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EXTERNAL-DEBT SUSTAINABILITY AND DEBT-REDUCTION OPERATIONS

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EXTERNAL-DEBT SUSTAINABILITY AND DEBT-REDUCTION OPERATIONS

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Abstract. The simple premise of the Highly Indebted Poorest Countries (HIPC) Initiative is that reducing poorer economies' public debt-service burden would make financial resources available for growth-promoting and poverty-reducing expenditure. Paradoxically, though, debt-reduction exercises may prove less favorable to growth prospects than one might at first suppose. The key point is that debt-reduction exercises not only reduce debt stocks, but also limit the new debt governments can take on following debt reduction, to prevent the debt problem from reviving. Since maintaining a reduced debt-GDP or debt-exports ratio may imply a reduced import flow, it could make the economy grow more slowly than it otherwise might. Since maintaining a reduced debt-GDP (or -exports) ratio would imply a reduced primary deficit, it may require the government to keep expenditure lower or revenue higher, which could be unfavorable to development and poverty reduction. It is useful to distinguish, on the one hand, *an economy's* ability to sustain a given debt ratio, given its own characteristics and its growth and development objectives, and, on the other hand, *external creditors'* willingness and ability to lend enough to enable the economy to sustain that ratio. This paper describes an analytical "framework" for addressing the question of whether economies can sustain "safe" debt ratios. Because debt-sustainability analysis must address the full set of national-, external-, *and* fiscal-accounts constraints, the framework comprises a simplified, but full, set of macroeconomic accounts. These can be used to gauge the degree of balance-of-payments and fiscal tightening likely to prove necessary to stabilize reduced debt-GDP or debt-exports ratios.

The Excel workbook AtMS.xls is available on request from the writer.

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1. Introduction

1. When an economy is granted a reduction in its external-debt stock, it is likely to have to accept a *lower* real-GDP growth rate in order to maintain the reduced debt-GDP (or debt-exports) ratio. This is because the reduced debt-GDP ratio implies that the net external-debt inflow, and most likely the net transfer (defined as the net inflow less interest due), will be smaller than they would have been. Unless alternative financing flows (such as grants) are made available, the economy would then have to accept a lower capital-formation rate, and so a lower real-GDP growth rate.

2. Similarly, when a government is granted a reduction in its external-debt stock, it may need to maintain a lower primary (non-interest) deficit in order to maintain the reduced ratio of government debt to GDP (or exports). Again, this is because the government will receive a smaller net financing flow, and most likely a smaller net external-debt transfer, than it otherwise would have. If the government's primary deficit must be lower, then, of course, it will have to maintain some combination of higher revenue and lower expenditure – again, unless alternative financing flows (such as grants) are made available.

3. Stated this way, these points seem plausible enough. If they are correct, however, they would seem to pose a paradox for debt-reduction operations. The objectives of such debt-reduction programs as the Highly Indebted Poorest Countries (HIPC) Initiative and the more recent Multilateral Debt Reduction Initiative (MDRI) have been to foster *higher* real growth and to enable governments to *increase* expenditure. Their premise was that reducing a country's public external debt-service obligations would free financial resources that could be applied to promoting development and reducing poverty. The multilateral and bilateral institutions that carried out the HIPC and the MDRI clearly intended that debt reduction would work in this way. Indeed, they went to considerable lengths to hold economies benefiting from debt reduction to conditionality intended to ensure that the debt-service reduction would be redirected to current and capital expenditure to promote development and reduce poverty.

4. Fortunately, the paradox is easy enough to explain. Debt forgiveness does, of course, reduce debt service. But if the debt-GDP ratio must now be held lower, new financing flows will most likely be lower by comparison with what they would have been if the debt-GDP ratio had been allowed to remain higher. That is, debt-reduction operations do two distinct things: they (i) reduce the stock of existing debt and debt service, which increases resource availability to the macroeconomy broadly and to the government specifically; but also (ii) tend to reduce new debt inflows, which reduces resource availability. It is unclear which effect will dominate without taking account of the specific circumstances.

5. This paper applies a general macroeconomic programming framework (set out in Beckerman 2009), to determine whether a debt-reduction operation in a particular economy would increase or reduce the maximum real-GDP growth rate and primary deficit that the economy could *sustain*. The framework is a simplified version – a "reduction," so to speak -- of more elaborate "models," such as the World Bank's Revised Minimum Standard Model and the IMF's standard accounting framework. This is a somewhat different approach to sustainability from what the HIPC-MDRI programs have now made standard. The basic purpose of this paper is to characterize this alternative approach, and to suggest that in some applications it may be as useful as the now-standard approach. The idea is to have sustainability criteria that take more direct account of whether debt reduction is likely to improve an economy's growth prospects and its government's ability to maintain developmental and poverty-reducing expenditure.

6. In the HIPC-MDRI conceptual framework, debt "sustainability" has been defined in terms of *benchmark* debt-export and debt service-export ratios. Since the first HIPC operations in the second half of the 1990s, ratios of public external debt stocks -- defined as the net present values of future debt service -- to exports of goods and non-factor services have been deemed "sustainable" if and only if they could be held within, if not below, the range of 150-200 per cent. Debt service-export ratios have been deemed sustainable if and only if they could be held within or below the range of 20-30 per cent. These criteria were presumably grounded in experience, since they had no obvious theoretical underpinning.[1]

[1] A case can be made that the HIPC objectives ought to have been set from the outset as ratios to GDP – it may help to think of them as ratios of per-capita debt to per-capita GDP -- rather than exports. Ratios to GDP would have been more relevant indicators of the economy's debt *burden* than ratios to exports, especially if

7. In principle, though, depending on their projected macroeconomic performance, some economies might be capable of sustaining higher ratios. Economies holding to lower ratios than they are capable of sustaining, consequently, might be maintaining lower real-GDP growth rates than they could. They may also be maintaining smaller primary deficits than necessary, and so taxing more heavily than necessary or spending less than they could. (Of course, it is possible that some economies may be maintaining higher ratios than they could, and may therefore still be in danger of slipping into payments crises.)

8. The paper is organized as follows. Section 2 discusses the alternative "debt-sustainability" concept. Section 3 sets out a simplified algebraic version of the kind of macroeconomic "framework" conventionally used in debt-sustainability analyses (DSAs), with integrated external-, national-, and fiscal-accounts projections. Section 4 applies this exercise in an illustrative quantitative projection exercise for a hypothetical economy, to show quantitatively by how much a reduction in the external debt-GDP ratio may intensify the fiscal pressure and force a reduction in the real-GDP growth rate. In this exercise, the framework is used to formulate a projection for a given set of initial circumstances and a set of projection assumptions; a second projection is carried out for the same circumstances and assumptions, except that the government external debt-GDP ratio is reduced through a reduction operation, so that the government's final internal debt-GDP must increase compared to its original value; and then a *reduction* in the assumed government-expenditure flow is calculated that would bring the final internal debt-GDP ratio down to its value in the first projection exercise. The reduction in the assumed government-expenditure flow may be taken as an indicator of the fiscal tightening that debt reduction would require *for the particular economy*. The concluding Section 5 draws some conclusions and recommendations for policy.

2. "Debt sustainability"

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the objective was to enable the government to maintain adequate developmental expenditure. In any case, apart from differing policy approaches regarding export incentives, differing circumstances of geography and economic structure imply differences in economies' export-GDP ratios: small, open economies tend to have higher export flows than larger economies.

1. In the HIPC-MDRI conceptual framework, as noted, a country's external-debt stock is deemed "sustainable" if the debt stock (calculated as the present discounted value of the future debt service) and service flows are, and are likely to remain, within bench-mark limits relative to exports. Consider the following alternative definition: a developing economy's public external debt may be considered "sustainable" if, under realistic "state-of-the-world" assumptions, the economy, and in particular the government, could maintain the projected *debt-service* payments while (i) real GDP and living standards grew at minimum acceptable rates or better and (ii) the government maintained or exceeded minimum expenditure on basic services and developmental objectives. That is, the debt should be considered sustainable if and only if the government could service it while also maintaining adequate expenditure on basic services, economic development, and poverty reduction, and while real GDP and living standards grew sufficiently.

2. Several points may be noted about this alternative definition. First, it focuses on the *debt-service flows*, not the *debt stock*. Debt service, after all, is the burden of any debt for a borrower. Rather than convert the future debt-service flows into a current stock through a net-present-value calculation, it focuses on the *evolution* of the future flows, and asks whether – and, if so, when -- they will eventually become higher than the government could reasonably be expected to pay.[2]

3. Second, this way of characterizing debt sustainability not only *requires* a realistic projection of all relevant state-of-the-world variables, *it is defined for* a particular state-of-the-world projection. As a moment's thought should make clear, the sustainability of any given debt stock or service flow can only be meaningful *given* the borrower's prospective income and expenditure commitments. The basic HIPC-MDRI sustainability concepts take account of the country's export flow, but of no other aspect of the country context. To be relevant, any debt-sustainability definition must take account of the full range of the borrower's likely future earnings and expenditure commitments, and so of the "state-of-the-world" variables that determine those

[2] Conversion of a debt-service burden into a stock value through the net-present-value calculation substitutes a single number for a series of figures, and analysts have found this useful in many contexts. It may be less practically useful in the debt-reduction context, however, precisely because it is useful to compare the time profile of a country's debt-servicing burden with the time profile of the determinants of the ability to meet that burden – i.e., the growth rates of exports, GDP, and private consumption.

earnings and commitments. In contrast with the HIPC-MDRI concept, the characterization of debt sustainability proposed here makes a point of doing this.

4. It may be, of course, that the projected debt-service flow would be sustainable for one future state of the world but not for another that is different but nonetheless plausible. In this case, one could judge the debt stock sustainable in what might be called the "base" scenario for the future state of the world, but *vulnerable* – i.e., sensitive -- to reasonably likely changes in the state-of-the-world assumptions. The key point remains, though, that the sustainability of a given debt stock can only be meaningful in terms of a specified set of relevant assumptions regarding the future.

5. A third, perhaps more controversial, point may be added. One important shortcoming of the HIPC-MDRI approach is that it takes account of future debt service arising from *existing* debt, but not from debt the country might take on in the future. It does not distinguish, in effect, between governments with large and small *prospective* external-borrowing needs. A government running a substantial fiscal deficit, or a country with a substantial current-account deficit, would have to borrow in the future. For a sustainability analysis, the debt service on that new borrowing should be included in the net-present-value calculation. Either that, or the sustainability analysis should focus on the future year-by-year flow projections, determining whether the country and the government would be able to meet the debt-service obligations while meeting their other commitments in each projection year.

6. Finally, however, there is an important fourth point. This way of characterizing debt sustainability focuses exclusively *on the country itself*, on whether the country could maintain government expenditure and grow while keeping up the debt service. As noted, a country may be able to maintain adequate government expenditure and growth while, or indeed *only while*, maintaining a relatively high debt stock relative to exports or to GDP. To say whether a country's debt stock is sustainable, however, it may be necessary to take account not only of the country's future, but of the views and circumstances of the country's creditors. All other things being equal, the higher the debt-export or debt-GDP ratio that the country aims to maintain, the less likely it will be that the country's creditors will be willing to provide sufficient new lending to maintain that ratio. One might suppose that if a country's debt-export or debt-GDP ratio is sustainable

according to the definition proposed here, then creditors would always be inclined to provide enough new lending to maintain it. The basic problem, of course, is risk: all other things being equal, the larger their exposure, the less likely creditors are to accept it.

7. This last point notwithstanding, it is nevertheless useful to carry out what may be characterized as a "country-focused" debt-sustainability analysis. In keeping with the definition of "sustainability" proposed here, the exercise would determine whether the projected external debt-service flows would be feasible for the country *given* its fiscal and external context of earnings and expenditure commitments, *without* taking account of whether external creditors would be likely to find it comfortable to maintain the projected lending flows. If the debt would be feasible at this level – that is, if the projection indicates that this sustainability criterion would be satisfied for realistic future states of the world -- then the next step would be to complete the sustainability analysis by determining whether foreign creditors would be likely to provide the new lending the projection assumes.

8. A practical "country-focused" sustainability exercise could be structured, in broad terms, as follows. The first step would be to set out multiannual assumptions for exogenous conditions, such as key export and import prices, world interest rates, the population growth rate, natural-resource production flows, and other determinants of the economy's basic "performance." These exogenous conditions would also include assumptions for the economy's relevant behavioral parameters, such as the determinants of import demand or of money demand. The next step would be to set out "programming" assumptions for real-GDP growth and for the growth rates of living standards – minimal (or perhaps "aspirational") targets to express the development and poverty-reduction objectives policy-makers aim to achieve in coming years. The next step would be to set out assumptions for the government's expenditure flows -- what would be required to achieve the government's economic-development and poverty-reduction strategy. The final structuring step would be to set out the external-debt program whose sustainability is to be examined, including the program of debt service on existing debt, new disbursements, and debt service arising from those disbursements.

9. The sustainability analysis would then consist of calculating (1) national-expenditure, (2) external-, (3) fiscal, and (4) monetary-accounts projections based on these assumptions. Each of these "sectors" is governed by an accounting identity – the national-expenditure accounts identity for the national accounts, the balance-of-payments identity for the external accounts, the government-budget identity for the fiscal accounts, and the banking-system balance-sheet identity for the monetary accounts. In each sector, all but one of the accounts would be projected for each year on the basis of the assumptions, leaving one account to be determined residually through the identity. For the national accounts, the residual account could be private consumption; for the external accounts, the residual account could be non-government external borrowing; for the fiscal accounts, the residual account could be government internal borrowing; and for the monetary accounts, the residual account could be net open-market sales from the central bank's holdings of government obligations.

10. The basic idea is that each year's residual account in each accounts system would indicate the feasibility of the projection – that is, of the external-debt program -- for that year. To the extent the national-accounts projections indicated small residual per-capita private-consumption flows, the external-accounts projections indicated large residual non-government external borrowing, or the fiscal-accounts projections indicated large residual internal borrowing, the external-debt program would be deemed unsustainable.

11. (To be sure, just about any account could serve as the residual account for any sector. For example, in the fiscal accounts, it would be perfectly reasonable to project net internal government borrowing, have total tax receipts be the residual account, and then examine the year-by-year residual tax-receipts results to see whether they would have to be unfeasibly large. Unidentified or unprogrammed financing accounts seem to be the natural and practical choices for the residual accounts, however, because the basic aim is to show the financing implications of policy choices.)

12. That is, the approach recommended here would gauge the debt program's sustainability by determining whether *non-public* external debt would have to become unfeasibly large in closing the balance-of-payments projections, and/or whether government *internal* debt would have to

become unfeasibly large in closing the fiscal-accounts projections. If so in either case, the *external-debt program* would have to be judged unsustainable.

13. The government-expenditure flows would be calculated on the basis of the country's development and poverty-reduction objectives. A "usual-suspects" list of development indicators for which policy planners could program minimum acceptable rates of improvement would include (a) per-capita real-GDP growth; (b) per-capita real non-government consumption growth ("average" living standards); (c) poverty and extreme-poverty incidence (i.e., the distribution of living standards); (d) productive employment of the working-age population; (e) primary- and secondary-school attendance; (f) child and maternal mortality; (g) infectious-disease control (especially AIDS, tuberculosis, and malaria); (h) environmental standards consistent with good health and living conditions; and (i) maintenance of a sustainable, renewable natural-resource base. Some of these development indicators figure in the United Nations Millennium Development Goals, and those not explicitly included may be considered to be included implicitly.

14. Unfortunately, the techniques for deriving the government expenditure flows required to bring about these objectives remain rough and imprecise, and, in any case, are they are beyond the present paper's scope. (Note, however, that one of the key objectives of a poverty-strategy paper is to describe how specified government-expenditure flows and general economic growth would serve to attain the development indicators in the list above.) For present purposes, the essential point is simply that a "country-focused" debt-sustainability analysis would require programming assumptions for minimum required government-expenditure flows for the projection period, and logically, these ought to derive from the nation's development objectives. The overall persuasiveness of the debt-sustainability analysis will depend, *inter alia*, on the persuasiveness of the techniques for determining the government expenditure flows consistent with attaining the development objectives.

15. To summarize, it is useful to analyze an economy's external-debt sustainability from the country's point of view, by addressing the question of whether the economy and its government will be able to sustain a given debt-service flow while growing adequately and carrying out the government expenditure necessary to meet development objectives. The recommended practical approach would be to formulate assumptions for exogenous, "state-of-the-world" variables and

behavioral parameters; program minimum real-GDP growth rates; set out minimum future government-expenditure flows, particularly for development-related expenditure; and set out a program for the country's public external debt. These would then be applied in a multiannual projection exercise to determine whether the government's internal debt and/or the non-government external debt and debt service would have to grow unfeasibly large in order to make these possible. If so, the government-expenditure program, the real growth rate, and the external-debt program taken together would be considered unsustainable. It is important to remember, however, that even if this exercise indicates that the external-debt program is sustainable, it would still be necessary to consider whether foreign creditors are likely to be willing to lend as assumed.

3. A "country-focused" sustainability exercise[3]

1. A full external debt-sustainability analysis must consider sustainability in the national, external *and* the fiscal accounts. Equations [(1) – (20)] below constitute a summary, "generic" version of the kind of macroeconomic projection exercise that can address external-debt sustainability in these terms.[4] The exercise is intended to be a simplified version of such well-known macroeconomic consistency exercises as the World Bank's Revised Minimum Standard Model (RMSM-X). (Beckerman 2010 describes a more detailed exercise that can be, and has been, used in practical, if "back-of-the-envelope" country applications.) Here it is used to show in broad terms how an indicator could be developed of the general macroeconomic consequences of a debt-reduction exercise, in particular, its sustainability characteristics. A similar exercise could be done for any actual economy using a macroeconomic projection "model" specifically set up for that economy.

2. The exercise carries out a projection of macroeconomic performance based on base-year data and programming assumptions for a particular economy. In broad terms, the methodology

[3] The consistency exercise presented here is drawn from Beckerman 2010.

[4] Although this is a simple exercise, intended mainly for illustrative and teaching purposes, it can be applied to address issues of longer-term policy in specific economies.

consists of programming future real growth rates for (a) GDP, (b) exports of goods and non-factor services, (c) government expenditure, (d) external government debt, and (e) population, and then using additional assumptions and accounting identities to calculate implied real growth rates of (i) per-capita non-government consumption, (ii) non-government external debt and (iii) government internal debt. These results may then be evaluated for feasibility. Inadequate (or even negative) growth of per-capita non-government consumption and/or very rapid growth of non-government external debt and government internal debt would imply that the programmed government expenditure and growth rates of GDP, government expenditure, and government external debt would not, taken together, be feasible.

3. For present purposes, the exercise is applied as follows. An initial projection exercise is carried out for a period of several years, with the growth rate of government external debt programmed to be precisely equal to the growth rate of GDP. A second exercise is then carried out with the single change of reducing the initial debt stock, as in a HIPC or MDRI operation. Because this would then imply a reduced flow increase in government external-debt, one consequence would be that the required flow of government internal debt must be higher compared with the first exercise. A third exercise is then carried out, in which the growth rate of government consumption expenditure is reduced by precisely the amount required to reduce the ratio of the final government internal debt stock to GDP to the same value it reached in the concluding year of the initial projection exercise. The required reduction in the growth rate of government consumption expenditure (or in the average per-capita flow of real government consumption expenditure) would then be an indicator of the fiscal constraint required by the debt-reduction operation.

4. In this simplified version of a debt-sustainability exercise, the macroeconomic aggregates – i.e., GDP and the various components of expenditure – are all in real terms. (If applied in an actual projection exercise, it is generally useful to express them in constant dollars, i.e., dollar values at a base year's prices and exchange rate.) This version of the exercise accordingly abstracts from such important variables as the price level, the exchange rate, and the terms of trade. It does, however, take account of (a) the GDP-capital formation relationship, (b) the national accounts, (c) the general-government accounts, (d) the external accounts, and (e) the monetary accounts.

5. Define the following variables:

Y real GDP;

I total real capital formation (including government capital formation);

K’ year-end real capital stock;

T real government revenue;

Z real external transfers to government;

G real government consumption expenditure;

J real government capital formation;

H real government internal transfers and subsidies;

X real exports of goods and non-factor services;

Q real imports of goods and non-factor services;

F net real current-account inflows excluding net exports, real external transfers to government and net interest due;

W net real non-debt capital inflows;

E’ real year-end stock of government external debt;

L’ real year-end stock of central-bank external liabilities;

A’ real year-end stock of central-bank external assets;

U’ real year-end stock of non-government external debt;

D’ real year-end stock of government internal debt;

M’ real year-end money stock;

B’ real year-end monetary base;

V’ real year-end central-bank net internal assets;

S real non-government saving, and

P real government primary surplus.

The primes following the variables E’, L’, A’, U’, and D’ indicate that they are year-end stock values. The variables E, L, A, U, and D (that is, without the prime) are the year-average values corresponding to the year-end values:

$$E = (E'_{-1} + E')/2 = E'_{-1} + (\Delta E'/2), \text{ where } \Delta E' = E' - E'_{-1};$$

likewise for the year-average values L, A, U and D.

6. The following variables are projection assumptions:

v incremental capital-output ratio, net of capital depreciation;

v’ capital-output ratio;

d depreciation rate of the capital stock;

r_U interest rate on non-government external debt;

r_D interest rate on government internal debt;

r_E interest rate on government external debt;

r_L interest rate on central-bank external liabilities;

r_A interest rate on central-bank external assets;

m marginal money multiplier;

t elasticity of T with respect to Y;

q elasticity of Q with respect to Y;

f ratio of F to Y; and

w ratio of W to Y.

In general, the growth rate of any variable "x" is given by $(x/x_{-1}) - 1$. The values of the following variables are programming assumptions:

$a = A'/(Q/12)$,

$g_Y = (Y/Y_{-1}) - 1$;

$g_Z = (Z/Z_{-1}) - 1$;

$g_G = (G/G_{-1}) - 1$;

$g_H = (H/H_{-1}) - 1$;

$g_J = (J/J_{-1}) - 1$;

$g_L = (L'/L'_{-1}) - 1$;

$g_E = (E'/E'_{-1}) - 1$; and

$g_N = (N'/N_{-1}) - 1$.

7. The real flows of interest due on government internal and external debt and on non-government external debt are taken to be based on the average debt stock over the year. Thus, interest due on the government's external debt is given by

$$r_E\, E = r_E\, (E'_{-1} + E')/2 = r_E\, E'_{-1} + r_E\, \Delta E'/2, \text{ where } \Delta E' = E'_{-1}\, g_E.$$

8. The first equation of the projection system gives ***gross fixed capital formation*** in year t as a function of (i) the programmed growth rate "g_Y" in the following year, (ii) the incremental capital-output ratio for capital formation carried out in year t, and (iii) the capital-depreciation rate d,

(1) $I = Y\, v\, [g_{Y(+1)} + d].$

This is because GDP growth in year t+1 is given by

$$\Delta Y_{+1}/Y = (I/Y)/v - d\,(K'_{-1}/Y)/v'$$

$$= [(I/Y)/v + d],$$

(since by definition $[K'_{-1}/Y] = v'$).

9. Next, ***government revenue*** (excluding external transfers) is given by

(2) $T = T_{-1}\, [(1 + g_Y)^t],$

where "t" is a policy-programming assumption. External transfers to government are given by

(3) $Z = Z_{-1}\, [1 + g_Z].$

The non-interest government-expenditure flows are based on the assumptions for "g_G", "g_J" and "g_H." These are ***government consumption expenditure***,

(4) $G = G_{-1}\,[1 + g_G]$;

government expenditure on ***gross fixed capital formation***,

(5) $J = J_{-1}\,[1 + g_J]$;

and ***government internal transfers and subsidies***,

(6) $H = H_{-1}\,[1 + g_H]$.

10. Exports and imports of goods and non-factor services follow from the assumptions for g_X and q. ***Exports of goods and non-factor services*** are given by

(7) $X = X_{-1}\,[1 + g_X]$

(as explained below, the growth rate of exports *should not* be linked positively to real-GDP growth), and ***imports of goods and non-factor services*** by

(8) $Q = Q_{-1}\,[(1 + g_Y)^q]$.

11. ***Non-government consumption*** is then determined residually using the national-accounts expenditure identity so as to be consistent with the projections of G, I, X and Q,

(9) $C = Y - [(G + J) + (I - J) + (X - Q)]$

$$= Y - (G + I + X - Q).$$

One basic purpose of the exercise is to determine whether the growth rates g_Y, g_X, g_G, g_J, and g_H taken together constitute a feasible macroeconomic "program," given the other assumptions and initial conditions of the economy.

12. In the balance of payments, ***"other" current-account flows*** – that is, current-account flows other than net exports of goods and non-factor services, net interest, and external transfers to government, encompassing non-interest factor-service net exports and all other net unrequited transfers -- are given by

(10) $F = f\,Y.$

Non-debt capital account flows (including net investment, short-term non-debt financial flows, and errors and omissions) are given by

(11) $W = w\,Y.$

13. One of the basic "strategic" approaches this exercise takes is *to program* – that is, to assume -- the growth rates of the government external debt (and the central bank's external liabilities). It is then possible to calculate *both* the net increase in non-government net external liabilities, U', that would be required to complete the financing of the external accounts, *and* the net increase in the government's net internal liabilities, D', that would be required to complete the financing of the fiscal accounts. If the growth rates of either U' or D' would need to be significantly larger than the respective sources of finance would be likely to be willing and able to provide – in particular, if they significantly exceed the growth rate of real GDP – then the programmed macroeconomic policy and government expenditure would presumably be unfeasible, and would need to be adjusted.

14. That is, applying the programmed values g_E and g_L, the ***flow increases*** in the ***government's external debt*** and the ***central bank's external debt*** are given by

(12) $\Delta E' = g_E E'_{-1}$ and

(13) $\Delta L' = g_L L'_{-1}$.

Using the programmed value "a" (in months of imports of goods and non-factor services) the ***flow increase in the central bank's external asset stock*** (basically, gross international reserves) is given by

(14) $\Delta A' = [a (Q/12)] - A'_{-1}$.

Applying the assumptions for the interest rates on government and non-government external debt to the year-average debt stocks, and the assumptions for the interest rates on central-bank

external assets to the year-average asset stock, the ***flow increase in non-government external debt*** is given by

$$\textbf{(15)} \quad \Delta U' = r_U U + r_E E + r_L L - r_A A - (X - Q + Z + F + W) - \Delta E' - \Delta L' + \Delta A'.$$

This equation is simply a rearrangement of the balance-of-payments identity. That is, the sum of the current and capital accounts is,

$$[(X - Q) + r_A A - (r_U U + r_E E) + Z + F] + [\Delta E' + \Delta U' + W],$$

and the central-bank financing of the balance-of-payments *deficit* is given by

$$\Delta L' - \Delta A'.$$

Equation (15) may be solved for $\Delta U'$, making use of

$$U = U'_{-1} + (\Delta U'/2):$$

$$\Delta U' = [(r_U U'_{-1}) + (r_E E) + (r_L L) - (r_A A) - (X - Q + F + W) - \Delta E' - \Delta L' + \Delta A']/[1 - (r_U/2)].$$

The government's primary surplus is then given by

(16) $P = T + Z - (G + H + J)$.

Applying the assumptions for the interest rates on government external and internal debt to their year-average stocks, the ***flow increase in government internal debt*** is given by

(17) $\Delta D' = r_D D + r_E E - P - \Delta E'$.

Equation (17) can be solved for $\Delta D'$, making use of

$$D = D'_{-1} + (\Delta D'/2):$$

$$\Delta D' = [(r_D D'_{-1}) + (r_E E) - P - \Delta E']/[1 - (r_D/2)].$$

15. Two equations describe the monetary aggregates. Assume that the economy's average money holding over each year, M, is given (as a percentage of GDP). Since

$$M = M'_{-1} + (\Delta M'/2),$$

the ***flow increase in the money supply*** is given by

$$\Delta M' = 2 (M - M'_{-1}).$$

The ***flow increase in the monetary base*** is then given by

(18) $\Delta B' = \Delta M'/m$,

and the ***flow increase in the central bank's net internal assets*** is given by

(19) $\Delta V' = \Delta B' + (\Delta L' - \Delta A')$.

That is, $\Delta V'$ is whatever amount is required to ensure that the monetary authority's flow balance identity is satisfied, with the increase in assets $\Delta V'$ and $\Delta A'$ backing the increase in liabilities $\Delta L'$ and $\Delta B'$.

16. The system's final equation gives the ***year-average population***,

(20) $N = N_{-1}\,[1 + g_N]$.

This value is used to calculate projected per-capita values.

17. In summary, for each projection year t, the analyst would program the government expenditure assumptions, "g_G," "g_J," "g_H,", as well as "g_Y" and "g_E," and the growth rates of real GDP and (real) government external debt. The equations listed can then be used to solve for the growth rate of per-capita non-government consumption,

$$g_{C/N} = [(C/C_{-1})/(1 + g_N)] - 1;$$

the year-end non-government external-debt stock as a percentage of GDP,

$$U'/Y = (U'_{-1} + \Delta U')/Y; \text{ and}$$

the year-end government internal-debt stock as a percentage of GDP,

$$D'/Y = (D'_{-1} + \Delta D')/Y.$$

These projected values would then be examined to determine whether they are sufficiently high, in the case of per-capita non-government consumption, or sufficiently low, in the cases of the debt ratios, to ensure the program's feasibility.

4. An illustrative quantitative exercise

1. The projection equations (1) – (20) can be used to demonstrate the kinds of constraint a debt-reduction operation could effectively impose on an economy. By way of illustration, this section describes an exercise for a hypothetical economy, called "Atlántica." Table 1 below shows the main characteristics of the economy in its base year:

Table 1. "Atlantica": Characteristics of the macroeconomy in the base year (2005)

	Year: 2005
GDP (US$ million)	**$10,000.0**
Population (millions)	**10.0**
Per cent of GDP:	
Gross domestic product (GDP)	**100.0%**
Non-government consumption expenditure	75.5%
Government consumption expenditure	11.0%
Total gross fixed capital formation	21.0%
Non-government gross fixed capital formation	16.0%
Government gross fixed capital formation	5.0%
Exports of goods and non-factor services	13.5%
Imports of goods and non-factor services	21.0%
Year-end capital stock	**400.0%**
Government accounts:	
Government revenue excl. external transfers	14.5%
External transfers to government	5.0%
Government consumption expenditure	11.0%
Government gross fixed capital formation	5.0%
Government domestic transfers and subsidies	5.0%
External accounts:	
External transfers to government	5.0%
Net current-account inflows excluding net exports, transfers to govt., net interest due	-18.0%
Net non-debt capital inflows	1.0%
External and government assets and liabilities:	
Central-bank external assets	8.8%
Government external debt	60.0%
Central-bank external liabilities	0.0%
Non-government external debt	1.0%
Net government domestic debt	5.0%
Monetary accounts:	
Broad money supply	30.7%
Monetary base	10.2%

Source: Excel workbook [AtMS.xls].

These are stylized values intended to characterize a more or less typical non-oil developing economy. Different figures would generate different outcomes, of course. Since the present purpose is only to show some possible, plausible outcomes of a debt-reduction exercise, these figures should suffice to make the point.

2. Table 2 gives the projection assumptions for the basic projection exercise, and Table 3 gives the projection results. In effect, this projection constitutes a debt-sustainability exercise, which tests whether this economy could sustain a debt-GDP ratio of #60 per cent. Since, with the programming assumptions indicated, per-capita real consumption would grow at the more or less satisfactory annual rate of #3.4 per cent, the residual non-government external debt would rise slowly but remain within #8 per cent of GDP, and the residual government internal debt would rise

slowly but remain within #9 per cent of GDP, the ratio of government external debt to GDP would be, from this perspective, “sustainable.”

Table 2. "Atlantica": Projection assumptions, 2006-2020

		Year:	2006	*Average:* 2006-2020	2020
Assumptions for parameters, exogenous variables:					
	Real growth rates:				
(1)	Exports of goods and non-factor services	g(X)	5.0%	5.0%	5.0%
(2)	Population (millions)	g(N)	2.0%	2.0%	2.0%
	Incremental capital-output ratio (ICOR)	**[I/Y]/g(y)**	**3.2**	**3.2**	**3.2**
(3)	ICOR net of depreciation	v	1.8	1.8	1.8
(4)	**Depreciation rate of the capital stock**	**d**	**4.0%**	**4.0%**	**4.0%**
	Per cent of GDP:				
(5)	Net current-account inflows excluding net exports, transfers to govt., net interest due	f	0.2%	0.2%	0.2%
(6)	Net non-debt capital inflows	w			
	Elasticities with respect to real GDP:				
(7)	Government revenue excl. external transfers	t	1.1	1.0	1.0
(8)	Imports of goods and non-factor services	q	100.0%	100.0%	100.0%
	Year-average stock/GDP:				
(9)	Broad money supply	M/Y	30.0%	30.0%	30.0%
(10)	**Marginal money multiplier**	**m**	**3.0**	**3.0**	**3.0**
	Real interest rates on...				
(11)	Government external debt	r(E)	3.0%	3.0%	3.0%
(12)	Central-bank external liabilities	r(L)	3.0%	3.0%	3.0%
(13)	Central-bank external assets	r(A)	2.0%	2.0%	2.0%
(14)	Non-government external debt	r(U)	5.0%	5.0%	5.0%
(15)	Net government domestic debt	r(D)	8.0%	8.0%	8.0%
Programming assumptions:					
	Real growth rates:				
(16)	Gross domestic product (GDP)	g(Y)	*5.0%*	*5.0%*	*5.0%*
(17)	Government external debt	g(E')	*5.0%*	*5.0%*	*5.0%*
(18)	Central-bank external liabilities	g(L')	*5.0%*	*5.0%*	*5.0%*
(19)	External transfers to government	g(Z)	*5.0%*	*5.0%*	*5.0%*
(20)	Government consumption expenditure	g(G)	*5.0%*	*5.0%*	*5.0%*
(21)	Government domestic transfers and subsidies	g(H)	*5.0%*	*5.0%*	*5.0%*
(22)	Government gross fixed capital formation	g(J)	*5.0%*	*5.0%*	*5.0%*
	Months of imports of goods and non-factor services:				
(23)	Central-bank external assets	a	5.0	5.0	5.0

Source: Excel workbook [AtMS.xls].

Table 3. "Atlantica": Projection results, 2006-2020

	Year:	2006	Average: 2006-2020	2020
Per cent of GDP:				
Total gross fixed capital formation	**I/Y**	**15.8%**	**15.8%**	**15.8%**
of which, replacement of depreciated capital		15.2%	11.7%	9.3%
of which, net fixed capital formation		0.5%	4.0%	6.4%
Government gross fixed capital formation	J/Y	5.0%	5.0%	5.0%
Non-government capital formation	(I-J)/Y	10.8%	10.8%	10.8%
Overall government surplus:	(P + R)/Y	**-3.6%**	**-3.5%**	**-3.4%**
Government primary surplus:	**P/Y**	**-1.4%**	**-1.1%**	**-1.0%**
Government revenue excl. external transfers	T/Y	14.6%	14.9%	15.0%
External transfers to government	Z/Y	5.0%	5.0%	5.0%
Government consumption expenditure	G/Y	11.0%	11.0%	11.0%
Government domestic transfers and subsidies	H/Y	5.0%	5.0%	5.0%
Government gross fixed capital formation	J/Y	5.0%	5.0%	5.0%
Government interest due	**R/Y**	**-2.2%**	**-2.3%**	**-2.4%**
Disposable non-government income:	**(C+S)/Y**	**90.8%**	**90.7%**	**90.6%**
Non-government consumption expenditure	**C/Y**	**80.8%**	**80.8%**	**80.8%**
Total saving = gross investment:		**15.8%**	**15.8%**	**15.8%**
Non-government saving	S/Y	11.4%	11.1%	10.9%
Government saving	(P + J)/Y	1.4%	1.5%	1.6%
Foreign saving (current-account deficit):		2.9%	3.1%	3.3%
Net imports of goods and non-factor services:	(Q - X)/Y	1.3%	1.3%	1.3%
Net interest payments due on government, non-government debt		1.6%	1.8%	2.0%
Per cent of disposable non-government income:				
Non-government consumption expenditure	c = C/(C+S)	88.9%	89.0%	89.1%
Non-government saving	s = S/(C+S)	12.5%	12.2%	12.0%
Growth rates:				
Programnmed:				
Gross domestic product (GDP)	g(Y)	5.0%	5.0%	5.0%
Government external debt	g(E')	5.0%	5.0%	5.0%
Central-bank external liabilities	g(L')	5.0%	5.0%	5.0%

continues

		Year: 2006	Average: 2006-2020	2020
Projections (continued):				
Results:				
Increase as a per cent of GDP:				
Government external debt	ΔE'/Y	2.9%	2.9%	2.9%
Central-bank external liabilities	ΔL'/Y	0.0%	0.0%	0.0%
Central-bank external assets	ΔA'/Y	0.4%	0.4%	0.4%
Non-government external debt	ΔU'/Y	0.5%	0.7%	0.8%
Net government domestic debt	ΔD'/Y	0.7%	0.6%	0.5%
Year-end stock/GDP:				
Capital stock	K'/Y	381.5%	297.4%	240.1%
* Government external debt	E'/Y	60.0%	60.0%	60.0%
* Central-bank external liabilities	L'/Y	0.0%	0.0%	0.0%
Monetary aggregates:				
Broad money supply	M'/Y	30.7%	30.7%	30.7%
Monetary base	B'/Y	10.2%	10.2%	10.2%
Central-bank net external liabilities	(L' - A')/Y	-8.8%	-8.8%	-8.8%
Central-bank net domestic assets	V'/Y	1.5%	1.5%	1.5%
Non-government external debt	***U'/Y***	***1.5%***	***4.7%***	***7.9%***
Net government domestic debt	***D'/Y***	***5.5%***	***7.5%***	***8.8%***
Per-capita non-government consumption	***C/N***	***831.3***	***1026.3***	***1247.3***
Per-capita government consumption	***G/N***	***113.2***	***139.8***	***169.9***
Per-capita government capital formation	***J/N***	***51.5***	***63.5***	***77.2***
Growth rates:				
Per-capita non-government consumption	***g(C/N)***	***10.1%***	***3.4%***	***2.9%***
Non-government external debt	ΔU'/U'(-1)	53.1%	21.0%	11.6%
Net government domestic debt	ΔD'/D'(-1)	15.5%	9.1%	6.7%
Broad money supply	ΔM'/M'(-1)	5.0%	5.0%	5.0%
Monetary base	ΔB'/B'(-1)	5.0%	5.0%	5.0%
Central-bank external assets	ΔV'/V'(-1)	5.1%	5.0%	5.0%
Per cent of GDP:				
Government interest due	***R/Y***	***-2.2%***	***-2.3%***	***-2.4%***
Per-capita non-government consumption	***[r(U) U]/Y***	***0.1%***	***0.2%***	***0.4%***
Overall government surplus		-3.6%	-3.5%	-3.4%
Current-account surplus		-3.9%	-4.1%	-4.3%
Per cent of exports of goods and non-factor services:				
Government external debt	E'/X	444.4%	444.4%	444.4%
Interest on government external debt	r(E) E(-1)/X	13.0%	13.0%	13.0%

Source: Excel workbook [AtMS.xls].

3. The exercise proceeds as follows. A single change is made in the base-year values: the figure given for government external debt is reduced by one half, as might take place in a debt-reduction operation. This single change with the same projection assumptions given in Table 2 produces a new set of projection results:

Table 4. "Atlantica": Projection results with reduced debt stock, 2006-2020

	Year:	2006	Average: 2006-2020	2020
Per cent of GDP:				
Total gross fixed capital formation	**I/Y**	**15.8%**	**15.8%**	**15.8%**
of which, replacement of depreciated capital		15.2%	11.7%	9.3%
of which, net fixed capital formation		0.5%	4.0%	6.4%
Government gross fixed capital formation	J/Y	5.0%	5.0%	5.0%
Non-government capital formation	(I-J)/Y	10.8%	10.8%	10.8%
Overall government surplus:	(P + R)/Y	**-2.7%**	**-3.0%**	**-3.3%**
Government primary surplus:	**P/Y**	**-1.4%**	**-1.1%**	**-1.0%**
Government revenue excl. external transfers	T/Y	14.6%	14.9%	15.0%
External transfers to government	Z/Y	5.0%	5.0%	5.0%
Government consumption expenditure	G/Y	11.0%	11.0%	11.0%
Government domestic transfers and subsidies	H/Y	5.0%	5.0%	5.0%
Government gross fixed capital formation	J/Y	5.0%	5.0%	5.0%
Government interest due	**R/Y**	**-1.3%**	**-1.8%**	**-2.4%**
Disposable non-government income:	**(C+S)/Y**	**90.9%**	**91.1%**	**91.5%**
Non-government consumption expenditure	**C/Y**	**80.8%**	**80.8%**	**80.8%**
Total saving = gross investment:		**15.8%**	**15.8%**	**15.8%**
Non-government saving	S/Y	11.4%	11.3%	11.3%
Government saving	(P + J)/Y	2.3%	2.0%	1.7%
Foreign saving (current-account deficit):		2.1%	2.4%	2.8%
Net imports of goods and non-factor services:	(Q - X)/Y	1.3%	1.3%	1.3%
Net interest payments due on government, non-government debt		0.8%	1.1%	1.5%
Per cent of disposable non-government income:				
Non-government consumption expenditure	c = C/(C+S)	88.9%	88.7%	88.3%
Non-government saving	s = S/(C+S)	12.6%	12.4%	12.4%
Growth rates:				
Programnmed:				
Gross domestic product (GDP)	g(Y)	5.0%	5.0%	5.0%
Government external debt	g(E')	5.0%	5.0%	5.0%
Central-bank external liabilities	g(L')	5.0%	5.0%	5.0%

continues

		Year: 2006	Average: 2006-2020	2020
Projections (continued):				
Results:				
Increase as a per cent of GDP:				
Government external debt	ΔE'/Y	1.4%	1.4%	1.4%
Central-bank external liabilities	ΔL'/Y	0.0%	0.0%	0.0%
Central-bank external assets	ΔA'/Y	0.4%	0.4%	0.4%
Non-government external debt	ΔU'/Y	1.1%	1.4%	1.8%
Net government domestic debt	ΔD'/Y	1.3%	1.5%	1.9%
Year-end stock/GDP:				
Capital stock	K'/Y	381.5%	297.4%	240.1%
* Government external debt	E'/Y	30.0%	30.0%	30.0%
* Central-bank external liabilities	L'/Y	0.0%	0.0%	0.0%
Monetary aggregates:				
Broad money supply	M'/Y	30.7%	30.7%	30.7%
Monetary base	B'/Y	10.2%	10.2%	10.2%
Central-bank net external liabilities	(L' - A')/Y	-8.8%	-8.8%	-8.8%
Central-bank net domestic assets	V'/Y	1.5%	1.5%	1.5%
Non-government external debt	***U'/Y***	***2.0%***	***9.2%***	***16.5%***
Net government domestic debt	***D'/Y***	***6.1%***	***12.9%***	***19.6%***
Per-capita non-government consumption	***C/N***	***831.3***	***1026.3***	***1247.3***
Per-capita government consumption	***G/N***	***113.2***	***139.8***	***169.9***
Per-capita government capital formation	***J/N***	***51.5***	***63.5***	***77.2***
Growth rates:				
Per-capita non-government consumption	***g(C/N)***	***10.1%***	***3.4%***	***2.9%***
Non-government external debt	ΔU'/U'(-1)	112.4%	28.5%	12.1%
Net government domestic debt	ΔD'/D'(-1)	27.6%	15.1%	10.8%
Broad money supply	ΔM'/M'(-1)	5.0%	5.0%	5.0%
Monetary base	ΔB'/B'(-1)	5.0%	5.0%	5.0%
Central-bank external assets	ΔV'/V'(-1)	5.1%	5.0%	5.0%
Per cent of GDP:				
Government interest due	***R/Y***	***-1.3%***	***-1.8%***	***-2.4%***
Per-capita non-government consumption	***[r(U) U]/Y***	***0.1%***	***0.4%***	***0.8%***
Overall government surplus		-2.7%	-3.0%	-3.3%
Current-account surplus		-3.1%	-3.4%	-3.8%
Per cent of exports of goods and non-factor services:				
Government external debt	E'/X	222.2%	222.2%	222.2%
Interest on government external debt	r(E) E(-1)/X	6.5%	6.5%	6.5%

Source: Excel workbook [AtMS.xls].

With the initial-year government external-debt stock reduced at the outset but growing at the same rate, the net flow of new external debt to the government in subsequent years would be reduced. Since the government deficit is reduced only slightly (through the reduction in the interest bill on external debt), while the net external-debt flow would be reduced significantly, an increased flow of net internal debt would be required to cover the deficit.

4. The next step in the analysis is to make one further change in the projection assumptions. A new value is calculated for the annual growth rate of government capital-formation expenditure, *such that* the final stock of government internal debt would be the same with the reduced

government external debt as it was with the unreduced government external debt, as given in Table 3 above. This calculation is carried out using the Excel "goal-seek" iterative calculation procedure. The required reduction turns out to be substantial: instead of growing at #5 per cent per annum as shown in Table 2 above, all other assumptions being the same, government capital formation would have to grow by only #3.3 per cent per year. In real terms, assuming the flows of tax revenue, external transfers to the government, capital expenditure, and government transfers and subsidies remain unchanged, annual per-capita government capital formation over the period would have to be #12.5 per cent smaller, on average, than the value indicated in Table 2. This can be taken as an indicator of the fiscal tightening that the debt-reduction operation would require.

5. A different exercise can be carried out to address the balance-of-payments constraint. Note that the final stock of non-government external debt in Table 4 would be higher as a percentage of GDP than in Table 3. This is because the inflow of external debt to the government debt would be lower with the debt reduction, and a larger inflow of non-government external debt would be required to compensate. A second change in the assumptions may be calculated, to determine by how much lower the average annual real-GDP growth rate would have to be for the final stock of non-government external debt to be the same with the reduced government external debt as it originally was in Table 3 above, i.e., with no debt reduction. This calculation is also carried out using the Excel "goal-seek" iterative calculation procedure. The required reduction in the real-GDP growth rate would be fairly significant, from #5 per cent to #4.3 per cent.

6. Obviously these results depend on the specific figures characterizing the hypothetical economy, both for the base-year values and for the projection values. Changes in the specific values chosen can change the results significantly, either way. The present point is simply that debt-reduction operations in which the reduced debt ratio is to be preserved may require significant reductions in real GDP growth and significant fiscal tightening.

5. Conclusions and broad recommendations for policy approaches

1. Because debt-reduction exercises not only reduce debt stocks but reduce new borrowing flows, their consequences for future growth and development are not assuredly favorable. For policy formulation, the implication is that anyone who formulates a debt-reduction exercise should be aware of this possibility; apply projection techniques like those discussed here to determine the likely consequences of whatever debt-reduction exercise is carried out; and try to ensure that the exercise in its full dimension favors growth and development, to the extent possible. If a debt-reduction exercise has already been carried out, it is important for all concerned to recognize that it may turn out much less favorably than hoped, or even unfavorable, to growth and development. It is then important to try to determine whether and how steps can be taken to offset unfavorable consequences for growth and development.

2. The HIPC-MDRI definitions of debt sustainability are evidently problematic, but at least one reason they have persisted is that it has been difficult to find better ones. This paper has argued that a meaningful debt-sustainability analysis must ask whether a country and its government can sustain a given debt-service flow, *given* minimum real GDP-growth and government-expenditure aspirations. Calculating the present value of future debt payments and comparing them with current exports is all well and good for some purposes, but a debt-sustainability calculation needs to be tied more closely to development and poverty-reduction criteria.

3. This paper has proposed a general approach to structuring a practical debt-sustainability analysis for a developing macroeconomy, using a simplified consistency framework with integrated national, external, fiscal and even monetary accounts to describe and illustrate the approach. The procedure considers not only the sustainability of existing public external debt, but also the sustainability of a future external-debt program, along with a minimum government-expenditure program as required for public-services, development and poverty reduction, as well as a minimum acceptable real growth rate. The essence of the procedure is to use the programming assumptions along with projected state-of-the-world variables to formulate projections of the national, external, fiscal and monetary accounts, calculating the unprogrammed non-public external borrowing that would be necessary “to close” each year’s balance of payments and the unprogrammed internal borrowing that would be necessary “to close” each year’s fiscal accounts. If such unprogrammed borrowing were unfeasibly large and growing

explosively, then the analyst would conclude that the public external-debt program would be unsustainable.

4. As many observers have concluded, for some post-HIPC economies, the only practical way to ensure both adequate developmental expenditure and stable external-debt ratios may be to maintain a relatively high and steady flow of external grants. It is important to bear in mind, however, that external grants are almost never freely available funds. They almost always come with tight conditionality or quite specific earmarking regarding their use.[5] If external grants are likely to remain limited, however, or available for different purposes than the economy requires, it may then be reasonable enough for the economy to take on more external debt than the HIPC benchmark would imply. This may be "less bad" than raising taxes or borrowing internally, *if* the higher debt-GDP ratio can be sustained under reasonable assumptions about the future. For many poorer economies, the remaining financing alternatives – higher taxation and internal borrowing – may be more damaging for longer-term growth.

5. It is always important to bear in mind that in recent decades developing economies' external-payments crises has led world public opinion "to demonize" external debt. This is perfectly understandable, of course: excessive external debt led to massive problems in many developing economies, particularly in Latin America, where the bulk of the external debt was at commercial (and, more precisely, floating) rates, but also in Africa, where the bulk of the debt was concessional. All the same, however, it is uncertain whether the optimal way to address the issue was simply to reduce debt stocks *and keep them reduced*. It is by no means clear that this approach leaves the countries in question better placed to develop faster.

[5] Grants are more likely than loans to be provided in the form of training and technical assistance and less in forms leading to physical capital formation. In particular, all other things being equal, to the extent an economy receives grants rather than loans, it is likely to find it harder to finance physical capital formation.

REFERENCES

Allen, Mark and Gobind Nankani (2004). "Debt Sustainability in Low-Income Countries – Proposal for an Operational Framework and Policy Implications" (International Monetary Fund and International Development Association: Washington, DC), February.

Beckerman, Paul (2009). *Medium-term Macroeconomic Programming Techniques for Developing Economies.* (forthcoming, 2010)

Beckerman, Paul (2006). "Bolivia: Economic Performance and External Debt since the 1980s" (processed; presented at the UNCTAD Conference on Debt and Development, October 26-28, 2005).

Beckerman, Paul (1994). "External Debt and Growth: The 'Debt-Stabilizing' Real Growth Rate," *Journal of Developing Areas*, Vol. 28 (January), pp. 229-236.

Domar, Evsay (1947). "Expansion and Employment," *American Economic Review*, Vol. 37, No. 1 (March), pp. 34-55.

Geithner, Timothy (2002). "Assessing Sustainability". IMF Policy Development and Review Department. May.

Harrod, Roy (1959). "Domar and Dynamic Economics," *Economic Journal*, Vol. 69, No. 275 (September), pp. 451-464.

International Monetary Fund (2005). "Bolivia: Ex Post Assessment of Longer Term Program Engagement," March 10.

International Monetary Fund and International Development Association (2001). "The Challenge of Maintaining Long-Term External Debt Sustainability," April.

Jones, Hywel (1975). *An Introduction to Modern Theories of Growth* (Nelson: London).

Nogueira Batista, Jr., Paulo (1987). "*Formação de capital e transferências*," *Revista de Economia Politica*, Rio de Janeiro, Vol. 7, No. 1, January-March, pp. 10-27.

Payer, Cheryl (1974). *The Debt Trap* (Monthly Review Press: New York).

Rajan, Raghuram (2005). "Debt Relief and Growth." *Finance and Development* (June).

Robinson, Joan (1954). "The Production Function and the Theory of Capital," *Review of Economic Studies*, Vol. 21, No. 2, pp. 81-106.

continues

REFERENCES (continued, concluded)

Sargent, Thomas and Neil Wallace (1981). "Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis *Quarterly Review*, Fall, pp. 1-18.

Selowsky, Marcelo and Hermann C. van der Tak (1986). "Economic Growth and External Debt," *World Development*, Vol. 14, No. 9 (September) pp. 1107-1124.

Solow, Robert M. (1970). *Growth Theory: An Exposition* (Oxford, England: Oxford University Press).

United Nations (2002). “Millennium Development Goals” (United Nations Public Information Department: New York, NY), February.

van Trotsenburg, Axel and Alan MacArthur (1997) “The HIPC Initiative: Delivering Debt Relief to Poor Countries (International Monetary Fund and World Bank: Washington, DC), February.

World Bank (2003). HIPC website http://www.worldbank.org/hipc/about/hipcbr/hipcbr.htm