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Poverty Alleviation in a Financial Programming Framework: An Integrated Approach

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Abstract

Poverty alleviation is typically addressed in financial programming through additive programs that target vulnerable groups but without modifying the underlying stabilization and adjustment targets. Instead, this paper integrates the poverty alleviation objective into the financial programming framework using a well-known poverty index. In consequence, the assessment of trade-offs between competing objectives is facilitated. A simulation demonstrates how the integrated approach can reduce adverse effects on poverty and improve the balance of payments, although at the cost, temporarily, of a higher fiscal deficit and inflation.

JEL Classification Numbers:

E60, H6, I30

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Contents

Summary

Poverty alleviation has usually been addressed in financial programming models by adding social safety net programs to the financial programs but without modifying the underlying stabilization and adjustment targets. Despite its convenience, this traditional approach may be less effective than an integrated approach in which the settings of financial program instruments are chosen in such a way as to minimize adverse implications for poverty.

This paper addresses the issue by setting up a general version of the financial programming model that can be used to explore possible trade-offs between targets, such as for the balance of payments, inflation, and output growth. The Sen Poverty Index is explicitly introduced into this model and consists of the following: (1) head-count ratio (the proportion of a population below a predetermined poverty line, (2) poverty gap or the degree of poverty (the gap between the average income for the poor and the poverty line), and (3) the Gini coefficient (distribution of income) among the poor.

At the macroeconomic level, the poverty index may be affected either by the outcomes of the model with respect to output and inflation or by the policy measures that may be enacted, such as a devaluation or a fiscal consolidation. By reference to factors inducing a change in the Sen Poverty Index and with a view to containing their effects, the preferred short-term macroeconomic outcome of an adjustment program would be for (1) the rate of output growth not to be unduly depressed, (2) the balance of payments to be improved, (3) inflation to be reduced, and (4) fiscal outlays, especially those that benefit the poor, not to be excessively suppressed.

The paper presents a simulation in which an externally delivered shock (20 percent decline in export prices) is assumed. Although the economy will be impoverished by the terms of trade shock, the results indicate that the poverty index could be held at a lower (better) level with a better output and balance of payments performance. The cost would be a temporarily slightly higher fiscal deficit and higher inflation than with the traditional model, in which poverty programs are simply added on.

I. Introduction

In recent years, country stabilization and structural adjustment programs supported by the International Monetary Fund (IMF) have been criticized for ignoring their effects on the poor even while their impact may have been positive for the balance of payments (see, among many others, Cornia and Stewart, 1993; and EISSEAS, 1994). Increasingly, country financial programs have attempted to recognize the importance of ensuring that the poor and vulnerable are not made worse off as a consequence of the adjustment measures incorporated in the financial programs (see Heller, et al., 1988; Tanzi and Chu, 1989; and Nashashibi, et al., 1992). In the discussion surrounding these attempts, it is recognized that there are potentially important trade-offs between policy objectives giving rise to the policy mix problem (see various recent reports issued by the Development Committee, for example (1990)). It is also recognized that the use of various instruments has to reckon with possible adverse side effects, and that how measures are sequenced can make a big difference to the attainment of the poverty alleviation objective, in particular. However, the issue of how to take account of the poverty alleviation objective in the Fund's financial programming framework has yet to be resolved.

The programs often explicitly propose measures to alleviate social stress subject, of course, to available resources. Because much of the focus of this work is on how to economize on the limited available resources when promoting poverty alleviation goals, the emphasis is on the design of selective measures for the more cost-effective targeting of economically vulnerable groups (see Gupta and Nashashibi, 1990; and Chu and Gupta, 1993). The resulting poverty alleviation measures, better defined as social safety net mechanisms, are "added on" to the financial programs insofar as the underlying stabilization and adjustment targets remain unaffected. 1/

While there is much to be said for the operational and analytical convenience of this additive approach, often the critique of financial adjustment programs stems from the exclusion of a poverty constraint as an integral part of the underlying model. Indeed, adopting an integrated approach could make it evident whether, and to what extent, different macro-policy prescriptions result compared to those emerging from the traditional model.

The extent to which the overall design characteristics of a financial program itself may need to be modified to support a poverty alleviation objective depends on the economic structure. A particular economic structure could impose significant trade-offs between the different objectives. Indeed, that is likely to be the case. It is possible that by adopting an "integrated" approach, whereby the settings of the program instruments are selected in such a way as to minimize adverse implications

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1/ Fund staff has also attempted to study directly the effect of adjustment programs on the poor (see, for example, Liuksila, 1991; and Gotur, 1991).

for poverty, the likelihood of success, both with regard to the stabilization objective of balance of payments viability as well as the poverty alleviation objective, is increased. 1/ Such an approach should help address some of the concerns expressed by certain critics of Fund-supported financial programs that the programs have an excessively deflationary and pro-poverty bias (Cornia and Stewart, 1993). They argue that the programs not only constrain output growth, which adds to the ranks of the poor, but that the poor are further hit by the mandatory curtailment of overall fiscal outlays for stabilization purposes. 2/

The stabilization-induced decline in output could cause revenue to fall, forcing the government to further cut back overall outlays in order to preserve its stabilization-oriented fiscal target, which in turn depresses output. This process of declining output is likely to be accompanied by declining social outlays, which are often the first expenditures to be cut. While the additive approach reallocates expenditure and puts in place targeted poverty programs, which cushion the poor to an extent, 3/ nevertheless, a mutually reinforcing vicious circle could result. Some have, therefore, concluded that the outcome for the poor could be even more adverse than what is shown by indices of output decline, owing to the inevitable curtailment of public goods that support minimum living standards, which serves to aggravate social stress (Anand and Ravallion, 1993).

An integrated approach that may be better able to limit the adverse ramifications on the poor by explicitly incorporating a poverty constraint, than the additive approach which relies only on supplemental poverty alleviation programs, therefore, should be considered. Such an investigation is the objective of this paper. The paper proceeds by first setting up, in Section II, a general version of the financial programming model that can be used to explore possible trade-offs between targets for the balance of payments, output growth, and inflation. Alternative measures of poverty are reviewed in Section III, with a view to determining which ones may be included in the financial programming models along with macroeconomic indicators typically used as performance criteria by them. Section IV presents a simulation of the financial programming model under

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1/ Atkinson (1993) argues for an integrated approach that explicitly takes account of the trade-offs between poverty alleviation and various macroeconomic objectives. He observes that this is generally not done and finds it "...alarming...that undue faith is placed on the efficiency of social policy to solve the distributional problems generated by macroeconomic policy" (p. 11).

2/ In addition to the preceding macroeconomic factors, structural reforms such as removing price subsidies on commodities predominantly consumed by the poor could also worsen the plight of the poor.

3/ This assumes, of course, that such programs could be quickly designed, financed, and implemented, a matter that comes increasingly under doubt from actual experience.

the influence of an external shock followed by typical program-related policy responses, and considers implications for the poverty alleviation objective. Concluding comments are presented in Section V.

II. The Model

In the financial programming approach, central reliance is placed on a predictable demand for money function and the means for supplying the money needed to fulfill that demand, whether through domestic credit creation or international reserve movements (see IMF, 1987). Programming in this context consists of determining, by reference to the economic objectives and, in particular, the balance of payments target, the appropriate rate of credit expansion as a key policy instrument. Typically, the models assume that there is an underlying rate of growth of output and of inflation that are separately determined, either as trends or as targets, which determine the incremental demand for money. It is also assumed that these are not affected by the solution for the rate of credit expansion that is consistent with the projected incremental demand for money and the balance of payments targets. The version of the financial programming model set out here, while continuing to be driven by monetarist underpinnings--in that the incremental demand for money plays a central role--is more general, from which the basic model falls out as a special case (see Chand, 1989). This permits exploring possible trade-offs between targets for the balance of payments, and nominal output growth, in particular.

The model, containing a number of particularly simple behavioral expressions, is set out here in annotated form and distinguishes four sectors: 1/ 2/

Monetary sector

- demand for money

$$M^d = \frac{1}{v} PY, \qquad (1)$$

- incremental money supply

$$\Delta M^S = \Delta D_g + \Delta D_p + E\Delta F, \qquad (2)$$

1/ The terminology is defined in the Appendix.

2/ For specific country applications, the model will, of course, have to be tailored to country conditions both with regard to behavioral and market specifications.

- incremental demand for money

$$\Delta M^d = \left(\frac{\Delta P}{P_{-1}} + \frac{\Delta Y}{Y_{-1}}\right) M_{-1} = \frac{1}{v} \Delta PY, \quad (3)$$

- distribution of credit

$$\Delta D = \Delta D_g + \Delta D_p, \text{ 1/} \quad (4)$$

External sector

- incremental supply of foreign exchange (in domestic currency terms, with E the exchange rate and taking account of trade, net external transfers, and capital flows)

$$E\Delta F^s = P_x X - EP_f Z + ETr_g + ETr_p + E\Delta K_g + E\Delta K_p, \quad (5) \text{ 2/}$$

- import demand function

$$EP_f Z = z(e)PA, \quad (6)$$

where $z = eb(e)$ and $b'(e) < 0$

PA refers to absorption and is defined as

$$PA = PC_p + PI_p + PG, \quad (7)$$

Private sector

- income and borrowing flows and their allocation

$$PY_d + ETr_p + E\Delta K_p + \Delta D_p = PC_p + PI_p + \Delta M^d, \quad (8)$$

- consumption function

$$PC_p = cPY_d, \quad (9)$$

- disposable income definition

$$PY_d = PY - PT + PG_{po}, \quad (10)$$

where PG_{po} denotes government transfers to the poor

1/ The subscript convention of g and p is adopted to indicate government and private, respectively. In what follows, several other totals are distributed between these two categories.

2/ Export and import price indexes are assumed to be exogenously determined.

- tax function

$$PT = tPY, \tag{11}$$

- investment function

$$PI_p = PY - PC_p + (ETr_p + E\Delta K_p + \Delta D_p - \Delta M^d), \tag{12}$$

Government sector

- budget constraint

$$PG - (PT + ETr_g) = E\Delta K_g + \Delta D_g. \tag{13}$$

Some consolidations

Imports are assumed to be a function of desired absorption A by residents. The sum of expenditures represented by the latter equals the consolidated flow of private and government sector's income, to which is added any net transfers received by these two sectors and the proceeds from borrowing, and from which the desired accumulation of money balances is subtracted. This demonstration begins with equation (7), where absorption is defined as the sum of private consumption and investment demands and government outlays. Then use equation (8) to substitute for consumption, and equation (13) to substitute for government expenditure, which on manipulation will yield

$$PA = PY + (ETr + \Delta D + E\Delta K) - \Delta M^d. \tag{14}$$

The reduced form solution

The equilibrium condition for financial and physical flows in this model are developed by adding up the three sectoral constraints (5), (8), and (13), placing goods on the left-hand side (LHS) and financial items on the right-hand side (RHS) to generate

$$PY - PC_p - PI_p - PG - (P_xX - ETr - EP_fZ) = (\Delta M^d - \Delta M^s). \tag{15}$$

The solution of the model is provided in terms of nominal income by equating either the LHS or the RHS of the conditions stated in equation (15) to zero. Equating the RHS of equation (15) to zero, and substituting for the incremental demand and supply of money by using equations (2) and (3), yields

$$\Delta PY = v(\Delta D + E\Delta F). \tag{16}$$

The reduced form solution for the change in nominal income can be obtained by using equation (5) to substitute for the $E\Delta F$ term in equation (16), drawing on equations (6) and (14) to substitute for the import term, and utilizing the property $PY = (PY)_{-1} + \Delta PY$:

$$\Delta PY = \frac{v}{(1-z+zv)} \left[(1-z)\ (\Delta D + ETr + E\Delta K) + P_X X - z(PY)_{-1} \right]. \quad (17)$$

To understand this solution, note that if there is an excess supply of money from additional domestic credit creation, absorption will increase and both nominal income and imports will rise. This contrasts with the basic formulation of the financial programming model, where an excess money supply is eliminated only through a deterioration in the balance of payments (see Chand, 1989), given that nominal income is exogenously determined. This result is easily generated in the present model by pegging ΔPY and noting that exports now function as a slack variable that automatically adjusts to preserve it. As before, absorption is raised by the additional domestic credit creation, but is now entirely met by a diversion of some exports to domestic use and an increase in imports, thereby generating the one-to-one relationship between additional credit creation and the balance of payments deterioration of the basic model. 1/

The solution for nominal income can be subdivided into its respective output and price components by noting that

$$(1 + \Delta PY/PY_{-1}) = (1 + p)(1 + y) \quad (18)$$

where small letters denote growth rates.

By building in more structure so as to endogenously determine a rate of price inflation p, or alternatively output growth y, the nominal income solution can be decomposed into its price and output components which, in turn, would facilitate the assessment of output growth and inflation trade-offs. However, this decomposition is not needed in what follows. The approach here, as will be evident subsequently, is to use a purchasing power criterion that can be conveniently expressed in nominal terms. On a heuristic basis, movements in nominal GDP can sometimes be used to derive inferences about the underlying price and output components as is illustrated subsequently.

Finally, it should be noted that the solution presented above is for an interval of time. For a proper dynamic analysis, a sequence of such intervals will need to be examined that allows for the effects of capacity affecting policies to take place. Such an analysis, however, is beyond the scope of this paper, which focuses on shorter-term responses during which the bulk of the adverse poverty effects are likely to occur. Beneficial supply-enhancing effects of the stabilization and structural adjustment policies generally take hold over a longer interval.

1/ Having exports as the sole equilibrating variable in the basic model eliminates the possibility of trade-offs involving nominal income.

III. Selected Poverty Measures

With the objective of seeking a feasible poverty index or criterion that could be incorporated within the financial programming framework, this section surveys various alternatives in the literature and seeks to select a couple that could be usefully employed. Feasibility in this context should comprise two factors: first, that the criterion used adequately addresses the issue of poverty; and second, that its application be based on easily available data so that it would be amenable for use in individual country programs.

A comprehensive survey of the literature on poverty measures is by Blackwood and Lynch (1994). The definition of poverty could be linked to concepts of well being, opulence, utility of a predefined variety or income (see Anand and Ravallion, 1993). Nevertheless, the most practical definition of poverty--especially in terms of the feasibility criterion defined above--has to be based on income. Below we consider the pros and cons of selected possibilities.

1. Poverty line and head count

These are the most rudimentary poverty measures. As a beginning, a minimum income level required to meet basic needs could be used to establish a poverty line (o). Of course basic needs and their costs would vary among different economies; nevertheless, an attempt might be made to estimate it individually by country 1/ and to ensure that it is kept constant in real terms over time. A typical financial programming exercise could relatively easily incorporate a binding constraint ensuring a minimum income level at the poverty line. Also, a before-and-after head count of the people as a percentage of the population under the poverty line could be used as an index. The problem, however, is that the poverty line, being an income level, is a discreet measure even though poverty cannot quite be conceived as terminating at a particular marginal dollar for all individuals. Also, the head count is a simplistic measure which fails to recognize the extent of poverty as a criterion. Therefore, it may be necessary to incorporate somewhat more sophisticated measures of poverty, building on the poverty line and head count, in the financial programming model. Some possible measures are discussed below.

2. Poverty gap

If the income shortfall from the poverty line, of the average poor with mean income $\bar{m}$, is denoted by Δk, then the aggregate income shortfall or the poverty gap is:

1/ Note that the intention in incorporating poverty as a criterion in the financial program of a particular country is not to attempt an international comparison, which would be a more difficult task.

$$(\Delta k)n = (o - \bar{m})n \qquad (19)$$

where n is the size of the population below the poverty line o. Conceptually, it should be possible to reduce $(\Delta k)n$, given o, within the financial programming model. This can happen if the financial program results in a reduction in the number of poor. While a reduction in the poverty gap could certainly be incorporated in a financial programming framework as a performance criterion, its shortcoming lies in that it would ignore income distribution among the poor.

3. Lorenz curve and Gini coefficient

The Lorenz curve (L) is well known. Its concomitant concept, the Gini coefficient (GI) incorporates income distribution. L relates, in a square diagram, the cumulative shares of income to the cumulative percentages of the population. Thus:

$$GI = \frac{\text{area between L and diagonal line}}{\text{area between diagonal and horizontal axis}} \qquad (20)$$

$$0 \leq GI \leq 1. \text{ 1/}$$

Larger values of GI imply higher inequality. GI could be estimated for any segment of the population, for example, for only the poor (GI_p). Then measures of GI_p under the poverty line, before and after a policy change, would indicate how the distribution of income among the poor was affected by that policy. 2/

Nevertheless, the GI is not flawless in that it fails to order income distributions completely. For example, two Ls with dissimilar shapes could yield the same GI. This is because the numerator in the above expression of GI may result from populations with vastly different concentrations in income. It therefore fails to indicate the intensity of poverty.

4. Composite poverty indices

The poverty measures considered, so far, have the positive property of simplicity but, for the reasons cited above, they are not fully indicative when used by themselves. For this reason, composite poverty indices that incorporate more properties have been proposed. Two such indices that are also feasible are the Sen Poverty Index (S) and the Generalized Lorenz Curve (GLC).

1/ The denominator in GI is half the area of the square diagram.

2/ Similar estimates of GI for the entire population would enable comparisons for the population as a whole.

a. Sen Poverty Index (S)

S incorporates the number of poor (head count h), the degree of poverty $\Delta k'$ (poverty gap Δk as a ratio of the poverty line level), and the distribution of income (GI_p) among the poor. Thus:

$$S = h[\Delta k' + (1 - \Delta k')GI_p] \tag{21}$$

$\Delta k'$, already defined above, is:

$$\Delta k/_o = \left[\sum_{i=1}^{n} (o-m_i) \right] / no \tag{22}$$

where m_i is the income of the i^{th} household under the poverty line o.

The following properties of S may be observed. First, it is an index that focuses only on the poor rather than on their relative position vis-à-vis the rich. Second, it is negatively related to the incomes of the poor. 1/ Third, income transfers even within the poor--which can be regressive or progressive--affect the value of S.

If S were to be included as a constraint in a typical financial programming model, then the additional information that would be required would include: o, Σm_i, n, h, G_{po} (pro-poor government transfers) and GIp. While this certainly adds to data requirements, the nature of the data reveals that it should not be impossible to assemble them.

Nevertheless, S could be argued to possess some shortcomings. It is biased toward improving h more than Δk or GIp. This implies that S would improve most by first bringing across people from just below to just over o. It would improve least as a result of policies that focus on the most destitute first. Therefore, the use of S in the framework of financial programming models does involve a value judgment.

b. Generalized Lorenz Curve (GLC)

By weighting the L by the average income of the distribution, Shorrocks (1983) introduced the GLC. Thus, focusing only on the poor:

$$GLp = \bar{m}\, Lp\, (m_i, \ldots, m_n, n). \tag{23}$$

1/ Note that while the head count by itself does not satisfy this property, the poverty gap satisfies it.

The weighting allows two identical income distributions--but with different average incomes--that would have yielded the same L to result in two GLs, that is, in two different poverty measures. This simple procedure thus makes it feasible to track not only the income distribution among the poor but also the degree of poverty.

Incorporating GL_p into a financial programming framework requires information similar to that of S. However, unlike the latter, the former does not involve a head count of the poor that could be of some interest to policymakers. Other than that, GL and S are similar indices. Given the slightly greater information available from using S, it should be usually preferable to use it over GL_p.

IV. Some Experiments with the Integrated Model

This section first considers some of the connections or interface points between the financial programming model and the Sen Poverty Index as the preferred poverty index. Subsequently, a simulation is undertaken of the integrated model.

1. Integrating poverty into the model

Even at the macroeconomic level of the financial programming model, there are several ways in which the selected poverty index can be affected, either by the outcomes of the model with respect to output and inflation, or the policy measures that may be enacted such as a devaluation or fiscal consolidation.

First, and probably the most important influence on the poverty index, concerns the growth in output in the face of a growing population. If for some reason output contracts, while population continues to grow, average per capita output levels could decline fairly sharply. Does this imply an increase in the poverty index? Even if the relative distribution of income remains unchanged which in itself is a strong assumption--as the more likely outcome is for it to shift in favor of the stronger and less vulnerable--the decline in average per capita output will have caused a number of persons to cross over to below the poverty line. The 1990 World Development Report (WDR) (World Bank, 1990) took US$370 in purchasing power equivalent as the measure of the poverty line. According to that report about one third of the population of the developing countries falls below that line. While more detailed information is needed to infer the distribution of a population across the income range, it is likely that a reduction of say 10 percent in the mean real per capita income in a poor country, which could easily occur in a year of bad harvest or deteriorating terms of trade,

would push a significant additional part of the population below the poverty line. 1/

Second, a real depreciation of the exchange rate, which implies some reduction in the real purchasing power of the economy, could also involve an increase in the poverty index; just as with the decline in real per capita output, more persons would be pushed below the poverty line. However, it is now possible, depending on the differential effects of the devaluation, that exporters and producers of exportables gain, and importers lose, so that even though the purchasing power of the economy as a whole is reduced, there may be a change in relative incomes such that the poverty index declines. This would be the case if, for example, producers of exportables were primarily peasant farmers earning below the poverty line, while consumers of imports were primarily urban dwellers earning above the poverty line. In the apparently more typical situation, however, significant numbers of both urban dwellers and peasant farmers continue to earn below the poverty line after the devaluation with the consequence that the poverty index rises. Nevertheless, insofar as the depreciation eases the balance of payments constraint, and the supply of imports improves, the economy would benefit.

A third manifestation of the model that could affect the poverty index concerns inflation. While the effect of inflation is not to change, at least directly, the amount of output or purchasing power available to the economy, there is a strong presumption that those who have less recourse to indexation, in particular, people such as pensioners on fixed incomes or unorganized labor, will lose relative to other income groups. The poverty gap, or the difference between the incomes of the poor and more vulnerable and the poverty line would widen. Measures would then have to be taken to counter the impact of inflation on the poverty index.

Fourth, policies that involve fiscal consolidation could affect the poverty index adversely, although the outcome will depend on a balancing of effects. Typically, the most poor tend to be subsistence farmers who are usually less affected by government spending and tax programs. Nevertheless, a sufficiently sharp retrenchment of the budget could push other occupation groups from above to below the poverty line. In addition, it could worsen the distribution of income for those already below that line. However, insofar as fiscal consolidation succeeds in reducing the rate of inflation, the poor may be benefitted, as they would from any resulting crowding in of investment that raises the growth rate, although all these

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1/ See Table 3.7 of the 1990 WDR for several country instances of short-run recession (Colombia, Costa Rica, Côte d'Ivoire, Malaysia, Poland, Venezuela, Yugoslavia). Note, however, that even with positive economic growth and a commensurate rise in per capita incomes, it is not impossible to imagine a worsening of income distribution and additions to the ranks of the poor. See, for example, the cases of Brazil, China, and Thailand in the same table that indicate a worsening head-count ratio in the face of a positive growth in mean incomes. This latter case is not examined here.

effects will have to be set against a possible shorter-term economic contraction. Such conflicting tendencies are likely to make it more difficult to assess the overall effects on the poverty index of fiscal consolidation.

While the preceding discussion concerns possible deflationary macroeconomic effects of fiscal consolidation, any pro-poor outlays that are eliminated or reduced, for example, transfers or subsidies, will directly impact on the poor who will suffer an equivalent income loss. Once again, some balancing is involved between the economy's efficiency gains from the pursuit of less distortive policies and the direct loss sustained by the poor.

To sum up, by reference to factors inducing a change in the poverty index and with a view to containing their effect, the preferred short-term *macroeconomic outcome of an adjustment program would be for* (1) the rate of growth of output not to be unduly depressed; (2) the balance of payments to be improved; (3) inflation to be reduced; and (4) fiscal outlays, especially with a pro-poor bias not to be unduly suppressed. Some aspects of sequencing have to be kept in mind. In the short run, alleviating a particularly severe balance of payments constraint may be an overriding concern and growth may have to decline even more leading to a bigger increase in the poverty index. The important question examined next is that of how to observe the overriding (balance of payments) constraint, while choosing that package of adjustment measures that minimizes the rise in the poverty index.

2. Incorporating the Sen Poverty Index (S) in the financial programming model

Of the three components in S, at least two are likely to be directly influenced by movements in macroeconomic aggregates: the head-count ratio h and the poverty gap Δk. The GI for the poor (GI_p), which measures the distribution of income among the poor, is subject to several less well understood complex forces whose relationship to shorter-term fluctuations in macroeconomic aggregates may in any case be limited. In the analysis that follows we will assume that this coefficient is set at a constant value and focus on the first two components in S. 1/

Key influences on the head-count ratio would obviously include the measure of the poverty line. Employing the World Bank criterion of US$370 for the poverty line and expressing it in local currency terms gives the first point of reference. This is assumed to be an absolute standard whose local valuation depends on the level of the exchange rate. Should the

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1/ The informational requirements for measuring changes in the Gini coefficient for the poor as a result of macroeconomic shocks or policy shifts are potentially formidable. For the simulation that follows GI_p is set at 0.2.

latter appreciate, the head-count ratio would fall, and conversely for a depreciation. Fluctuations in the exchange rate are thus taken into account in the local currency valuation of the poverty line. The combined effects of inflation and output growth are captured by movements in nominal GNP which, given the size of the population, affects average per capita income. If the latter rises relative to the poverty line, some of the poor will be lifted above the line, with the number depending on the underlying distribution of income. This feature is conveniently expressed as a response elasticity of the head-count ratio with respect to the gap between the per capita income for that economy and the poverty line.

$$h = h(u-o), \quad h' < 0 \tag{24}$$

and $\eta_h = (-h')(u-o)/h$

where u is per capita income and o is the local currency value of the poverty line.

An elasticity of 0.2 is used here based on a regression run on a sample of countries, which related the head-count ratio to the period change in real per capita income. 1/ The regression did not take explicit account of varying inflation rates, but it may be expected that the higher the degree of inflation in the observed movement in nominal GNP, the lower this elasticity, as the poor are likely to be less effective in indexing their incomes.

To determine the poverty gap it is necessary to estimate the average per capita income of the poor $\bar{m}$. This is readily done by first using the L distribution to determine the proportion of total GNP that accrues to the percent of the population that was earlier found to lie below the poverty line, that is, the head-count ratio. On taking account of the population size, the relevant proportion of total GNP is converted into per capita magnitudes. Insofar as incomes of the poor are supplemented by government subsidies and transfers G_{po}, the per capita income estimate for the poor will need to be adjusted to include this amount. 2/ It is reasonable to hypothesize that an increase in the average per capita income, relative to the poverty line, will also exert an upward pull on average per capita income of the poor. Two effects are involved here: the first concerns the

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1/ The regression related the proportional change in the head-count ratio to the proportional increase in real per capita income over periods ranging from 10-24 years for a sample of 11 developing economies reported in Table 3.7 of the World Bank Report (1990):

$$\Delta h/h = -33.2 - 0.16\ \Delta u/u \qquad R^2 = 0.35$$
$$(2.3)$$

2/ In a fuller analysis, the total effect of government's redistributive actions should be taken into account, including taxation and quasi-fiscal transactions.

reduction in the head-count ratio and the associated absolute increase in the amount of income accruing to the remaining poor, while the second concerns the increase in the incomes of some of the poor as a consequence of the general rise in incomes. Once again, the strength of these effects depends on the underlying distribution of income. These effects are conveniently summarized by an elasticity as follows:

$$\bar{m} = f(u-o) \qquad f' > 0 \tag{25}$$

$$\eta_{\bar{m}} = (f')(u-o)/f. \text{ 1/}$$

The value of S, which ranges in the bounded interval 0 to 1, with a state of no poverty represented by the lower bound and complete poverty by the upper bound, can now be fully determined on the basis of the preceding hypotheses. The information set needed for a basic analysis comprises the level of the exchange rate, movements in nominal GDP, the size of the population and its rate of growth, the L of the economy, and the amount of government expenditures devoted to the poor, and an estimate of the GI_p. 2/

3. A simulation

Suppose that the economy were initially in equilibrium, growing at, say, 4.5 percent annually (its underlying secular rate of growth), with inflation at 10 percent and the balance of payments (under conditions of a liberalized external sector) in equilibrium. The equilibrium profile is depicted in Column 1 of the Table.

Suppose next the economy is subjected to an external shock--export prices decline by 20 percent. If the economy were to exhibit a pattern of response that has been frequently observed in many countries, there might initially be relatively little policy reaction. Pressures on the budget mount for providing relief in a variety of ways to ameliorate the recessionary effects of the decline in export prices, with the consequence that government expenditures may rise. If so, the balance of payments is likely to become even worse and international reserves will fall. Eventually, declining reserves will force the government to either devalue or, if this is resisted (usually on the grounds that it unnecessarily impoverishes the country), to introduce external controls and taxes on imports. However, the restraint on imports reduces the aggregate supply of goods to the economy, whereas aggregate demand is being stimulated by the growing fiscal deficit. Insofar as the latter is financed by the domestic banking system, domestic credit expands and the rate of inflation takes off.

1/ For purposes of the simulation an elasticity of 0.3 is assumed.
2/ For the simulation this is set at 0.2.

Table. Simulation Results 1/

	Initial Equili-brium t (1)	Shock/ Nonad-justment t+1 (2)	"Additive" Adjustment Approach (Basic Model) t+2 (3a) prediction	(3b) outcome	(3c) add on	"Integrated" Adjustment Approach t+2 (4)
Macro indicators						
Nominal GDP growth (in percent)	15.0	33.7	15.0	2.0	2.0	24.1
Balance of payments (in foreign currency)	--	-3.6	-1.0	-2.7	-2.7	-1.0
Fiscal balance (in percent of GDP)	-3.2	-8.3	-3.1	-3.1	-3.1	-3.8
Sen Poverty Index (S)	0.119	0.075	0.122	0.146	0.118	0.118
(head-count ratio)	(0.30)	(0.23)	(0.30)	(0.33)	(0.30)	(0.29)
Instruments						
Credit expansion	2.6	10.0	4.9	4.9	4.9	7.0
of which: to budget	1.0	7.5	1.0	1.0	1.0	3.0
(Incremental demand for money)	(2.6)	(5.6)	(3.3)	(0.5)	(0.5)	(5.4)
Official external borrowing	2.0	3.0	2.0	2.0	2.0	2.0
Real exchange rate	1.0	0.83	1.20	1.20	1.20	1.25
External liberalization	full	restrictions	full	full	full	partial
Tax ratio (in percent of GDP)	15.0	15.0	17.0	17.0	17.0	17.0
Government expenditure	17.1	30.0	28.8	26.0	26.0	32.9
(in percent of GDP)	(17.1)	(22.4)	(18.7)	(18.9)	(18.9)	(19.8)
Outlay on poor	0.6	0.7	1.0	1.0	5.6	1.1
(in percent of GDP)	(0.6)	(0.5)	(0.7)	(0.7)	(4.1)	(0.7)
Memorandum items:						
Velocity v	5.0	6.0	6.0	6.0	6.0	6.0
Import ratio z	0.2	0.15	0.22	0.22	0.22	0.18
Propensity to consume c	0.9	0.9	0.9	0.9	0.9	0.9
Export price index	1.0	0.8	0.8	0.8	0.8	0.8
Private net foreign transfers and capital inflows	2.0	-2.0	2.0	2.0	2.0	2.0
Nominal GNP	100	133.7	153.8	137.4	137.4	165.9

Source: Staff calculations.

1/ In units except where otherwise noted.

If the fiscal situation is not stabilized, the underlying imbalances become entrenched and the economy will increasingly be characterized by the extensive application of controls, accompanied by a growing shift of private activity to less formal channels. It is also likely that the economy will suffer from an outflow of private capital, ending up with stagnation and endemic inflation. Column 2 of the Table shows some of these outcomes.

The stimulative fiscal policy pursued in the nonadjustment phase is indicated in the Table both by an increase in the government expenditure ratio from 17 percent to over 22 percent and in the increase in the amount of domestic credit expansion to finance the budget from 1 unit to 7.5 (the fiscal deficit jumps from 3.2 percent of GDP to over 8 percent). The effect is to sharply increase the nominal rate of growth in GDP, which jumps to some 34 percent. As the underlying real growth rate was initially assumed to be around its trend path, virtually all of the increase in nominal GDP can be attributed to a surge in the inflation rate. Assuming that the exchange rate is not adjusted generates a substantial real appreciation of the exchange rate. This development, together with the stimulative fiscal policy, causes the balance of payments to deteriorate from an initial state of equilibrium to -3.6. The simulation assumes that the authorities responded in the nonadjustment phase by introducing controls on imports; otherwise, the balance of payments deterioration would have been worse.

Interestingly, for the nonadjustment case, S registers a significant decline, indicating that the stimulative policies pursued have exerted a favorable antipoverty effect. This is not surprising given that the overvaluation of the exchange rate has increased the purchasing power of residents, while the stimulative fiscal and monetary policies, together with the controls on imports, have increased domestic nominal per capita incomes. Such developments will reduce the head-count ratio, and the poverty gap is also likely to decline. Although inflation will probably worsen the situation for the poor, there are less of them. It is no wonder that such policies are more attractive to the poor and to populist governments than those of austerity and adjustment. However, the improvement in S is purely temporary, as the policies underlying it are not sustainable.

Suppose next a traditional, adjustment strategy is implemented involving tighter monetary and fiscal policy, external sector liberalization, and exchange rate correction. Column 3a of the Table indicates the profile that is expected to result if the new fiscal target is set at the level that prevailed before the shock; a real devaluation of 20 percent is undertaken; full external liberalization restored; the tax ratio increased by 2 percentage points to 17 percent; and the amount of domestic credit expansion sharply curtailed to a level consistent with the basic financial programming model's solution, including a short-term target

for the balance of payments of -1. 1/ The expected profile would have resulted if the resources released by the policy package are fully absorbed in higher exports so that domestic production is maintained. Had the basic model's predictions been sustained, the Sen Index shows that the outcome for the poor would involve a significant deterioration, but not as extreme as in the case considered next.

Simulating the effects of the above policies in the more general model shows instead a severely contractionary outcome for the economy (column 3b). This is because initially the contractionary effects of the policies are assumed not to be fully compensated by higher exports, while the beneficial supply-side effects are assumed to take longer. Given limited export growth, the simulation results in nominal GDP growth declining to 2 percent (column 3b) indicating, in the face of underlying inertial inflation, that the real growth rate must be significantly negative. (It is possible that the inflation rate will also have been sharply reduced, but this is not explicitly solved here.) Although the fiscal balance target of -3.2 is attained, the balance of payments only improves a little and its outcome (-2.7) is substantially worse than targeted (-1). Owing to the sharp fall in nominal GDP growth, the incremental demand for money is much lower (0.5) which explains the result.

S deteriorates further to 0.146, indicating that the poverty situation has become more aggravated. The elimination of the exchange rate overvaluation pushes the poverty line out, which is not offset by the very small increase in nominal income. As a consequence, both the head-count ratio and the poverty gap index rise. Up to this point, it has been assumed that poverty-related government outlays have grown moderately. However, if there is concern for the severe consequences for poverty under the scenario depicted by the basic model's outcomes, an additive approach could be pursued: increase poverty-related outlays, assumed to be means-tested and restricted only to those falling below the poverty line, but do not relax the overall fiscal goals and other policies. The simulation shows that in order to attain the S count of the "integrated" alternative presented next, there will need to be a big increase in poor-related outlays to 5.6 units (column 3c). This sharply compresses available outlays for other purposes, given the requirement of meeting the fiscal deficit target. The welfare and resource allocation costs of this redirection of government expenditure is not evaluated but could be substantial.

1/ Because of the limited structure of the basic model, the effects of these policies cannot be adequately simulated using it. Viewed individually or as part of a package, the preceding set of policies appear appropriate. However, to properly establish the dosage and sequencing of such policies requires that account be taken of their impact on welfare-affecting variables such as GDP, which the basic model does not allow to change endogenously.

Column 4 presents the alternative "integrated" approach. On taking account of the trade-offs, less emphasis is placed in the short run on the inflation target and achieving both the ambitious fiscal consolidation target and immediate full external liberalization of the additive approach. Instead, the emphasis is on meeting the balance of payments target, and on ensuring that the initial equilibrium S count is attained. (Even so, the fiscal deficit is substantially reduced to 3.8 percent of GDP from the nonadjustment level of 8.3 percent of GDP and is not much bigger than the target level of 3.2 percent of GDP.) The policy instrument settings involve a more moderate reduction in the amount of credit expansion; but a bigger devaluation; less complete liberalization of the external sector, which is assumed to be phased over a longer time horizon; an increase in the tax ratio to 0.17, as in the additive case, but with more emphasis on underlying trade-related taxes (reflected in the simulation by a smaller rise in the import ratio); and outlays for the poor hat are in line with assumed historical averages.

The results shown in Column 4 are instructive. The nominal GDP growth rate is higher than in the additive case, but less than in the nonadjustment shock case, indicating that inflation is probably being brought down, but not as quickly as in the additive approach. However, unlike with the latter, the balance of payments target is met, while the decline in real output growth will have been restrained. Despite the bigger devaluation, the more favorable per capita income developments have led to smaller deteriorations in the head-count ratio and in the poverty gap measure. 1/ Other trade-offs are possible and could be explored.

Finally, note that the more favorable per capita income development of the integrated approach, necessitating a far less direct outlay on the poor (0.7 percent of GDP) compared to the additive approach (4.1 percent of GDP), implies that the sometimes overwhelming problems of identifying and targeting the poor as well as setting up the administration and subsequent implementation of poverty programs are less of a constraint than in the additive approach. This is because there would be simply less poor individuals as a result of the externally delivered shock in the integrated approach than in the additive approach. This is not to downplay the importance of the poverty alleviation programs for the vulnerable, whatever their needed scope or size. Once the amount to be allotted to the poor is determined, we have to know who the poor are and why they are poor to understand impacts on poverty. One variant to the answer, that the poor are

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1/ The strategy underlying the simulation of the integrated case is to ensure that while observing the balance of payments constraint, the poverty index is kept within acceptable bounds. This is done by manipulating policy instruments in such a way that some progress is also made in reducing nominal output and, by implication, inflation; liberalizing the external sector; and achieving the fiscal consolidation target. Traditional targets with regard to the latter are thus phased over a somewhat longer period of time.

unable to command resources, may be helpful. It points to the old, widows, single mothers, and their children, the assetless and so on as well as those who are on very low wages or are unemployed. For the first group the price level is of special importance but so are transfer payments. For the second group wages and unemployment compensation are important. Setting up programs that would enable better command over resources is, therefore, critical. The point made in the paper is not to belabor their lack of importance but that, given the illustrated integrated approach that is better able to address poverty within the constraints of the financial programming model itself, the need for direct programs, concomitant with various feasibility issues associated with them, would be lessened.

V. Concluding Remarks

The paper set out to reformulate the financial programming model so as to have the alleviation of poverty as an explicit and central objective of policy. The framework was set up to make relatively limited additional data demands. These are mainly the poverty line (o), the size of the population below the poverty line (n), the mean income of the poor ($\bar{m}$), government outlays to the poor (G_{po}), and an estimate of the Gini coefficient of the poor (GI_p). Knowing how the last responds to macroeconomic developments would make the analysis more sophisticated but is not altogether essential.

Integrating these poverty-related concepts in the form of a poverty index as an explicit constraint into a suitably structured financial programming model enables the systematic exploration of alternative policy options. This facilitates choosing that combination of policies that would promote adjustment to desired stabilization and poverty objectives.

Interestingly, the simulation that was carried out, tracing the impact of an external shock on a stylized financial programming model, indicates that the integrated approach that incorporates the poverty constraint can also better achieve the balance of payments target than can the traditional approach, although at the cost, temporarily, of a higher fiscal deficit and more inflation.

However, despite the higher inflation than in the additive case, note that the poverty index is lower reflecting an underlying better output performance. Nevertheless, compared to the shock case, the poverty index does rise whether in the additive, or the integrated, approach. To overcome this adverse shorter-term result, there is no alternative but to ensure a satisfactory achievement of suitable growth and export promotion objectives in the medium term which alone could probably result in a decline in the poverty index to its earlier levels and beyond.

Summary of Symbols

M	-	money stock	e	-	real exchange rate (ratio of E to P)
D	-	credit stock	y	-	real growth rate or $\Delta Y/Y_{-1}$
F	-	net foreign asset position	p	-	inflation rate or $\Delta P/P_{-1}$
P	-	domestic price level	GI	-	Gini coefficient
P_f	-	price of imports in foreign currency	GI_p	-	Gini coefficient for the poor
P_x	-	price of exports in domestic currency	G_{po}	-	Government transfers to the poor
Y	-	real gross domestic product	L	-	Lorenz curve
v	-	income velocity of circulation of money	PC_p	-	nominal private consumption
u	-	average income	PI_p	-	gross private nominal investment or capital formation
E	-	domestic currency price of a unit of foreign exchange	c	-	average propensity to consume
X	-	real exports	T	-	nominal tax revenue
Z	-	real imports	PG	-	nominal government expenditure
Tr	-	net foreign transfers from abroad	t	-	ratio of taxes net of subsidies to nominal GDP
			ΔD_g	-	credit extension to government
ΔK	-	net foreign capital inflow	D_p	-	credit extension to private sector
A	-	real domestic absorption	S	-	Sen Poverty Index

b - share of imports in real absorption

z - share of domestic currency value of imports to nominal absorption

$\bar{m}$ - average income of poor

h - head-count ratio

k - poverty gap

Δ - first difference

* - target value

\- - solution value

η - elasticity

Superscript s, d - supply and demand, respectively

Subscript f, d - foreign and disposable, respectively

o - local currency denominated poverty line

n - size of population below poverty line

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