

The distribution of expenditure tax burden before and after tax reform: The case of Cameroon

By

Tabi Atemnkeng Johannes
Atabongawung Joseph Nju
and

Afeanyi Azia Theresia
*Faculty of Economics and Management
University of Dschang, Cameroon*

AERC Research Paper 161
African Economic Research Consortium, Nairobi
November 2006

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 - City Square
Nairobi 00200, Kenya

Printed by: Modern Lithographic (K), Ltd.
P.O. Box 52810 - City Square
Nairobi 00200, Kenya

ISBN 9966-778-01-2

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Abstract

This paper examines the incidence of indirect taxation in Cameroon in 1983, 1996 and 2001. Using household surveys for these three years, the paper looks into which consumption taxes are progressive and determines if changes in tax policy influenced the welfare of the poor. The paper suggests that the incidence of expenditure taxes changes with the changing economic environment and reveals that the indirect tax reforms of 1994 and 1999 have been generally pro-poor. In the aggregate, consumption taxes became more progressive than before, partly due to changing consumption patterns following the introduction of new taxes or replacement of old ones.

Acknowledgements

We would like to thank the African Economic Research Consortium (AERC) most sincerely for funding this study. We would also like to extend our gratitude to the resource persons for their valuable comments and inputs during the various review stages. We also thank the anonymous external reviewer for their comments on the final version of the paper. We, however, remain responsible for any errors in the paper.

1. Introduction

Taxation, as the source of a major part of the public sector's budget, serves as an instrument of economic policy. Changing expenditures and receipts to maintain fiscal balance, surplus or deficit, for example, may bring on economic changes. Of central importance to economists and policy makers is the distributional impact of the taxation side of the budget. The few available studies on tax incidence in developing countries including Africa show that some tax policies have redistributive impacts – both positive and negative – of a size comparable to the effects of the more commonly studied social sector expenditures. These impacts justify equal attention from analysts interested in understanding the distributional consequences of public policies (Sahn and Younger, 2003).

This paper concentrates on indirect tax incidence as these taxes constitute an important component of the overall government revenue¹ in Cameroon. In most developing countries where the formal tax base is not well established, taxation of goods and services via indirect tax instruments plays a significant role in sustaining the state revenue flow. Equally, the equity consequences of indirect tax instruments amidst the 1994 tax reforms in Cameroon and the dramatic decline in GDP from the mid 1980s remain important to analysts and policy makers. We are also aware of the efficiency consequences of a good tax policy, but this issue is not a subject matter in this study. Thus, the main purpose of this study is to determine if changes in tax policy affected the progressivity of indirect taxes or if changes in incidence is due to changing expenditure patterns following the upset of crises from the mid 1980s.

2. Background issues

Economic development in Cameroon has passed through three main phases. From independence in 1960 until 1985, the economy experienced impressive growth performance thanks to oil exploration and sustained agricultural production backed up by strong world market prices. Alongside, the government was able to fill its role of the provision of public goods and services, following a sustainable and consolidated public finances. After 1985, much of the progress of the previous two decades was undone by lower export earnings that resulted from the fall in oil and other export prices. Following the continuous decrease in world market prices and deteriorating terms of trade, the economic slump persisted in 1986/87 and beyond.²

As the economic situation improved from the mid 1990s, government budgetary revenues started increasing (see Appendix Table A1). Thus, the period 1985/86 to 1993/94 was a decade of deep social and economic crisis for Cameroonians as opposed to the period 1995–2001, which is regarded as years of hope. The monetary adjustment that took place in January 1994 and was achieved through the devaluation of the CFA franc, coupled with other economic policy measures, may have contributed to reverse the trend. The Cameroonian economy was thus renewed with real growth rates (DSCN, 2002).

It should be understood that Cameroon's welfare indicators also moved closely to the level of income or economic progress. Per capita income rose steadily after independence to its peak in 1984/85, but has averaged as low as CFAF249,000 subsequently (Amin, 1996). The situation ameliorated between 1996 and 2001, however. In all, the per capita income estimated through adult equivalent expenditure witnessed an increase of 14.8% for the five years after 1996. This gives an annual increase of 3%. Cameroon's poverty study, based on the 1983, 1996 and 2001 household surveys, reveals that poverty affected an estimated 53.3% of Cameroonians in 1996 (up from 40% in 1983/84) and 40.2% in 2001 (DSCN, 1997, 2002). As observed in Table 1, the overall incidence of poverty fell by about 13.1% while its depth reduced by only 5%. The general amelioration of the poverty situation by 13.1 points is more manifested in urban areas than in rural areas, that is, 19.3 points as against 9.7, respectively.

Inequality in the distribution of income remains high, with more income disparities between individuals in 2001 than in 1996. This situation is confirmed by the Gini index, which shows that income distribution was more unequal in 2001 (0.408) than in 1996 (0.406). Rural areas and the male population were most affected (see Table 2).

Table 1: Evolution of indicators of monetary poverty between 1996 and 2001

Indicators	Milieu	1996	2001	Variations
P0=incidence	Urban	41.4	22.1	- 19.3
	Rural	59.6	49.9	- 9.7
	Cameroon	53.3	40.2	- 13.1
P1=intensity	Urban	14.7	6.3	- 8.4
	Rural	21.5	18.3	- 3.2
	Cameroon	19.1	14.1	- 5.0
P2=severity	Urban	6.9	2.7	- 4.2
	Rural	10.1	9.3	- 0.8
	Cameroon	9.0	7.0	- 2.0

Source: DSCN (2002), Living Conditions and Poverty Profiles in Cameroon in 2001.

Table 2: Evolution of the Gini index between 1996 and 2001 according to some variables

Variable	Modalities of the variable in question	1996	2001	Variations
Milieu of residence	Urban	0.449	0.406	-0.043
	Rural	0.345	0.369	0.024
Sex	Male	0.402	0.407	0.005
	Female	0.424	0.412	-0.012
Stratum	Yaoundé	0.487	0.433	-0.054
	Douala	0.485	0.410	-0.075
	Other cities	0.397	0.378	-0.019
	Rural (Forest)	0.287	0.377	0.090
	Rural (Highlands)	0.346	0.398	0.052
Employment status	Rural (Savannah)	0.354	0.330	-0.024
	Employed	0.403	0.410	0.007
	Unemployed	0.424	0.376	-0.048
Cameroon	Inactive	0.423	0.395	-0.028
		0.406	0.408	0.002

Sources: DSCN (2002).

Thus, despite several measures undertaken within the auspices of the structural adjustment programme initiated in the 1987/88 budget, there is urgent need for policy measures to further reduce poverty via a reduction in inequality. It is crucially important to examine the equity aspect of the tax system before and after the tax reforms in order to acknowledge whether the tax reforms have made the poor better or worse off.

The main features of Cameroon's tax system and tax reforms

The Cameroon government derives its revenue from two main sources – oil revenue and non-oil or fiscal revenue. Fiscal or tax revenue, being the most important part, constitutes about 75% of total revenue and 11% of GDP. The main types of taxes that account for the bulk of tax receipts are those on income and profits and indirect taxes such as taxes on goods and services and international trade.³ With respect to revenue

contribution of each tax, taxes from trade are the most important source of tax revenue. Import duties seem to be a more important source of total trade taxes than export taxes. While export tax as a share of total tax revenue ranged from 5% in the late 1960s to 0.3% in the early 1990s, import taxes were as high as 30% in the early 1960s and as low as 1.5% in the early 1990s (Amin, 1998).

Appendix Table A1 illustrates the importance of indirect taxation in overall government revenue for the 1990s. In fiscal years 1990 to 2000 international trade taxes accounted for about 30% of total tax revenue. Ranking second are taxes on goods and services such as turnover tax, value added tax (VAT), excise taxes and tax on sales of petroleum products, which represented 20% of total tax receipts. Income tax, which ranks third in terms of revenue, contributed less than 20% of total tax receipts over the same period. The foregoing analyses indicate that consumption taxes including import duties and taxes on goods and services constitute a greater part of total tax revenue. Any tax reform aimed at raising revenue mainly through indirect taxation should therefore consider the equity aspect of this type of tax.

Within the framework of the structural adjustment programme, the government implemented some tax reforms. From the 1984/85 financial year a special tax on petroleum products was instituted. A major initiative was the tax and customs adjustment adopted in 1994, covering the reform of the domestic indirect tax system and the reform of the common external tariff (CET) for the Central African Economic and Monetary Community (CEMAC).⁴ In all the CEMAC nations in the pre-reform period an internal turnover tax (*impôt sur le chiffre d’Affaire Intérieur* – ICAI) was imposed on businesses on sales of domestic production and on purchases of inputs. For taxes on imports, the treaty establishing UDEAC called for implementation of a common external tariff with the rest of the world. They had in common three different levies on imports of semi-final and final goods. In the post-reform era, various specific taxes (for example the ICAI) were replaced by a turnover tax (TCA) with two rates, a normal rate and a reduced rate. In July 1994, the rates fixed by the government of Cameroon were 5% and 15%, respectively.

One other reform was the replacement of TCA by VAT in January 1999, with corresponding exemptions and zero rating. With respect to intra-CEMAC trade flows, multiple rates of indirect taxation were simplified and a generalized preferential tariff equivalent to 20% of the CET was introduced. Custom duties vis-à-vis the rest of the world were set into a four-tier structure with a 50% top rate (duties had previously been up to 300% in some countries). Imports were classified into four groups and custom duties ranged from 5% in January 1994 as follows: 5% for essential goods, 15% for raw materials and capital goods, 35% for intermediate and miscellaneous goods, and 50% for consumer goods. These rates were lowered to 5%, 10%, 20% and 30%, respectively, in December 1994. During the same period excise taxes went into operation and were imposed on tobacco products, alcoholic beverages, bottled water and jewellery at a rate of 25%.

Lastly, another accomplishment of the Cameroon government in the domain of tax reforms in the late 1990s was the removal of massive implicit taxation on exports. From July 1998 export taxes on rural activities (e.g., cocoa, coffee, cotton, rubber, sugar, medicinal plants, palm oil and banana) were eliminated. Finally, the income tax, precisely personal income tax comprising taxes on salaries and wages, industrial and commercial profits, profits from handicraft and agricultural activities, income from property, and

earnings from securities, was modified with effect from January 2004. The proportional tax and the graduated surtax, which formerly constituted the personal income tax, have been merged into a unique progressive tax. This reform is in line with the government's objective of fighting poverty and it is believed the new system, which appears to be more progressive, would favour consumer spending, savings and investment by reinforcing fiscal equity.

Research problem and objectives

In 1994 and partly in 1999 the Cameroon government implemented some fiscal and customs reforms in line with the structural adjustment programme. With the aim of improving savings by public services, this led to the restructuring of taxes and/or the reduction of public expenditure. The main features of the 1994 reforms were raising domestic revenue through indirect taxation; restraining wages; and increasing non-wage expenditure on public sector investment. A new policy orientation introduced by the World Bank in 1999 is the poverty reduction strategy programme, which has become an integral component of the Heavily Indebted Poor Countries Initiative (HIPC) and a precondition for access to the Poverty Reduction Support Credit. The government of Cameroon has been highly involved in this important novelty and had to finalize its poverty reduction strategy paper (PRSP) in 2002 as a step towards being admitted to the HIPC initiatives⁵. One of the measures defined in the paper involves initiation of policies to raise consumer purchasing power in order to improve the well being of all social classes, especially the poor. However, the taxation side of government budget could also be used to achieve equality in the distribution of income via a rise in purchasing power and thus reduce poverty. Furthermore, by analysing indirect tax incidence, we are able to gain better insight into the role of tax reforms on household welfare.

The consumption of essential needs – categorized in Cameroon under headings such as food, clothing, health, and equipment and housing maintenance – represented about 80% of total household consumption in the 1996 household survey and 75% for the case of the first household expenditure survey of 1983/84. In poor households these basic needs amounted to 86% of total consumption (DSCN, 1997): the 2001 survey indicates expenditures of about 75% and 85% on such consumption needs for the entire nation and for poor households, respectively. Thus, assessing the distribution of expenditure as affected by the cost of taxation is critical in the study of tax incidence. This approach is supported by the implication that poverty is considered as a lack of command over basic consumption needs and the poverty line as the cost of those needs.⁶ An examination of the cost of taxation on expenditures that constitute the greater share of poor households' spending in particular and that of the entire population as a whole will help redress the deteriorating welfare situation of the poor.

The objectives of this study are therefore to:

- Check the progressivity of indirect taxes before and after tax reform. Answers to the question of who pays consumption taxes (i.e., sales tax, value added tax, import and excises taxes) are provided in the paper.
- Examine the progressivity of consumption taxes over time.
- Determine if the change in indirect tax incidence is due to changes in the tax system (i.e., tax code) or household expenditure patterns.

3. Overview of the literature

There is a considerable literature related to tax incidence in public finance, with empirical estimates dating back over half a century. This paper does not intend to provide an exhaustive list of the studies and their findings.⁷ However, we provide the main issues and review the incidence results obtained recently while highlighting the general trends in the findings of past studies.

Some recent studies that describe the extent to which the tax system succeeds in transferring resources to the poor in African countries focus on three countries: Uganda (Chen et al., 2001), Madagascar (Younger et al., 1999) and Ghana (Younger, 1996). Sahn and Younger (1998) carried out similar analyses for Madagascar, Tanzania, Côte d'Ivoire and Guinea. All these studies obtained quite similar results. The tax systems of the countries are considered to be progressive or mildly progressive except for taxes on kerosene and export duties, which are regressive. The excise tax on kerosene, used mostly by lower income households as a cooking fuel, explains its regressivity. Export duties involve traditional agricultural exports (vanilla in the case of Madagascar, cocoa in the case of Ghana and Côte d'Ivoire, etc.). The personal income or wage taxation tends to be the most progressive, but surprisingly progressivity was also evident in most consumption taxes including VAT. Such a result is believed to be related to the phenomenon common in developing countries where only transactions in the formal sectors are actually taxed, coupled with the fact that most low-income households function almost completely within the informal sector.

Other studies on tax incidence recently undertaken in Latin America also produce the same overall conclusion of progressivity or mild progressivity of the tax systems, as in the case of Guatemala (Bahl et al., 1996) and Mexico (Martinez-Vazquez, 2001). Several others reviewed in Shah and Whalley (1991) also find a broadly progressive overall incidence pattern.⁸

Similar studies carried out in developed countries, especially between the 1950s and 1980s, are reviewed in Atkinson and Stiglitz (1980). These authors obtain results that are broadly the same in that the incidence of taxation is roughly proportional over a wide range of incomes. Other tax incidence studies for OECD countries also find generally proportional or mildly progressive patterns (Messere, 1997). Accordingly, it would appear that over time OECD governments have always taken steps to maintain proportionality or mild progressivity of the entire tax system. For example, during the rate flattening tax reforms of the late 1980s, the decrease in progressivity was offset by increasing minimum exempt thresholds, providing more generous family allowances, broadening the tax base by making interest income and capital gains taxable, and disallowing deductions that tended to benefit higher income tax payers (Messere, 1997).

In sum, we find that these results for overall progressive tax incidence over the last two decades contrast with those found in earlier studies, as reported in Bird and De Wulf (1973). Of the 24 tax incidence studies these authors reviewed for Latin America, only four were to have found some degree of progressivity in the tax systems.

Thus, it becomes unclear whether the move toward progressivity in more recent decades has been due to changes in tax policies or to differences in the measurement of tax incidence. The general nature of tax reforms in developing and developed countries over the last two decades centred on the introduction of value-added taxes on the use of income, and in the substitution for a variety of sales taxes the flattening of rates and broadening of the tax bases on the source of income, with a decrease in the importance of corporate income taxes. It is believed these broad policy changes should have altered the conclusions reached. For example, it was typical of earlier studies to assume that any kind of sales tax was highly regressive. More recent studies have taken into account that in developing countries, for example, lower income groups may not pay consumption taxes because they live mainly outside the formal system (Martinez-Vazquez, 2001).

The foregoing analyses suggest that it might be necessary to carry out tax incidence studies over time and not on a point in time. This could help provide a definite conclusion on the changing trend of results observed in tax incidence studies. Most tax incidence studies that have been done concentrated on the analysis at a time period mainly using a single household survey. The household expenditure survey provides a snapshot of the living standards of the household, but this may change with time and not be captured in a single data set.

Chen et al. (2001) conducted a welfare dominance analysis of tax incidence in Uganda using a single cross section data on expenditures from the 1992 integrated household survey and simulated a supposed tax burden for the 1995 after tax-reform period. They found that the tax structure was progressive before reforms and remained so afterwards. This indicates that the burden of tax reforms has not fallen disproportionately on the poor. The study also finds that other tax reforms implemented in the 1990s were generally pro-poor and that substituting VATs for sales taxes did not necessarily worsen the welfare of the poor, since most goods consumed by the poor were zero-rated.

A recent study by Refaquat (2003) analyses the incidence of general sales taxes on the economy as a whole and on different individual commodities. The results obtained indicate that the general sales tax (a form of indirect taxation) has been progressive, an outcome ascribed to the particular selection of taxable items and exemptions. The author believes that under an alternative set of commodities the results could have been entirely different. Most of the tax incidence studies reviewed above⁹ compute tax burden on the basis of annual data for income sources and expenditure patterns and also on the basis of several assumptions concerning how the different taxes are shifted to households because they are either consumers (for indirect taxes) or owners of factors of production (for direct taxes).

Others have used the input-output table (Rajemison and Younger, 2000) to take into account the nature of production in the economy in order to understand the incidence of consumption taxes, while some use a computable general equilibrium model pioneered by Harberger (1962) with the consequent increase in complexity and cost. For the latter, tax incidence is established by comparing the vector of equilibrium prices before and

after the tax change. This may be done in the context of “differential” tax incidence where one tax is substituted for another while keeping government expenditures constant or in the context of “absolute” tax incidence where a tax is introduced holding government expenditures constant. In both cases the additional revenue collected by the government may be rebated to taxpayers in a lump sum fashion.¹⁰ The models capture all the parameters that play a role in final tax incidence among different income groups: different demand patterns, different endowments in resources and variations in capital–labour ratios in different economic sectors. However, they are criticized for their hypotheses on household preference functions and for their aggregate nature, which does not capture the repercussions of a marginal shift in tax policy.

4. Methodology

Tax incidence is the analysis of who ultimately bears the burden of government taxes in the economy. The implication here is that generally there can be large differences between who the law says is obligated to pay taxes and who ultimately in the economy bears the burdens of taxes (i.e., those whose real purchasing power falls) in the course of government imposition. Thus, the objective of tax incidence studies is to determine economic rather than statutory incidence. Economic incidence refers to those taxpayers who ultimately experience a decline in their real purchasing power. Statutory incidence, on the other hand – also called legal or nominal incidence – refers to those taxpayers that are by law required to pay the tax. In economic theory, it is understood that entities that are legally required to pay a tax do not necessarily suffer a reduction in real purchasing power when the tax is imposed. Several taxes are shifted onto other persons or households by the original taxpayers. Examples include expenditure taxes or taxes on firms, which may be shifted to consumers or suppliers, respectively, through changes in prices. For this reason, tax incidence studies often adopt a number of strong assumptions for easy analyses.

For indirect or consumption taxes, including several forms of sales taxes (e.g., ICAI or TCA for Cameroon), value-added taxes and excises, the general assumption underlying the estimates is that households or consumers bear the entire burden according to their share of consumption of the taxed goods and services. Thus, smokers pay taxes on tobacco and households that use kerosene or paraffin pay the taxes on paraffin. In the particular case of gasoline (petrol and diesel), the estimate takes into account the direct expenditures on these petroleum products, but also spending on transport by means of higher prices.

The incidence of sales taxes is complicated in many countries by the presence of cascading multiple rates and exemptions.¹¹ For some imported products, it is very difficult to determine the incidence because of lack of information about which income groups end up consuming the imported goods. In the light of this, the burden of import or custom duties is distributed to consumers according to their share of cash expenditures on all goods and services without any further distinction (case of non-identified imports) just as with sales or value-added taxes. That is assuming a perfectly competitive situation, where a tax on imported goods raises the price of both imported and domestically produced goods of the same type. So for consumers, it does not matter whether they consume imports or domestic goods.¹²

From the analyses above, it is clear that indirect tax incidence studies are concerned with the share of taxes paid or loss of purchasing power by different income groups. Usually, these groups are defined by the welfare or standard of living distribution. Living

standards for individuals are determined by their level of utility or satisfaction. In trying to compare living standards or the well-being of individuals, observable proxies for utilities, such as income or consumption, are used. Most studies of fiscal incidence make use of household expenditure (per capita) as a welfare indicator rather than income. Expenditure per capita is considered a better proxy for utility because households generally tend to report their expenditures more accurately than they do their incomes for the reason that they have less incentive to hide expenditures than income.

Nature of data

Data on household expenditures in Cameroon are available for the years, 1983/84, 1996 and 2001 in the integrated household surveys. These surveys were undertaken by the Department of Statistics and National Accounts (DSCN). In all cases, “household” is regarded as a group of persons related or not but living under the same roof, eating together or in small groups, putting together part of their income for the welfare of the group, and recognizing the leadership of one individual as the household head particularly in matters of expenditure. The 1983/84 household budget and consumption survey was the first of its kind. While it covered a randomly selected sample of 5,500 households drawn from urban areas including some big cities, semi-urban, rural areas and the agro-ecological zones, the 1996 survey sampled just 1,700 households. The 2001 Cameroon household survey covered 11,500 households, also randomly sampled nationwide. These surveys provide detailed information on expenditure sources of households and being national initiatives used the same questionnaire. Information on household expenditure sources covers monetary and non-monetary expenditures on essential needs categorized under the following headings: food, clothing, housing and house maintenance, health and personal care, transport and communication, and education and leisure. The food items also include drinks and tobacco goods.

Lastly, it should be recalled that the tax situation was fairly stable over the period between 1983 and 1996, and 2001 is after reform periods. The same taxes charged in 1996 were levied in 2001 except the TCA, which was replaced by the VAT in 1999. And even though a particular tax was not actually collected or charged during one of the time periods, we computed a supposed tax burden for the taxes by simulating a small tax.

Calculating household tax payments

The basic methodology behind conventional models of tax incidence is to allocate tax burdens to different income groups, ordered from rich to poor by deciles or quintiles of the population, on the basis of a series of assumptions about who bears the final burden of taxes.¹³ In the simplest of cases, where taxes are collected according to the letter of the law, this calculation is straightforward for ad valorem taxes. The tax paid is just the tax rate times the pre-tax value of expenditures given as:

$$T_{ij} = t_j p_j x_{ij} = \left(\frac{t_j}{1 + t_j} \right) e_{ij} \quad (1)$$

where T_{ij} is household i 's total loss in purchasing power for a tax on good j ; $p_j x_{ij}$ is household i 's pre-tax amount of expenditure on good j ; t_j is the ad valorem tax rate; and e_{ij} is the post-tax amount of expenditure on good j . The fact that T_{ij} is proportional to e_{ij} , the expenditure that is reported in a household survey, is a convenient assumption (see Sahn and Younger, 2003).

The procedures and application peculiar to Cameroon are presented below, where in the various equations for *Cexp* (CIF and Dv) the case represents the post-tax (pre-tax) amounts of expenditure. Appendix Table A2 shows the various commodities and their corresponding tax rates before the reform, whereas Table A3 presents the same information after the reform with indication of the relative reduction in import duties. Both tables also show the various rates of the 1983/84 sales tax, which was replaced by a uniform VAT (18.7% with some zero rating) beginning in 1999.

The assumptions provided in the Cameroon tax laws are used to compute households' tax payments on consumption for three survey periods. The assumptions of the tax base for each tax are as follows:

- ICAI (internal turnover tax) is levied on the cost in full (CIF) value of imports or domestic sales.
- TCA (turnover tax) is levied on the CIF value of imports plus all import duties and excise taxes paid.
- VAT is calculated on the CIF value of the imports plus the import duty.
- Import duties and tariff (IMD) are levied on the CIF value of imports.
- Commodity specific excises (EXT) are levied on the CIF value of imports (if the goods are reported as imports) plus all import duties paid or on the value of domestic sales if locally produced.

The following formulas and applications are used:

$$(a) \text{ ICAI} = \text{CIF value} \times \text{rate of ICAI } (t_{ICAI})$$

$$(b) \text{ TCA} = (\text{CIF value} + \text{IMD} + \text{EXT}) \times \text{Rate of TAC } (t_{TCA})$$

$$(c) \text{ VAT} = (\text{CIF} + \text{IMD}) (t_{VAT})$$

$$(d) \text{ IMD} = \text{CIF value} \times t_{IMD}$$

$$(e) \text{ EXT} = (\text{CIF} + \text{IMD}) t_{EXT}$$

We extend these tax bases to consumption expenditure (*Cexp*) for the calculation of taxes on the assumption that prices rise by the full amount of taxes.

Tax payments for the 1983/84 survey (with no excise tax except the direct tax of gasoline that falls on users of public transport)

$$C \text{ exp} = Dv + ICAI + GT \quad (2)$$

Substituting (a) and (d), we have

$$C \text{ exp} = CIF + CIFt_{IMD} + CIFt_{ICAI}$$

$$CIF = C \text{ exp}/(1 + t_{ICAI} + t_{IMD}) \quad (3)$$

Therefore, the various taxes could now be computed as follows:

$$ICAI = CIF \times t_{ICAI} \quad (4)$$

$$IMD = CIF \times t_{IMD} \quad (5)$$

Gasoline (petrol and diesel) via transport tax (GT) = Domestic value (Dv) x gasoline via transport tax rate (t_g)

$$\begin{aligned} C \text{ exp} &= Dv + ICAI + GT \\ &= Dv + Dv.t_{ICAI} + Dv.t_g \end{aligned} \quad (6)$$

$$Dv = C \text{ exp}/(1 + t_{ICAI} + t_g)$$

$$GT = C \text{ exp}/(1 + t_{ICAI} + t_g)t_g \quad (7)$$

Tax payments for the 1995/96 and 2001 surveys with excise taxes, gasoline via transport tax and a special tax on petroleum products (TSSP) inclusive

Thus, C_{exp} in 1995/96 is given as

$$C_{exp} = CIF + IMD + TCA + EXT \quad (8)$$

Substituting (b), (d) and (e) and rearranging we have,

$$C_{exp} = CIF(1 + t_{IMD} + t_{TCA} + t_{EXT} + t_{IMD} \cdot t_{TCA} + t_{IMD} \cdot t_{EXT} + t_{TCA} \cdot t_{EXT} + t_{IMD} \cdot t_{TCA} \cdot t_{EXT}) \quad (9)$$

$$CIF = C_{exp}(1 + t_{IMD} + t_{TCA} + t_{EXT} + t_{IMD} \cdot t_{TCA} + t_{IMD} \cdot t_{EXT} + t_{TCA} \cdot t_{EXT} + t_{IMD} \cdot t_{TCA} \cdot t_{EXT}) \quad (10)$$

$$\text{Then, } TAC = CIF(t_{TCA} + t_{TCA} \cdot t_{IMD} + t_{TCA} \cdot t_{EXT} + t_{IMD} \cdot t_{EXT} \cdot t_{TCA}) \quad (11)$$

$$IMD = CIF \cdot t_{IMD} \quad (12)$$

$$\begin{aligned} EXT &= (CIF + IMD)t_{IMD} \\ &= (CIF + CIF \cdot t_{IMD})t_{EXT} \\ &= (CIF + (t_{EXT} + t_{IMD} \cdot t_{EXT})) \end{aligned} \quad (13)$$

Using the same expression as above, gasoline via transport tax is determined as follows:

$$\begin{aligned} C_{exp} &= Dv + TCA + GT \\ &= Dv + Dv \cdot t_{TCA} + Dv \cdot t_g \end{aligned} \quad (14)$$

$$GT = C_{exp}/(1 + t_{TCA} + t_g)t_g \quad (15)$$

For the special tax on petroleum products (TSSP) we have

$$C_{exp} = CIF + IMD + TCA + TSSP \quad (16)$$

$$\begin{aligned} & CIF + CIFt_{MD} + [CIF + CIF.t_{IMD} + (CIF + CIFt_{IMD}t)_{EXT}]t_{TCA} + CIFt_{TSSP} \\ & CIF = C_{exp}/(1 + t_{IMD} + t_{TCA} + t_{TSSP} + t_{TCA}.t_{IMD} + t_{TCA}.t_{EXT} + t_{IMD}.t_{EXT}.t_{TCA}) \end{aligned} \quad (17)$$

$$TSSP = CIF.t_{TSSP} \quad (18)$$

For 2001, C_{exp} is given as,

$$C_{exp} = C.i.f + IMD + VAT + EXT \quad (19)$$

Substituting (c), (d) and (e) we have,

$$\begin{aligned} C_{exp} &= CIF + CIF(t_{IMD}) + (CIF + IMD)t_{VAT} + (CIF + IMD)t_{EXT} \\ &= CIF(1 + t_{IMD} + t_{VAT} + t_{EXT} + t_{IMD}.t_{VAT} + t_{IMD}t_{EXT}) \end{aligned} \quad (20)$$

$$\text{Then, } CIF = C_{exp}/(1 + t_{IMD} + t_{VAT} + t_{EXT} + t_{IMD}.t_{VAT} + t_{IMD}t_{EXT}) \quad (21)$$

$$\text{Effectively, } IMD = CIF.t_{IMD} \quad (22)$$

$$\begin{aligned} EXT &= (CIF + IMD).t_{EXT} \\ &= CIF(t_{EXT} + t_{IMD}t_{EXT}) \end{aligned} \quad (23)$$

$$\begin{aligned} VAT &= (CIF + IMD).t_{VAT} \\ &= CIF(1 + t_{IMD})t_{VAT} \end{aligned} \quad (24)$$

Gasoline (petrol and diesel) via transport tax (GT) is given as,

Pre-tax value (Dv) x gasoline on transport tax rate (t_g)

$$Cexp = DV + VAT + GT \quad (25)$$

$$VAT = (CIF + IMD).t_{VAT}$$

$$Cexp = DVt_{VAT} + DVt_g \quad (26)$$

$$GT = Cexp/(1 + t_{VAT} + t_g)_g \quad (27)$$

For the special tax on petroleum products (TSSP),

$$\begin{aligned} Cexp &= CIF + IMD + VAT + TSSP \\ &= CIF + CIF.t_{IMD}(CIF + CIF.t_{IMD})_{VAT} + CIF.t_{TSSP} \end{aligned} \quad (28)$$

$$CIF = Cexp/(1 + t_{IMD} + t_{VAT} + t_{TSSP} + t_{IMD}.t_{VAT}) \quad (29)$$

$$TSSP = Cexp/(1 + t_{IMD} + t_{VAT} + t_{TSSP} + t_{IMD}.t_{VAT})_{TSSP} \quad (30)$$

Another objective of the study is to observe the progressivity of a given tax over time. But some of the taxes were not actually collected in a particular year, as indicated in the calculations above. For example, sales tax (ICAI) was collected only in 1983, the TCA in 1996, VAT in 2001, and excises in 1996 and 2001. We simulate a small tax by calculating a supposed tax burden for the years that these taxes were not collected. The tax on a particular good, j , is determined from Equation 1 given above as $T_j = t_j/(1+t_j)Cexp_j$ where $Cexp_j$ is the post-tax expenditure and t is the tax rate. This calculation is based on the assumption that a household's indirect tax burden is proportional to its expenditure.

Lastly, it should be understood that indirect tax incidence depends on two things: the tax code and expenditure patterns. In order to ascertain whether the change in tax incidence between 1983, 1996 and 2001 occurs as a result of the change in tax code (tax reform) or because of changing household consumption patterns, we addressed this consideration by applying the 1983 tax code to the 1996 expenditure data. If the results are similar to the 1996 tax results, then it is not the tax code that has changed incidence, but the expenditure patterns that have changed¹⁴ (see Table 3).

Table 3: Extended Gini coefficient of taxes after reforms, 1996, based on 1983 tax code

	Import duties	Sales tax TCA	Gasoline via transport ^a	Gasoline and transport ^b	Gasoline ^c	Aggregate expenditure taxes
2	0.564	0.558	0.441	0.717	0.855	0.564
4	0.732	0.753	0.681	0.868	0.962	0.744
6	0.786	0.813	0.760	0.904	0.976	0.801
8	0.815	0.843	0.800	0.921	0.982	0.831
10	0.833	0.861	0.826	0.932	0.985	0.849

- a. Gasoline via transport refers to the part of the direct tax on gasoline that falls on users of public transport.
b. Transport and gasoline refers to the combined impact of the direct tax on gasoline and the indirect tax on users of public transport.

c. Gasoline refers to the direct tax on gasoline.

Source: Author's calculation based on household survey data and data provided by the Ministry of Economy and Finance.

Method of analysis

After the computations of taxes, the next step is to check the progressivity against two benchmarks: whether they are progressive, i.e., inequality reducing relative to our welfare benchmark, and whether they are per capita progressive, implying that those at the upper end of the income distribution pay at least an equal level of taxes as lower income individuals. One of the most widely used methods for doing so is known as “Welfare dominance”. The methodology, developed by Yitzhaki and Slemrod (1991), uses concentration curves.¹⁵

The concentration curve is an important normative tool, used in assessing the impact of tax and transfer policies and reforms. The concentration curve for a tax, T , is:

$$C_T(p) = \frac{\int_0^p \bar{T}(q) dq}{\mu_T}, \text{ where } \mu_T = \int_0^1 Q_T(p) dp = \mu_X - \mu_N \text{ is average taxes across}$$

the population with $Q_T(p)$ representing the p-quartile functions for taxes. X and N represent post-tax and pre-tax expenditure, respectively. In practice, concentration curves are usually estimated by ordering a finite number of observations in increasing values of living standard or gross incomes. On the other hand, the benchmark with which the progressivity of indirect taxes is compared is the Lorenz curve. The Lorenz curve is the most popular graphical tool for illustrating and comparing income inequality. It provides complete information on the whole distribution of income relative to the mean, and it gives a more comprehensive description of the standard of living than any one of the traditional summary statistics of dispersion. The Lorenz curve at p-percentile of the population is:

$$L(p) = \frac{\int_0^p Q(q) dq}{\int_0^1 Q(q) dq} = \frac{\int_0^p Q(q) dq}{\mu}$$

The numerator sums the incomes (expenditure per capita) of the bottom p (the poorest 100 p % of the population), while the denominator sums the incomes of all. Since the population size is normalized to 1, the denominator gives the average standard of living. $L(p)$ thus indicates the cumulative percentage of total income held by a cumulative proportion of the population when income is ordered in increasing magnitude. For example, if $L(0.5)=0.4$, it implies 50% of the poorest individuals hold 40% of the total income of the population.

Yitzhaki and Slemrod proved in their model that for any social welfare function favouring equitable distribution of income, a marginal reduction in one tax, T_1 , followed by a marginal increase in another tax, T_2 , which keeps the tax revenue constant, will improve social welfare if T_1 's concentration curve is everywhere above T_2 's curve. Explicitly, if poorer households tend to pay more of the taxes associated with a particular type of revenue measure, say, kerosene taxes, and less of another, say, gasoline taxes, then increasing taxes on the latter to pay for the former will improve the distribution of welfare. They refer to this as welfare dominance because of the analogy with the concept of second order stochastic dominance in the finance literature. Thus, in as much as the concentration curves for different types of taxes are compared, each of the curves is also compared with two benchmarks: the Lorenz curve for per capita expenditures, $L_x(p)$ and the 45-degree line (see figures B1 to B9 in Appendix B). A tax is progressive if it taxes poorer household less than wealthy ones, relative to their income, and regressive if it does not. Following the tax redistribution (TR) approach (Duclos and Araar, 2004), a tax T is said to be TR-progressive if its concentration curve, $C_T(p)$, lies everywhere below the Lorenz curve, $L_x(p)$. Of two taxation schemes, the more TR-progressive one is that whose concentration curve is the lowest. Thus, the more progressive a tax is, the more it moves away from the 45-degree straight line and for one tax to dominate the other, the difference in their concentration curve must be non negative over the whole range of income.

If the concentration curves intersect, however, then it is impossible to show dominance. When the dominance tests are inconclusive, conclusions can only be drawn by being more specific about the importance of each household in the social welfare function. Effectively, the use of cardinal measures of inequality is necessary. The Gini coefficient is used, meaning that a specific welfare function with a specific weighting scheme is also needed. Several weighting schemes exist, but a family of weighting schemes that is based on the same argument is offered by the extended Gini (Yitzhaki, 1983). This allows for adjustments in the social weights given to households and provides a clearer notion of how alternative social welfare functions differ with tax regimes. The extended Gini is a weighted integral of the area between the 45-degree straight line and the Lorenz curve. The formula for the extended Gini is given as:

$$G(v) = -vCOV\left[e, (1 - F(e)^{v-1})\right]$$

where v is a parameter that affects the weighting of the points on the concentration curve, $F(e)$ is cumulative tax payment, and e measures the household's tax payment. When $v=2$, $G(2)$ yields the traditional Gini coefficient, while the higher is v , the greater is the emphasis on the bottom of the income distribution (i.e., more weight is given to commodities consumed by the poorest households). When the Gini coefficient for a given tax is greater than the Gini coefficient of per capita expenditure, then the tax is considered progressive. Accordingly, the comparison of the Gini coefficient before and after the tax reforms indicates how progressive the indirect tax system has become (Table 4 to 7).¹⁶ However, we find it necessary to compute the Kakwani index¹⁷ (Table 8) for the import duties, sales tax and VAT in order to easily assess the differences in terms of equity.

Table 4: Extended Gini coefficient of taxes before reforms, 1983/84

V	Import duties and tariff	Sales tax, ICAI	Gasoline via transport ^a	Gasoline and transport ^b	Gasoline ^c	Simulated alcohol excise	Simulated tobacco excise	Aggregate taxes Expenditure	Expenditure
2	0.552	0.564	0.645	0.602	0.830	0.591	0.353	0.554	0.482
4	0.761	0.769	0.892	0.833	0.959	0.830	0.592	0.763	0.487
6	0.825	0.829	0.941	0.888	0.980	0.894	0.687	0.826	0.756
8	0.855	0.859	0.958	0.910	0.988	0.921	0.736	0.856	0.792
10	0.873	0.876	0.965	0.922	0.991	0.936	0.765	0.874	0.815

- a. Gasoline via transport refers to the part of the direct tax on gasoline that falls on users of public transport.
 b. Transport and gasoline refers to the combined impact of the direct tax on gasoline and the indirect tax on users of public transport.
 c. Gasoline refers to the direct tax on gasoline.

Source: Authors' calculation based on household survey data and data provided by the Ministry of Economy and Finance.

Table 5: Extended Gini coefficient of taxes after reforms, 1996

V	Import duties	Sales tax TCA	Total excise taxes	TSSP	Gasoline via transport ^a	Gasoline and transport ^b	Gasoline ^c	Alcoholic drinks excise	Tobacco excise	Bottled water excise	Jeweleries excise	Aggregate taxes	Expenditure
2	0.564	0.551	0.596	0.855	0.441	0.701	0.855	0.518	0.261	0.825	0.650	0.564	0.463
4	0.736	0.75	0.792	0.962	0.681	0.857	0.962	0.69	0.422	0.956	0.859	0.744	0.649
6	0.78	0.811	0.849	0.976	0.760	0.896	0.976	0.748	0.49	0.978	0.915	0.801	0.714
8	0.81	0.842	0.875	0.982	0.800	0.914	0.982	0.782	0.529	0.982	0.939	0.831	0.749
10	0.83	0.860	0.891	0.985	0.826	0.926	0.985	0.805	0.557	0.982	0.952	0.849	0.773

- a. Gasoline via transport refers to the part of the direct tax on gasoline that falls on users of public transport.
 b. Transport and gasoline refers to the combined impact of the direct tax on gasoline and the indirect tax on users of public transport.
 c. Gasoline refers to the direct tax on gasoline.

Source: Authors' calculation based on household survey data and data provided by the Ministry of Economy and Finance.

Table 6: Extended Gini coefficient of taxes after reform, 2001

V	Import duties	VAT	Total excise	Alcoholic	Tobacco	Bottled water	Jewelries excise	TSSP	Gasoline via transport ^a	Transport and gasoline ^b	Gasoline ^c	Net VAT	Aggregate taxes	Expenditure
2	0.498	0.535	0.556	0.653	0.242	0.668	0.688	0.849	0.451	0.642	0.849	0.533	0.518	0.451
4	0.684	0.727	0.734	0.831	0.413	0.713	0.855	0.954	0.679	0.811	0.954	.729	0.705	0.633
6	0.748	0.787	0.787	0.878	0.484	0.896	0.904	0.972	0.757	0.860	0.972	.789	0.786	0.696
8	0.782	0.818	0.813	0.899	0.526	0.899	0.926	0.979	0.798	0.885	0.979	.821	0.798	0.731
10	0.804	0.837	0.830	0.912	0.557	0.901	0.939	0.983	0.823	0.90	0.983	.840	0.819	0.754

a. Gasoline via transport refers to the part of the direct tax on gasoline that falls on users of public transport.

b. Transport and gasoline refers to the combined impact of the direct tax on gasoline and the indirect tax on users of public transport.

c. Gasoline refers to the direct tax on gasoline.

Source: Authors' calculation based on household survey data and data provided by the Ministry of Economy and Finance.

Table 7: Extended Gini coefficient of simulated sales taxes and VAT from 1983 to 2001

V	1983			1996			2001		
	ICAI	TCA	VAT	ICAI	TCA	VAT	ICAI	TCA	VAT
2	0.564	0.574	0.575	0.553	0.551	0.557	0.526	0.524	0.531
4	0.769	0.780	0.779	0.746	0.750	0.749	0.714	0.716	0.722
6	0.829	0.841	0.839	0.806	0.811	0.808	0.774	0.777	0.782
8	0.859	0.870	0.868	0.837	0.842	0.838	0.805	0.809	0.813
10	0.876	0.887	0.885	0.855	0.860	0.857	0.825	0.829	0.833

Table 8: Kakwani indexes of import, sales, value added and aggregate expenditure taxes before and after reform

V	1983 imports duties	1983 sales tax (ICAI)	1983 aggregate expenditure tax	1996 import duties	1996 sales tax (TCA)	1996 tax expenditure aggregate tax	2001 VAT
2	0.069	0.081	.072	0.10	0.088	0.101	0.084
4	0.073	0.081	0.076	0.08	.10	0.095	0.094
6	0.068	0.073	.07	0.07	0.097	0.095	0.0903
8	0.063	0.066	0.064	0.064	0.091	0.082	0.086
10	0.058	0.061	0.059	0.059	0.087	0.076	0.082

Source: Authors' calculation based on household surveys data and data from the Ministry of Economy and Finance.

5. Results

This section presents the results on the incidence of expenditure taxes on household welfare. The progressivity or incidences of indirect taxes over time is determined using data from the 1983, 1996 and 2001 Cameroon household surveys. Indexes of progressivity (concentration coefficients, or extended Ginis and Kakwani index) and concentration curves are computed using DAD (Duclos et al., 2003), a software for distributive analysis developed by researchers in CREFA, Université Laval. In cases where taxes were not actually collected during one of the periods, a supposed tax burden is calculated by simulating a small tax.

Table 4 and Figure B1 summarize the results prior to the reform based on extended Ginis as well as the concentration curves. The results indicate that the indirect tax structure comprising mainly the sales tax (ICAI) and the import duties was progressive even before the reform. Other individual taxes, such as taxes on the direct consumption of gasoline, are more progressive than all other taxes in the same period. Furthermore, since most gasoline is consumed as an intermediate input to other services, more especially transport, this indirect effect is captured by assuming that fuel accounts for about 18.5% of the cost of intercity and intracity transport.¹⁸ By assuming that part of the gasoline tax falls on users of public transport, extended Ginis are calculated for this tax as well as for the combined impact of direct purchase of gasoline and the indirect purchase through public transport. The results indicate that even the tax on public transport is progressive, although not as progressive as the direct consumption of gasoline. Nevertheless, it should be noted that these services are concentrated among urban households. These individual taxes are more progressive than the sales and import duties in the pre-reform period. On the contrary, sales taxes dominated the import duty, i.e., sales tax is more progressive than import duty. The simulated excises on alcohol and cigarettes or tobacco also show that alcohol excise tax is progressive whereas tobacco excise is less progressive. The results are in line with those of similar studies on Ghana and Madagascar (Younger, 1996; Younger et al., 1999), a few sub-Saharan African countries (Sahn and Younger, 1998), and Uganda (Chen et al., 2001).

However, the incidence analysis further shows that after the reform, the entire indirect tax system in Cameroon became more progressive (tables 5 and 6 or figures B2 and B3). One reason for the progressive nature of consumption taxes in developing countries could be that a majority of food sales (constituting a greater proportion of poor household expenditure) are not taxed. The other kinds of taxes such as excises on alcoholic drinks, bottled water, jewellery and tobacco as well as a special tax on petroleum products, gasoline or petrol and diesel that were introduced in the reform could also be responsible

for such results. These taxes are all highly progressive except tobacco excise, which became more regressive than the simulated tobacco excise in the pre-reform period. A similar result on tobacco excise was obtained in Côte d'Ivoire by Sahn and Younger (1998), who concluded that because of the social stigma attached to the consumption of tobacco, reporting of expenditure for the product may be very unreliable.

In order to clearly determine if changes in tax policy actually affected the progressivity of indirect taxes and perhaps taking it as a reason for the progressive nature of such taxes, this paper computed another set of 1996 tax results (Table 3). This was done by applying the 1983 tax code to the 1996 expenditure data. These results are similar to the actual 1996 tax results, an indication that it is not the tax reform that changed incidence, but the changing expenditure patterns of households. Nonetheless, we further found out that the replacement of the sale taxes in 1983 and 1996 by the value added tax (VAT) also had a role to play as far as changes in tax incidence is concerned.¹⁹ We had to use the tax redistribution approach and computed the Kakwani indexes (see Table 8), which represent the difference between the indexes of concentration of the taxes and the inequality index for expenditure. Further analysis also involved estimating the net tax incidence of the VAT²⁰ reported in Table 6. In comparing the two regimes (before and after reforms) using the results in Table 8, we observe that the sales tax and import duties are more progressive than before, whereas the replacement of the 1996 sales tax by the VAT did not lead to the poor being worse-off. With the second method, which provides the net tax incidence of the VAT, the net effect relative to the 1996 sales tax is more progressive.

Lastly, the results in figures B4 to B9 and tables 3–7 give a picture of the evolution of the progressivity of a given tax over time. The various sales taxes, ICAI and TCA of 1983 and 1996 as well as the VAT of 2001 including alcohol and tobacco excises, have a tendency to decline in terms of progressivity and this should be due to changing household consumption patterns.

In sum, our results indicate greater overall progressivity of the indirect tax burden than before. These results should be interpreted with care because, as described in the calculation procedures, taxes are not paid according to the letter of the law. Many transactions in developing countries occur in the informal markets not subject to the government's tax handles, which are always formal sector firms or goods passing through the port, coupled with tax evasions or corruption. Nevertheless, these household level results are compared with the actual tax payments reported by the government in order to understand any misclassification. In all cases the differences (after scaling the household estimates up to the national levels) do not exceed 30%, an indication that the estimates range from 60% to 70% of the actual figures. Understanding these differences is important for the discussion of tax incidence results. The tax authorities must play a formidable role in avoiding tax evasion and encouraging compliance.

6. Conclusion

This paper has examined the progressivity of expenditure taxes before and after reforms, revealing that the modification of the indirect tax structure in the 1990s did not necessarily affect the welfare of the poor. Excise taxes on alcoholic drinks, jewellery and bottled water are highly progressive, but the tobacco excise tax is less so. The sales tax of 1983, although progressive, is less so than the 1996 sales tax, which is also slightly less progressive than the VAT. Net tax incidence of the VAT that replaced the former indicates a marginal dominance of the VAT over the 1996 sales tax. This may be due to the application of increased zero-rating on the VAT for some commodities mostly consumed by the poor. Second, import duties prior to and after reform are less progressive than the sales taxes and the VAT as well. However, import taxation became more progressive after the reform.

Taxes on gasoline and diesel consumption are highly progressive especially after the reform with the introduction of a special tax on petroleum products. These taxes are judged preferable on efficiency grounds because of the negative externalities associated with them. Furthermore, the impact of this petroleum product tax on users of public transport services supports the view that higher gasoline taxation would be beneficial from an efficiency perspective. Excise taxes dominate the VAT, except tobacco excise, which is dominated by all other taxes. Finally, the progressivities of expenditure taxes may change over time with changing consumption patterns.

Policy makers can therefore rest assured that shifting the tax structure towards excises, VAT and gasoline taxes rather than import duties would be equitable. Thus, the current tax structure could help reduce the level of poverty via a reduction in inequality, which actually increased between 1996 and 2001. It should be understood that progressivity is not the only element of a good tax. Other characteristics such as efficiency (easy to handle) and productivity in terms of generating revenue for government expenditures do matter. Nevertheless, progressivity occupies an important place as far as poverty reduction strategy is concerned and should be a subject of constant assessment.

Notes

1. See Table A1 in the Appendix.
2. The Cameroonian economy experienced a steady growth from the 1960s to the mid 1980s, followed by severe crisis. The nominal GDP grew at an average rate of 18.2%, from about CFAF300 billion in 1970 to CFAF4,135 billion in 1986. However, from 1986 Cameroon's economic performance was on the decline. GDP fell by 2% in 1986/87 and by 8.5% in 1987/88. Over the period 1985–1993, income per capita declined by nearly 6.4% per year and private consumption per capita (i.e., purchasing power) declined by 6.1% per year over the same period. Between 1984 and 1991, industrial production dropped by 14% in volume and employment by 10% (DIAL/DSCN, 1993).
3. The income tax in Cameroon has two essential components, the personal income tax and the company tax. The former includes taxes on salary and wages, income from non-agricultural enterprises, and earnings from securities or financial assets.
4. Formed in 1994, CEMAC – the Central African Economic and Monetary Community–replaced UDEAC, the Central African Economic and Customs Union, which had existed since 1964. It comprises six central African countries including Cameroon.
5. Cameroon finally reached the completion and was declared a highly indebted poor country in April 2006, and is expected to benefit from enormous debt cancellation.
6. Basic needs have been interpreted in terms of minimum specified quantities of such things as food, shelter, water and sanitation that are necessary to prevent ill health, under nourishment and the like (Streeten et al., 1981). This definition also fits in our classification of essential needs.
7. See, for example Bird and de Wulf (1973), de Wulf (1975), Wasylenko (1986), Atkinson and Stiglitz (1980), Shah and Whally (1991), and Chu, Davoodi and Gupta (2000) for review and summary of findings in the literature.
8. An exception is Wasylenko (1986), who found an inverted U-shape incidence pattern (income is redistributed from the middle income groups to the poor and the rich) for Jamaica.
9. A review of other studies on indirect tax incidence is found in Sahn and Younger (2003).
10. See McLure (1975) and Bovenberg (1987) for application and expansion of Harberger's model.

11. Some conventional studies used an input output framework to establish effective rates in the presence of cascading and multiple rates and exemptions. See, for example, Bird and Miller (1991).
12. What is different from other taxes is that not all of the benefits of the tax go to the government. Local producers also benefit because their price rises. However, this latter effect cannot be captured with a standard household survey, because we don't know who those local producers are.
13. Typically, as earlier discussed, we assume that indirect taxes on goods and services are shifted entirely to consumers, as a standard result if markets are competitive and taxes apply to final sales (or value added).
14. Similar taxes collected in 1983 are computed using the 1996 data by applying the 1983 tax law or code (i.e., Equation 2 to Equation 7) to compute 1996 taxes.
15. These are curves similar to the Lorenz curve, which is a graphical representation of inequality. In this analysis, households are ranked from poorest to wealthiest along the horizontal axis and the cumulative share of taxes paid along the vertical axis.
16. The Gini coefficient is zero for perfect equality, and one for perfect inequality.
17. The Kakwani index is the difference between the extended Gini (concentration coefficient) of the tax and S-Gini for the expenditure distribution, $KK_{(T)} = IC_T - G_{\text{expenditure}}$. The index is positive if the tax is progressive. Kakwani (1977) provides a progressivity measure defined in terms of the elasticity of the tax function $T(X)$ with respect to income X . Using the Lorenz, $L X(p)$ and concentration $C_T(p)$ curves, a proportional tax will mean a merging of the two curves while progressivity is measured by the distance between the two curves.
18. With simple estimates from national accounts, we find the average input-output coefficient for petroleum in the transport sector for the three survey years.
19. It was not possible to determine conclusively using the Gini coefficients or from Figure B4 to Figure B6 if after the reform, the substitution of the VAT for the sales taxes of 1996 and 1983 improves the welfare of the poor. It may be because the benchmark used for comparing the welfare effect of the taxes (i.e., the inequality of expenditure distribution) also changed between these periods.
20. This calculation is performed by replacing the difference between the statutory rates of VAT and the TCA in the VAT equation. When the difference is negative, however, it implies the VAT is zero relative to TCA and in such cases the zero rates are used.

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Appendix A: Supplementary tables

Table A1: Budgetary revenue (percentage of total revenue)

	1990-91	1991-92	1992-93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
Petroleum revenue	37.1	33	25.9	18.7	20.1	21.8	24	24.1	15.9	29.7
Non petroleum fiscal revenue	52.7	54.2	60.6	69.4	68.3	67.6	63.7	66.6	76.9	64.2
Income tax	16.2	14.7	17.5	19	13.6	13.1	13.6	15.5	19.4	16.7
Tax on goods and services	11.3	9.8	12.4	16.4	24.3	24.1	21.3	22.3	27.1	23
Import duties and taxes	12.7	17.5	18.1	19.9	19.7	20.3	21	22.6	25.2	20.9
Export duties and taxes	8.5	8.2	8.9	10.1	7.9	7.8	6.1	5.1	3.1	1.3
Other fiscal revenue	4.0	4	3.7	3.9	2.8	2.3	1.7	1.2	2	2.2
Non petroleum (non fiscal) revenue	5.7	8.9	10.5	11	9.1	8.4	10.6	7.7	6.3	5.6
Revenue to be classified	4.6	3.9	3	1	2.4	2.1	1.8	1.6	0.9	0.5
Non petroleum revenue (incl)	62.9	67	74.1	81.3	79.1	78.2	76	75.9	84.1	70.3
Revenue from privatization										
Total budgetary revenue	100	100	100	100	100	100	100	100	100	100

Source: Adapted and arranged from Economic and Financial Services, IMF and BEAC (published in various reports of the National Council of Credit of Cameroon).

Table A2: Household survey commodities and corresponding tax rates in Cameroon, 1983 (per cent)

Commodities	Import duties	Sales tax (ICAI)	Other tax
All food except those listed closely below	0	0	
Rice	40	8	
Macaroni, spaghetti and related products	45	8	
Wheat flours and others ^a	33	8	
Canned tomato	50	8	
Milk (liquid and powdered)	17.5	8	
Diary products	27.5	8	
Butter and related products	35	8	
Refined cooking oil and other oils	35	8	
Canned meat	42.5	8	
Canned fish	37.5	8	
Sugar	110	8	
Salt	30	8	
Hotels, cafe and restaurants	0	8	
Non alcoholic drinks	0	8	
Other non alcoholic beverages	50	8	
Beer	150	8	
Other alcoholic drinks	120	8	
Industrial cigarettes	150	8	
Clothing and other accessories	52	8	
Footwear and accessories	60	8	
Water	0	8	
Electricity	0	8	
Kerosene	30	8	
Domestic cooking gas	0	8	
Batteries	40	8	
Matches	150	8	
Other fuel and power	40	8	
Household furniture	0	8	
Camera, musical and leisure instruments	60	8	
Household appliances	50	8	
Household linen	60	8	
Household and kitchen utensils	60	8	
Gardening and home tools	47.5	8	
Home maintenance products	50	8	
House construction and repairs materials	55	8	
Medicine	23.5	8	
Personal care articles	85	8	
Automobiles and motor cycles	55	8	
Gasoline(petrol and diesel)	30	8	
Lubricants (oil and greases)	25	8	
Transportation in cities	0	4	7 ^b
Intercity transportation	0	4	7 ^b
Mail and telecommunication	0	8	
Education and training	0	8	
Sport and spectacles	0	8	

Notes:

a. Includes wheat in bread and other flour composed products.

b. For transport cost we assume that on average 18.5% of the cost is due to taxes on petroleum products.

Source: Adapted from Government of Cameroon's General Tax and Customs Codes and the 1983/84 survey data.

Table A3: Household survey commodities and corresponding tax rates in Cameroon, 1996 and 2001 (per cent)

Commodities	TCA'Sales taxes	Import taxes	VAT*	Excises	Others
All food except those listed	0	0	0	0	0
Rice	8	36	0		
Macaroni, spaghetti and related	15	58	18.7		
Wheat	0	58	18.7		
Wheat flours and others ^a	0	58	18.7		
Canned vegetables tomato	15	58	18.7		
Baby food	8	12.5	18.7		
Canned food	8	58	18.7		
Milk (liquid)	8	39	0		
Milk (powdered)	8	29	0		
Cheese	15	60	18.7		
Butter and margarine	15	60	18.7		
Refined cooking oil and other oils	15	58	18.7		
Frozen chicken	8	40	0		
Canned fish	8	60	0		
Refined sugar	8	56	0		
Salt	15	48	18.7		
Hotels, cafe and restaurants	15	0	18.7		
Fruit juice and other non alcoholic drinks	15	0	18.7		
Other non alcoholic beverages	15	58	18.7		
Bottled or mineral water	15	0	18.7	25	
Beer	15	83	18.7	25	
Wine, liquor and other imported alcoholic drinks	15	83	18.7	25	
Cigarettes (Cameroon)	15	0	18.7	25	
Cigarettes (Imported)	15	83	18.7	25	
Clothing and footwear articles	15	55	18.7		
Water charges	8	0	18.7		
Electricity	8	0	18.7		
Kerosene	8	35	18.7		
Domestic cooking gas	8	0	0		
Batteries	15	55	18.7		
Matches	15	58	18.7		
Candles	15	0	18.7		
Household furniture	15	0	18.7		
Household linen	15	55	18.7		
Musical and other instruments	15	55	18.7		
Computer materials	15	55	0		
Household appliances	15	55	18.7		
Household and kitchen utensils	15	45	18.7		
Gardening and home tools	15	55	18.7		
Home maintenance products	15	55	18.7		
House construction and repairs materials	15	55	18.7		
Pharmaceutical products	0	65	0		
Readaptation and medical apparatus	15	11.5	18.7		
Personal care articles	15	55	18.7		

continued

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Commodities	TCA*Sales taxes	Import taxes	VAT*	Excises	Others
Automobiles, motor cycles, bicycles and tricycles (petrol and diesel)	15 15	55 35	18.7 18.7		Gasoline 120/65C FAF/litre
Lubricants (oil and greases)	15	55	18.7		
Spares and other tools for transport	15	55	18.7		
Transportation in cities and intercity	15	0	18.7		10 ^b
Mail and telecommunication	8	0	18.7		
Education and training	15	0	18.7		
Camera, sports and leisure frills	15	55	18.7		
Sport, leisure and spectacles	15	0	18.7		
Bags and leather objects	15	35	18.7		
Watches and other	15	55	18.7		
Jewelleries	15	83	18.7	25	

Notes: * TCA was levied in 1996, whereas VAT replaced TCA as from 1999.

a. Includes wheat in bread and other flour composed products.

b. For transport cost we assume that on average 18.5% of the cost is due to taxes on petroleum products.
Source: Adopted from Government of Cameroon's General Tax and Customs Codes, the 1996 and the 2001/2002 surveys.

Appendix B Graphic presentations of results

Figure 1: Main expenditure taxes before reform

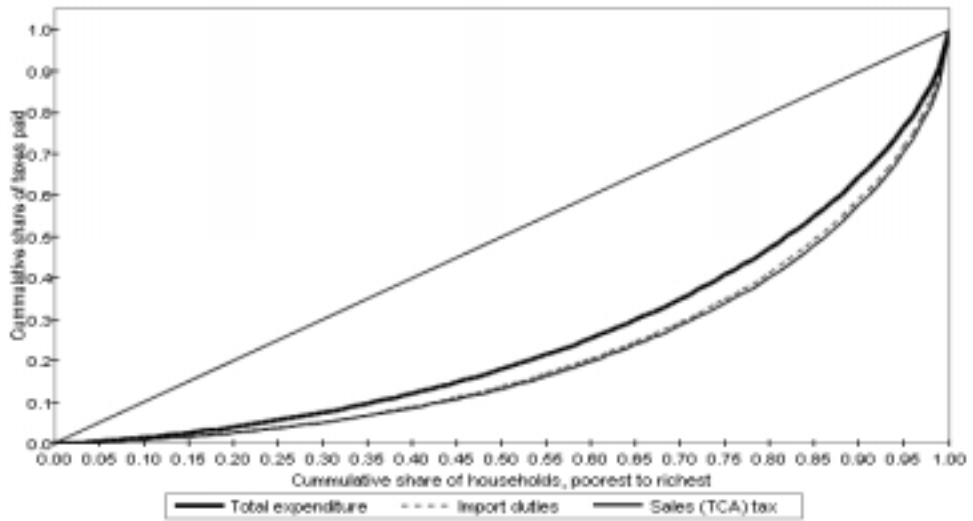


Figure 2: Main consumption taxes after reform, 1996

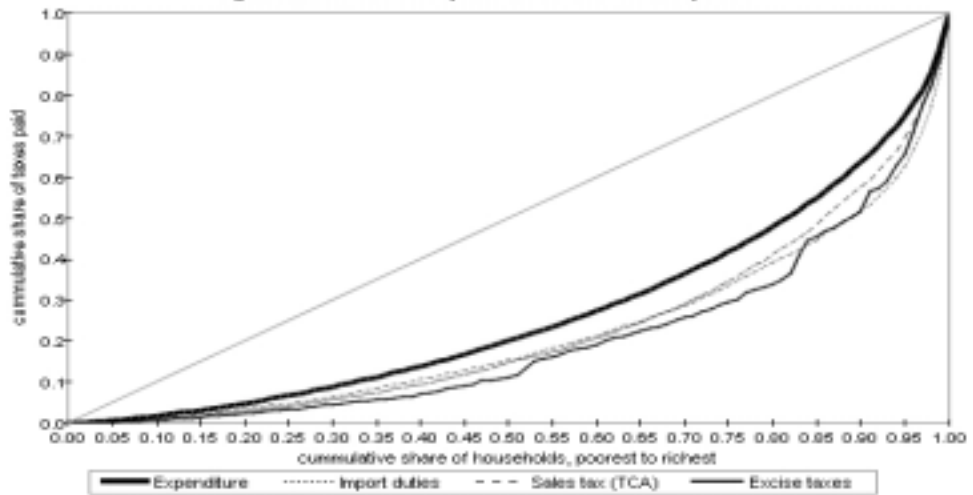


Figure 3: Main Consumption taxes after reform, 2001

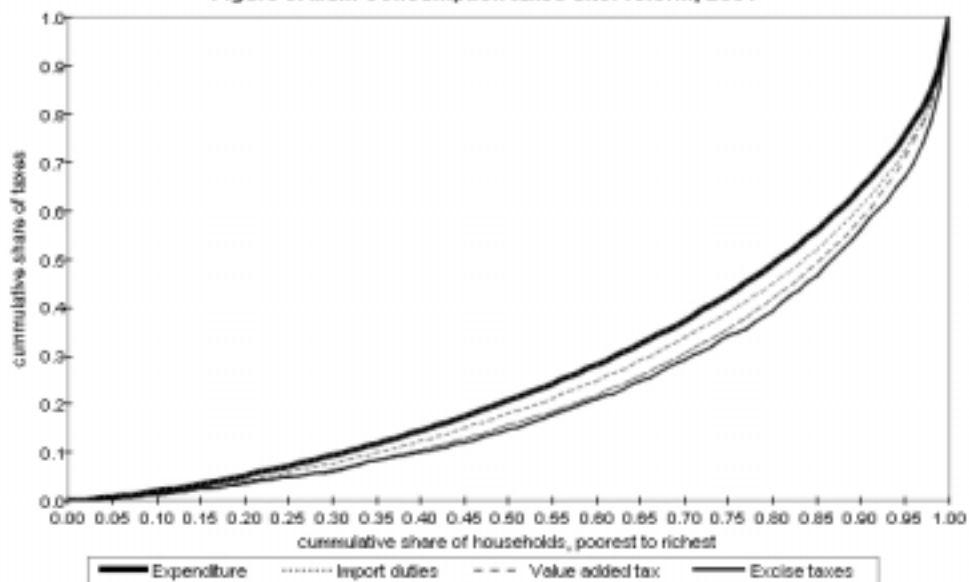
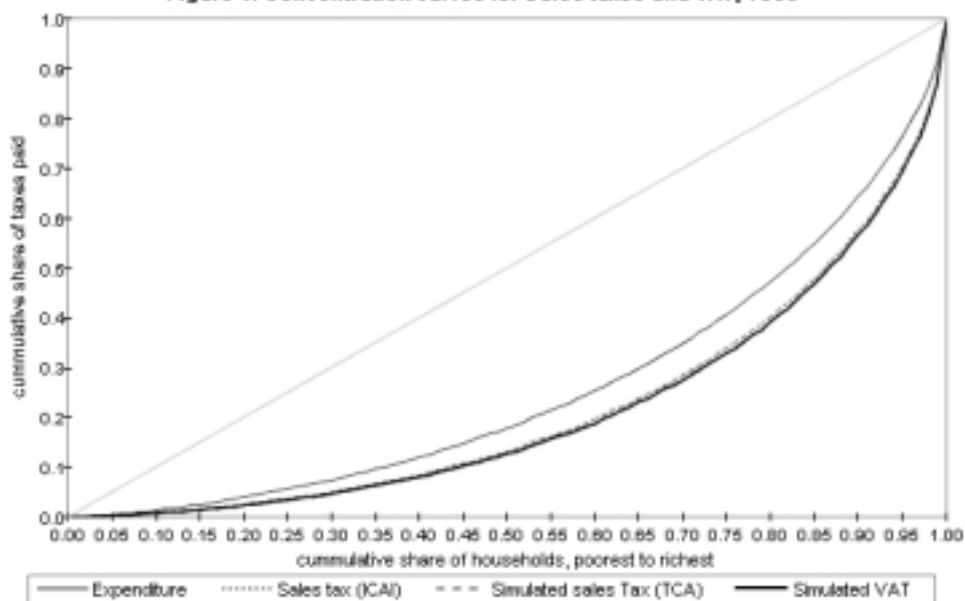


Figure 4: Concentration curves for Sales taxes and VAT, 1983



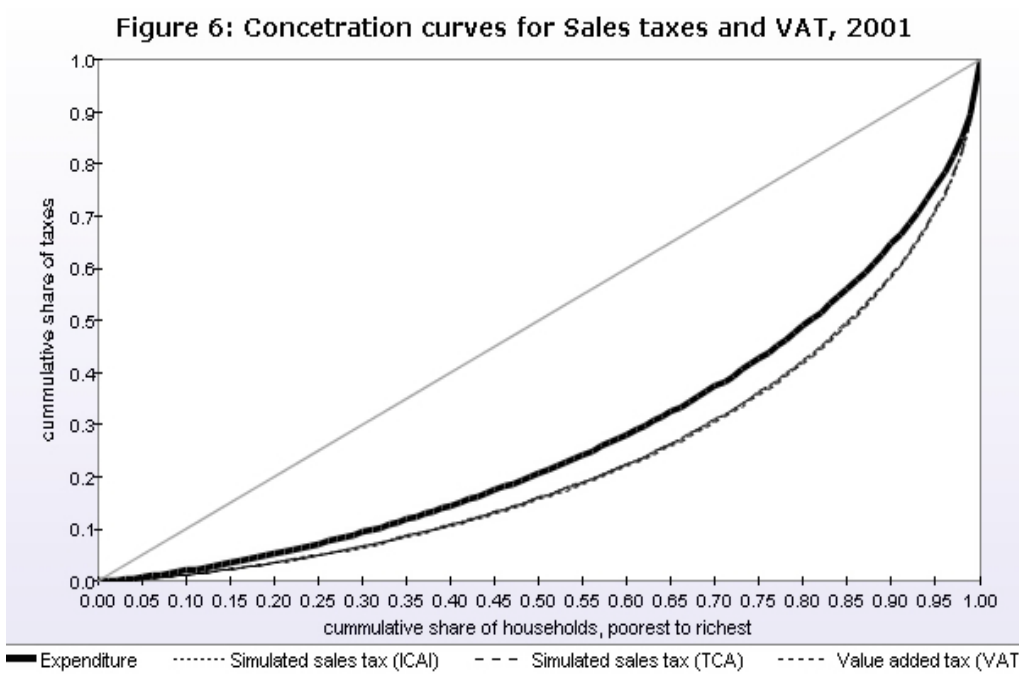
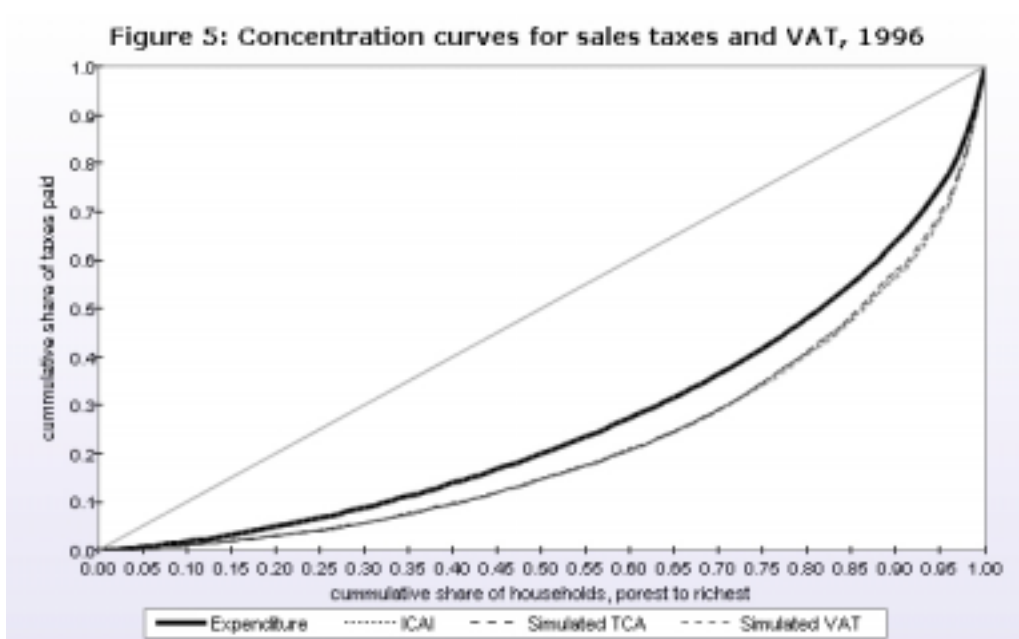


Figure 7: Concentration curves for Alcohol and Cigarette Excises, 1983

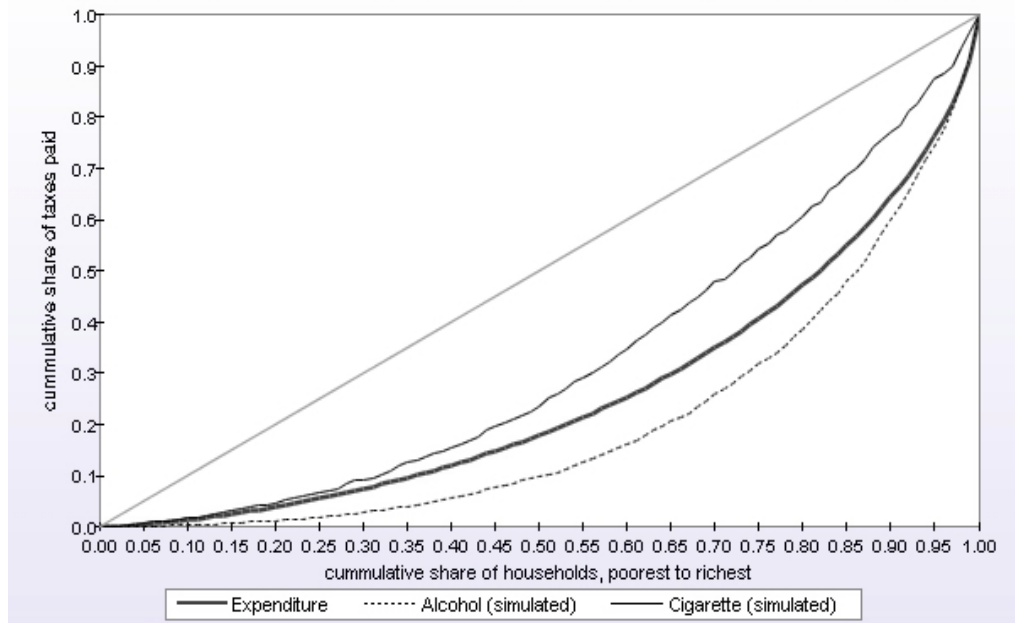


Figure 8: Concentration curves for Alcohol and Cigarette Excises, 1996

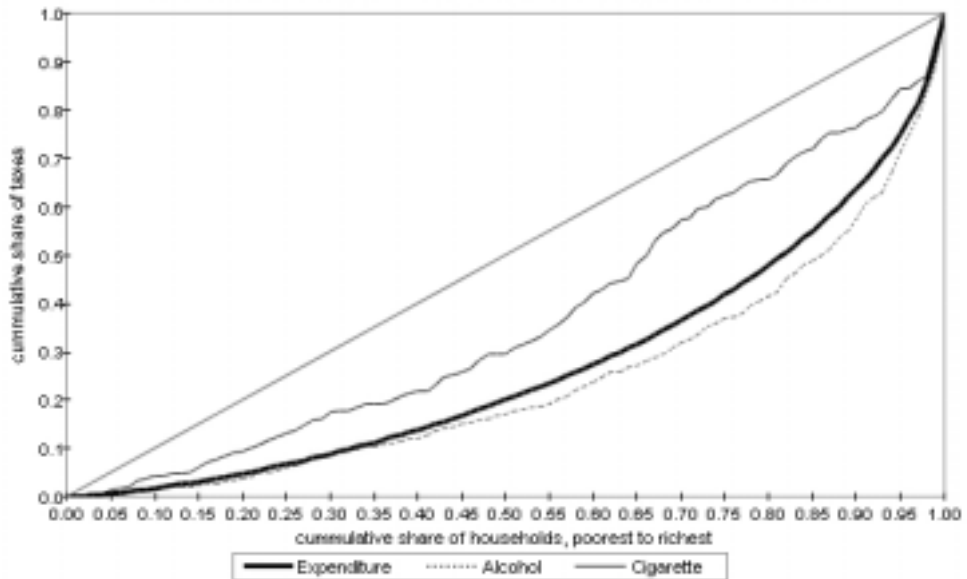
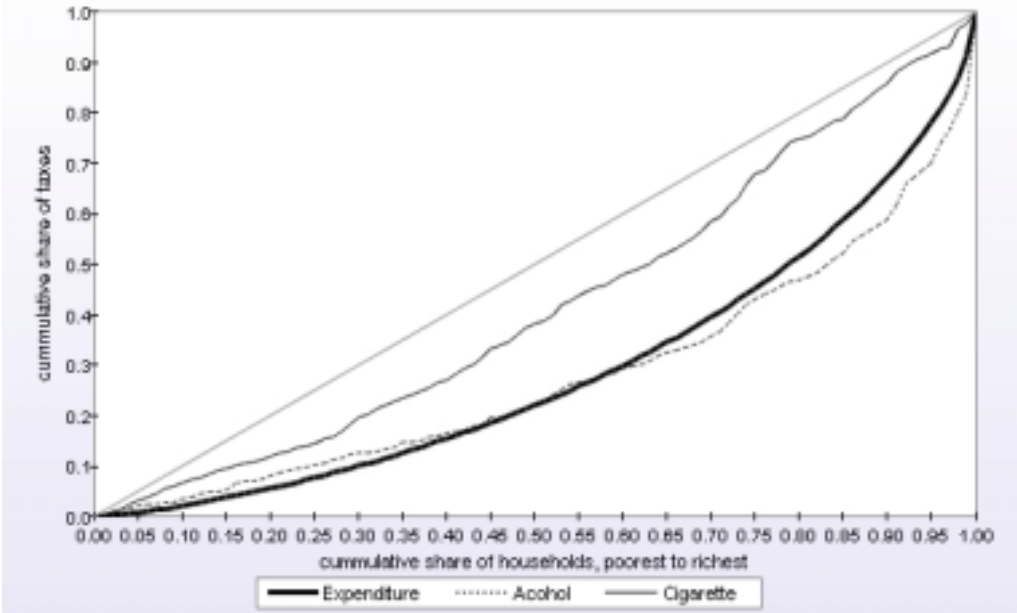


Figure9: Concentration curves for Alcohol and Cigarette Excises, 2001



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