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The marginal cost of public funds and tax reform in Africa ☆

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ABSTRACT

In this paper we propose estimates of the marginal cost of public funds (MCF) in 38 African countries. We develop a simple general equilibrium model that can handle taxes on five major tax classes, and can be calibrated with little more than national accounts data. A key feature of our model is the explicit recognition of the informal economy. Our base case estimate of the average MCF from marginal increases in all five tax instruments is 1.2. Focusing on the lowest cost tax instruments in each country, commonly the VAT but not always, the average MCF is 1.1. Finally extending the tax base to include sections of the informal economy by removing some tax exemptions offers the potential for a low MCF source of public funds, and a lowering of MCFs on other tax instruments.

1. Introduction

Tax revenue as a proportion of GDP is typically about 20 percentage points lower in African countries than in rich OECD countries. Reforms are needed to improve the efficiency of African tax systems and to provide reliable revenue at low social cost. This is particularly important now, as rich countries emerge from the global financial crisis with high debt. It is unlikely that development assistance will increase significantly in the near future, and there is a risk that aid could be reduced. So the paper examines suitable directions for African tax reform. More specifically, if extra revenue is to be raised, should it be achieved by extending taxes to untaxed parts of the economy, or by raising existing tax rates? If the overall tax effort is too low, are there nevertheless particular taxes which should be repealed? The answers to such questions depend on the marginal cost of public funds (MCF)—the change in social welfare associated with raising an additional unit of tax revenue using a particular tax instrument. The paper hence estimates the marginal cost of public funds for five key tax instruments–domestic sales taxes, import and export taxes, and corporate and personal income taxes–in 38 African countries.

The central role of the MCF in tax policy is well known. A given level of revenue can be obtained at lower welfare cost by increasing a tax with a low MCF and lowering a tax with a high MCF. The literature on this topic dates back at least thirty years, but it is almost entirely focused on the tax systems of high income countries. MCF estimates are particularly hard to come by for African countries, given the paucity of data and the difficulty of adapting sophisticated computable general equilibrium (CGE) models to obtain these estimates.[1] Moreover, the few estimates that exist may not be comparable because of the differences of the modeling techniques. Thus, the challenge as we have conceived it is to develop a simple CGE model that can be calibrated with little more than national accounts data, and can be used to provide consistent estimates comparable across African countries. This enables lessons to be drawn from their variation.

One important feature of our model is that it deals explicitly with the informal economy, a key requirement for realism in the African context. As a by-product of our model's calibration, we have produced

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[1] Substitution effects, which are at the heart of the dead-weight loss of taxation, are poorly captured by partial equilibrium analysis. CGE models are required because real tax systems are complex, and because it is necessary to take account of multiple interactions within tax systems.

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estimates of the untaxed economy (see Table 11 in the Appendix). Viewing GDP as the sum of all output, our calibration algorithm indicates untaxed goods represent an average of 35% of GDP. Viewing GDP as the sum of all income, untaxed factor payments constitute an average of 56% of GDP. Our measures of the untaxed economy are not identical with efforts to measure the shadow economy, such as Schneider and Enste (2000). To the extent that the shadow economy includes activities that are not caught in measures of GDP, our measure is smaller. To the extent that we include legal activities that are captured in GDP and happen not to be taxed by one of our five taxes, our measure is larger.

Inclusion of the informal sector in the model is important in two respects. First it permits us to compute taxes on domestic goods and factor taxes using legally specified rates, rather than 'effective' tax rates which are commonly modeled in CGEs.[2] Second we might suspect that in countries with larger informal sectors, it is easier for economic agents to shift from formal to informal activity. Greater substitutability would lead to higher marginal costs of taxation on formal activity. Comparison of estimates of MCF across the 38 countries reveals the importance of the size of the informal sector as a determinant of the magnitude of MCFs. Larger informal sectors are typically associated with higher MCFs.[3]

Our MCF estimates of the five key tax instruments provide a lens through which many of the major issues of African tax reform can be viewed. Over the past 10–20 years, African countries have lowered trade taxes to improve competitiveness, and introduced VATs, in part to compensate for lost trade tax revenues. In our 38 countries, from the early 1990s to the mid 2000s, on average trade taxes fell from 35.2% of tax revenue to 29.6%, while total tax revenue rose on average from 13.7% to 17.1% of GDP.[4] Our model and MCF estimates suggest directions for further reform of tax structures. Low values of MCF estimates indicate that in most countries additional revenue could be raised with relatively low efficiency cost, in most cases using higher VATs, but in some cases through higher trade taxes. We find no general rules that imports or exports should not be taxed, so that MCF estimates are needed in order to determine appropriate change in trade taxes. Finally, we estimate low MCFs in the informal economy, indicating priorities for the removal of tax exemptions and for the inclusion of untaxed parts of the economy.

After a brief review of the existing literature in Section 2, we present the model in Section 3. The model is inspired by the minimal data requirements of the '1-2-3 model' of Devarajan et al. (1994). The basic 1-2-3 model has one country with two producing sectors and three goods: a domestic good, exports and imports. This model is extended to include production of an informal good, an intermediate investment good, and four factors of production: formal capital, informal capital, formal labor and informal labor. Our definition of an informal good or factor is one on which no tax is paid. We thus use the terms 'untaxed' and 'informal' interchangeably.

In Section 4 we apply the CGE model to produce estimates of MCFs for five taxes in 38 African countries, vastly increasing the number of developing countries for which MCF estimates exist. Our base case estimate of the average MCF from marginal increases in all five tax instruments is 1.21, with a plausible range of 1.19 to 1.29. These estimates provide a basic blueprint for tax reform in Africa, indicating the high cost taxes that are ripe for cutting, and the low cost taxes which could be increased. Sensitivity testing of the model reveals which elasticities are the most important in determining MCF magnitudes, and suggests that our base case estimates are reasonably robust for purposes of tax reform. We also estimate the impact of administrative costs on MCFs.

In Section 5 we examine two central aspects of tax reform–the reform of tax structures, and the priorities for extending the tax base–with particular attention to the implications of Africa's large informal sectors. We ask whether African policies of lowering trade taxes and expanding the application of VATs are appropriate. We find that the VAT and import tariff are typically the key optimal tax instruments, but in some cases taxes on exports and factors are also optimal. The optimality of taxes on inputs follows from the presence of the informal economy. In respect of tax base broadening, we ask how much administrative cost should be spent in order to bring parts of the informal economy into the tax system. On average we find quite high administrative cost thresholds above which efforts to impose an existing tax on currently untaxed sectors would be more costly than simply raising the existing tax rates.

We conclude in Section 6 with a review of several issues in African tax reform, interpreted in the light of our results.

2. The marginal cost of public funds

The MCF measures the change in social welfare associated with raising an additional unit of tax revenue using a particular tax instrument:

$$MCF = -\frac{\Delta W}{\Delta R} \tag{1}$$

where ΔW is a monetary measure of the change in social welfare and ΔR is the change in tax revenue arising from a marginal change in a tax instrument. The change in social welfare is a measure such as the equivalent variation or change in consumer surplus. Table 1 sets out a

Table 1
Selected MCF Estimates.

Country	Tax type	Estimate	Source
Australia	Labor	1.19–1.24	Campbell and Bond (1997)
Australia	Labor	1.28–1.55	Findlay and Jones (1982)
Australia	Capital	1.21–1.48	Diewert and Lawrence (1998)
Australia	Capital	1.15–1.51	Benge (1999)
Bangladesh	Sales	0.95–1.07	Devarajan et al. (2002)
Bangladesh	Import	1.17–2.18	Devarajan et al. (2002)
Cameroon	Sales	0.48–0.96	Devarajan et al. (2002)
Cameroon	Import	1.05–1.37	Devarajan et al. (2002)
Canada	Commodity	1.25	Campbell (1975)
Canada	Labor	1.38	Dahlby (1994)
Canada	Labor	1.39–1.53	Fortin and Lacroix (1994)
China	Sales	2.31	Laffont and Senik-Leygonie (1997)
India	Excise	1.66–2.15	Ahmad and Stern (1987)
India	Sales	1.59–2.12	Ahmad and Stern (1987)
India	Import	1.54–2.17	Ahmad and Stern (1987)
Indonesia	Sales	0.97–1.11	Devarajan et al. (2002)
Indonesia	Import	0.99–1.18	Devarajan et al. (2002)
New Zealand	Labor	1.18	Diewert and Lawrence (1994)
Sweden	All taxes	1.69–2.29	Hansson and Stuart (1985)
United States	All taxes	1.17–1.33	Ballard et al. (1985)
United States	Labor	1.21–1.24	Stuart (1984)
United States	Labor	1.32–1.47	Browning (1987)
United States	All taxes	1.47	Jorgenson and Yun (1990)
United States	Labor	1.08–1.14	Ahmed and Croushore (1994)

[2] 'Effective' tax rates are calculated as tax revenues divided by sector size. They provide an average between taxpayers who pay tax at something like the legal rate, subject to some under-reporting, and informal producers or consumers who pay no tax. Effective tax rates underestimate the marginal tax rate incurred by those who actually pay tax and are thus likely to underestimate MCFs.

[3] Fortin and Lacroix (1994) suggest the informal sector accounts for around 0.02–0.05 of their MCF estimates of 1.39–1.53 for labor taxation in Canada. They note that although small, the impact of the informal sector increases rapidly with the level of the marginal tax rate. The importance of the informal sector when analyzing taxation in developing countries is also emphasized in other settings by García Peñalosa and Turnovsky (2005) and Emran and Stiglitz (2005).

[4] These figures are based on data from IMF country report Statistical Annexes, using the earliest and most recent data available from reports available online. The periods covered differ for each country, with 1992/3 the median first year, and 2005 the median final year. Trade tax revenues as a proportion of GDP rose from 4.7% to 4.9% on average. The share of trade taxes in tax revenue rose in 15 countries, and tax revenue as a proportion of GDP fell in 9 countries. The list of 30 countries that now have VATs is included in our data set in Appendix B.