

# **Tax Policy in Sub-Saharan Africa: Examining The Role of Excise Taxation**

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## ABSTRACT

Excise taxes, notably on tobacco and petroleum products and on alcoholic beverages, raise revenue equivalent to 1.9 percent of gross domestic product in Sub-Saharan Africa. Their importance varies widely and inexplicably across countries, and shows no trend over time. In principle, excise taxes are good revenue sources, cheap to administer and potentially efficient, especially when applied to goods that cause negative externalities or face price-inelastic demand. Excises are consistent with a fair tax system, and complement broadly based taxes such as the value added tax.

Excise taxes have, however, been largely ignored in the professional literature on developing countries. This article aims to begin to redress this imbalance, by asking what role excises do, and should, play in the countries of Sub-Saharan Africa.

The paper formulates five propositions:

- *Revenue from excise taxes could, and should, be doubled in most African countries;*
- *Considerable scope exists for efficiency-enhancing changes in the structure of excise taxes;*
- *Excise taxes should be confined to the traditional excises and a limited number of luxury items;*
- *Excise tax administration could be substantially improved by codifying and disseminating current best practices within Sub-Saharan Africa; and*
- *Increased reliance on excise taxes is consistent with an equitable tax system.*

These propositions are necessarily tentative, because large gaps in our knowledge of excises in developing countries remain—about demand elasticities, the extent of externalities, equity effects, administrative and compliance costs, and best practices. These gaps need to be filled before one can confidently advocate greater reliance on excises.

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## INTRODUCTION

One of the necessary conditions for rapid, equitable, and sustainable economic growth in Africa and elsewhere is a healthy system of public finance. In the words of Richard Bird, “The tax system constitutes one of the most important instruments of development policy in any country” (Bird 1992, p. ix). Revenue should be adequate to finance basic services such as security and primary education, to permit the government to help finance public investment, and to obviate the need for inflationary financing. Government should also be financed in an efficient way, using a well-designed tax system not overly reliant on taxes on trade. Several recent studies of rapid economic growth in East and Southeast Asia have highlighted the role played by consistent, prudent public finance policy (Lindauer and Roemer 1994, World Bank 1993, Page 1994).

The literature on tax reform in developing countries, which has burgeoned over the past decade or more, has led to three main recommendations. First, indirect taxation should rely heavily on a value added tax (VAT), to replace turnover and even sales taxes (Jenkins 1991; Gillis 1989, p. 503). Second, taxes should be levied at low and relatively flat rates on bases that have been broadened through the elimination of exemptions and other loopholes (Gillis 1989, pp. 1-2). Lower, simpler taxes are seen as easier to collect and administer, and as creating less inefficiency. Third, countries should move away from their current heavy reliance on taxes on trade, which are seen as being particularly inefficient (World Bank 1988, Aguirre and others 1981, Anderson 1987).

The emphasis on lower, flatter, simpler, and more broadly based taxes appears to leave little room for excises, which are by their very nature taxes levied at high rates on narrow bases. The most important of these taxes are the traditional excise taxes on tobacco products, alcoholic beverages, and petroleum products. The only thorough assessment of excise taxation is over 20 years old (Cnossen 1977), and in his review of recent tax reforms Jenkins (1991) makes no mention of excises. The relative neglect of excises prompted Shoup (1983, p. 274) to refer to them as “the orphans of tax policy.”

This article aims to begin to redress this imbalance by asking what role excise taxes do, and should, play in the countries of Sub-Saharan Africa. After briefly defining excises, the paper reviews the available information about the level and evolution of these taxes. This is followed by a discussion of the theoretical justification for excises. A few studies of the economic effects of excise taxes are then considered, and the dearth of research on these taxes in Africa is noted. Because of the large gaps in our understanding, we set out a research agenda and some thoughts on methodology in the penultimate section.

The final section sets out five propositions that might serve to guide future discussion of the role of excises in Africa over the years ahead. They are:

- Revenue from excise taxes could, and should, be doubled in most African countries;
- Considerable scope exists for efficiency-enhancing changes in the structure of excise taxes;

- Excise taxes should be confined to the traditional excises and a limited number of luxury items;
- Excise tax administration could be substantially improved by codifying and disseminating current best practices within Sub-Saharan Africa; and
- Increased reliance on excise taxes is consistent with an equitable tax system.

These propositions are necessarily tentative, and may need to be refined in the light of future research findings, but we believe that they are justified based on the evidence now available.

## **WHAT ARE EXCISE TAXES?**

There is some confusion about what excise taxes are, and so it is worth setting out what we mean by excises before proceeding to an analysis of their scope. Excises are taxes levied on particular products and services, typically with discriminatory intent. Excises include the profits of fiscal monopolies. The International Monetary Fund (1974, p. 166) defines them as taxes “levied on particular products, or on a limited range of products . . . (that) may be imposed at any stage of production or distribution and may be assessed by reference either to the weight, strength, or quantity of the product, or by reference to the value.”

Excises thus stand in contrast to general sales, value added, or turnover taxes, or to taxes on trade. In the British Commonwealth countries, excises were traditionally levied at specific rates on the volume of domestic production, and inspectors were stationed at the main factories to monitor and tax the physical flow of goods (Due 1988, p. 61). This system evolved over time to increased reliance on ad valorem taxes (taxes according to the value of a good), and to levying excises on domestic consumption rather than production. The latter change means that excise taxes are now typically collected on imports as well as domestically produced goods destined for local consumption.

The line between excise taxes and other taxes is sometimes difficult to draw. The sales tax in India, which traditionally has had many different rates, taxes with discriminatory intent but does so on such a wide scale that it is difficult to classify these taxes as excises (Due 1988, p. 63). If a country applies a luxury rate VAT to a limited number of items, this would fit the broadest definition of excise taxes. When excises are applied to domestic production, and import tariffs are calibrated to apply, de facto, comparable rates to competing imports, then much of the import tariff revenue on these goods should be considered as excise revenue in principle, although this is not done in practice.

Because the measurement of excise taxes is somewhat arbitrary, international comparisons of excise revenue must be treated with caution, despite the best efforts of the IMF (and others) to put together consistent numbers. This problem needs to be borne in mind in considering the comparisons that follow in the next section. Fortunately the problem is mitigated by the fact that about 90 percent of excise tax revenue comes from the traditional (and unambiguous) excises on tobacco products, alcoholic beverages, and motor fuels.

## EXCISE TAX REVENUE AND RATES

Excise taxes are an important source of revenue in most African countries. During the two decades since 1973, excises in Africa have yielded 1.9 percent of gross domestic product, according to the data for the 17 countries for which consistent IMF data were available, and which are reviewed in Table 1 (see, too, Shome 1995, p. 299). This amounted to an estimated 11 percent of all tax revenue during the same period. These proportions are similar to those found in other developing countries, but are substantially lower than those found in the Organization for Economic Cooperation and Development (OECD) countries, where excise taxes raise revenue equivalent to about 3 percent of GDP (Shome 1995, p. 293). In the early 1990s excise revenues accounted for more than 6 percent of GDP in 11 countries of northern Europe, and more than 5 percent of GDP in another 11 countries in Eurasia.<sup>1</sup>

Despite the modest role played by excises in Africa, they raised more revenue than general sales taxes (including VAT and turnover taxes) in 11 of the 17 countries listed in Table 1. In about half of all cases, excises yield more revenue than do individual income taxes.

Like all taxes, the revenue from excise taxes varies considerably from year to year. This is measured in Table 1 by the Coefficient of Variation (= Standard Deviation/Mean) of the share of excise revenue in GDP between 1973 and 1993. The unweighted mean value is 32 percent, which reflects a good deal of variation, but is nonetheless lower than the coefficient of variation for general sales taxes and for domestic indirect taxes overall.

Although excise tax revenue (as a fraction of GDP) varies from year to year, there is no measurable trend over time in Sub-Saharan Africa. This emerges clearly from Table 2, which presents five-year averages of the proportion of GDP collected by excises since 1975. Data for the whole period, along with comparable information on general sales taxes, are available for only eight countries, and show a slight decline in excise revenue (relative to GDP) over time. When the largest available sample is used for each five-year period, there is no discernible trend; excises yielded 2.1 percent of GDP in 1975–1979 and again in 1990–1994. During this same period there is some evidence that the share of revenue from general sales taxes rose from an estimated 2.5 to 3.0 percent of GDP.

The importance of excise taxation varies substantially across countries, with a yield of less than 1 percent of GDP in four countries, and more than 2.5 percent in five others, ranging from 0.8 percent in Niger to 4.9 percent in Ghana. One is naturally led to ask why this variation occurs, and whether it might be related systematically to differences between one country and the next.



**Table 1**  
*Structure of Domestic Taxes on Goods and Services in Sub-Saharan Africa*

|               | Revenue as % of GDP |               |         | CV of revenue as % of GDP* |               |         | Sample Years    |
|---------------|---------------------|---------------|---------|----------------------------|---------------|---------|-----------------|
|               | Total               | of which      |         | Total                      | of which      |         |                 |
|               |                     | General sales | Excises |                            | General sales | Excises |                 |
| Burkina Faso  | 2.5                 | 1.0           | 1.5     | 9.5                        | 17.3          | 15.1    | 1975-85         |
| Cameroon      | 2.8                 | 1.3           | 1.5     | 9.3                        | 21.7          | 17.9    | 1976-93         |
| Côte d'Ivoire | 5.1                 | 1.9           | 3.0     | 11.1                       | 13.3          | 18.5    | 1984-90         |
| Ethiopia      | 4.0                 | 1.2           | 2.6     | 16.4                       | 24.9          | 15.8    | 1973-90         |
| Gambia        | 2.1                 | -             | 0.3     | 133.7                      | -             | 100.2   | 1974-92         |
| Ghana         | 3.1                 | 0.7           | 2.3     | 38.8                       | 60.9          | 43.6    | 1973-93         |
| Kenya         | 8.7                 | 5.9           | 2.5     | 23.9                       | 33.4          | 18.0    | 1973-94         |
| Madagascar    | 4.2                 | 2.3           | 1.9     | 50.5                       | 59.0          | 43.8    | 1978-82,1988-93 |
| Malawi        | 5.3                 | 4.5           | 0.7     | 20.5                       | 27.7          | 19.0    | 1973-90         |
| Mauritius     | 4.7                 | -             | 2.1     | 15.5                       | -             | 23.0    | 1978-94         |
| Namibia       | 8.6                 | 5.9           | 1.9     | 18.1                       | 8.1           | 40.4    | 1986-93         |
| Rwanda        | 1.5                 | -             | 1.5     | 36.1                       | -             | 36.4    | 1973-80         |
| Seychelles    | 2.9                 | -             | 0.5     | 68.7                       | -             | 111.0   | 1973-78         |
| Sierra Leone  | 2.6                 | 0.5           | 2.2     | 48.1                       | 21.0          | 36.2    | 1974-94         |
| Zaire         | 2.5                 | 1.6           | 0.8     | 58.6                       | 80.1          | 36.3    | 1976-93         |
| Zambia        | 8.7                 | 3.4           | 5.3     | 23.0                       | 33.4          | 46.7    | 1973-93         |
| Zimbabwe      | 8.4                 | 5.7           | 2.5     | 16.1                       | 14.0          | 30.8    | 1976-90         |
| All countries | 4.3                 | 2.6           | 1.9     | 36.6                       | 34.3          | 32.3    | From above      |

Sources: IMF, *Government Finance Statistics Yearbook 1995*; World Bank, *World Tables*.

Notes: \* CV (coefficient of variation) is defined as standard deviation divided by mean value of variable. Excise taxes defined here constitute the sum of items under headings 5.2, 5.3 and 5.4 using IMF nomenclature.

**Table 2**  
*Evolution of Domestic Taxes on Goods and Services in Sub-Saharan Africa*

|  | 1975-79                | 1980-84 | 1985-89 | 1990-94 | 1975-79       | 1980-84 | 1985-89 | 1990-94 |
|--|------------------------|---------|---------|---------|---------------|---------|---------|---------|
|  | (As percentage of GDP) |         |         |         | (Sample Size) |         |         |         |
| <b>For countries with complete data:</b> |                        |         |         |         |               |         |         |         |
| Total domestic taxes on goods & services |                        | 5.0     | 5.7     | 4.7     | 5.0           | 8       | 8       | 8       |
| <i>of which</i>                          |                        |         |         |         |               |         |         |         |
| General sales, VAT, turnover taxes       |                        | 2.3     | 3.0     | 2.8     | 3.0           | 8       | 8       | 8       |
| Excise taxes                             |                        | 2.5     | 2.6     | 1.8     | 2.0           | 8       | 8       | 8       |
| <b>For largest available sample:</b>     |                        |         |         |         |               |         |         |         |
| Total domestic taxes on goods & services |                        | 3.8     | 4.5     | 4.3     | 5.6           | 16      | 16      | 17      |
| <i>of which</i>                          |                        |         |         |         |               |         |         |         |
| General sales, VAT, turnover taxes       |                        | 2.5     | 2.8     | 2.8     | 3.1           | 10      | 12      | 13      |
| Excise taxes                             |                        | 2.1     | 2.3     | 1.8     | 2.1           | 15      | 15      | 14      |

Source: As for Table 1.

We approach this issue by regressing the average ratio of excise revenue to GDP against measures of GDP/capita (in world prices), nonexcise tax revenue as a fraction of GDP, exports as a proportion of GDP, and a dummy variable that is set equal to 1 for Francophone countries. The data are based on averages for 1985–1989, and the sample of 15 consists of the largest possible number of Sub-Saharan African countries for which data were available.

The results are shown in the first column of numbers in Table 3. The estimated equation is not statistically significant, which means that excise revenue is *not* higher (or lower) in richer countries, or countries with large governments, or economies that are more open to trade, or Francophone countries. In short, excise revenue (as a proportion of GDP) may vary substantially across countries, but for no easily identifiable reasons. A corollary is that there is likely to be considerable scope for change in policy and tax administration to raise (or lower) the revenue from excises. Based on the numbers in Table 1, if excises were raised to the level of the three countries with the highest reliance on them (Zambia, Côte d'Ivoire, and Ethiopia), they would have to be almost doubled, to some 3.6 percent of GDP.

**Table 3**  
*Correlates of Tax Revenue and Rates in Sub-Saharan Africa: Regression Results*

| Dependent variables:                  | Excise revenue/GDP  | Tax rate on premium gasoline |                   | Tax rate on diesel fuel |                   |
|---------------------------------------|---------------------|------------------------------|-------------------|-------------------------|-------------------|
|                                       | (1)                 | (2a)                         | (2b)              | (3a)                    | (3b)              |
| <b>Independent variables</b>          |                     |                              |                   |                         |                   |
| GDP/capita                            | 0.0031<br>(0.010)   | 4.950<br>(0.653)             |                   | 1.000<br>(-0.186)       |                   |
| Exports/GDP                           | -1.8030<br>(-0.716) | 1.725<br>(0.009)             |                   | 73.880<br>(0.575)       |                   |
| Non-excise tax revenue as %<br>of GDP | 4.7030<br>(0.823)   |                              |                   |                         |                   |
| Government revenue as %<br>of GDP     |                     | -82.820<br>(-0.664)          |                   | -43.470<br>(0.575)      |                   |
| Francophone? (Yes=1)                  | -0.1480<br>(0.251)  | 51.790<br>(1.724)            | 50.020<br>(1.833) | 35.500<br>(1.615)       | 36.470<br>(1.850) |
| Intercept                             | 1.6180<br>(1.950)   | 67.650<br>(1.510)            | 60.540<br>(3.469) | 38.070<br>(1.200)       | 41.150<br>(3.38)  |
| $\bar{R}^2$                           | 0.0870              | 0.185                        | 0.144             | 0.184                   | 0.153             |
| $R^2$                                 | -0.2450             | -0.006                       | 0.101             | -0.020                  | 0.108             |
| F (significance)                      | 0.5800              | 0.450                        | 0.080             | 0.490                   | 0.080             |
| Number of observations                | 16                  | 22                           | 22                | 21                      | 21                |

Notes and Sources:

- Bracketed numbers are t-statistics. Dependent variables are in percentages.
- Regression (1): Variables measured as means for 1985-1989. Tax numbers from IMF, *Government Finance Statistics Yearbook*, various issues; GDP/capita from Robert Summers et al., *Penn World Tables (Mark 5.6)*, 1995; exports and other GDP figures from IMF, *International Financial Statistics Yearbook*, various issues.
- Regressions (2) and (3): Sources as for (1), except tax rates, which are from IMF, *Tanzania: Value Added Tax-Issues of Design and Administration*, Fall 1993.
- Variables are measured in 1991, or closest previous available year.
- Regressions include maximum number of Sub-Saharan countries for which data were available.

Sufficient comparative data are not available to allow one to decompose excise tax revenues into their constituent parts. But an idea of the nominal tax rates on some of the major excisable items may be had from Table 4, which summarizes the excise tax rates in place in the early 1990s. As a fraction of the pretax retail price, the excise tax was about 75 percent on beer and 60 percent on cigarettes, 51 percent on diesel fuel, and 82 percent on premium gasoline.

Once again the most striking feature of the tax rates is the wide variation across countries. The histograms in Tables 5a–5e are designed to emphasize this point. The taxes on beer and cigarettes are bimodal. About half of the countries shown in Table 5a tax beer at 50 percent or less, and most of the rest apply a tax of 100 percent or more. A similar division is evident in cigarette taxation, where the low rates tend to be in Francophone countries.

**Table 4**  
*Summary of Excise Tax Rates*

|                  | Nominal tax rate |      | Sample size | Year (approx.) |
|------------------|------------------|------|-------------|----------------|
|                  | Mean             | SD   |             |                |
| Beer             | 74.5             | 47.5 | 16          | 1993           |
| Soft drinks      | 26.7             | 25.6 | 12          | 1993           |
| Cigarettes       | 60.3             | 51.4 | 21          | 1993           |
| Premium gasoline | 82.3             | 68.1 | 30          | 1991           |
| Diesel fuel      | 50.8             | 42.4 | 30          | 1991           |

Notes: Tax rate is as % of pre-tax retail price. Sample consists of all countries in Sub-Saharan Africa for which consistent data are available.

Source: As for Table 5.

**Table 5a**  
*Excise Tax Rates on Beer in Sub-Saharan Africa, circa 1993*

|        |           |            |           |         |                  |
|--------|-----------|------------|-----------|---------|------------------|
| <20%   | Gab-20    |            |           |         |                  |
| 20-49% | Zai-20/25 | Egn-25/30  | Ngr-25/50 | Sen-30  | Mlwi-40          |
| 50-99% | Gbis-50   | Ken-50/100 | Gh-76     | Zim-77  |                  |
| 100% + | Eth-100   | Erit-100   | Ug-100    | Bur-116 | Zam-125 Mtia-195 |

Source: IMF country reports (various)

**Table 5b**  
*Excise Tax Rates on Soft Drinks in Sub-Saharan Africa, circa 1993*

|        |         |           |        |        |         |
|--------|---------|-----------|--------|--------|---------|
| <20%   | Sen-3   | Mlwi-3    | SA-5   | Ken-10 | Cd'I-12 |
| 20-49% | Chad-22 | Zim-23    | Cmn-25 | Zam-25 |         |
| 50% +  | Ug-50   | Eth-50/80 | Gh-76  |        |         |

Source: IMF country reports (various)

**Table 5c**  
*Excise Tax Rates on Cigarettes in Sub-Saharan Africa, circa 1993*

|        |         |             |             |         |           |            |        |        |       |
|--------|---------|-------------|-------------|---------|-----------|------------|--------|--------|-------|
| <20%   | Bur-4   | Guin-10     | Chad-14     |         |           |            |        |        |       |
| 20-49% | Ngr-20  | Cmn-25      | Gab-25      | Egn-30  | Mlwi-30,4 | Mtia-24/40 | CVR-30 | Sen-30 | SL-30 |
| 50-99% | Erit-50 | Zai-50      | Zim-80      |         |           |            |        |        |       |
| 100% + | Ug-100  | Mta-120/132 | Ken-120/140 | Zam-125 | Eth-150   | Gh-171     |        |        |       |

Source: IMF country reports (various)

**Table 5d**  
*Excise Tax Rates on Premium Gasoline in Sub-Saharan Africa, circa 1991*

|          |         |          |         |        |         |         |        |        |        |        |        |        |        |
|----------|---------|----------|---------|--------|---------|---------|--------|--------|--------|--------|--------|--------|--------|
| <20%     | Ngia-5  | SL-17    |         |        |         |         |        |        |        |        |        |        |        |
| 20-49%   | Ben-26  | Bot-39   | Togo-36 | Zam-23 | Swaz-30 | Mlwi-39 | Moz-39 | Les-37 | Tan-37 | Dji-36 | Eth-40 | Zim-30 | Moz-39 |
| 50-99%   | BF-85   | Chad-93  | Mts-92  | Nam-61 | Rw-75   | STP-62  | Ug-92  |        |        |        |        |        |        |
| 100-199% | Cam-174 | Cd'I-174 | EG-178  | Gh-111 | Gwi-125 |         |        |        |        |        |        |        |        |
| 200%+    | Ang-218 | Gam-203  | Sen-258 |        |         |         |        |        |        |        |        |        |        |

Source: IMF, *Tanzania: Value Added Tax*, February 1993

**Table 5e**  
*Excise Tax Rates on Diesel Fuel in Sub-Saharan Africa, circa 1991*

|        |          |         |         |         |         |        |        |        |        |        |
|--------|----------|---------|---------|---------|---------|--------|--------|--------|--------|--------|
| <20%   | Ben-18   | Cam-19  | Togo-16 | Moz-5   | Ngia-5  | Tan-19 | Eth-12 | Zim-11 |        |        |
| 20-49% | Zam-21   | STP-49  | Swaz-30 | Les-35  | Mlwi-35 | Mts-44 | Dji-21 | SL-20  | Ken-21 | Bot-28 |
| 50-99% | Ang-82   | BF-72   | Bur-56  | Chad-89 | EG-91   | Nam-59 | Rw-74  | Ug-57  |        |        |
| 100% + | Cd'I-131 | Gam-148 | Sen-164 |         |         |        |        |        |        |        |

Source: IMF, *Tanzania: Value Added Tax*, February 1993

The variation in tax rates on gasoline is particularly wide, with almost half of the countries applying rates of 40 percent or less, and a quarter of the countries setting rates of at least 110 percent. The tax rates on diesel fuel are almost universally substantially lower than the rates on premium gasoline—in contrast with the experience in the OECD countries—and are more tightly bunched. The coefficients shown in the four right-hand columns of Table 3 result from regressions that attempt to explain the variation in tax rates on motor fuels. The only variable, other than the constant term, that has a significant effect is the dummy variable for Francophone countries. For example, equation 2b indicates that the tax rate on premium gasoline is slightly more than 60 percent for non-Francophone countries, and about 110 percent for Francophone countries. More striking is the poor fit of equations (2) and (3), which indicate that most of the intercountry variation in excise tax rates, on motor fuel at least, remains unexplained.

Most developing countries impose relatively high taxes on motor vehicles, and especially cars. For instance, around 1990, all motor vehicles in Malawi faced an 80 percent tax, cars in The Gambia were taxed at between 55 and 75 percent, and motor vehicle taxes in Tanzania varied from 37 to 180 percent,

depending on the category and engine size (Haughton 1991). Although none of these taxes were formally called excises, they are analytically indistinguishable from excise taxes in that they amount to (high) tax rates on specific goods.

## **Why Excise taxes?**

Before considering how best to design excises, it is useful to examine the justification for such taxes in the first place. Whatever the case for excises might be, it must be powerful, because they are ubiquitous.

The central purpose of taxation is to raise revenue in “a reasonably non-distorting, equitable, and sustainable manner” (Burgess and Stern 1993, p. 2; World Bank 1991). In short, a tax system needs to yield adequate revenue, and be efficient and fair. The consensus is that indirect taxes should rest on a broadly based consumption tax, complemented with excises (Burgess and Stern 1993, World Bank 1991, Jenkins' introduction in Hussey and Lubick 1996).

### **Revenue Adequacy**

“The most compelling reason for the use of excise taxes” write McCarten and Stotsky (1995, p. 100) “is that they can potentially raise a great deal of revenue with little distorting effect.” For a tax system to continue to raise adequate revenue, it helps if taxes are income-elastic.<sup>2</sup> This occurs when revenue rises in line with national income even when no adjustments are made to the tax rates or bases. Where the tax system lacks elasticity, taxes will have to be modified frequently to maintain revenues, and “the accumulation of piecemeal changes is likely to create an unwieldy and inefficient system” (Haughton 1996, p. 7; Morrissey 1995, commenting on Tanzania). The spate of tax reforms in the late 1980s was driven by the need to reorganize tax systems that had gradually become chaotic (Gillis 1989, chap. 14).

Ad valorem taxes levied on income-elastic bases will themselves be income-elastic. This situation frequently applies to taxes on motor fuels, where the income elasticity of demand generally appears to be greater than 1. This is reflected in Table 6, which summarizes the results of a variety of studies of fuel demand in Africa. It is somewhat surprising that some of the elasticities reported are well below 1. However, the demand for alcoholic beverages and cigarettes frequently rises less quickly than GDP, and so revenue from these sources is likely to be less elastic (except perhaps where excise taxes fall only on the higher-quality lines of alcohol or tobacco products). When the tax rates are specific, revenue will be less income-elastic, and regular adjustments in the rates are likely to be needed to account for inflation.

Ahmad and Stern (1989, p. 1019) conclude from their survey of a large number of studies for developing countries that excise taxes are generally found to be income-elastic. Cnossen (1977, p. 28) reports that earlier studies of East Africa found excise systems to be income-elastic. However, over the past two decades in Sub-Saharan Africa, revenue from excises has risen in line with GDP in Africa (Table 1), indicating a buoyancy of about 1. Buoyancy reflects both the built-in income elasticity of excises and the many changes to the tax rates and bases that have been introduced. Thus, as a practical matter, excise taxes do not appear to have outstanding buoyancy. Furthermore, their yield (relative to GDP) over time is about as stable as the yield of other direct taxes (Table 1).

One specific study is worth mentioning. Osoro (1992) found that over the period 1979–1989 the buoyancy of taxes in Tanzania was 1.03, but 0.96 for sales taxes (including excise taxes). He also estimated that the elasticity of sales and excises was just 0.73 relative to GDP and only 0.50 compared with the base of these taxes. The elasticity of a tax measures how the revenue it yields responds to a change in GDP (or some other base), assuming that no changes are made in the tax laws over time; put another way, elasticity aims to measure the revenue that would be generated automatically if the tax system were to remain unchanged over time (see Haughton 1998a for details).

**Table 6**  
*Price and Income Elasticities for Gasoline and Energy in Sub-Saharan Africa*

|                              | Year       | Own-price elasticity of demand | Income elasticity of demand |                   |                   | Sources                |
|------------------------------|------------|--------------------------------|-----------------------------|-------------------|-------------------|------------------------|
|                              |            |                                | Medium-run                  | Short-run         | Long-run          |                        |
| <b>Gasoline</b>              |            |                                |                             |                   |                   |                        |
| Côte d'Ivoire                | ?          | -0.09 <sup>ˆ</sup>             | 0.57 <sup>ˆ</sup>           |                   |                   | Dahl (1994), p.70.     |
| Ghana                        | 1965,70-81 | 0.04 <sup>ˆ</sup>              | 0.05 <sup>ˆ</sup>           |                   |                   | Dahl (1994), p.74.     |
| Kenya                        | 1965,70-81 | -0.06 <sup>√</sup>             | 1.60 <sup>ˆ</sup>           |                   |                   | Dahl (1994), p.73.     |
| Nigeria                      | 1965-80    | ...                            | 1.65 <sup>√</sup>           |                   |                   | Adegbulugbe & Dayo     |
|                              | 1965-80    | ...                            |                             | 0.48 <sup>√</sup> | 1.37 <sup>√</sup> | Adegbulugbe & Dayo     |
| South Africa                 | 1965,70-81 | -0.01 <sup>ˆ</sup>             | 0.93 <sup>√</sup>           |                   |                   | Dahl (1994), p.73.     |
| Low-income LDCs              | 1960-82    | -0.50                          |                             |                   |                   | Dunkerley & Hoch       |
| Mid-income LDCs              | 1960-82    | -0.40                          |                             |                   |                   | Dunkerley & Hoch       |
| <b>Transport fuel</b>        |            |                                |                             |                   |                   |                        |
| Low-income LDCs              | 1960-82    | 0.00                           |                             |                   |                   | Dunkerley & Hoch       |
| Mid-income LDCs              | 1960-82    | -0.20                          |                             |                   |                   | Dunkerley & Hoch       |
| <b>Energy use per capita</b> |            |                                |                             |                   |                   |                        |
| Burundi                      | c.1960-70  | ...                            | 0.00 <sup>√</sup>           |                   |                   | Dahl (1992), pp.16-17. |
| Djibouti                     | 1970-80    | -0.03                          | 0.01                        |                   |                   | Dahl (1992), pp.10-11. |
| Ethiopia                     | c.1960-70  | ...                            | 2.35 <sup>√</sup>           |                   |                   | Dahl (1992), pp.16-17. |
| Kenya                        | 1971,81    | ...                            | 0.29 <sup>√</sup>           |                   |                   | Dahl (1992), pp.16-17. |
| Somalia                      | 1970-80    | -0.03                          | -0.26                       |                   |                   | Dahl (1992), pp.10-11. |
| Tanzania                     | c.1960-70  | ...                            | 1.00 <sup>√</sup>           |                   |                   | Dahl (1992), pp.16-17. |
| Sudan                        | 1970-80    | -0.03                          | -0.18                       |                   |                   | Dahl (1992), pp.10-11. |
| Uganda                       | c.1960-70  | ...                            | 2.11 <sup>√</sup>           |                   |                   | Dahl (1992), pp.16-17. |
| <b>Total energy use</b>      |            |                                |                             |                   |                   |                        |
| Nigeria                      | 1972-76    | ...                            | 1.31 <sup>ˆ</sup>           |                   |                   | Dahl (1992), pp.12-13. |
| Kenya                        | 1971,81    | ...                            |                             |                   |                   | Dahl (1992), pp.12-13  |
| <b>Urban energy use</b>      |            |                                |                             |                   |                   |                        |
| Ethiopia                     | 1986       | -0.05 <sup>ˆ</sup>             | -0.66 <sup>ˆ</sup>          |                   |                   | Dahl (1992), pp.4-5.   |
| <b>Rural energy use</b>      |            |                                |                             |                   |                   |                        |
| Ethiopia                     | 1986       | -0.45 <sup>ˆ</sup>             | 1.13 <sup>ˆ</sup>           |                   |                   | Dahl (1992), pp.4-5.   |

Notes: <sup>√</sup> denotes statistically significant, generally at 10% level or better.  
<sup>ˆ</sup> denotes not statistically significant, generally at 10% level.  
... denotes elasticity not estimated.  
Where significance levels were not reported, no symbol is displayed.

Excise taxes are an important source of revenue, as documented above, and the rates are easy to change. This makes them a tempting target for short-run efforts to enhance revenue. When Tanzania reduced its excises in 1992–1993, for example, the revenue cost was so high that an IMF tax mission recommended reversing the policy (IMF 1993). Another IMF team recommended increases in excise rates for Madagascar to help improve the weak tax effort of that country (Abdel-Rahman and others 1994, p. 27). Changes such as these, however expedient, can also leave a country with an incoherent tax structure, because the country undertakes “interim measures that deviate in varying degrees from the long-term goals of tax reform” (Shome 1995, p. 20; Sachs 1996).

## Efficiency

Good taxes are efficient. There are several dimensions to efficiency. An efficient tax has low administrative costs—rarely more than 2 percent of total revenue. Most excises, and particularly the traditional ones, are relatively cheap to apply. An efficient tax has low compliance costs, which are the costs borne by taxpayers as they try to comply with the tax laws. Little is known about the costs of complying with excise (or any other) taxes in Africa, although the recent study by Shekidele (1998) has begun to fill this gap.

Also, an efficient tax does not unduly distort the choices that producers and consumers make about what to produce and consume, how to produce it, and in what quantities. In the absence of externalities, tax rates should be chosen so that the deadweight (or pure) loss imposed, per additional dollar of revenue collected, is the same for all taxes. In this situation it is not possible to collect a given amount of revenue without imposing a greater cost on society.

This gives rise to the Ramsey rule, which states that “the proportional reduction in compensated demand arising from taxes should be the same for all goods” (Ahmad and Stern 1989, p. 1041). When supply is infinitely elastic and cross-elasticity effects may be ignored, this yields the inverse-elasticity rule, whereby the tax levied should be inversely proportional to the own-price elasticity of demand.<sup>3</sup>

The Ramsey rule implies that commodity taxes should be finely differentiated. In the real world the constraints imposed by information uncertainty, politics, and weaknesses in tax administration dictate that nearly uniform indirect taxation—tax neutrality—be the rule and excise taxes the exception. But one use of the theoretical results is that they help one to identify good candidates for exceptional taxation—essentially goods facing price-inelastic demand. A further implication is that close substitutes should be taxed alike, because when there is a satisfactory alternative to buying a good, its demand will be highly elastic (Haughton 1998c).

The high tax rates on excises could be seen as reflecting price-inelastic demand, coupled with the importance of excisable goods in household expenditure. But how price-elastic is the demand for traditional excisable goods? McLure and Thirsk (1978) report own-price elasticities of demand for cigarettes in developed countries to be between -0.35 and -0.71; these low numbers may partly reflect the addictive qualities of cigarettes. The demand for petroleum products is also price-inelastic, at least in the short run, as the remarkably small numbers reported in Table 6 indicate.<sup>4</sup> However, when taxes fall only on the higher-quality lines of a product, such as on bottled but not market-brewed beer, then the own-price elasticities of demand, *for the excisable product*, may be relatively high. Chapman and Richardson (1990), in what they claim is the first study of cigarette and tobacco demand in a developing country, report excise elasticities for Papua New Guinea of -0.71 for cigarettes and -0.50 for tobacco; the own-price elasticities are probably twice these levels (or -1.4 and -1).<sup>5</sup>

When the use of a good or service causes negative externalities, the standard prescription is to levy a Pigovian (corrective) tax, which forces the supplier to internalize the costs of the negative side effects (Nellor 1995). Alcohol use leads to road accidents, family stresses, and hospital costs. Tobacco use is unpleasant for nonsmokers, and increases the demand for publicly supported health care, particularly for treating lung cancer (Viscusi 1995, Warner 1990). The use of fossil fuels produces pollution and congestion. The presence of these negative externalities provides a case, in principle at least, for corrective taxes on these traditional excisable items. The practical problem is that the costs of the side

effects have yet to be measured in the African context, so the size of taxes justified on corrective grounds remains unclear.

Taxes on motor fuels and vehicles have a further justification. They represent a form of charge on road users. Ideally, one would like to charge directly for the construction costs and wear and tear on roads, but since this is impractical, using taxes on motor fuel may provide a second-best solution. The argument is weakened if a significant quantity of petroleum products is used for other activities (such as tractors on a farm); this helps explain why the tax rate on diesel fuel is typically lower than the tax rate on gasoline (Table 5).

The cost of wear and tear, imposed by cars, trucks, and buses, has been calculated for many road types. However, much less is known about the pollution and congestion costs that vehicles cause, and this makes it more difficult to estimate the appropriate size of tax that would be justified under the guise of user charges. It is clear that this approach would imply a higher tax rate on diesel fuel, because this is the fuel of choice for large trucks, which in turn cause the great bulk of the damage to the road system. A recent study by the World Resources Institute estimated that in the United States the external costs imposed by vehicle use, including road building and maintenance as well as pollution and congestion, amount to 5.3 percent of GDP (*The Economist*, June 22, 1996, p. 7).

Sumptuary taxes on alcohol and tobacco are sometimes justified on the grounds that they discourage the consumption of goods that morally ought to be discouraged. This is particularly notable in the high taxes on alcoholic beverages in many Moslem countries (for example, the 195 percent tax on beer in Mauritania). If the moral argument were paramount, consumption of the items would simply be banned. The price-inelastic demand for alcoholic beverages and tobacco products means that even high taxes do not deter consumption very much, and “a widespread argument in some developing countries is that their primary effect is to deprive the families which use these commodities of funds for milk, and other items essential for health” (Due 1994, p. 27). At a minimum this suggests that the moral argument carries little force, although sumptuary taxes “appear to continue to enjoy public acceptance” (McLure and Thirsk 1978, p. 499).

## **Equity**

Possibly the commonest criticism of excise taxes is that they are unfair (McLure and Thirsk 1978; Due 1994, p. 27). Whether this is true depends in part on what one means by fairness. Some argue that it is fair that those who benefit from a good or service such as a road should pay for it. Thus “to the extent that excise taxes serve as user charges, they should not be included in incidence analysis” (Shah and Whalley 1990, p. 538). Shoup (1983, p. 262) seems to claim that it is fair to levy corrective taxes, arguing that “being poor should not entitle one to an unlimited license to create negative externalities” (see, too, Cook and Moore 1994). Thus, not everyone agrees that a tax falling on the poor is ipso facto unfair.

The more standard approach rests on the ability-to-pay criterion. Agreement is widespread that for vertical equity, the poorest members of society should bear a very light tax burden, if any. The difficulties begin when one tries to apply the criterion in practice. First, an assumption is needed about who actually bears the burden of a tax. Usually the supposition is that the burden is shifted onto the final

consumer, but in many cases this may not be correct (Shah and Whalley 1990, p. 543). Second, a measure of ability to pay is needed, which ideally should reflect one's permanent income rather than the income (or wealth) one happens to enjoy in a single year (Krelove 1995, p. 44).

An equally fundamental problem is that equity judgments are often framed in the context of a particular tax instrument, whereas tax policy should take a wider view of the tax system as a whole, or, indeed, of the fiscal system as a whole. Thus, Cnossen (1990, p. 355) considers that even “regressive excises are acceptable (in terms of fairness) if revenues cannot be raised by other means and if they finance badly needed public services for the poor.” And the survey of fiscal policy in a leading textbook on development economics (Gillis et al. 1996, chap. 13) concludes that redistribution is best accomplished on the expenditure side of the budget, through programs like public education, primary health care, and market-supporting public infrastructure investments.

Goode (1984, p. 147) emphasizes the role played by the taxes themselves, arguing that “in practice, selective taxes on luxury consumption items may be more effective in reaching high-income groups than poorly enforced direct taxes on income or consumption are.” This is particularly likely to be true when, as is the case in most developing countries, the informal sector produces close substitutes for the taxed goods (home-distilled rum, hand-rolled cigarettes, and so forth), which escape tax and are consumed disproportionately by the poor.

In his advocacy of excise taxation, Cnossen (1977, pp. 48–55) argues that, despite the analytical problems, incidence analysis should guide tax reforms toward easing the excise burden on the poor and increasing the burden on the well-to-do. For example, he recommends that within any product category, low-quality products should bear less tax and high-quality products should bear more. One way to accomplish this is to adopt ad valorem rather than specific excises. His strongest recommendation for increasing progressivity of the excise system is to ensure adequate taxation of motor vehicles.

Even if poor people do not purchase excisable goods such as gasoline directly, they may do so indirectly when they travel by bus or buy goods that have been transported by truck. In principle these effects can be traced through an input-output table, but in practice such tables tend to be out-of-date and insufficiently disaggregated to be very helpful. A more promising route may be to trace the effects directly for the most important components of household expenditure—for instance, by measuring how much effect a higher gasoline tax would have on the cost of a bus ride. This information can be generated quite successfully for transport costs, with the help of the software developed at the World Bank for estimating vehicle operating costs (Archondo-Callao and Faiz 1994).

It is sometimes argued that alcohol taxes have a particularly harmful impact on women and children. The claim is that if alcohol taxes rise, total spending on alcohol by the household will rise (because demand is inelastic), leaving less for essentials such as food, schooling, and clothing. This claim has yet to be seriously investigated. There is another interesting possible gender effect: to the extent that alcohol taxes hit the formal sector, and beer in the informal sector is brewed by women, then higher alcohol taxes could lead to higher consumption of the latter, boosting the profits of the female brewers. This argument has been made in Kenya, but may be applicable more generally.



## DESIGN ISSUES

In the words of an IMF expert on taxation, “tax administration is tax policy” (Casanegra 1990, p. 179). One of the strengths of many traditional excise taxes is that they are relatively straightforward to administer (Cnossen 1977, Due 1988). This is because they are levied at specific rates on domestic production, and a simple physical controls at factories are sufficient to ensure the collection of most of the revenue. But specific tax rates have drawbacks. They need to be adjusted over time to ensure that revenue keeps up with inflation—although routine indexing has been proposed (Hussey and Lubick 1996, Barreix 1996); they fall relatively heavily on the poorer-quality lines of goods and thus (probably) on poorer consumers; and they are not appropriate for taxing services such as restaurant meals.

The trend, therefore, has been toward using ad valorem taxes, and this is now the standard IMF recommendation (Stotsky 1995, Nashashibi et al. 1992). Ad valorem taxes require that tax administrations be more skilled, with a solid knowledge of accounting. Such skills are relatively scarce in developing countries, and weak tax administration “makes it difficult . . . to raise large amounts of revenue from relatively complex taxes” (Aguirre et al. 1981). The costs of collecting excises appear to fall into the range of 1-3 percent of total revenue (World Bank 1988, p. 85).

Exemption problems bedevil excises, in the same way that they erode the tax base for income, sales, and trade taxes. Exemptions are commonly granted to the government itself, as well as to diplomats and foreign-financed projects. Some African countries also grant military personnel access to beer and cigarettes at tax-free or tax-reduced prices; the resale of such products has provided a significant fillip to military incomes in Zambia and Tanzania while severely eroding excise revenue for the government.

The revenue from some excise taxes is earmarked for particular uses. This is especially common for taxes on petroleum products, where a part of the proceeds is often dedicated for road building and maintenance. Purists dislike earmarking, because it constrains the government's discretion in allocating expenditure, and may sometimes divert spending from potentially more important uses. However, earmarking often enhances public support for a tax (McCarten and Stotsky 1995, p. 101); this appears to be the case, for instance, with fuel taxes in Madagascar.

## STUDIES OF EXCISE TAXATION IN AFRICA

Remarkably little has been written on excise taxes in Africa, although they have warranted passing attention within larger studies, and undoubtedly a substantial volume of unpublished practical work has been done within individual ministries of finance.

### Ghana

Younger (1993) uses data from the 1988 *Ghana living standards survey* to measure the distributional effects of excises. His calculations are presented in the form of pairs of Lorenz curves, one showing the

incidence of each tax and the other showing the distribution of household income. A tax is progressive throughout the range of incomes if the tax curve lies wholly below the income distribution curve. This is summarized by a progressivity coefficient (PC), which is positive to the extent a tax is progressive and negative to the extent a tax is regressive.

The relevant findings from Younger's study are shown in Table 7. He finds that the excise tax on tobacco appears to be quite regressive. The tax on alcoholic beverages is slightly regressive, although it appears to be somewhat progressive when a rough adjustment is made for spending on alcohol at weddings and funerals. The excise on nonalcoholic beverages is mildly progressive (PC = 0.097). He cautions that these results are only indicative, for two reasons. Households substantially underreported their spending on alcohol and tobacco. Also, some of the consumption on these products went to untaxed varieties, although the extent of this diversion cannot be determined from the survey data.

**Table 7**  
*Tax Incidence in Ghana*

|   | Progressivity coefficient |
|---|---------------------------|
| Tobacco   | -0.194                    |
| Alcoholic beverages                                   | -0.035                    |
| Alcoholic beverages, adjusted for weddings & funerals | 0.021                     |
| Non-alcoholic beverages                               | 0.097                     |
| Gasoline (direct spending)                            | 0.053                     |
| Gasoline (via price of transportation)                | 0.034                     |
| Kerosene  | -0.194                    |
| All petroleum taxes                                   | 0.091                     |
| All direct taxes                                      | 0.096                     |

*Note:* A large positive progressivity coefficient indicates a progressive tax incidence; a large negative coefficient indicates regressive tax incidence. *Source:* Younger (1993).

Younger also found that the tax on gasoline is highly progressive when one looks at direct spending, and almost proportional when one looks at the effect of the tax on the price of transportation costs. The tax on kerosene is regressive. Combining all petroleum taxes, the incidence remains progressive, nearly matching the progressivity coefficient for direct taxes.

## Côte d'Ivoire

Yitzhaki and Thirsk (1990) provide similar calculations of the equity effects of excise taxation in Côte d'Ivoire, using household survey data from the 1985–1986 Côte d'Ivoire *Living standards survey*. They point out that the Lorenz curves for various excise taxes can and do cross, in which case the equity comparison depends on judgments about the proper distribution weights in the social welfare function (from optimal tax theory). To deal with this, the authors define tax A as “welfare dominant” over tax B if a revenue-neutral shift to higher A and lower B improves social welfare, using “virtually any” plausible distribution parameters.

For their empirical analysis, Yitzhaki and Thirsk first compute distribution-weighted income elasticities for 16 categories of consumption expenditure, over a broad range of equity-preference parameters. They then explore welfare dominance of possible taxes on 5 categories with income-elastic expenditure patterns: telephone service, electricity service, gasoline, alcoholic beverages, and public transportation. A tax on telephone services turns out to be welfare dominant over all four alternatives. A tax on electricity would be welfare dominant over taxes on alcohol and public transportation, but the welfare comparison with a gasoline tax turns out to depend on one's equity judgment. In turn, the tax on gasoline dominates taxes on alcohol and public transport.

The actual excise system in Côte d'Ivoire in the mid-1980s included taxes on tobacco products, alcoholic beverages, and gasoline. Yitzhaki and Thirsk find that as the distributional parameter changes from low to high concern for equality, the weighted income elasticities for tobacco range from 0.63 to 0.72. Because demand is income-inelastic, taxing tobacco scores badly in terms of equity effects. Over the same range of distributional parameters, the weighted income elasticity for alcohol ranges from 1.17 to 1.09, and the elasticity for gasoline ranges from 1.71 to 1.29. Both, therefore, are reasonable excise taxes on equity grounds. But Yitzhaki and Thirsk conclude that excises on telephone and electricity services would be still more equitable over a broad range of equity-preference parameters.

## **Kenya**

Haughton (1991) developed a model of demand for motor vehicles in Kenya to measure the effects of a lower and flatter rate structure on revenue. Motor vehicles are an attractive target for taxation: cars are seen as luxuries, the base (vehicle sales) is very elastic with respect to GDP, and at first sight the taxes appear to be easy to collect. Despite these apparent advantages, motor vehicle taxation in practice faces three difficulties: the high tax problem, the gradient problem, and the problem of intermediate goods.

The high tax problem occurs when high tax rates on vehicles create a strong incentive to (legally) avoid or (illegally) evade taxes. For example, in 1991 the tax rate on (imported) cars into Kenya was finely differentiated, varying from 77 to 275 percent depending on the capacity of the engine; Tanzania had a similar system. The Kenyan rates included a 50 percent import duty. Yet in practice the import duty collected amounted to 16 percent of the import price for all cars, and just 7 percent for cars with engines above two liters. The high tax rates prompted buyers to find ways around the system: about a quarter of cars were imported tax free for diplomats and nongovernmental organizations; another quarter were granted tax exemptions by the Minister of Finance; and most of the rest were brought in as used cars and underinvoiced, or imported by returning students and others as tax-free personal effects.

The gradient problem occurs when close substitutes are taxed at substantially different rates, causing a serious distortion in buying patterns. Again Kenyan experience is instructive in illustrating the problem. In 1984-1985 the sales tax on small cars was 80 percent, although it was 17 percent on vans; as a result many buyers purchased vans and used them instead of cars. Over the subsequent five years the sales tax

on small cars was lowered to 20 percent, and during this period sales of small cars rose by 200 percent whereas sales of vans increased by only 4 percent. Similar gradient problems arise if alcoholic beverages are taxed at very different rates, or when there are differential taxes on different petroleum products. The inordinate number of four-wheel-drive vehicles in Tanzania owes much to the favorable import tax rate on these vehicles.

The problem of intermediate goods arises because some motor vehicles are inputs into production, such as minibuses to carry tourists or trucks to transport goods. Unlike a VAT, excise taxes cannot easily be refunded, especially when it is difficult to determine whether a vehicle is a bona fide input or not. The typical solution has been to tax such vehicles more lightly than sedan cars, but then the gradient problem, with its attendant substitution effects, becomes important.

To quantify the revenue effects of flattening and lowering the tax rates on motor vehicles, Haughton specified a system of  $N$  demand equations of the form

$$Q_i^d = A_i \prod_{j=1}^N P_j^{\alpha_{ij}} Y^{\beta_i}$$

where there are  $N$  goods (including a residual “all other goods”),  $P_j$  refers to the price of the  $j$ th good, and  $Y$  measures income. There are  $N$  income elasticities and  $N^2$  price elasticities, but by invoking homogeneity and symmetry the system requires only half as many distinct elasticities. Using elasticities drawn from elsewhere, the study found that a flattening and some lowering of tax rates on motor vehicles would increase tax revenue, particularly when the greater enforceability of such rates is taken into account. In recent years Kenya has substantially flattened and lowered the rates to levels that are easier (politically) to enforce, and revenue has risen.

## The Research Agenda

Although the basic principles of excise taxation are well understood, far less is known about the workings of excise taxes in practice, particularly in the context of Africa. Yet good information is important, both in improving the administration and design of excises and in building political support for them (Aguirre and others 1981, p. 7). Here are some of the issues about which more needs to be known:

*What are the revenue effects from changes in excise tax rates?*

To answer this important question one needs to estimate demand and supply elasticities, which has rarely been done in the African context. An answer is needed to determine the revenue-maximizing tax rates, and thus to assess whether (as we suspect) excise rates sometimes go beyond this revenue-maximizing point. The estimation of standard demand elasticities is relatively straightforward, and may be based on either time-series or household data, which are increasingly available (Haughton 1998b).<sup>6</sup> However, the determination of revenue-maximizing tax rates is highly sensitive to the functional form of the demand curve (Haughton 1998c).<sup>7</sup>

One of the most controversial issues is the structure of excise taxes on goods that are close substitutes, such as gasoline and diesel fuel, or beer and stout. For example, in Madagascar the tax on kerosene is 5 cents per liter, but 8 cents for diesel fuel (24 percent of the pretax price) and 16 cents for ordinary gasoline (39 percent of the pretax price). The World Bank favors a flattening of these rates, but is this appropriate, and what would the revenue effects be? The revenue and welfare effects of flattening the tax structure call for a significant amount of further analysis—from estimating elasticities to formulating more flexible systems of demand equations.

*What tax rates are justified to correct for negative externalities and for the provision of associated benefits?*

Put another way, how large are the externalities produced by consuming tobacco, alcohol, and petroleum products? And if petroleum taxes are thought of as payments to cover road maintenance and construction, how large should such taxes be? A wealth of secondary information is available that would lead to answers to these questions, but it needs to be harnessed to address the tax questions.

*What are the equity effects of changes in excise taxes?*

As noted above, the evidence from Ghana indicates that taxes on most fuels and on soft drinks are progressive, that taxes on alcohol are roughly proportional, and that taxes on tobacco may be regressive (Younger 1993). Similar results have been found for the Côte d'Ivoire (Yitzhaki and Thirsk 1990), but very little is known about the distributional effects in other African countries. In our experience, policymakers have a strong desire to know more about these effects, particularly for fuel taxes. The general equilibrium effects of changes in excises have hardly been looked at. A priority is to trace the effect of higher fuel prices on the prices of goods and services (such as transport and electricity); these pass-through effects have yet to be measured anywhere in Africa. There is also a presumption that sudden large changes in the fuel tax regime are not desirable. This is because tax rates on fuel become “deeply embedded in economic behavior” (Hughes 1987, p. 558), so investments and jobs are oriented to the existing structure of energy prices. Again, the actual effects of rapid, rather than slow, changes have not been examined.

*How high are the administrative and compliance costs?*

It is often argued that excises are cheap and easy to administer, but there is virtually no evidence to support or refute this assertion. As countries liberalize their trade regimes, and as their economies become more sophisticated, the administrative and compliance costs are likely to rise, but it is not known by how much. We have been unable to find any study of compliance costs in an African context, except for the EAGER-sponsored study by Shekidele (1998).

*Why does the yield from excises vary so much from country to country, and even over time within a country?*

Table 1 shows that excise taxes vary widely in importance across countries, and Table 2 presents evidence of the variation of excise revenue in selected countries over time. A better understanding of these variations would help clarify the political economy of excise taxation, and give a better sense of the practicality of putting more emphasis on excises.

*What goods and services should bear an excise tax?*

A recent study in Tanzania suggested that only traditional excises be levied (Mangesho 1994), which is standard IMF advice (Stotsky 1995), whereas Cnossen (1977, p. 48–55) proposes that consideration be given to including some or all of a long list of goods and services with high income elasticities. The Ghanaian tax reform of 1987 abolished all excise taxes other than those on alcoholic beverages and tobacco and petroleum products (Kapur et al. 1991). It is more common for countries to tax a longer list of goods: telephone service, electricity, soft drinks, and motor vehicles persistently emerge as plausible candidates for excise taxation.

*What are the current best practices in excise tax administration?*

Little is known about this, but there is keen interest among practitioners in how taxes are administered in neighboring and other countries.

## **FIVE POLICY PROPOSITIONS**

In the absence of better answers to the questions posed in the research agenda, it might seem premature to make any policy recommendations. Nonetheless there is probably some virtue in formulating a few propositions that can be supported or refuted by further research. These propositions are based on the authors experience in Africa, knowledge of best practices there, and reading of the literature on excise taxation. These propositions are as follows:

Proposition 1: *Revenue from excise taxes could, and should, be doubled in most African countries.*

If doubled, excises would mobilize a little more than 3.5 percent of GDP, or be in line with the average for OECD countries. In some cases it may be that excise tax rates exceed the revenue-maximizing levels, in which case higher revenues can be achieved with lower tax rates.

Proposition 2: *Considerable scope exists for efficiency-enhancing changes in the structure of excises.*

Most excises are poorly designed, because they have been subject to years of ad hoc changes, some of them the result of IMF advice. Some improvements would come by linking the design to associated externalities (tobacco and alcohol taxes) and benefits (fuel taxes); these changes would reduce economic distortions and therefore tend to enhance growth. Efficiency is also enhanced when taxes are higher on goods facing price-inelastic demand, and tobacco and alcohol taxes may be good candidates in this respect.

Proposition 3: *Excise taxes should be confined to the traditional excises and a limited number of luxury items.*

This proposition is required to maintain the simplicity, and thus integrity, of the excise system. The luxury items are likely to include such items as motor vehicles, soft drinks, and perhaps electricity and telecommunications.

Proposition 4: *Excise tax administration could be substantially improved by codifying and disseminating current best practices within Sub-Saharan Africa.*

In Madagascar, and to some extent in Tanzania, we have found that policymakers and tax administrators are poorly informed about what their counterparts are doing in other countries; they are also keen to know what is being tried elsewhere. The evident paucity of cross-country information suggests that their administrative structures fall well short of current best practice.

Proposition 5: *Increased reliance on excise taxes is consistent with an equitable tax system.*

Developed countries rely more heavily on excise taxes than do developing countries, and their tax systems are also more equitable. Thus a heavy reliance on excises is consistent with an equitable tax system. This is especially true in developing countries, where many excises clearly fall more heavily on richer households. Also, some excises that are regressive in developed countries may be progressive in African countries. This is because excise taxes on goods such as beer tend to be collected from the formal sector only, sparing those who buy their beer from the informal sector.

If the evidence supports these propositions, then the policy implications for improving growth with equity are striking. In countries where revenue mobilization is clearly inadequate—and this includes countries such as Madagascar (8 percent of GDP), Ghana, and perhaps Tanzania—the additional revenues from an improved excise system can reduce the fiscal deficit, or support an increase in growth-oriented spending on such items as health, education, and infrastructure.

Not every African government needs to mobilize additional revenue—certainly this is the case for Kenya, where the government now collects 28 percent of GDP. As a group, African countries are effective at raising revenue (Shalizi and Squire 1988; see, too, the tabulations in Shome 1995). But in most of these cases there is an urgent need to reduce the reliance on trade taxes, which are highly distortionary. The point is worth stressing. As African countries become more outward oriented, they need to reduce their dependence on import tariffs. In the past a severe stumbling block has been the absence of good alternative tax handles. Greater use of excise taxes provides an excellent alternative source of revenue. Indirectly, yet powerfully, strengthening the excise tax system can strengthen trade reform and in turn boost economic growth.



## ENDNOTES

<sup>1</sup> One African exception is Zambia, where excise revenues yielded 7.8 percent of GDP in 1978, up from 4.2 percent in 1972 and higher than the 2.6 percent observed in 1985–1989. Tanzi (1987, p. 227) calls the 7.8 percent figure “extraordinary.”

<sup>2</sup> Bird (1992, pp. 12–13) has questioned the desirability of income-elastic taxes, given recent calls to reduce the size of the public sector.

<sup>3</sup> Let demand for a good be linear, given by  $Q_i = c_i - b_i P_i$ , and let the supply curve be infinitely elastic. Then the revenue from an ad m tax  $t_i$  is given by

$$R_i = t_i(c_i P_i - b_i P_i^2 - b_i t_i P_i^2) \quad (1)$$

and the excess burden by

$$Eb_i = -(1/2)t_i^2 P_i^2. \quad (2)$$

Solve (1) for  $t_i$  and substitute into (2) to get

$$\frac{dEB_i}{dR_i} = \frac{1}{2b_i} + \frac{(c_i P_i - b_i P_i^2)}{2b_i} [(b_i P_i^2 - c_i P_i)^2 - 4b_i P_i^2 R_i]^{-1/2}$$

This must be equalized for all goods in order to achieve efficiency. Let there be two goods, and the goal be to raise revenue  $R = R_1 + R_2$ . Given  $c_i$ , as  $b_i$  rises demand becomes more inelastic. Since  $d(dEB_i/dR_i)/db_i < 0$  it now becomes cheaper at the margin to tax. It follows that for given  $c_1, c_2$  and  $b_2$ , as  $b_1$  rises,  $R_1$  should rise, which means that  $t_1$  should rise. In other words, the tax rate should be higher on the good whose own-price elasticity of demand is higher.

For a given  $b_i$ , one may think of a larger  $c_i$  as representing a broader base. Since  $d(dEB_i/dR_i)/dc_i < 0$ , raising revenue becomes cheaper at the margin because it can be done at a lower tax rate. This is the efficiency justification for the common recommendation for levying tax on a broader base at a lower (marginal) rate.

<sup>4</sup> Haughton and Sarkar (1996) find the own-price elasticity of demand for gasoline to be approximately -0.15 in the short run and -0.3 in the long run in the United States; these are somewhat smaller elasticities than had previously been found.

<sup>5</sup> The excise elasticity of a tax is defined as the percentage change in quantity demanded divided by the percentage change in the excise tax rate which led to the change. So if an increase in the excise tax from 40 to 50 cents per package (+25 percent) leads to a fall in the quantity demanded by 17.5 percent, then the excise elasticity would be -0.7. If excise taxes account for half of the retail price of cigarettes, this would yield the own-price elasticities given in the text.

<sup>6</sup> For example, 68 household surveys, focused on measuring living standards and poverty, have been or are being undertaken in 35 of the countries of Sub-Saharan Africa, with substantial technical support from the World Bank.

<sup>7</sup> Let  $\eta$  be the own-price elasticity of demand for a good; it will generally be a negative number. Then if the demand curve is linear, the revenue-maximizing tax rate is given by  $t^* = -1/2\eta$ , so that if  $\eta = -2$  then revenue will be maximized with a tax rate of 25 percent. If the demand curve is linear in logs (in other words, a constant-elasticity demand curve), then  $t^* = -1/(1+\eta)$ , which in our example would yield a revenue-maximizing tax rate of 100 percent. More attention is needed to the choice of appropriate functional form for the demand curve.

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