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FISCAL FEDERALISM AND STABILIZATION POLICY IN BRAZIL[1]

Rogério L. F. Werneck

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1. Introduction[2]

State reform has been rightly seen as the key step to overcome the decade long Brazilian economic crisis. The reform that seems to be required is so deep that state reconstruction would probably be a more accurate expression. Since the early eighties at least, and particularly during the last two years, there has been efforts to push the reform forward. But there is much to be done yet. And the Collor administration is slowly finding out that, notwithstanding its reformist drive, many years of continuous effort will be necessary before the reform challenge has been properly faced.

The difficulties imposed by the state reform in Brazil are in many aspects amplified by the peculiarities of the country's federalism. As it is well known, the Brazilian state is a particularly complex and multifarious entity, that unfolds in three different government levels, comprising the central government, more than two dozen state governments and well above four thousand local governments. Each one of them having both Executive and Legislative branches. The legal framework which regulates the intergovernmental relations within this intricate system has shown to have many deficiencies, particularly after the 1988 Constitution.

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2 The author is grateful to Dionísio Carneiro and Maria Victória Werneck for helpful comments.

Unfortunately, the long and delicate political negotiations which brought about the new constitution took place exactly when the central government was notably feeble, due to the shortcomings of a president, accidentally inducted into office, and continuously mobilized by the quest of a higher degree of legitimacy. In those negotiations, the interests that should have been defended by the central government were not properly taken into consideration. When the 1988 Constitution was promulgated, it was greeted by many analysts as an important advancement of power decentralization in the country, since it reduced the central government importance. However, since 1988 the deficiencies of the fiscal federalism introduced by the new Constitution are becoming increasingly clear. The central government has lost a substantial part of its tax revenue to states and local governments, without being able to transfer to them any significant part of its spending programs. Nevertheless, as the new fiscal system is being phased in, states and local governments are not only quickly adjusting their spending in response to their fast growing revenue. They are spending well above their recently enlarged means.

Fiscal federalism is clearly imposing severe difficulties to stabilization policy in Brazil. What happened in 1990 well illustrates the involved difficulties. The central government fiscal austerity efforts was partly offset by state and local governments overspending. And this also had a serious impact on the steering of monetary policy, since part of the higher

borrowing requirements of state and local governments was financed by the states' banks, which ended up being bailed out from bankruptcy by the Central Bank, under the political pressure of governors.

Facing the need to make a permanent fiscal adjustment, the central government has been constrained by the obligation to transfer to lower level governments a large proportion the revenue stemming from personal income tax, profit tax and excise taxes on industriallized products, knowing in advance that any transfer will be immediately spent by state and local governments. This leakage reduces the effectiveness of the fiscal effort, and the possibilities of stabilization policy. And has created a search for exotic fedral taxes, capable of generating resources not shared with state and local governments. And that has meant a deterioration of the quality of the tax system.

This paper tries to analyze the nature of some the difficulties imposed by fiscal federalism on fiscal adjustment in Brazil. The next section describes briefly the recent redistribution of fiscal resources among the three government levels and the resulting spending response of state and local governments. The third section presents a simple model which allows interesting insights on the impact of fiscal adjustment on state and local government spending and how it could be taken into account by the central government in the design of the fiscal adjustment. In the third section, results of simulations based on the model are discussed. The last section draws some policy conclusions.

2. State and Local Governments: Tax Revenue and Spending

During the seventies and the early eighties, the total tax revenue of the three government levels as proportion of GDP remained surprisingly stable, around 25%. However, from the mid eighties and the end of the decade, there was a fall in the gross tax burden and this ratio was reduced to 22%. This fall was only reverted in 1990, when the fiscal measures of the Collor I Plan, allowed the gross tax burden to increase to 27%, exceeding the ratio observed in the seventies. As a large part of those measures generated once and for all effects restricted to 1990, the tax burden lowered again in 1991.

Affonso and Villela (1991) have analyzed how the fall in the gross tax burden during the late eighties affected in different ways the total taxes collected by each of the three government levels. Taking collected taxes as proportion of GDP, table 1 shows that the tax revenue collected by the central government fell 20% from 1980 to 1989 and that collected by local governments fell 16%. During the same period taxes collected by state governments increased 23%, basically in 1989, due to the enlargement of their tax base allowed by the 1988 Constitution. Several federal taxes -- as for example, the so-called "unique taxes" on fuel, electricity and mineral products -- were suppressed, and their tax base transferred to the value added tax collected by the states.

TABLE 1

BRAZIL - TAX REVENUE

Years	Taxes Collected by the Federal Government		Taxes Collected by the State & Local Governments						Total	
			State		Local		Total			
	% GDP	1980=100	% GDP	1980=100	% GDP	1980=100	% GDP	1980=100	% GDP	1980=100
1970	17,33	93,17	7,95	146,14	0,70	95,89	8,65	140,19	25,96	104,88
1975	18,59	99,95	5,99	110,11	0,71	97,26	6,70	108,59	25,29	102,10
1980	18,80	100,00	5,44	100,00	0,73	100,00	6,17	100,00	24,77	100,00
1985	16,39	88,12	5,74	105,51	0,56	76,71	6,30	102,11	22,69	91,60
1986	17,54	94,30	6,85	125,92	0,64	87,67	7,49	121,39	25,03	101,05
1987	16,87	90,70	5,99	110,11	0,59	80,82	6,58	106,65	23,45	94,67
1988	15,69	84,35	5,71	104,96	0,61	83,56	6,32	102,43	22,01	88,86
1989	14,80	79,57	6,69	122,96	0,61	83,56	7,30	118,31	22,10	89,22
1990	18,52	99,57	7,95	146,14	0,96	131,51	8,91	144,41	27,43	110,74

Source: Affonso and Villela [1991].

Table 1 presents only the evolution of the tax revenue collected by each government level. It does no take governmental transfers into account. Table 2 presents the evolution of the disposable revenue of the three government levels during the same period. For each one of them, the revenue was determined by adding the net governmental transfers to taxes directly collected. Naturally, in the case of the central government, such transfers are always negative.

It may be seen that, taken as a proportion of GDP, the disposable revenue of the central government fell by almost 24%, while the states' increased approximately 15% and local governments' by more than 25%. Notwithstanding the 16% fall in collected taxes revenue of local governments, observed in the previous table, there has been a large increase in their disposable revenue, particularly after 1988, when they were especially benefited by the more generous tax transfers of the new Constitution.

It is useful now to compare the evolution of the disposable tax revenue of state and local governments to the evolution of their main expenditure component, public servants payroll. Total payroll expenditures of the three government levels were equivalent to 6.31% of GDP in 1980 and 6.95% in 1985. In 1989 those expenditures had risen to 9.72% of GDP, reaching 10.49% of GDP in 1990. From 1985 and 1990, those expenditures increased, as a proportion of GDP, by more than 50%. The available data allows only to break down the total payroll expenditures into those of

TABLE 2
BRAZIL - DISPOSABLE TAX REVENUE

	Federal Government		State & Local Governments						Total	
			State		Local		Total			
Years	% GDP	1980=100	% GDP	1980=100	% GDP	1980=100	% GDP	1980=100	% GDP	1980=100
1970	15,77	92,01	7,56	137,70	2,84	123,36	10,20	133,68	25,97	104,84
1975	17,20	100,35	5,91	107,65	2,17	101,40	8,06	105,90	25,26	102,06
1980	17,14	100,00	5,49	100,00	2,14	100,00	7,63	100,00	24,77	100,00
1985	14,46	84,36	5,81	105,83	2,43	113,55	8,24	107,99	22,70	91,64
1986	15,28	89,15	6,77	123,32	2,97	138,79	9,74	127,65	25,02	101,01
1987	14,90	86,93	6,08	110,75	2,48	115,89	8,56	112,19	23,46	94,71
1988	13,84	80,75	5,80	105,65	2,38	111,21	8,18	107,21	22,02	80,90
1989	13,12	76,55	6,30	114,75	2,68	125,23	8,98	117,69	22,10	89,22
1990	15,67	91,42	7,64	139,16	4,11	192,06	11,75	154,00	27,42	110,70

Source: Affonso and Villela [1991].

the central government, on one hand, and those of state and local governments taken together, on the other hand. As shown in table 3, during the same period, from 1985 to 1990, measured as a proportion of GDP, payroll expenditures of state and local governments increased almost 77%, while those the central government increased by approximately 19%.

Such explosive rise in the payroll of lower level governments greatly exceeded the increase in their revenue during the same period, notwithstanding all the generous revenue growth made possible by the 1988 Constitution. As seen in table 4, from 1985 to 1990, the ratio of the total payroll expenditures of state and local governments to their aggregate disposable revenue has increased by more than a third. Fragmentary evidence suggests that the larger aggregate payroll is mostly due to an increase in the number of public servants than to a rise in their average salary level.

TABLE 3

GOVERNMENT PAYROLL AS % OF GDP

Years	Federal		State & Local	
	% GDP	1985=100	% GDP	1985=100
1970	4,18	136,60	4,07	104,90
1975	3,33	108,82	3,81	98,20
1980	2,76	90,20	3,55	91,49
1985	3,06	100,00	3,88	100,00
1986	2,40	78,43	4,90	126,29
1987	2,78	90,85	4,99	128,61
1988	3,21	104,90	4,71	121,39
1989	4,11	134,31	5,61	144,59
1990	3,63	118,63	6,86	176,80

Source: IBGE National Accounts Department and Central Bank

TABLE 4

STATE & LOCAL GOVERNMENTS PAYROLL
AS % OF THEIR TOTAL TAX REVENUE

Years	1985=100
1970	84,74
1975	100,14
1980	96,81
1985	100,00
1986	106,84
1987	123,80
1988	122,28
1989	132,67
1990	123,99

3. A Simple Model

Useful insights on the constraints imposed by fiscal federalism on stabilization policy in Brazil may be obtained from a very simple model, where the government sector is broken into only two levels: the federal government and the state & local governments.

It is assumed that state and local governments try to spend as much as possible. Their aggregate non-interest expenditures (G_E) may be expressed as

$$G_E = T_E - r_E B_E + V_E \qquad (3.1)$$

where T_E is their total revenue, B_E their outstanding (domestic) debt, r_E is the interest rate paid on this debt and V_E their fiscal deficit. It is assumed that they have no external debt.

Of course, the deficit has to be financed by issuing new debt. The larger the debt issue the higher the interest rate r_E paid on the total debt stock B_E. But r_E is supposed to fall as the revenue revenue/debt ratio (T_E/B_E) rises. One may, therefore, write

$$r_E = i + r(V_E, t_E) \qquad (3.2)$$

where i is the basic market interest rate and

$$t_E = T_E/B_E \tag{3.3}$$

and where the relevant derivatives are assumed to have the following signs:

$$\frac{\delta r}{\delta V_E} > 0; \quad \frac{\delta^2 r}{\delta V_E^2} > 0; \quad \frac{\delta r}{\delta t_E} < 0 \quad \frac{\delta^2 r}{\delta t \delta V_E} < 0 \tag{3.4}$$

Only part of the revenue of state and local governments (T_E) stems from the taxes they collect (T_A). The remaining part comes from their share (e) in part (T_U) of the federal tax revenue. That means that

$$T_E = T_A + eT_U \tag{3.5}$$

Substituting equation (3.5) in (3.3) and the resulting expression in (3.2), one may get an expression for r_E which may be used in (3.1) to get

$$G_E = T_A + eT_U - \{i + r[(T_A + eT_U)/B_E, V_E]\}B_E + V_E \tag{3.6}$$

It is assumed that, given their outstanding debt B_E, and the revenue components T_E and eT_U, states and local governments will choose the deficit level (V_E) which maximizes their expenditure G_E. It should be noticed that as V_E increases, the adverse effect, assumed in (3.4), on the interest rate paid on the outstanding debt will increasingly reduce the net effect of an extra unit of V_E on G_E. The maximum G_E value will be reached when this net effect is reduced to zero:

$$\frac{\delta G_E}{\delta V_E} = - \frac{\delta r}{\delta V_E} B_E + 1 = 0$$

implying

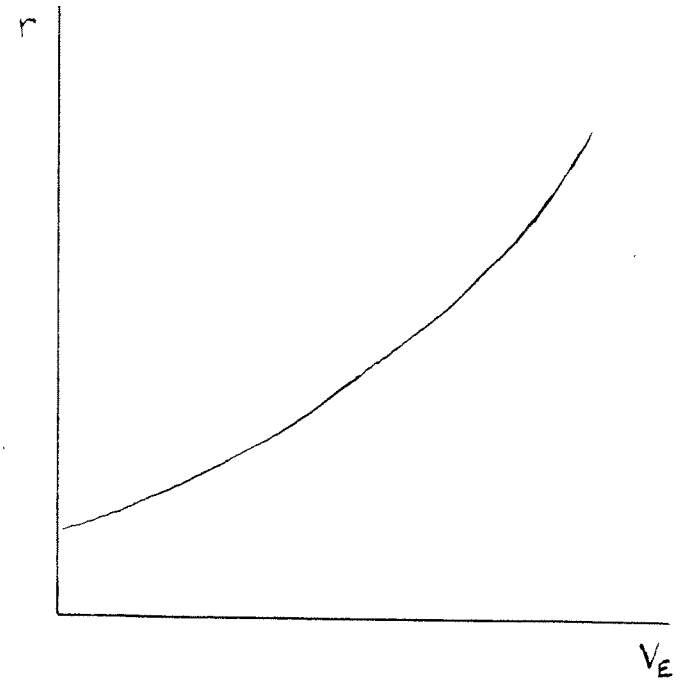
$$\frac{\delta r}{\delta V_E} B_E = 1 \qquad (3.7)$$

Condition (3.7) determines the state and local governments' deficit level V_{Eop} which maximizes their expenditure G_E, as shown in figure 1. The relevant question now is what would be the effect on the optimal value V_{Eop} of a rise in federal taxes T_U. How would the state and local governments' deficit respond to a higher federal tax revenue? Differentiating condition (3.7) one gets

$$\frac{\delta V_{Eop}}{\delta T_U} = - \frac{e \dfrac{\delta^2 r}{\delta t \delta V_E}}{\dfrac{\delta^2 r}{\delta V_E{}^2}} > 0 \qquad (3.8)$$

It may be seen that the assumptions made in (3.4) above are sufficient to assure that the optimal deficit value will increase when T_U rises, as shown in figure 2. The magnitude of this response will be larger the bigger the derivative $\delta^2 r/\delta t \delta V_E$, which measures the sensitivity to $t = T_E/B_E$ of the adverse effect of V_E on the interest spread $r(V_E, t_E)$, introduced in equation (3.2). This derivative was assumed to be negative in (3.4), meaning that the adverse effect of V_E on the interest spread would be lessened as the revenue/debt ratio (T_E/B_E) increases, as shown in the upper part of figure 2.

FIGURE 1



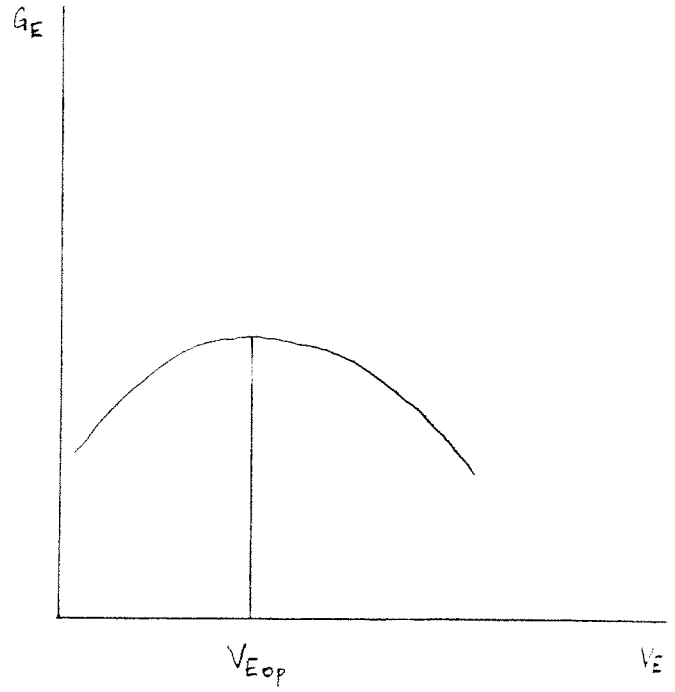
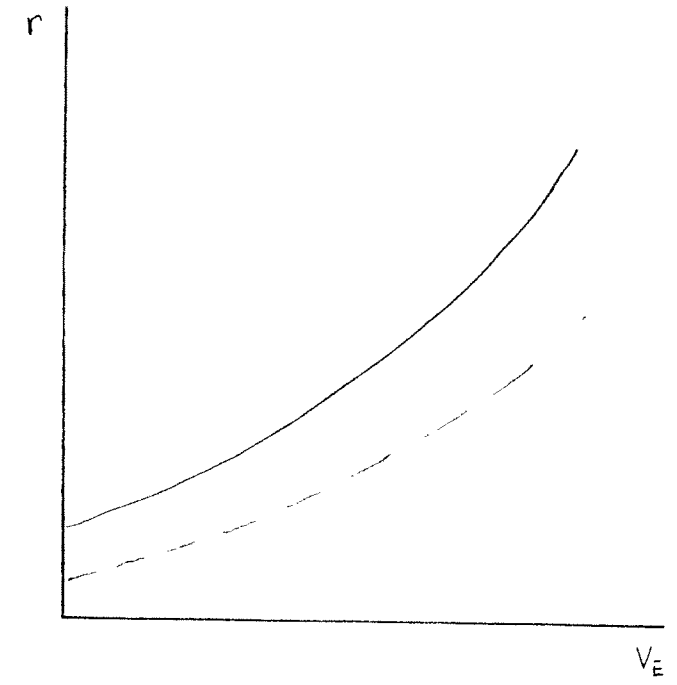
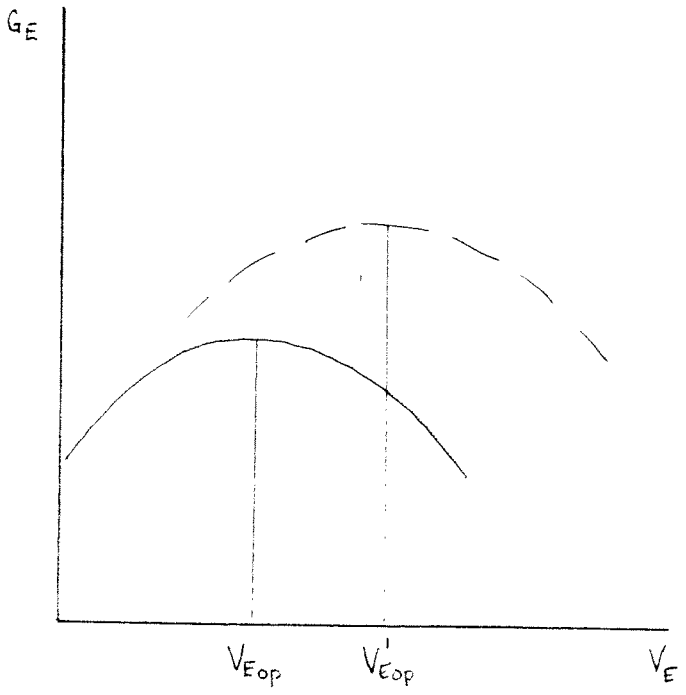


FIGURE 2





The magnitude of the response of V_{Eop} to T_U will also be larger the smaller the derivative $\delta^2 r/\delta V_E^2$, which was assumed to be positive in (3.4), meaning that the adverse effect of V_E on the interest spread will become more intense as V_E rises. The flatter the $r(V_E,t_E)$ curve in the upper part of figure 2, the larger the extent of the change in V_{Eop} in response to a change in T_U.

From condition (3.7) one gets

$$V_{Eop} = V_{Eop}(T_U) \tag{3.9}$$

which establishes the optimal state and local governments' deficit as a function of the federal tax revenue TU.

Given the fiscal behavior of state and local governments, the important question concerns the reaction of the federal government. It will be assumed that the federal government's objective function is to reduce the aggregate government deficit as close as possible to zero. That means to minimize V

$$V = V_U + V_E \tag{3.10}$$

the sum of the federal and state and local governments' deficit. Let G_U be federal government consumption expenditures, iB_U the interest payments on federal domestic debt and OT the federal tax revenue not shared with states and local governments, net of transfers and subsidies. If J is the interest bill on foreign government debt one may write the federal deficit as

$$V_U = GU + iB_E + J - OT - (1 - e)\ TU \qquad (3.11)$$

where (1 - e) TU is the net federal shared tax revenue. Substituting (3.11) in (3.10) and using the optimal V_E value in (3.9) one gets

$$V = GU + iB_E + J - OT - (1 - e)\ TU + V_{Eop}(T_U) \qquad (3.12)$$

and may write

$$\frac{\delta V}{\delta T_U} = -(1 - e) + \frac{\delta V_{Eop}}{\delta T_U} \qquad (3.13)$$

Since it was established in (3.8) that $\delta V_{Eop}/\delta T_U > 0$, the negative effect of an increase in TU on the aggregate deficit V given by the term [- (1 - e)] will be partly offset. The net effect on V of a fiscal adjustment through a higher TU is determined by the size of a leakage larger than simply the share term (e), turning this route to fiscal adjustment even more strenuous for the federal government. In an extreme case, in which $\delta V_{Eop}/\delta T_U > (1 - e)$, the derivative $\delta V/\delta T_U$ would even become negative.

4. Simulations

In order to evaluate the order of magnitude of the effect considered in (3.8) above, the expression below was used for the interest spread function $r(V_E,t_E)$ in equation (3.2)

$$r_E = i + r(V_E,t_E) = i + [(T_A + eT_U)/B_E]^{\alpha} [h + k(V_E)^{\beta}] \qquad (3.14)$$

Estimates for T_A, T_U, B_E and e were used in (3.14). The value of i was assumed to be 15%. The parameter α, which measures the sensitivity of the interest spread to the revenue/debt ratio was initially set equal to -1.5. The value attributed to h was calibrated so that the spread when $V_E = 0$ was 4 percentage points.[3] The value of β, that measures the sensitivity of the interest spread to the state and local governments' deficit was preliminarily set equal to 2, assuming a quadratic relationship between r and V_E. Finally the value of k was calibrated so that the interest spread would reach 20 percentage points when V_E reached 3% of GDP.

The substitution of (3.14) in (3.6) leads to the following equation for the non-interest expenditures of states and local governments.

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[3] Notice that if h were null, one would have a familiar homogeneous function of degree $(\alpha + \beta)$ in (3.9), but the interest spread would be zero when $V_E = 0$. As that would not be realistic, a positive value was attributed to h. Since the intercept of the r_E schedule is jointly determined by h and α, the value of h was established as a function of α in such a way as to assure an intercept of 4 percentage points for any value attributed to α.

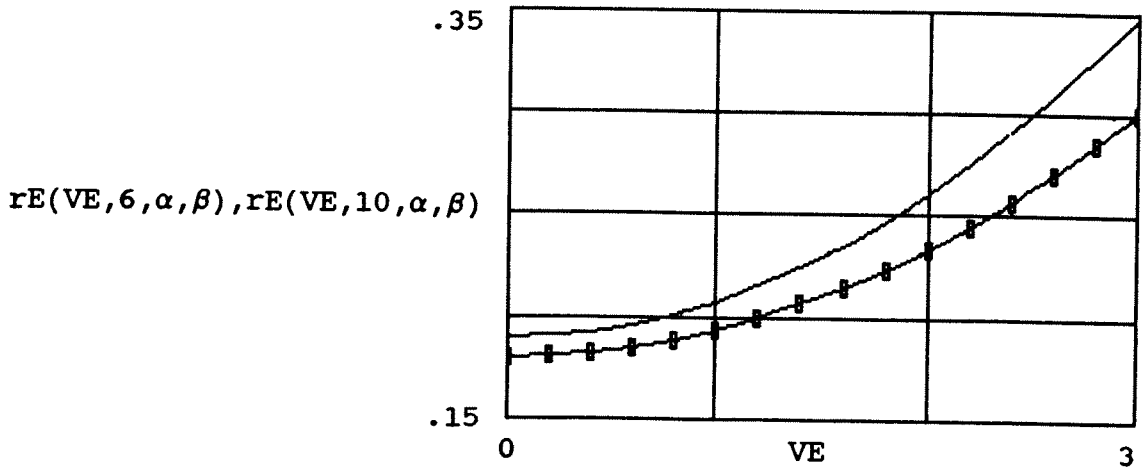
$$G_E = T_A + eT_U - (i + [(T_A + eT_U)/B_E]^{\alpha}[h + k(V_E)^{\beta}])B_E + V_E \quad (3.15)$$

Figure 3 shows plots of both equations (3.14) and (3.15), as well as of the derivative of (3.15) in relation to V_E, for V_E values between zero and 3% of GDP and two different values of T_U, 6 and 10% of GDP. It may be seen that the original r_E curve is shifted downwards when federal shared taxes are increased. And, as shown in the mid plot, a higher T_U will shift the G_E curve upwards. As may be noticed in this plot and, more precisely, in the lower one, the V_{Eop} value which maximizes the upper G_E curve is (approximately 0.46% of GDP) higher than the corresponding V_{Eop} value in the lower curve. This increment in the state and local governments' deficit resulting from an increase in T_U equivalent to 4% of GDP implies that the derivative $\delta V_{Eop}/\delta T_U$ is approximately equal to .116

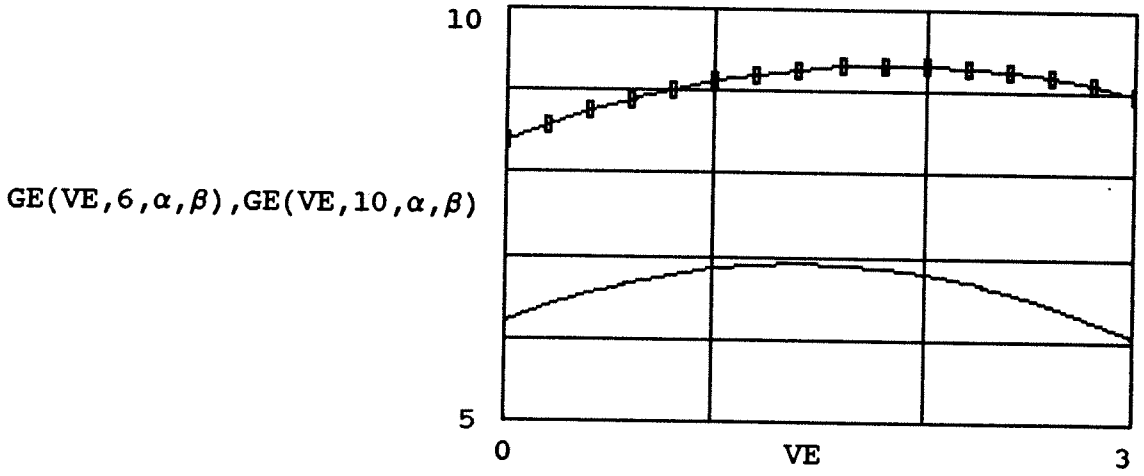
Of course, the magnitude of this increase in V_{Eop} induced by the rise in federal tax revenue depends on the values attributed to the α and β parameters. Figure 4 shows the sensitivity of the derivative $\delta V_{Eop}/\delta T_U$ to different values β, when TU is equal to 6% of GDP and α is kept equal to -1.5. It may be seen that for $1.5 < \beta < 2.0$, the value of $\delta V_{Eop}/\delta T_U$ is highly sensitive to β, falling very rapidly as the value of β rises. On the other hand, as shown in figure 5, the sensitiveness of $\delta V_{Eop}/\delta T_U$ to α increases sharply as the value of β falls from 2 to 1.5.

FIGURE 3

$$rE(VE,TU,\alpha,\beta) := i + \left[\frac{TA + e\cdot TU}{BE}\right]^{\alpha} \cdot \left[h(\alpha) + k\cdot (VE)^{\beta}\right] \qquad TU := 6$$



$$GE(VE,TU,\alpha,\beta) := TA + e\cdot TU - \left[i + \left[\frac{TA + e\cdot TU}{BE}\right]^{\alpha} \cdot \left[h(\alpha) + k\cdot (VE)^{\beta}\right]\right]\cdot BE + VE$$



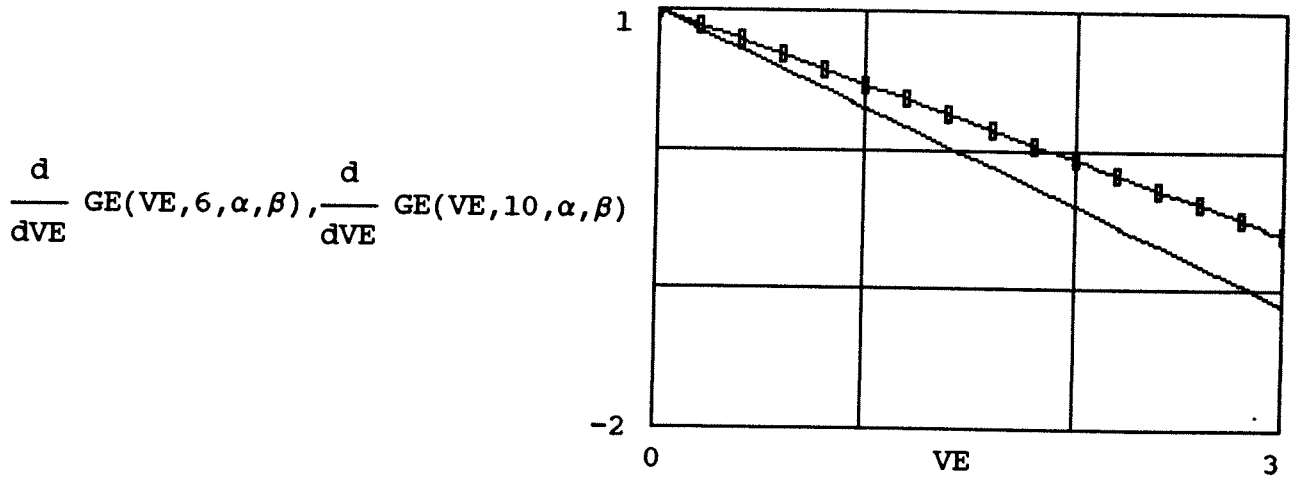


FIGURE 4

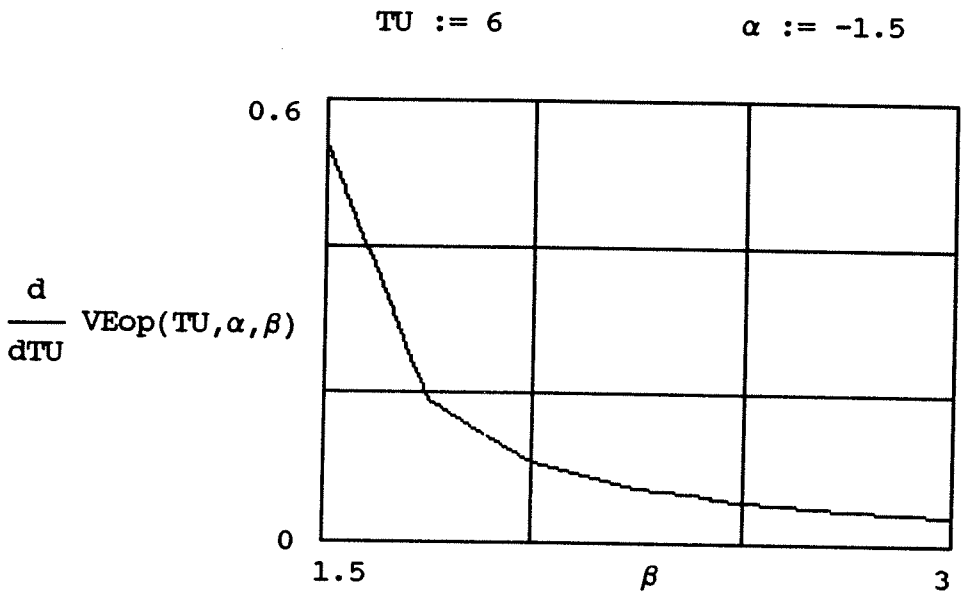
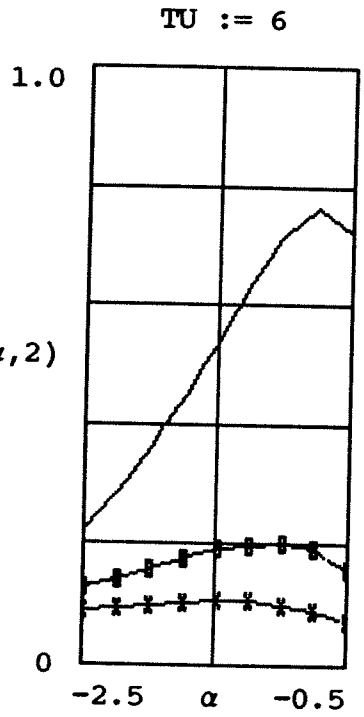


FIGURE 5

$$\frac{d}{dTU}\,VEop(TU,\alpha,1.5),\frac{d}{dTU}\,VEop(TU,\alpha,1.75),\frac{d}{dTU}\,VEop(TU,\alpha,2)$$



Combinations of low values of β with low (absolute) values of α may lead to a very high sensitiveness of the optimal deficit V_{Eop} to TU. For those combinations would be higher than .5, and since e = .5, one would have

$$\frac{\delta V_{Eop}}{\delta T_U} > 1 - e \qquad (3.16)$$

that would mean, from equation (3.13),

$$\frac{\delta V}{\delta T_U} > 0 \qquad (3.18)$$

Of course, this perverse effect of an increase of federal taxes TU on the total deficit V would not be obtained for other combinations of the parameters, values. For combinations of high values of β with high (absolute) values of α would lead to a relatively low sensitiveness of the optimal deficit V_{Eop} to TU, and would assure that $\delta V/\delta T_U$ would be negative, despite the effect of V_{Eop}/TU that would not be greater than .11.

Combinations of intermediate values of the parameters α and β could lead to an interesting case. For relatively low values of TU, the derivative $\delta V_{Eop}/\delta TU$ would be smaller than 1 - e. But a positive effect of the increase in TU on $\delta V_{Eop}/\delta TU$ would eventually make this derivative greater than 1 - e.[4] In such a

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[4] Notice, from (3.13) and (3.8), that the sign of the second derivative

$$\frac{\delta^2 V}{\delta T_U^2} = \frac{\delta^2 V_{Eop}}{\delta T_U^2}$$

case, there would be an optimal TU value for the federal government, corresponding to the minimal value assumed by the total deficit V.

Examples of the three possible cases are presented in figure 6. The perverse case is represented by the upper curve, generated by $\alpha = -1.5$ and $\beta = 1.5$. The intermediate case, represented by the middle curve, would come about when $\alpha = -2$ and $\beta = 1.5$. The third case is represented by the lower curve, brought about by $\alpha = -2$ and $\beta = 2$.

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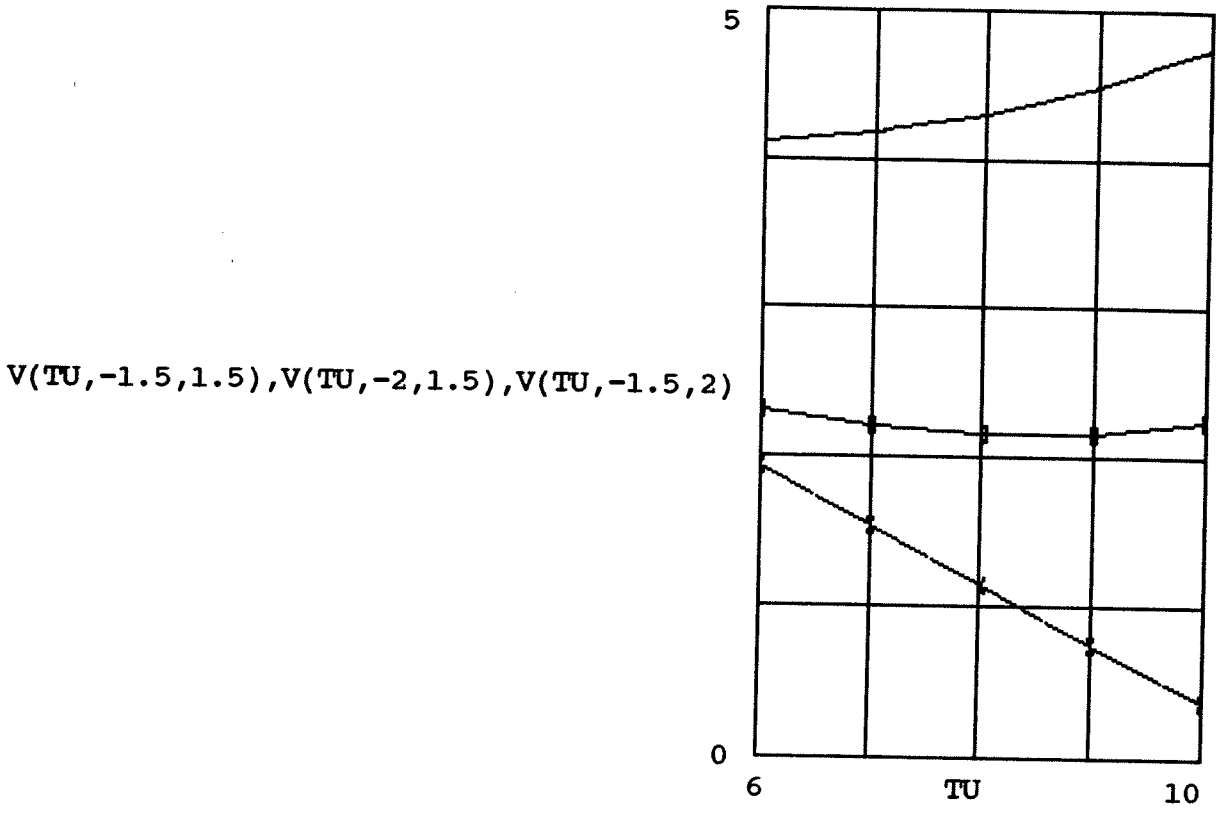
cannot be unequivocally established.

FIGURE 6



5. Some Policy Implications

Most state governments in Brazil have become clearly over indebted. And the federal government has been pressed hard by state governors to "solve" their debt problems. Facing the possibility of rejection by Congress of the fiscal adjustment package submitted in late 1991, the federal government finally agreed to include in the package an ample rescheduling of the states' debt. The part of the debt owed to either the federal government itself or any of its financial institutions will be rescheduled to be paid over 20 years. The state bonds held by the private investors, which pay a very high interest rate, will be exchanged for lower cost federal bonds.

Seen from the point of view of the above model, these measures would mean both drastically turning the r_E curve flatter and shifting it downwards, by lowering β, the sensitiveness of the interest spread to the deficit V_E, and reducing the intercept of the spread term $r(V_E)$ determined by both α and h.[5]. As was just seen, that would induce a probably very big increase in the optimal deficit V_{Eop}. Moreover, the new r_E curve would lead to a much greater sensitiveness of V_{Eop} to TU. And, therefore, to a much more unfavorable V(TU) curve, reducing even more the net effect on the total deficit V of a fiscal adjustment effort based on an increase in TU.

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[5] See the footnote on this intercept and the parameter h above.

To avoid this inducement to a large increase in the states' deficit, the federal government succeeded in including in the debt rescheduling legislation a restraint on the states' new debt issues. To be able to reschedule its debt, any state would be required to agree not to issue any new debt for a number of years, the penalty for failing to obey that clause being simply to make the rescheduling agreement null. The new legislation only established the guidelines that bilateral rescheduling agreements between each state and the federal government should follow.

Before any agreement has been signed, the largest states have been manifesting their resistance to accepting that clause and considering the possibility of making Congress approve the required changes in the legislation. Before the end of 1992, the federal government will be submitting a new fiscal adjustment package to Congress. Again, given the still precarious support of the government in Congress, approval of that package may depend upon the extent of the backing of the state governors to the proposed measures. The pressures in favor of a less rigorous clause about the states' new debt issues in the rescheduling agreements may become overpowering. The model discussed above suggests that if the federal government backs off, the net effect of the fiscal adjustment effort may prove to be quite disappointing.

Another, interesting policy conclusion concerns credit rating practices. The positive effect of a rise in TU on the optimal deficit V_{Eop} stems from the assumption that the spread term in

$$r_E = i + r(V_E, t_E) \tag{3.2}$$

depends (negatively) on the tax-revenue/debt ratio $t_E = T_E/B_E$. How would the model change if one assumes that the interest spread depends, not on tax-revenue/debt ratio t_E, but on

$$x_E = \frac{T_E - G_E}{G_E} \tag{3.19}$$

the primary-surplus/debt ratio? If (3.2) is rewritten as

$$r_E = i + r(V_E, x_E) \tag{3.20}$$

and (3.19) and (3.5) are taken into account, equation (3.6) should be rewritten as

$$G_E = T_A + eT_U - \{i + r[(T_A + eT_U - G_E)/B_E, V_E]\}B_E + V_E \tag{3.21}$$

Implicit differentiation of (3.21) also to

$$\frac{\delta G_E}{\delta TU} = \frac{e\left(1 - \frac{\delta r}{\delta x}\right)}{1 - \frac{\delta r}{\delta x}} = e \tag{3.22}$$

that means that a rise in TU only affects G_E through the share coefficient e. There is not any additional incentive to increase

G_E stemming from more favorable interest spread conditions. In that case, the optimal deficit V_{Eop} would not be affected by a change in TU. One additional unit of TU generates a fraction e of additional resources for the state and local governments, and if that is spent there is no impact on the primary surplus x and, therefore, no change in the interest spread conditions. There is no reason, therefore, to any change in the optimal deficit V_{Eop}.

The same point could be done in a more roundabout way. The implicit differentiation of (3.21) allows one to establish the first order condition for the maximization of G_E as

$$\frac{\delta G_E}{\delta V_E} = \frac{-\frac{\delta r}{\delta V_E} B_E + 1}{1 - \frac{\delta r}{\delta x}} = 0$$

which means

$$\frac{\delta r}{\delta V_E} B_E = 1 \qquad (3.23)$$

similarly to (3.7) above, but with the r function now being defined by (3.20) and not (3.2). If (3.23) is implicitly differentiated, and conditions (3.22) and (3.23) are taken into account, one will obtain

$$\frac{\delta V_{Eop}}{\delta TU} = 0$$

The second policy conclusion therefore is that if credit rating practices start to give more weight to primary-surplus/debt indicators than to tax-revenue/debt indicators in state and local governments' accounts, the impact of TU on V_{Eop} would tend to be reduced and most the problems raised here would tend to loose importance. This change in credit rating practices could be fostered by the legislation on new debt issue limits itself and by the credit rating practices in official financial institutions.

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