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Fiscal Challenges Facing Tanzania

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March 2012

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Fiscal Challenges Facing Tanzania

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Executive Summary

The budget

In the fiscal arena, Tanzania has performed very well over much of the past decade, but has experienced difficulties in the last few years. These were partly due to food and fuel price shocks, followed by the global financial crisis, but they were also internally driven, not least by the desire to improve social sector performance relative to the MDGs. During these years, there was a remarkable increase in spending, particularly in recurrent spending, and since revenue performance was modest, this was accompanied by a sharp deterioration in the deficit. Especially during fiscal year 2010/11, a very optimistic view of both domestic and external resources led to a very sharp budgeted increase in expenditure, which proved infeasible to implement, and had to be cut back, largely at the expense of development spending. There seems to have been a temporary failure of the budgeting process. It is very important to take steps to prevent a repetition of this, and to re-establish the tradition of prudent budgeting which characterized Tanzanian fiscal operations in earlier years.

Domestic revenue mobilization

The flattening out of the revenue to GDP ratio which followed the global crisis led to some anxiety that this might represent a secular change. However, the ratio has increased substantially in the current fiscal year, and it is expected to continue to rise, though not at the very high rate achieved some years back. Tanzania's revenue performance is now not out of line with other SSA countries, and it would not be reasonable to expect any very rapid rise, though there is clearly serious scope for reducing exemptions, or so called tax expenditures, which have cost something like 25% of net revenue over the last decade. Exemptions tend not to be effective in encouraging economic activity, so eliminating them tends to be relatively costless (economically, if not politically). Where exemptions cannot be eliminated, they should be explicitly costed.

Taxes inflict deadweight losses by distorting private behaviour, and these losses rise sharply as the tax rate rises. This means that the marginal cost of public funds exceeds a dollar for each dollar of revenue raised, and this marginal cost schedule is upward-sloping. Attempting to increase revenues by raising tax rates may therefore be very costly. In any event, it is very important to take the marginal cost of funds into account in making expenditure choices. Gas discoveries may lead to very substantial additional revenues, but these will not materialize until 7 or 8 years' time at the earliest.

Recurrent costs and appropriability

Public investment imposes a variety of budgetary costs in addition to the initial capital costs and/or the on-going costs of servicing any debt incurred in financing these. In particular, there are recurrent costs in the form of operating expenses and routine and periodic maintenance (O&M). Ideally, the decision as to whether to proceed with an investment will not only assess the social returns from the investment, but also take into account any budgetary implications, if the project is not exactly self-financing. Unfortunately, responsibility for capital and recurrent costs typically falls on different parts of government,

and decisions may not be well integrated. The root of the problem lies in limited appropriability. This means that the government either cannot, or chooses not, to levy user charges, or other methods of cost recovery, at a level that captures all of the investment's return. One implication is that with incomplete appropriability, projects need extremely high benefit-cost ratios if they are not to cause budgetary problems. If these can be resolved by viable tax increases/expenditure reductions, they will be worth undertaking, even at much lower benefit-cost ratios, though these will still need to be substantially higher than for a comparable private or fully appropriable project.

Financing infrastructure development

The future of concessional financing is unclear, but it seems highly likely that it will continue to taper off relative to GDP, with the uncertainty being about how fast this tapering will be. Given the scale of the country's infrastructure deficit, and the relatively modest domestic revenues available, it will be necessary to continue exploring non- and quasi-concessional financing options. The government has already negotiated a syndicated bank loan, and there seems further scope for this device. It has also considered issuing a sovereign bond, but the merits of this route seem more questionable. There are also several very large Chinese loans, mainly associated with natural resources, but it is hard to establish quite what the comprehensive terms of these packages are, and hence what if any level of concessionality they carry. All of these arrangements have complex exchange rate implications that need to be addressed carefully. There is also the vexed issue that, however financed, investment efficiency may be low.

Tanzania is also actively pursuing a wide range of public private partnership arrangements. Its previous experience with these has been dismal, usually ending in failure, but those largely involved attempted resuscitation of failing public enterprises, with insufficient attention to the underlying problems. The prospective PPP arrangements are more focussed on greenfield operations, and should be easier to manage. However, there are a number of concerns, for example about cross-subsidization. And the problem of what to do with the public enterprises remains.

Debt sustainability, fiscal rules, and fiscal space

Tanzania is at little risk of breaching any reasonable debt sustainability threshold, but there is a danger that repeated "successful" DSAs will divert attention from some real issues involving the microeconomics of investment choice and associated budgetary impact. A great deal of work is required to ensure that the scale, and more especially the composition, of public spending is compatible not only with the goals of government, but also with its own internal logic, notably the connection between capital and recurrent expenditure, and with the limitations on available instruments, notably the twin problems of incomplete appropriability, and of the deadweight burden of taxes. Recent budgetary events have also raised the issue of whether Tanzania should adopt some form of fiscal rule. It seems better, instead, to expand something that is already in place, the use of fiscal indicators which signal when problems may be emerging and/or the steps that should be taken to avoid these.

1: Introduction

In the fiscal arena, Tanzania has performed well over much of the past decade, as was noted by the IMF in its 2011 discussion of revenue mobilization in developing countries, where it gave Tanzania (along with El Salvador and Vietnam) as one of its three examples of "strong performers".[1] Revenue performance, measured by the ratio of revenue to GDP, improved rapidly; and a combination of prudent macroeconomic policy and debt relief ensured that the country had some fiscal room for manoeuvre, or in the modern jargon, "fiscal space" or a "fiscal buffer". With the advent of the global financial crisis in 2008, some of this space was used up, partly as a consequence of automatic impacts, for example on revenue collections, and partly as a consequence of deliberate policy choices, such as the "rescue plan" announced in the budget speech of 2009.

Subsequently, after the peak of the crisis had passed, revenue performance seemed to have flattened out, raising concerns as to whether this was temporary or marked a fundamental change. More recently, revenue growth (relative to GDP) has resumed, and it is expected that that will continue, though at a more modest pace than hitherto. There was also a sharp increase in the budgeted deficit, raising concerns about the sustainability of fiscal policy. Steps have been taken to address this.

Over the longer run, Tanzania faces substantial challenges in finding ways to finance large infrastructure programmes, as well as large social sector programmes, in ways that do not threaten future fiscal sustainability.

These are very large issues, and this paper can only address them in an incomplete way. An extensive discussion of many of the relevant arguments was provided in a previous paper by this author, and those arguments are not repeated here.[2] In a sense, the two papers are complements, and could be read in conjunction with each other. The intention of the present paper is to ensure that the main issues that need to be addressed are at least tabled, and to provide some ways of thinking about them, rather than providing any definitive solutions. Two important related issues that are not explored in depth are projections of future concessional aid, and explorations of alternative assumptions within the Debt Sustainability Framework, though they are discussed briefly. Nor will the scale of Tanzania's infrastructure deficit be discussed here: it was addressed at some length in the earlier paper, and has received detailed consideration both in GoT's five year development plan, and by the Africa Infrastructure Country Diagnostic (AICD).[3]

The paper is structured as follows. Section 2 looks briefly at some of the main fiscal magnitudes in the budget, and their recent and likely future evolution. Section 3 then looks in more detail at domestic revenue mobilization, covering tax and non-tax revenues, and examining the issue of exemptions. It also looks at the issue of tax effort, and the associated

[1] IMF, 2011b.
[2] Bevan, 2010.
[3] United Republic of Tanzania, 2011a; and Shkaratan, 2012.

marginal cost of public funds. Section 4 considers the question of recurrent cost, and the way in which an increase in infrastructure investment may impact on the recurrent budget. Section 5 looks at how the investment may be financed, both via loans and via public-private partnerships. It also looks at the efficiency of the investment process. Section 6 discusses how to think about fiscal space and whether there is a role for fiscal rules, and section 7 concludes.

Before concluding this introduction, the author owes at least some of his readers an apology. Pieces of fairly straightforward algebra are scattered in several places in the text. Attempting to relegate these to appendices made it very difficult to introduce the numerical and analytic illustrations that are central to the paper's argument in an effective way. Hopefully, they will clarify the argument for some readers, and can be skipped over by those prepared to take the derivations on trust.

2: The budget

2.1: The shape and scale of the budget - recent evolution

Table 1: Selected budget ratios 2007/08 – 2011/12

	07/08	08/09	09/10	10/11	11/12 (projected)
Total Revenue	15.9	16.2	15.4	16.5	18.1
Tax Revenue	14.7	15.3	14.6	15.3	15.8
Total Expenditure	22.8	25.7	27.0	26.9	32.0
Recurrent (Current)	14.9 (17.0)	17.7 (19.3)	18.3 (22.9)	19.2 (21.9)	19.6 (23.6)
Development (Capital)	7.9 (5.7)	8.0 (6.4)	8.6 (4.0)	7.7 (5.0)	12.5 (8.4)
Capital/Development	72%	80%	47%	65%	67%
Balance before grants	-6.9	-9.5	-11.6	-10.4	-14.0
Balance after grants etc.	-1.7	-4.5	-6.4	-7.0	-7.1
External financing	3.2	3.6	4.6	3.4	6.1
Domestic financing	-1.5	1.0	1.8	3.6	1.0

There has been much analysis of recent fiscal events, and this discussion will be very brief. Table 1 gives a sample of key fiscal aggregates: it demonstrates that Tanzania's recent fiscal history has been quite eventful. While the global crisis, and previous food and fuel price shocks, definitely contributed substantially to this history, their contributions were certainly not played out against an otherwise stationary picture. Much of the change was internally driven, not least by the desire to improve social sector performance relative to the MDGs.

2.2: Commentary

After its very rapid growth in previous years, the revenue ratio flattened out, but is now projected to grow substantially in the current fiscal year. There has been a remarkable increase in spending, especially if the projection for the current year is accurate (there seem to be a number of versions, but they are reasonably close to each other). Over 2007/08 to 2010/11, this was driven primarily by recurrent spending, but in the current year by development spending. However, actual capital expenditure averages only two thirds of development expenditure, though this ratio appears to be quite volatile. Since revenue growth has been modest (relative to GDP), there has been a sharp deterioration in the deficit with a correspondingly raised financing requirement. Even so, budgeted amounts were even more ambitious than the out-turns.

Tanzania was one of the earliest countries to arrange a Policy Support Instrument (PSI) with the IMF. This instrument was designed to permit a country that no longer had need of the Fund's on-going financial support to still maintain a relatively intense policy dialogue with the Fund, and with the Fund signing off on the country's programme. This was perceived as having the dual advantage of maintaining the dialogue, while also sending a signal to bilateral and multilateral donors, and to other possible partners more generally. One consequence is that in addition to the usual budgeted, provisional, and actual fiscal figures, there are also figures generated as part of the PSI programme.

For years before 2010/11, there is a reasonable correspondence between the various figures. However, during that year, a large gap opened up between the programme figures and the budget figures, with actuals reverting much closer to the programme figures. Thus for revenue, the programme, budget, and actual % figures were 16.3, 17.8, and 16.5. For total expenditure, 27.1, 31.0, 26.9. However, there was a very different sequence for recurrent expenditure, 17.5, 20.0, 19.2, as opposed to development expenditure, with 9.6, 11.0, 7.7. Two things emerge from this very brief comparison. First, for both total revenue and for total expenditures, the programme was a pretty good forecast of what was achieved, while the budget was very over-optimistic, to the tune of 1.3% of GDP on revenue, and a staggering 4.1% on total expenditure, reflecting over-optimism in respect of both domestic and external resources. Second, the rectification of the over-optimistic budgeted total expenditure was borne disproportionately by the development budget, which fell by 3.3% of GDP relative to budget, and even by 1.9% relative to the programme.

These discrepancies appear to have been largely rectified by the current fiscal year. However, they raise very worrying questions about the budget process, which appears temporarily to have lost touch with reality. The fact that budget out-turns were not disastrous, though the composition of expenditure was very adversely affected, is largely down to the existence of an effective cash-budgeting mechanism.

GoT requested an IMF Technical Assistance Mission to look at budgetary issues,which made a very long list of recommendations as to how to improve the process.[4] However, while these process improvements are doubtless very important, it will be absolutely critical for them to be backed up by the political will to ensure that the budget mechanism seriously addresses the twin issues of what resources are available to GoT, and how best to deploy them.

2.3: The shape and scale of the budget – looking forward

Clearly continued expansion at these rates is infeasible – the question is whether aggregate spending should be stabilized at the current level or cut back. The consensus is the latter. The five year development plan envisages stabilizing total spending at 28% of GDP; the current PSI envisages 28.2% in 2012/2013, and 27.1% in 2013/14 though this would require 1.1% and 1.7% respectively of "unidentified fiscal measures", that is to say expenditure cuts.

There is also the issue of what future revenue performance can be achieved: the IMF stresses how much revenue is lost from the plethora of exemptions, but past experience suggests that reducing these poses substantial political and managerial problems. The projection for the current year is 18.1%; the current PSI projects a little less for the coming two years, but those projections pre-date the recent upturn in performance; the development plan has a target of 19%. While it is the specific circumstances of Tanzania that matter, it is worth noting that Tanzania is not now out of line with other low-income countries in Sub-Saharan Africa.

While it is not to be relied on for policy-making, there is some evidence to suggest that it would not be wise to push too aggressively for a substantial and rapid rise in the revenue ratio. This evidence consists of work on "tax effort" and on the marginal cost of public funds. All of these issues are addressed in more detail later in the paper, starting with the revenue questions.

3: Domestic revenue mobilization

After an extended period during which domestic revenue stagnated at very low levels, the fairly comprehensive reforms to macroeconomic policy, tax policy, and tax administration undertaken earlier finally began to yield a serious payoff in the early 2000's. The revenue to GDP ratio rose rapidly from 10.8% in 2002/03 to 16.2% in 2008/09.[5] With the onset of the

[4] IMF, 2011d.

[5] Scaling revenue and other fiscal magnitudes relative to GDP has its drawbacks, particularly when the GDP figures are themselves subject to substantial revision, as was the case in Tanzania during this period. Thus, a claim that revenue has reached the regional average can be undone by an upward revision in GDP which then

global financial crisis, this rise temporarily went into reverse, and the ratio fell back to 15.4% in 2009/10, before recovering to 16.5% in 2010/11. This behaviour naturally prompted the question as to whether this relative stagnation simply reflected the international recession and GoT's response to this, or whether it marked a long-term shift in trend, because the improvements in tax policy and administration had begun to run out of steam. This section starts by looking at the evolution of tax revenue; then considers exemptions or tax expenditures; it looks much more briefly at non-tax revenues before turning to a consideration of tax effort and the marginal cost of public funds.

3.1: The evolution of tax revenue

The latest figures suggest that the ratio for fiscal 2011/12 may come in at around 18%, which argues in favour of the first explanation, so that the underlying growth trend is still on-going. The question is, how long may this continue, and at what rate? Since the factors affecting tax and non-tax revenue are somewhat different, it is useful to consider them separately. Over the last ten years, the contribution of non-tax revenue has been trendless at around 1% of GDP, a low figure by comparison with comparable countries. Hence the upward trend in the revenue ratio to date is attributable entirely to the performance of taxes: the tax to GDP ratio rose from 9.8% in 2002/03, through 10.8% in 2004/05 to 15.3% in 2008/09, dipping to 14.6% in 2009/10, before recovering to 15.3% in 2010/11, and rising to an anticipated 15.8% in 2011/12. The picture is therefore one where the ratio grew at a very unusual rate in excess of 1 percentage point per annum over the four years 2004/05 to 2008/09, stagnated over the two years 2008/09 to 2010/11, and then is (probably) growing at 0.5 percentage points during the year 2010/11 to 2011/12.

The Tanzania Revenue Authority (TRA) is reasonably confident that this more recent, less breakneck, rate of increase can be sustained for a few years ahead, so that the tax ratio could rise to, say, 18% over the next five years. Achieving this will require further improvements in tax administration, which should be achievable with much more efficient information processing being brought into play, as well as at least some progress on reducing tax exemptions. These require somewhat more detailed discussion.

Looking further ahead, there are two main issues. The first is that, with a high target growth rate and the intention to achieve middle income status by or before 2025, many features of the economy will change, and the tax ratio may be expected to rise. Interestingly enough, the "comparator country" analysis of what this might involve carried out by IGC suggested a revenue ratio of 21%.[6] This implies a relatively modest upward trend over the next couple of decades at perhaps around one quarter of one percentage point per annum. This analysis presupposes a relatively steady progress through investment and improved productivity.

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gives the lie to that claim. However, there seems to be no practical alternative as a basis for assessing fiscal performance and fiscal challenges.

[6] Moyo et al 2012.

However, that assumption is likely to be invalidated if current forecasts of the volume and value of Tanzania's gas reserves are substantiated. Assuming they are, one highly speculative calculation suggests that government revenues from this source might grow very steeply from about 2020 through to about 2045, with an extended peak of perhaps 10 years or so at US$2500 million per annum, something like 10% of current GDP. This sounds tremendous, being better than 50% of current domestic revenue. However, if the economy indeed grows at 7% per annum, GDP will rise over two decades to nearly 4 times its present level, so these numbers become 2-3% and 12% respectively. The revenue gain from these (highly speculative) projected gas flows would still be substantial relative to the economy, but not thoroughly game-changing. This reduces the risk of induced problems like Dutch Disease, threats to good governance, and outright corruption, but it also reduces the scope for dramatic beneficial change.

There are two implications to be drawn from this. First, the real revenue gains are likely not to accrue for 7-8 years at best, so do not directly assist in providing resources for GoT's pressing current needs. Nor would it be wise to attempt directly to mortgage these future revenues. However, to the extent that the reserves can be established with reasonable certainty, they will fundamentally alter the time profile of Tanzania's resources relative to its expenditures. It would in consequence make perfectly good sense to take a more relaxed view of medium term public debt levels. Making estimates of how much more "fiscal space" is available would be relatively straightforward once reliable lower bounds for the resource volumes can be established.

The second implication is that Tanzania has a decent window, before the revenues arrive, during which to design and implement good practice arrangements to deal with the revenues when they start flowing. These could include, for example, but are not restricted to, some sort of sovereign wealth fund. It is appropriate to use the proceeds from running down one asset (gas reserves) to build up others, and ultimately a capital scarce country is likely to reap higher returns from investing in physical and human capital within its own boundaries than from investing in foreign financial assets. However, increasing physical and human investment sharply usually runs into sharply diminishing returns; it is not wise to try to spend an income "pulse" from reserve depletion according to the same time profile as the pulse, as opposed to doing so over a more extended horizon. This involves a temporary build-up, followed by a run-down, of foreign financial assets. The composition of these assets needs careful management by a specialist agency. How the profile is managed is an entirely different and more difficult question, most especially in a capital-constrained economy.

3.2: Tax exemptions or tax expenditures

These have been a central topic in all discussions of tax policy and performance in Tanzania for several decades. They are prevalent and costly, and new ones are invented faster than old ones are removed or reduced. TRA regularly reports on these and, in its latest, estimates the value of exemptions as averaging 3.5% of GDP between 2003/04 and 2007/08, before

declining to 2.7% in 2008/09 and 2.1% in 2009/10.[7] It contrasts these figures with averages of 1.1% for Kenya and 0.4% for Uganda. It should be noted that with very minor exceptions, these figures are for indirect taxes only.

TRA (2012) also notes that "other studies [of Tanzania] indicate that exemptions and tax incentives are as high as 6% of GDP", quoting the African Development Bank (2010). However, it appears that the Bank is itself merely quoting a study by the Policy Forum (2009). This study quotes the TRA's own figures, but in addition makes guesstimates as to both direct tax exemptions awarded to mining companies as well as of revenues lost from them because of alleged under-reporting of profits. In effect, these calculations impute a further 3% of GDP in lost revenue, but the detailed basis for them is unclear, and it is also unclear what scope their might be for reducing the amount of revenue lost. However, it is widely acknowledged that the past tax treatment of mining was unduly generous, that there are some limited possibilities for partly rectifying this by negotiation, and that, looking forward, the tax system in respect of mining is now much better designed and no longer unduly generous.[8]

Returning to the TRA's own computations, and looking at the average over 2006/07 – 2009/10, the overwhelming bulk of the losses were on VAT (57%) and Import Duty (41%). The main groups of beneficiaries were holders of Tanzania Investment Centre Certificates (45%), private companies (20%), Donor-funded projects (9%) and Mining (8%).

The TRA points to the large empirical literature that shows that tax exemptions and incentives – tax expenditures, as they are often called - rarely achieve their supposed goals, and makes a wide variety of sensible recommendations to regularize and reduce them. These draw on visits made to investigate practice in Brazil, Georgia, Mauritius, and Peru. One important set of recommendations covers the case where some tax expenditures are retained. It is worth quoting these in full:

Recommendations on Tax Expenditure Analysis and Reporting (as excerpted from TRA 2012, page 54)

> (a) Legislate for comprehensive analysis and reporting of tax expenditures for all taxes, beneficiary categories, and relevant sectors as part of budget documentation.
>
> (b) Emulate the Brazilian requirement for:
>
> > (i) Estimating the revenue cost of every proposed new tax exemption, exoneration, or concession;
> >
> > (ii) Identification of alternative revenue sources for every such proposal;

[7] TRA 2011.
[8] IMF 2011a.

(c) Emulate the practice in Peru by legislating a time limit for any tax concession, exoneration, or exemption.

(d) Review tax returns and other information sources to facilitate the capturing of data for undertaking tax expenditure analysis and reporting;

(e) Empower TRA's Research and Policy Department for undertaking the relevant analysis and prepare an Annual Tax Expenditure Report.

These proposals are designed to improve transparency in an area that has been very lacking in that quality, so that the associated revenue costs are known and can become part of the political debate. Given that tax expenditures have led to a loss of tax revenue that has averaged a little over 25% of net tax revenue over the past 7 years, this is an important issue that needs serious and urgent attention.

3.3: Non-tax revenue (NTR)

This category of revenue includes revenue from fees, rents, royalties, from sale of public goods and services, as well as dividend payments from the Bank of Tanzania. The Government commissioned a study on NTR to look at activities in a number of the Ministries, Departments, or Agencies (MDAs) that are involved.[9] The study found a wide variety of weaknesses, and argued that better practices could raise revenues collected by at least 56%. It canvassed four possible policy options, separately or in combination; (1) simply to improve existing arrangements within the MDAs; (2) to transfer responsibility to a purpose–designed special unit; (3) to transfer it to the TRA; and (4) to transfer it to private sector agents. While the report suggests that a step increase in NTR is feasible, it does not throw light on whether it would then stabilize at (say) 1.5% of GDP, or whether there is scope for a further trend increase in this ratio. The PSI assumes that the group of revenues typically booked as NTR remain stable at about 1% of GDP, but from 2009/10, Local Government Authorities' own revenues have been included and these are projected to rise from 0.5% to 1% of GDP over the programme period. Since the rest of the budgetary accounts relate essentially to Central Government Operations, it is not clear that this change in practice is very revealing.

3.4: Tax effort and the marginal cost of public funds

Tax effort

The ratio of tax revenue to GDP rises sharply with per capita income. While Tanzania, at between 15% and 16%, has now reached the sort of level fairly typical for low-income countries, this lies a long way below the median value for high-income countries, at around 36%, with middle-income countries typically somewhere in between.[10] This poses the

[9] PriceWaterhouseCoopers 2009.

[10] Of course, there is a wide variation around these central values. In East Africa, the figures for Kenya and Uganda are 18.3% and 12.9% respectively. Leaving aside outliers such as Singapore and Hong Kong at the low

question as to how much this reflects lower (relative) tax capacity in poorer countries, and how much it reflects lower effort to collect taxes?

There have been a number of studies over the years which attempt to disentangle these factors, and while they should be taken with a pinch of salt, they do throw some light on the question. The assumption is that revenue is a multiplicative function of variables that are exogenous in the short run (per capita income, degree of openness, share of agriculture, etc.) and of an index of effort (prevalence of exemptions, intensity of audit, etc.). To the extent that these policy choices are unobserved, they enter the estimation as an error term bounded above by one. Stochastic production frontier techniques are appropriate to handling this feature, and enable country- and time-specific estimation of effort. One recent study along these lines suggests that median tax effort is rather similar in both low- and high-income countries, at about 80% (middle-income countries score rather less well).[11]

Hence the very different actual tax ratios that are achieved in the different groups reflect major differences in tax capacity, and not in tax effort. This empirical inference is entirely in accordance with analytical priors, since poorer countries have fewer "tax handles" than richer ones, have much larger difficult-to-tax informal sectors, and have much less complete informational "paper-trails", though these days, the trails are more likely to be electronic.

The marginal cost of public funds (MCF)

Taxes are distortionary, inducing changes in private sector behaviour that are adverse to efficiency, and so impose a deadweight burden.[12] In consequence, the MCF will typically be greater than 1.[13] This has very important implications for public expenditure choices, because raising an extra dollar of tax will impose more than one dollar cost on the private sector; the implication is that, in turn, the additional dollar of public spending should be required to yield more than one dollar's worth of benefit to the private sector. The key question is, just how large is the deadweight burden likely to be in practice? The answer is likely to differ widely between different countries, different periods, and between different taxes.[14]

Once again, there have been many studies addressing this question. Unfortunately, they have produced very varied answers. For example, various studies yielded the following ranges of estimates: for Australia, 1.15-1.51; for Canada, 1.25-1.53; for Sweden, 1.69-2.29; for the

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end, and Sweden at the high end, the ratios for high-income countries tend to lie between the high-20s and the mid-40s.

[11] See Pessino and Fenochietto (2010).

[12] Of course, this will not be the case for a tax efficiently designed to correct for an externality. In this case the tax will – by design – push the economy in the direction of greater efficiency. However, only a fraction of the government's revenue requirement can be raised in this way, and on average and more especially at the margin, taxes will impose deadweight losses.

[13] Only 'typically', because in a poorly designed tax system, increasing a specific tax might actually *reduce* existing deadweight losses by accidentally offsetting a distortion created elsewhere in the tax system.

[14] In the last case, this presupposes that the tax system has not been efficiently designed to equalize the MCF across different taxes. This supposition is fully supported by the empirical evidence.

USA, 1.08-1.47; for Indonesia, 0.97-1.18; for India, 1.54-2.17; for Bangladesh, 0.95-2.18.[15] A recent ambitious study covering 38 African countries made estimates ranging from 1.05 to 1.72, averaging 1.21.[16] These values were for a marginal increase in taxes across the board, though estimates were also made for increases in specific taxes taken separately. Tanzania was one of the countries covered; the MCF for the tax system as a whole was estimated at 1.25, with values for component categories of tax ranging from 1.18-1.19 for consumption taxes, and 1.57-1.83 for factor taxes.

One feature leading to higher deadweight losses, and hence a higher MCF, is the level of tax rates, with higher rates inflicting more than proportionately higher losses. A conventional rule of thumb is suggested by partial equilibrium analysis (the previous estimates are typically derived in a general equilibrium framework, using computable general equilibrium models). This rule of thumb asserts that the deadweight loss rises with the square of the tax rate.[17] Whatever credence is attached to this specific relation, it does capture neatly the more general truth that successive rises in a tax rate will inflict increasingly severe deadweight losses. In effect, a government attempting to raise the revenue ratio faces an upward sloping MCF curve. This is one force keeping the overall level of taxes in check. It is not clear, a priori, whether a low-income country government, limited by low tax capacity, but facing heavy demands for public services, will choose to push further up this cost curve or not.

Interestingly, the estimates of MCFs for developing countries quoted above, including those in Africa, are not out of line with those for high-income countries. It appears that the two groups of countries have not chosen, on average, systematically different points on this cost curve. This rather speculative conclusion is entirely consistent with the results of the tax effort studies noted previously. Both pieces of evidence suggest that the lower revenue ratio in low-income countries may be "about right".[18]

The upshot of this discussion is that there is no particularly compelling reason to suppose that the MCF will be higher in a low-income country, and hence no reason to apply more stringent cost-benefit criteria than in richer countries. This still leaves open what value of the MCF to use. Given the uncertainties surrounding its estimation, it seems sensible to use a range. One recent piece of cost benefit analysis of education in the USA uses an MCF of 1.5.[19] In the illustrative calculations later in this paper, two values of the deadweight loss, 0.25 and 0.75 are used, so that the MCF takes the alternative values of 1.25 and 1.75.

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[15] These examples are drawn from the set reported by Auriol and Warlters, 2012. For a comprehensive discussion, see Dahlby, 2008.
[16] Auriol and Warlters, 2012.
[17] Consider a linear approximation to the demand curve for a commodity. Then the deadweight loss from imposing a tax is the right-angled triangle of consumer surplus that is lost (i.e. the excess over the transfer in revenue); this triangle has a height equal to the tax rate, and a length proportional to that rate, hence an area proportional to the square of the rate.
[18] Of course, since this also implies a lower (relative) supply of public services, that requires that the income elasticity of demand for these services should be greater than one.
[19] Heckman et al, 2010.

4: Recurrent costs and appropriability

4.1: The issue

Public investment imposes a variety of budgetary costs in addition to the initial capital costs and/or the on-going costs of servicing any debt incurred in financing these. In particular, there are recurrent costs in the form of operating expenses and routine and periodic maintenance (O&M). Ideally, the decision as to whether to proceed with an investment will not only assess the social returns from the investment, but also take into account any budgetary implications, if the project is not exactly self-financing. Unfortunately, responsibility for capital and recurrent costs typically falls on different parts of government, and decisions may not be well integrated. Such a failure of integration may lead on the one hand to wrong project choice. In addition, a nearly universal consequence has been inadequate maintenance and often an inadequate operating budget also. This has led both to a reduction in the service flow and to an avoidable acceleration in depreciation and expensive rehabilitation.

The root of the problem lies in limited appropriability. This means that the government either cannot, or chooses not, to levy user charges, or other methods of cost recovery, at a level that captures all of the investment's return. Indeed, if it could do so, arguably the investment should be left to the private sector. In any event, a fully appropriable project should only be undertaken if it at least fully covers all the relevant costs. When a project is not fully appropriable, it may impose substantial net budgetary costs, even though its social rate of return is high. This net budgetary impact needs to be taken into account at the outset, both in choosing which projects to undertake, and in the formulation of the fiscal framework. It has implications not only for financing, but also for expenditure composition.

4.2: A remark on interest rates and discount rates

In the simplest textbook models, there is a single interest rate which governs all investment and savings decisions, and this is the rate at which government should discount its own operations. In practice, there are many different interest rates which, especially in low-income countries, are very widely spread.

In view of this, how should the government discount rate be set?[20] It is much easier to say what it should NOT necessarily be, in considering an investment, than what it should be. Specifically, it should not be:

(1) The concessional rate – the government cannot borrow freely at this rate, since it is effectively rationed. Even if it could freely borrow at present, it would not be able to do so in future, so any such finance would have to be rolled over at different rates in future, and the discount procedure would have to take this into account.

[20] In more general terms, what is required is likely to be not just a discount rate, but a discount procedure that includes not only a rate but also a set of revaluation or shadow pricing criteria. This complication is ignored in the text, which focuses on the more restricted problem of choosing the rate itself.

(2) The internal rate of return on the investment under consideration. This might be very high, but with a project that is infra-marginal; the government does not have unlimited opportunities like this. It might be argued that the internal rate of return on the marginal project should be equal to the discount rate, but while true, this is back-to-front. It is knowledge of the discount rate that enables the marginal project to be identified.
(3) The effective interest rate on the instrument used to finance the investment – this might be above the discount rate, but worth incurring if it is the only way to finance a very high return investment.

Hence the government is likely to use a discount rate which differs from the borrowing rate as well as from the IRR. Choosing the level of this rate is non-trivial, both in the technical sense – it is difficult and demanding – and in the sense that it matters – quite mild variations in the rate can have very different consequences for the design of public policy. In the rest of this paper; these issues are glossed over; in some cases, illustrations can be set up in a way that does not require specification of the rate, in others, it is simply assumed to be known.

4.3: r-coefficients

In an ideal world, consideration of any public investment would include detailed attention to: (1) an assessment of the project-specific recurrent cost implications; (2) an assessment of the extent to which these could be recovered from users of the service provided, and the extent to which they would need to recovered from within the budget; (3) specific budget allocations, over the life of the project, to cover these components. In practice, some method of crude approximation to this ideal is required. There has been some limited work to try to establish what levels of recurrent cost are typical of different types of investment. The findings are that these can be reasonably approximated as proportional to capital cost, so that recurrent cost equals *r* time capital cost, where *r* is dubbed the r-coefficient. Unsurprisingly, these coefficients differ very substantially by sector. Table 2 provides some illustrations.

Table 2: Illustrative r-coefficients for developing countries

Fisheries	**0.08**
Agriculture	0.10
Rural development	0.08-0.43
Primary schools	0.06-0.70
Secondary schools	0.08-0.72
Rural health centres	0.27-0.71
Urban health centres	0.17
District hospitals	0.11-0.30
Buildings	0.01
Feeder roads	0.06-0.14
Paved roads	0.03-0.07

Source: Heller, 1991

Unfortunately, different studies come up with different figures and there does not appear to be a consensus.[21]

4.4: An illustration

Consider a project with capital cost K in year 0, which runs until year T, at which it disintegrates with zero residual value. All quantities, costs, and prices are stationary during the interval. This enables the choice of discount rate to be ducked.
If the project was completely appropriable, the stationary (annual) profit would be:

$$\pi = pQ - (r + c)K$$

Where p, Q are the price and quantity of output, K is the capital investment, r is the r-coefficient, and c is the cost of servicing the financing of the investment. Following the previous discussion, O&M costs are set proportional to K.

$$p_M M + wL = rK$$

Where w, L, p_M, M are the annual wage rate, number of workers, price and quantity of materials engaged in O&M, respectively.

The cost of servicing the investment is

$$c = i \Big/ \left[1 - \left(\frac{1}{1+i} \right)^T \right]$$

Suppose that the value of output is also proportional to the capital investment, so that:

$$pQ = RK$$

Then the test for project viability is simply that

$$R \geq (r + c)$$

Now consider the same project with only partial appropriability, so that government direct receipts amount only to a fraction f of the gross value of output. The remainder, $(1 - f)RK$, accrues to the private sector. However, existing taxes recover the fraction τ of this, while imposing a deadweight loss at the rate λ. The stationary (annual) impact on the government's budget, per dollar of investment, is now:

(1) $$R[f + \tau(1 - f)] - (r + c)$$

[21] The main alternative source to Heller is Hood et al (2002) which for the most part finds lower figures than Heller. Indeed, some of Hood's figures seem implausibly low; hence the decision to quote Heller in the table.

While the private sector has the flow benefit, per dollar investment, of

$$R(1-f)\left[1-\tau(1+\lambda)\right]$$

However, if the net budget impact (1) is negative, more tax will have to be raised (or some expenditure reduced). Suppose the former. For the reasons argued earlier, raising additional tax at the margin is likely to have a higher deadweight loss than on average:

$$\lambda_m > \lambda$$

In this case, eliminating the induced deficit would leave the private sector with a net position

$$Net = R(1-f)\left[1-\tau(1+\lambda)\right] + \left\{R\left[f+\tau(1-f)\right]-(r+c)\right\}(1+\lambda_m)$$

The first term is the direct impact of the project on private net income; the second is the additional loss if the budget needs to be rectified. Cleaning this expression up a bit

$$Net = R\left[1+f\lambda_m+(1-f)(\lambda_m-\lambda)\tau\right]-(1+\lambda_m)(r+c)$$

This is a little complicated, so consider two special cases. First, assume that there are no deadweight losses, so that: $\lambda_m = \lambda = 0$ Then the project should be accepted provided:

$$R \geq (r+c)$$

Of course, this is exactly the same as in the fully appropriable case. If there are no deadweight losses, funds can be costlessly transferred between public and private sectors, so a budgetary loss is immaterial to the social evaluation.

Second, assume there is no increase in deadweight loss at the margin, so that:

$$\lambda_m = \lambda > 0$$

Then the project should be accepted if:

(2) $$Net = R(1+f\lambda)-(r+c)(1+\lambda) \geq 0$$

Equations (1) and (2) can be used to explore when a project will induce a budget deficit, and when it might still be acceptable. Assume $\tau = 0.18$, so that the effective tax rate coincides with the anticipated Tanzanian tax/GDP ratio a few years down the line) and that either $\lambda = 0.25$ or it equals 0.75.

Table 3: Conditions for project acceptance

	Min R/(r + c) to avoid a deficit[1]	Min R/(r + c) for a welfare increase[2]	
f		$\lambda = 0.25$	$\lambda = 0.75$
0	5.56	1.25	1.75
0.1	3.82	1.22	1.63
0.25	2.60	1.18	1.47
0.5	1.69	1.11	1.27
0.75	1.26	1.05	1.12
0.9	1.09	1.02	1.04

Notes: 1. Condition when it is not acceptable to increase raise additional tax or reduce other expenditure.
2. Condition when it is acceptable to increase taxation, and impose deadweight burden.

One implication is that with incomplete appropriability, projects need extremely high benefit-cost ratios if they are not to cause budgetary problems. If these can be resolved by viable tax increases/expenditure reductions, they will be worth undertaking, even at much lower benefit-cost ratios, though these will still need to be substantially higher than for a comparable private or fully appropriable project, even for quite modestly distortionary taxation. If the budgetary issues cannot be resolved, very few of these projects should be undertaken. To illustrate from the table, consider the row with $f = 0.5$. Thus, government is able to recover half of the gross benefit flow through user charges or some other means. Then, if it is not practicable to subvent from the budget, the benefit cost ratio must exceed 1.69. If, instead, it is possible to make a budgetary allocation, either by raising additional tax, or by cutting some other valuable expenditures at the margin, then the benefit cost ratio would have to exceed 1.27 if the MCF was 1.75, and 1.11 if it was 1.25.

Another implication is to weaken the assumption that it is all right to borrow for public investment but not for public consumption. This is only strictly true for investments that are capable of fully servicing their recurrent costs, inclusive of debt service. Since, on past experience, many public investments do not achieve this, the rule that it is all right to borrow to finance them is too generous. On the other hand, some elements of expenditures that are described as consumption have an investment component, which provides an offset. For example, successful expenditures on education should create human capital, raising both incomes and the taxes that are levied on them.

4.5: Implications for the composition of expenditure, and its management

To keep matters reasonably simple, assume that all relevant ratios and rates are stationary. Let the ratio of gross public investment to GDP be I/Y, the average depreciation rate be δ, the average r-coefficient be r, and the real growth rate of GDP be g. Then it is easy to show that the ratio of additional recurrent cost to GDP at time t (m_t) induced by investment subsequent to time 0 is given by:

$$m_t = \frac{r(I/Y - \delta)}{(g+\delta)}\left[1 - \frac{1}{(1+g+\delta)^t}\right]$$

with the term in square brackets converging to zero as t becomes large.

For example, suppose $I/Y = 0.09$, $\delta = 0.04$, $r = 0.1$, $g = 0.07$. Then the sequence of m_t over years 1 to 4 would be 0.45%, 0.86%, 1.22%, 1.55%, and it would eventually converge to 4.54%. Recurrent expenditure would have to rise by these amounts to be consistent with the investment programme. To the extent that user charges covered a part of these expenditures, they would not all accrue as budgetary costs.

All this assumes that the provision for recurrent spending on capital installed *prior* to "year 0" has been adequate, that there is no need to raise this component, nor to undertake extensive rehabilitation. In practice, neither of these assumptions is likely to be correct. Second, notice that these recurrent expenditures include wages as well as goods and services, so that it may be inappropriate to try to put a cap on the wage bill, unless this can be implemented by making offsetting reductions elsewhere in the wage bill.

Ideally, handling the problem would require a clear separation in the budget between: capital expenditures, including those on human capital; the recurrent expenditures associated with operating and maintaining both new and old capital; and other consumption expenditures.

5: Financing infrastructure investment

5.1: Introduction

Given the large scale of the infrastructure deficit in Tanzania, financing the necessary investment poses serious difficulties. Certainly, budgetary resources are inadequate, given the competing pressures on them, and traditional donor financing is also under similar pressures; hence, it will be necessary to supplement these via other mechanisms.[22] These mechanisms could include foreign direct investment (FDI), public-private partnerships (PPPs), various loan arrangements involving non-traditional financing, commercial loans denominated in local currency, and commercial loans denominated in dollars.[23] However, FDI, other than in the composite form involved in some PPPs, is only relevant where outright privatization of infrastructure is involved, and that has not been the preferred model in Tanzania, for good reason. Nor is there any discussion here of local equity or NGO participation; though they may well have a role in some sectors, for example in supplementing the inadequate public coverage of water supply, they are likely to remain very small players in the overall financing scheme. Hence the discussion here focusses on Loans and PPPs.[24] Before doing so, it is worth considering the complications introduced by the need to operate in different currencies.

[22] The future of concessional financing is unclear, but it seems highly likely that it will continue to taper off relative to GDP, with the uncertainty being about how fast this tapering will be.
[23] Of course, other international currencies may be involved, but for simplicity the common convention is followed here of using the word "dollar" to cover all these cases.
[24] The general issue of how to lengthen financial contracts in Africa is addressed in Chapter 4 of Beck et al 2011.

Differential inflation and the exchange rate
Over the decade 2001-2011, the consumer price index rose at an average rate of 7.6% per annum, and the nominal Tanzania shilling to US dollar exchange rate depreciated at an annual average rate of 5.5%. Making the strong assumption that no other effects than differential inflation were at work, this would be consistent with an annual US inflation rate of 2.1%, not far from the reality.[25] The Tanzanian figures for the previous decade, 1991-2001, were less comfortable, with inflation averaging 17.4%, and depreciation 14.6%. On the other hand, looking forward, if GoT achieves its inflation target of 5%, and the US maintains an inflation rate of 2%, other things equal, the exchange rate would depreciate at 3% per annum.

In the absence of risk, the upshot is that the rate of depreciation needs to be added to the nominal dollar interest rate to obtain the equivalent nominal interest rate in shillings of a dollar loan. Thus, if the nominal interest rate on a dollar loan is 9%, that would translate into a 14.5%, (9% + 5.5%), equivalent shilling interest rate, using the average figures for the last ten years. (Alternatively, the figure would be 9% + 14.6% = 23.6% on the previous decade's figures, or 9% + 3% = 12% if the forward plans are successfully achieved.) While the nominal rate calculations are straightforward, there is sometimes confusion as to what real rate is appropriate, so this matter is pursued further in the more detailed discussion of loans below.

Of course, the future rate of depreciation is not easily projected, nor does it take place at a steady rate. Over the last decade, there were three years at which the exchange rate *appreciated*. In compensation, there were years with a substantially higher rate of depreciation: the fastest rate over any two year period averaged at 10%. Hence borrowing in dollars to finance expenditures which will yield returns in shillings is risky, and a risk premium needs to be added to these calculations. Of course, the interest rate on which domestically denominated loans can be obtained from international investors will also include a risk premium for the exchange risk *they* bear. The difference is that that risk premium is already embedded in the terms on which these loans are available, whereas it requires explicit calculation by GoT in assessing the relative cost of borrowing in dollar-denominated, as opposed to local currency terms.

The relevance of all this is that financing infrastructure involves potential currency mismatches and requires taking a view both of the likely trend in the relevant exchange rate, and of its volatility. These potential mismatches involve, on the one hand, the actual expenses for investment, operations, and maintenance, as opposed to the revenues: and on the other, the financial flows that support them. What is more, there are two parties to these financial flows. To illustrate, consider three different stylized investments. First, suppose that sufficient natural gas is discovered to justify establishing an LNG export operation. In this

[25] Of course, it is far from clear that the CPI is the appropriate price index for this argument, but the numbers are intended only to be illustrative of the issue at hand.

case, the overwhelming majority of both costs and revenues will be foreign denominated, and this includes GoT's share of these. Hence currency exposure is minimized by arranging the financing to be foreign denominated also. Indeed, it would be in the most unlikely event that the financing were denominated in local currency that a currency risk would emerge. Second, consider an investment in a thermal power plant that will burn locally sourced coal in supplying the domestic electricity market. The bulk of the original construction costs, and part of maintenance costs, will be foreign denominated, but operating costs and revenues will be in local currency. Potential currency mismatch will be minimized by a financing arrangement which involves a mix of denominations.[26] Third, consider a labour-intensive road rehabilitation scheme where the costs and revenues (from increased collections of the fuel levy) will both accrue in shillings. Then a local currency denominated loan would minimize GoT's currency risk. That would be the end of the story if all the financing was provided by local investors. Suppose, instead, that much of it comes from an international bank. Then the bank is investing dollars to obtain a shilling denominated return and is itself bearing the currency risk. Evidently, it will charge for this service, depending on its assessment of the risk.

The bottom line is that there are two sources of currency risk, one arising from the operations themselves, and the other from the financing arrangements; that it may be feasible to match the two in a way that minimizes this risk, but it may not; and that where it is infeasible to eliminate the risk, it may be possible to shift who bears it, but always at a cost.

5.2: Investment efficiency

The discussion so far has implicitly assumed that a dollar of net public investment yields an additional dollar's worth of public capital. However, there is a large literature and much evidence that this has not generally been true in developing countries. Indeed recent work suggests that a dollar of investment may frequently yield as little as 50 cents worth of capital.[27]

The reasons are various, and include poor project selection and implementation, diminishing returns arising from bottlenecks during investment surges, as well as outright corruption. Recognition of this problem has three implications.

First, it requires major efforts to raise investment efficiency in future; these efforts will have to involve the investing governments, but will also require inputs from the international community, from the agencies financing the investments, and from any private partners in PPP arrangements. The problem appears to be spread widely across project appraisal, selection, management and evaluation. There is a wealth of experience on how to conduct

[26] This was the form arranged in the syndicated bank financing of a power project of UNICEM in Nigeria in 2006, where about a quarter was dollar-denominated, the rest in Naira. See Irving and Manroth, 2009.
[27] See Dabla-Norris et al, 2011, who construct an index of investment efficiency. Tanzania does not score well in this study, with 1.38 (out of a maximum of 4), compared to a median value for all the LIC and MIC countries in the sample of 1.65. Kenya's score was 1.49, Uganda's 1.44.

these related activities efficiently, but there has been remarkably little focus on how best to use this experience to ensure efficient outcomes.[28]

Second, once adjustments are made for the gap between cumulated investment and the efficiency-adjusted capital stock, it appears that public capital is a much more significant contributor to growth than earlier – unadjusted – estimations suggested.[29] Hence, if the efficiency problem can be resolved, investing in public capital will have a high pay-off. However, if the problem cannot be resolved, rates of return to the investment funds deployed will be low.

Third, and what may be a bitter pill to swallow, if the problem cannot be resolved, there must also be recognition of this when fiscal choices are being made. Systematic downgrading of the anticipated rates of return must be made, relative to those appearing in the design studies for a project. What might appear to be an infra-marginal project may have to rejected unless firm assurances can be obtained that the efficiency problem has been resolved.

Indeed, it has been pointed out that, "ironically, the high debt and low levels of public infrastructure that plague many low-income countries are in part the legacy of previous large public investment projects that have had minimal impact on growth… [deriving] primarily from shortcomings in the investment process".[30] The importance cannot be stressed too highly of not repeating these mistakes in the big investment push currently being contemplated in Tanzania as elsewhere in the low-income countries.

5.3: Loans

Syndicated bank lending

There has been a steady use of this financing mechanism for infrastructure across Africa in recent years, with maturities varying from 2 years to 20, though mostly in the range 5-12 years; loans for telecoms are typically at the shorter end, those for transport at the longer. Usually, the syndication has involved both local and international banks, with the balance between the two groups varying widely. Some loans are denominated in local currency, some in international currency (often Euros), while others have involved a mixture. In the latter case, the intention has been to reduce the risks of a currency mismatch for the borrower, where, for example, costs and revenues accrue in different currencies. These loans may also be on fixed- or floating interest terms.

This mechanism has been actively pursued in Tanzania in recent years, especially in the telecoms sector (for example, loans to Celtel, Vodaphone, and Helios Towers), often in a mixed currency format. Last year, for the first time, GoT itself agreed a syndicated loan, on a seven year term for $250 million. Prior to the Global Financial Crisis, it had been seriously considering a sovereign bond issue, but, along with several other countries, found that

[28] For an overview on these related activities see for example Ribeiro, 2011.
[29] See Gupta et al, 2011.
[30] IMF, 2011b, page 33.

lenders' appetite for these had greatly reduced. From Tanzania's point of view, this may be no bad thing, since syndicated loans may well prove the less expensive option. Clearly, further loans are under consideration. One rather worrying development has been Kenya's recent (2012) access to a large (US$600 million) syndicated loan. While this is described as a loan to finance infrastructure, it was launched in the context of a general budgetary shortfall. Increased familiarity with and access to this type of facility could weaken budget discipline, as opposed to providing a strictly monitored means of access to infrastructure finance. Given the fungibility issue, this can only be achieved by government adopting a very clear financing stance, and undertaking to provide a detailed justification for any deviations that it feels compelled to make.

Local institutional investors

Examples of these are pension funds and insurance companies, which remain relatively small, but will be growing in importance in Tanzania over coming years. They also have the sort of long-term liabilities that require matching with long-term assets, so are potentially good candidates for providing infrastructure finance. To date, they have not done so, except to an extremely limited extent. Indeed they have been criticized for an excessive focus on government bonds and commercial and other real estate. There are also complex issues of regulatory control. Over the longer horizon, these investors may become important providers of infrastructural finance, but this is infeasible over the short and medium term.

Loans from non-traditional partners

There are now a number of very substantial loans involving non-traditional partners. Looking at the relations between China and Tanzania, for example, there have now been, inter alia, a US$1billion loan from the Chinese government for a gas pipeline, over a twenty year horizon with a seven year grace period; a US$700 million loan for investment in power generation; and, provisionally, a US$3billion loan for a combined iron ore and coal extraction project. The latter two arrangements are not with the Chinese government itself, so fall within the PPP arrangements discussed below; however the role of the two governments and the private partners is closely linked. These arrangements are not only large, but also very complex: the detailed assessment of how much concessionality is involved is difficult. What is clear, however, is that these arrangements are distinct from old-fashioned concessional lending on the one hand, or more arms-length commercial lending on the other.

Other (fixed-interest) loans

Another major development in recent years has been in the bond markets, notably in emerging economies, which may provide some indicators of the way forward for Tanzania. Issues have been both sovereign and corporate, and both denominated in local currency and dollar-denominated. In the African context, much has been made of the sovereign bond issues in Gabon and in Ghana, both dollar-denominated. However, it is worth noting that the distribution by value of all issues in the more mature emerging markets was as follows in 2011: local currency sovereign debt, 48%; $ sovereign debt, 6%: local currency corporate

debt, 36%: $ corporate debt 10%.[31] What is clear from these figures is the dominance of local currency issues over dollar-denominated issues for both sovereign and corporate debt. If that has been the revealed preference for the emerging market economies, it bears careful consideration how far down the dollar-denominated road a country like Tanzania should consider going.

However, even the local currency route may be fraught. In 2009, the Kenyan electricity company KenGen launched a 10 year public infrastructure bond for between 15-25 billion K shillings to finance investment in a 500MW power generator. The rate of interest was 12.5%, and this was tax exempt for both resident and non-resident investors, so equivalent to 15.9% for a taxpayer on the 30% rate, or 14.7% for one facing a withholding tax at 15%. These are very high rates to service, assuming that inflation is kept under a reasonable leash.

Transfer burdens

This discussion relates to any operations involving inter-temporal exchanges between different agents, but it is convenient to restrict the exposition to the case where a loan is used to finance an investment, with the debt being serviced either from the investment returns, or from some tax mechanism. In the analysis of a conventional private sector loan in a closed economy, the key question is whether the investment will generate sufficient cash returns to pay interest and to repay the principal according to the agreed time frame.[32] In the present case where the loan is to finance an infrastructure investment, there are four additional complications, all of which can be described, at a pinch, as transfer burdens.

(1): First, there is the possibility, analysed at length elsewhere in this paper, that the financial charges will have to be reimbursed, at least in part, from additional taxation. This is the appropriability problem, and it imposes a secondary burden arising from the deadweight losses of taxation.

A further pair of issues arise because the likely standard configuration will involve borrowing in dollars, but reimbursing the lender from shilling receipts. This has two implications.

(2): One is that, if there is differential inflation, so the domestic currency is expected to depreciate, even in the absence of the project, this needs to be accounted for, both as a trend and with an appropriate risk premium, in assessing the cost of servicing the debt.

(3): The other is that, for a substantial programme of investment, with a large associated volume of financing, the real exchange rate may first appreciate during the investment phase (to the extent that it involves non-tradable expenditures), but then depreciate during the repayment phase, partly to the extent that non-tradable output is enhanced, but also because of the need to turn shillings into dollars for repayment.

[31] Dehn 2012.

[32] Subsidiary questions, as for example what happens in the event of default, are for the most part glossed over here.

(4): Finally, if the public investment process is inefficient, or corrupt, or if it proves impossible adequately to police a private partner in a PPP, then there will also be a question of investment efficiency – one dollar of investment may not produce one dollar's worth of public infrastructure capital.

These four concerns are an uncomfortable mix of effects which are project specific ((1)), system-wide ((2) and (4)), or the outcome of aggregation ((3)). However, some attempt must be made to track and evaluate them, both for individual projects and for the programme as a whole.

Covering the costs of a loan

This section constructs a stylized model that is designed to throw some light on what would be required to prevent budget deterioration in a growing investment programme. The assumption is made that the system is in balanced growth at the rate g. Using the notation introduced previously, but adding to it as necessary, suppose that the capital output ratio is σ, that debt service on a unit of borrowing is d_t and is arranged to fall at the constant rate ϕ, so that for a dollar loan taken out at time 0, $d_t = d_0 e^{-\phi t}$. Then with the interest rate still i, it follows that $d_0 = i + \phi$. If output is Q_0 at time 0, then gross investment, to cover both depreciation and the required net growth, is $(g+\delta)\phi Q_0$. It is then straightforward to show that, integrating over past investment, the payment to cover the debt service on this cumulated, depreciated, investment at time 0 is:

$$\frac{(i+\phi)(g+\delta)\sigma Q_0}{(g+\phi)} = \frac{(i+\phi)(g+\delta)K_0}{(g+\phi)}$$

To avoid a budgetary drain, the price must be set to cover this cost as well as the O&M costs, in other words:

$$R \geq (r + \frac{(i+\phi)(g+\delta)}{(g+\phi)})$$

Notice that if the interest rate exceeds the growth rate, it is helpful to pay off debt rapidly; if the growth rate exceeds the interest rate, it pays to do the reverse. Now consider the plausible scenario in which debt service on a particular loan is set to fall at the same rate as the rate of depreciation of the capital that it was used to finance, so that $\phi = \delta$. Then the requirement simplifies to $R \geq (r + i + \delta)$. The budgetary return to capital needs to be at least equal to the sum of the r-coefficient, the interest rate, and the depreciation rate. For example, suppose the r-coefficient is 0.1, the real interest rate is 10%, and the depreciation rate is 5%. Then to prevent part of these costs becoming a burden on the budget, cost recovery will have to yield a gross return on capital of at least 25% per annum.

Calculating the real interest rate

Finally consider what happens when the loan is foreign denominated, there is differential inflation and exchange rate depreciation. This is spelt out in some detail, as it is often a source of confusion. The likelihood of differential risk premia discussed earlier is ignored, and all the following expressions are to be interpreted as being expected values. Then the relevant real dollar interest rate on dollar-denominated debt i_r^* is equal to the nominal dollar-denominated rate i_n^* minus the dollar inflation rate π^*:

$$i_r^* = i_n^* - \pi^*$$

And the real shilling interest rate on locally-denominated debt i_r is equal to the nominal shilling-denominated rate i_n minus the shilling inflation rate π:

$$i_r = i_n - \pi$$

Meanwhile, the expected rate of exchange rate depreciation η is equal to the difference between the shilling and dollar inflation rates:

$$\eta = \pi - \pi^*$$

Hence the nominal shilling interest rate of a dollar-denominated loan $\hat{i}_n$, say, is:

$$\hat{i}_n = i_n^* + \eta$$

And, finally, the real shilling interest payable on this dollar-denominated loan is:

$$\hat{i}_r = \hat{i}_n - \pi = i_n^* + \eta - \pi = i_n^* - \pi^* = i_r^*$$

So, in brief, $\hat{i}_r = i_r^*$ and, over the long term, under arbitrage, the real shilling interest rate on dollar-denominated borrowing can be thought of equivalently as the nominal rate plus the depreciation rate minus the domestic inflation rate, or as the nominal rate minus the dollar inflation rate.[33] To illustrate the calculation for a dollar denominated loan, suppose domestic inflation is 5%, dollar inflation 2%, and the nominal dollar interest rate 10%. Then anticipated depreciation is 3%, the nominal shilling interest rate is 13% (10% + 3%), and the real interest rate is 8% (10% + 3% - 5%) calculated in shillings or, equivalently, 8% (10% - 2%) calculated in dollars.

Either way, the common real interest rate can then be compared with the real interest rate on shilling-denominated borrowing to see whether one is cheaper than the other. As will be clear from the previous discussion, this simple analysis would need to be augmented in two ways. First, the stochastic nature of the relations would need to be taken into account and appropriate risk premia applied; it is to be expected that the risk associated with repayment obligations denominated in foreign exchange would be higher. Second, any anticipated trend movement in the real exchange rate would need to be incorporated.

[33] Of course, over the short term, this arbitrage relation will not continue to hold, since there will be disequilibria. But it has to remain the best forward planning assumption for long-term comparisons.

5.4: Public-private partnerships (PPPs)

Introduction

As for many other countries, Tanzania has carried out extensive experimentation with PPPs, and mainly, to date, with unsatisfactory outcomes. However, given the difficulties in developing, financing, and managing a range of investments in infrastructure and resource extraction, there has been renewed enthusiasm for revisiting this mode of operation. This raises several questions. Why was the past record so unsatisfactory? What can be done to prevent a repetition? What are the characteristics that should determine whether activities should be carried out by the public sector, or the private sector, or some partnership between them? In the last case, what form should the partnership take?

This is a huge topic, with a very wide variety of organizational forms, set in very different institutional contexts, and designed to tackle very different problems. In developing countries, these experiments really took off at the start of the 1990s; during that decade, the private sector became involved in nearly 2,500 infrastructure projects; by 2011, this had doubled to nearly 5000. In consequence, there is now much experience of what works, and what doesn't.[34] However, while disasters are easily identified, it is much more difficult to assess what is the net contribution of most PPPs, since that involves the construction of a counterfactual – what would have happened in the absence of private sector participation?

Given the scale and range of these activities, and the intricacies involved, this brief note can do no more than scratch the surface, offering a very incomplete sketch of the available options, and of how GoT may set about choosing between them.

General background

The early (1980s) arguments in favour of privatizing public service provision have an uncanny echo of previous arguments to shift the boundary in the opposite direction via nationalization; in both cases advocates tended to claim that benefits would flow directly from the mere change in ownership. More recent discussions of how to manage the public-private boundary have been more nuanced, and posed in terms of how to obtain the "least-bad" outcome, in minimizing the joint adverse effects of a mixture of market and government failure. If a service can be provided in competitive circumstances, and in the absence of externalities and other specific sources of market failure, full divestiture or privatization is called for.[35] There is no need for public involvement, beyond its usual role of setting the general environment for private sector activities.[36]

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[34] For an earlier, but still very relevant and broad overview, see Harris, 2003.

[35] In principle, there would be no objection to having a public sector provider as one of the competing agencies, provided it was subject to the same pressures as the private providers. Indeed, at a stretch, this could be a desirable mechanism for preventing the emergence of cartels. In general, however, it seems best for the public sector to limit its economic activities to areas in which it is likely seriously to add (welfare) value.

[36] This includes the need to correct non-specific market failures, via provisions for contract enforcement, health and safety, and the like.

The remaining cases of interest are where untrammelled private sector activity is likely to have undesirable consequences, or to be infeasible. The most obvious example of the first is the type of natural monopoly that is prevalent in infrastructure provision. An example of the second is where it is impossible for an operator sufficiently to appropriate the benefits of the activity, so that full cost recovery is impossible. Note that this could still occur even when there is a natural monopoly, due to the nature of supply (for example, increasing returns) – it is just that the natural monopoly is not one that a private agent would find worth exploiting, even though its social value might be high.

In the natural monopoly (NM) case, there are three options: the first is outright public provision, involving full public ownership and operation; the second is full privatization, with the hope of more efficient operation, combined with a regulatory regime that is designed to restrict the exercise of monopoly power; the third is some form of PPP also designed to benefit from the private sector's supposed tighter control of capital and operating costs while limiting its freedom of action. The problem with both the second and third options is that the force driving higher efficiency and lower costs is the *combination* of the profit motive with a competitive environment. In the absence of this environment, attempts to mimic it through regulation may be ineffective, or even perverse, as with rate of return regulation. Public utilities often combine a natural monopoly component (for example, the networks for transmission and distribution of electricity) with a potentially competitive component (for example, power generation). The current conventional wisdom is to unbundle these components, following the mantra "competition where feasible, regulation where not". However, this pays insufficient attention to the nature of risks, and how the chosen framework assigns risk bearing between the parties.[37] Ultimately, the costs of operating any partnership will depend on the perceived set of risks, on which partner bears which risks, and on whether they are assigned to the partner best able to do so.

In the incomplete appropriability (IA) case, the same three options are available, only private sector participation will now require some mechanism for subsidization; just as in the design of regulation, the design of a subsidy mechanism is technically and informationally demanding, and could easily result in an excessive drain on the budget. A partial exception to this is where it is possible to combine a subsidy mechanism with a competitive process, with free entry to the subsidized activity; an excessively generous subsidy can then be avoided by making its determination part of a bidding process. More generally, the emphasis on subsidy design has shifted from mechanisms that focus on inputs to so-called "output-based aid".

In any event, as regards PPP, the precise form that is appropriate in each case depends on the set of problems recognised as needing to be addressed. These forms range from service contracts through management contracts, lease contracts, concessions, Build-Operate-Transfer (BOT) arrangements and related variants, through to full divestiture-cum-regulation, with varying implications for duration, ownership and risk characteristics of the PPP.

[37] See, for example, Newbery, 2002.

Table 4: Key features of the basic types of PPPs

	SERVICE CONTRACTS	MANAGEMENT CONTRACTS	LEASE CONTRACTS	CONCESSIONS	BOT
Scope	Multiple contracts for a variety of support services such as meter reading, billing, etc.	Management of entire operation or a major component	Responsibility for management, operations, and specific renewals	Responsibility for all operations and for financing and execution of specific investments	Investment in and operation of a specific major component, such as a treatment plant
Asset Ownership	Public	Public	Public	Public/Private	Public/Private
Duration	1–3 years	2–5 years	10–15 years	25–30 years	Varies
O&M Responsibility	Public	Private	Private	Private	Private
Capital Investment	Public	Public	Public	Private	Private
Commercial Risk	Public	Public	Shared	Private	Private
Overall Level of Risk Assumed by Private Sector	Minimal	Minimal/moderate	Moderate	High	High
Compensation Terms	Unit prices	Fixed fee, preferably with performance incentives	Portion of tariff revenues	All or part of tariff revenues	Mostly fixed, part variable related to production parameters
Competition	Intense and ongoing	One time only; contracts not usually renewed	Initial contract only; subsequent contracts usually negotiated	Initial contract only; subsequent contracts usually negotiated	One time only; often negotiated without direct competition
Special Features	Useful as part of strategy for improving efficiency of public company; Promotes local private sector development	Interim solution during preparation for more intense private participation	Improves operational and commercial efficiency; Develops local staff	Improves operational and commercial efficiency; Mobilizes investment finance; Develops local staff	Mobilizes investment finance; Develops local staff
Problems and Challenges	Requires ability to administer multiple contracts and strong enforcement of contract laws	Management may not have adequate control over key elements, such as budgetary resources, staff policy, etc.	Potential conflicts between public body which is responsible for investments and the private operator	How to compensate investments and ensure good maintenance during last 5–10 years of contract	Does not necessarily improve efficiency of ongoing operations; May require guarantees

BOT = build–operate–transfer, O&M = operation and maintenance.

Source: Asian Development Bank 2006, Table 3, page 28

One typical characterization of these relationships is reproduced in Table 4 above. This characterization is very aggregated, with each column covering a very wide range of alternative structures. Even so, it serves to emphasize what a wide variety of relationships is available, and has indeed been tested, usually many times over, in different countries and different sectors.

As noted earlier, it is hard to assess what the net impact of a shift to PPP arrangements has been, given the difficulty of controlling for the counterfactual. One unusual systematic attempt to make such an assessment doing this, for the electricity and water industries, used data from 1,200 utilities in 71 developing and transition economies.[38] It found that there were clear improvements in operational performance (lower costs, increased coverage, increased bill collections); and that these were accompanied by substantial staff reductions, but that there were no clear investment gains, and no systematic changes in price. The implications were twofold. First, shifting to a successful version of PPP should improve efficiency, but may impose quite serious employment issues. Second, the lack of improvement in tariff and investment levels may mean that these efficiency gains are not sustainable, unless further reforms are undertaken.

The key point to take from this discussion is, what is the shift to PPP intended to achieve or rectify? For example, if the central problem is one of financial viability due to a failure to set tariffs at levels that will recover costs, will the PPP arrangements address this? If the regulator is as vulnerable to popular/political pressures to keep tariffs low as the public enterprise was, then either no private partner will emerge, or if a private partner does emerge, it will come to grief because no feasible cost reductions can compensate for the inadequate underlying revenues. It is crucial to identify what the problems are, what prevents them being fixed within the public enterprise, and what it is about the PPP arrangement that ensures they can/will be fixed.

Past experience in Tanzania

Previous PPP arrangements in Tanzania developed in a pretty ad hoc fashion, reflecting the actions and interests of different responsible Ministries, rather than any concerted or integrated GoT approach. Six major examples involve:

(1) Dar es Salaam Water Supply and Sanitation (DAWASCO)
(2) Tanzania Electric Supply Company Limited (TANASCO)
(3) Tanzania Railways Limited (TRL)
(4) Tanzania International Container Terminal Services Limited (TICTS)
(5) Tanzania Telecom Communications Limited (TTCL)
(6) Air Tanzania Company Limited (ATCL)

Between them, these examples span the major infrastructure sectors of transport, communications, power, and water supply and sanitation. The experiences have been

[38] Gassner et al, 2009.

analysed by various authors, and the picture that emerges is pretty bleak.[39] The contractual forms differed widely.

- DAWASA took the form of a ten year lease, starting in 2003, but, following manifold problems, this was cancelled by GoT after two years. Apart from the unresolved financial problems arising from low and uncollected tariffs there was a failure to address the issue of low coverage. In effect, the well-to-do were provided with heavily subsidized connections, while the poor had to pay for less reliable private supplies at prices which were several times higher.
- The arrangements at TANESCO had two different components. One was a management contract, running from 2002 to 2004, renewed until 2006, but not renewed subsequently.[40] The other was the establishment of two Independent Power Projects (IPPs), IPTL and Songas, supplying thermal energy to TANESCO under twenty year Power Purchase Agreements starting in 2002 and 2004 respectively, which arrangements are on-going. While these sources have made a crucial contribution to overall electricity supply, TANESCO has systematically failed to set and collect tariffs that recover the associated costs.
- TRL became operational in 2007, as a vertically integrated concession supplying freight and passenger services, jointly owned by GoT and Rail India Technical and Economic Services (RITES). Poor performance led to an agreement in 2009 to renationalize TRL, with GoT purchasing the outstanding RITES shares.
- TICTS was awarded a ten year lease contract to run the container terminal at the Port of Dar es Salaam. This functioned very successfully through to 2005, inducing GoT to extend the contract for a further 15 years through to 2025. Ironically, this coincided with a decline in performance over 2005-2009, partly in consequence of congestion occasioned by increased traffic, coupled with shortcomings and inflexibilities in the original contract. GoT responded positively in amending the contract, and performance is now recovering.
- The story of the attempt to introduce PPP into TTCL is convoluted, reflecting the divergent evolution of fixed line and mobile telecommunications. TTCL had exclusive rights for the former, but was in a competitive market for the latter. After attempting to work with different PPP partners, GoT eventually made the surprising decision to buy back (renationalize) TTCL.
- ATCL was a wholly owned and operated state enterprise until 2002 when 49% of the shares were sold to South African Airlines (SAA), who would also take management control. Following many difficulties, this arrangement was wound up in 2006 and ATCL renationalized. A further PPP arrangement was made with China Sonangol Investment Limited (CSIL) in 2008 but wound up in 2010.

[39] See, for example, WaterAid, 2002, Gratwick et al, 2006, and, in particular, Nelsson 2011.
[40] Another interesting case of a sequence of management contracts was in respect of the National Microfinance Bank (NMB). The original contract was intended to get the business in shape for privatization (a 70% sale) in 2001; the improved performance under the contract led to disputes about the desirability of privatization, which was delayed until 2005, and involved only 49% of shares, with a succession of management contract renewals in the interim. See Beck et al 2011, Chapter 6.

Arguably, TTCL and ATCL should have been cut loose by GoT some time ago, since they are loss-making, non-strategic, and operate in sectors which are in any case competitive. The case for continued state involvement in either enterprise is opaque. The other four enterprises are clear candidates for continued public sector involvement, involving natural monopolies coupled with strategic importance. All six enterprises suffered from a degree of political interference, with five of them, partly in consequence, having real issues as to their financial sustainability. Of the six, only TICTS can be regarded as a success on balance, and even that became problematic for a period, and was nearly aborted at one point. As regards the other five, problems of financial sustainability were the main reason for undertaking private sector involvement, but private management was unable to rectify these problems, partly because of poor legal protection against theft and unrecoverable debts, and interference in asset acquisition and retrenchment, coupled with unresponsive tariff regulation that has made cost recovery difficult.

Private sector involvement cannot rectify underlying management problems without political support for necessary reforms. It can at best be a component in an integrated policy designed to address the underlying problems of infrastructure finance, investment, rehabilitation, operation and maintenance. There is a further problem, in no sense confined to Tanzania. This is that a combination of excessively high expectations, coupled with often very poor performance under PPP has induced considerable public scepticism about the consequences of further experiments with this type of arrangement.

Current intentions in Tanzania

As noted earlier, the Tanzanian authorities remain keen to utilize PPP in the future. They have now begun to take a much more systematic look at this type of arrangement. A National PPP Policy was spelt out by the Prime Minister's Office in 2009.[41] This distinguished between a variety of PPP forms suitable for the operation of existing assets and those suitable for the development and operation of new facilities. It noted that most previous PPPs had involved direct service delivery, and had had limited success, partly due to the lack of clear guidelines on the criteria for these arrangements. It set out to rectify these omissions and to establish a framework for future PPPs, including a Central Coordination Unit within the Tanzania Investment Centre, and a Finance Unit within the Ministry of Finance. These principles were duly enshrined in the PPP Act of 2010.

A very wide range of possibilities has been canvassed under the new legal framework, and several are already under implementation. The National Development Corporation (NDC) has listed a draft summary of projects for joint venture and other PPP arrangements in which it is either already engaged or seeking private participation.[42] A high proportion of these involve infrastructure investments in railways, roads, pipelines, and ports, and in power

[41] United Republic of Tanzania, 2009.
[42] National Development Corporation, 2011.

generation and transmission. However, there are also a substantial number of potential investments in resource extraction, sometimes coupled with those in infrastructure.
By and large, this seems a sensible strategy. The bulk of the agenda involves greenfield projects, and it is much easier to design functional PPP arrangements for these than for on-going – and often deeply problematic – public enterprise operations. However, three caveats are in order.

> First, consider a greenfield operation that will be selling output to an existing state enterprise with cost recovery problems. Then this may constitute a desirable expansion in service provision which nonetheless exacerbates the underlying problem of a fiscal drain on the government budget. (The IPPs supplying TANESCO are illustrative of this problem.) This will be the case whether or not the greenfield operation is a PPP or purely private.
>
> Second, the rationale for the private partner acquiescing in a PPP rather than "going it alone" may be straightforward when the operation involves access to a mineral resource owned by the state or to a natural monopoly regulated by the state. However, in other cases, the rationale is less clear. Recourse to the PPP form must then be carefully justified to ensure that it does not involve some unwarranted subsidy. Several of the NDC's potential projects involve manufacturing and other activities that may fall into this category.
>
> Third, some of the NDC proposals involve bundling of natural resource projects with either manufacturing or infrastructure projects. Great care must be taken to ensure that these bundles, if undertaken, do not involve unjustified transfers, using the rents accruing to the natural resources to cross-subsidize losses in the associated activities. This will require either arms-length relationships, or close attention to appropriate transfer pricing.

Finally, this leaves open what should be done in respect of the on-going transport operations and public utilities where there remain serious financing, management, and cost recovery problems, and where previous attempts at PPPs proved so difficult to implement. The lesson here should not necessarily be to give up on PPPs, but to recognize that the underlying problems, for example in setting realistic tariffs, have to be addressed regardless of the division of responsibilities between public and private sectors that is to be adopted.

Some relevant criteria

The preceding discussion has surveyed, albeit very briefly, some of the complications that bedevil the public-private issue. The section concludes with a stylized discussion of the sort of criteria that would be involved in a formal treatment of even the simplest case.[43] Suppose there is a natural monopoly in supplying some service, and that production involves

[43] The example could be elaborated in the direction of greater realism, but still serves to illustrate the central point.

increasing returns; specifically, there is a fixed capital cost (K), and output can then be supplied at constant marginal cost (c). Both these cost components may be higher if the supply is made by the public sector, so that $K_g = (1+\psi)K_p \geq K_p$, and $c_g = (1+\nu)c_p \geq c_p$. Government faces the stark choice of either letting the supply be made by an efficient private monopolist, because it knows its informational and regulatory capacities are too weak to prevent a monopoly price being set; or operating a (possibly) inefficient state enterprise, and setting the socially optimal price, conditional on the costs of that enterprise. If it has to subsidize the state enterprise, the marginal cost of public funds is $1+\lambda > 1$ reflecting deadweight losses of the tax system. It is also assumed that government is unable to extract tax from the monopolist. Finally, suppose demand takes a constant elasticity form, so that output is related to price as $Q = Ap^{-\varepsilon}$, where $\varepsilon > 1$ is the price elasticity of demand.

The question then is, when should the government choose to provide the service through a public enterprise, and when should it privatize it? This depends partly on just how profitable the private monopolist would be. Clearly, if the capital cost was too high, even the exercise of monopoly power would not make the activity profitable. Suppose that the actual private capital cost is in the ratio $\theta \leq 1$ to the value at which private monopoly profit would be extinguished.[44]

Then, after some tedious manipulations, it can be shown that social welfare is best served by a public enterprise provided:

$$((1/(1-1/\varepsilon)+\lambda)^{\varepsilon} /((1+\upsilon)(1+\lambda))^{\varepsilon-1} - (1/(1-1/\varepsilon)-1) > (\lambda+\psi(1+\lambda)\theta$$

Similar expressions can be derived for the conditions under which the public enterprise would be desirable, even if a private monopoly was infeasible, and for the conditions under which optimal operation of the public enterprise would require subsidization from the budget.[45]

As an illustration, suppose that $\varepsilon = 5$ and that $\psi = \nu$ so that any cost penalty associated with public enterprise is spread equi-proportionately over investment and operating costs. Then, for two alternative trial values for the marginal cost of public funds, $(1+\lambda) = 1.25$, 1.75 respectively, the boundary values of θ can be computed that are consistent with public operation at all, with a preference for public operation over private, and with a requirement for subsidization. Table 5 provides these illustrative values. Uniform cost penalties of 0, 5%, 7%, 10%, and 15% are considered. These more than cover the sort of range that empirical work has typically suggested, with most results clustering in the lower part of the range.

[44] For a related perspective, which uses linear demand, and focuses on asymmetric information, see Auriol and Picard 2004.
[45] A technical note, deriving these relationships, is available on request.

Table 5: Boundary values of θ for various conditions to hold

% Cost penalty of public enterprise with $(\psi = \nu)$ (1)	Marginal Cost of Public Funds 100% $(1+\lambda)$ (2)	Public enterprise desirable in absence of alternatives if $\theta <$ cell value (3)	Public enterprise preferred to private monopoly if $\theta <$ cell value (4)	Public enterprise requires subsidy if $\theta >$ cell value (5)
0	125%	2.49	3.44	0.41
0	175%	1.95	1.55	0.73
5%	125%	1.95	0.99	0.32
5%	175%	1.53	0.67	0.57
7%	125%	1.77	0.36	0.30
7%	175%	1.39	0.40	0.52
10%	125%	1.55	-0.33	0.26
10%	175%	1.21	0.09	0.45
15%	125%	1.24	-1.08	0.21
15%	175%	0.97	-0.30	0.36

Note: θ is the ratio of actual private capital cost to the value of private capital cost at which private monopoly profits would be extinguished

Interpretation and implications

Private agents will only choose to bid for the business if $\theta \leq 1$. However, the third column shows that it is worth establishing a public enterprise even if capital costs are substantially higher than this, unless both the public cost penalty and the MCF are very high (if the MCF is 175% and the penalty is 15%, θ just dips below 1). However, for high values of these parameters, public enterprise is only preferred to private for very low or even (infeasibly) negative values of θ; only the prospect of very high extraction of monopoly rents justifies public enterprise when these cost factors are adverse. What the fourth column suggests is that public enterprise is always preferred if there is no cost penalty, never preferred if the penalty is 10-15%, and that the choice is moot for penalties in the range 5-7%.

The relation between the fourth and fifth columns demonstrates the non-linearity that runs through this system. Suppose for all cases that private enterprise would be viable. Consider first any row where the cell value is higher in column (4) than in column (5). (The 5%, 175% row illustrates.) Then there are three possibilities. The actual value of θ may be higher than the column (4) value, intermediate between the two, or lower than the column (5) value. In the first case, the activity is left to private enterprise; in both the other two, it is undertaken by public enterprise, requiring subsidy in the intermediate case, but profitably in the third. Second, consider cases where the cell value is lower in column (4) than in column (5). (The 7%, 175% row illustrates.) Then there are again three possibilities with the actual value of θ being above the column (5) value, intermediate, or below the column (4) value. The activity is left to the private sector not only in the first case, but also the intermediate one. It is assigned to public enterprise only in the third case, and will then always be profitable.

There are two main implications of this analysis. First, the range of values for the public cost penalty to which the choice between public and (relatively unregulated) private enterprise is sensitive appears to be very narrow, perhaps a few percentage points either side of 5%. For higher or lower penalties, the choice appears to be relatively straightforwardly in favour of private or public enterprise respectively. Second, these conclusions do not appear to be particularly sensitive across quite a wide range of possible valued for the marginal cost of public funds.

6: Debt sustainability, fiscal space and fiscal rules

6.1: Debt sustainability analysis (DSA) and debt management (DM)

Since the World Bank and the Fund made a Medium Term Debt Strategy analytical tool available as open-source software, it has been possible for governments, the IFIs, and other interested parties to explore the implications of various macroeconomic, fiscal, and financing assumptions for debt sustainability using a common approach, essentially one consistent with the revised DSA approach adopted in 2005. On balance, this has been highly desirable, in making systematic exploration of alternative assumptions widely available. The downside is that the existing DSA framework remains very restricted and mechanical, with very little capability for endogenizing important and relevant relationships. For example, it is not well designed to examine whether the growth impact of increased public investment would be sufficient to justify an increased budgetary financing burden, from the debt sustainability perspective.

There are a number of on-going attempts to get round this problem. Some of these involve some sort of extension to the Financial Programming Framework, but that does not seem likely to resolve the difficulty.[46] More promising is the programme to integrate DSA concerns into a more fully specified modelling framework, for instance a micro-based Dynamic Stochastic General Equilibrium model.[47] In due course this type of approach will allow an integrated treatment of public investment, growth, taxation, borrowing and debt.

In the meantime, there have been a number of analyses using the standard framework in Tanzania. Both GoT and the World Bank/IMF regularly produce updated DSAs, the latter as part of the reviews of the Policy Support Instrument. These are large and complex documents, and there is no scope to consider them in detail here. A handful of comparative numbers from three of the most recent analyses to reach the public domain are included in Table 6. Since the original documents only give data for selected years, there are some minor discrepancies in the reported years, but these are not germane to the discussion.

[46] See, for example, Estache and Munoz, 2008.
[47] See Buffie et al, 2012.

Table 6: Net present value of public and publicly guaranteed external debt Baseline scenarios, various years (% of GDP)

	2010	2011	2015	2020	2021	2030	2031
IFIs May 2010	13.1	16.7	22.7	22.6		21.5	
URT Dec 2010	14.9	16.1	14.1	12.9		10.3	
IFIs April 2011	22.7	26.6	29.2		25.3		16.2

Sources: URT 2010, World Bank/IMF 2010, and World Bank/IMF 2011

Three things are very noticeable about these baseline scenarios. First, there was a very substantial jump between 2010 and 2011 for the 2010 figures. Apparently this reflects changes in the data; previously external debt databases were held independently in both the Ministry of Finance and the Bank of Tanzania. These have now been merged, and it appears that both were seriously incomplete, so that the merged sum was substantially greater than either of its components. While this is very disconcerting in the context of DSA and DM, it is believed that the data are now reasonably accurate, so that only minor further revisions in the base data need be expected.

Second, the three baseline trajectories are very different, with URT making substantially more optimistic assumptions than the IFIs. More puzzling is the different profile of the two IFI projections, with the 2010 trajectory leading to a doubling of the ratio over the first 5 years, after which it stabilizes, while the 2011 trajectory starts from a much higher base (apparently in consequence of the data revision), rises much more modestly over the first 5 years, and then roughly halves over the next 15. This is particularly puzzling since the text in the 2011 analysis asserts that the underlying assumptions are little altered.

Neither of these features induces much confidence in these exercises. However, the third feature still seems reasonably robust: it is that Tanzania's public debt is reasonably low, and most of the debt sustainability analyses, where alternative assumptions are made relative to the baseline ones, suggest that sustainability is unlikely to be a problem under most scenarios. (A notable exception is when the high primary deficit of some recent years is modelled as going uncorrected.)

GoT have also used this framework to examine its medium term debt management strategy.[48] It examines the short and medium term implications of various financing mechanisms if insufficient concessional finance is available, including syndicated loans and Eurobond

[48] See URT 2011b.

issues, and finds that they do not breech reasonable limits; however it finds that syndicated loans are to be preferred to the Eurobond.

This section may be concluded on a cautionary note. DSA is very important in providing early warning of emerging problems and exploring ways of resolving them. But it is concerned with a particular type of malfunction, the absence of which does *not* mean that the fiscal situation is necessarily satisfactory. There will be many different patterns in the composition and level of both expenditure and revenue which are consistent with debt sustainability, but which have very different implications for efficiency, growth, and welfare. Of course, "bad" patterns are more likely to lead to unsustainability; but even very inefficient fiscal programmes, with misconceived financial arrangements, badly designed tax systems, and poor choice and implementation of investments, could be perfectly consistent with sustainability, and pass all DSA tests if the starting point for the programme lies sufficiently far within the boundaries.

6.2: Fiscal rules, fiscal indicators, fiscal space, and fiscal buffers

Fiscal rules

The sharp increase in fiscal deficits and public debt in many countries has led to renewed interest in the possible role of fiscal rules, and currently, more than 80 countries operate some form of rule. However the recent crisis caused more than a quarter of these to be suspended. Rules have involved restrictions on various fiscal magnitudes, usually relative to GDP: for example, the budget balance; debt; expenditure; revenue; or on combinations of these. [49]

A few years ago, an IMF working paper suggested a fiscal framework for Tanzania that incorporated a permanent hard ceiling on debt (that the PV to GDP ratio on all government debt be held below 40%) coupled with annual benchmarks on net domestic financing (2½% of GDP in a single year), on non-concessional external financing (also 2½% of GDP in a year), and on expenditure growth (3 percentage points of GDP).[50] GoT were not particularly interested at the time (the paper was originally written just before the global crisis), partly on the ground that it was unnecessary, and partly on the ground that it was in any case too lax. Of course, Tanzania has already signed up to certain fiscal rules, in principle, in the context of the EAC convergence criteria.

Following the global crisis, times have changed, and there has been an episode of budgetary laxity in Tanzania, so some commentators have again raised the possibility that it might be helpful to adopt some form of rule. 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

[49] For an overview, see IMF, 2009.
[50] See Kim and Saito, 2009

not handle all contingencies well. In attempting to construct more flexible rules, they rapidly become too complex to be operational.[51] A second rationale is to prevent irresponsible fiscal behavior. 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.

Fiscal indicators

In consequence, it may be better to think in terms of fiscal indicators and target bounds, rather than rules. This is consistent with the approach in Tanzania; for example, the five year development plan includes targeted bounds for domestic borrowing (1% of GDP), external borrowing (6%), and overall expenditure (28%), as well as the target of increasing revenue to 19%.

One indicator that has been discussed recently in Tanzania is the gap between revenues plus program grants on the one hand, and recurrent expenditures on the other. The idea is that government should not borrow to finance public consumption, but can do so to finance investment, because the investment will be able to service the costs of borrowing. The previous discussion of appropriability shows that this is too optimistic an assumption. Conversely, parts of current expenditure may yield future revenue gains. However, there is no reason to suppose that these two effects would cancel out.

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.

Fiscal space and fiscal buffers

Closely related to fiscal indicators is the notion of a fiscal buffer, the extent to which government has room to manoeuvre, for example in response to an adverse shock. The idea is that there is a set of boundary conditions that determine fiscal sustainability. To the extent that a government's position lies well inside these boundaries, it has fiscal space.[52] The question is, how much of this fiscal space should be set aside as a buffer? The IMF seems

[51] For a rule that scores high on flexibility, but low on ease of operation, see Buiter and Grafe, 2002. The sort of simple but poorly designed and inflexible rules that they were trying to reform were those adopted by the European Monetary Union.

[52] For an attempt to measure fiscal space by estimating explicit debt limits, see IMF 2010.

currently to regard a 40% PV of debt to GDP ratio as the relevant boundary, and the buffer to require a debt limit in normal times well below this.

However, this argument is based on a supposed asymmetry, with it being much more costly temporarily to exceed the boundary than usually to stay below it. Ultimately, this is an empirical question. While there is no reason to skirt the edge of a boundary simply for the sake of doing so, there may be good reasons for using all the space that is available. If an economy has a substantial number of socially profitable investment opportunities, but limited budgetary and concessional resources, it may wish to opt for a temporary rise in its debt ratio, and wish to push this out towards some safe boundary.

The cost of staying a substantial distance below this boundary is the foregone investments, and the growth that they would have eventually engendered. The cost of pushing out to the boundary is that there is a risk of some adverse shock, which might be much more costly to handle if there was little remaining fiscal space available for use. The calculation would then require offsetting a known loss of investment and growth against some composite calculation of the probability of the adverse shock and of the increased cost of handling it.

It is evident that making this sort of calculation would be difficult; however, it is certainly not evident that the right answer would be to maintain a fiscal buffer large enough to handle any conceivable eventuality.

7: Conclusions

It appears that domestic revenues are likely to continue to grow relative to GDP, albeit at a slower rate than in the mid-2000's. The future of concessional financing is unclear, but it seems highly likely that it will continue to taper off relative to GDP, with the uncertainty being about how fast this tapering will be. Given the very large expenditure requirements of government, increased access to non-concessional and quasi-concessional sources of financing will be required.

A great deal of work is required to ensure that the scale, and more especially the composition, of public spending is compatible not only with the goals of government, but also with its own internal logic, notably the connection between capital and recurrent expenditure, and with the limitations on available instruments, notably the twin problems of incomplete appropriability, and of the deadweight burden of taxes.

Beyond the analysis, there is a real need to study how best to implement planning and budgeting in a way that respects these requirements, and radically to improve investment efficiency. Fiscal indicators, as well as debt sustainability analysis, may provide helpful checks on these processes, but are no substitute for them.

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