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**Working Paper**

## Tax structure and the incidence on the poor in developing countries

CREDIT Research Paper, No. 03/18

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*Suggested Citation:* Gemmell, Norman; Morrissey, Oliver (2003) : Tax structure and the incidence on the poor in developing countries, CREDIT Research Paper, No. 03/18, The University of Nottingham, Centre for Research in Economic Development and International Trade (CREDIT), Nottingham

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**Norman Gemmell and Oliver Morrissey**

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Norman Gemmell is Professorial Research Fellow and Oliver Morrissey is Director of CREDIT in the School of Economics, University of Nottingham.

**Acknowledgements**

This paper is based on a study commissioned by DFID in 2000. The views expressed are those of the authors alone.

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October 2003

# **Tax Structure and the Incidence on the Poor in Developing Countries**

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## **Abstract**

The past two decades have witnessed widespread attempts to reform tax structures in developing countries. As the relatively small formal sector limits the base for taxes on income, the major reform is to replace trade taxes with sales taxes. To the extent that this has involved rationalisation of taxes, reducing the level and range of tax rates, and a shift away from taxes on international trade, the reforms are likely to have improved economic and collection efficiency. However, little attention has focussed on the likely effects on distribution and the poor. This paper reviews available evidence on the effects of various taxes on distribution and the poor to address this neglected aspect of reform. Taxes on exports and goods consumed especially by the poor (e.g. kerosene) are the most consistently found to be regressive, whereas taxes on 'luxury' items such as cars, beverages and alcohol are the most likely to be progressive. The available evidence suggests that sales taxes are slightly more progressive, or less regressive, than taxes on imports. Consequently, it seems likely that the reforms will not have worsened the effects of the tax structure on distribution and the poor.

## **Outline**

1. Introduction
2. Characteristics of Tax Systems in Developing Countries
3. Assessing the Distributional Impact of Taxes
4. Evidence on the Distributional Impact of Taxes
5. Conclusions



## 1. INTRODUCTION

Tax reform has been promoted by the International Financial Institutions (IFIs) in recent years as an important component of more general economic policy reform in many developing countries (LDCs). This commonly includes a shift from trade taxes to domestic sales taxes, the rationalisation of income taxes, and measures to reduce budget deficits and/or raise tax/GDP ratios. The tax systems are often in need of reform, as there is usually considerable dependence on high and distortionary taxes on trade and production, which encourage evasion and avoidance and reduce economic efficiency (Bird, 1992; Burgess and Stern, 1993). Attempts to make the economy more 'open', to improve macroeconomic stability, and to improve the efficiency of the tax system (by minimising distortions) or of collection (discouraging avoidance and evasion) typically underlie these reforms. Consequently, reforms are usually evaluated against criteria of effects on economic and administrative efficiency, and may be desirable on these grounds.

Despite the prevalence of redistribution as a guiding motive in the design of tax systems in developed countries, poverty and/or inequality considerations have generally been of secondary importance, at best, in LDC fiscal reforms. Even where inequality is addressed, poverty impacts have often been ignored. There are two likely reasons for this neglect. First, the belief that any effects of taxes on the poor are likely to be small, as in practice the poor pay few taxes *directly*. The poor may pay some taxes indirectly where these taxes affect the prices of goods that the poor consume or produce (especially trade and sales taxes). Secondly, it has commonly been believed that public social expenditures provide a better means to target the poor and reduce poverty, with taxes viewed as essentially an instrument for revenue raising. As a result, the poverty impacts of taxation, and revenue systems more generally, have remained peripheral topics of research, even though the poverty impacts of social expenditures have received attention (van de Walle and Nead, 1995).

The aim of this paper is to review the evidence on the neglected aspect of tax structure in LDCs, the effects on distribution and the poor. We limit attention to the formal, central government tax structure. Consequently, we do not consider local taxes (see Fjelsted, 2001) or non-tax revenues (such as charges or fees), which can be significant sources of



revenue. Furthermore, and of greater importance in terms of our focus on distribution and the poor, we do not consider ‘implicit’ taxes or subsidies (which could be considered negative taxes). In a typical low-income country, agriculture is, directly or indirectly, the principal source of livelihoods for the poor. Policies that discriminate against agriculture, such as overvalued exchange rates, price controls or marketing boards that reduce producer prices, act as implicit taxes on the sector that includes many poor producers (of food and cash crops). On the other hand, food is the single major component of the consumption basket of the poor and such policies implicitly subsidise the price of food (there may even be explicit food subsidies) and benefit the poor, or at least the urban poor (even if the benefits are inaccurately targeted). We do not discuss these important implicit taxes, as they are more appropriately addressed in the context of agricultural policy. We omit discussion of subsidies as this is more often considered as an element of government expenditure.

Formal tax structures in low-income countries tend to be quite narrow, reflecting the fact that the formal sector accounts for a relatively low share of employment and even of business activity. The scope for levying taxes on incomes, personal or corporate, is quite limited. Tax systems in LDCs are dominated by indirect taxes which, unlike income taxes, cannot be levied directly on individuals, but rather depend on the goods and services consumed. This need not be a problem as taxes on consumption ‘are a better source of revenue for developing countries [than income taxes because] they are easier to collect and more consistent with achieving economic growth objectives’ (Mintz, 2003: 226). To the extent that rich and poor households purchase different consumption bundles, it is possible that some indirect taxes can be made quite strongly progressive or regressive. The potential for adverse poverty effects within LDC tax systems therefore needs careful examination (given information on consumption patterns). One needs to know not only the relative importance of taxed goods in the consumption bundles of different households, but also whether the goods are actually likely to be subject to tax (e.g. purchases from a supermarket will be taxed, but purchases from a market stall may not be). Furthermore, one needs to allow for the possibility that (poor) households may be both producers and consumers, especially of food.

The structure of the remainder of this paper is as follows. The next section reviews the major features of LDC tax systems and the types of tax structure reforms that have been

implemented since the 1980s. We then present a brief overview of the main methods that have been used to measure the distributional or poverty impacts of taxes. The penultimate section discusses the recent evidence using these methods, while a summary and some conclusions are provided in the final section.

## 2. CHARACTERISTICS OF TAX SYSTEMS IN DEVELOPING COUNTRIES

Although developed and developing countries use many of the same taxes, tax systems in the two groups of countries are very different. Pre-reform tax systems in LDCs have been described as ‘inefficient, inequitable, beset with complications and anomalies and unable to cope with rising expenditure requirements or external shocks’ (Coady, 1997, p.35). Many of the pre-reform differences remain post-reform, but also much has changed. As we show below, although it is instructive to compare tax systems in terms of the tax/GDP ratio and the shares of different taxes in total revenues, these can also mask some important changes.

**Table 1 Tax and Expenditure Shares of GDP, by Income Group**

<i>Country Group</i>	<i>As % of GDP, 1980</i>		<i>As % of GDP, 1997</i>	
	Current revenue	Public expenditur e	Current revenue	Public expenditur e
low income	18.0	19.8	17.5	18.3
middle income	20.2	20.9	21.0 <sup>a</sup>	23.7 <sup>a</sup>
lower middle	..	..	21.5	24.0
upper middle	20.1	19.5	23.4 <sup>a</sup>	29.2 <sup>a</sup>
Low and middle	19.3	20.1	17.3	18.9
High income	22.8	26.4	29.6	31.2

*Notes:* Low-income excludes China and India. Current revenue excludes grants. Caution must be exercised in interpreting these data as they are unweighted averages of varying samples of countries, for many of which data quality is poor. In some cases, countries with missing data may have small values (e.g. for income tax shares) so that reported averages can be biased upwards. ‘a’ denotes values for 1998, .. denotes missing value.

*Source:* *World Development Indicators 2000* (p. 230) and Heady (2001: 3).

**Table 2 Tax Composition by Income Group**

<i>Country Group</i>	<i>Share of tax revenue</i>					
	Income taxes		Sales taxes		Trade taxes	
	80-84	95-98	80-84	95-98	80-84	95-98
Low income	28.7	27.2	31.0	33.1	34.6	34.8
Lower middle	29.8	27.3	27.8	41.2	30.0	20.2
Upper middle	29.5	31.1	32.4	39.4	20.0	13.0
High income	36.4	35.4	30.5	33.4	3.8	0.8

*Notes:* Caution must be exercised in interpreting these data as they are unweighted averages (and classification of countries by income may differ from Table 1). Income taxes include personal and corporate and capital gains. Sales taxes are domestic taxes on goods and services.

*Source:* Adapted from Khattry and Mohan Rao (2002: 1437).

**Table 3 Tax Composition in Selected Countries 1997**

Country	<i>Revenue (% GDP)</i>	<i>Tax as % of revenue</i>			
		Income Taxes	Sales Taxes	Trade Taxes	Non-tax Revenue
Burundi	13.7	22	45	16	7
Cameroon	n.a.	17	25	28	27
Congo, Dem. Rep.	5.3	25	18	28	20
Congo, Rep.	29.4	9	5	9	77
Côte d'Ivoire	21.6	20	17	50	4
India	11.6	27	27	22	25
Indonesia	16.8	57	28	3	9
Kenya	26.2	34	37	15	14
Lesotho	44.7	15	12	52	21
Madagascar	8.7	18	24	53	2
Mongolia	19.5	26	28	5	20
Myanmar	7.8	18	30	10	42
Nepal	10.6	13	37	28	16
Nicaragua	n.a.	11	43	21	6
Pakistan	15.9	21	29	22	19
Sierra Leone	10.2	17	33	46	3
Vietnam	18.2	22	33	22	14
Yemen, Rep.	36.8	16	7	9	66
Zimbabwe	29.4	43	24	20	10

*Source:* adapted from Heady (2001, Table 1)

We first consider the broad picture with data on changes between the early 1980s and late 1990s for revenue/GDP (R/GDP) and public expenditure/GDP (G/GDP) ratios and for the composition of tax revenue by major taxes in Tables 1 and 2. These reveal a number of features:

- Both R/GDP and G/GDP ratios are greater in countries with higher incomes, and the gap has widened between 1980 and 1997. The ‘gap’ between R/GDP in low and high income countries rose from 4.8 percentage points to 12 percentage points, with a similar increase in the gap for G/GDP.
- Aggregate revenues have actually declined in the poorest countries. Both R/GDP and G/GDP ratios declined for low income but increased for other country groups. The tax/GDP ratio for low income countries also fell, from an average 14.5% in 1980-84 to 14.1% in 1995-98, whereas the respective ratio for high income countries rose from 28.5% to 30.5% (Khattry and Mohan Rao, 2002: 1436).
- Richer countries derive a greater share of revenues from income taxes, especially social security taxes (see Heady, 2001). Taxes on incomes account for less than 30% of tax revenue in low, compared to over 35% in high income countries.
- Domestic sales taxes are the most important revenue source in all countries. Their shares are broadly similar in low and high income countries, at about a third of tax revenue, but are some 40% of tax revenue for middle income countries.
- Trade taxes are a much greater source of tax revenue the lower a country’s income – steady at around 35% for low income countries in the 1980s and 1990s.

Broadly speaking, there appears to be a pattern of evolution of tax structure. At low levels of income, trade taxes are relatively important (Greenaway and Milner, 1991) and income taxes relatively less important. As income increases, there is a shift from trade to domestic sales taxes. As incomes rise again, trade taxes become unimportant and various income taxes become most important. These averages, however, conceal wide disparities between countries. Heady (2001: Table 1) shows that R/GDP ratios *can* be high for poor countries: in 1998 they range from just over 5% (Congo DR) to over 35% in Lesotho and Yemen; almost half of the LDCs have a ratio above 15%.

It is also dangerous to generalise with respect to revenue shares of particular taxes (see Tanzi, 1987, 2000). Data for individual countries in 1997 are shown in Table 3. Trade taxes as a share of revenue vary from 10% or less (Indonesia, Congo Rep, Myanmar, Yemen) to 50% or over (Cote d'Ivoire, Lesotho, Madagascar). Similarly, the share attributable to non-tax revenue (especially important in resource-rich economies) varies from over 60% (Congo DR, Yemen) to 10% or less in seven of the 19 countries. Taxes on income can be a relatively significant share of revenue in some LDCs – over 30% in Kenya, Zimbabwe and Indonesia.

Heady (2001) shows that revenue/GDP ratios in low-income countries tended to worsen rather than improve over 1980-97. A majority of the sample recorded increases in income tax revenue shares and declines in the shares of trade and 'other' taxes, but there is considerable disparity in magnitudes. Some countries reveal perverse movements (e.g. large trade tax increases in Zimbabwe). There is evidence that trade liberalisation has tended to reduce tax/GDP ratios in developing countries (Khattry and Mohan Rao, 2002). There is no consistent pattern regarding which taxes have been increased to compensate for trade tax revenue losses. The general policy advice from IFIs is to increase domestic sales taxes, especially by introducing VAT. However, fewer than half of the countries covered in Dean *et al* (1994) increased the share of sales taxes in tax revenue in the 1980s, while the share of income taxes increased in almost two-thirds of the countries, but usually only modestly.

#### *Elements of Tax Reform*

The last two decades have seen considerable and often dramatic tax reform. Among the developed economies, the aim has usually been to reduce the tax share in national income, and in particular to reduce individual income tax rates. In developing countries by contrast, where tax reforms have been an important component of adjustment programmes, they have been intended to raise the tax share in national income - to mobilise domestic resources and reduce dependence on aid and borrowing. For example, some 50% of all adjustment loans agreed between 1979 and 1989 included conditions relating to 'fiscal reforms' and more than 50% included conditions relating to both trade and 'rationalisation of government finances' which had tax reform elements (Webb and Shariff, 1992: 71). Thus, even where tax reform did not feature explicitly as a major component of the economic policy reform agenda, that agenda nevertheless had

significant effects on tax structures. Tax reform recommendations from the IFIs differ in their detail across countries, but most include the elements shown in Box 1.

<b>Box 1 Elements of Tax Structure Reforms</b>	
<i>Income taxes:</i>	<ul style="list-style-type: none"> <li>- rationalise multiple schedules into as few as possible</li> <li>- reduce the number of marginal rates applicable</li> <li>- raise the lowest marginal rate threshold but remove assorted exemptions and deductions</li> </ul>
<i>Trade taxes</i>	<ul style="list-style-type: none"> <li>- convert quantitative restrictions to tariffs</li> <li>- reduce the range and number of tariff rates</li> <li>- reduce the average nominal tariff</li> <li>- eliminate or reduce export taxes</li> </ul>
<i>Sales taxes</i>	<ul style="list-style-type: none"> <li>- introduce broad-based sales taxes (usually VAT) at a single rate (plus zero and possibly 'luxury' rates)</li> <li>- remove 'tax cascading' in existing sales taxes</li> <li>- remove taxes on intermediates</li> <li>- set sales tax and tariffs at same or similar rates</li> <li>- narrow the excise base; reduce excessively high rates</li> </ul>
<i>Property taxes</i>	<ul style="list-style-type: none"> <li>- rationalise (e.g. up-date property tax base) or remove</li> </ul>
<i>General</i>	<ul style="list-style-type: none"> <li>- increase revenue/GDP ratio</li> <li>- reduce budget deficits</li> <li>- improve tax administration and collection efficiency</li> </ul>

Inevitably tax reform in practice has been less radical than the recommendations in Box 1 might lead one to expect. Indeed it might be argued that, after two decades of reform, many LDC tax systems remain unnecessarily complex and a long way from the economically and administratively efficient systems that were sought. In some countries, for example in Africa, reform could be characterised as the replacement of a badly administered 'old' system by a slightly less badly administered 'new' system. In this regard, it is interesting to note that a recent World Bank assessment of Bank sponsored tax reforms (Barbone *et al*, 1999) focussed almost exclusively on the administration and institutions of tax systems, rather than economic efficiency aspects (and poverty aspects do not surface at all).

We do not attempt a review of the large literature on the successes and failures of reform in practice (see Dean *et al*, 1994; Patel, 1997; Thirsk, 1997; Barbone *et al*, 1999; Chu *et*

*al.*, 2000; Tanzi and Zee, 2000). However a number of points emerge from most assessments of reform experience.

- Tax administration and evasion problems pre-reform were much worse than originally appreciated; early reforms paid insufficient attention to these aspects; and even now administration and evasion difficulties remain severe in many LDCs despite (in many cases several) reform episodes. As a result appraisals of reformed systems based on statutory changes can be misleading. For example, the statutory income tax changes may appear to improve progressivity, but if corruption in its administration remains or worsens, actual incidence changes could be quite different from those presumed from the changes in the schedules themselves.
- Implementation of proposed (or even agreed) reforms is partial, with reversals quite common, such as introduction of new excises or increased rates, after reforms have removed or rationalised these. For example, personal income tax schedules for many countries continue to have multiple marginal rates (Tanzi and Zee, 2000). Similarly, tariffs are often re-introduced (often under another name) in response to demands for protection from domestic lobby groups.
- Using information on the revenue shares of different taxes to evaluate reforms can be misleading for a number of reasons. Firstly, real revenues from the tax in question may have increased, perhaps even relative to GDP, but still grown less rapidly than other taxes. Secondly, it is often easiest to administer tax reform involving moves from tariffs to domestic consumption taxes, by retaining separate collections at the import and domestic production stages. The reforms may well have achieved their objectives (improved revenues, efficiency or equity) but revenue shares need not have changed. The import tax share could even rise.
- Traditional IFI tax reform recommendations have been guided too rigidly by theory. They failed to recognise that a given economic objective might be achieved by different types of tax or tax administration in different contexts. For example, in very poor economies, it may be preferable to stick with simple sales taxes, broaden their use and aim for more uniform rates, rather than introduce a complex VAT system (as often advocated by the IMF).
- It is increasingly recognised that the general presumption against consumer subsidies, especially for food, in reforming countries may be misplaced. When viable tax instruments are limited, direct subsidies targeted at sections of the population

may be one way of achieving poverty reduction objectives at relatively low efficiency costs.

### **3. ASSESSING THE DISTRIBUTIONAL IMPACT OF TAXES**

There are several measures or methods that can be used to assess the distributional effects of taxes in practice. Some of these measures relate simply to the tax structure or schedule, and are essentially measures of the progressivity of the tax system, whilst others are used to compare 'pre-tax' and 'post-tax' income distributions, sometimes concentrating on the poor (the lower tail of the income distribution). First we consider the issue of tax incidence, as this is fundamental to all attempts to measure the distribution of tax burdens.

#### *Tax Incidence*

In seeking to identify how much tax each person pays it is important to distinguish between the 'statutory incidence' (the legal liability to pay the tax) and the economic incidence, which in practice is often the belief regarding who ultimately bears the burden of the tax. It is the latter that is really important: 'as all who work in the real world of public finance policy soon learn, perceived incidence often dominates policy discussion' (Bird, 2003: 345). For example, producers at each stage of production are usually legally liable to pay VAT. Producers are often able to raise prices to recoup their tax liability, so consumers of the taxed final products pay all or part of the tax. If consumers switch away to untaxed (or lower taxed) products so that these prices rise, consumers of the untaxed products also bear some of the tax burden.

In a recent theoretical paper, Emran and Stiglitz (2002) show that in the presence of a large informal sector, so that VAT coverage is incomplete, a revenue-neutral replacement of trade taxes with VAT may reduce aggregate welfare. This arises because goods may be produced and sold in both the formal and informal sectors, but the consumption tax is only paid by the formal sector and creates a distortion between the sectors. Standard economic welfare analysis assumes that tariffs are replaced with consumption taxes bearing the lowest indirect tax burden, in which case the reform increases welfare. When there is a large informal sector, as in LDCs, the consumption tax on formal sector commodities misses informal sector commodities that have zero, hence the lowest, tax burden. Consequently, the standard reform may not increase



aggregate welfare. Furthermore, demand will shift to the untaxed informal sector, increasing prices there so some of the incidence will be shifted to informal producers and consumers.

**Table 4 Tax Incidence Assumptions**

<b>Tax</b>	<b>Statutory incidence</b>	<b>Standard economic incidence</b>	<b>LDC factors</b>
Personal income tax:	Recipients of income	no shifting	Corruption may mean evasion by rich
Corporate taxes:	firms	shifted back to capital owners or forward to consumers	Corruption and evasion; exemptions for foreign firms
Sales taxes:	Producer, retailer, etc	shifted forwards to consumers	Price controls limit shifting; Informal markets
Trade taxes: imports	importers	shifted forwards to consumers	Burden shifted to non-protected sectors
exports	exporters	exporters	smuggling

Studies of the impact of taxes must decide on the appropriate tax incidence ‘shifting’ assumptions to make. The traditional or standard assumptions adopted are shown in Table 4, and the final column indicates how specific features of LDCs may alter these. These assumptions are known to be inaccurate, even in developed countries, but are likely to be especially inappropriate under conditions in many LDCs (see Shah and Whalley, 1991). For example, for indirect taxes, partial equilibrium analysis can demonstrate that it is only under extreme assumptions about price elasticities of demand and/or supply that full forward shifting is appropriate. It is generally a mixture of convenience and a lack of reliable information on these elasticities that leads to the

widespread adoption of the full forward shifting assumption. Shah and Whalley (1991) argue that quantitative restrictions on many imports, general price controls and regulations, the existence of informal (and other non-taxable) markets, rural-urban migration and tax evasion affect the ability of those legally liable for various taxes to shift these as traditionally assumed. Tax evasion does affect incidence but is difficult to incorporate. Existing incidence studies, which ignore evasion, can be thought of as providing a benchmark of what ‘full implementation’ of the tax would produce.

Taxation of intermediate inputs raises similar problems to assessing the incidence of import taxes as one wants to know how the tax affects final prices of goods that are consumed. In such cases it is important that incidence analyses are based on effective, not nominal, tax rates (the two can differ significantly). Ahmed and Stern (1991) report effective commodity tax rates for India and Pakistan and show that goods consumed disproportionately by the poor can face positive effective rates even though nominal rates were zero or negative (subsidy). Younger (1996) and Younger *et al* (1999) argue, for Ghana and Madagascar, that taxation of petroleum is an important example. As fuel is sold as an intermediate as well as a final good, fuel taxation increases transport costs and can affect the prices of other final goods that are consumed by the poor. For most indirect taxes, however, tax incidence is likely to remain uncertain; analysts should try to justify their assumptions and provide some sensitivity analyses.

### *Measures of Tax Progression*

Tax *progression* refers to the extent to which a tax departs from proportionality, whereas measures of tax *progressivity* combine information on both the tax structure and the distribution of incomes (or some other tax base measure) to describe the amount of redistribution achieved by the tax. Under certain assumptions, such as an unchanged pre-tax income distribution and no re-ranking of individuals between pre- and post-tax distributions, progressivity conclusions can be drawn from progression measures.

The most commonly used measure is *average rate progression (ARP)*; letting  $m_j(y)$  and  $a_j(y)$  be respectively the marginal and average rates of tax  $j$  then:  $ARP_j = m_j(y) - a_j(y)$ .

Progression implies  $ARP_j > 0$ : the marginal rate of tax exceeds the average rate, so the average tax rate increases with income,  $y$ . Such tax progression measures can be

compared at selected income levels or for specific income groups,. They cannot quantify the extent of redistribution through the tax system, but they provide information on an important component: the degree of departure of the tax from proportionality. The *ARP* in particular has often been used in studies of LDC tax systems to summarise tax progression or regression (often erroneously labelled as ‘progressivity’ or ‘regressivity’).<sup>2</sup> It has the merit that, if calculated from information on actual tax payments by individuals at different income levels, it can give a more accurate picture of progression than the use of statutory marginal (or average) tax rates, as the latter ignore compliance aspects. A given tax schedule can, of course, demonstrate progression, proportionality, and regression over different ranges of income.

### *Measures of Inequality, Poverty and Social Welfare*

The distributional impact of a tax can be assessed in a number of ways. Does the tax increase or reduce a measure of the inequality of incomes of the population or some population sub-group? Is some measure of post-tax poverty greater or less than its pre-tax equivalent? Has the tax raised or lowered overall social welfare? Different measures of inequality, poverty and social welfare have been used in empirical tax studies. It is important at the outset, however, to distinguish between statistical and normative analyses. Statistical measures simply record, for example, how an income distribution differs from an alternative. Whether one distribution is regarded as superior to the other, i.e. drawing a conclusion regarding the welfare effect, requires value judgements.<sup>3</sup> Measuring the impact of different taxes on poverty has been much less prevalent than assessing inequality impacts. Studies that have been undertaken demonstrate the importance of the particular poverty measure chosen for the conclusions reached, and those of which we are aware refer only to developed countries. Given the available evidence for LDCs, one can only draw inferences for the impact on the poor from the distribution impact of different taxes.

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<sup>1</sup> This is the ‘scale independent’ version of the *ARP* measure, proposed by Lambert (1993).

<sup>2</sup> Note that making taxes more progressive may be harmful to the poor if the distortions to behaviour from a progressive tax are sufficient to reduce efficiency, causing revenues that finance poverty-reducing social expenditures to decline. This highlights the importance of assessing tax and expenditure effects on poverty simultaneously: the desirability of progressive taxation may depend on the government’s ability to target anti-poverty expenditures adequately. Such analysis is beyond the scope of this paper.

<sup>3</sup> See Lambert (1993) for discussion of research seeking to identify value judgements that allow normative welfare conclusions to be drawn from the statistical evidence. Atkinson (1970) proposed an

The Lorenz curve is a familiar representation of inequality in the income distribution, plotting the cumulative proportion of income recipients (ranked from lowest to highest) against the proportion of total income received. The further the curve lies below the 45° line, the greater is the inequality of the variable under consideration. In tax analysis Lorenz curves can be used to compare the pre- and post-tax income distribution. Where one Lorenz curve dominates the other – that is, one curve lies wholly inside the other – equality can be said to be greater for the distribution with the dominant (inner) Lorenz curve. Concentration curves are similar to Lorenz curves but whereas the Lorenz curve uses the same income definition to rank both the axes, concentration curves use different income definitions for each axis.<sup>4</sup> These typically plot post-tax income, expenditure or tax payments against the proportion of the population ranked by pre-tax income. For example, if an indirect tax is unambiguously progressive, its concentration curve will lie wholly outside the concentration curve for expenditures. That is, the poor pay proportionately less tax than their share of expenditures.

Comparisons of Lorenz or concentration curves give rise to the notion of *dominance*, which has been used to evaluate taxes.<sup>5</sup> Where one curve dominates the other it unambiguously represents a more equal distribution, so a ‘dominant’ tax is a more progressive one. This can be determined from visual inspection or, more rigorously, statistical tests can be employed to verify whether the inner curve is confirmed as statistically significantly different from the outer curve (see Younger *et al*, 1999). Often in practice, because Lorenz curves cross, it is not possible to establish dominance. While more sophisticated techniques exist to address these problems (such as generalised Lorenz curves or welfare dominance), these are rarely applied in developing country work and are not discussed here.

A common approach by economists to answer the question of whether one tax is to be preferred to another is to construct a measure of social welfare (from some combination

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index of inequality that incorporates value judgements regarding aversion to inequality, and which has become widely used in tax analyses (although rarely for LDCs).

4 See Lambert (1993: 38), who shows that where individuals, ranked by their pre-tax incomes, differ from the post-tax ranking, the post-tax Lorenz and concentration curves will not coincide and the concentration curve overstates the extent of redistribution.

5 One could measure the extent of inequality associated with Lorenz or concentration curves using the Gini coefficient, but this has not often been done for taxes in LDCs.

of the well-being of individuals or households) and examine the impact of the taxes in question on that measure. For the case of indirect taxes, the most relevant case for most LDCs, the standard approach is to construct money-metric measures of utility – usually income – and consider how a given indirect tax, which changes goods prices, affects this utility measure. Individual utilities, or utility changes, are then aggregated according to the social welfare function, which specifies how different individuals are weighted.

The most common measure of welfare change of this sort is the Equivalent Variation (*EV*), commonly used in computable general equilibrium (CGE) analysis. Consider an increase in the prices of goods resulting from the imposition of a set of taxes. Compared to a no-tax situation this will make an individual feel less well off (reduce welfare). The *EV* is the amount of money such an individual would be willing to pay to avert the change in prices.<sup>6</sup> The *EVs* therefore provide a money measure of the welfare losses suffered as a result of the tax change. They can be calculated for specified groups or types of individuals (or households), or aggregated to measure overall welfare losses. Aggregation however requires specific judgements about household weightings, so most studies using *EVs* report them for specified, relatively homogeneous, groups.

The concept of the Marginal Social Cost (*MSC*) of taxes was developed and extended to the context of LDC tax reform in the 1980s and 1990s (Ahmed and Stern, 1984, 1991; Stern, 1987). The question asked is would a marginal increase in tax *i*, funded by a marginal decrease in tax *j* improve welfare? If desired, welfare can be specified to focus exclusively on those in poverty. Reforms that raise welfare and do not lower total tax revenues are preferred in this framework. However, welfare-raising reforms that reduce revenue cannot be unambiguously evaluated without knowledge or assumptions about the use of the foregone revenues. To calculate *MSCs* requires information on consumers' expenditures, tax rates, aggregate cross-price elasticities, and welfare weights chosen by the investigator (see Creedy, 1998a). Furthermore, what constitutes 'marginal' in this context is open to some interpretation. If general equilibrium effects are not thought to be large, the *MSC* approach may provide a reasonable approximation even for relatively large shifts in tax structure. Where there are substantial changes in the tax system, and behavioural responses are thought likely to be important, CGE models are usually the preferred method of analysis. These model social welfare and economic behaviour

across the economy explicitly, typically assuming price flexibility and using the equivalent variation to measure the social welfare effects of tax changes.

**Table 5 Merits of Alternative Methods**

<i>Method</i>	<i>Pros</i>	<i>Cons</i>
1. <i>CGE</i>	<ul style="list-style-type: none"> <li>- can examine variety of incidence assumptions</li> <li>- can examine sector/ socio-economic divisions</li> <li>- includes behavioural responses</li> <li>- various welfare measures</li> </ul>	<ul style="list-style-type: none"> <li>- data intensive</li> <li>- imposes parameters</li> <li>- smooth price adjustment assumptions not always appropriate</li> <li>- requires behavioural data</li> </ul>
2. <i>Marginal social cost</i>	<ul style="list-style-type: none"> <li>- less data intensive than CGE</li> <li>- behaviour responses via aggregate price responses</li> <li>- limited welfare measure</li> </ul>	<ul style="list-style-type: none"> <li>- requires behavioural data (price elasticities)</li> <li>- marginal changes only</li> <li>- mainly for expenditure taxes</li> <li>- results tend to be sensitive to inequality aversion</li> </ul>
3. <i>Dominance/ distribution (Lorenz or concentration curves)</i>	<ul style="list-style-type: none"> <li>- can compare pre- &amp; post-reform distributions</li> <li>- can focus on poor</li> <li>- needs limited data (expend., income distribution by group)</li> <li>- apply to direct &amp; indirect taxes</li> <li>- can examine tax compliance</li> <li>- software available 'off the shelf'</li> <li>- no (or limited) behavioural responses</li> </ul>	<ul style="list-style-type: none"> <li>- interpreting crossing curves</li> <li>- statistical tests can have low power</li> <li>- need good data at low incomes to identify the poor</li> <li>- limited ability to alter incidence assumptions</li> <li>- no behavioural responses</li> </ul>
4. <i>Tax progression</i>	<ul style="list-style-type: none"> <li>- requires data on tax structures only</li> <li>- simple to interpret</li> </ul>	<ul style="list-style-type: none"> <li>- measures tax rates by income level/group but not distributional or poverty impacts</li> <li>- welfare interpretations not always possible</li> <li>- cannot readily adapt incidence assumptions</li> <li>- can be misleading re progressivity if few taxpayers at some tax rates</li> </ul>

In applications of the methods discussed in this section to LDCs there are advantages and problems associated with each, as summarised in Table 5. In general the more

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6 An alternative measure is the Compensating Variation – see Creedy (1998b) for details.

difficult-to-apply methods can yield greater insights but their reliability is dependent on good quality data. A probable ranking, from most difficult to apply to easiest, is:

- 1) CGE models;
- 2) marginal social cost analysis;
- 3) tax progressivity measures (concentration curves, dominance tests,);
- 4) tax progression measures.

#### 4. EVIDENCE ON THE DISTRIBUTIONAL IMPACT OF TAXES

As mentioned, few studies have actually looked at the impact on the poor of specific tax structure changes in LDCs, and there are no direct studies of the impact on poverty. However, a body of empirical evidence is now accumulating on the impact of taxes on distribution, from which some inferences can be drawn regarding the impact on the poor (even if the best that can be done is to rank taxes). The most popular measure in early work was Average Rate of Progression (ARP), and we review such evidence first. Evidence is also available for several countries using concentration curve and welfare dominance concepts. These measures have generally been used to assess the progressivity of existing taxes rather than compare pre- and post-reform regimes (an exception is Chen *et al* 2001 for Uganda) but they can nevertheless shed light on this issue. Marginal social cost evidence addresses reform explicitly, both actual and counterfactual, but there are few studies for LDCs. Finally, we review some evidence from the CGE approach.

##### *Tax Progression Evidence*

Numerous studies, calculating average tax rates by income level or across income groups were undertaken during the 1960s and 1970s. They used statutory tax rates and traditional shifting assumptions and are of questionable reliability, especially early studies where data were particularly limited. Jimenez (1986) and Gemmell (1987) review this evidence. Although the terms ‘progressivity’ and ‘regressivity’ are regularly used in these studies, the evidence relates simply to *departures from proportionality* of the taxes concerned. Broadly, the evidence is as follows:

Personal income taxes	<i>progressive (but evasion generally ignored)</i>
Corporate taxes	<i>U-shaped (regressive then progressive)</i>

Property Taxes	<i>progressive (but generally a low revenue share)</i>
Indirect taxes	<i>generally regressive</i>
Overall tax system	<i>varied, often regressive at low incomes</i>

Jimenez (1986) reports overall tax incidence from various country studies (Table 6). In cases where progressivity is found, this is often because income tax evidence dominates (but where the use of statutory tax rates and thresholds is especially unreliable). Despite this, the combined effect of taxes in many countries appear to be regressive at lower income levels, even if they appear to be progressive further up the income scale. One problem with this evidence for indirect taxes (import taxes, sales taxes etc) is that progression has often been measured with respect to income levels rather than expenditures. This can lead to apparent evidence of regressive indirect taxes when, in fact, it reflects the income-expenditure relationship.

**Table 6 Incidence of Taxation from ARP Studies**

<i>Country</i>	<i>% of income paid in taxes</i>			<i>Conclusion</i>
	<i>Lowest income</i>	<i>Middle income</i>	<i>Highest income</i>	
Argentina	17.2	19.8	21.4	progressive
Brazil	5.2	14.3	14.8	progressive
Chile	18.2	16.2	26.7	progressive
Colombia	17.1	13.1	29.9	U-shaped
Kenya	11.5	8.8	12.7	U-shaped
Korea, South	16.4	15.7	21.6	U-shaped
Lebanon	8.4	20.2	20.3	progressive?
Malaysia	17.7	16.5	42.1	U-shaped
Mexico	40.2	22.7	14.9	regressive
Pakistan	15.0	9.6	25.3	U-shaped
Peru	4.8	17.4	26.6	progressive
Philippines	23.0	16.9	33.5	U-shaped

*Note:* Figures include direct and indirect taxes.

*Source:* Jimenez (1986: 116).

### *Concentration Curves and Inequality Measures*



Recent work has begun to report concentration curves, with associated welfare dominance tests, for several taxes in African countries (Younger, 1996; Sahn and Younger, 1998; Younger *et al*, 1999; Rajemison and Younger, 2001; Chen *et al*, 2001). These are generally based on statutory tax rates and traditional incidence assumptions, but do allow for some shifting of intermediate goods taxes. Evidence on tax progressivity/regressivity from dominance testing is shown in Table 7 for six African countries: Cote d'Ivoire, Ghana, Guinea, Madagascar, Tanzania and Uganda. Taxes are designated as progressive (regressive) if the concentration curve for the relevant tax lies wholly outside (inside) that for household expenditures *and* the difference is statistically significant. Where this cannot be established, the tax is shown as 'neutral/inconclusive'. The taxes consistently found to be regressive or at least not progressive are those on exports (which affect smallholder agricultural producers) and kerosene or paraffin. The taxes that are most consistently progressive are those on imports, sales, alcohol and soft beverages and automobiles. Results for tobacco are very mixed. Ghana appears to have the most regressive taxes.

**Table 7 Progressivity Results from Dominance Testing**

<i>Tax:</i>	<i>Progressive</i>	<i>Neutral/inconclusive</i>	<i>Regressive</i>
Exports		CI, Guinea, Mad.	Ghana, Uganda
Imports	Guinea, Mad., Tanz., Uganda	CI	
VAT/Sales	Guinea, Mad., Tanz., Uganda	CI, Ghana	
Excises	Mad., Tanz.	CI, Guinea, Uganda	
Tobacco	Mad., Uganda	C.d'I, Guinea, Tanz.	Ghana
Alcohol	CI, Guinea, Ghana, Tanz., Uganda	CI	
Non-alcoholic Beverages	CI, Guinea, Ghana, Uganda		
Gasoline	CI, Guinea, Ghana, Mad., Tanz., Uganda		
Kerosene /Paraffin		CI, Tanz.	Ghana, Guinea, Mad. Uganda
Transport Autos	Mad., Tanz. CI, Guinea, Mad.	CI, Guinea	

*Note:* CI = Cote d'Ivoire; Mad. = Madagascar; Tanz. = Tanzania. Results for Ghana are based on concentration curves without statistical testing of dominance.

*Source:* Based on results in Younger and associates (1996, 1999, 2001).

**Table 8 Tax Dominance Estimates for Four African Countries**

<b>Tax</b>	<b>Dominates the following:</b>
<b>Cote d'Ivoire</b>	
Autos	All others below
Gasoline	VAT, imports, excises, kerosene
Beverages	VAT, imports, excises, kerosene, exports
Alcohol	Excises, tobacco, exports
VAT	Imports, kerosene, tobacco
Excises	Tobacco
<b>Guinea</b>	
Petrol&Diesel, Beverages	VAT, imports, excises, tobacco, kerosene, exports
Alcohol	Kerosene, exports
Autos	Kerosene, exports, VAT, imports, tobacco
Transport, VAT, Imports, Excises, Tobacco	Kerosene, exports
<b>Madagascar</b>	
Gasoline, Transport	All others below except autos
Autos	All others below except tobacco
Excises, alcohol	Imports, kerosene
VAT, Petroleum, Imports	Kerosene
<b>Tanzania</b>	
Gasoline & Transport	All others below
Alcohol	Sales, imports, kerosene
Excises, Sales, Imports, Tobacco	Kerosene

*Note:* For each country, taxes are listed in descending order from most to least progressive. Taxes which appear in the right-hand column but not in the left-hand column (e.g. import taxes) do not dominate any other taxes but are dominated by at least one other tax.

*Source:* Based on results in Younger and associates (1996, 1999, 2001).

When considering beneficial reforms the 'welfare dominate' criterion is useful, as dominance implies a preference for the dominating tax regardless of the weight given to the poorest. Table 8 report results for Cote d'Ivoire, Guinea, Madagascar and Tanzania. The taxes in the left-hand column are arranged in descending order of progressivity; for example, in Guinea, gasoline and diesel taxes are estimated as most progressive, followed by taxes on beverages, alcohol, automobiles, etc. The right-hand column shows those taxes that are welfare dominated by the associated tax in the left-hand column. What emerges from this evidence is:

- Taxes on private transport (gasoline, autos) tend to be strongly preferred on distributional grounds.
- VAT and sales taxes tend to be more progressive than import taxes or excises, though usually not by enough for statistical tests to confirm welfare dominance.
- Export taxes and taxes on kerosene are often regressive and are the least preferred taxes on welfare criteria. However, it should be noted that most of the export taxes in question are on cash crops produced by medium and small scale farmers. Taxes on mining or plantation exports are unlikely to be regressive.
- Progressivity of the so-called ‘sin taxes’ on alcohol and tobacco is variable. In three of the four countries alcohol taxes are more progressive than tobacco taxes, but only in Cote d’Ivoire is tobacco taxation found to be regressive.<sup>7</sup>
- Uniform taxation of fuel would be problematic because of the very different consumption patterns for gasoline and kerosene (or paraffin) which are respectively highly pro-rich and pro-poor in their consumption. Furthermore, as fuel is an input to transportation, the economic incidence may be more regressive than indicated here.

Rajemison and Younger (2001) investigate incidence using (i) actual tax payments to calculate tax rates; and (ii) input-output (I-O) tables to calculate effective tax rates, in Madagascar where intermediate uses account for over 60% of imports and 80% of petroleum consumption. They find that (i) substantially reduces tax rates while (ii) significantly increases them. All three methods (including using statutory rates) produce similar progressivity rankings except for the two taxes where intermediate use is important: import duties and petroleum tax. However, it is the use of actual tax rates, rather than allowing for I-O effects, which has a substantial effect on progressivity results.

For import duties, conventional incidence assumptions produced a regressive outcome whereas they were progressive (and could not be dominated by any other taxes ) using I-O methods. Traditional incidence assumptions for tariffs may, therefore, be seriously misleading; an important observation for evaluation of IFI-type reforms. One methodological difficulty with the I-O approach however is that it can require considerable aggregation across goods in order to estimate effective tax rates, reducing

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<sup>7</sup> Tobacco taxes also appear to be regressive in Ghana except at high income levels (Table 7).

the accuracy of progressivity comparisons. In the case of Madagascar, applying I-O methods reduced the number of goods examined from 222 to 30!

Chen *et al* (2001) report, for Uganda, that allowing for the pass-through of petrol tax into other sectors reduces the estimated progressivity of the tax. With strong aversion to inequality, it can become regressive. This is also one of few studies to compare pre- and post-reform progressivity, using concentration curves and dominance testing. They find that, overall, the two systems are similarly progressive but there are some important changes for individual taxes. General excises became more progressive while import duties became more regressive. Also the coffee stabilisation tax (1994-96) appeared regressive (but evasion was believed to be very high).

#### *Marginal Social Cost of Taxation*

Ahmed and Stern (1987, 1991) use the *MSC* method to examine possible welfare-improving reforms in India and Pakistan respectively. Using effective tax rates for around 90 commodity sub-groups, they calculate the *MSCs* for 9 (India) and 13 (Pakistan) commodity aggregations of mainly food and clothing products. In brief, they found:

- Taxes on fuel, sugar, gur and ‘other foods’ tended to have consistently high or above median rankings (i.e. relatively high social costs), implying that it would be welfare enhancing to replace them with a lower ranked revenue neutral alternative.
- In contrast, taxes on milk, dairy products, meat, fish, eggs and edible oils tended to have a low ranking, i.e. relatively low social costs.
- The ranking of some taxes was dramatically altered depending on the assumed level of inequality aversion. For example, attaching a high (low) priority to equality suggested reducing (raising) the tax on cereals, whereas the reverse was the case for clothing and other non-food items.
- The rankings of some goods were insensitive to inequality aversion assumptions (e.g. sugar in India; milk products in India and Pakistan).
- For each inequality aversion, there was always at least one reform that could improve on current welfare. For example, for high levels of inequality aversion one would want to replace taxes on fuel and cereals with taxes on clothing and non-food items.

- When efficiency considerations dominate, taxes on goods with low price elasticities of demand, such as some cereals and domestic fuel, can be increased to improve social welfare. However, since these are consumed disproportionately by the poor, any reasonable concern with poverty leads to those taxes reducing welfare.

Broadly speaking, as greater inequality aversion is similar to a concern with sheltering the poor from taxes, the findings confirm the widely held view that taxes on staple foods and necessities such as fuel have the highest social cost. Taxes on more luxury foods, such as dairy products, and non-food items such as clothing have relatively low social costs. To the extent that fuel here is interpreted as kerosene or paraffin, the results support those in Table 7 that taxes on such fuels are regressive and have a high social cost. Indeed, if one allows for the fact that petrol is an intermediate input and that it is not feasible to distinguish use in private cars from use in production or transport of goods, one would conclude that all fuel taxes have high social costs. Although the rankings are based on consumption patterns, the conclusions would be similar if one allowed for the fact that many relatively poor households are producers of staple foods using fuel as an input. In general, the goods produced by the poor are similar to the goods they consume, and it is such goods that should face the lowest tax rates.

Finally, Ahmed and Stern (1987, 1991) have explored the distributional impact of (hypothetical) major reforms in India and Pakistan, involving the replacement of some or all of the existing excise taxes with a proportional VAT. Estimating EVs separately for 14 urban and 14 rural income groups, they show that a revenue-neutral reform could reduce poor rural households expenditures by as much as 7% (and 5% for poor urban households). The richest households gain by up to 4%. Even exempting cereals from the VAT (to assist the poor), still produces welfare losses for the poorest six rural (10 urban) groups. This suggests a trade-off between improvements in efficiency and poverty. However, reform involving domestic sales taxes can be tailored to help the poor but probably only at the cost of increasing the complexity of the system (e.g. with exempt goods and more than one tax rate). As they note for India ‘it would be interesting ... to study a system with, for example, a selective VAT, plus food subsidies, plus special taxation of selected items such as gasoline and some luxury items. We could very probably produce a package that would lose no revenue and would look attractive in terms of the above [welfare] analysis’ (Ahmed and Stern, 1987: 320).

### *CGE Evidence*

Because of their multi-sector nature, CGE models are best suited to examining the implications of changing incidence assumptions and evaluating major tax restructuring. A number of CGE models have been constructed for individual LDCs to explore the distributional impact of taxes. For example, Clarete (1991) and Shah and Whalley (1991) examine the progressivity of various taxes in the Philippines and Pakistan respectively, the latter distinguishing between urban and rural income earners. Dahl and Mitra (1991) apply CGE tax models to Bangladesh, China and India and explore distributional effects by industrial sector, between formal and informal, and between rural and urban areas.

For Pakistan, Shah and Whalley (1991) found that the effect of changing incidence assumptions (presumed to reflect the institutional and economic conditions in LDCs better) led to very different conclusions regarding progressivity. There are two main arguments. First, quantitative restrictions can mean that indirect taxes are not fully passed on to consumers in prices so that some or all incidence is borne by the importer or domestic producer. Quantitative restrictions include import quotas or licenses, price controls or restrictions which limit price flexibility or access to foreign exchange. Second, income taxes are generally restricted to modern, urban or public sectors. Some incidence of the tax is therefore borne by producers or workers or both in untaxed sectors. A similar argument could be made in the case of taxes on imports that protect certain sectors – the incidence is shifted to unprotected sectors (see Table 4).

The second effect is probably not quantitatively important in most countries (because income taxes are little used), but may be relevant in specific cases (and the related argument regarding tariffs could be widely important). The first effect, however, could be substantive enough to raise doubts about the distributional conclusions reached by existing studies using conventional incidence assumptions. Shah and Whalley (1991) provide some evidence on this but only for trade taxes. They show that, in Pakistan, traditional assumptions would lead to a regressive conclusion. They argue that quantitative restrictions would cause some of the incidence to fall on import and export license holders; and *assume* that the incidence rests with capital income earners. The link here is a tenuous one and they experiment with alternative assumptions regarding

which capital income earners are affected. These alternatives lead to trade taxes appearing to be progressive, sometimes strongly so. It remains unclear how far these arguments apply to domestic indirect taxes. The key issue is whether supply curves for taxed goods can reasonably be thought of as perfectly elastic at the margin. If not, there is good reason to think that not all of the incidence of indirect taxes will fall on consumers of those products. In addition it should be remembered that Shah and Whalley (1991) provide no data in support of their alternative incidence assumptions.

Clarete (1991) undertakes a similar exercise for major Philippine taxes allowing for imports and foreign exchange restrictions and rural-urban migration. He shows that, allowing for these three institutional effects (one at a time), leads to different conclusions for excise taxes, VAT and tariffs. Corporate and personal income tax results are essentially unchanged.<sup>8</sup> The importance of incidence assumptions for model results is confirmed by Chia *et al* (2000) for Cote d'Ivoire. Two other key results emerge from this study. Incidence may vary considerably across socio-economic groups and this does not translate into a simple income ranking – the poor in one sector may suffer while the poor elsewhere gain. Allowing for inter-household transfers (e.g. remittances from urban to rural households) substantively affects incidence results.<sup>9</sup>

Coady and Harris (2001) used CGE methods to measure the social cost of raising revenues from alternative VAT systems (single- and multi-rate, exemptions etc) to finance transfers to the poor in Mexico. They show that with even modest concern for the poor (inequality aversion) there are social gains from all VAT options but all are dominated by financing the transfers by reducing food subsidies. They also show that if concern is with the very poorest, raising tax revenues to finance transfers can be socially costly. Although tax incidence is low for the poor in general it can be higher on the very poorest (with any incidence on the poorest being treated as especially costly).

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8 Further examples of CGE simulations of the distributional impact of taxes under different assumptions can be found in Chia *et al* (2000) for Cote d'Ivoire, and Lora and Herrera (2000) for Colombia.

9 This is a case where it is important to analyse tax and expenditure incidence together. If, hypothetically, inter-household transfers were instead paid to the government in tax and the government made equal transfers to those households, tax incidence would change considerably but no difference may have occurred in households income positions. The incidence of the transfers should be examined alongside that for taxes.

In summary, much CGE evidence must be regarded as ‘suggestive’ rather than conclusive, but three conclusions are:

- there is greater uncertainty concerning the distributional effects of taxes in LDCs than had generally been appreciated, and results are sensitive to the assumptions made regarding economic incidence;
- overall the tax system may be more progressive than is often presumed;
- sector-specific taxes, and segmented markets, can lead to incidence effects differing as much across sector or socio-economic groups as across income levels.

## 6. CONCLUSIONS

Many LDCs have reformed aspects of their tax structure since the 1980s. In general, trade taxes have been reduced (and most export taxes have been eliminated) and replaced with domestic consumption taxes (increasingly, VAT is the form of sales tax used). As the formal sector remains small in relatively poor LDCs, reforms to income taxes have not been significant. These reforms are likely to have increased the efficiency of the tax system, especially collection efficiency (as incentives to evade or avoid trade taxes have been reduced). However, the reforms have tended not to be revenue neutral – poor LDCs on average have experienced a decline in tax revenue relative to GDP. *Ceterus paribus*, this implies a reduction in funds available for pro-poor government expenditures, an adverse welfare implication beyond the scope of this paper. The issue addressed in this paper is what have been the probable effects on distribution and the poor.

Having reviewed both the methods typically used and the evidence on the distribution aspects of taxation in developing countries, a number of conclusions emerge for studies of the poverty impacts of taxes and tax reforms. Firstly, on methods:

- Given uncertainties over incidence and the particular features of LDCs (e.g. evasion, informal sectors), different methods should be compared wherever possible. For a given method, sensitivity testing of assumptions should be pursued as far as possible.
- Data constraints in individual country settings are likely to influence strongly the type of analysis that can be undertaken. Where data are severely limited, the *ARP* approach can provide useful information (especially if alternative incidence



assumptions can be applied) but must be interpreted with care. Many countries now have some form of household expenditure survey data that can be used to improve the *ARP* approach and allow the construction of tax concentration curves, and dominance testing.

- The counterfactual against which the tax in question is being compared must be considered carefully. The usual counterfactual is a proportional tax yielding the same revenue. However, tax comparisons in practice in LDCs (e.g. pre- and post-reform), may involve increased or reduced revenues so that observed poverty or inequality changes cannot be unambiguously attributed solely to the tax change but may represent the effects of growth. There are two options here. Firstly, comparisons can be made whereby both taxes generate equal revenues. Secondly if revenues change after reform, consideration can be given to how this revenue (including deficit finance) could have been raised in the absence of reform. The new tax should then be compared with this alternative.
- It is often wrong to think that sectors or individuals that are not taxed directly bear no tax incidence. In addition to the effect of the taxation of intermediates, informal sectors and poor consumers may find the prices of their products affected by taxation elsewhere. Though no tax revenue arises from this, untaxed sectors certainly bear some of the tax incidence, and (typically poor) consumers and producers of informal sector products can both be affected.

As is often the case, there are many limitations in the approaches adopted in existing studies. Nevertheless, having considered the wide range of approaches, what conclusions can be drawn from the empirical evidence? General conclusions with respect to particular taxes are quite hard to find – progressivity or regressivity conclusions are often country specific. To the extent that the incidence of indirect taxes rests wholly with consumers, evidence from *ARP* studies, concentration curves and welfare dominance tests point to taxes on smallholder exports (e.g. cocoa in Ghana; coffee in Uganda; vanilla in Madagascar), intermediates, and kerosene excises as ‘bad’ for the poor. In general, one would also expect that taxes on foods, especially staple foods, would have an adverse effect on the poor. Conclusions regarding particular types of taxes must be nuanced.

*Taxes on imports* often appear among the more regressive (less progressive). As reforms frequently involve reductions in and/or rationalisation of trade taxes, and the elimination of taxes on intermediates, this aspect of reform might reasonably be expected to assist the poor. However, if Shah and Whalley's (1991) argument that import tax incidence is in any case borne by higher income recipients, this effect might be small. It would be hard to argue that removing these taxes harms the poor – though, of course, the net effect will depend on what taxes replace tariffs. Emran and Stiglitz (2002) show that, under plausible assumptions, the replacement of trade taxes with VAT is likely to reduce aggregate welfare (because informal sectors imply incomplete coverage of VAT). It cannot simply be assumed that trade tax reforms represent cases where efficiency and equity outcomes are complementary.

*The impact of export taxes* is also difficult to determine, and much depends on the relative importance of poor producers in production of the good in question and the presence or not of implicit taxes. For example, Younger (1996) found that about 70% of the additional tax revenues raised by the 1980s tax reform in Ghana were accounted for by the highly regressive cocoa export duty and petroleum excises, suggesting reform was bad for the poor. However, an overvalued exchange rate before reform meant that there had been an implicit tax on exports. When pre-reform taxes are adjusted to reflect this, reform is shown to have reduced reliance on the regressive cocoa duty, highlighting the importance of considering implicit tax incidence carefully. It is also worth recognising that export taxes may be the most effective means of taxing certain groups, whether smallholder cash crop producers or relative rich plantation owners or mining companies. In principle, large scale exporters could be taxed on (corporate) profits, and this would be preferable to a broad-based tax on exports.

*Indirect taxes* are difficult to classify as consumption patterns differ by income group, some goods are intermediate inputs, and the presence of an informal sector affects incidence. Because different income groups tend to consume similar goods (albeit in differing proportions) it is generally difficult to achieve significant redistribution through indirect taxes. Some goods are of greater importance to the poor. Kerosene (or paraffin) is often important within poor household's budgets for heating/lighting/cooking fuels but is not widely used by the rich. Thus, not only will kerosene taxes be harmful to the poor, but it should be possible to exempt kerosene from

more general fuel taxes to improve equity without encouraging inefficient substitutions between fuel types. More generally, taxes on intermediates such as fuel are often thought to be regressive because they affect transport costs (thus increasing prices of goods consumed by the poor).

*Excise taxes* are often justified on efficiency grounds, given the negative externalities associated with alcohol, tobacco etc. They have also traditionally been thought of as regressive, partly as a result of early evidence. More recent evidence, even using traditional incidence assumptions, casts some doubt on this. African evidence, for example, found that car/petrol taxes were strongly progressive; alcohol taxes appear quite progressive in most cases; and even tobacco taxes were reasonably progressive in Madagascar. Reforms that rationalise these taxes (e.g. imposing uniform rates on different types of tobacco or alcohol) will generally improve efficiency, and would not have a disproportionate effect on the poor. Low demand elasticities for those goods tend to make them good candidates on efficiency grounds.

*Value added taxes* have been the main domestic ‘replacement’ tax for tariffs and a wide array of excises in many reforms, and by 1998 were used in the majority of LDCs (Tanzi and Zee, 2000). Concentration curve and dominance test evidence generally puts VAT relatively low on the progressivity rankings although it is not normally found to be regressive. Indeed much early evidence suggesting regressivity of indirect taxes in general, and sales taxes/VAT in particular, appears to result partly from estimating tax rates as proportions of income rather than expenditure. When expenditure is used as the base, progressivity conclusions are more likely. Since the poorest consumers are unlikely to spend much of their income on VAT-liable goods (especially where necessities are exempted) VAT has little direct effect on the poor. Where it replaces an *ad hoc* array of excises at penal rates, VAT may even assist the poor by removing serious price distortions. Nevertheless, in some poor countries, the same pro-poor objectives could be achieved with a sales tax that is administratively easier. Furthermore, there is no convincing evidence that VAT is preferable to trade taxes.

*Income tax* reforms often involve reductions in *progression* (e.g. by removing or reducing higher marginal tax rates), but widespread evasion meant that they were not very *progressive* before reform (at least at the top end of the income scale). Reforms

therefore probably generally benefit those in the lower half of the income distribution and are largely irrelevant to most of the poor. The rationalisation of income tax schedules also contributes to a more efficient income tax system, even if only by removing previous 'evaders' from the tax net. Whilst it is possible that limiting income taxes to formal sector employees has knock-on effects to the wages of informal and rural sectors (Shah and Whalley, 1991) this is likely to have a minor effect at most on the poorest. Taxes on capital or property (income or wealth) would impact on the rich, but these are politically difficult to enforce (Heady, 2001).

The tax structure reforms that have been implemented in LDCs are consistent with the general pattern of the evolution of taxes as an economy develops (see Table 2). Taxes on international trade diminish in importance and, at first, are replaced by domestic consumption taxes but, ultimately, taxes on incomes become the most important. What are likely effects on distribution and the poor in LDCs? An important feature of countries that are now middle or high income, is that shares of taxes in total revenue changed in line with the development of the economy. As the formal sector increased in importance, sales and then income taxes became more important, i.e. the change was not caused by tax structure reform. The situation in poor LDCs is different, as tax structure reform has caused the (revenue depleting) shift from trade to sales taxes.

On balance, the evidence suggests that these tax structure reforms have not had an adverse effect on distribution or the poor. In most LDCs, export taxes were regressive, typically incident on smallholder agricultural producers (who, if not actually poor, were relatively low income). The removal of such taxes, combined with the reduction of other implicit taxes on agriculture, should have had a favourable impact on distribution and the poor. The evidence is inconclusive regarding the impact of generally replacing tariffs with sales taxes, largely because we do not know enough about economic incidence and the implications of a large informal sector. Excise taxes on fuel, an important source of revenue, are especially problematic; a tax on petrol for cars has a low social cost, whereas taxes on diesel for transport or kerosene used by the poor have high social costs. On balance, then, tax systems should have become slightly less regressive (or more progressive) but continued monitoring of reforms is needed. The important implication for tax policy is that, on distribution and poverty grounds, taxes on goods that are most important in the consumption bundles of the poor should be kept as low as possible.



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