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Aid, Fiscal Policy, Climate Change, and Growth

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Abstract

This paper sets out to provide an introduction to two sets of questions, and to some relevant literature that has tried to answer them. The first set of questions concern what determines growth in low-income countries, and how the answers are conditioned by the history of fiscal policy design (public capital, debt and deficit management, for example). The second (related) set of questions concerns how to design fiscal policy in face of future uncertainties over climate change, structural change, and the evolution of aid flows. The paper is intended to ask questions, rather than answer them, but at least to provide some structure within which to do this.

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1 Introduction

This paper is concerned particularly though not exclusively with low-income countries (LICs), and within that group, most explicitly LICs in sub-Saharan Africa (SSA). Even on the most optimistic assumptions, many of these will remain low-income over an extended horizon, and a long view must be taken in any analysis of their policy options. Consider, for example, a LIC achieving the common but ambitious target of sustained growth of GDP at 7 per cent per annum. Then if population growth remains at the current LIC average of 2.1 per cent per annum, a country now at the median income of the group (US$440) would take something over 17 years to reach the threshold (US$995) at which it would exit LIC status, as defined by the World Bank, and become a lower middle-income country. Of course, if population growth fell during the period, this might be achieved somewhat faster, but the downside risk of growth set-backs is much greater.[1] If GDP growth averaged only 5 per cent, the transition would take over 29 years.

Two conclusions follow from this rather sobering exercise.[2] First, the growth implications of domestic policies, donor interventions, the evolution of the physical environment, and the way these interact, are absolutely crucial. Second, the horizon for this analysis needs to be quite long, and will involve major uncertainties. Good policy design, even in the short-run, will have to consider the probable need to adapt to major shifts of limited predictability. A critical focus for the analysis has to be fiscal policy, defined rather widely to include not only the evolution of public debt and the fiscal deficit, but also the level and composition of public spending, and the level and design of domestic revenue mobilization.

In the medium and long-run, there may be quite marked changes in the physical environment in many countries, arising partly from environmental degradation and population pressures, and partly from the likely impact of climate change, both in causing secular alterations to the feasible pattern of economic livelihoods, and in inducing an increase in the scale and frequency of catastrophes. These changes will pose major challenges for the fiscal authorities, for donors, and for public-private co-operation.[3]

Also, over such a long horizon, the relation of aid flows to public expenditure needs is unlikely to be either stationary or neatly calculated to decline only in complement to enhanced domestic revenue capacity. Donor finances are themselves likely to come under severe pressure in the medium and longer run, for at least three reasons. First, the aftermath of the global crisis will require a very large increase in their primary budget balances if debt/GDP ratios are to be brought back down to pre-crisis levels.[4] Second,

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[1] In any event, the impact of changes in population growth on per capita income growth is ambiguous, depending *inter alia* on demographic structure and factor intensities.

[2] Neither conclusion is restricted to LICs, of course, but they have increased urgency for these countries.

[3] These include, for example, the involvement of capital markets in catastrophe insurance.

[4] If, instead, they were stabilized at the levels likely to be reached in 2015, research suggests that there might be a significant subsequent growth penalty.

demographic changes, notably very low birth rates and rapid rises in longevity, are likely to pose very substantial fiscal costs, and possibly a growth penalty as well. Third, the costs of reducing the more extreme forms of climate change will have to—and should—fall primarily on the richer countries, and will also have a substantial fiscal component. These pressures make the long-run profile of aid flows even more uncertain.

From the perspective of low-income countries themselves, an additional complication arises from the increasing attention being paid to where poor people live, from recognition of shifts in this location, and from the possible consequences for aid design. The common-sense presumption is that poor people mostly live in poor countries, but whereas this used to be true thirty years ago, it is so no longer; they are now mostly to be found in middle-income countries.[5] There is also much disagreement about future trends, in particular as to how much poverty will be eliminated by growth in stable countries, with the problem becoming increasingly located in fragile states, (both low- and lower middle-income ones). All this raises pressing questions about how aid should be targeted: at poor countries, or at poor people? at poor people in poor countries? or at poor people in fragile countries whose governments are unable to mobilize resources on their behalf?

Even for stable economies, sustained economic growth involves large structural transformations of a fairly systematic kind as well as substantial changes in per capita income. Each has fiscal implications, both for the efficiency of the tax system, and hence for the marginal cost of public funds, and for the marginal benefit from public spending. The fiscal system of a country in such a transition is not in steady state, but will need to change systematically, and this should ideally be by design. Amongst many others, this raises the difficult issue of how we should discount future events.[6] To the extent that aid flows and the physical environment are also evolving, possibly in an adverse manner, that further complicates this planning problem.

This is a very large and complex agenda. The purpose of the paper will be to lay out these issues and their connections in more detail, and to help develop a framework for thinking about how best to handle them. Section 2 provides a very incomplete survey of some environmental issues, including problems of environmental degradation and water access arising from population pressures and economic growth, as well as the incidence of natural disasters and secular changes associated with climate change. There follow some sections looking at the relation between various public activities and growth. Section 3 looks at this relation for public capital, and Section 4 at that for public debt. Section 5 then examines the relation between growth and economic structure; it considers the sort of structural change that has in the past been implied by the evolution to middle income status, as a very speculative guide to what will be required in comparable future transitions. Section 6 examines the comparable question, concerning the relation between the higher incomes associated with growth and the size of the state. Section 7 looks at a number of related inter-temporal issues, including the possible evolution of aid flows, of domestic revenues, and of other financing sources; the

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5 Sumner (2012) provides recent figures. He estimates that half of the world's poor live in India and China, and only a quarter in low-income countries. Of this, the bulk is located in fragile states, with only 7 per cent residing in stable low-income countries.

6 Just how difficult this is over a long horizon has been highlighted by recent debates over how to react to the risks of global warming.

difficult question of how to discount the future; and the relation between the time pattern of these resources, the path of public investment, and expenditure criteria. Section 8 concludes.

2   Some environmental issues

There are two groups of environmental challenges, which are particularly acute in developing countries, though by no means restricted to them. Policies for dealing with them overlap, though they are quite distinct in origin. The first group involves environmental degradation and increasingly fraught access to water, caused by a combination of population pressure and economic development. The second is a consequence of global warming, and reflects both the increasing incidence and severity of climatological disasters as rapid-onset events as well as more slowly evolving changes to temperature, rainfall and sea level.

Adjusted net saving

For some years, the World Bank has attempted to compute a 'true' rate of savings for national economies, taking into account capital consumption of produced assets, investments in human capital, depletion of natural resources and damage caused by pollution by adjusting the more conventional gross savings rate calculated in the national accounts. While the detailed calculations can easily be challenged, these adjustments do represent a sustained effort to produce a better view of how a country's wealth is evolving. If adjusted net savings are negative, then total wealth is in decline; policies leading to persistently negative rates are unsustainable. The results are sobering.[7] For 2008, the Bank's calculations yield an adjusted net saving rate (exclusive of particulate emission damage) for the world as a whole of 7.4 per cent, but this average hides very substantial differences between groups of countries. East Asia has an average of 29.2 per cent, SSA an average of -5.9 per cent.[8]

Equally important, these calculations ignore the bulk of the costs of environmental degradation, which are likely to be very significant in many low-income countries, and depress their net savings rates substantially. These costs are largely country specific, and assessing their magnitude requires country-specific study. Not least, these costs are likely to have significant fiscal implications, whether steps are taken to mitigate them or not. Trying to get a better handle on how large these costs are, and on the costs of trying to mitigate them, is critical to good policy choices in the medium term.

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[7]   See the World Bank's environment web site.

[8]   Low-income countries as a whole perform much better, at 11 per cent. There is a wide variation between countries, with mineral extractors often showing high negative counts, because they are depleting one asset without using the proceeds to acquire another. These economies are disproportionately important in SSA, with Equatorial Guinea, Angola, Chad, and Congo Brazzaville ranging from -38 per cent up to -56 per cent.

Climate change

There is now relatively little dispute about either the fact of global warming, or the role of human agency in causing it. There is, however, much uncertainty about the rate of onset, about the best profile of attempts to mitigate it, and about the detailed country specific distribution of consequences. Even so, three aspects of these forthcoming changes do seem fairly clear.

First, LICs have played a negligible role in causing the problem, and do not have the resources to contribute significantly to mitigating it. On the contrary, they will require substantial additional assistance to help them adapt to changes that richer countries have been unable to mitigate. Whether these resources will be genuinely additional to developmental aid flows remains moot, particularly given the fiscal problems that advanced countries now face.[9] Second, the most adverse consequences are likely to accrue in the tropical parts of the world, and hence are likely to be particularly inimical to LICs.

Third, the real impact of these consequences, and the costs of adapting to them, is likely to be deferred for a relatively extended period. There have not to date been many country-specific studies, and this is a field in which the devil is likely to be in the detail. A recent example is a study of Vietnam, which is potentially highly susceptible to climate change, not least because it has a substantial area of low-lying coastland, which is vulnerable both to cyclone strike and a rising sea level.[10] This study examined a large number of scenarios over the 40 year period to 2050. It found that growth was reduced in all scenarios, but that the reduction was modest, with the loss of GDP at the horizon ranging between 0.25 per cent and 3.5 per cent. Over a 40 year period, the reduction in the annual average growth rate is therefore very small. What is more, the bulk of this impact comes in the latter part of the period. From 2050 on, the process accelerates and the impact is more severe. However, the implication of this study is that other factors than climate change are likely to be more important determinants of growth over at least the next few decades.

Much the same conclusion could be drawn from the World Bank's ambitious study of the economics of adaptation to climate change in developing countries over 2010-2050.[11] The headline figures are large, at an annual US$70-100 billion in 2005 prices, and certainly underline the serious nature of the issue.[12] Even so, they fall in the range 0.12 per cent—0.17 per cent of current aggregate developing country GDP, and a substantially smaller percentage of the levels of GDP which will be reached over this horizon. Of course, these costs are not uniformly distributed,[13] and, relative to GDP, are likely to be substantially higher in SSA. Nevertheless, it appears that climate change is

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9   See Arndt and Friis Bach (2011).

10 See Arndt and Thurlow (2011).

11 World Bank (2010).

12 As the study is careful to note, these numbers overestimate likely costs, since they assume full adaptation, whereas in practice, only partial adaptation would be sensible—attempting to balance the marginal costs and benefits. The numbers themselves are perhaps twice the size of previous estimates by the UN and the Bank itself.

13 Some countries, such as Bangladesh, do face potentially dreadful consequences, which may materialize quite soon.

most unlikely to be a game-changer for the LICs as a whole, given the challenges they already face.

This conclusion is supported by parallel work on the growth impact of past natural disasters. After an initial drop in output, which may be very short-lived, growth tends to recover to pre-disaster rates, or even to accelerate temporarily so that the original output path is recovered.[14] Even very small economies often prove to be very resilient, even when hit by large disasters, as for example demonstrated by the experience of Caribbean islands lying in the track of hurricanes. This is not to deny that severe adverse shocks can derail the growth process in some cases; however, this seems to have been true more for financial crises than for natural disasters.

Water stress

A major problem in many developing countries is the present widespread inadequacy of freshwater resources, and the likelihood that this will intensify sharply in the future. A natural and much studied question is how much of this intensification will be due respectively to climate change, to population growth, and to rising incomes. There seems to be widespread agreement that rising water demands greatly outweigh greenhouse warming in defining the state of water systems in future decades. One much cited study[15] for the period 2000-25, found virtually no difference in the increases in numbers of people under stress for scenarios that included climate change as for those that did not. A more recent study[16] projected that—according to the scenario adopted[17]—water stress increased over 62-76 per cent of total river basin area, and decreased over 20-29 per cent of it. However, whereas the principle cause of *increasing* stress was growing water withdrawals, the principle cause of *decreasing* stress was increased precipitation due to climate change. Furthermore, the increase in water demand was more associated with income growth than with population growth.

Implications

None of the foregoing is intended to deny the gravity of greenhouse warming, the very great long term risks it poses, especially if it induces one or other of the various postulated catastrophic climate regime shifts, and hence the need for very energetic efforts to mitigate it. However, the best, though undoubtedly speculative, evidence we have suggests that the growth consequences and other damage to low-income countries is likely to be small in relative terms over the next few decades; that they are in no position—nor should they be expected—to contribute materially to mitigation unless in ways that come with associated financing; and that other environmental concerns— water stress and environmental degradation—are both more urgent and, at least over a reasonable horizon, more costly than adaptation to climate change per se.

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[14] For a survey of some of this evidence, as well as a discussion as to why it is consistent with theoretical priors, see Bevan (2011).

[15] Vorosmarty et al. (2000).

[16] Alcamo et al. (2007).

[17] These are basically scenarios A2 and B2 of IPCC 2007.

3 Growth and public capital

The infrastructure deficit

There are huge infrastructure deficits in LICs, especially in SSA, as revealed by the Africa Infrastructure Country Diagnostic (AICD).[18] These have had three main causes. First, they have arisen partly as a casualty of earlier (often successful) stabilization efforts. Since it has typically proved very difficult to raise revenue performance sharply in the short term, reducing an excessive fiscal deficit has required reductions in expenditure, and current expenditures are much harder to compress than capital expenditures. Hence the bulk of adjustment was often borne by the latter. A second reason is that donors had become so focused on social sector spending that infrastructure became neglected in aid budgets. This was partly due to positive enthusiasm for the benefits believed to accrue from increased expenditures in these sectors, particularly on education and health. However; it also reflected the perception that much capital spending was highly inefficient, with defective project evaluation and implementation, even when it was not a vehicle for corruption.

The third reason is that infrastructure is very expensive. Most SSA countries spend between 6 per cent and 12 per cent of GDP on infrastructure (taken to include ICT, power, roads, water and sanitation), with more than half of them exceeding 8 per cent. This sounds pretty respectable, compared to the OECD average of 5 per cent. However, given the very low income levels in these countries, average annual spending by SSA LICs is less than US$50 per person. The shortfall in capacity, even relative to LICs elsewhere, is variable by sector, but often startlingly large. It is particularly acute in power generation, where SSA LICs have barely one tenth of the capacity of other LICs. What is more, Africa's infrastructure services are on average twice as expensive as elsewhere. This partly reflects higher costs (as is the case for power generation, reflecting diseconomies of small scale), and partly excess profits (as for road freight, where operators are often protected from competition).

AICD has also produced compelling evidence that an infrastructure deficit has serious adverse consequences for growth as well as productivity. It estimates Africa's infrastructure spending needs at US$93 billion per annum, more than double previous 'guestimates', and about 15 per cent of the region's GDP. Some two thirds of this total relates to capital expenditure, and the remaining one third is required for operation and maintenance. However, these figures are for the region as a whole, inclusive of middle-income and resource rich countries. The estimates for the LICs are much higher; to build and maintain a basic infrastructure platform, expenditure as a share of GDP would need to be raised to about 23 per cent in non-fragile LICs, and 37 per cent in fragile ones. These are truly daunting numbers; it seems inconceivable that such a huge financing gap can be fully covered for the LICs as a whole.[19] Even in the unlikely event

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[18] The numbers given in this section of the paper are taken from AICD's major report, Foster and Briceno-Garmendia (eds) (2010).

[19] Recent resource discoveries, such as gas reserves in Tanzania and Mozambique, offer the prospect of substantially enhanced public resources which can be used to close the infrastructure gap. However, these will not be available until the medium term (seven to ten years) and also pose the challenge of avoiding the 'resource curse' which has seen mineral rents derail development efforts in many developing countries.

that full financing could be arranged, the challenge of increasing spending to such a degree, and doing so efficiently, would be very great. In consequence, there will be a need for very stringent prioritization, which will pose difficulties of both a political and technical kind. There is also a real risk that an inability to close the infrastructure gap will cumulatively dampen Africa's growth prospects.

Public capital and growth

There has been extensive work looking at the productivity of public capital, and its impact on growth, mostly for advanced economies, but more recently for developing ones. The early work for advanced economies tended to find high productivity and substantial output elasticities; a later wave of work, addressing a number of methodological and econometric problems, tended to find lower and more heterogeneous elasticities. A meta-regression analysis of all this work found an average elasticity in the range 0.05-0.17, with higher values for the long-run and 'core' capital (namely infrastructure).[20]

For developing countries, the empirical results were often pretty mixed. However, one factor which may go some way to explain this is that there is often a very poor correlation between public capital spending and any real addition to the effective public capital stock. This reflects political imperatives and technical shortcomings that, as noted above, have resulted in poor project choice and implementation, as well, in some cases, as outright corruption.

More recent work has adopted a variety of strategies to deal with these shortcomings, and has suggested quite a strong contribution to growth, particularly if some estimate is made of public capital actually in place, rather than assuming this is captured by cumulated depreciated investment (which involves much waste, as noted).

For example, one study constructs an infrastructure index, using physical measures of infrastructure, not monetary values.[21] A large cross country panel is constructed, for 88 countries, from 1960 to 2000. The study finds a long-run elasticity of output with respect to this index of 0.07-0.10, and this is highly significant and robust. What is more, it does not appear to vary across countries; hence observed differences in the ratio of aggregate infrastructure to output should offer a useful guide to differences in the marginal productivity of infrastructure between countries.

Another line of approach is to construct a measure of the public capital stock that is explicitly adjusted for the (in)efficiency of the investment that produced it. This procedure was followed in a study of 52 developing countries that found the effective capital stock might be only a half of that calculated by traditional methods.[22] Hence traditional studies grossly underestimated the productivity of public capital. This study found productivity to be significantly higher than the marginal cost of funds under normal financing conditions. Of course, these results hinge on the adequacy of the efficiency adjustment. For this, the study used the Public Investment Management Index

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[20] Bom and Ligthart (2011).

[21] Calderon et al. (2011).

[22] Gupta et al. (2011).

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(PIMI), constructed from a large number of public sector data bases, primarily collected by the World Bank, which seems to capture the issue pretty well.[23]

Finally, the AICD has itself conducted a number of exercises on this topic. It asserts that advances in the penetration of telecommunication services (virtually the only sector in which Africa's lag is relatively small) were responsible for 1 percentage point of Africa's growth in 1990-2005, more than half as much again as all structural policies put together. It also estimates that if African countries caught up with the regional leader (Mauritius), per capita growth would increase by 2.2 percentage points.[24]

This discussion poses two interesting questions. First, how have SSA countries achieved such high recent growth rates, given the very poor state of their infrastructure? Second, will they be able to continue with this sleight of hand, or will the infrastructure deficit begin to exact a serious growth toll in future?

4   Growth and public debt

In its analysis of 'fiscal exit' from the high public indebtedness caused by the global crisis, the IMF uses two different targets for the debt to GDP ratio; for advanced economies, this is 60 per cent, for emerging economies, 40 per cent. Both these numbers are based on empirical work suggesting that high debt inhibits growth, that the effect is non-linear, and that it sets in at lower debt ratios for less advanced economies. There appears to general agreement that things get serious above 90 per cent; unfortunately, this is the region now occupied by most advanced economies.

One recent study of these two groups over 1979-2007 suggests an inverse relationship between initial debt and subsequent growth; on average, a 10 percentage point increase in the ratio lowers growth by 0.2 per cent per annum, somewhat less (0.15 per cent) for advanced economies than emerging ones.[25] There is some evidence of non-linearity, with only a debt ratio above 90 per cent having a significant negative effect. This adverse effect is attributed to a slowdown in labour productivity growth, reflecting reduced investment.

For developing countries as a group, relatively little is known about the consequences of internal debt, reflecting poor data quality, as well as a variety of complicating factors— a history of financial repression, highly imperfect credit markets and very thin financial markets generally, as well as imperfect competition in the banking sector.

For external debt in these countries, the evidence is somewhat confused, though it generally suggests a negative and non-linear relationship. Much of this work has examined whether there is a 'debt overhang'—a situation where the debt service burden is so heavy that incentives to invest are very materially reduced—and if so, where it is. One recent study suggests that there is a real risk of a debt overhang (with investment

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[23] See Dabla-Norris et al. (2011). PIMI is composed of 17 indicators grouped into four stages of the public investment management cycle: (i) Project Appraisal; (ii) Project Selection; (iii) Project Implementation; and (iv) Project Evaluation.

[24] Calderon (2008).

[25] Kumar and Woo (2010).

collapses) if the present value debt ratio exceeds 40 per cent.[26] Other studies find rather lower levels at which negative effects on growth begin to set in, at 15-30 per cent of GDP[27] or 20 per cent.[28]

These somewhat ambiguous estimates provide a rather opaque basis for policy. Fund/Bank sustainability analyses use a variety of ratios, for example 50 per cent for a 'strong performer', less for a weak one. Recently, Fund discussions of 'fiscal space' and 'fiscal buffers' seem to have adopted a prudential ratio of 40 per cent for total debt, and 15 per cent for the internal component.

Every participant in this discourse agrees that the question of determining a prudent approach to debt is highly country specific. However, a more neglected dimension is that mistakes can be made if cyclical periods of easy credit are misinterpreted as permanent. This feature was stressed by a paper that introduced the concept of debt intolerance, and in subsequent work by the authors.[29] The paper argued that debt intolerance was crucial to any assessment of debt sustainability, debt restructuring, and the scope for international lending to ameliorate crises. The 'safe' ratio of external debt to GDP might be as low as 15 per cent for a debt intolerant country.

There are cycles in capital flows to emerging markets (and, increasingly, LICs as well). During periods when interest rates are low, and liquidity ample, governments of these countries may find it easy to borrow from abroad, and do so, but on past experience these borrowings have often led to default, and this pattern may be repeated in a history of serial default, further lowering the safe threshold. LICs facing a substantial infrastructure deficit as well as other pressing calls on the public finances need to strike a careful balance in how much to borrow, taking into account their own prospects; their own history and reputation; the current costs of borrowing; and the risks of a future deterioration in the terms on which external financing can be obtained.

5   Growth and structural change

Governments in most LICs have adopted ambitious national 'visions' typically extending over a couple of decades, and specifying some combination of a target growth rate for GDP—7 per cent has been a popular choice, though by no means the most ambitious—and a target date to achieve middle-income status. As noted in the introduction, at this impressive (if it were sustained) growth rate it would take a country now at the median income level for LICs the best part of two decades to achieve this goal, which would involve more than doubling per capita income. It is routinely noted that economies undergo substantial structural change as per capita incomes rise, notably in the composition of production between agriculture, manufacturing and services. These changes are both a cause and a consequence of income growth, reflecting differential sector productivity, rising human and physical capital, and different income elasticities of demand. Importantly, these structural changes are accompanied by many

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[26] Imbs and Ranciere (2005).

[27] Cordella et al. (2005).

[28] Patillo et al. (2002).

[29] Reinhart et al. (2003).

others, across a wide sweep of economic and social factors, ranging, for example, from national savings rates, through measures of financial depth, to the number of doctors and secondary school teachers per thousand of population.

There could be two responses to the policy implications of the knowledge that some version of these shifts will take place along the growth path.

One response would be to say that the government's responsibility is limited to its usual duties of maintaining macroeconomic stability and fiscal sustainability; improving economic, social and political institutions; providing an enabling environment for the private sector, including an appropriate regulatory regime; providing some level of social safety net; and acting to correct, to the extent possible, externalities and other market failures.[30] On this view, it would be up to the private sector to follow the opportunities that arose, and the shifting shape of the economy would follow naturally from this, without the need for further government involvement.

The other response would be to acknowledge that the government needs to take a more active role, in addition to these 'usual' functions, and for three reasons. First, government has a direct responsibility for some of these shifts. For example, a (rapid) rise in numbers of secondary school teachers requires early public planning on the expansion of teacher training facilities. Second, no LIC government has the resources or capability to address all second best problems fully and simultaneously. It must attempt to identify where the most pressing problems lie. For example, if the growth path requires a rapid movement of labour out of agriculture, it will not be sufficient to assume that this will just happen when the time is right; bottlenecks need to be identified and addressed; is it crucial to raise agricultural productivity, or to increase the rate of creation of urban jobs? Third, the characteristics of lower middle-income countries are quite various—countries that have reached this state by virtue of mineral exports look quite different from those that have done so by other means. So while there is a fairly characteristic type of shift involved, the relationship is far from mechanical. Some transitions are likely to be superior in both welfare terms and in sustainability than others. In consequence, government has a potential role in modifying the characteristics of the transition, rather in simply enabling it to happen.

If the second response is adopted, then it becomes important for government to form a view of the likely characteristics of the transition, as well as of the extent to which these can be modified beneficially. In the remainder of this section we tentatively consider possible first steps to achieving the first of these goals.

Empirical work

The most systematic series of attempts to examine the structural transformation that accompanies economic growth remains the work of Hollis Chenery and his collaborators, culminating in Chenery et al. (1986). From the present perspective, this work has two drawbacks. The first drawback is that it is based primarily on data for the period 1950-70, a twenty year span that predates the present period of interest by more than a full half century. Of course, to the extent that the relation between structure and

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[30] This last heading would include a major role in designing, financing, and implementing infrastructure investments, either as sole public interventions, or in some form of public-private partnership.

income is stable, that may not be fatal. The second drawback is that the real focus of attention was on semi-industrial countries transiting a higher range of income levels. Some inferences can still be drawn but they offer a very bleak vision to LICs, that—under the standard pattern identified by the authors—rapid growth in per capita income really only becomes feasible once a country has slowly grown to at least lower middle-income status. This perspective is unhelpful and seems excessively pessimistic; it may reflect an earlier historical failure of many LICs to escape the poverty trap, rather than providing any evidence of the infeasibility of doing so. And indeed there have been a number of more recent cases of rapid growth within this category of countries.[31] In consequence, the evidence on structural transformation—which is provided mainly in the form of differential growth rates relative to these low averages—is also unhelpful in the present context.

Analytic approaches

Unfortunately, we do not have analytic tools that throw much light on this question. Growth theory has utilized highly aggregated models which cannot address the relation between structure and growth. Indeed, the reliance on models which are capable of supporting a balanced path virtually excludes it. There are a handful of heroic attempts[32] to set up models which can exhibit balanced growth while undergoing structural shifts, but they rely on such extreme assumptions about technology and preferences as to make them virtually unusable for specific country studies.

There are, of course, more detailed approaches, which do explicitly model economic structure, notably in the use of computable general equilibrium models (CGEs). However, the dynamics of these are often very rudimentary, and they have typically been used to model policy changes and other shocks in the relatively short-run. Even for these purposes, they place heavy burdens on the data, and on the modeller's preparedness to make heroic assumptions about key parameters. While in principle it would be perfectly possible to develop a CGE which addressed long-run growth incorporating structural change, it would take an unusually bold modeller to attempt this, and I am unaware of any that have done so.

Use of comparator countries

An alternative procedure is to examine the structure of a sample of countries which have already reached the 'target' level of per capita income, at the time they did so, and to infer what structural shifts are likely to accompany the transition from this sample.[33] This procedure is fraught with all sorts of difficulties and can be set up in many different ways. Obvious criticisms are that the past may be a very poor guide to the future, that 'one size won't fit all', and that any sample will be drawn from very different historical episodes.

Given these legitimate reservations, any seriously 'scientific' approach would not only be a very large undertaking, but subject to considerable scepticism. Nonetheless, it

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[31] Examples within SSA include Ethiopia, Mozambique, Tanzania, and Uganda.

[32] See, for example, Kongsamut et al. (2001), and Ngai and Pissarides (2007).

[33] The method is spelt out in detail in Appendix 1 of Bevan et al. (2003). It is further elaborated in Moyo et al. (2010).

may be worth applying this technique in a way that is much less ambitious, and aims only to be illustrative and anecdotal. Two such exercises are briefly described here, one for Uganda carried out in 2003, and the other for Tanzania, carried out in 2010.[34] Obviously the sample of comparator countries tends to expand over time, as more countries succeed in making the transition (though a few do unfortunately fail to sustain this, and fall back). The data source for these comparisons is the World Bank's World Development Indicators, which contains data for more than 500 variables for more than 200 countries over 50 years. However, there is a strong case for making comparisons in terms of purchasing power parity measures of national income, rather than those which simply translate domestic currency values at nominal exchange rates, as in the conventional (Atlas) measure. Since the PPP data in the WDI are not available before 1975, only 35 years are relevant here.

In the Uganda study, two groups were eliminated from the sample. The first consisted of very small (typically island) economies whose characteristics are likely to be idiosyncratic. The second consisted of countries which emerged from the former Soviet Union, a substantial number of which passed through the benchmark the 'wrong way' while in free fall from substantially higher income levels. In view of this, and the fact that they were typically emerging from a highly distorted configuration, it would be unwise to draw inferences from them about the relation between economic structure and income. This left around 15 countries in the sample, with the benchmark year varying between 1975 and 1997. What this exercise made clear was that even with something like 4000 data points available, there were very few snapshots of countries at the requisite income level. This is because most countries had either already cleared this hurdle by 1975, or had still failed to reach it by 1999, the last year for which data were available in this study. The few countries which fall in neither group effectively provide only one observation on structure even if they do not pass through the benchmark cleanly, but linger. In consequence, focusing on income as a filter means we do not have the luxury of also filtering for other relevant characteristics (like being landlocked or in SSA for example).[35] It would be possible to conclude that this type of descriptive comparative exercise was simply infeasible; however, it seems worth pursuing, with care, especially given the lack of alternatives.

In the later Tanzania exercise, there would have been more countries in the comparator sample, but it was decided to treat mineral exporting countries separately, since they have distinctly different characteristics. Hence there were again around 15 countries in the non-mineral exporting sample, obviously with a substantial, though incomplete, overlap with the earlier study.

Tables 1 and 2 provide some summary statistics for these two exercises. What is common to each is the implication of rapid growth in industry, especially in manufacturing, and contraction in agriculture. To converge on the mean of the two samples, industry would have to expand at an annual average rate of 9.5 per cent, and manufacturing at 10.5-12 per cent. Domestic revenue would have to growth at over 9 per cent, exports at 10-13.5 per cent and financial deepening (measured by the ratio of broad money to GDP) at 12 per cent.

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34 See previous footnote.

35 Of course, this would become possible to some extent if the larger and more formal analysis alluded to above were undertaken.

Table 1: Shifts in composition and required growth rates to achieve middle income status
Uganda illustration

	Agricul	Industry (Manuf)	Services	Export	Import	Invest	FDI	Saving	Aid	Budget	Revenue	M2
Group Mean % of GDP	18.2	34.5 (21.9)	47.3	24.5	29.4	26.1	1.1	23.3 (11.5)	3.7	-4.2	19.7	46
Uganda (01/02) % of GDP	40.5	18.9 (9.7)	40.6	11.8	27.7	20.7	2.4	5.5 (-2.0)	12.6	-5.4	12.1	14
Required Growth Rate (See note)	3.0	9.5 (10.5)	7.4	10.1	7.0	7.8		13.6	1.2		9.0	12.3

Note: At 6.7% GDP growth for 23 years.

Source: Bevan et al. 2003.

Table 2: Shifts in composition and required growth rates to achieve middle income status
Tanzania illustration

	Agricul	Industry (Manuf)	Services	Export	Import	Invest	FDI	Saving	Aid	Budget	Revenue	M2
Group Mean % of GDP	20.7	30.7 (17.8)	48.6	30.5	37.4	26.6	4.5	21.6	4.5		20.7	51.5
Tanzania (2009) % of GDP	28.4	24.0 (9.4)	47.6	13.2	29.0	25.0	3.9	17.9	12.9		16.2	27.5
Required Growth Rate (See note)	5.6	9.4 (12.1)	7.8	13.5	9.4	8.1		9.0	0.9		9.4	12.1

Note: At 7.7% GDP growth for 15 years.

Source: Moyo et al. 2010.

Required growth rates for various publicly provided stocks (for example skilled workers in medicine and education) are even more striking, given that these involve headcounts, rather than productivity-enhanced outputs. From the Tanzanian comparison, for example, numbers working in education would have to rise at 10.5 per cent per annum, and those in health at 10.25 per cent over the 15 year period.

Looking ahead over 15 or 20 year horizons is bound to be highly speculative, and is not something that can rely on conventional forecasting techniques. However, given the very long gestation period for the sorts of investment and institutional change that will be required to achieve the type of major transformation that is likely to be involved in sustained rapid growth, some sort of long view must be taken. Despite the problematic nature of these comparator calculations, they do at least provide some sort of working basis for constructing scenarios; and, to the extent that government has a view on how the future may differ from the past, the crude comparator based projections can obviously be modified. One important instance of this is the current wave of mineral explorations taking place, notably in Africa. Given the incompleteness of geological surveys, the rapid current discovery of mineral resources seems likely to continue, and these will have to be factored in to projections for many countries.

6   Growth and the size of the state

This section begins by saying what it is *not* about. It is not concerned with the large empirical literature which attempted to establish whether a (relatively) large public sector was inimical to growth, and often succeeded in doing so. Much of this work is vitiated by a very cavalier attitude to the role of the government budget constraint. It is not possible simply to have, for example, higher public consumption, without some offsetting change elsewhere in other public sector magnitudes. This could involve lower public investment, a higher deficit, or higher taxation. These cannot all be put into a regression, since that would involve estimating an identity. But what is dropped is crucial. What is estimated is the relative effect of the change considered against this omitted category, and leaving this as 'everything else' is neither constructive nor illuminating. Suppose instead, for example, that it is public investment that is dropped: then the regression effectively estimates the growth consequence of substituting consumption for investment.

Once this issue is properly addressed, the results become more various and more interesting. On the whole, public expenditures which are routinely thought to be 'productive' (in terms of growth) prove to be so, relative to those that are not (but which may be of high welfare value all the same, and not necessarily waste).[36] Results are also supportive in respect of taxes that are thought to be more or less distortionary than others. In principle, it should be expected that expanding an undersized public sector should be good for welfare and/or growth, as should contracting an oversized one. In other words, it certainly seems equally plausible that the state could be 'too small' as that it could be 'too big' from the narrow perspective of economic efficiency. This is certainly the perspective from mainstream economic theory.[37] Of course, the desirable size and scope of the state is not a narrowly economic question, but depends on ethical, social, and political perspectives. And whether, given these perspectives, the state is at a desirable size also depends on historical, social and political forces as well as economic ones.

Given this background, there are two related discourses. First, what should be the size and scope of the state? What should be its functions? Discussion of public 'provision' involves separate consideration of production and financing. Second, are the present fiscal arrangements for delivering these functions sustainable? This is partly a matter of flows (budget balance), but also of stocks (initial debt).

Both discourses are typically conducted with all magnitudes scaled relative to GDP. In both cases, there may be some adjustment required over time, if the initial position is deemed unsatisfactory and some rectification is required. Hence there may be a need to analyse dynamic trajectories. However, rectification aside, it is usual to assume that the answers to the central questions are stationary in the ratios. Typical assumptions are that public spending 'should be' x per cent of GDP and public debt 'should be' no more than y per cent of GDP. Alternatively, the stationary feature may be related to the flow ratios, in which case the stock ratios may evolve over time. For example, a balanced budget (stationary at zero balance) implies a fall debt ratio in a growing economy.

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[36] See Adam and Bevan (2005).

[37] See, for example, Barro (1990) and Barro and Salah-I-Martin (1992).

More recently, attention has turned to circumstances where it is inappropriate to restrict these discourses to the stationary case. One of these circumstances is the aging populations in advanced economies; another is the recognition of the costs and changes associated with climate change. Both of these circumstances imply major long-run fiscal stresses for the advanced economies, over and above the extended fiscal aftermath of the global crisis. This raises questions about the scale of future development aid flows. It also, as noted earlier, raises questions about the extent to which flows to assist developing countries to meet costs of mitigation and adaptation to climate change will be additional to development flows.

In any event, developing countries will have to face demographic and climate challenges of their own, to which these flows will make only a limited contribution. There is another major source of non-stationarity for the developing countries, however. This is because they will (hopefully) be achieving sustained per capita income growth, with associated structural and fiscal change. This paper has already noted the likely large scale of the structural changes, and some aspects of the associated fiscal challenges. However, the prospective changes go much further than these.

There are a number of stylized facts about the relative size of the public sector. It is typically much larger in richer countries, and it has typically grown over time; there are, however, substantial regional differences. What can we expect for the transition, say, from low- to lower middle-income status? And what might be an appropriate debt profile over time?

Size of the public sector—scale and scope in the long run

As noted, much inter-temporal analysis assumes that key fiscal ratios to GDP are stationary. There are several reasons why this may be a poor assumption, particularly for LICs.

In practice the government expenditure ratio tends to rise with rising per capita income (Wagner's law). According to taste, this may reflect some combination of a high income elasticity for public services (so that the marginal benefit of spending rises at a given spending share) and the fact that the deadweight burden of tax falls as income rises (so that the marginal cost of public funds falls at a given revenue share). There are a host of other reasons for non-stationarity. 'Inherited' debt may be at an inappropriate level. This may also be true of infrastructure. The future profile of concessional loans and grants is likely to have an uneven shape—possibly rising for a time, then falling.
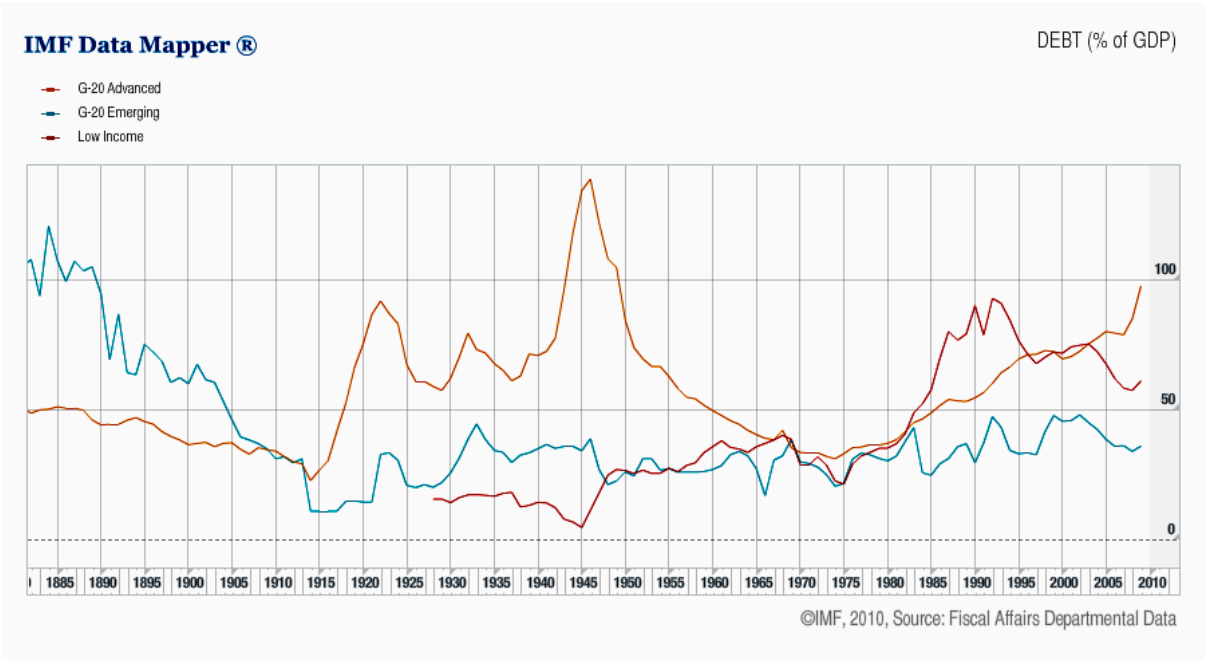
On its own, a high income elasticity would imply that government should run an initial surplus, build up its asset position, then run it down. On its own, a falling deadweight burden would imply that government should run an initial deficit, initially go into debt, then gradually repay this. With both forces operative, the result is ambiguous. Coupled with inherited debt, and possible infrastructure deficits, the optimal path is still more complex. The anticipated shape of aid flows is a further factor,[38] and so is some sort of risk assessment. In all of these dimensions, uncertainty is a feature, and prudential behaviour must reflect this. The IMF has tended to take a very asymmetric view of risk,

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[38] Aid volatility remains a major problem in the short term, but the point here involves uncertainty over a longer horizon.

with the damage caused by what proves, ex post, to have been excessive spending very much higher than the damage caused by what proves, ex post, to have been excessive caution. The existence, and if so, scale of this asymmetry is not obvious a priori, and should be susceptible to a cost-benefit type of analysis rather than simple assertion.

The bottom line from this discussion is that stationary fiscal ratios are likely to be the exception, that preferred profiles may be very far from stationarity, and that they will in any case be very country specific. While these considerations extend across the whole fiscal spectrum, particular significance attaches to the debt ratio, and a little history is instructive.

Figure 1: Debt to GDP ratios across country groups

©IMF, 2010, Source: Fiscal Affairs Departmental Data

The historical pattern is quite volatile, particularly for the advanced economies. The main sources of past, and possible future, rises have been wars, growth slowdowns, and financial crises. In the last of these, private debt is taken onto the public books, and public balance sheets may deteriorate sharply, even if the fiscal stance has been conservative. While current public debt levels have been experienced before, they are now accompanied by unprecedented levels of private debt. There is also the whole issue of contingent liabilities which are not included in the calculations, notably ageing populations, pension and health commitments, and rising dependency ratios.

The data also show some very rapid reductions from high debt ratios. There have been four main mechanisms for reduction, aside from economic growth itself; fiscal adjustment (including a redefinition of the state's obligations); formal default, restructuring, or forgiveness; high inflation; and financial repression. Recent work has stressed the central role of the last of these in bringing down debt ratios after the Second World War. However, inflation and repression are only available to reduce domestic debt ratios, so do not help address the problem of excessive external debt.

7 Inter-temporal considerations

7.1 The evolution of aid flows, domestic revenues, and other financing

Grants and concessional borrowing: concessionality and sustainability

In practice, there is no clear way of assessing sustainability in LICs. It depends on uncertain *future* access to concessional loans and grants, and on uncertain *future* growth performance. In addition, there may be a complete divorce between a country's capacity to absorb aid and any particular sustainability calculation. If the purpose of aid is to assist development, allocation should be according to need and the capacity to use it; the additional constraint of 'sustainability' may be unhelpful. This problem would be much reduced (but not go away, as discussed below) if all aid was in the form of grants. There is a distinction between optimal (or more realistically 'good enough') policy and a policy that is sustainable. Therefore, in the concessional context, sustainability is a very slippery concept, and possibly not the most appropriate one. Whether a given policy proves to have been sustainable depends on a very uncertain future. Current calculations involve very arbitrary rules. There has been substantial debt forgiveness in the past, for countries where growth did not become established. It seems likely that this would be repeated in similar future circumstances. Hence a concessional loan is really a mixed debt/equity instrument; if a country succeeds, it is a debt; if it fails, it is an equity stake. This arrangement is not formally upfront, but likely de facto, ex post. It is far from clear that this has desirable incentive properties. If it is felt that some combined debt/equity instrument is a desirable component in the aid armoury—and there is a real case for this—it would be far better to make the design explicit. This could easily be arranged both at the project level, contingent on project outcomes, and at the more aggregate level, contingent on national growth. In any event, ongoing concessional aid will be withdrawn at some point in the future, partly contingent on a country's growth. This point is considered further below.

The prospect for future aid flows

Prior to the global financial crisis, a substantial literature had examined whether existing fiscal policies in advanced economies were sustainable, while ignoring shifts in future obligations. The results were pretty mixed, being both study and country dependent. More recently, a smaller literature has begun to address the implications of these shifts, due for example to demographic trends. Typical results are that a fiscal adjustment of 4-5 per cent of GDP is required to achieve sustainability.[39] The fiscal consequences of the crisis imply a further need for adjustment. Recent IMF calculations suggest as much as a further 8 per cent on average, and nearly 12 per cent for the US.[40]

However, while these estimates suggest a bleak future for aggregate aid flows, the story may be very different at the individual LIC country level. Since it is reasonable to suppose that a rising number of LICs will succeed in exiting from that status, and given donor enthusiasm for continued focus on LICs, it seems plausible that donor flows to individual LICs may well be maintained or increased into the medium term. Since it is the more stable LICs that are most likely to achieve sustained growth into middle

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[39] See for example Hauner et al. (2007).
[40] IMF (2010).

income status, the remaining ones will probably contain a rising proportion of fragile states. As noted earlier, these would also be the target group if aid design switched increasingly to a focus on poor people per se.

Revenue issues

Taxes are distortionary, and impose deadweight losses, so that the marginal cost of a dollar of public funds (MCF) is typically greater (possibly much greater) than US$1. Since most tax systems are fairly arbitrary, having been driven by convoluted histories of *Realpolitik*, the MCF may differ markedly between different taxes. However, on average the MCF will rise as the total revenue share increases. (The public finance 'rule of thumb' is that the deadweight burden rises with the square of the tax rate.)

It is commonly accepted that it is more difficult to raise revenue in LICs. This reflects a number of factors, including among others; an informal sector that may account for 40 per cent of GDP on average; weak and often corrupt tax administrations; and habits of non-compliance.

This difficulty could have one or both of two consequences. First, it could lead to governments being smaller relative to GDP in poorer countries than in rich ones. Second, it could lead to there being higher deadweight losses from tax distortions in poorer countries. The first consequence certainly holds in practice. It is quite important to get some idea of whether the second does also. If it does, more stringent benefit-cost requirements would be required for tax-financed expenditures in LICs. The balance of advantage between borrowing and tax-financing of public investment might also shift.

Two pieces of evidence suggest that this second consequence may not hold. The first comes from efforts to estimate so-called 'tax effort', the other from direct attempts to estimate MCFs.

As already noted, on average the ratio of tax revenue to GDP rises with per capita income for low-income countries, a figure of 14 per cent would be typical, whereas a comparable high-income figure would be 36 per cent (middle-income countries mainly fall in between).

In principle, this marked difference in performance could be due either to lower tax capacity in less developed countries, or to lower tax effort. Empirical attempts to measure these suggest that median tax effort is rather similar in each group, at around 80 per cent, so the difference lies in capacity.[41] Hence, somewhat speculatively, tax capacity in LICs might average something like 17 per cent—18 per cent of GDP. A country with a ratio below, say, 15 per cent has scope materially to raise it.

The second piece of evidence relates to estimates of the MCF, and suggests that there need be no presumption that the MCF is systematically higher in LICs. Estimating the MCF is complicated; it is a classic second best problem and it needs a general equilibrium approach. However CGEs are now available for most countries. Until recently, most estimates have been for advanced economies, but now more attention is

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[41] Pessino and Fenochietto (2010). These types of calculation must be regarded with some scepticism, but they are not wholly devoid of information.

being devoted to developing countries. Recent estimates for SSA countries[42] suggest that the MCF might average about 1.2, which is not out of line with estimates for advanced economies.

The implication is that SSA countries have lived within their means, at least as regards use of the tax system to finance expenditure. They appear to have restricted their tax-raising efforts in line with their lower tax-raising capabilities. This is in line with the inference from the tax effort studies.

Other sources of financing

Domestic borrowing

A country at the IMF's 'safe' upper bound for domestic debt/GDP of 15 per cent, with a target for real growth of 7 per cent, and a target for inflation of 5 per cent, could in consequence cover a domestic deficit of 1.8 per cent[43] plus say an additional 0.7 per cent from seigniorage, or 2.5 per cent of GDP in all. This could be bigger if the growth rate rose as a result of public investment, provided the borrowing was used to increase this, and provided the funds were efficiently deployed.

A major concern about domestic non-monetary financing of the deficit is that it may drive up interest rates and crowd out private investment. There is very little empirical work on this relation for LICs. Other work does suggest a fairly weak positive relation, except where financial depth is low, when it becomes much more powerful. Hence international evidence provides little guidance, but some cause for caution.

A lack of financial depth, and of integration with the rest of the financial world, is generally a disadvantage, though paradoxically the latter feature may have helped insulate LICs from the worst ravages of the global financial crisis. In more normal times, the lack of depth causes a number of problems, including difficulties for the government and central bank in smoothing fiscal and foreign exchange fluctuations; for both public and private sectors in obtaining domestic credit in ways that do not interfere with each other; and in yielding a lack of instruments over which non-bank domestic financial institutions can diversify their asset portfolios. It also renders monetary policy much more difficult. In the latter context, some of the energy which has been devoted to enabling the adoption of relatively advanced techniques such as inflation targeting might have been better devoted to trying to accelerate financial deepening.

External borrowing

Non-concessional external borrowing has rapidly shifted onto the agenda for many LICs, as a consequence of several factors. These include extensive debt relief, improved macroeconomic performance, a relaxation of traditional donors' rules on mixed financing, and the emergence of non-traditional partnerships. In addition, there is the sheer scale of the infrastructure deficit, and the perceived need and potential feasibility of financing this from non-concessional sources.

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[42] Auriol and Warlters (2012).
[43] 0.15 x (0.07 + 0.5) = 0.018.

The picture is fairly confusing, with a heterogeneous array of new financing arrangements, many of which are semi-concessional; that is, they are more costly than the type of concessionality available under, for example, IDA, but appear to be substantially cheaper than conventional access to the financial markets. However, the true cost can be very hard to assess, since unfamiliar features are sometimes involved, such as currency swaps. There are also a variety of public-private partnerships, whose true cost can again be difficult to assess.[44]

There is also access to financial markets, for example via sovereign bond issues. So far, only a few SSA countries have gone down this route, and (excluding the Republic of South Africa) have paid around 9 per cent per annum on average. To put this figure in perspective, recent media discussions of the Eurozone crisis have repeatedly used 7 per cent as a signal that sovereign debt has become—or will shortly become—unsustainable. For the LICs, one difficulty has been how to assess the likely cost of borrowing for the first time, when a country does not already have a sovereign credit rating. Recent empirical work appears to capture existing ratings pretty well, so offers a means for making this assessment prior to such a rating.[45] However, the likely current cost, coupled with the earlier strictures concerning changes in the future sovereign financing climate, make this a route to be treated with extreme caution.

There are two separate issues here. One is that a country may pay a higher rate than is really justified, because it is unable to guarantee its political *bona fides,* so that a higher premium is demanded than is justified by the objective circumstances. The second is that 100 per cent debt financing of uncertain investments is inherently undesirable. With projects that can attract private participation, that may not be an issue; but with others, it will be. It would be desirable, following the earlier discussion of mixed debt-equity instruments, for donors to consider this type of device, for example for infrastructure support.

The primary budget balance

Revenues, expenditures, deficits, and debt are tied together by the primary budget balance—revenue minus expenditure exclusive of interest payments. In the absence of debt repudiation or debt forgiveness, all government budgets must satisfy the inter-temporal budget constraint, which states that the present discounted value of primary surpluses must be no less than the initial value of the debt. This could involve consideration of infinitely many paths that would satisfy the constraint, so some simplification is in order.

Consider the simplest story; suppose the growth rate (g) and the interest rate *(r)* are constant, and that the initial debt to GDP ratio is d. Let the ratio of the primary surplus to GDP be *s.* Then to stabilize the debt ratio, it would be necessary to maintain the surplus ratio at:

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[44] These arrangements include, for example, loans specifically tied to mineral exploitation, which often involve some package of ancillary developments (for example, for transport or power infrastructure, or for downstream activities) as well as the supply of materials, labour, and expertise. The loan component may look cheap, but it may be difficult to assess the relative cost of the bundle as a whole. This is exacerbated when the loans and repayments are separated into different components, denominated in different currencies.

[45] Gueye and Sy (2010).

$$s = (r—g)\, d$$

To lower the debt ratio at 100x per cent per annum, it would be necessary to set the surplus ratio at:

$$s = (r + x - g)\, d$$

which would fall over time, as the debt ratio fell.

If the government wishes to maintain the existing debt ratio, or has a target path for it; has a (realistic) target for growth; and is constrained in its revenue capability, and in the interest rates it is likely to face: then the path of government expenditure is determined. Of course, these values are jointly determined, so if this path was not acceptable something else (the debt target?) would have to give. This relaxation might be chosen as a temporary deviation to accommodate shocks, but it should not routinely happen in the absence of shocks, unless there is some change in fundamentals that makes revision of the debt target acceptable.

What should be the target or target path?

Targets have been quite popular. Some examples include the Maastricht criteria of the European Union, under which the fiscal deficit should not exceed 3 per cent of GDP, and public debt should not exceed 60 per cent of GDP. As previously noted, in its analysis of 'fiscal exit' from the high public indebtedness caused by the global crisis, the IMF uses two different targets for the debt to GDP ratio, 60 per cent for advanced economies, and 40 per cent for emerging economies.

The case of LICs is more complicated, for at least two reasons. First, they are usually in receipt of concessional loans, with very low interest rates. The convention is to use a market interest rate to compute the net present value of these debts (NPV), which is well below their nominal value. The difference is the 'grant element' of the loan. Second, they vary substantially in their past records, and it is believed that countries who are 'strong performers' can safely carry higher debt and deficit ratios. The IMF and World Bank carry out debt sustainability analyses using indicative thresholds for both debt and debt service. For example, for a strong performer, these are that the NPV of debt should be less than 50 per cent of GDP, 200 per cent of exports, and 300 per cent of budget revenue. As regards debt service, this should be less than 25 per cent of exports, and 35 per cent of budget revenue.

For a typical LIC, with exports around 25 per cent of GDP, and revenue 17 per cent of GDP, then the components in each set of thresholds are very similar, but the first set is much more likely to bind. Many countries have gone a step further and adopted various numerical fiscal rules. A fairly comprehensive illustration, suggested to Tanzania informally through an IMF working paper, though not adopted (because the authorities then had less formal but more stringent policy restrictions in mind), had a primary medium term 'anchor' and three benchmarks.[46] The anchor was a limit on the debt ratio of 40 per cent. The benchmarks each applied annual limits: net domestic financing to be

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[46] Kim and Saito (2009).

less than 2.5 per cent of GDP; non-concessional external borrowing to be less than 2.5 per cent of GDP; the change in the ratio of government spending to GDP to be less than 3 per cent per annum.

However, there are (at least) two problems in constructing rules, depending on their rationale. One rationale is to provide relatively automatic control of fiscal policy. However, fiscal policy has to respond to various contingencies. If the rules are kept relatively simple, they do not handle all contingencies well. In attempting to construct more flexible rules, they rapidly become too complex to be operational. A second rationale is to prevent irresponsible fiscal behaviour. However, if there is political commitment to fiscal responsibility at the highest level, rules are probably unnecessary; and if there is not, rules are unlikely to be successful.

In consequence, it may be better to think in terms of fiscal indicators and target bounds, rather than rules. There are two advantages to adopting a regime of indicators, rather than of rules. The first is that it is easier to be flexible, when appropriate, and temporarily miss an indicator, without either having to break a rule, or to behave inflexibly even when there is a case for relaxation. However, it is important to allow this flexibility only with justification. A model that might be adopted is along the lines of UK Monetary Policy, where the Governor of the Bank of England has to write to the Chancellor of the Exchequer, to explain why the inflation target was missed, if it was missed by a material amount.

The second advantage is that it is possible to track a wide variety of indicators, if they are all thought relevant to the good conduct of policy, whereas it is impractical to have too many moving parts in a rule-based system. More generally, having a range of clearly articulated indicators, together with the rationale for these, is likely to be conducive to a more informed debate about policy design and performance.

Discussion on the proper way to assess fiscal strategy remains very open. The Fund's interpretation of fiscal space has become increasingly focused on safe debt limits.[47] There are a number of more nuanced approaches in the literature, and this remains an active area of research. In particular, there is much discussion of fiscal rules both as commitment devices and as helpful indicators.[48]

7.2 Discounting

There is a fairly wide consensus amongst economists that the discount rate should be expressed as the so-called Ramsey equation, $r = \rho + \eta g$, where r is the consumption rate of interest, used for discounting consumption equivalents at different dates, ρ is the rate of pure time preference or impatience, g is the growth rate of per capita consumption (driven by investment productivity), and η depends on how rapidly the satisfaction provided by an extra dollar of consumption declines as consumption increases.

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[47] Ostry et al. (2010).

[48] See, for instance, Buiter (2004).

Unfortunately, there is wide disagreement about the values to be assigned to these parameters. For example, in the climate debate, Stern (2007) had $\rho = 0.1\%$, $\eta = 1$, $g = 1.3\%$, *so* $r = 1.4\%$, while Nordhaus (2007) had $\rho = 1.5\%$, $\eta = 2$, $g = 2\%$, *so* $r = 5.5\%$. With no great differences in the *scientific* modelling, Stern advocated large immediate action, Nordhaus a slow start, followed by very gradual 'ramping up' over the next century. In addition, with uncertainty, there are powerful arguments that the discount rate should fall over longer horizons, rather than being assumed to be stationary.[49]

The situation is even more complicated in low-income countries. They are capital constrained, with relatively high rates of return in some sectors (often including a substantial risk premium if financed by private foreign investors). They also have access to highly concessional finance. However this is usually sector specific, is constrained in volume, and is of finite, and usually unknown, duration. Hence there is very wide range of different interest rates, all of which may be relevant to the discounting issue. As previously noted, the marginal cost of public funds from taxation is also likely to be non-stationary. Given the large shifts in so many economic variables that may be expected in the future, it may be necessary to shift between alternative sources of financing, even within a particular type of project, with consequential, but uncertain changes in the appropriate discount rate. All this provides a real challenge in determining inter-temporal trade-offs. As very often proves to be the case, analysis of economic choices in LICs is *more* not *less* complicated than for more advanced economies. Establishing an appropriate procedure for these countries remains not a work in progress, but a work yet to be undertaken.

7.3 Expenditure criteria

Technical criteria for public expenditure are quite complex enough even for advanced economies. However, as an illustration of the preceding conclusion, they are substantially more so for LICs, for whom government faces a wide variety of different interest rates. These arise from concessional borrowing, non-concessional domestic borrowing, and non-concessional external borrowing. Furthermore, circumstances are much more prone to change, due to structural change associated with successful development, the potential but uncertain withdrawal of concessional finance, and higher volatility. This makes rational inter-temporal choice much more difficult. The remainder of this section focuses on two complications arising from concessional financing of current expenditures and the limited appropriability of returns to public capital.

Concessional financing of current expenditures

Concessional aid will be withdrawn at some point in the future, partly contingent on a country's growth. To accommodate this, some combination of three changes will be required. The first is an increase in the domestic revenue ratio. The second is a reduction in the government expenditure ratio. The third is a shift between low-cost concessional borrowing and higher cost external or domestic borrowing. However, the

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49 There are a number of these arguments, but the central one can be illustrated as follows. Suppose we are uncertain whether to discount the future at a high or low rate. At the high rate, the weight we attach to an event in the distant future is very small, whereas at the low rate, it is quite high. Whatever averaging procedure we adopt, the high weight will dominate over the low one. Hence the low discount rate becomes dominant over very long horizons.

last type of substitution may not be possible: a reduction in concessional finance may require a complementary *reduction* in non-concessional finance to be compatible with a given primary surplus ratio.

Consider a grant-financed recurrent expenditure increase. The concern about this expansion in recurrent spending, even when grant financed, is that the grant will diminish or disappear at some future date, but that it will prove difficult or impossible to reduce the expenditure that has been induced. This requires an 'exit option' from the increased aid. Suppose that the additional expenditure is e and will produce benefits of b. If the arrangement were indefinite, the recipient should accept provided $b > 0$, even if $b < e$.

Now suppose that the grant is expected to disappear in year T, that the expenditure will have to be maintained thereafter, and financed by domestic tax with an MCF of $(1 + \theta)$. Then it may be appropriate to 'look a gift horse in the mouth'; the government should only accept the initial grant if:

$$b > e(1+\theta)e^{-rT}$$

There would be similar, but more severe problems if the expenditure were financed by concessional borrowing.

Public investment criteria

A large and rapid expansion of public investment is very risky. The estimates noted earlier suggest that in developing countries it has taken well over US$2 of investment to install US$1 of public capital. Much more coherent procedures for appraisal, selection, implementation, and evaluation will be needed if a future expansion is not to be very wasteful. However, these skills have atrophied, even within the World Bank. It also needs consistent treatment of different sorts of payoff. One important distinction is between projects which have benefits appropriable by government; those whose benefits are not appropriable by government, but where these benefits accrue as monetary income to the private sector; and those whose benefits accrue as non-monetary income to the private sector. For plausible scenarios, it turns out that the key distinction is between the first case and the other two, which both require a more stringent benefit-cost test.

Hence the distinction often made between 'developmental' and 'financial' returns is second order to public investment decisions; appropriability is the central issue, reflecting the underlying financing (and repayment) concerns.

8   Conclusions

During volatile times, there is a temptation to focus on the short-term. However, it is then even more important to maintain a longish perspective. In many cases, current choices cast very long shadows, and the interval required to execute institutional and infrastructure investments may be very extended. Given the uncertainties of economic life, forecasting even a short way ahead is fraught with difficulty, and over longer

horizons it is infeasible. In consequence, it is necessary to find other ways of projecting future scenarios, perhaps more of an art than a science; obviously, this has to be rolling process, as old projections become falsified either by inadequacies in their design, or because of unanticipated changes in circumstances. Unfortunately, LICs have both more volatility in the short-run, and face larger changes in the long-run, while also having fewer analytic resources with which to address these. Some of these issues are country specific, but many are systemic. Hence there are two related agendas. One is for the country authorities themselves, the other for the economic community more generally, not least for economists in the IFIs, the donors, and the academic community. Since these agendas overlap, no attempt is made here to separate them, though areas in which donors should lead these efforts are indicated. A list—though doubtless not exhaustive—of items that should be included follows:

- Country-specific versions of adjusted net savings should be constructed, taking environmental degradation as well as mineral depletion into account. This needs to be done for both private and public sectors. Over the long-run, a country can only grow proportionately to its wealth, and public and private sectors' net worth must also be commensurate with their relative role in the economy. Countries will need assistance in undertaking these exercises.

- The preceding work would also provide an input into efforts to decide how best to mitigate and adapt to environmental degradation: this includes, but is by no means restricted to, the impact of climate change.

- There needs to be a systematic appraisal of the main shape of economic transformation implied by a country's growth targets, and what that implies for government actions. One method of initiating this is discussed in the text. Given the incompleteness of geological surveys, notably in SSA, and the rapid current discovery of mineral resources, these will also have to be factored in for many countries.

- Similarly, a view needs to be developed of the relative size and scope of government relative to the economy, as the economy grows. This involves projections, relative to GDP, of domestic revenue, and of the main components of public expenditure. The mineral resource point applies here as well.

- A closely related exercise involves developing a target path for both internal and external debt. This will require use of projections, but also an exercise of judgement. Current procedures for debt sustainability analysis, as underwritten by the World Bank and the IMF, are very inadequate, and a major effort to improve these is required.

- A complement to these exercises is that much more work needs to be done on the asymmetry issue. What are the costs of excessive prudence, and what are the costs of excessive optimism in fiscal matters? How should this inform public choices? These are systemic issues, and beyond the capacity of LICs to address in more than a very partial way, but something that donors could examine on a co-ordinated basis.

- Much effort has been put into attempts at tax reform; while these should continue, there also needs to be systematic study of the costs of the existing imperfect system, not least in what it implies for the marginal cost of public funds. The international community has been too prepared to subscribe to a very uniform view of tax design, based largely on models that are particularly inappropriate to countries with inadequate tax administrations and large informal sectors. A more focused study of tax design in LICs is needed.

- Serious attention needs to be given to resuscitating cost benefit analytic capacity, as well as to modalities for improving other elements in the public investment process. CBA fell into disrepute following its high popularity with the IFIs and donors in the 1970s and 1980s. However, very poor performance of many public investment programmes since then demonstrates that existing procedures are grossly inadequate. The capability to conduct competent CBA has atrophied both in the World Bank and in the donor community more generally, and a concerted effort is required to rebuild this competence. This is a matter on which donors need to provide a lead.

- The problem of how to handle the discounting issue, given the very wide range of relevant interest rates faced by LIC governments, has been very little explored and requires real attention. Again this requires concerted attention by donors.

- Expenditure criteria need to reflect a menu of costs and pattern of returns, given the financing options. While growth is not the only criterion, the likely growth trade-offs from higher taxes, increased debt, and deficient infrastructure is a good place to start. Yet again, this is an area in which donors could make a concerted effort to fund methodological improvements.

- Many SSA countries have a profound infrastructure deficit, which is likely to be deleterious to growth if they do not begin to address it soon; but if they do, this poses severe financing problems. Much work is needed to explore these trade-offs. One potentially very productive avenue would be for donors either to create mixed debt-equity financing instruments for infrastructure finance as part of the aid programme, or to find ways of supplementing private financial arrangements with a view to constructing a composite which mimics the same features.

- In many cases, these investments are likely to have severe ongoing consequences for the future recurrent budget, reflecting operations and maintenance expenditures, financing costs, and limited appropriability of the project returns.[50] This should have implications both for donor technical assistance and for the design of budget support.

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[50] Limited appropriability means that, while the project may have high economic returns, these accrue largely to the private sector, and cannot be recovered by government through user charges and the like. Hence, even though the project may have a high social return, it may impose ongoing budgetary costs that need to be financed.

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