How Much
Fiscal Adjustment
Is Enough?
The Case of Colombia

William R. Easterly

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interest rates and inflation to more manageable levels.

Colombia's impressive fiscal adjustment during
1985-87 was due to structural changes in fiscal
policy, concludes Easterly—not simply to such
fortuitous events as the coffee boom.

Losses of public financial institutions were
important in some other Latin American coun-
tries but there is no evidence that they were a
major factor in Colombia. The data suggest that
the Banco de la Republica and other public
financial institutions suffered a small quasi-
fiscal loss, but that that loss was not the domi-
nant factor in fiscal behavior.

Although impressive, the fiscal adjustment
fell short of actually improving the govern-
ment's net financial position. Total public debt
as a percentage of GDP was roughly unchanged
from its 1984 value at the end of 1987, even
after correcting for the effect of currency devalu-
ation on dollar-denominated instruments. Public

development lending as a percentage of GDP
fell slightly during the same period.

Perhaps partly because of public debt
behavior, real interest rates remained very high
and inflation accelerated slightly. Improving on
adjustment would probably require reducing
interest rates and inflation.

Easterly's model simulations suggest that to
reduce interest rates to more manageable levels
would require continued reduction of the fiscal
deficit, below levels currently envisioned. To
reduce inflation would require even tighter fiscal
policy.

The magnitudes of required deficit reduction
do not seem out of reach however, even allow-
ing for uncertainty about the figures. Continued
policy initiatives would help Colombia confront
the fiscal challenges of the 1990s.

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by
William R. Easterly

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Introduction

A key component of the largely successful adjustment program
Colombia has followed since 1985 has been the improvement in the fiscal
deficit. Starting from a position of severe imbalances in both the external
and fiscal accounts prior to 1985, Colombia had achieved surpluses in both
accounts by 1986. Although both have since reverted to deficit, the levels
are much lower than before the onset of adjustment. At the same time, other
indicators of economic performance have been favorable. Substantial growth
returned in 1986-87 (over 5 percent), and export performance was buoyant, at
least partially in response to the major exchange rate adjustment that
accompanied the adjustment program. Inflation performance has been good for
most of the adjustment period, remaining relatively constant at around 22
percent despite the rapid rate of currency devaluation. Only recently (in
1988) has inflation accelerated, which may in part reflect temporary supply
shocks.[1]

Despite the apparent success of the fiscal adjustment, there are
several nagging questions that remain. One question is how much the fiscal
adjustment that was achieved was the result of temporary and/or fortuitous
events, as opposed to fundamental policy changes which have lasting effects.
A related question is how the deficit reduction was divided between reductions
in investment and increases in noninterest current saving.

There are also more fundamental questions about how fiscal
adjustment should be defined and whether the traditional analysis of the
nonfinancial public sector deficit is adequate. Public financial

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1.The nature of the imbalances is summarized nicely in Thomas (1985). A
  summary of the adjustment program can be found in Ocampo (1987), and Garcia
  (1989).

intermediaries, especially the central bank, sometime contribute to public deficits through losses suffered on their financial operations. Development credit extended either by public financial intermediaries or the nonfinancial public sector has to be financed just as do traditional public expenditures. To capture all of these factors, the most comprehensive definition of the public sector would be through its total financing requirements. This is also useful from the standpoint of macroeconomic analysis, since it is through its financing needs that the public sector comes to affect interest rates, private investment, inflation, and other macroeconomic variables.

The consideration of public financing requirements leads naturally to the analysis of public debt behavior. This is the "bottom line" of fiscal analysis, since the public debt captures the long-term cost of fiscal policies. The composition of public debt also affects domestic interest rates. It may also have fiscal implications if differentials exist between domestic and external interest rates. The fiscal adjustment of 1985-87 will therefore also be evaluated from the standpoint of the impact on public debt.

Finally, and perhaps most importantly, the future sustainability of current public deficits must be analyzed. This can be done by evaluating the implications of future deficits for inflation and interest rates, and checking the consistency with policy targets for these variables.

Structural fiscal deficit adjustment, 1985-87

This section will evaluate the question of how much the adjustment achieved during 1985-87 reflected temporary factors. There are several temporary shocks to consider in the fiscal accounts. The public sector benefited from the advent of a fortuitous rise in coffee prices during 1986, which yielded enormous profits to the quasi-public National Coffee Federation (FNC in Spanish). This also contributed extra revenue to the National

Government through the coffee export tax and through special transfers from the FNC. The rise in coffee prices was temporary, as they fell again in 1987.[2] However, by that time, substantial new finds in oil reserves had begun yielding additional profits through the state-owned oil company ECOPETROL. Finally, a major tax reform in 1986 had a large but temporary effect on the budget through a one-time tax amnesty that took effect in 1987.

The effect of these factors is shown in Table 1, which shows the overall public deficit adjusted for the surpluses or deficits of the FNC, ECOPETROL, and the temporary items in the National Government budget. The unadjusted consolidated public deficit improves almost 7 percentage points of GDP between 1984 and 1986, when a small surplus is achieved. There is some slippage in 1987, when it reverts to deficit again, so that the total adjustment over 1984-87 is a little more than 5 percentage points. The corrected "structural deficit" shows much smoother behavior. There is steady improvement from 1984 to 1987, with the total adjustment amounting to slightly less than 5 percentage points. Thus, the adjustment from 1984 to 1987 is almost entirely due to structural factors, with the temporary factors mainly affecting the path of the adjustment and the level of the remaining deficit.

Table 1 also shows the composition of the adjustment. We first remove the external and internal interest payments to get the "structural primary deficit". This reflects the impact of the current fiscal policies, as opposed to the legacy of past deficits as reflected in interest on debt. A deficit on this account exceeding the revenue from money creation is not sustainable in the long-run. We see that a structural primary surplus had in fact been achieved by 1987. The improvement in the structural primary deficit

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2. See Pizano (1988) for a discussion of the effect of the "coffee boom" on public finances. Cuddington (1986) contains a more general discussion of the role of coffee in the economy.

amounted to about 6 percentage points of GDP over 1984-87. This exceeds the overall fiscal adjustment since the increase in public interest payments offset part of the improvement in the primary account.

Finally, we break out investment expenditure to see the composition of the primary deficit reversal. The "structural primary current deficit"--i.e. the primary deficit less investment--was negative throughout the period. This simply means that non-interest public saving was positive. This component of the deficit improves about 3 percent of GDP over 1984-87. Thus, half of the structural fiscal adjustment was due to improved current saving and the other half due to cutbacks in investment. It is unclear to what extent cutbacks in investment reflect actual improvement in the long-run fiscal picture. If productive investment was cut, this will lower future public income and so does not represent fiscal improvement. If projects were cut that were additions to sectors with excess capacity or that were otherwise unproductive, however, then this would be genuine fiscal adjustment. Past analysis of public investment in Colombia suggests that some of the investments cut were indeed in excess capacity sectors, such as the electric sector. The conclusion is that at a minimum 3 percentage points of the fiscal adjustment was a long-run improvement, while at least part of the 3 percentage points that correspond to the cuts in public investment was an improvement.

Profits/losses of public financial intermediaries

The central bank, Banco de la República, is traditionally excluded from most measures of fiscal behavior in Colombia. However, it has some revenues and expenditures which are analogous to those in the nonfinancial public sector. Table 2 shows an account of the central bank which cover most, though not all, of its operations. This is the account known as Cuenta

Especial de Cambios (CEC).[3]   It includes net income from foreign exchange

reserves, which represent net interest received on the country's international

reserves, of which Banco de la Republica is the sole custodian. Other reserve

income comes from sales and/or revaluation of gold. The capital gains on

holdings of foreign currency show up on a realization basis as currency is

bought and sold. On the expenditure side, the main item is the interest

expenditure on central bank bonds called titulos canjeables (TC's) (this

category also includes another type of central bank bond known as titulo de

participación, but for accounting purposes all of the bonds are classified as

TC's). Since some of these bonds are dollar-denominated, this expenditure

includes also capital losses suffered on the bonds from currency devaluation.

These bonds are used in the open-market operations of Banco de la República to

control the money supply. Besides administrative costs, the other main

expenditure item is the exchange rate differential, which reflects differences

between the exchange rate at which the central bank values its reserves and

the price at which they are sold to the government for foreign debt repayment.

The balance on the CEC fluctuates between plus and minus one percent

of GDP. Interest on TC's grows steadily as open-market operations became more

important in 1986-87. However, interest on foreign exchange reserves is also

growing, as is the profit on the purchase and sale of foreign exchange, both

of which reflect the rising level of net international reserves. A deficit of

-0.3 percent of GDP in 1985 thus becomes a surplus of 0.6 percent of GDP by

1987. However, the profit on the sale and purchase of foreign exchange

essentially reflects nominal capital gains on international reserves, which

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3.A superb explanation and analysis of the CEC is contained in Jaramillo and
     Montenegro (1982).

should be excluded to be consistent with standard deficit definitions.[4] The balance excluding this item shows a deficit of between 0.2 and 0.5 percent of GDP over 1984-88.

The CEC is not a comprehensive measure of the profit or loss of the central bank on financial intermediation. The most notable omission is the interest revenue and expenditure of the Fondos Financieros, which are the entities within the central bank that carry out development lending. The Fondos raise financing through mandatory purchases of their bonds at below-market rates by the financial system (known as 'forced investments'). They then lend at a subsidized rate to the target sectors. The sketchy data available seems to indicate that the main loss-maker among the Fondos is the Fondo Financiero Agropecuario, which carries out agricultural lending. Recent adjustments in controlled interest rates applicable to the FFAP have raised its borrowing rate faster than the rate it charges on loans, as shown in table. 3.   Other fondos have a positive margin on their lending. However, to estimate the profit or loss of these entities, we need data on their operating costs and their level of defaults on loans. Table 3 shows some hypothetical calculations which assume a 5 percent operating cost ratio and a 10 percent rate of default. This yields a deficit for the Fondos shown of between 0.1 and 0.2 percent of GDP over 1985-88. It should be stressed that this is only a hypothetical calculation, however.

Other public financial intermediaries exist outside the central bank. These also engage in development lending and any potential losses or gains they realize should also be considered in an evaluation of fiscal behavior. One potential loss-maker is Caja Agraria, the public bank responsible for lending to the agricultural sector. It is estimated to have

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4.Teijeiro (1989) has a good discussion of principles of measuring central bank deficits.

had cumulative losses equal to 0.7 percent of GDP in 1985, part of which were concealed by the transfer of a note payable by the government. The stock of losses had been reduced to 0.4 percent of GDP by the end of 1987. Although Caja Agraria continued to run small losses in 1986-87, the rapid growth of GDP allowed the cumulative losses to decline in relative terms.

Another important public financial entity is the Fondo de Garantía de Instituciones Financieras, which was created to deal with the crisis in the financial system which began in 1982. Substantial resources were contributed to the Fondo de Garantía by Banco de la República and by the Coffee Fund, with a flow of gross credit of 1.6 percent of GDP during 1986 from these two entities, as we will see below. However, the evaluation of profits or losses in an economic or accounting sense raises many difficult problems. The only source of income for the Fondo de Garantía is interest on its loans to troubled banks. It is difficult to value these loans at present, since their value depends on the return of the troubled banks to profitability, which is highly uncertain. As in the case of the U.S. savings and loan crisis, the fiscal cost of the support to the financial system may not be known for several years. A system of deposit insurance has been proposed to give the Fondo de Garantía another source of income through premiums paid on deposits. However, the system appears to face severe political and legal obstacles to its implementation.

It is clear from this discussion that data on profits or losses of public financial intermediaries, including the central bank, are fragmentary and incomplete. The next section will present another method of estimating the balances of these entities from the net financing they utilize, but this approach also has pitfalls. It is clear that more research and data-gathering efforts are necessary to evaluate the fiscal burden of financial intermediation performed by public entities. Although these preliminary

calculations show the deficits of public financial entities to be small in absolute terms, they can be important at the margin when the authorities try to alter fiscal policy.

Financing of public sector deficits

This section examines the magnitude and significance of the fiscal deficits during 1985-87 from the financing side. The results are based on a flow-of-funds exercise utilizing data on Banco de la República, the financial system, direct public borrowing from the private sector, and external debt flows.[5] We consider six classes of economic agents: (1) Banco de la República, (2) the nonfinancial public sector, (3) public financial intermediaries (Banco Central Hipotecario, Financiera Eléctrica Nacional, Caja Agraria, and Caja Social), (4) private financial intermediarier. (5) the nonfinancial private sector, and (6) external agents. The changes in these stocks represent borrowing or asset accumulation by each sector (as well as revaluation of liabilities or assets).

Table 4 shows the results of the flow-of-funds exercise for 1985-87. The table presents the financing of the consolidated nonfinancial public sector and Banco de la República in inflation-adjusted terms as a percent of GDP. The inflation adjustment subtracts the part of the flow of domestic financing that merely compensates for the erosion of the real value of debt outstanding. The financing flows also exclude the revaluation of external assets and liabilities caused by depreciation of the peso against the dollar, as well as that caused by depreciation of the dollar against non-dollar currencies.[6]

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5. An earlier analysis of deficit financing is contained in Restrepo (1987), which uses somewhat different data and methodology.

6. Herrera (1988) has an excellent analysis on how to correct for the effect of inflation and devaluation on the change in financial wealth of the public sector.

The estimates of net financing shown in Table 4 are somewhat higher than the conventional measures of nonfinancial public sector deficits. The memo part of the table compares the conventional measure with the net financing unadjusted for inflation. There are two sources of discrepancy. One is that Banco de la Republica is found to have net financing requirements (after correcting for capital gains on foreign exchange reserves) of around 1 percent of GDP. This provides another estimate of the possible loss suffered on quasi-fiscal operations by Banco de la República. However, such an estimate should be viewed with caution since there are many complications in making valuation adjustments and in treating central bank and government accounts consistently. This estimate is larger than that indicated by the calculations on the operations through the CEC and Fondos Financieros discussed above. Tracing the source of this possible loss would require further research.

Even after removing Banco de la República, we still find that the consolidated nonfinancial public sector has a somewhat higher net financing requirement in 1985-86 than that indicated by the conventional measure. The financing estimate may well be more comprehensive, since the conventional estimate is based on a less than complete sample of public enterprises, local governments, and national decentralized public entities. The financing estimate also includes some entities that are financial in nature, such as the Instituto de Crédito Territorial (although not the public financial intermediaries such as FEN and Caja Agraria mentioned earlier). However, in 1987 we find that the financing estimate is nearly identical to the conventional nonfinancial public sector deficit.

Since the table consolidates the nonfinancial public sector and Banco de la República, money creation is shown as simply another way to finance the consolidated net deficit. The inflation correction is not

appropriate for monetary financing, however, since the inflationary erosion of the monetary liability is a tax on the holder which helps finance the public sector. The real change in the monetary stock represents the change in demand for money as a means of payment, the revenues of which accrue to the government. This is presented as "seignorage" in the table. In addition, the rate of inflation times the pre-existing stock gives an "inflation tax" to the government. The sum of these two items is simply the nominal change in the money stock. This breakdown is shown in the table for currency and financial system reserves on deposits.

The table shows the inflation-adjusted financing requirement of the public sector to decrease from 6.2 percent of GDP in 1985 to 2.1 percent in 1987. Except for financial support and other rediscounts to the banking system, the nonmonetary public assets decline in real terms over the period. The support of the banking system is concentrated in 1986. Thus, although it appears from the conventional fiscal accounts that most of the fiscal adjustment took place in 1986 and that there was slippage in 1987, the data on gross financing needs tell a different story. The large commitments for financial support of the banking system made the overall financing needs fall much less than the net deficit in 1986. In 1987, by contrast, the reduction in the flow of lending to the banking system more than offset an increase in the net deficit of the total public sector, so that the financing requirement fell.

A major change in the type of public deficit financing is also evident over the period. While in 1985 net external lending was still accounting for about half of total financing, it was drastically reduced in 1986-87. Gross external financing was significant in 1986, but practically all of it went into reserve accumulation. Thus, the need for internal financing actually increased in 1986, even though the total financing

requirement fell significantly. In 1987, the reduction in financing needs and a small increase in net external lending allowed the domestic financing to fall again.

Examination of the composition of domestic financing shows that monetary financing was the most consistently important. The sum of currency creation and reserves held by the banking system amounted to about 1.7 percent of GDP in all three years. The forced investments (including both inversiones del encaje and inversiones obligatorias) are surprisingly unimportant as a source of finance.[7] Bond sales were important in 1985-86, but turn negative in 1987. Lending by the financial system is also volatile--very significant in 1986, much less so in 1985 and 1987. Lending from the public financial intermediaries is larger than that from the private financial system.

Another perspective on fiscal policy in these years comes from examining the ratios of total public debt to GDP, shown in table 5. These ratios capture the long run impact of fiscal policy, since they measure the extent to which fiscal policy increases or lowers the requirement for future government saving. An increase in the ratio of government debt to GDP would require some future increase in government saving to pay the debt service.

Table 5 shows that the initial year of the adjustment program was not successful in reversing the fiscal deterioration, as the debt ratio increased sharply in 1985. External debt increases particularly strongly.[8]

7.Forced investments are the mandatory holdings of liabilities of the Fondos Financieros described earlier.

8.This is not due to the major currency devaluation of 1985, as the external debt figures are evaluated at the 1987 real exchange rate. We also correct for revaluation of the external debt due to depreciation of the dollar against other industrial currencies. The dollar-denominated domestic liabilities of Banco de la República are also corrected for valuation changes.

In 1986-87, the strong fiscal adjustment reduces the overall debt ratio by an amount that roughly offsets the increase of 1985. Surprisingly, the strong fiscal adjustment during 1985-87 did not actually lower the public debt ratio.[9]

Table 5 is also insightful in showing the changing composition of public debt. The composition of debt at the end of 1984 was heavily weighted towards external sources, which accounted for 80 percent of total public debt. These proportions were roughly maintained during 1985. During 1986-87, however, there was a shift towards internal debt as the external debt ratio declined. The composition of internal debt was changing at the same time. Forced investments and bonds increased in 1985, but then declined in 1986-87. The expansion in internal debt in 1986-87 was mainly fueled by lending by public financial institutions, and to a lesser extent, by the private financial system.

Meanwhile, public financial assets were roughly constant over 1984-86. Decreased development lending by the Fondos Financieros was offset by the increase in public financial support of the financial system. In 1987, public financial assets decline as a percent of GDP, as both development lending and lending to the financial system decline.

Table 5 also shows that the real base money stock declines over 1984-87. This reflects a fall in the real demand for the money base, meaning the potential for financing through money creation was also being eroded. Thus, at the end of 1987, the public sector's financial position had not

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9. As noted earlier, however, there are many complications involved in making this calculation, so some margin of error should be allowed for in interpreting this result. Possible complications include correcting for valuation changes, classification of assets and liabilities and differing accounting methods between the government and central bank. Robinson and Stella (1988) recommend excluding central bank debt associated with normal monetary operations, but it is difficult to see the economic justification for doing so. Further research is needed in this area.

improved in absolute terms compared to the end of 1984. However, the public sector's financial position was much better at the end of 1987 than it would have been in the absence of fiscal correction.

Evaluation of sustainable deficits

To evaluate the sustainable fiscal deficit and the financing tradeoff in financing it, a simple model is used that relates the portfolio behavior of the private sector to the financing needs of the public sector.[10] The Appendix contains an algebraic presentation of the model. This section summarizes briefly the model and then will summarize the results.

The financial behavior of the private sector is modeled with a standard Tobin-style portfolio model with some simplifications. The demand for currency depends only on inflation and real GDP, as shown in the regression in Table 6.[11] This implies that the demand for currency is strictly a transactions demand, with the real demand declining as the "tax" on currency holdings increases. The demand for non-currency domestic financial assets depends on real interest rates and real GDP, as shown in the second regression in Table 6.

These results must be translated into portfolio demands for each of the assets in the model. We make the simplifying assumption that all domestic

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10. This model is in the spirit of the approach of Anand and van Wijnbergen (1989) and van Wijnbergen, et.al. (1988) to modelling inflation and sustainable deficits in Turkey, with the addition of an endogenous interest rate and an analysis of transitional portfolio shifts. Easterly (1989) derives static and dynamic results for a similar type of model.

11. Steiner (1988) has an alternative estimate of the demand for currency as a function of nominal interest rates. His equations show much lower elasticities.

noncurrency assets are perfect substitutes and carry the same interest rate. The shares of each of these assets in the domestic non-currency portfolio are assumed to remain the same as in 1987. The real demand for currency is independent of the size of the portfolio, with the desired ratio of currency to GDP depending only on the inflation rate. The share of the noncurrency assets which go to domestic assets depends on the domestic real interest rate, with the elasticity given by the regression in Table 6. The remainder goes into foreign currency assets.

The asset side of private financial behavior is assumed to be strictly separated from the liability side.[12] The demands for credit by the private sector are modeled as part of the investment decision. Regression 3 in Table 6 shows the ratio of private investment to GDP as a function of the real interest rate. We assume that private foreign borrowing is rationed by external capital markets and/or the government. Lending by public financial institutions and the central bank is determined exogenously as a matter of government credit policy. Domestic borrowing then becomes the residual source of finance for investment, and thus is a function of real interest rates as in regression 3.

The financial institutions have their behavior determined largely by regulation. They are required to set aside fixed percentages of their portfolio in reserves, reserve investments, and forced investments.[13] The

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12. This could reflect, for example, an institutional distinction between consumers and private firms.

13. Montes and Carrasquilla (1986) have a model of regulatory determinants of the interest rate structure. Correa (1986) also has an insightful discussion of the effects of the financial regulations.

private financial system supplies the credit demanded by the nonfinancial

private sector at a given interest rate, then supplies the remainder to the

government. Public financial intermediaries deliver credit to the public and

private sectors in fixed proportions, which are based on the 1987 portfolio

shares.

The external sector is determined on the assumption that there is

external credit rationing and a government target for its own external

borrowing. The external credit rationing takes the form of fixed external

debt ratios for the private sector and financial system. The government sets

targets for its external borrowing and reserve accumulation at the central

bank, and external flows are determined accordingly.

The model is closed by endogenously determining the government

deficit on the basis of available financing. The inflation rate and interest

rate are set exogenously, which then implies a given financeable government

deficit. This can be thought of as determining the consistency of the fiscal

deficit with macroeconomic targets for interest rates and inflation.

Table 7 shows a simulation of the model which calculates the deficit

consistent with roughly unchanged inflation and real interest rates over

1988-92. We assume the 28.5 percent inflation that took place during 1988 is

reduced to 24 percent in 1989, then continues at this rate for the rest of the

period. Real interest rates remain constant at their 1988 levels, which

implies that the internal debt of the government will stay roughly constant

relative to GDP. The external debt ratio also is assumed to stay constant.

The resulting financing supplied to the government amounts to 4.8 percent of

GDP in 1988, then declines to 4.4 percent of GDP in 1989-92.[14]   After

projecting the development lending flows, this implies net financing for the

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14.The decline in financing is because of the reduction in inflation.

consolidated public sector plus central bank of 3.7 percent in 1988 and 3.5 percent for the rest of the period. After allowing for the net financing of the central bank and the residual between the financing definition of the public deficit and the conventional definition, a conventional nonfinancial public deficit of 2.7 percent of GDP is estimated for 1988. This declines slightly to 2.4 percent of GDP over 1989-1992. As shown in the table, this implies a primary surplus of 1.3 percent of GDP, as compared to a primary surplus of 2.0 percent in 1987.

However, this outcome is not the most desirable because of the high real interest rates that are required to maintain this financing level. Table 7 shows the estimate of the model that the real lending interest rate necessa.., to finance the deficit in 1988 was 15.7 percent, an increase of 1.9 percentage points over 1987. Since controls were in place during part of 1988, this can be interpreted as the "shadow" or market-clearing interest rate. The model implies that it is necessary for interest rates to remain at this high level to finance the projected nonfinancial public deficit of 2.4 percent over 1989-92. This is likely to be inconsistent with the ccntinuing revival of private investment necessary to support growth.

This projection also supposes that the current structure of interest rates remains in place. Thus, real interest rates on forced investments continue to be negative, while the interest rate on development credits remains below the rate for commercial loans. This implies that the benefits of the high real interest rate in attracting financial savings is not fully realized, since real deposit rates are six percentage points below loan rates.

We thus consider an alternative simulation -- shown in table 8 -- in which real loan interest rates will be steadily reduced, with a total reduction of 9 percentage points over the period. This is accomplished in part by changing the interest rate structure through increasing the real

interest rate paid on forced investments and by moving the interest rate on development credits towards the rate on commercial loans. Thus, the spread between deposit and loan ..ter is reduced and real deposit rates fall only 6 percentage points.

The fall in real interest rates reduces the domestic debt financing to the government. This reduces the total financeable deficit to 1.9 percent in 1989 and 1.6 percent by 1991. However, the financeable deficit increases again to 2.1 percent of GDP in 1992 (and following years) after interest rates stabilize at the lower level. It is necessary for the deficit to decrease more in the short run than in the long run because the one-time portfolio shift reduces the domestic financing available during the transition.

The change in interest rate structure also affects central bank financing requirements. There are two offsetting effects. On one hand, the increase in rates paid on forced investments without a compensating increase in development credit interest rates increase central bank losses. On the other hand, the reduction in overall interest rates lower interest costs of central bank bonds and reduce central bank financing requirements. The net effect is to leave the financing requirement roughly unchanged.

The scenario in Table 8 still has the shortcoming of continued high inflation of 24 percent. Therefore, in Table 9 we present a simulation in which inflation is reduced by nearly 14 percentage points over 1989-91, stabilizing at a rate of 10.6 percent in 1992. The same real interest rate decline and change in structure that held in the previous simulation is assumed here. The reduction in inflation requires a reduction in money creation that reduces the net financing of the total public sector from 4.8 percent of GDP in 1988 to 2.5 per cent of GDP in 1991, increasing again to 2.9 percent of GDP in 1992. The decline in nominal interest rates reduce central bank financing requirements from 0.8 percent to 0.4 percent, while the nominal

flow of development lending also falls. The conventional financeable deficit must be temporarily reduced to 1.3 percent of GDP in 1991, after which it stabilizes at a long run level of 1.7 percent of GDP in 1992 and after.

Interpretation of results

The limitations of this kind of model should be well understood. Although the model can capture the transitions from one financial equilibrium to another, it does not include other short-term shocks that perturb financial markets and the general price level (bad harvests, financial panics, etc.). Thus, interest rates or inflation may move in the short run for many other reasons than those in the model. However, the model is useful to illustrate the fundamentals that determine interest rates and inflation in the absence of short-term disturbances.

The exact magnitudes calculated for required deficit reduction should also be interpreted cautiously, since they depend on many parameters whose values can only be approximated. The deficit reductions appear to be quite modest in view of the significant decreases in real interest rates and inflation in the simulation. This reflects the low elasticities with respect to interest rates of investment and financial asset demands implied by the results of table 6. A reduction in interest rates thus does not lead private credit demand to increase much, nor private financial savings to decrease greatly. This result is crucial to the results and thus would bear further study.

The results are also sensitive to the projected growth rate (4.5% over 1989-92 in the current simulation). A lower growth rate would decrease the financing available for a given debt ratio, and thus require a greater deficit reduction. For example, if growth were to only be 2% over the period, then the deficit in the simulation of reduced interest rates and inflation

would have to be reduced to 0.6% of GDP by 1991, as compared to 1.3% with the higher growth rate.

Conclusions

The fiscal adjustment during 1985-87 was impressive compared to the previous large fiscal deficits. It was due to structural changes in fiscal policy and not simply to fortuitous events such as the coffee boom. Although losses of public financial institutions were important in some other Latin American countries, there is no direct evidence that they were a major factor in Colombia. A small quasi-fiscal loss of Banco de la República and other other public financial institutions is suggested by the data, but it was not the dominant factor in fiscal behavior.

Although the fiscal adjustment was impressive, it fell short of actually improving the net financial position of the government. Total public debt as a percent of GDP was roughly unchanged from its 1984 value at the end of 1987, even when we correct for the effect of currency devaluation on dollar-denominated instruments. Public development lending as a ratio to GDP fell slightly from 1984 to 1987.

Perhaps in part because of this public debt behavior, real interest rates remained very high, while inflation accelerated slightly. To build upon the adjustment achieved thus far would likely require reductions in interest rates and inflation. The model presented attempts to calculate the fiscal deficit reductions that would be necessary to achieve this objective.

The results of the simulations suggest the difficult challenges faced by fiscal policy in the years ahead. To reduce interest rates to more manageable levels would require continued reduction in the fiscal deficit, below levels currently envisioned. To also attain the laudable goal of inflation reduction would require even tighter fiscal policy. However, the

deficit magnitudes suggested do not seem out of reach, even if we allow for uncertainty as to the exact figures. This suggests that in addition to the commendable efforts shown thus far, continued policy initiative would be very helpful in confronting the fiscal challenges of the 1990's in Colombia.

TABLE 1: STRUCTURAL TRENDS IN FISCAL POLICY

Percent of GDP (+ deficit/-surplus)	1984	1985	1986	1987	Proj 1988	Proj 1989	Proj 1990
Total consolidated public sector deficit	6.76	3.55	-0.16	1.60	2.86	2.68	2.80
corrected for:							
FNC	-0.41	-1.36	-3.18	0.63	0.35	0.18	0.32
ECOPETROL	-0.15	1.18	0.24	-0.93	0.34	-0.09	-0.40
National goverment--temporary items\1	0.09	0.11	0.44	0.76	0.18	0.13	0.13
Structural deficit	7.42	3.85	3.22	2.66	2.36	2.72	2.51
corrected for:							
External interest	1.63	1.94	2.27	2.88	3.01	3.42	3.43
Domestic interest	0.77	0.89	0.76	0.88	0.99	0.90	0.81
Structural primary deficit	5.02	1.02	0.20	-1.10	-1.65	-1.60	-1.73
corrected for:							
Fixed capital formation	8.78	8.27	6.40	5.52	5.99	7.91	8.17
Structural primary current deficit	-3.76	-7.25	-3.20	-6.62	-7.63	-9.51	-9.89

\1 Includes coffee tax (2.5%), ECOPETROL transfers and backpayment of duties, FNC transfers,
Decreto 399-1986, and special revenue from the tax amnesty (in 1987).

TABLE 2: Cuenta Especial de Cambios--Banco de la Republica

PERCENT OF GDP	1984	1985	1986	1987	till June 1988
Net income from:	1.38	0.15	0.79	1.53	1.29
foreign exchange reserves (net)	0.13	0.09	0.22	0.42	0.34
interest earnings	0.26	0.25	0.41	0.54	0.57
interest payments	0.13	0.16	0.18	0.12	0.23
other net reserve income	0.44	0.01	0.21	0.29	0.04
gold	0.43	0.02	0.11	0.29	0.03
other	0.01	-0.00	0.09	0.00	0.01
purchase and sale of foreign exchange	0.77	-0.01	0.29	0.79	0.93
exchange rate differentials-external credit	0.04	0.04	0.07	0.03	-0.02
Expenditure on:	0.78	0.46	0.82	0.92	0.81
Titulos canjeables	0.30	0.30	0.72	0.83	0.73
Administration costs of CEC	0.07	0.05	0.04	0.04	0.04
Reserves-exchange rate differentials	0.40	0.11	0.06	0.06	0.04
Net balance	0.60	-0.32	-0.03	0.61	0.48
Net balance excl foreign exchange transaction	-0.17	-0.31	-0.32	-0.18	-0.46

Source: Contraloria de la Republica, Informe Financiero

Table 3: Interest rates for Fondos Financieros and hypothetical operating losses

	1985	1986	1987	1988 (November)
Interest rates paid on credit resources (percent)				
FFAP	18.7	18.2	19.8	22.3
FIP	22.7	21.1	24.3	26.3
FFI	23.7	21.7	22.0	24.4
FCE	24.0	21.3	24.0	25.4
Level of credit resources by Fondo (percent of GDP)				
FFAP	1.70	1.65	1.48	1.21
FIP	0.15	0.13	0.12	0.10
FFI	0.18	0.07	0.04	0.08
FCE	NA	0.04	0.18	0.17
Average interest rate for four Fondos		18.6	20.6	23.0
Interest rates received on loans by Fondos				
FFAP	16.6	18.3	19.1	19.0
FIP	25.1	24.5	26.9	26.9
FFI	22.0	22.1	23.4	24.7
FCE	18.3	19.0	23.3	25.8
PROEXPO	22.0	22.0	22.0	NA
Loans by Fondo (percent of GDP)				
FFAP	1.69	1.53	1.41	1.16
FIP	0.15	0.12	0.11	0.1^
FFI	0.17	0.12	0.10	0.0
FCE	NA	0.13	0.15	0.1
Average interest rate on lending by Fondos (except PROEXPO)		19.0	20.2	20.4
Hypothetical operating profit (+)/ loss (-) of Fondos Financieros (percent of GDP)				
FFAP	-0.15	-0.13	-0.13	-0.13
FIP	-0.01	-0.01	-0.01	-0.01
FFI	-0.02	0.00	0.01	0.00
FCE	NA	0.01	-0.02	-0.02
Total four Fondos		-0.12	-0.14	-0.17

TABLE 4:
Net financing flow of consolidated central bank and nonfinancial public sector--inflation adjusted
(percent of GDP)

	1985	1986	1987
Currency held by public	1.1	0.7	1.2
Seignorage	0.2	-0.1	0.3
Inflation tax	0.9	0.9	0.8
Reserves	0.6	1.0	0.7
Seignorage	0.1	0.5	0.2
Inflation tax	0.5	0.5	0.6
Forced investments	0.4	0.0	-0.1
by private financial system	0.3	0.0	-0.1
by public financial institutions	0.1	0.0	0.0
Bonds of nonfinancial private sector	1.0	0.4	-0.1
Lending by private financial system	-0.4	0.8	0.4
Lending by public financial system	0.7	1.8	0.8
Total domestic finance	3.4	4.8	2.3
External lending	3.6	3.0	-0.9
Capital losses (-)	-10.4	-7.5	-7.7
Nominal change	14.0	10.5	6.8
Foreign exchange reserves	-0.8	-4.0	0.7
Capital gains	2.2	1.6	2.3
Nominal change	-3.0	-5.6	-1.7
Total external finance	2.8	-1.0	-0.3
Total financing	6.2	3.8	2.1
Public nonmonetary assets	0.2	1.2	-0.4
Lending by fondos financieros	-0.1	0.0	0.0
Financial support of banking system	-0.1	1.5	-0.1
Other rediscounts to banking sytem	0.0	0.3	-0.3
Rediscounts to private sector	0.4	-0.5	0.0
Total net financing	6.0	2.0	2.5
Memo:			
Net financing unadjusted for inflation, adjusted for capital gains	5.9	2.4	2.6
--consolidated nonfinancial public sector	5.0	1.3	1.8
--Banco de la Republica	0.9	1.1	0.8
Nonfinancial public sector deficit--conventional measure	3.6	-0.2	1.6

Table 5: PUBLIC DEBT RATIOS

PERCENT OF GDP	1984	1985	1986	1987
Base Money	8.5	8.3	7.9	7.9
--Currency	5.5	5.3	4.7	4.
--Reserves	3.0	3.0	3.2	3.
Net Internal Debt	5.8	6.9	8.1	7
--Forced investments	3.1	3.3	3.0	2
by private financial system	2.9	3.1	2.8	2
by public financial institutions	0.1	0.2	0.2	0
--Bonds of nonfinancial private sector (exchange rate adjusted)	2.6	3.3	3.4	3
--Lending by private financial system less deposits	0.7	0.3	0.5	0
--Lending by public financial system less deposits	-0.6	0.0	1.2	1
Net External debt (valued at 1987 real exchange rate)	23.6	26.1	23.9	22
--External liabilities less nonmonetary deposits	30.3	33.3	34.9	32
--Net international reserves	-6.6	-7.2	-11.0	-2
Total public debt	29.4	33.0	32.0	22
Public nonmonetary assets	4.9	4.8	4.7	4
--Lending by fondos financieros	2.4	2.2	2.0	1
--Financial support of banking system	0.6	0.5	1.9	
--Other rediscounts to banking sytem	1.8	1.7	1.0	
--Rediscounts to private sector	0.0	0.4	-0.1	-
Total net nonmonetary liabilities	24.5	28.2	27.2	26.2

REGRESSION I   TABLE 6

SMPL   1972 -   1987
16 Observations
LS // Dependent Variable is LCUREA
Convergence achieved after 3 iterations

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-6.6216688	2.4247631	-2.7308519	0.018
CPIYTY	-0.5148596	0.2800343	-1.8385588	0.091
LGDP	0.9379755	0.1837274	5.1152574	0.000
AR(1)	0.5788390	0.2492560	2.3222665	0.039

R-squared	0.941127	Mean of dependent var	5.548805	
Adjusted R-squared	0.926408	S.D. of dependent var	0.188232	
S.E. of regression	0.051063	Sum of squared resid	0.031289	
Durbin-Watson stat	1.212913	F-statistic	63.94250	
Log likelihood	27.19350			

REGRESSION II

SMPL   1973 -   1987
15 Observations
LS // Dependent Variable is LRM2CU
Convergence achieved after 3 iterations

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-21.087270	3.1139532	-6.7718649	0.000
LGDP	2.1221520	0.2363584	8.9785327	0.000
RLR2	0.4062346	0.2555644	1.5895587	0.140
AR(1)	0.6134617	0.2422598	2.5322475	0.028

R-squared	0.985502	Mean of dependent var	6.779140	
Adjusted R-squared	0.981548	S.D. of dependent var	0.403074	
S.E. of regression	0.054753	Sum of squared resid	0.032977	
Durbin-Watson stat	1.398098	F-statistic	249.2397	
Log likelihood	24.61590			

REGRESSION III

SMPL   1972 -   1985
14 Observations
LS // Dependent Variable is IVFGDP

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	11.755552	0.4764354	24.673966	0.000
RLR2	-11.633157	5.1697259	-2.2502463	0.044

R-squared	0.296749	Mean of dependent var	11.35919	
Adjusted R-squared	0.238145	S.D. of dependent var	1.897658	
S.E. of regression	1.656356	Sum of squared resid	32.92220	
Durbin-Watson stat	1.746165	F-statistic	5.063609	
Log likelihood	-25.85077			

Notes

Regression I

LCUREA: log of real currency; source for currency: <u>Revista del Banco de la Republica</u>, various issues.

CPIYTY: Consumer Price Index, year-to-year rate using December data; Source: BESD, World Bank.

LGDP: log of real GDP; source: <u>Revista del Banco de la Republica</u>, various issues.

AR(1):   Auto regression correction factor.

Regression II

LRM2CU: log of real M2 minus real currency (both deflated by year-to-year CPI rate using December data); source for M2 and currency: <u>Revista del Banco de la Republica</u>, various issues.

LGDP: log of real GDP; source: <u>Revista del Banco de la Republica</u>, various issues.

RLR2:   Nominal CDT interest rate (yearly average) deflated by Consumer Price Index, year-to-year rate using December data; source for 1972-1986 CDT rate: Colombia CEM, World Bank, Oct. 15, 1987, for 1987 <u>Revista</u>,; source for CPI: BESD, World Bank.

AR(1):   Auto regression correction factor.

Regression III

IVPGDP: Private Investment as a ratio to GDP, source: <u>Cuentas Nacionales</u>, DANE, various issues.

RLR2:   Nominal CDT interest rate (yearly average) deflated by Consumer Price Index, year-to-year rate using December data; source for 1972-86 CDT rate: Colombia CEM, World Bank, Oct. 15, 1987, for 1987 <u>Revista</u>; source for CPI: BESD, World Bank.

TABLE 7 FISCAL POLICY SIMULATION: Interest rates and inflation unchanged from 1989
Percent of GDP

	1985	1986	1987	Estimated 1988	Projected 1989	Projected 1990	Projected 1991	Projected 1992 24-May-89 07:46:29 PM
Nominal PSBR	14.5	8.1	8.7	9.7	8.6	8.6	8.6	8.6
Net exchange rate losses	9.5	6.8	7.0	6.8	6.0	6.0	6.0	6.0
Deficit excluding exchange rate losses	5.0	1.3	1.8	2.9	2.6	2.6	2.6	2.6
Conventional deficit	3.6	-0.2	1.6	2.7	2.4	2.5	2.4	2.4
Residual	1.4	1.5	0.2	0.2	0.2	0.2	0.2	0.2
Net domestic interest payments	0.9	0.8	0.9	1.2	1.1	1.0	1.0	0.9
Net external interest payments	1.9	2.3	2.9	2.8	2.8	2.8	2.8	2.8
Primary deficit	2.2	-1.7	-2.0	-1.2	-1.3	-1.2	-1.2	-1.1
Conventional primary deficit	0.7	-3.2	-2.2	-1.4	-1.5	-1.4	-1.3	-1.3
Residual	1.4	1.5	0.2	0.2	0.2	0.2	0.2	0.2
Central bank net financing requirement	-0.3	0.2	-0.6	-1.0	-0.6	-0.6	-0.6	-0.6
net exchange rate losses	-1.3	-0.9	-1.6	-1.9	-1.6	-1.6	-1.6	-1.6
Net financing excluding exchange rate gains/losses	0.9	1.1	0.8	0.8	0.8	0.8	0.9	0.9
--losses on development lending	0.3	0.4	0.2	0.3	0.2	0.3	0.3	0.3
--other	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Consol public sector financing (incl central bank)	6.9	3.5	3.1	4.6	4.4	4.4	4.5	4.5
money creation	1.7	1.7	1.9	1.9	1.9	1.8	1.8	1.8
reserves	0.6	1.0	0.7	0.8	0.7	0.7	0.7	0.7
currency	1.1	0.7	1.2	1.1	1.2	1.1	1.1	1.1
bonds to private sector	1.1	0.7	0.2	0.6	0.7	0.7	0.7	0.7
foreign borrowing (net of nonmon dep and xrate loss)	3.6	3.1	-0.9	0.9	1.1	1.1	1.1	1.1
foreign exchange reserves (net of xrate gain	-0.6	-4.0	0.7	-0.3	-0.3	-0.3	-0.3	-0.3
net borrowing from private financial institutions	-0.3	0.3	0.3	0.5	0.1	0.3	0.3	0.3
net borrowing from public financial institutions	0.5	1.2	0.5	0.4	0.3	0.3	0.3	0.3
forced and reserve investments	0.9	0.6	0.4	0.7	0.6	0.6	0.6	0.6
Consol public sector borrowing requirement--breakdown	6.9	3.5	3.1	4.6	4.4	4.4	4.5	4.5
Net deficit-cent bk+NFPS (excl xrate losses)	5.9	2.4	2.6	3.7	3.4	3.5	3.5	3.5
Credit by fondos financieros	0.3	0.3	0.3	0.6	0.5	0.5	0.5	0.5
Financial support of banking system	0.0	1.6	0.2	0.3	0.3	0.3	0.3	0.3
Credit to private sector	0.4	-0.4	0.0	0.0	0.0	0.0	0.0	0.0
Other rediscounts to banks	0.3	-0.3	0.1	0.3	0.2	0.2	0.2	0.2
Residual (consistency check)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inflation rate (GDP deflator)	24.9	28.4	24.3	28.5	24.0	24.0	24.0	24.0
Inflation rate (CPI)	21.6	21.6	22.7	28.5	24.0	24.0	24.0	24.0
Interest rates (Nominal)								
--deposit	38.9	32.1	34.2	40.5	38.9	38.9	38.9	38.9
--lending	45.3	41.2	41.4	48.7	43.5	43.5	43.5	43.5
--paid on forced investments	17.2	17.2	17.2	22.4	18.1	18.1	18.1	18.1
--development lending	22.6	22.6	31.4	36.7	31.9	31.9	31.9	31.9
Interest rates (Real)								
--deposit	6.6	2.9	8.0	9.4	9.6	9.6	9.6	9.6
--lending	16.3	10.0	13.8	15.7	15.7	15.7	15.7	15.7
--paid on forced investments	-6.2	-8.8	-5.7	-4.7	-4.7	-4.7	-4.7	-4.7
--development lending	-1.6	-4.5	5.7	6.3	6.4	6.4	6.4	6.4
Interest rate differentials								
--deposit minus forced investment	18.7	15.0	17.0	18.1	17.8	17.8	17.8	17.8
--lending minus development lending	22.7	18.6	10.0	12.0	11.6	11.6	11.6	11.6
Growth rate	3.1	5.1	5.4	3.7	4.5	4.5	4.5	4.5
Net long-term external public financing (US$million)	1140.9	1011.9	-310.3	327.7	422.1	434.1	453.6	474.0
Debt ratios (end of period)								
Internal public debt	6.9	8.1	7.9	8.2	8.1	8.1	8.1	8.1
External public debt	24.7	23.1	22.5	22.5	22.5	22.5	22.5	22.5

TABLE 8 FISCAL POLICY SIMULATION: Fall in interest rates
Percent of GDP

	1985	1986	1987	Estimated 1988	Projected 1989	Projected 1990	Projected 1991	Projected 1992
Nominal PSBR	14.5	8.1	8.7	9.7	8.0	7.8	7.7	8.2
Net exchange rate losses	9.5	6.8	7.0	6.8	6.0	6.0	6.0	6.0
Deficit excluding exchange rate losses	5.0	1.3	1.6	2.9	2.1	1.9	1.8	2.2
Conventional deficit	3.6	-0.2	1.6	2.7	1.9	1.7	1.6	2.1
Residual	1.4	1.6	0.2	0.2	0.2	0.2	0.2	0.2
Net domestic interest payments	0.9	0.8	0.9	1.2	1.1	0.8	0.6	0.3
Net external interest payments	1.9	2.3	2.9	2.6	2.8	2.8	2.8	2.8
Primary deficit	2.2	-1.7	-2.0	-1.2	-1.8	-1.7	-1.6	-0.9
Conventional primary deficit	0.7	-3.2	-2.2	-1.4	-2.0	-1.9	-1.7	-1.1
Residual	1.4	1.5	0.2	0.2	0.2	0.2	0.2	0.2
Central bank net financing requirement	-0.5	0.2	-0.6	-1.0	-0.8	-0.6	-0.9	-0.8
net exchange rate losses	-1.3	-0.9	-1.6	-1.9	-1.6	-1.6	-1.6	-1.6
Net financing excluding exchange rate gains/losses	0.9	1.1	0.8	0.8	0.8	0.8	0.8	0.8
--losses on development lending	0.3	0.4	0.2	0.3	0.3	0.3	0.2	0.2
--other	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Consol public sector financing (incl central bank)	6.9	3.5	3.1	4.8	3.9	3.7	3.5	4.0
money creation	1.7	1.7	1.9	1.9	1.9	1.8	1.8	1.8
reserves	0.6	1.0	0.7	0.8	0.7	0.7	0.7	0.7
currency	1.1	0.7	1.2	1.1	1.2	1.1	1.1	1.1
bonds to private sector	1.1	0.7	0.2	0.6	0.7	0.7	0.7	0.7
foreign borrowing (net of nonasm dep and xrate loss)	3.8	3.1	-0.9	0.9	1.1	1.1	1.1	1.1
foreign exchange reserves (net of xrate gain	-0.8	-4.0	0.7	-0.3	-0.3	-0.3	-0.3	-0.3
net borrowing from private financial institutions	-0.3	0.3	0.3	0.5	-0.4	-0.5	-0.7	-0.3
net borrowing from public financial institutions	0.5	1.2	0.5	0.4	0.3	0.4	0.4	0.4
forced and reserve investments	0.9	0.6	0.4	0.7	0.6	0.6	0.6	0.6
Consol public sector borrowing requirement--breakdown	6.9	3.5	3.1	4.8	3.9	3.7	3.5	4.0
Net deficit-cent bk+NFPS (excl xrate losses)	5.9	2.4	2.5	3.7	2.9	2.7	2.5	3.0
Credit by fondos financieros	0.3	0.3	0.5	0.6	0.5	0.5	0.5	0.5
Financial support of banking system	0.0	1.6	0.2	0.3	0.3	0.3	0.3	0.3
Credit to private sector	0.4	-0.4	0.0	0.0	0.0	0.0	0.0	0.0
Other rediscounts to banks	0.3	-0.3	0.1	0.3	0.2	0.2	0.2	0.2
Residual (consistency check)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inflation rate (GDP deflator)	24.9	28.4	24.3	28.5	24.0	24.0	24.0	24.0
Inflation rate (CPI)	21.6	21.6	22.7	29.5	24.0	24.0	24.0	24.0
Interest rates (Nominal)								
--deposit	35.9	32.1	34.2	40.5	33.8	30.6	27.7	27.7
--lending	45.3	41.2	41.4	48.7	40.2	36.2	32.2	32.2
--paid on forced investments	17.2	17.2	17.2	22.4	22.4	23.4	23.9	23.9
--development lending	22.6	22.6	31.4	38.7	31.9	31.9	31.9	31.9
Interest rates (Real)								
--deposit	8.8	2.9	8.0	9.4	7.9	5.5	3.0	3.0
--lending	16.3	10.0	13.8	15.7	13.1	9.8	6.6	6.6
--paid on forced investments	-6.2	-8.8	-5.7	-4.7	-1.2	-0.4	0.0	0.0
--development lending	-1.8	-4.5	5.7	6.3	6.4	6.4	6.4	6.4
Interest rate differentials								
--deposit minus forced investment	18.7	15.0	17.0	18.1	11.4	7.3	3.7	3.7
--lending minus development lending	22.7	18.6	10.0	12.0	8.3	4.3	0.3	0.3
Growth rate	3.1	5.1	5.4	3.7	4.5	4.5	4.5	4.5
Net long-term external public financing (US$million)	1140.9	1011.9	-310.3	327.7	422.1	434.1	453.6	474.0
Debt ratios (end of period)								
Internal public debt	6.9	8.1	7.9	8.2	7.8	7.0	6.3	6.3
External public debt	24.7	23.1	22.5	22.5	22.5	22.5	22.5	22.5

TABLE 9 FISCAL POLICY SIMULATION: Fall in interest rates and inflation
Percent of GDP

	1985	1986	1987	Estimated 1988	Projected 1989	Projected 1990	Projected 1991	Projected 1992
Nominal PSBR	14.5	8.1	8.7	9.7	8.0	5.1	4.4	4.9
Net exchange rate losses	9.5	6.8	7.0	6.8	6.0	4.3	3.0	3.0
Deficit excluding exchange rate losses	5.0	1.3	1.8	2.9	2.1	1.7	1.5	1.9
Conventional deficit	3.6	-0.2	1.6	2.7	1.9	1.6	1.3	1.8
Residual	1.4	1.5	0.2	0.2	0.2	0.2	0.2	0.2
Net domestic interest payments	0.9	0.8	0.9	1.2	1.1	0.6	0.3	0.2
Net external interest payments	1.9	2.3	2.9	2.6	2.8	2.6	2.6	2.6
Primary deficit	2.2	-1.7	-2.0	-1.2	-1.8	-1.7	-1.6	-1.1
Conventional primary deficit	0.7	-3.2	-2.2	-1.4	-2.0	-1.6	-1.6	-1.3
Residual	1.4	1.5	0.2	0.2	0.2	0.2	0.2	0.2
Central bank net financing requirement	-0.3	0.2	-0.8	-1.0	-0.8	-0.5	-0.4	-0.4
net exchange rate losses	-1.3	-0.9	-1.6	-1.9	-1.6	-1.2	-0.8	-0.8
Net financing excluding exchange rate gains/losses	0.9	1 1	0.8	0.8	0.8	0.6	0.4	0.5
--losses on development lending	0.3	0.4	0.2	0.3	0.3	0.1	-0.1	-0.1
--other	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Consol public sector financing (incl central bank)	6.9	3.5	3.1	4.8	3.9	3.1	2.5	2.9
money creation	1.7	1.7	1.9	1.9	1.9	1.6	1.2	1.1
reserves	0.6	1.0	0.7	0.8	0.7	0.5	0.4	0.4
currency	1.1	0.7	1.2	1.1	1.2	1.0	0.8	0.7
bonds to private sector	1.1	0.7	0.2	0.6	0.7	0.5	0.4	0.4
foreign borrowing (net of nonmon dep and xrate loss)	3.8	3.1	-0.9	0.9	1.1	1.2	1.3	1.3
foreign exchange reserves (net of xrate gain)	-0.8	-4.0	0.7	-0.3	-0.3	-0.4	-0.4	-0.4
net borrowing from private financial institutions	-0.3	0.3	0.3	0.5	-0.4	-0.5	-0.6	0.0
net borrowing from public financial institutions	0.5	1.2	0.5	0.4	0.3	0.3	0.2	0.2
forced and reserve investments	0.9	0.6	0.4	0.7	0.6	0.4	0.3	0.3
Consol public sector borrowing requirement--breakdown	6.9	3.5	3.1	4.8	3.9	3.1	2.5	2.9
Net deficit-cent bk+NFPS (excl xrate losses)	5.9	2.4	2.6	3.7	2.9	2.4	1.9	2.4
Credit by fondos financieros	0.3	0.3	0.3	0.6	0.5	0.4	0.3	0.3
Financial support of banking system	0.0	1.6	0.2	0.3	0.3	0.2	0.2	0.2
Credit to private sector	0.4	-0.4	0.0	0.0	0.0	0.0	0.0	0.0
Other rediscounts to banks	0.3	-0.3	0.1	0.3	0.2	0.2	0.1	0.1
Residual (consistency check)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inflation rate (GDP deflator)	24.9	28.4	24.3	28.5	24.0	16.3	10.6	10.6
Inflation rate (CPI)	21.8	21.6	22.7	28.5	24.0	16.3	10.6	10.6
Interest rates (Nominal)								
--deposit	35.9	32.1	34.2	40.5	33.8	23.5	15.0	15.0
--lending	45.3	41.2	41.4	48.7	40.2	28.2	18.2	18.2
--paid on forced investments	17.2	17.2	17.2	22.4	22.4	15.4	9.9	9.9
--development lending	22.6	22.6	31.4	36.7	31.9	23.9	17.9	17.9
Interest rates (Real)								
--deposit	8.8	2.9	8.0	9.4	7.9	6.2	4.0	4.0
--lending	16.3	10.0	13.8	15.7	13.1	10.2	6.9	6.9
--paid on forced investments	-6.2	-8.8	-5.7	-4.7	-1.2	-0.8	-0.6	-0.6
--development lending	-1.8	-4.5	5.7	6.3	6.4	6.5	6.6	6.6
Interest rate differentials								
--deposit minus forced investment	18.7	15.0	17.0	18.1	11.4	8.1	5.1	5.1
--lending minus development lending	22.7	18.6	10.0	12.0	8.3	4.3	0.3	0.3
Growth rate	3.1	5.1	5.4	3.7	4.5	4.5	4.5	4.5
Net long-term external public financing (US$million)	1140.9	1011.9	-310.3	327.7	422.1	496.1	542.0	566.4
Debt ratios (end of period)								
Internal public debt	6.9	6.1	7.9	8.2	7.6	7.0	6.4	6.5
External public debt	24.7	23.1	22.5	22.5	22.5	22.5	22.5	22.5

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APPENDIX: MODEL OF GOVERNMENT DEFICIT FINANCE

Model equations

The model presented in equations (1)-(23) has a simple structure, although the notation is rather dense. The first part of the model is a conventional set of portfolio equations for the private sector. There are six assets: currency, BR bonds, government bonds, deposits in public financial institutions, deposits in private financial institutions, and foreign assets. We assume a three stage process of portfolio choice. First, individuals determine how much currency they need based on transaction volume and the rate of inflation. Second, they divide their remaining portfolio between domestic and foreign assets, according to the domestic interest rate less the rate of devaluation (which is assumed to equal the rate of inflation).[15] Third, they divide domestic assets into the four types based on fixed proportions. The fixed proportions reflect convention, since the four domestic assets are assumed to carry the same interest rate and to be perfect substitutes. The proportions used in the model are those existing at the end of 1987.

Private savings is assumed to be determined by the requirement that the ratio of gross financial assets to GDP stay at the desired level, which is here taken as the 1987 level. The flow of savings will thus be this ratio times the rates of current inflation and growth. There will be an adjustment factor in the denominator reflecting the fact that we use last year's ratio to give this year's saving. The ratio needs to be accordingly deflated by one plus the rates of inflation and growth. Thus, no matter what the (positive)

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15. Foreign interest rates enter here of course, but they are assumed to stay constant and so drop out of the equations expressed in terms of changes.

rates of inflation and growth, the factor which multiplies the desired asset ratio will always be between zero and one.

The net savings of Banco de la República, public financial institutions, and private financial institutions will be given as their interest income minus their interest expense, shown in equations (7) through (9).

External debt flows are assumed to be such as to maintain the ratio of debt stocks to GDP constant. However, as a policy parameter, we allow for a change in the ratio of government debt to GDP.

Private sector credit demand is assumed to be separated from private sector asset accumulation decisions. We have in mind a world where the private sector is divided functionally between those who save (e.g. households) and those who borrow and do physical investment (e.g. firms). The private sector credit demand can thus be thought of as an investment demand function. The credit demand is a function of the real interest rate on loans. If the real interest rate is unchanged, then the ratio of private credit to GDP is maintained over time.

The loan interest rate can be related to the deposit interest rate by taking into account reserve requirements and forced investments. If the only variables that change are other domestic interest rates, then the change in the deposit rate will be given by the change in the loan rate adjusted for the reserve requirement, minus the change in the differential between loans and forced investments times the forced investment ratios (equation 14).

Reserves and forced investments are determined on the basis of fixed ratios applied to deposits in public and private financial institutions (equations 15 through 21). The ratios are calculated on the basis of stocks outstanding at the end of 1987.

Other financial flows not represented in these equations are determined on the basis of maintaining constant the ratio of the financial stock to GDP that prevailed at the end of 1987.

Equation (22) shows the total net financing available to the government. This represents the nominal change in net financial assets, including the effect of devaluation on foreign assets and liabilities. Thus, this can be thought of as the total public deficit plus net capital losses. Adjustments for capital gains and inflation are then made to get to the figures shown in the main text.

The financing of the government deficit includes loans from Banco de la República, public financial institutions, and private financial institutions, forced investments from public and private financial institutions, government bonds held by the private sector, and external debt. We have to subtract asset accumulation, which includes deposits in Banco de la. República, and in public and private financial institutions, as well as foreign deposits.

The loans from Banco de la República in turn must be financed by reserves from financial institutions, currency holdings by the private sector, forced investments by financial institutions, bond sales to the private sector and financial institutions, and foreign debt. We must subtract other credit creation by BR, including rediscounts to public and private financial institutions and the private sector, and the loans of the fondos finrncieros. Finally we must subtract international reserve accumulation by BR.

The two financing identities can be consolidated by substituting for central bank credit in (22) using (23). We then arrive at financing for the total public sector, which is what is shown in the tables shown in the text.

Solution of the model

The model has two key equilibrating variables--inflation and the real interest rate. In principle, the model could be solved for equilibrium inflation and interest rates for a given fiscal deficit and assumed composition of its financing. However, it is computationally easier and intuitively appealing to turn the model around and solve for the fiscal deficit and its financing composition for given inflation and interest rates. This can be seen as giving the required deficit level and financing composition for target rates of interest and inflation. The model then becomes a set of recursive equations which can be solved in any simple software such as Lotus 1-2-3.

The solution of the model proceeds as follows. An inflation rate and real loan interest rate are set exogenously. The model then solves for the real deposit rate using (14). Private sector currency, deposit, and loan flows follow from (1) through (5) and (13). Reserve and forced investment flows follow from (15) through (21). External debt flows are determined from (10) through (12). The balancing item in the balance sheet of private financial institutions is credit to the public sector. In effect, any credit resources left over after private credit demands have been satisfied at the given interest rate are delivered to the government. Banco de la República also delivers residual credit to the public sector. Public financial institutions are assumed to share out their credit resources between public and private sectors in fixed proportions, according to a policy-determined rule.

This procedure thus gives us total financing available to the government, and the public sector deficit is determined endogenously. The composition of the deficit between different types of finance is also determined by the private sector money and deposit accumulation in response to

the specified inflation and interest rates. Different simulations can then be performed for different target inflation and interest rates.

NONFINANCIAL PRIVATE SECTOR

Demand for currency

$$(1) \quad \frac{\Delta H_p}{PY} = \frac{\left[\phi_H \, (\pi + \Delta\pi + g) + \phi_H^{'} \, \Delta\pi \,) \right]}{(1 + \pi + \Delta\pi + g)}$$

Demand for bonds of BR

$$(2) \quad \frac{\Delta B_p}{PY} = \frac{\left[\phi_B \, (\phi_D(n_p - \phi_H) \, (\pi + \Delta\pi + g) - \phi_H^{'} \, \phi_D \, \Delta\pi + \phi_D^{'} \, (n_p - \phi_H)(\Delta i_D - \Delta\pi) \right]}{(1 + \pi + \Delta\pi + g)}$$

Demand for government bonds

$$(3) \quad \frac{\Delta T_p}{PY} = \frac{\left[\phi_T \, (\phi_D(n_P - \phi_H) \, (\pi + \pi + g) - \phi_H^{'} \, \phi_D \Delta\pi + \phi_D^{'} \, (n_p - \phi_H)(\Delta i_D - \Delta\pi) \right]}{(1 + \pi + \Delta\pi + g)}$$

Demand for deposits in public financial institutions

$$(4) \quad \frac{\Delta D_{JP}}{PY} = \frac{\left[\phi_J(\phi_D(n_p - \phi_H) \, (\pi + \Delta\pi + g) - \phi_H^{'} \, \phi_D \Delta\pi + \phi_D^{'} \, (n_P - \phi_H)(\Delta i_D - \Delta\pi) \right]}{(1 + \pi + \Delta\pi + g)}$$

Demand for deposits in private financial institutions

$$(5) \quad \frac{\Delta D_{FP}}{PY} = \left[(1 - \phi_B - \phi_T - \phi_J)(\phi_D (n_P - \phi_H)(\pi + \Delta\pi + g) \right.$$
$$\left. - \phi_H' \phi_D \Delta\pi + \phi_D'(n_P - \phi_H) (\Delta i_D - \Delta\pi) \right]$$
$$\overline{\qquad\qquad\qquad (1 + \pi + \Delta\pi + g) \qquad\qquad\qquad}$$

Private savings

$$(6) \frac{S_P}{PY} = \frac{n_P (\pi + \Delta\pi + g)}{(1 + \pi + \Delta\pi + g)}$$

CENTRAL BANK (Banco de la República) net saving

$$(7) \quad \frac{\Delta N_B}{PY} = \left[(i_H + \Delta i_H) q_{FF} + (i_R + e)r_B - (b_J + b_F + b_P) (i_D + \Delta i_D) \right.$$
$$\left. - (i_F + e)f_B - (i_G + \Delta i_G) (ie_{BJ} + ie_{BF}) \right]$$
$$\overline{\qquad\qquad (1 + \pi + \Delta\pi + g) \qquad\qquad}$$

PUBLIC FINANCIAL INTERMEDIARIES net saving

$$(8) \quad \frac{\Delta N_J}{PY} = \left[(ie_{BJ} + ie_{GJ}) (i_G + \Delta i_G) + (i_H + \Delta i_H) (l_{CJ} + l_{GJ}) \right.$$
$$\left. - (i_D + \Delta i_D) (d_{JG} + l_{JF} + d_{JP}) - (i_F + e)f_J \right]$$
$$\overline{\qquad\qquad (1 + \pi + \Delta\pi + g) \qquad\qquad}$$

PRIVATE FINANCIAL INTERMEDIARIES net saving

$$(9) \quad \frac{\Delta N_F}{PY} = \left[(ie_{BF} + ie_{GF} + ie_{JF} + ie_{CF}) (i_G + \Delta i_G) \right.$$
$$+ (b_P + l_{GF} + l_{JF} + l_{CF} - q_{FF}) (i_C \div \Delta i_C) - (d_{FG} + d_{FP})(i_D + \Delta i_D)$$
$$\left. - (i_F + e)f_F - (q_{FF} + d_{FB}) (i_D + \Delta i_D) \right]$$
$$\overline{\qquad\qquad\qquad (1 + \pi + \Delta\pi + g) \qquad\qquad\qquad}$$

External debt flows

$$(10) \quad \frac{\Delta F_B}{PY} = \frac{(\pi + \Delta\pi + g)}{(1 + \pi + \Delta\pi + g)} \quad f_B$$

$$(11) \quad \frac{\Delta F_G}{PY} = \frac{(\pi + \Delta\pi + g)}{(1 + \pi + \Delta\pi + g)} \quad f_G \quad + \quad \Delta f_G$$

$$(12) \quad \frac{\Delta F_C}{PY} = \frac{(\pi + \Delta\pi + g)}{(1 + \pi + \Delta\pi + g)} \quad f_C$$

Private sector credit demand

$$(13) \quad \frac{\Delta L_{CF}}{PY} = \frac{\left[\psi (\pi + \Delta\pi + g) + \psi' (\Delta i_C - \Delta\pi) \right]}{(1 + \pi + \Delta\pi + g)}$$

Deposit interest rate

$$(14) \quad \Delta i_D = (1 - \mu_F)\Delta i_C - (\Delta i_C - \Delta i_G)(\iota_{BF} + \iota_{JF} + \iota_{CF} + \iota_{GF})$$

Reserves and forced investments

$$(15) \quad \frac{\Delta H_J}{PY} = \mu_J \left(\frac{\Delta D_{JG}}{PY} + \frac{\Delta D_{JP}}{PY} \right)$$

$$(16) \quad \frac{\Delta H_F}{PY} = \mu_F \left(\frac{\Delta D_{FP}}{PY} + \frac{\Delta D_{FG}}{PY} \right)$$

$$(17) \quad \frac{\Delta IF_{BJ}}{PY} = \iota_{BJ} \left(\frac{\Delta D_{JG}}{PY} + \frac{\Delta D_{JP}}{PY} \right)$$

$$(18) \quad \frac{\Delta IF_{GJ}}{PY} = \iota_{GJ} \left(\frac{\Delta D_{JG}}{PY} + \frac{\Delta D_{JP}}{PY} \right)$$

$$(19) \quad \frac{\Delta IE_{BF}}{PY} = \iota_{BF} \left(\frac{\Delta D_{PP}}{PY} + \frac{\Delta D_{FG}}{PY} \right)$$

$$(20) \quad \frac{\Delta IE_{GF}}{PY} = \iota_{GF} \left(\frac{\Delta D_{PP}}{PY} + \frac{\Delta D_{FG}}{PY} \right)$$

$$(21) \quad \frac{\Delta IE_{JF}}{PY} = \iota_{GF} \left(\frac{\Delta D_{PP}}{PY} + \frac{\Delta D_{FG}}{PY} \right)$$

Government financing

$$(22) \quad \frac{-\Delta N_G}{PY} = \left[\Delta L_{GB} + \Delta L_{GJ} + \Delta L_{GF} + \Delta IE_{GJ} + \Delta IE_{GF} + \Delta T_P + \Delta F_G - \Delta D_{BG} - \Delta D_{JG} - \Delta D_{FG} - \Delta R_G \right] \bigg/ PY$$

Central bank financing of government

$$(23) \quad \frac{\Delta L_{GB}}{PY} = \left[\Delta D_{BG} + \Delta H_J + \Delta H_F + \Delta H_P + \Delta IE_{BJ} + \Delta IE_{BF} + \Delta B_J + \Delta B_F + \Delta B_P + \Delta F_G - \Delta Q_J - \Delta Q_F - \Delta D_{FB} - \Delta Q_{FF} - \Delta Q_C - \Delta R_B + \Delta N_B \right] \bigg/ PY$$

Private financial institution financing of government

$$(24) \quad \frac{\Delta L_{GF}}{PY} = \left[\Delta N_F + \Delta Q_F + \Delta Q_{FF} + \Delta D_{FB} + \Delta D_{FG} + \Delta D_{PP} - \Delta F_F - \Delta L_{CF} - \Delta H_F - \Delta IE_{BF} - \Delta IE_{GF} - \Delta IE_{JF} \right] \bigg/ PY$$

Financing of government by public financial institutions

$$(25) \quad \Delta L_{GJ} = (1-\lambda) \left[\Delta N_J + \Delta Q_J + \Delta D_{JG} + \Delta L_{JF} + \Delta IE_{JF} + \Delta D_{JP} + \Delta F_J + \Delta IE_{BJ} - \Delta B_J - \Delta H_J - \Delta IE_{GJ} \right] \bigg/ PY$$

Variable definitions

H_p	currency held by private sector
P	General price level
Y	Real GDP
π	inflation rate
g	growth rate
B_i	Banco de la República bonds held by sector i
np	ratio of gross private financial savings to GDP
T_i	government bonds held by sector i
D_{ij}	deposits in sector i by sector j
S_p	private saving
N_i	net financial assets of sector i
IE_{ij}	_inversiones del encaje_ or forced investments made in sector i by sector j
L_{ij}	loans to sector i by sector j
F_i	peso value of external debt of sector i
i_D	deposit interest rate
i_H	interest rate paid on loans of _fondos financieros_
i_G	interest rate paid on forced investments
i_R	interest rate paid on foreign reserves (in dollars)
i_F	interest rate paid on foreign debt (in dollars)
i_C	interest rate paid on loans from banking system
e	rate of exchange rate depreciation
R_i	foreign reserves of sector i (peso value)
Q_i	Central bank rediscounts to sector i
Q_{FF}	Loans by fondos financieros

Parameters

μ_J	reserve requirement for public financial institutions
μ_F	reserve requirement for private financial institutions
ι_{ij}	forced investment ratio - directed to sector i from sector j
ϕ_H	ratio of currency to GDP
ϕ'_H	derivative of currency ratio wrt inflation
ϕ_B	share of BR bonds in private domestic non-currency assets
ϕ_T	share of government bonds in private domestic non-currency assets
ϕ_J	share of deposits in public financial institutions in private domestic non-currency assets
ϕ_D	share of domestic assets in private sector non-currency assets
ϕ'_D	derivative of ϕ_D wrt domestic real deposit interest rate
ϕ	ratio of private credit to GDP
ϕ'	derivative of ϕ wrt real loan interest rate

Notation conventions

Subscripts:

B	Banco de la República (Central bank))
G	Non financial public sector
J	Financial public sector
F	Financial private sector
P	Nonfinancial private sector

Other:

Δ	change during year

lower-
case
letter   Ratio of variable denoted by upper case letter to GDP

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