estimates for the Romanian economy.

Table 4.1. The Estimates of the financial sector portfolio model for the Romanian economy.

	LCUY	LDDY	LTDY	LSDY	LFDY*
Constant	- 0.84 (- 3.15)	- 0.32 (- 0.69)	0.86 (2.25)	- 0.42 (- 1.12)	- 3.95 (- 8.88)
Q1		0.48 (1.62)	- 0.49 (- 2.11)	- 0.45 (- 1.95)	- 1.04 (- 2.02)
LIAD	- 0.99 (- 2.24)	- 1.74 (- 2.18)			
AP	- 0.37 (- 2.88)	- 0.19 (- 0.84)	- 1.21 (- 6.30)	- 0.86 (- 4.56)	- 0.02 (- 0.07)
DAP			0.66 (4.65)	0.41 (2.93)	
FID			0.04 (0.76)	0.05 (0.81)	- 0.18 (- 1.55)
T	- 0.03 (- 2.11)	- 0.07 (-2.30)	- 0.08 (- 3.64)	- 0.08 (- 3.89)	0.09 (5.07)
R^2	0.73	0.72	0.89	0.88	0.79
DW	1.46	2.07	1.25	1.49	1.24
ADF**	- 2.51 (-1.62)	- 3.36 (-1.62)	- 2.51 (-1.62)	- 3.53 (-1.62)	- 2.32 (-1.62)
ADF***	- 4.00 (- 3.30)	- 3.05 (- 3.30)	- 2.16 (- 3.30)	- 4.84 (- 3.30)	- 2.11 (- 3.31)

* For the last equation we use dummy q =1 for 1992.1

** The ADF tests give the augmented Dickey-Fuller test for stationarity of the residuals,For the demand for currency, time deposits and savings deposits, we have used without constant, and time trend; critical values of the 90% confidence level of the ADF-test are given in parenthesis.

*** The ADF tests give the augmented Dickey-Fuller test for stationarity of the residuals, including constant, and time trend; critical values of the 90% confidence level of the ADF-test are given in parenthesis.

**** t-statistics are given in brackets under the estimates.

Through the fractional reserve system, base money depends on demand for the various assets offered by the banking system and on demand for cash balances. We therefore start with econometric estimation of the demand functions for Currency in circulation, Demand plus Time Deposits, and Foreign Currency Deposits. The results are given in table 4.1 and table 4.2. Table 4.1 presents the static estimates of demand for currency, demand for households, demand for economic agents, total demand in domestic currency deposits, and the demand for foreign currency deposits.

Table 4.2. Dynamic equations with an error correction term.

	DLCUY	DLDDY	DLTDY	DLSDY	DLFDY
Constant	- 0.04 (- 1.45)	- 0.02 (- 0.26)	- 0.04 (- 1.28)	- 0.07 (- 1.84)	0.05 (1.04)
D(AP)	- 0.36 (- 4.52)	- 0.30 (- 1.53)	- 0.64 (- 4.97)	- 0.57 (- 3.40)	- 0.26 (- 1.67)
D(DAP)			0.13 (1.42)	- 0.01 (- 0.09)	
D(LIAD)	- 0.97 (- 2.41)	- 0.80 (- 0.86)			
D(FID)			- 0.02 (- 1.26)	- 0.01 (- 0.66)	-0.03 (-1.53)
DLAjY(-1)	0.31 (2.39)	0.74 (2.67)	0.54 (4.62)	0.53 (3.39)	0.35 (2.11)
ECM(-1)	- 1.09 (- 4.31)	- 1.48 (- 4.20)	- 0.29 (- 1.99)	- 0.78 (- 4.39)	- 0.63 (-3.02)
R^2	0.78	0.63	0.90	0.84	0.69
DW	1.995	2.45	2.48	1.57	1.33

* ECM(-1) is one lag of the residuals, obtained from the static regressions.

Table 4.2 present the error correction form of demand for different assets (the dynamic equations for demand for Currency in circulation, Demand, Time, Savings deposits, and Foreign currency deposits). The dependent variables here are the first differences of the Currency in circulation, Demand, Time, Savings deposits, and Foreign currency deposits. The.

explanatory variables are first and second differences of CPI inflation (D(AP), and D(DAP), first difference of the nominal interest rate on credits(DLIAD), or of the domestic to foreign interest rate differential (D(FID)), one lag of the dependent variable, and the ECM term. The most important terms here are the error correction terms, which is simply the residuals from the static equations lagged once.

5. The Trade-off between Fiscal Deficit and Inflation

5.1. Inflation tax and Seigniorage revenues

Table 5.1. gives us the estimated assets demand, monetary base, inflation tax and seigniorage revenue for a given inflation rate. We have used 1994 as a base year in our simulation model. The underlying assumptions here are: 62 percent inflation rate (actual in 1994), 8 percent minimum reserve requirements for reserves, held in domestic currency; 16 percent minimum reserve requirements for reserves, held in foreign currency; 15 percent interest rate on reserves, denominated in domestic currency and 3 percent on reserves, denominated in foreign currency; real output growth rate of 3 percent; 2 percent foreign inflation rate; and zero real exchange rate devaluation.

Table 5.1: Inflation Tax and Seigniorage at Various Inflation rates (percent of GDP)

Inflation	Demand for:					M_0	πM_0	$(\pi+n)$ M_0
	Currency	Deposits						
		Demand	Time	Savings	Foreign currency			
0	6.87%	9.59%	9.74%	1.90%	3.87%	9.18%	0.01%	0.29%
10	6.03%	7.98%	8.68%	1.75%	3.87%	8.12%	0.73%	0.98%
20	5.36%	6.74%	7.81%	1.63%	3.86%	7.27%	1.23%	1.47%
40	4.34%	5.01%	6.48%	1.42%	3.85%	5.99%	1.83%	2.04%
62	3.57%	3.78%	5.44%	1.26%	3.84%	5.02%	2.15%	2.35%
100	2.67%	2.52%	4.21%	1.05%	3.82%	3.91%	2.34%	2.51%
160	1.87%	1.52%	3.07%	0.84%	3.80%	2.91%	2.30%	2.44%
200	1.54%	1.15%	2.58%	0.74%	3.79%	2.50%	2.20%	2.33%
220	1.41%	1.02%	2.38%	0.70%	3.79%	2.35%	2.15%	2.28%
250	1.25%	0.86%	2.15%	0.65%	3.92%	2.80%	2.92%	2.19%

The last two columns presenting inflation tax and seigniorage revenues show a Laffer curve pattern, and they reach their maximum of 2.35 and 2.51 percent of GDP respectively, at inflation rate about 100 to 130 percent. It also shows a low sensitivity of those revenues from inflation and a very flat shape of the Laffer curve.

5.2. Inflation and consistency of fiscal policy

i. The impact of different deficit measures on required deficit reduction

In this section we illustrate the impact of using the two different measures of real public sector deficit (the general government budget deficit and the quasi-fiscal deficit) for assessing the consistency between monetary and fiscal policies for the Romanian economy.

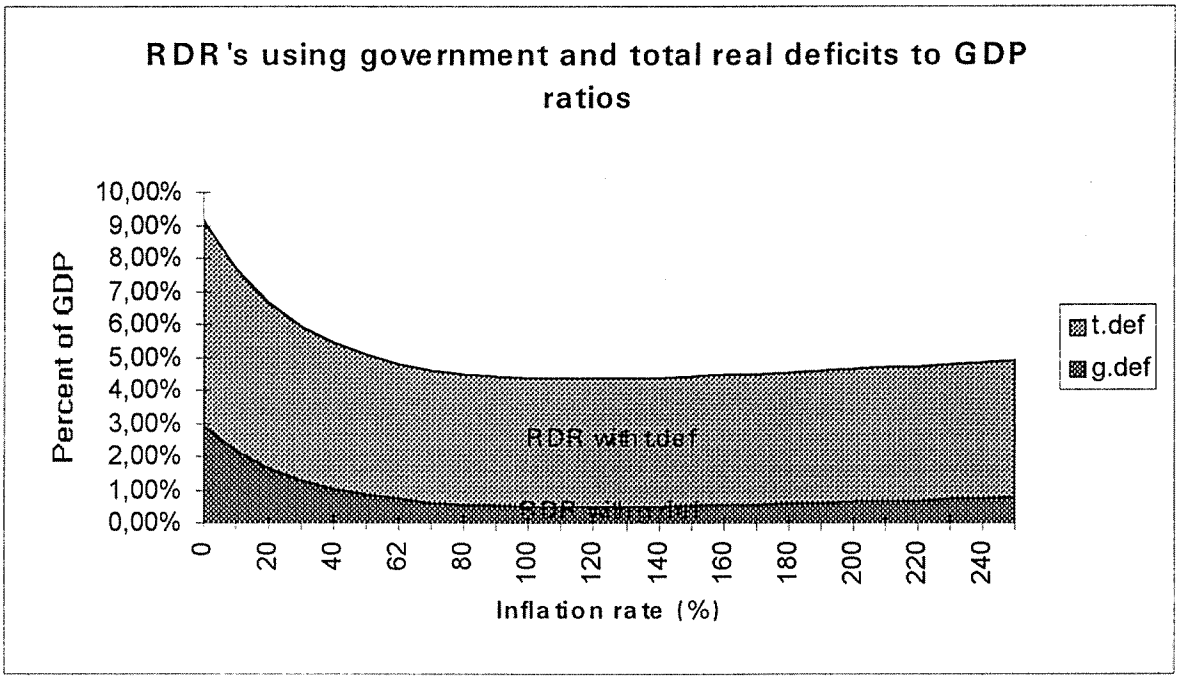
Table 5.2. The financeable deficit and rdr for various inflation rates (percent of GDP), using the real general government budget deficit and real total quasi-fiscal deficit.

Inflation rate	Financeable Deficit	Required Deficit Reduction	
		General gov/nt deficit(3.37 %)	Total quasi-fiscal deficit (6.68 %)
0	0.33%	2.89%	6.26%
10	1.06%	2.16%	5.53%
62	2.52%	0.70%	4.07%
80	2.65%	0.57%	3.94%
100	2.71%	0.51%	3.88%
120	2.73%	0.49%	3.86%
160	2.67%	0.55%	3.92%
200	2.58%	0.64%	4.01%
250	2.45%	0.77%	4.14%

Table 5.2. presents financeable deficit and required deficit reduction measure when using the two different measures of public sector deficit: general government real budget deficit and the total (incorporating NBR) deficit in our simulation model. The first column represents financeable deficit for various inflation rates. The second column presents the RDR measure when using the general real government deficit measure. In the base year (1994), we have estimated the general government budget deficit of 3.22 percent of GDP. The result of this simulation shows that we obtain that at the 1994 actual inflation rate (62%) the RDR is 0.70 percent of GDP, or the consistency is approximately achieved. The last column presents the measure of required deficit reduction when using the total real public sector deficit incorporating Central bank profit and loss account into the public sector real deficit measure. We have estimated the real quasi-fiscal deficit for year 1994 at 6.59 percent of GDP which is approximately twice as large as the general government budget deficit. Using the total public deficit measure in the base year we obtain 4.07 percent required deficit reduction at 62 percent inflation rate. Thus if we compare it with the previous table, rdr measure goes up

from 0.7 to 4.07 percent. The lowest value of rdr is achieved at approximately 120 percent inflation rate and it does not reach zero for any inflation rate. Thus much of the puzzle disappears once we use the total public sector deficit. This result once again supports the theories about fiscal roots of high and persistent inflations, since it reveals present, but hidden fiscal inconsistencies which can explain high inflation in Romanian - there is no inflation rate which can close the gap between financeable and actual deficit for the Romanian economy. This has been a central result for the case of Romanian economy, illustrating the importance of using the quasi-fiscal deficit, which incorporates the total assets and liabilities of the public sector.

Figure 3.



ii.The impact of switching to market interest rate on domestic debt

Table 5.3. presents the impact of transition to market interest rate on domestic debt. The first column of the table presents the base case. The second column calculates the effect of switching to market interest rate on all the domestic debt. Romanian domestic debt as a percentage to GDP is still very low, which reflects the fact that the market of government securities is not well developed yet. So far the major share of this debt is to the commercial banking sector, yielding below the market interest rates. However, the State Savings bank started to sell government securities, yielding market interest rate to the households. This would mean that every new debt and the old debt will be issued at market rate in the future, which will change the rdr measure in a medium run. Therefore, we look at the impact of switching from -0.6 to 5 percent real interest rate on domestic debt, other things remaining the same. At 62 percent inflation in the base year, the rdr measure rise only slightly from 4.07 to 4.10 percent. This small increase reflects the fact that since the domestic debt to GDP ratio is very small, such un increase of interest rates would not exacerbate the problems in the medium run very much.

Table 5.3.: Switching to market interest rate on domestic debt

Inflation rate	Required Deficit Reduction	
	r= -0.57%	r= 5%
0	6.26%	6.29%
10	5.53%	5.56%
62	4.07%	4.10%
100	3.88%	3.91%
160	3.92%	3.95%
200	4.01%	4.04%
250	4.14%	4.18%

iii.The impact of foreign-to-domestic debt substitution

Table 5.4. presents the impact of 10 percent foreign-to-domestic debt substitution. The underlying assumptions here are 5 percent real interest rate on domestic debt, 5 percent real interest rate on foreign debt, 5 percent domestic debt to GDP ratio, and 15 percent foreign debt to GDP ratio. Foreign inflation equals 2 percent. The first column presents the base case, whereas the second column presents the impact of 10 percentage points foreign to domestic swap on the RDR. At 62 percent inflation in the base year 1994, the RDR measure falls from 4.10 to 3.80 percent of GDP, and at 190 percent inflation, the lowest RDR decrease from 3.90 to 3.60 percent of GDP. This experiment shows that in the medium run it is less costly for the government to run domestic debt, then to borrow at the international financial markets. The conclusion is that any further development of domestic government security markets will have a positive impact on the RDR measure.

Table 5.4.: Assessing the impact of foreign-to-domestic debt substitution

Inflation rate	Required Deficit Reduction	
	No debt substitution	10% foreign debt substitution
0	6.29%	5.99%
10	5.56%	5.26%
62	4.10%	3.80%
100	3.91%	3.61%
160	3.95%	3.65%
200	4.04%	3.74%
250	4.18%	3.88%

iv. The impact of real exchange rate depreciation

The cost of servicing the foreign debt depends of course on the real exchange rate developments. Therefore, this experiment shows the impact of varying the rate of real exchange rate depreciation on foreign debt servicing costs and thus on financeable deficit and the RDR. We assume real exchange rate pegging in the base year, all other assumptions

remaining the same. Table 5.5 presents the impact of varying the rate of real exchange rate depreciation from 0 (the base case) to 5 and then to 10 percent. It is obvious from the table that any positive rate of the real exchange rate depreciation will only rise the required deficit measure for all the inflation rates and thus exacerbate the consistency problems. At zero inflation rate and subsequent increase of the real exchange rate depreciation from 0 to 5 and then to 10 percent, the RDR measure will rise from 6.29 to 7.13 and to 7.88 percent of GDP respectively. Thus, the capital losses on foreign debt associated with any positive real exchange rate depreciation can complicate stabilization policy.

Table 5.5. The impact of real exchange rate depreciation

Inflation rate	Required Deficit Reduction		
	e=0 % (Base case)	e=5 %	e=10 %
0	6.29%	7.04%	7.79%
10	5.56%	6.31%	7.06%
62	4.10%	4.85%	5.60%
100	3.91%	4.66%	5.41%
160	3.95%	4.70%	5.45%
200	4.04%	4.79%	5.54%
250	4.18%	4.93%	5.68%

v. The impact of delayed fiscal adjustment

In this section we use the model to predict what would be the impact on the eventual rdr if the government decides to close the gap between financeable and actual deficits through debt accumulation rather than fiscal adjustment for a number of years. Table 5.6. presents the impact of the delayed fiscal adjustment for the base year real GDP growth rate, 3 percent, and for a more optimistic assumption of 4 percent real GDP growth rate. Here we would like to illustrate that the debt accumulation process crucially depends on the difference between real interest rate and the real growth rate. Whenever the real interest exceeds the growth rate, as it does in the base case, delaying the required deficit reduction translates in a bigger

adjustment problem later on, as the first two columns of the table 5.6. show. Thus, at 62 percent inflation rate in 1994, if the government postpones the necessary fiscal adjustment for 6 years, at the end, the cumulative measure of RDR for this six year period will rise from 4.10 to 4.62 percent of GDP. Next two columns show the impact of real growth rate increase from 3 to 4 percent on this cumulative measure. First of all, such a GDP growth will increase seigniorage revenues, and therefore, will decrease the RDR at 62 percent from 4.10 to 4.03 percent of GDP (compare first and third column). Second, a rise in real GDP growth, other things equal will decrease the eventual RDR from 4.62 to 4.28 percent of GDP at the end of the six year period, since the debt policy rule will give more space of the government in running the new debt (compare columns two and four of the table).

Table 5.6.: The impact of higher output growth and a delayed fiscal adjustment

Inflation rate	Required Deficit Reduction			
	n=3 % (Base case)		n=4 %	
	now	after 6 years	now	after 6 years
0	6.29%	7.08%	6.19%	6.57%
10	5.56%	6.26%	5.47%	5.81%
62	4.10%	4.62%	4.03%	4.28%
100	3.91%	4.40%	3.85%	4.08%
160	3.95%	4.45%	3.89%	4.13%
200	4.04%	4.55%	3.99%	4.24%
250	4.18%	4.70%	4.13%	4.38%

5.2. The impact of financial sector reforms on the Fiscal Policy

In this section we present the impact of financial sector reform on the financeable deficit and the Required Deficit Reduction. We have evaluated the NBR policy concerning minimum obligatory reserves kept at the NBR by the commercial banks.

The first policy of the NBR during the period 1992 - 1995 was directed towards increasing the reserve requirements on all the deposits and especially towards a large increase of the reserve requirements on the deposits held in foreign currency. The channel through which this policy affects financeable deficit and the RDR is through increasing the reserve money, which in turns rises the revenue collected from inflation tax and seigniorage and thus for the same inflation rate it provides more resources for deficit financing.

In 1992 the NBR has introduced a minimum reserve requirement on the commercial banks foreign currency deposits and they became a part of monetary base. This was a very important policy change, since the foreign currency denominated deposits, together with the time deposits in lei were the most dynamic part of quasi-money. Also, substituting away from the assets denominated in domestic currency undermines the monetary base and thus cause a decrease in the seigniorage revenue for the same inflation rate[4]. Thus introducing the reserve requirements on foreign currency deposits was aimed towards better control over monetary management. However, in a high-inflationary countries, it also matters in which currency the commercial banks will keep their obligatory reserves in the central bank. If the reserves are kept in domestic currency, then the central bank can collect a seigniorage since they are eroded by the domestic inflation. In the case they are kept in foreign currency, however, then they are subject to the foreign inflation and thus the Central bank cannot collect inflation tax. To discourage commercial banks to hold their reserves on foreign currency deposits, denominated in foreign currency, the NBR discriminates between reserves in domestic and in foreign currency: thus in 1993, the lei denominated reserve requirements on forex deposits are 8 percent (the same as for the other lei deposits), whereas for the forex denominated reserves on forex deposits, the NBR has set 16 percent minimum reserve requirements, which is twice bigger than the reserve requirements on the lei deposits. During 1993, 1994, and 1995, the NBR has further increased.

Another policy measure used by the NBR in the same direction is a decrease of the interest rate on the obligatory reserves held in the NBR. Since the actual revenue available for deficit financing is the seigniorage revenue, net of the interest payments on the reserves, lower interest rate on the reserves means more seigniorage available for the deficit financing. Therefore the impact of such a policy is that for the same inflation rate, reserve requirements,

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[4] See Bas van Aarle and N. Budina (1995).

and seigniorage revenue, there are more resources available for financing the deficit and thus it causes an increase of the financeable deficit and consequent decrease of the RDR measure.

i. Reserve requirements, monetary base and the revenue from seigniorage

In this section we would first examine the impact of a rise in the reserve requirements on the inflation tax and seigniorage. There were two major changes in this aspect: in the first place, we examine the impact of a policy of introducing minimum reserve requirements on deposits held in foreign currency, as well as introducing different reserve requirements for the reserves on forex deposits held in the NBR either in domestic or in foreign currency; and in the second place we examine the impact of a rise in the minimum reserve requirements on all commercial bank lei deposits held in the NBR from 8 to 9 percent. Table 5.6. presents two important results: first, any increase of the reserve requirements increases the monetary base and thus, for the same inflation rate, allows the NBR to collect higher seigniorage revenues. The seigniorage revenue and seigniorage maximizing inflation are larger if the required reserves on forex deposits are held in domestic currency. This result is shown by comparing the third and the fourth column of table 5.6.. Even if the reserve requirements are half of those when these reserves are paid in foreign currency, the maximum seigniorage revenue is larger (3.26 percent of GDP) than in the former case (2.62 percent of GDP). Also, seigniorage maximizing inflation rate is raising from 120 to 200 percent. This is because of the large inflation differential between domestic and foreign inflation (we make an assumption of 2 percent foreign inflation).

Although this policy has distortionary effects on the banking system, in the medium run it provides more resources for deficit financing, without rising the inflation rate and therefore lowers the RDR measure for the same inflation rate.

Table 5.7. The impact of financial sector reforms

Inflation rate	Seigniorage revenues				
	RR_{FD}=0% RR_{LD}=8% iRR_{LD}=10%	RR_{FD}=16% RR_{LD}=8% in USD (base case)	RR_{FD}=8% in Lei RR_{LD}=8%	RR_{FD}=40% in USD RR_{LD}=9%	RR_{FD}=20 % in Lei RR_{LD}=9%
0	0.26%	0.29%	0.27%	0.34%	0.29%
10	0.95%	0.98%	0.99%	1.05%	1.07%
62	2.31%	2.35%	2.47%	2.45%	2.77%
100	2.47%	2.51%	2.70%	2.62%	3.10%
160	2.40%	2.44%	2.72%	2.56%	3.25%
200	2.29%	2.33%	2.66%	2.45%	3.26%
250	2.15%	2.19%	2.57%	2.31%	3.25%

ii. The impact of reserve requirements on the RDR

Table 5.7. presents the impact of the increase of the reserve requirements on the required deficit reduction. Having in mind the impact of changing the reserve requirements on the seigniorage revenues, we can conclude, that: first, any increase of the minimum reserve requirements would provide larger revenue for deficit financing and consequently decrease the necessary fiscal adjustment; second, the RDR measure decreases if the reserve requirements on forex deposits are held in domestic currency whenever the difference between domestic and foreign inflation is large.

Table 5.8. The impact of financial sector reforms

Inflation rate	Required Deficit Reduction			
	RR_{FD}=16% in USD (base case)	RR_{FD}=8% in Lei	RR_{FD}=40% in USD	RR_{FD}=20 % in Lei
0	6.29%	6.34%	6.20%	6.29%
10	5.56%	5.58%	5.46%	5.48%
62	4.10%	4.01%	3.99%	3.71%
100	3.91%	3.74%	3.80%	3.35%
160	3.95%	3.70%	3.84%	3.18%
200	4.04%	3.75%	3.94%	3.16%
250	4.18%	3.83%	4.07%	3.16%

iii. The impact of the interest rate on reserves on the RDR

The last section examines the impact of the change in the interest rate on reserves in foreign and in domestic currency on the required deficit reduction and inflation trade-off. For the first and the second columns of table 5.8. basic assumptions are 8 percent reserve requirements on the Lei deposits and zero reserve requirements for the forex deposits. The only difference is the rise of the interest rate on the Lei reserves from 10 to 30 percent. The impact of this experiment is a rise of the RDR measure: at 62 percent RDR rises from 4.17 to 4.25 percent of GDP. The reason is that the NBR pays larger interest payments on the reserves, which has to be subtracted for the seigniorage revenue, so that the part of it used for the deficit financing is decreased. Thus for the same inflation rate and for the same seigniorage revenue the public sector obtains smaller amount of this resource for the deficit financing.

Table 5.9. RDR and the interest rate on reserves

Inflation rate	Required Deficit Reduction		
	RR_{FD}=0% RR_{LD}=8% iRR_{LD}=10%	RR_{FD}=0% RR_{LD}=8% iRR_{LD}=30%	RR_{FD}=16% in USD RR_{LD}=8% iRR_{LD}=15% iRR_{FD}=3% (base case)
0	6.31%	6.56%	6.29%
10	5.59%	5.80%	5.56%
62	4.17%	4.25%	4.10%
100	3.99%	4.02%	3.91%
160	4.04%	4.04%	3.95%
200	4.14%	4.12%	4.04%
250	4.28%	4.25%	4.18%

6. Conclusions

We have applied a simple framework analysing the link between inflation and fiscal deficits for the Romanian economy. This framework can be used in two ways: i. to derive financeable deficit and the Required Deficit Reduction (representing the difference between funding requirements and funding sources) for given output growth rate, inflation rate and target debt-output ratios, and ii. to obtain the equilibrium inflation rate for which no fiscal adjustment needs to take place.

We have calculated both real general government budget deficit, and real quasi-fiscal deficit (incorporating all public sector assets and liabilities, including Central bank profit and loss account) and then we have used both measures respectively in our model. Thus using only the real general government budget deficit shows very small inconsistencies. Then we ask the question why the inflation rate is so persistent and it doesn't go down. The seemingly

puzzling result disappears, once we use the real quasi-fiscal deficit in our model. In this case a very large inconsistencies are revealed - there is no inflation rate for which the RDR measure is zero. The results of the two experiments illustrate the importance of the fact that in transition economies a large part of public sector liabilities are often switched to the Central banks and therefore we have to take into account the profit and loss account of the central bank. In the case of Romania, the RDR measure at 62 percent inflation rate in the base year 1994 goes up from 0.6 percent to 3.91 percent of GDP.

We also assess the impact of switching to market interest rates on domestic debt, as well as the impact of real exchange rate depreciation, and the impact of delayed fiscal adjustment on the financeable deficit and the required deficit reduction.

We finally use the same framework to assess the impact of a series of financial sector reforms introduced during the period 1994 - 1995 which have a potential impact on the demand for base money. All the policy measures introduced in this period were directed towards raising minimum obligatory reserves on commercial banks' deposits required by the NBR. In particular, the required reserves on foreign currency deposits differ held in foreign currency are much higher than if they are held in domestic currency. The seigniorage revenue and seigniorage maximizing inflation are larger if the required reserves on forex deposits are held in domestic currency. Therefore, we can conclude that: first, any increase of the minimum reserve requirements would provide larger revenue for deficit financing and consequently decrease the necessary fiscal adjustment; second, the RDR measure decreases if the reserve requirements on forex deposits are held in domestic currency. In one case (paying interest on reserves) affect seigniorage for given base money demand. We show that in particular paying interest on reserves is a very costly measure: the required fiscal deficit correction goes up by about two percentage points of GDP. While there are clear efficiency costs to taxing financial intermediation, giving up seigniorage revenues in this manner may be premature given the large fiscal corrections needed and the unfinished state of the process of tax reform in Romania.

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ANNEX 1: *Money demand estimates*

A1.1. Data description

The data source for money demand estimates are RNB annual, quarterly, and monthly bulletins. The observation period includes 1991.1 - 1995.1, on a quarterly basis.

Money assets- the following classification was available:

Demand Deposits in lei ,	LDD
-Deposits of Economic agents	EDD
-Deposits of Households	HDD
Time Deposits	LTD
-Deposits of EC'c agents	ETD
-Deposits of Households	HTD
Investment Deposits	ID
-Deposits of Ec'c agents	
-Deposits of Households	
Other Banking Deposits	OTHER
-Deposits of State Insurance Co. ASI	
-Other	
Demand deposits in $	FDD
-Deposits of EC'c agents	
-Deposits of Households	
Time Deposits in $	FTD
-Deposits of EC'c agents	
-Deposits of Households	

For the purpose of our analysis we have done the following aggregation:
DD=EDD+HDD
TD=ETD+HTD
SD=ID+OTHER
LD=TD+SD
FD=FDD+FTD

IAD - average interest rate on deposits

FI1 - London official rate on 1 month dollar time deposits

yin - calculated on basis of monthly average of 1989=100

GDP, quarterly- calculated on base of annual data for nominal GDP, discounted with the CPI index, and using as weights, the index of industrial production.

EXR - Official nominal exchange rate, Lei per USD, end of the quarter

A1.2.Variables definition

1. LAjY=LOG(Aj/GDP)-1/2UP, where Aj is CU, DD, TD, SD, and FD

2. AP=LOG(UCPI/UCPI(-1)), AP=4*P, annualized CPI inflation

4. E=LOG(EXR/EXR(-1)), AE=12*E annualized exchange rate devaluation

6. LFI=LOG(1+FI/100)+AE, LIBOR one month dollar time deposit rate, expressed in domestic currency, according to official and parallel market.

7. Q1 - dummy, which is 1 for the period 1992.1 until 1995.2, accounting for a big drop in the output, sharp rise of the interest rates (reflecting the restrictive nature of the policy implemented)

8. Q - dummy for the FD equation, 1 for 1992.1

A.3. Graphs of inflation, exchange rate depreciation, different assets, and interest rates in Romanian.

ANNEX 2. *Base Year Parameters of the Simulation model*

	1991	1992	1993	1994
BYFINFL			0.02	0.02
BYINFL	2.228	1.9785	2.9556	0.6193
REAL CU/GDP	0.044572	0.039808	0.0279961	0.0358
REAL DD/GDP	0.130886	0.058925	0.031569	0.0379
REAL TD/GDP	0.00871	0.008374	0.0079771	0.0552
REAL SD/GDP	0.066116	0.0404498	0.0172393	0.0127
REAL FD/GDP	0.010205	0.03217363	0.0346083	0.0383
I- TD	0.10	0.33	0.715	0.4737
I- FD	0.0493	0.0368	0.0333	0.0608
I- RRtd,sd,dd			0.15	0.15
I- RRfd			0.03	0.03
RR- TD, SD, DD			0.08	0.16
RR- FD				
REAL GDP GROWTH (EBRD)	-0.129	-0.136	0.01	0.03
REAL EXCH. RATE DEPR/N, e hat		-0.16074	-0.16859	-0.17494
AVERAGE INTEREST ON FOREIGN DEBT:				
	0.071	0.075	0.057	0.08*
INTEREST ON DEBT TO OFFICIAL PUBLIC CREDITORS:				
	6.8	7.0	5.2	
INTEREST ON DEBT TO PRIVATE CREDITORS:				
	8.6	8.4	6.9	
NOMINAL G'NT NFL (BN $)	1121	2354	3111	4121
NOMINAL GDP (BN LEI)	2203900	5982300	18835000	48338000
GDP IN $ BN, Y=GDP/E	11660.84	13005	14760.971	27355.97
REAL B*/Y	0.096133	0.181007	0.2107584	0.1506435
OFFICIAL DISCOUNT RATE		0.70	0.70	0.58
REAL INTEREST ON DOMESTIC DEBT (APPROXIMATED BY BASIC INT. RATE + 3%)				
R=(1+i+0.03)/(1+p)-1		-0.419	-0.56	-0.00574
REAL B/Y	0	0.0041596	0.0064836	0.0045588
REAL DEF/GDP		0.1402	0.0149	0.0659

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