ESTIMATING TAX INCIDENCE IN GHANA:

AN EXERCISE USING HOUSEHOLD DATA

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ABBREVIATIONS

ERP   Economic Recovery Program

GDP   Gross Domestic Product

GNP   Gross National Product

GLSS   Ghana Living Standards Survey

VAT   value added tax

1. INTRODUCTION

One of the most common criticisms of structural adjustment policies in Africa is that the burden of fiscal contraction falls disproportionately on the poor (Summers and Pritchett 1993). Most authors have concentrated on the potentially harmful effects of reducing government spending in order to balance budgets,[1] but it is also true that some of the most committed adjusters — Ghana, Uganda, and Tanzania, for example — have addressed their fiscal deficits by increasing tax revenues rather than reducing expenditures. While these increases are often appropriate in a macroeconomic context, policy makers should be as concerned about the incidence of these new taxes as they are about the incidence of expenditure cuts.

This paper is a first cut at addressing that issue. I use household income and expenditure data from the Ghana Living Standards Survey (GLSS) to examine the question, "Who pays the taxes?" in Ghana. The exercise is admittedly incomplete, but the information it provides should be useful to policymakers and also should help direct future research efforts on the same theme.

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[1]   Sahn (1990) shows that this concern is often unfounded. Overall government expenditures and expenditures on health and education have risen as often as they have fallen in adjusting African economies. In addition, it is not generally true that government expenditures are progressive in Africa; the benefits often go more to the wealthy than to the poor.

2. FISCAL POLICY AND ECONOMIC RECOVERY IN GHANA

Ghana is now widely recognized as one of the more interesting and successful cases of adjustment in Africa. Ghana has followed the standard prescription to reduce fiscal deficits with unusual vigor, yet it accomplished this at the same time that expenditures actually rose. As one can see in Figure 1,[2] all of the reduction in the fiscal deficit is due to the rapid increase in tax revenues during the adjustment program.[3] Table 1 shows that this revenue recovery was broad-based: domestic direct taxes, indirect taxes, and other revenues (mostly grants) have all increased beyond the levels of the late 1970s, while trade taxes have recovered to roughly the same levels. Within these broad groupings, trade taxes have clearly shifted toward import duties[4] and away from taxes on cocoa exports. This partly reflects conscious policy decisions to promote cocoa exports, but the most dramatic declines in cocoa duties have come since 1990, when international cocoa prices plummeted and the government protected local farmers by absorbing some of this shock through reduced duties rather than lower producer prices.

Among domestic indirect taxes, excise duties (on alcoholic beverages, tobacco, and soft drinks) recovered quickly after the ERP began but have since declined relative to GDP, while revenues from the sales tax and petroleum tax increased more gradually. The latter tax has become particularly important (and controversial) in recent years: the authorities have found it to be a convenient "tax handle" and have raised duties substantially. For the 1993 budget, petroleum taxes are projected to total one-third of all tax revenue, more than 4 percent of GDP (Botchwey 1993). This dramatic increase has fostered a debate over the equity of this tax, an issue that I will address in this paper.

Finally, the increase in domestic direct tax revenues has come almost entirely through the company tax (corporate income tax). It is difficult to say much about the incidence of this tax, because the GLSS data are for households, and the links between households and corporate ownership are not clear. Nevertheless, one would suspect that the corporate income tax falls mainly on the wealthy.

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[2]   The data in Figure 1 do not include spending that is financed by international project aid flows. Including that spending yields a deficit of between 2 and 3 percent of GDP in recent years (see Younger 1992).

[3]   The Economic Recovery Program (ERP) began in 1983, and the government continues to work closely with the World Bank and International Monetary Fund, under the rubric of several adjustment credits.

[4]   These figures include both tariffs and sales taxes on imported goods.

Figure 1 — Government Revenue and Expenditures as a Proportion of GDP
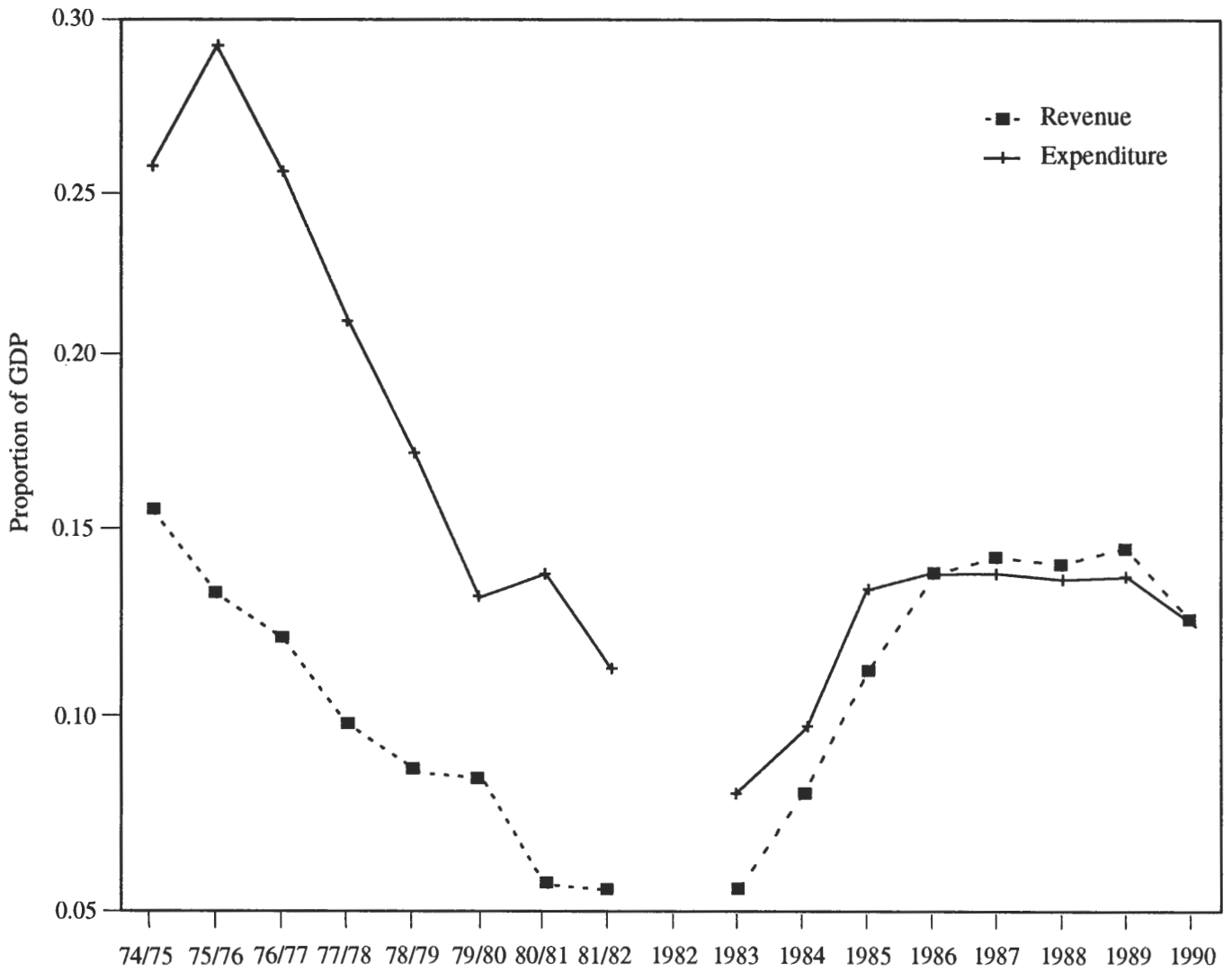
*Ghana switched to calendar year fiscal accounts in 1983. GDP data for the find six months of 1982 are not available, so that observation is omitted.

Table 1 —Central Government Revenues by Source, 1977/78–1990 (Proportions of GDP)

	1977/78	1978/79	1979/80	1980/81	1981/82	1982*	1983	1984	1985	1986	1987	1988	1989	1990
Taxes on international transactions	0.050	0.055	0.043	0.013	0.012		0.027	0.030	0.046	0.053	0.060	0.047	0.056	0.044
Import duties	0.015	0.011	0.011	0.008	0.008		0.008	0.009	0.014	0.019	0.017	0.016	0.023	0.018
Sales tax on imported goods	0.000	0.000	0.000	0.000	0.001		0.002	0.003	0.005	0.006	0.006	0.007	0.011	0.013
Purchase tax	0.001	0.001	0.000	0.000	0.000		0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Export duty on cocoa	0.032	0.039	0.032	0.000	0.000		0.015	0.017	0.026	0.027	0.036	0.023	0.022	0.013
Other export duties	0.000	0.000	0.000	0.000	0.000		0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
Other taxes on foreign transactions	0.001	0.001	0.000	0.004	0.002		0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Taxes on domestic goods and services	0.021	0.013	0.020	0.025	0.024		0.010	0.021	0.024	0.039	0.036	0.035	0.037	0.036
Cocoa local duty	0.001	0.000	0.004	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Excise duties	0.016	0.010	0.013	0.019	0.019		0.008	0.019	0.019	0.020	0.017	0.014	0.013	0.011
Sales tax on local products	0.003	0.003	0.002	0.003	0.002		0.001	0.002	0.003	0.005	0.011	0.012	0.013	0.011
Other	0.001	0.001	0.001	0.003	0.002		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Petroleum tax	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.002	0.013	0.007	0.008	0.011	0.012
Taxes on income and property	0.020	0.014	0.018	0.015	0.017		0.009	0.015	0.022	0.029	0.031	0.038	0.033	0.025
Employees	0.011	0.008	0.007	0.006	0.005		0.003	0.003	0.005	0.006	0.006	0.006	0.005	0.005
Self-employed income tax	0.000	0.000	0.002	0.001	0.004		0.002	0.003	0.003	0.003	0.005	0.005	0.004	0.003
Company tax	0.009	0.006	0.007	0.007	0.008		0.004	0.008	0.013	0.019	0.019	0.026	0.023	0.016
Interest and dividend tax	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rent income tax	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Others	0.000	0.000	0.001	0.001	0.000		0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.001
Nontax revenue	0.010	0.008	0.006	0.005	0.004		0.010	0.014	0.020	0.016	0.013	0.016	0.010	0.012
Grants	0.000	0.000	0.000	0.001	0.001		0.000	0.003	0.005	0.008	0.008	0.011	0.015	0.014

Source: Republic of Ghana (1992).

* Ghana switched to calendar year fiscal accounts in 1983. GDP data for the final six months of 1982 are not available, so that observation is omitted.

3. INCIDENCE OF SPECIFIC TAXES IN GHANA

METHODOLOGY

Economists have long recognized the difference between the statutory incidence of a tax and its economic incidence. Those the law requires to pay a tax are not necessarily those that suffer the decline in purchasing power associated with the transfer of resources to the government. Rather, households whose demand and supply for products and factors of production are relatively elastic will generally shift the burden of the tax onto those whose demand and supply are inelastic, regardless of who actually must pay the tax. Because economists are interested in the actual welfare changes that result from taxes, we would ideally like to identify the economic rather than statutory incidence of a tax. In practice, however, that is a difficult task, requiring the use of general equilibrium models of the entire economy.[5] Not only is there no such model for Ghana, even the basic building blocks of such a model — a social accounting matrix and estimates of elasticities — are lacking. Given these limitations, this paper estimates statutory rather than economic tax incidence in an analysis that is comparable to Pechman (1985) for tax policy in the United States, or Selowsky (1979) and Meerman (1979), who analyze the incidence of government expenditures in a similar fashion. As Pechman points out, the correlation between statutory and economic incidence is high when households' excess demand functions are inelastic, so one way to interpret these results is that they are conditional on the assumption that elasticities are zero.[6]

For consumption-based sales and excise taxes, I have calculated the amount that each household in the GLSS paid in taxes based on its consumption of the taxed commodities and the 1988 tax rates.[7] For direct taxes — mostly taxes on different sources of income — I have used the associated income information and the 1988 income tax schedules.[8] To judge the progressivity of a particular tax

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[5]   Shoven and Whalley (1984) discuss the use of computable general equilibrium models for analyzing tax policy in the United States. I am not aware of any comparable work for an African economy, although such work might be possible in Cote d'Ivoire and/or Cameroon, the two countries with existing household survey data and CGEs.

[6]   See Pechman (1985) for a discussion of the realism of this assumption.

[7]   The GLSS includes no useful information on import duties, the other important indirect tax in Ghana.

[8]   Appendix I explains these calculations in detail.

or combinations of taxes, I order the households by expenditure[9] and then plot their cumulative expenditures and cumulative tax payments against the cumulative proportion of households — so-called Lorenz curves. If expenditures are equal across households, this curve is a straight line from the origin to (1,1). The more convex the curve, the greater the inequality of expenditures (or tax payments). If the Lorenz curve for a tax is more convex than that for expenditures, wealthier households are paying a disproportionately large share of the tax relative to their expenditures: the tax is progressive. Exactly the opposite is true if the Lorenz curve for the tax is less convex.[10] As a summary measure, I calculate a "progressivity coefficient" equal to the area between the two curves. Positive values indicate a progressive tax, and vice-versa for negative values. The measure is bounded by $-(1+g)$ and $(1-g)$ where g is the GINI coefficient for expenditures (equal to 0.355 in the case of the GLSS data).

COMPARISON OF GLSS TAX CALCULATIONS WITH ACTUAL TAX REVENUES

Before examining the household level results, it is useful to compare tax payments I estimated from the GLSS with the actual tax revenues reported by the government. Table 2 shows government revenues broken down by category, along with my estimates scaled up to national levels by multiplying them by the 1988 population of Ghana divided by the population in the GLSS. As one can see, the figures for sales-tax revenue and withholding from wages and salaries correspond closely between the two sources, while the others appear to diverge by a large amount. Understanding these differences is important for the discussions of tax incidence that follow. The fact that my self-employment taxes and "other" direct taxes appear larger than the actual tax revenues is probably just a function of misclassification. I have included household businesses' daily and annual tax in the self-employment category, but some of these taxes (especially the annual taxes and license fees) probably belong under either the company tax or the non-tax revenues. Similarly, I have compared households' reported tax payments from the expenditure survey with other direct taxes, on the grounds that most of these expenditures are probably for property taxes. But they could also entail payment of other taxes or fees. Altogether, my GLSS calculations for these categories account for only 30 percent of self-employment, company, and other direct taxes combined. This seems low, but is probably not unreasonable given that a household survey like the GLSS will not find a substantial amount of company tax. In addition, households in the GLSS appear to have substantially underreported their incomes (Alderman and Higgins 1992).

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[9]   Using expenditure rather than income as a measure of welfare is preferable because expenditure data are generally more accurate than income data (Alderman 1992). Expenditure is also more closely related to a household's wealth (or "permanent income") under standard economic theory.

[10]   Note that, unlike expenditures, the Lorenz curve for the tax is not bound to be quasi-convex because the households are ordered by expenditure for both curves.

Table 2 - Actual Government Revenue for 1988 Compared with Estimates from the GLSS

	Actual Revenue	Estimate from GLSS	Ratio
Taxes on international transactions[a]	41,926		
Import duties	17,010		
Purchase tax	321		
Export duty on cocoa	24,464	8,809	0.360
Other taxes on foreign transactions	131		
Taxes on domestic goods and services	44,164		
Petroleum tax	8,485	3,142	0.370
Excise duties	15,019	5,284	0.352
Sales tax[a]	20,209	18,356	0.908
Other	451		
Taxes on income and property	39,689		
Employees	6,016	5,696	0.947
Self-employed income tax	5,080	8,264	1.627
Company tax	27,648		
Interest and dividend tax	—		
Rent income tax	29		
Others	916	1,615	1.764
Nontax revenue	16,459		
Grants (mainly from abroad)	11,553		
Grand total	153,791		

Sources: Republic of Ghana (1992), GLSS, and author's calculations.

[a] For better comparison with my estimates, I have moved the sales taxes on imported goods from the taxes on international transactions to those on domestic goods and services.

The fact that estimated cocoa revenues are only 36 percent of actual revenues is probably due to farmers underreporting their sales. Average cocoa yields in Ghana are about 100 kilos per acre, while the average yield in the GLSS is only 35 kilos per acre, a shortfall almost exactly equal to the proportion of total cocoa revenues that the GLSS captures.[11] If underreporting increases with production (i.e., larger farmers report proportionally less of their true harvest), the tax calculations that follow will appear more regressive than is actually the case.

The GLSS data capture only 37 percent of the total revenues from the petroleum tax. The most likely explanation of this is that a large proportion of petroleum sales go to firms rather than to final consumers and thus do not show up in a household survey. Virtually all diesel fuel, for example, is consumed by industry (for transport and power generation) rather than by households. The same is probably true of a large proportion of gasoline sales. In the calculations that follow, I will attempt to account for these intermediate sales wherever possible.

The GLSS calculations for excises taxes are also well below actual revenues, a fact that cannot be accounted for by intermediate sales. Rather, it seems likely that households underreport consumption of these goods in the survey. It also seems likely that households with large expenditures on alcohol and tobacco will be more likely to underreport their true consumption. If, in addition, consumption of these items increases more than proportionally with income, wealthier households will have underreported their consumption by proportionally more than poorer ones, so the tax burden will appear more regressive than it actually is.

With these reservations on the quality of the GLSS data in mind, I now turn to my estimates of the progressivity of each of these taxes.

RESULTS ON TAX INCIDENCE

Direct Taxes

Consider first the direct taxes (Figures 2-7). Income taxes are withheld from the wages and salaries of employees in the formal sector. The vast majority of these employees work either in the civil service or public enterprises, although a few large private enterprises also withhold income tax. The tax is progressive, which is consistent with the findings of Alderman, Canagarajah, and Younger (1993) that public-sector employees' households are still somewhat better

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[11] I have explored a variety of other possibilities for the low levels of cocoa production in the GLSS, including underreporting due to sharecropping, production from corporations (including the Cocoa Marketing Board), rather than households, and an underrepresentation of cocoa farmers in the GLSS sample framework. None of these factors provides a satisfactory explanation of the low production figures.

Figure 2 — Lorenz Curve for Income Taxes Collected Through Wage/Salary Withholding
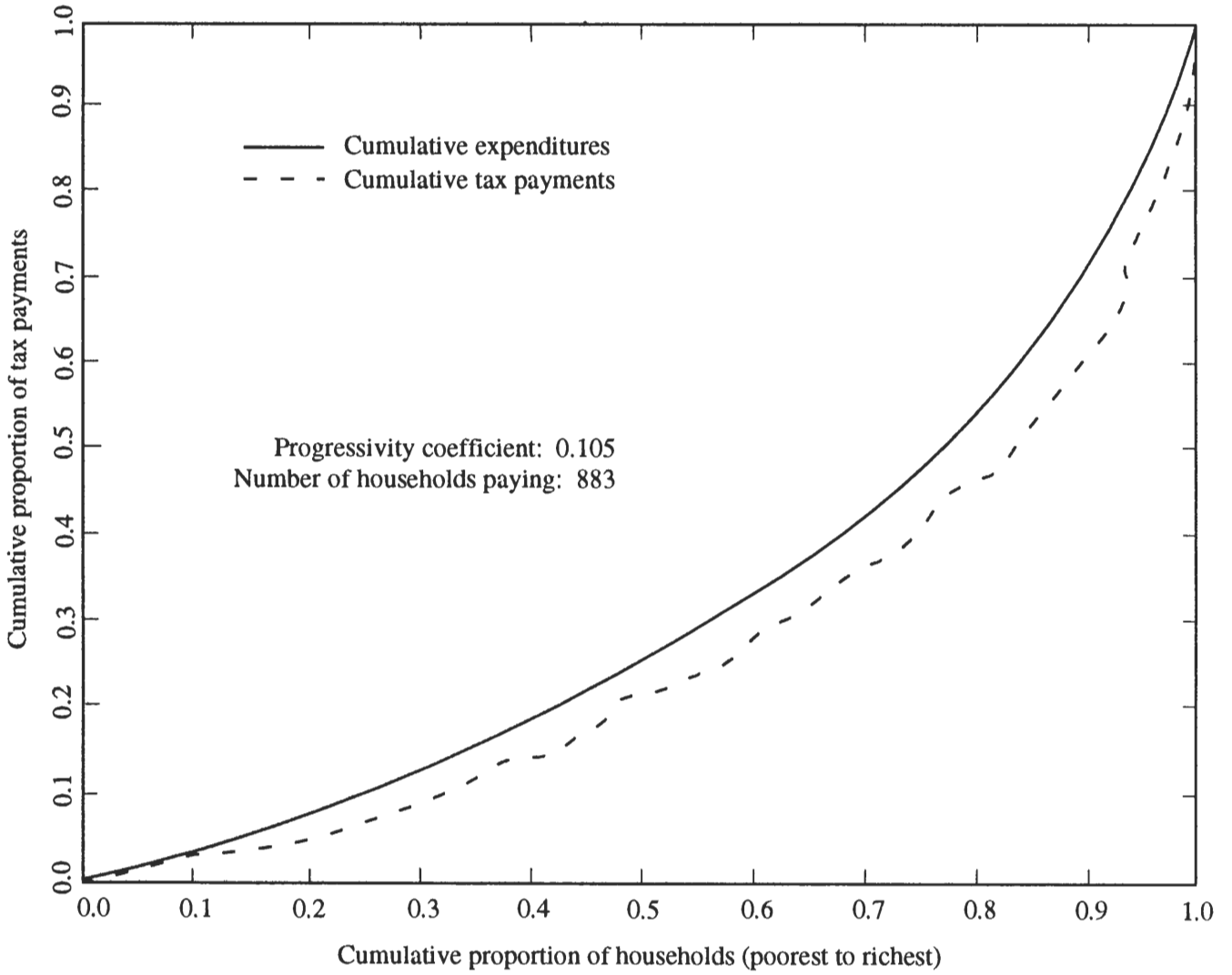
Figure 3 — Lorenz Curve for Presumptive Daily Income Levels

Progressivity coefficient: 0.044
Number of households paying: 700
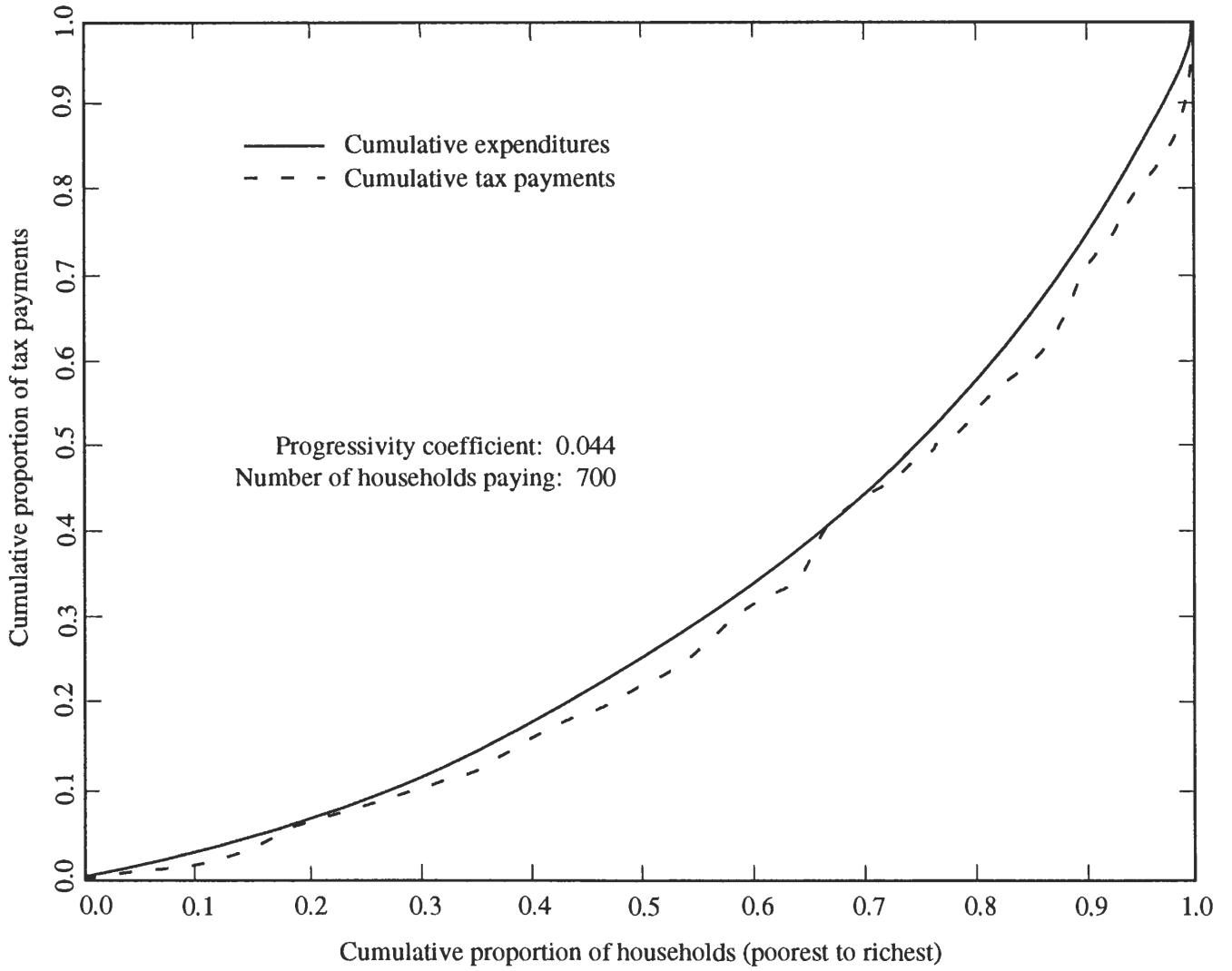
Figure 4 — Lorenz Curve for Annual Income Taxes

Progressivity coefficient: 0.215
Number of households paying: 352

Cumulative expenditures
Cumulative tax payments

Cumulative proportion of tax payments

Cumulative proportion of households (poorest to richest)

Figure 5 — Lorenz Curve for Taxes Paid on Dividend Incomes

Figure 6 — Lorenz Curve for Reported Expenditures on Taxes, Fees, and Licenses
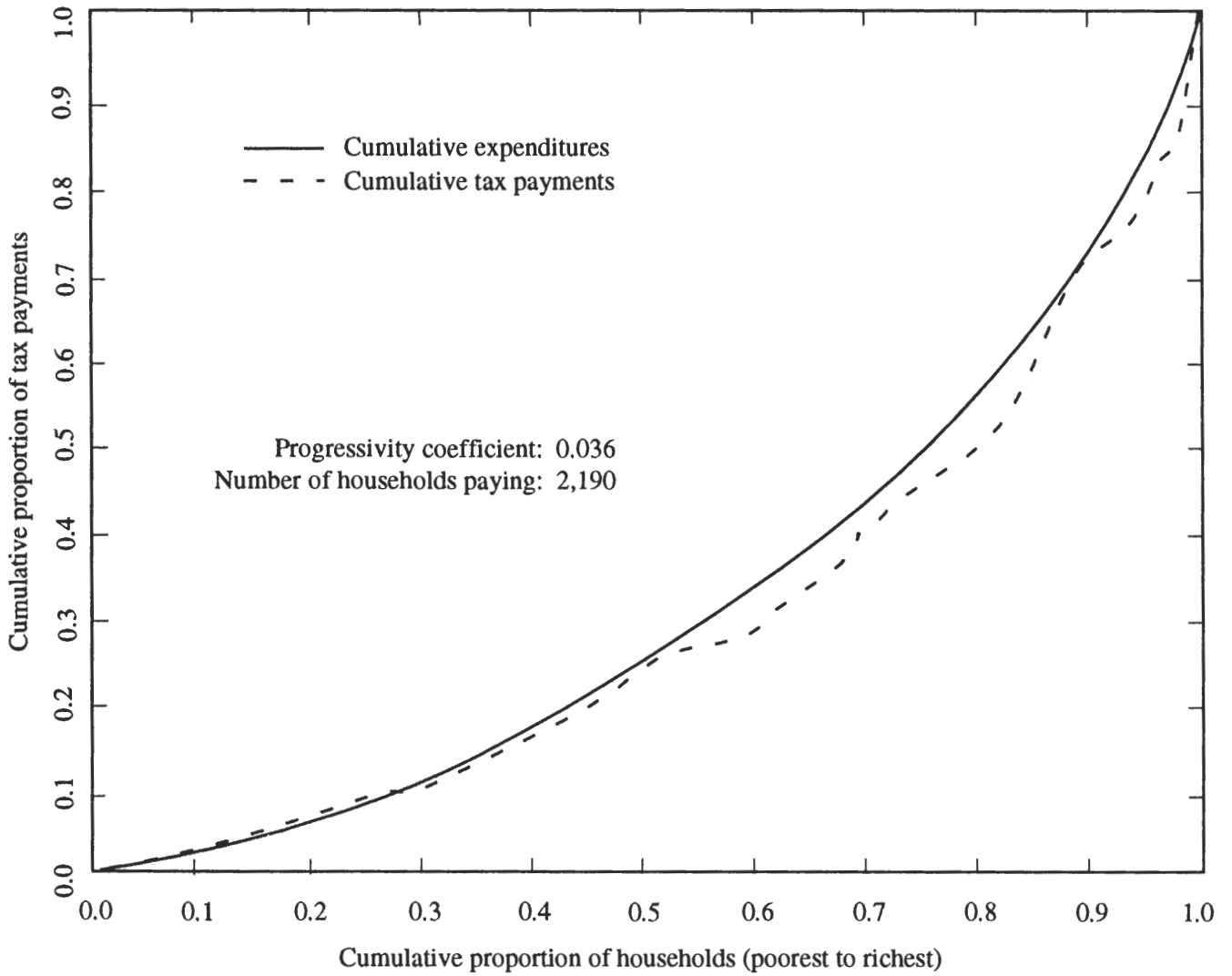
Figure 7 — Lorenz Curve for All Direct Taxes Combined
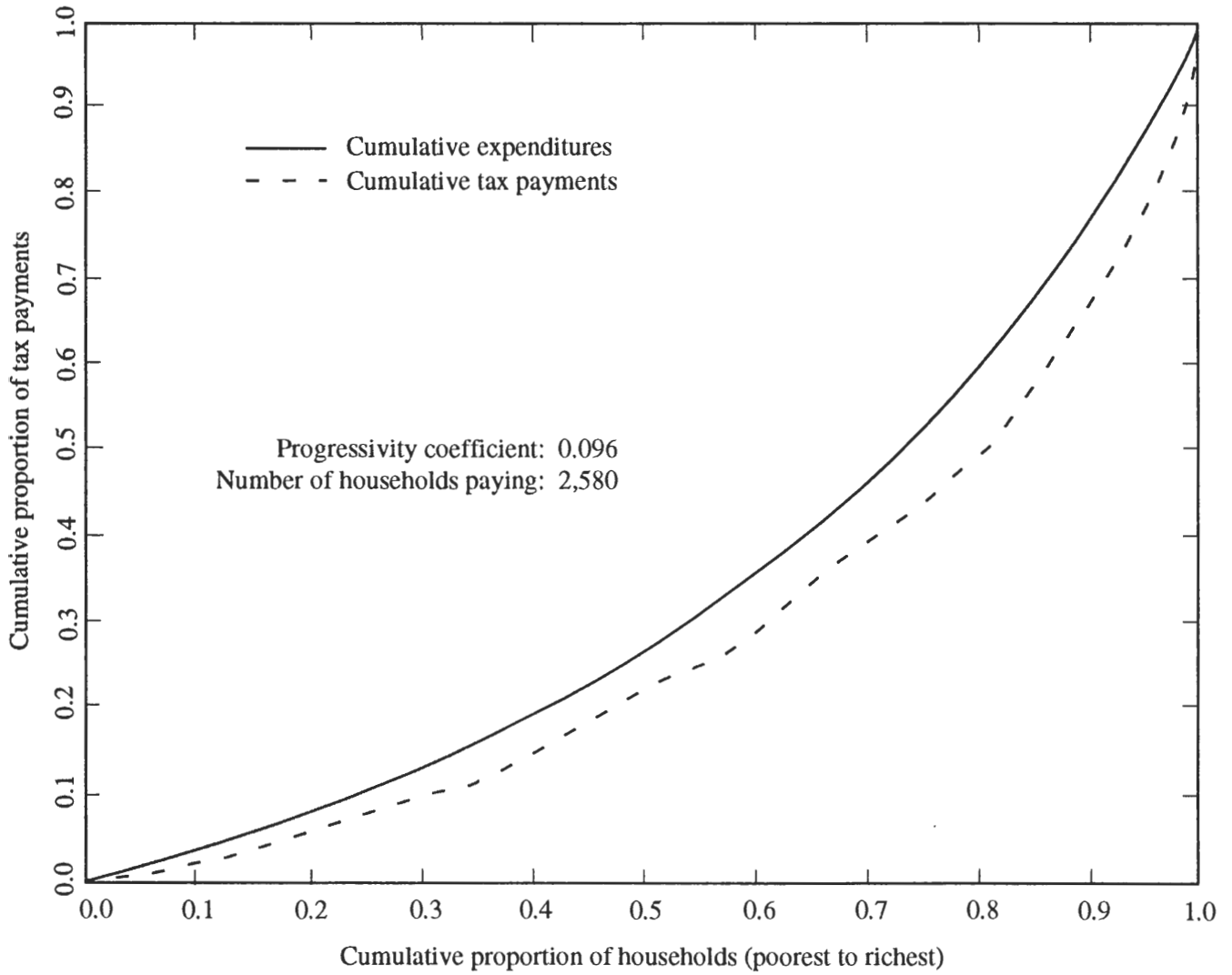
off than the population in general, despite the much-publicized decline in public-sector salaries during the early 1980s.

"Daily taxes" are collected mostly from small-scale, self-employed businesses as presumptive income taxes. Seven hundred households, 23 percent of the sample, paid this type of tax during the year, reflecting the large number of households engaged in self-employed activities and the widespread use of this tax. As one can see in Figure 3, the tax is slightly progressive, but essentially proportional at the lower end of the expenditure distribution.

"Annual taxes and licenses" are income taxes and license fees. The income taxes most likely pertain to larger family-owned enterprises that file an annual income-tax return. These firms may or may not be incorporated. The licenses could cover a wide range of government fees, some of which may not be related to income-earning activities (e.g., automobile licenses), but are still included in the household enterprises' costs. Fewer households pay these taxes and fees, and their impact is very progressive (Figure 4).

Only 27 households report earning dividends, which is not surprising given that most Ghanaian businesses are family-owned or heavily leveraged. But it is true that these 27 households are in the highest expenditure deciles, so that the tax, while unimportant, is highly progressive (Figure 5).

The last direct tax on which the GLSS provides information comes from responses to the question, "Have the members of your household spent money on taxes in the past 12 months?," asked in the expenditures section of the survey. It seems likely that these reported payments are for explicit tax payments, such as property taxes or income taxes paid in an annual tax return, rather than the taxes that are hidden in the price of purchased goods or withheld salaries. Neverth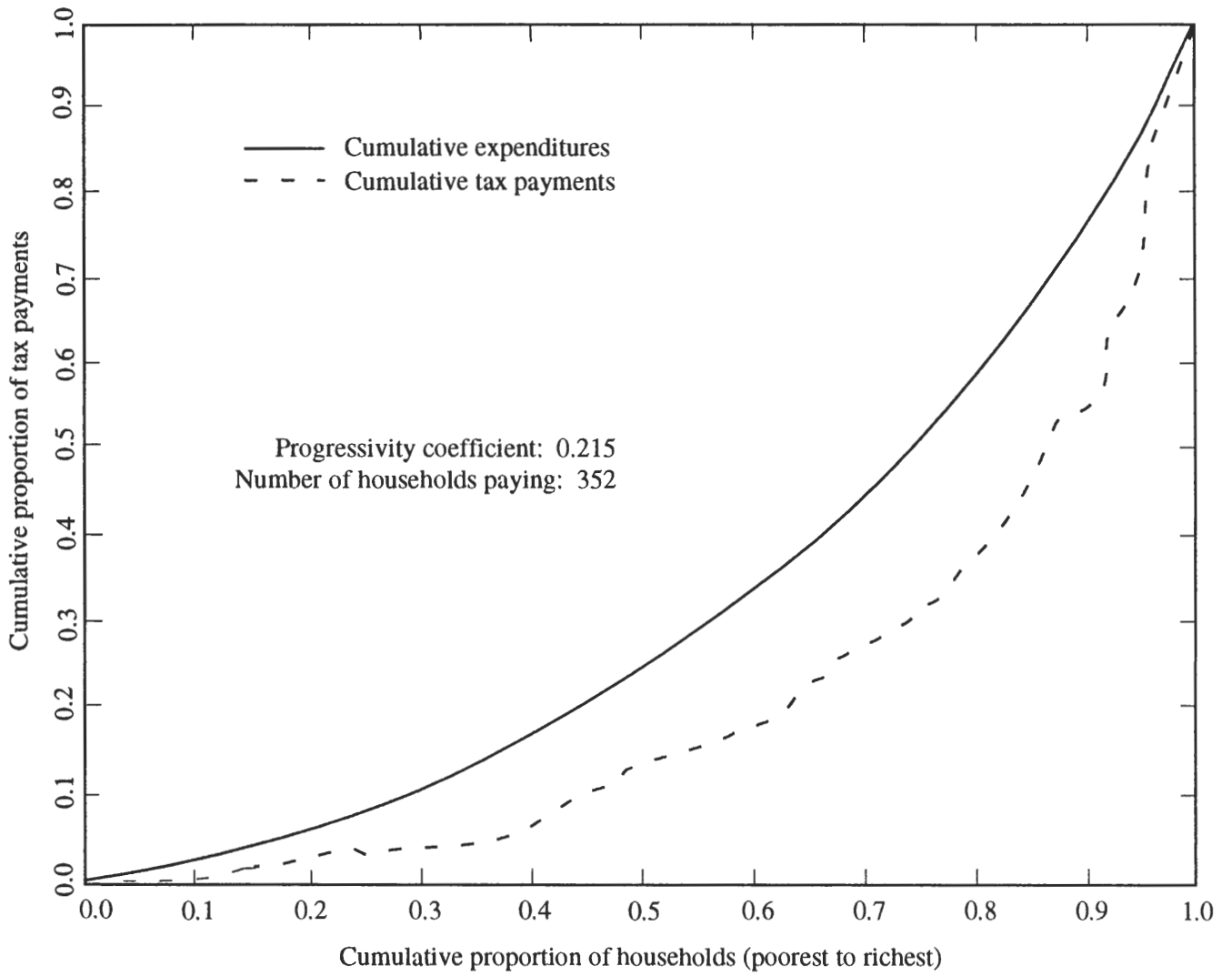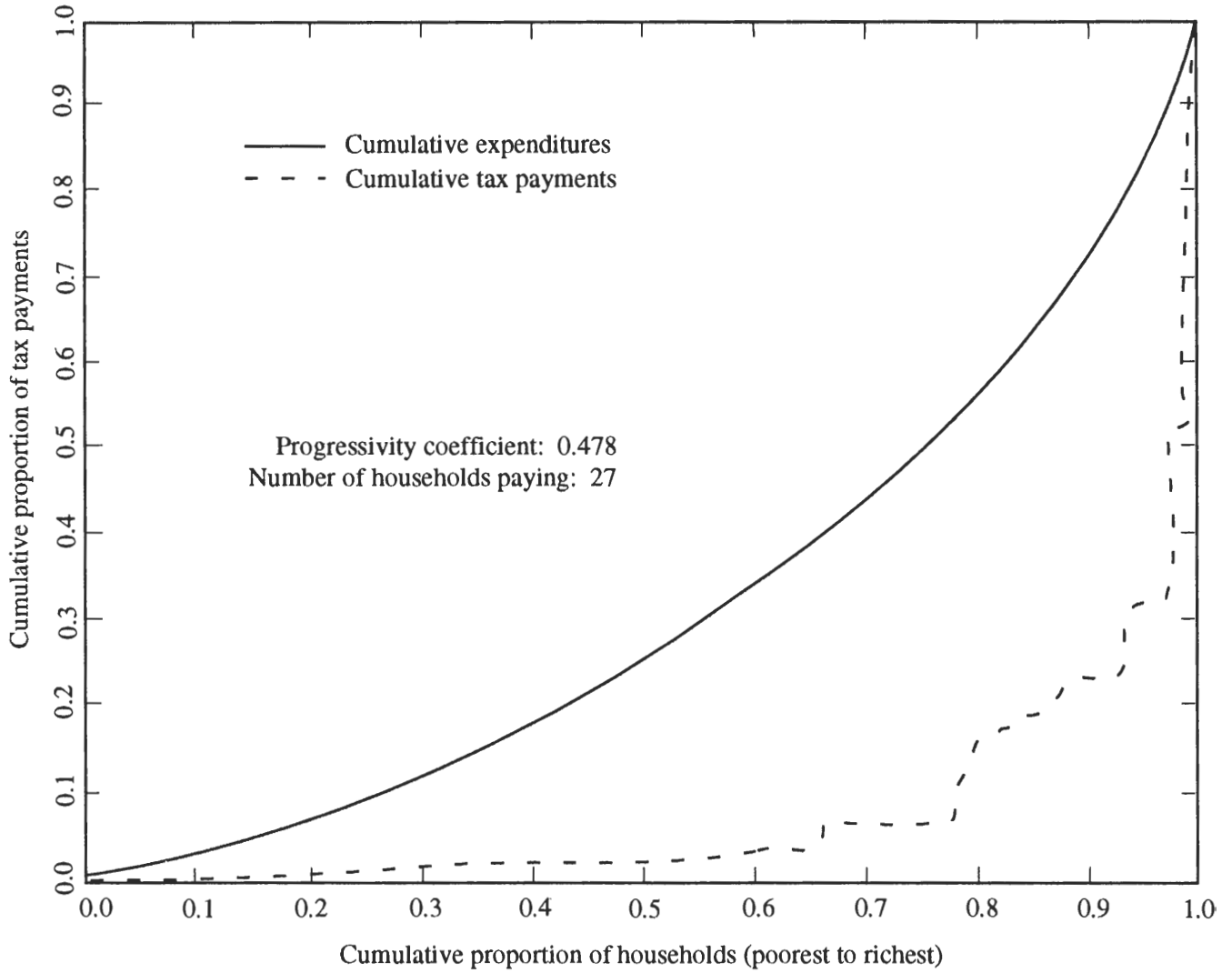eless, this category could double-count taxes reported elsewhere in the survey. It also seems likely that households overreported these payments, especially those households whose true tax payments are zero: many people would be reluctant to tell an unknown, official-looking interviewer that they did not pay any taxes. If the tendency to exaggerate actual tax payments is higher at the low end of the expenditure distribution, this tax will appear more regressive than it actually is. In any event, the tax as reported is slightly progressive, but most of the progressivity comes in the upper half of the expenditure distribution (Figure 6).

Finally, combining all forms of direct taxation reported in the survey,[12] we find that income and property taxes are progressive as a group, as one would expect (Figure 7).

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[12]   This includes the taxes reported in the expenditures section of the survey, which may lead to some double-counting.

Domestic Indirect Taxes

The impact of the sales tax is essentially proportional (Figure 8). This is surprising in an economy where agriculture, which is not affected by the sales tax, accounts for about half of GDP. Nevertheless, Alderman and Higgins (1992) find income elasticities of the demand for food to be very high in Ghana, between 0.9 and 1.0 in all of their estimates. Thus, higher expenditure households include only a slightly smaller proportion of non-taxed food in their consumption than poor households do. Beyond this unusual feature of Ghanaians' expenditures, it is also true that the survey questionnaire often combines items that are likely to be taxed with those that probably are not, which would bias this estimate of progressivity toward zero. For example, wealthier households are probably more likely to buy prescription medicines (which are taxed), while poor households buy traditional medicines (which are not), yet both are included in one expenditure category. Nevertheless, the high income elasticities for food demand imply that a sales tax is unlikely to be very progressive in Ghana.

Figures 9 through 12 show the incidence of major non-petroleum excise taxes. The information on these taxes is perhaps the most suspect in this study. It appears that the consumption of alcoholic beverages and tobacco is underreported in the survey, probably in a way that makes the tax burden appear more regressive than it actually is. In addition, the survey information on alcohol consumption has the same problem of "category confusion" that the sales tax does: all alcohol is lumped together, whether it is beer (which is taxed) or akpteshie, a local gin that effectively avoids taxes because it is produced in the informal sector. These problems make the excise taxes on alcohol and tobacco appear less progressive than one might have thought, with the latter looking like a highly regressive tax.

In addition to direct expenditures on alcohol, alcohol accounts for a large percentage of the expenditures on weddings and funerals, and a proportion of expenditures reported for "meals taken outside the home" are probably for alcoholic beverages. To account for this, I have included 50 percent of the expenditures on weddings and funerals and 20 percent of expenditures for dining out with the direct expenditures on alcohol to produce a "combined" estimate of the excise tax on alcohol. This tax is essentially proportional (Figure 11).

The last important excise tax is on non-alcoholic beverages (soft drinks). Relatively few households report expenditures on this item and revenues are lower than those from beer and tobacco, but the tax is more progressive than the other excise taxes (Figure 12). Figure 13 shows that the sum of all excise taxes (alcohol, both direct and indirect; tobacco; and soft drinks) is regressive (subject to the caveat on underreporting of consumption of these items).

The petroleum tax is the most controversial tax in Ghana. It is essentially an excise tax whose importance has grown tremendously in the past few years. As one can see from Figures 14 through 18, calculating its incidence across the expenditure distribution is not straightforward. To begin, Figure 14 shows that the tax on gasoline and motor oil coming from households' direct consumption of these items is highly progressive, but only 49 households in the GLSS survey

Figure 8 — Lorenz Curve for the Sales Tax

Progressivity coefficient: -0.018
Number of households paying: 3,035
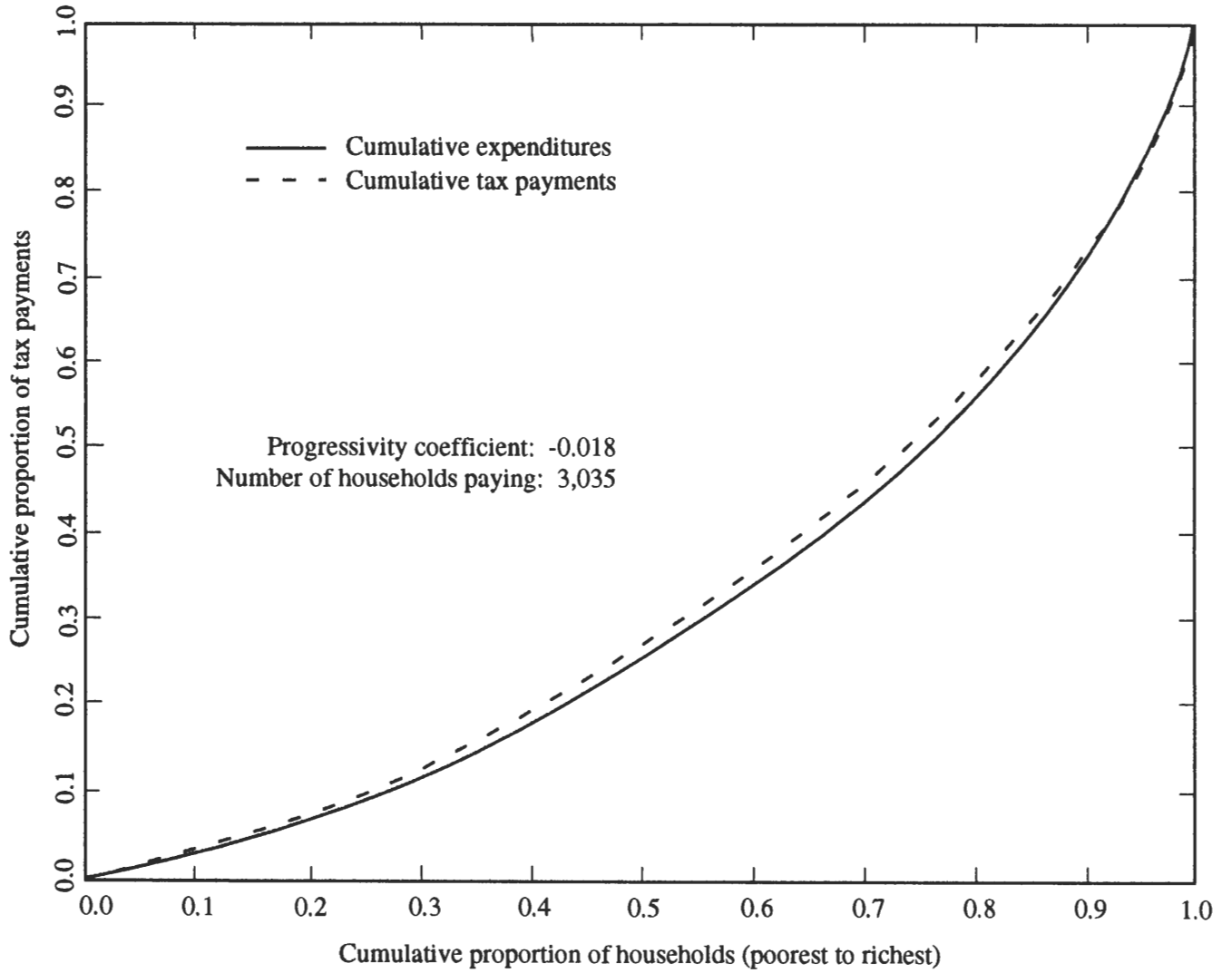
Figure 9 — Lorenz Curve for Taxes on Tobacco

Progressivity coefficient: -0.194
Number of households paying: 919
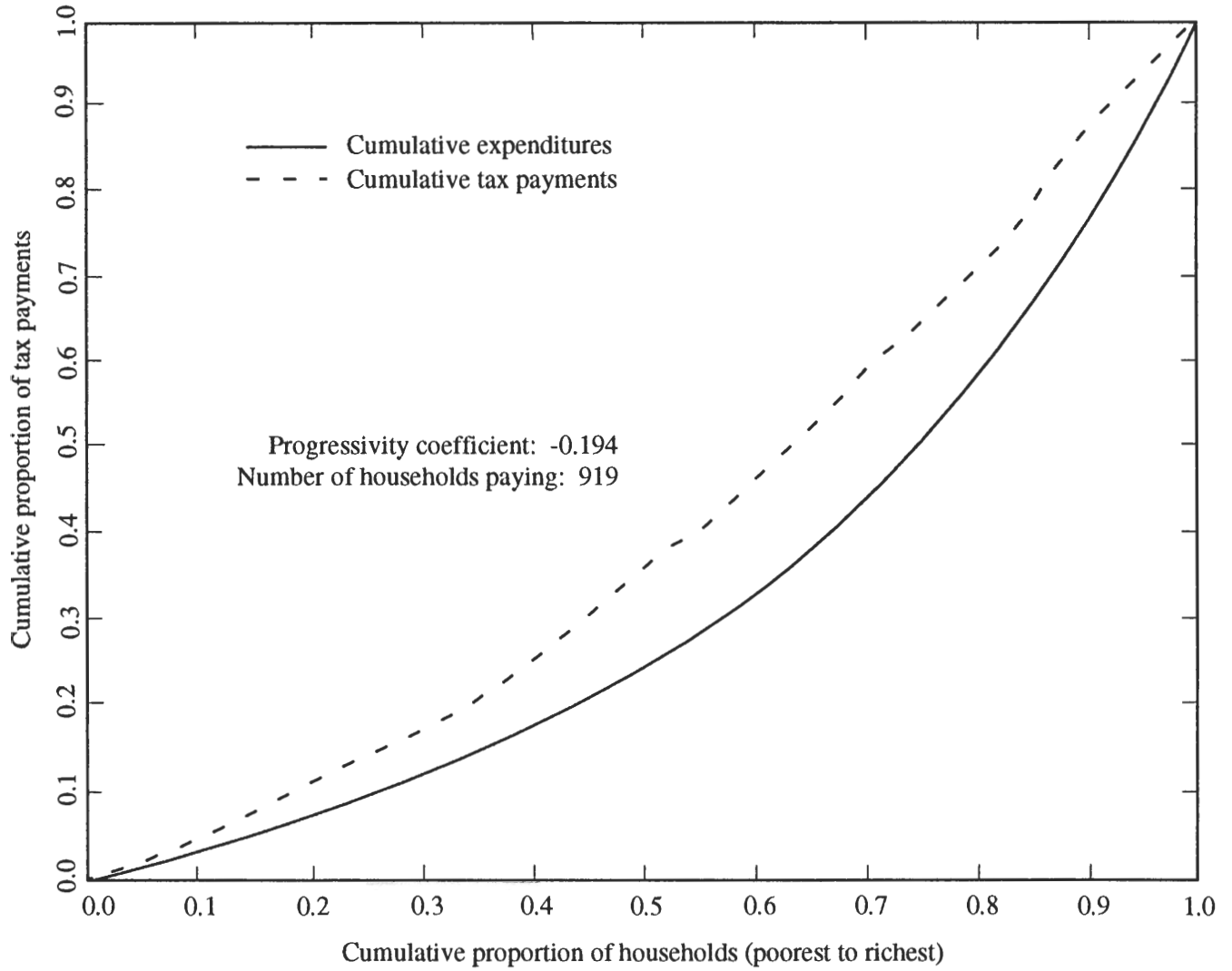
Figure 10 — Lorenz Curve for Taxes on Alcoholic Beverages

Cumulative expenditures
Cumulative tax payments

Progressivity coefficient: -0.035
Number of households paying: 1,205

Cumulative proportion of tax payments

Cumulative proportion of households (poorest to richest)
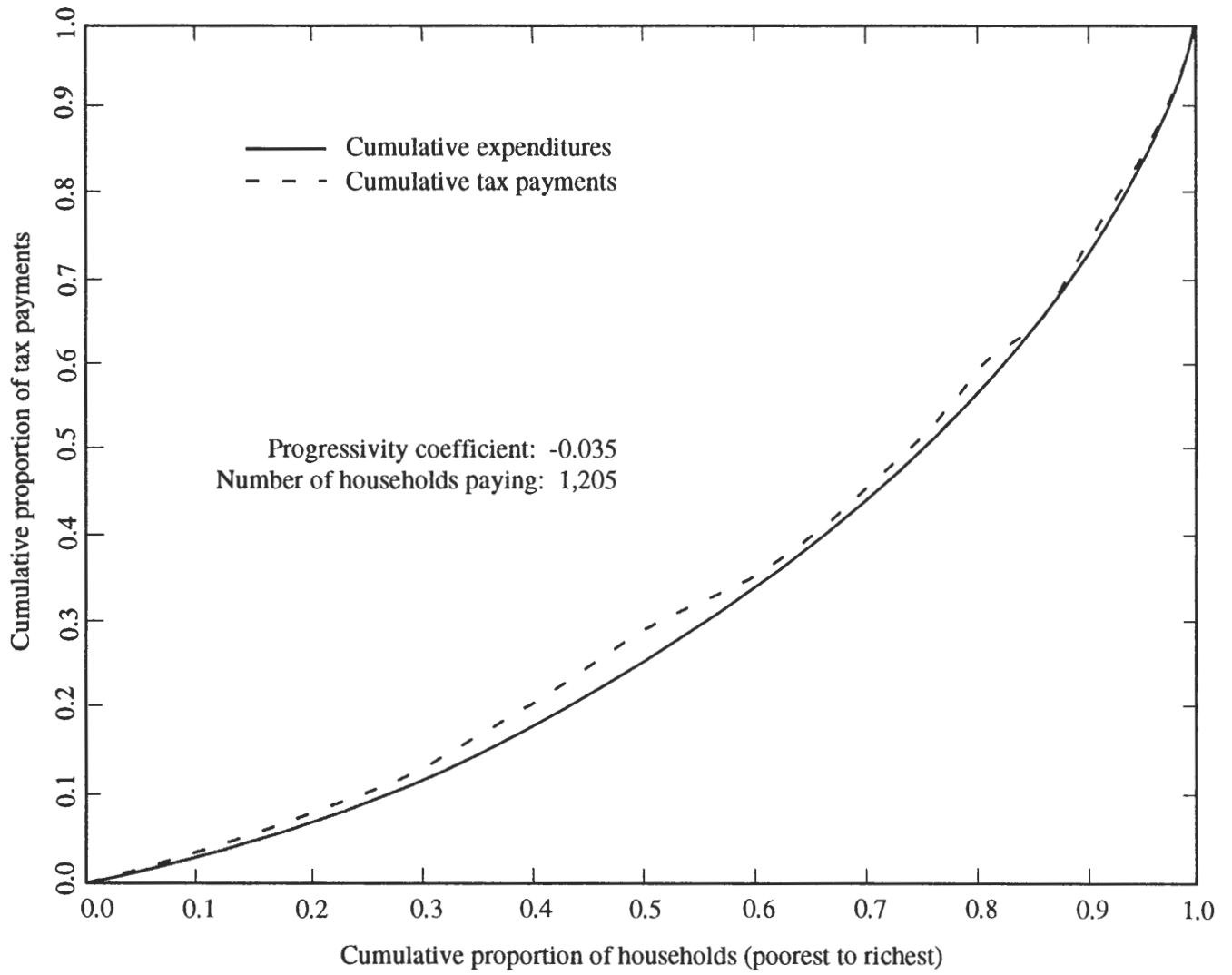
Figure 11 — Lorenz Curve for Taxes on Alcoholic Beverages, Direct and Through Weddings and Funerals
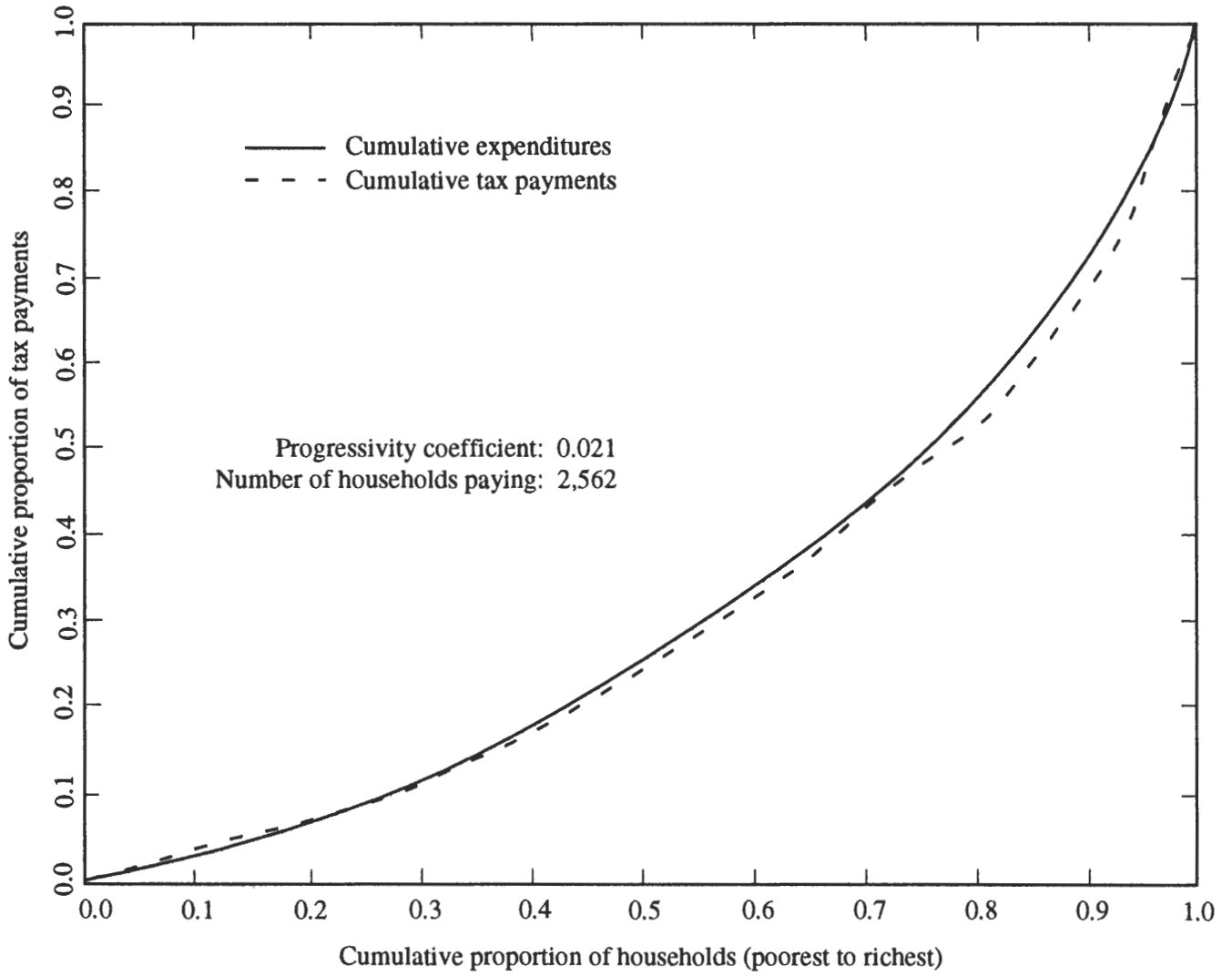
Figure 12 — Lorenz Curve for Taxes on Non-Alcoholic Beverages

Figure 13 — Lorenz Curve for All Non-Petroleum Excise Taxes Combined

Figure 14 — Lorenz Curve for Taxes on Gasoline

Figure 15 — Lorenz Curve for Taxes on Gasoline Through Transport Costs

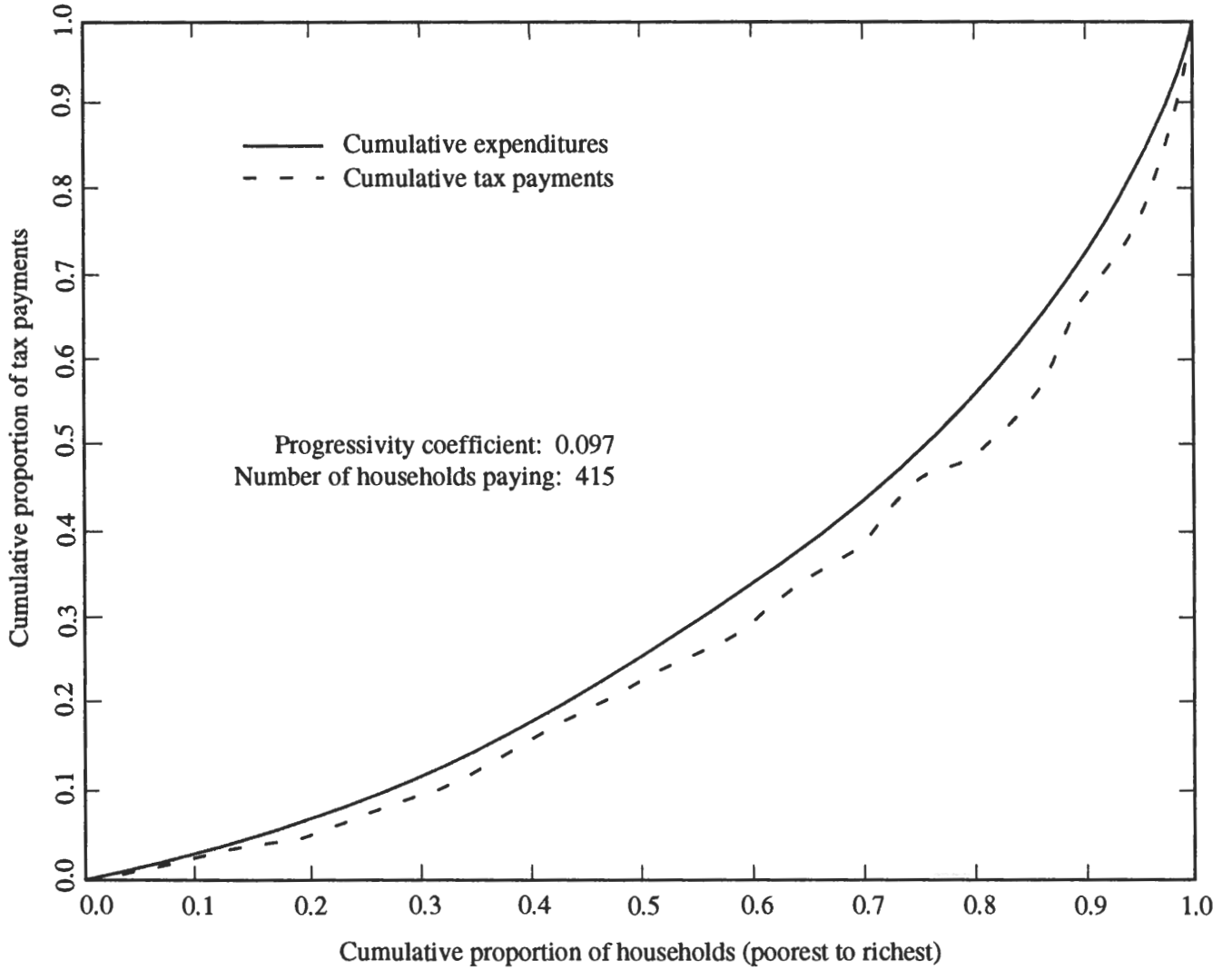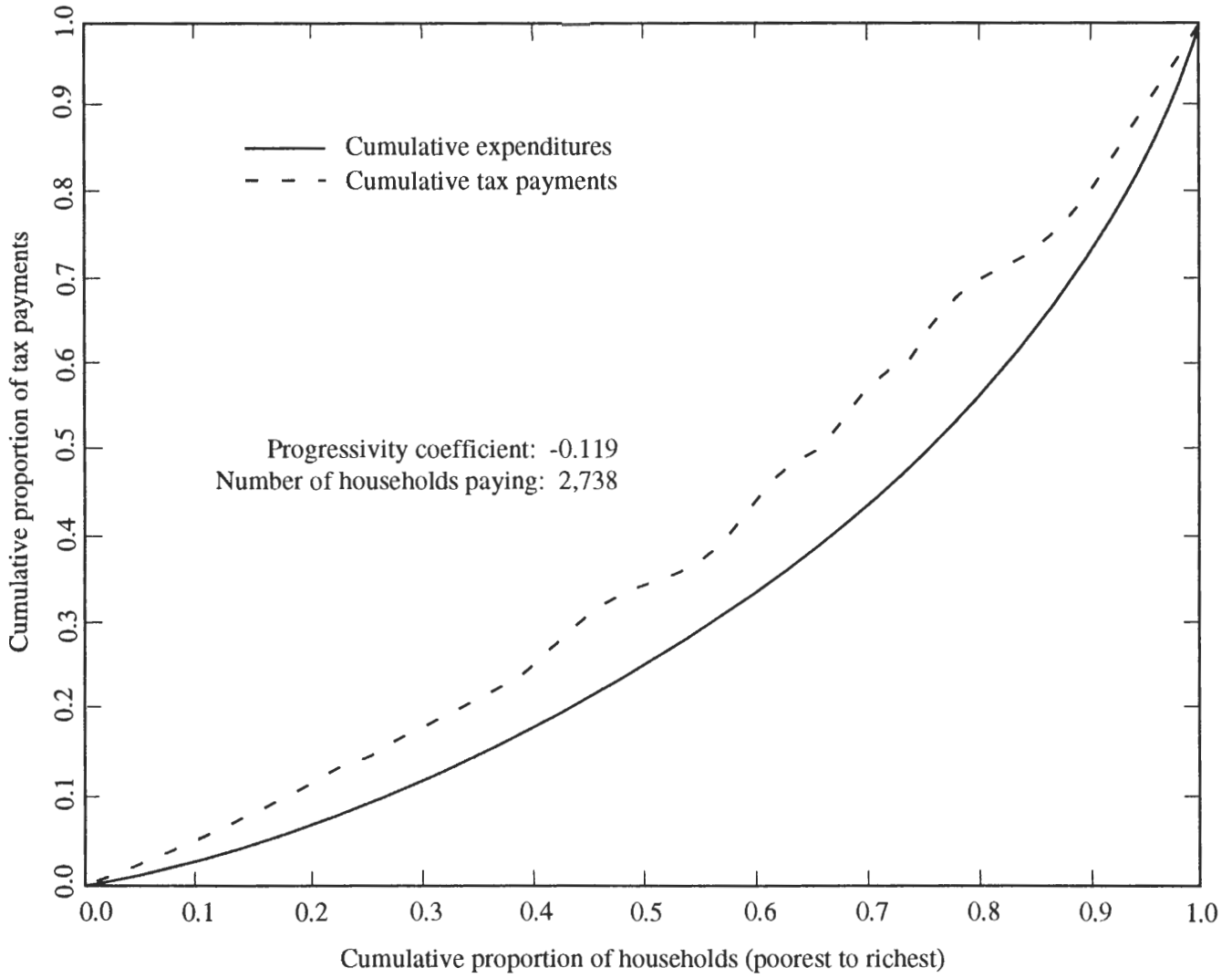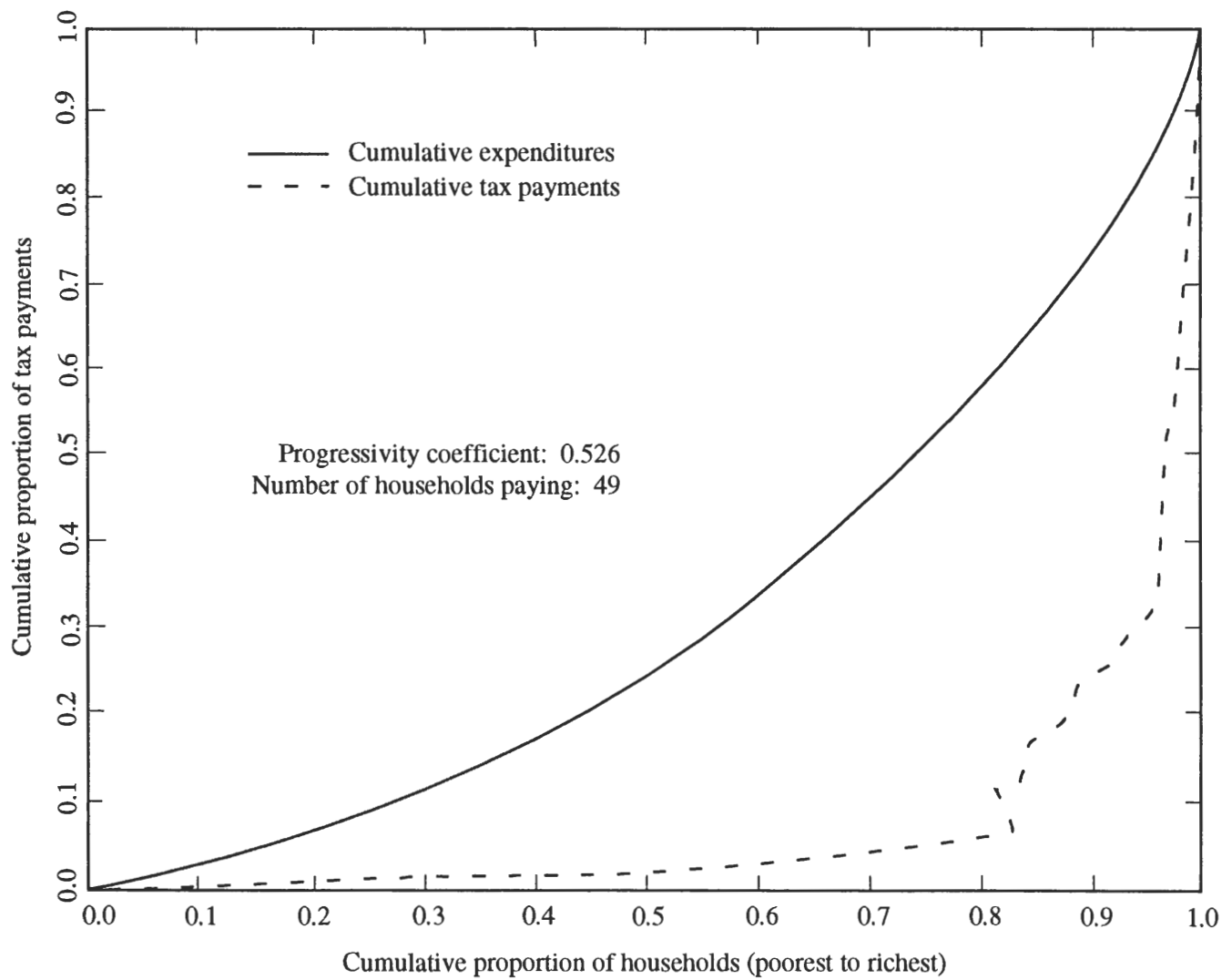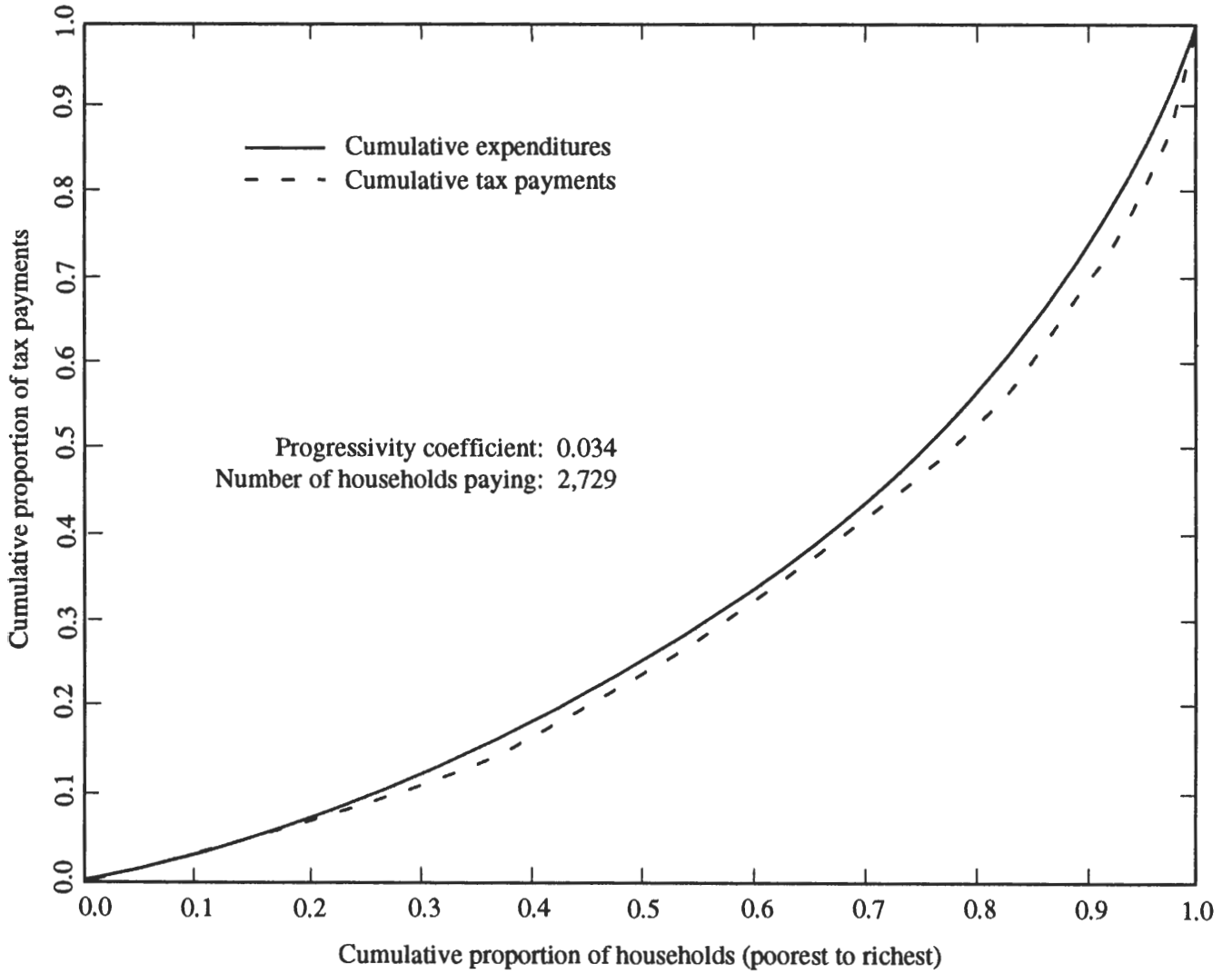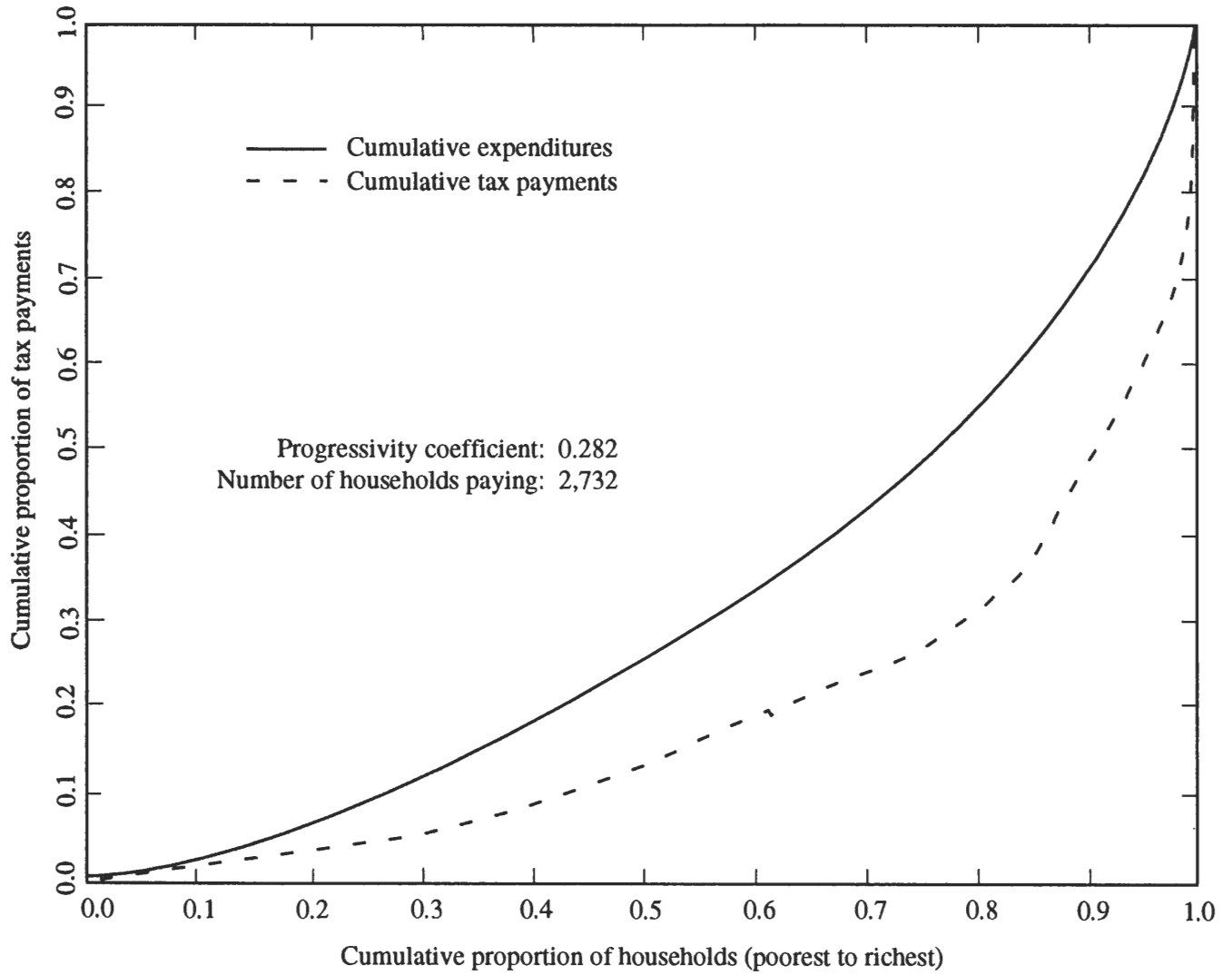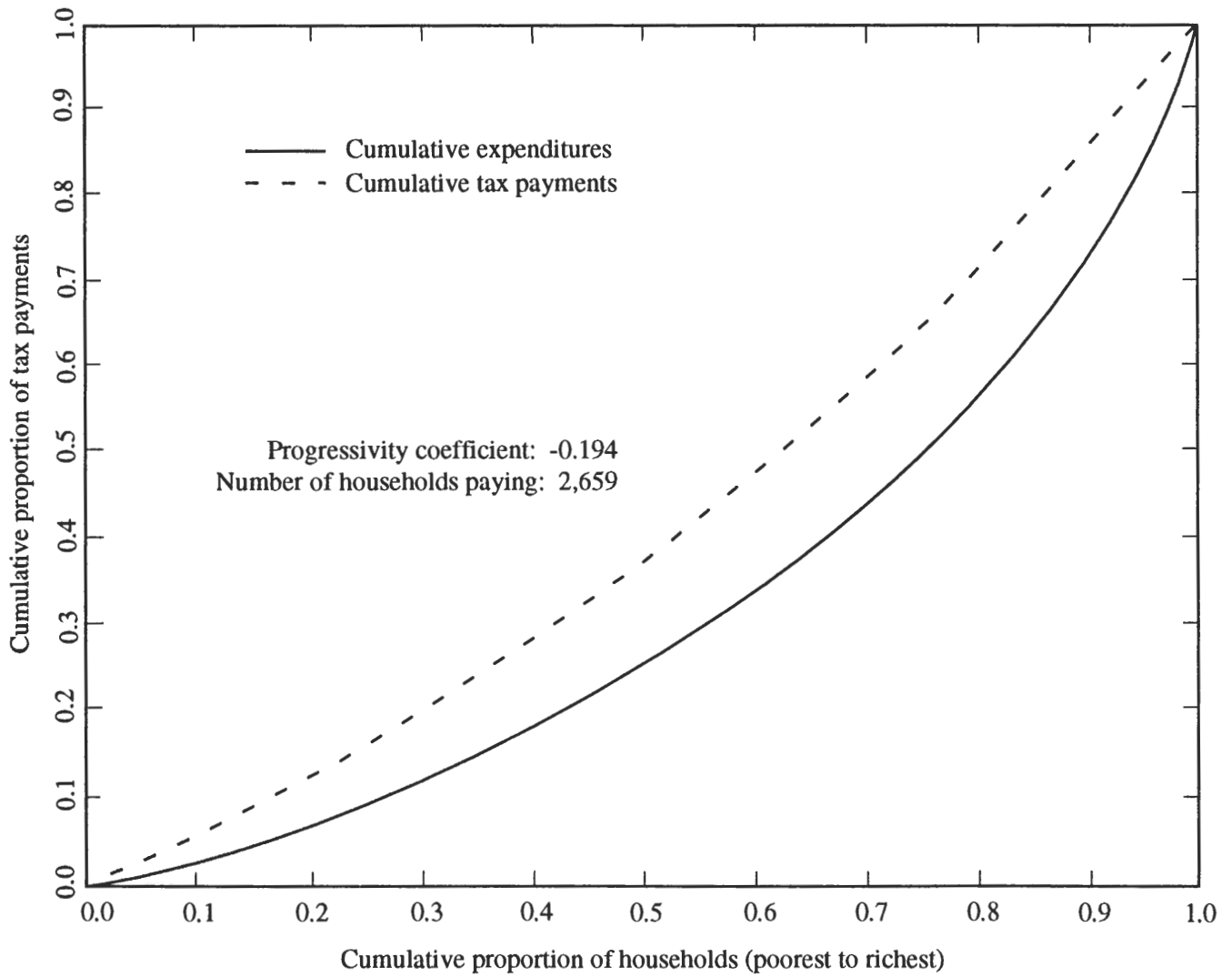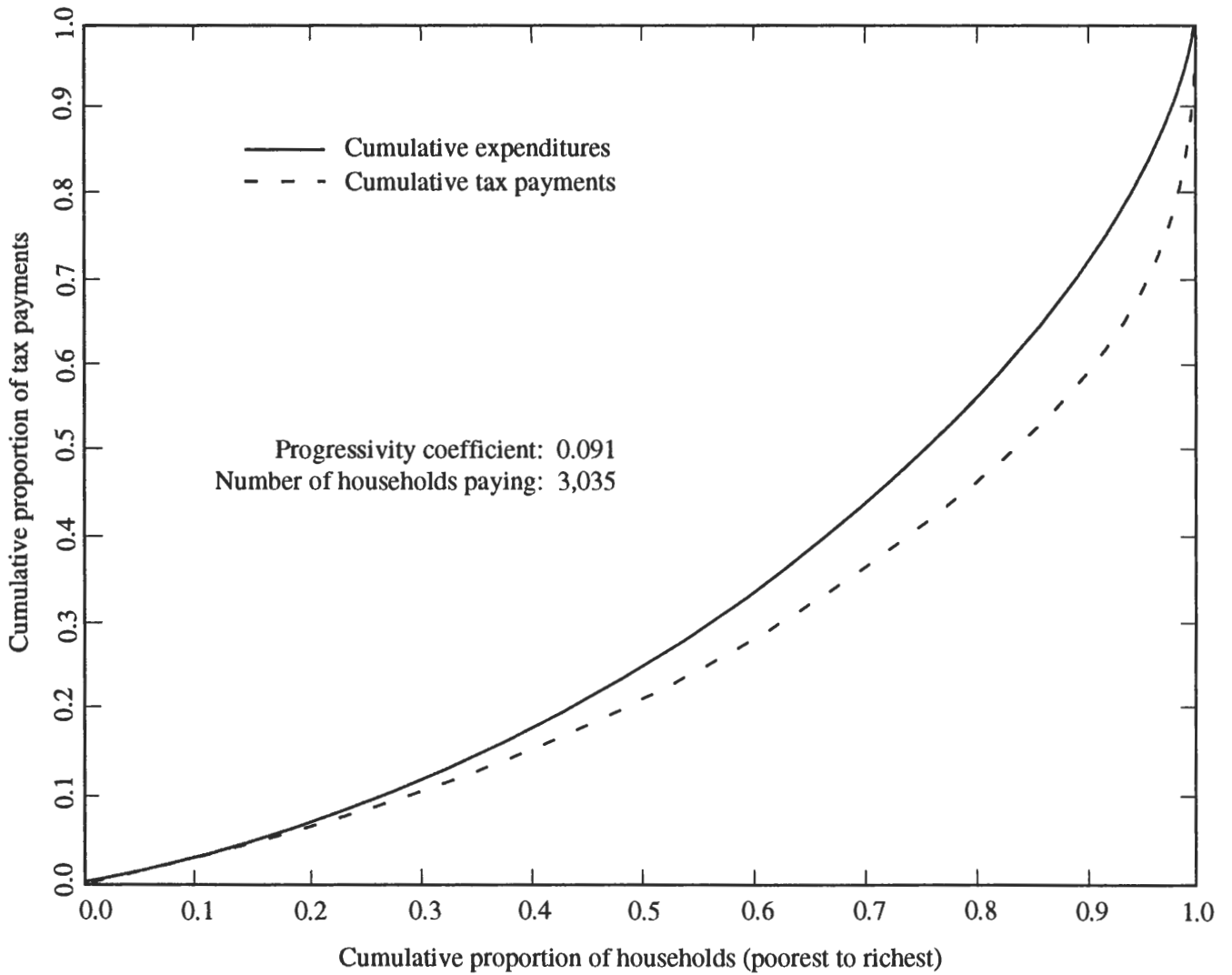**Figure 16** — Lorenz Curve for Taxes on Gasoline, Direct and Through Transport

Figure 17 — Lorenz Curve for Taxes on Kerosene

Figure 18 — Lorenz Curve for All Petroleum Taxes (Weighted by Actual Consumption Shares)

reported consuming them. This is not surprising; automobile ownership is still rare in Ghana.[13] Most of the consumption of petroleum products is by firms rather than households, so understanding the incidence requires (at a minimum) tracing the impact through an input-output table. No such table exists for Ghana, but I have tried at least to capture the impact of the petroleum tax on the public transit sector by assuming that 20 percent of the costs of transport are for fuel. (Input-output tables in Niger, Cameroon, and Madagascar all have coefficients near 0.2 for the value of petroleum inputs to the transport sector.) Consumption of transport services is much more balanced across the expenditure distribution than consumption of gasoline so that taxation of transport services (through the tax on gasoline) is roughly proportional (Figure 15). Combining these two sources of tax revenue from gasoline yields a very progressive tax. Taxes on kerosene, on the other hand, are very regressive (Figure 16). Consumption of kerosene is remarkably flat across households, so that the burden of taxes from this source falls disproportionately on poorer households.

Because gasoline and diesel fuel are often consumed by firms as intermediate inputs rather than by households, it is inappropriate to add up the actual tax payments calculated from the GLSS to estimate the overall impact of the petroleum taxes. Instead, I have calculated a weighted sum of consumption of different petroleum products based on each item's share in the overall consumption of petroleum in the entire economy in 1988. I base each household's proportion of total kerosene and gasoline consumption (direct and through transport) on the actual data reported above, and I assume that diesel consumption is proportional to household expenditures.[14] Figure 18 shows that this weighted sum is mildly progressive.

Taxes on International Transactions

Tariffs on imports have been and continue to be an important source of tax revenue in Ghana. Unfortunately, the GLSS does not distinguish between imports and domestically produced goods in its questionnaire. In addition, many imports are intermediate goods, which would need to be traced through an input-output table. Given this lack of information, one can only guess at the incidence of tariffs, but it is probably not much different from the roughly proportional incidence of the sales tax (which falls only on formal sector goods).

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[13] In addition, civil servants who use government vehicles generally do not pay for gasoline.

[14] Diesel is used primarily for trucks that transport goods rather than people, so its consumption will not show up in a household survey (although some cars and buses also use diesel). Assuming that the impact of a tax on diesel oil is proportional to household expenditure seems reasonable given that both transportation expenditures and expenditures on items that attract a sales tax are spread evenly across the expenditure distribution.

The one other important tax on international transactions is the tax on cocoa exports. According to the World Bank (1991), this tax amounted to 128,677 cedis per ton in the 1987/88 cropping season.[15] Using this figure and farmers' reported sales (by weight) in the survey yields their tax payments. As Figure 19 shows, this tax is both regressive and paid by relatively few households (13 percent of the survey). As I argued in the last section, however, this estimate may be more regressive than true tax payments, if larger farmers underreport their sales by more than small farmers do. Nevertheless, the argument seems less persuasive in this case than it does for the case of excise taxes on tobacco and alcohol: it is easy to understand why heavy consumers of tobacco and alcohol would underreport their consumption more severely, but all farmers have an incentive to underreport that is proportional to their actual output. If cocoa sales represent the bulk of their income, this also implies that the underreporting is evenly spread across the expenditure distribution.

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[15] This is the central government's actual tax revenue. In addition, the Cocoa Marketing Board's costs are very high, and one could argue that these are essentially a tax on farmers, combined with a transfer to Cocoa Board employees. I have not included these excessive marketing costs in my calculations here.

Figure 19 — Lorenz Curve for the Implicit Tax on Cocoa

Progressivity coefficient: -0.145
Number of households paying: 384

Cumulative expenditures
Cumulative tax payments

Cumulative proportion of tax payments

Cumulative proportion of households (poorest to richest)
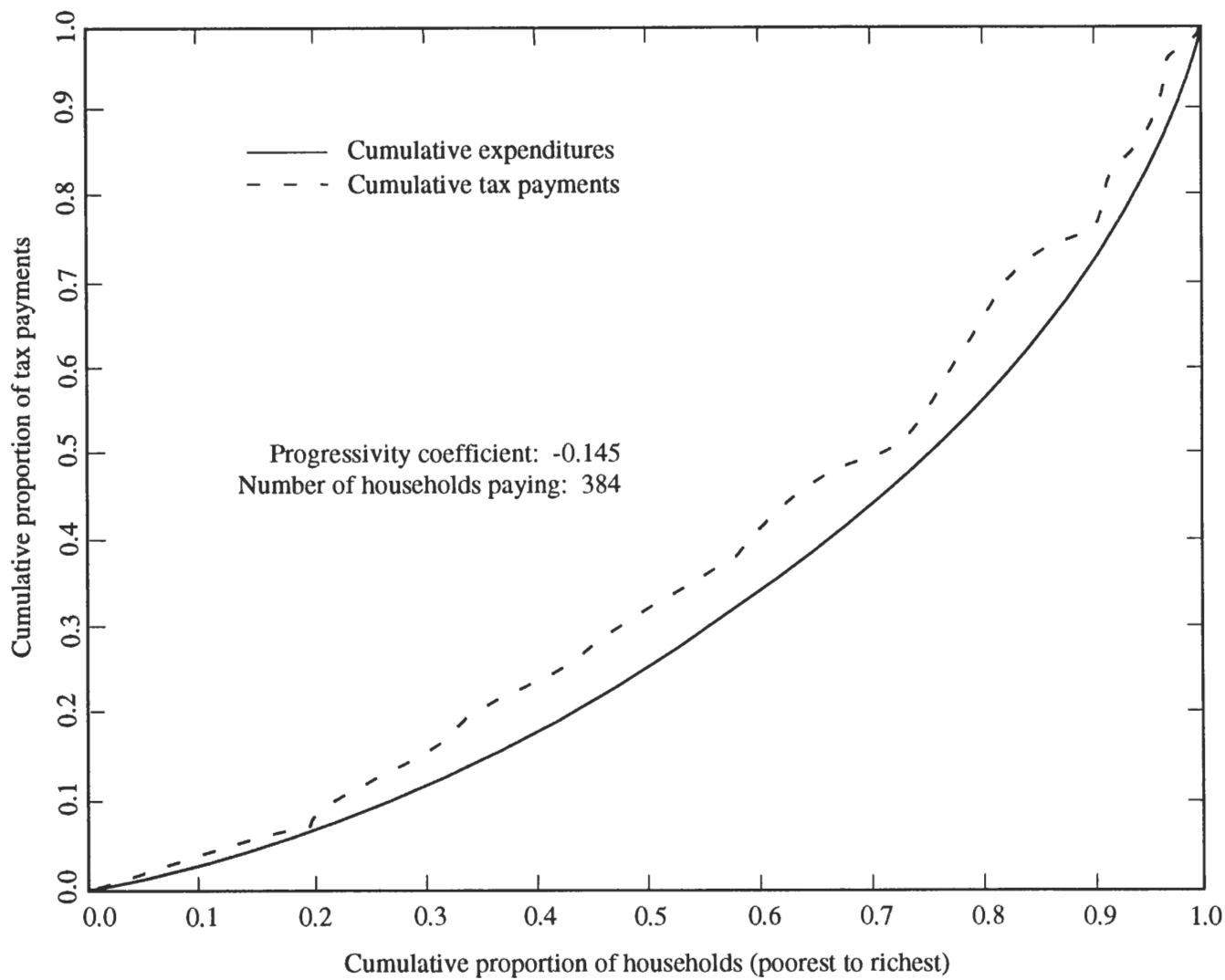
4. INTERPRETING THE RESULTS: HAS FISCAL STABILIZATION THROUGH INCREASED TAX REVENUES HURT THE POOR IN GHANA?

A convincing answer to this question could only come from a much more ambitious study than this one. Nevertheless, the household data from the GLSS combined with the government's revenue data provide interesting information that, if not conclusive, is suggestive of the changes in tax incidence in Ghana during the ERP. Between fiscal 1981/82 and 1987, tax revenues increased from 5 to 12 percent of GDP. Table 3 shows that about 70 percent of this increase came from cocoa export duties and non-petroleum excise taxes, both of which are regressive taxes according to the GLSS data, which would make one believe that the tax structure became more regressive in this period. Nevertheless, the data on the cocoa tax are quite misleading when thinking about cocoa farmers' welfare. While it is true that the government's fiscal revenues from the cocoa rose substantially in this period, so did farmers' real revenues. Before 1982, the highly overvalued exchange rate meant that the cedi value of cocoa sales was very low, leaving very little for the government, the Cocoa Board, and farmers to share between them. Basically, the lions' share of cocoa earnings actually went to importers who bought the foreign exchange proceeds at a very low exchange rate. The devaluation reduced that implicit subsidy to importers and made it available to both the government and farmers. Thus, both fiscal revenues from cocoa duties and farmers' real producer prices rose after the ERP began.

To account for this phenomenon, I have adjusted the data on cocoa revenues to include an implicit tax from exchange rate overvaluation equal to half the difference between the official and parallel exchange rates times the international price less 15 percent (which is generally considered a reasonable marketing margin for domestic and international transport and processing). Given the severe overvaluation of the currency in the 1970s and early 1980s, this adjustment is a very large number, as much as 15 percent of GDP in some years. Including it makes cocoa taxes the dominant source of tax revenue until the late 1980s (Table 4). This also implies that the government's reduced reliance on cocoa taxes have made the overall tax system considerably more progressive.

To be concrete, I have calculated a Lorenz curve for all tax revenues in 1977/78, 1981/82, 1987, and 1990, using weights implied by the government's revenue figures from Table 4 (which include the cocoa tax adjustment) for each of those years and proportions of expenditures from the 1987/88 GLSS.[16] Figure 20 shows that in both 1977/78 and 1981/82, the overall tax system in Ghana was

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[16]   For the two main taxes on which GLSS provides no useful information, imports and the company tax, I have assumed that the incidence is equal to the sales tax incidence and the annual income tax incidence, respectively. I assume that the small amounts in "other" categories are all distributed proportionally to expenditures.

Table 3 —Sources of Revenue as a Proportion of Total Revenue and Grants, 1977/78-1990

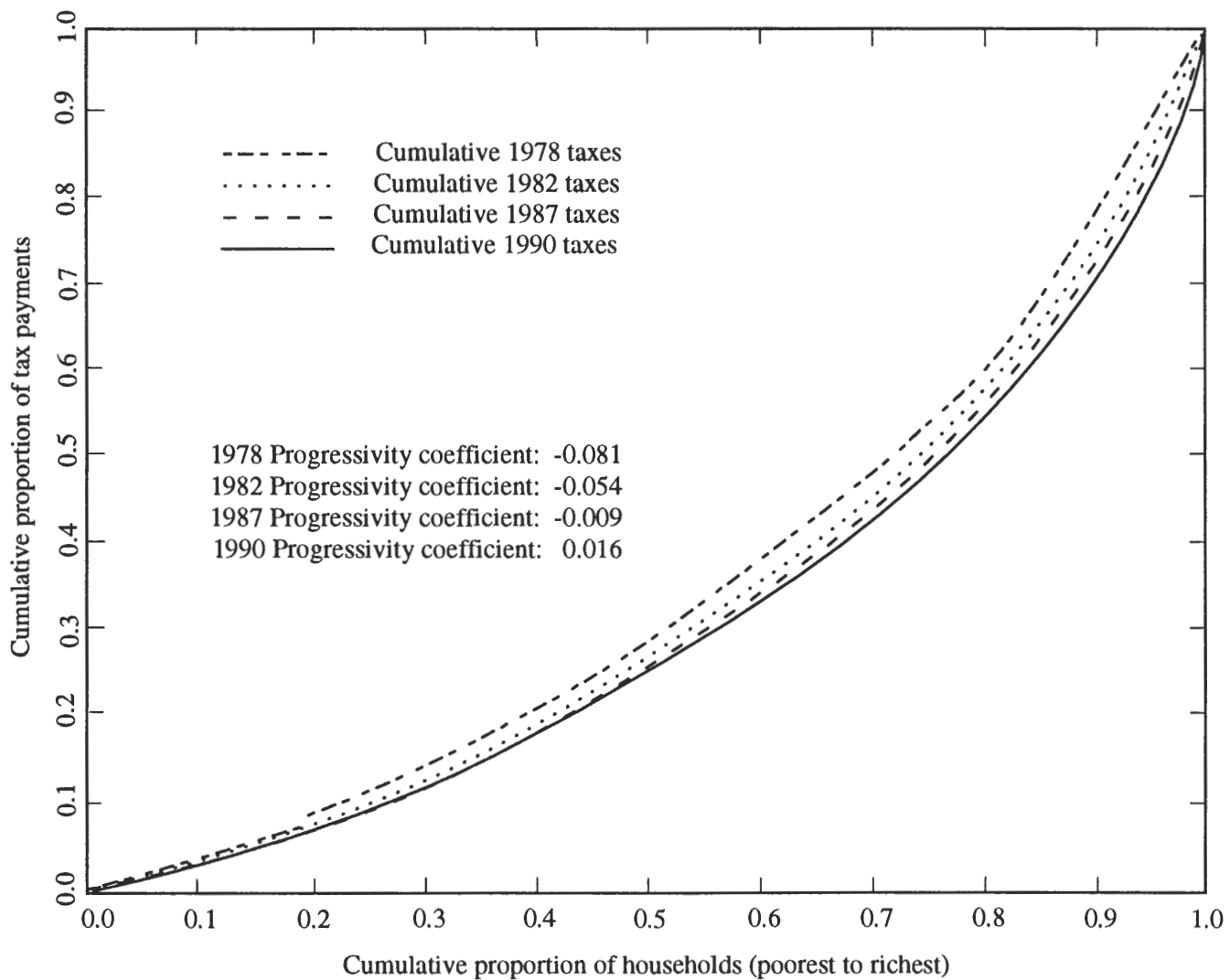|	1977/78	1978/79	1979/80	1980/81	1981/82	1983	1984	1985	1986	1987	1988	1989	1990
Taxes on international transactions	0.493	0.610	0.499	0.215	0.206	0.483	0.379	0.853	0.693	0.429	0.350	0.413	0.375
Import duties	0.148	0.159	0.122	0.135	0.147	0.137	0.115	0.124	0.137	0.121	0.120	0.168	0.150
Sales tax on imported goods	0.004	0.003	0.003	0.006	0.022	0.043	0.032	0.041	0.042	0.046	0.055	0.083	0.115
Purchase tax	0.011	0.006	0.002	0.002	0.008	0.005	0.004	0.006	0.006	0.002	0.002	0.001	0.001
Export duty on cocoa	0.314	0.429	0.364	0.000	0.000	0.273	0.208	0.229	0.199	0.257	0.172	0.162	0.109
Other export duties	0.005	0.004	0.002	0.001	0.001	0.013	0.017	0.008	0.004	0.000	0.000	0.000	0.000
Other taxes on foreign transactions	0.011	0.009	0.005	0.072	0.027	0.011	0.004	0.000	0.000	0.002	0.001	0.000	0.000
Taxes on domestic goods and services	0.210	0.148	0.232	0.430	0.421	0.172	0.257	0.216	0.285	0.257	0.255	0.273	0.304
Cocoa local duty	0.006	0.000	0.043	0.008	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Excise duties	0.157	0.108	0.154	0.316	0.335	0.148	0.233	0.171	0.150	0.122	0.106	0.098	0.096
Sales tax on local products	0.033	0.030	0.028	0.055	0.043	0.019	0.020	0.030	0.037	0.080	0.087	0.093	0.098
Other	0.015	0.010	0.008	0.051	0.043	0.004	0.002	0.000	0.004	0.003	0.003	0.004	0.004
Petroleum tax	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.095	0.052	0.060	0.078	0.106
Taxes on income and property	0.202	0.157	0.201	0.260	0.295	0.169	0.185	0.199	0.210	0.223	0.279	0.241	0.216
Employees	0.104	0.085	0.082	0.098	0.085	0.051	0.042	0.048	0.046	0.043	0.042	0.039	0.045
Self-employed income tax	0.000	0.000	0.020	0.019	0.063	0.034	0.036	0.030	0.021	0.034	0.036	0.026	0.025
Company tax	0.092	0.070	0.084	0.117	0.136	0.074	0.098	0.118	0.138	0.137	0.194	0.168	0.137
Interest and dividend tax	0.000	0.000	0.000	0.003	0.006	0.008	0.002	0.002	0.003	0.000	0.000	0.000	0.000
Rent income tax	0.001	0.001	0.002	0.001	0.002	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000
Others	0.004	0.001	0.014	0.022	0.001	0.000	0.007	0.000	0.000	0.008	0.006	0.007	0.008
Nontax revenue	0.095	0.084	0.066	0.081	0.068	0.171	0.172	0.170	0.111	0.087	0.116	0.073	0.106
Grants	0.000	0.000	0.002	0.014	0.011	0.006	0.040	0.040	0.053	0.054	0.075	0.099	0.104

Source: Republic of Ghana (1992).

Table 4.—Sources of Revenue as a Proportion of Total Revenue, Including an Adjustment for the Implicit Tax on Cocoa Exports Due to Exchange Rate Overvaluation, 1977/78-1990

	1977/78	1978/79	1979/80	1980/81	1981/82	1983	1984	1985	1986	1987	1988	1989	1990
Taxes on international transactions	0.838	0.860	0.797	0.643	0.617	0.677	0.606	0.898	0.765	0.468	0.438	0.418	0.391
Import duties	0.047	0.057	0.049	0.062	0.072	0.087	0.073	0.086	0.105	0.113	0.103	0.166	0.146
Sales tax on imported goods	0.001	0.001	0.001	0.003	0.011	0.027	0.020	0.028	0.033	0.043	0.048	0.082	0.112
Purchase tax	0.004	0.002	0.001	0.001	0.004	0.003	0.003	0.004	0.004	0.002	0.002	0.001	0.001
Export duty on cocoa	0.781	0.794	0.743	0.544	0.516	0.545	0.497	0.467	0.386	0.308	0.285	0.169	0.132
Other export duties	0.002	0.001	0.001	0.000	0.001	0.008	0.011	0.006	0.003	0.000	0.000	0.000	0.000
Other taxes on foreign transactions	0.004	0.003	0.002	0.033	0.013	0.007	0.002	0.000	0.000	0.002	0.001	0.000	0.000
Taxes on domestic goods and services	0.067	0.053	0.094	0.199	0.206	0.108	0.163	0.150	0.218	0.239	0.221	0.270	0.296
Cocoa local duty	0.002	0.000	0.017	0.004	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Excise duties	0.050	0.039	0.062	0.146	0.164	0.094	0.148	0.118	0.115	0.114	0.091	0.098	0.093
Sales tax on local products	0.010	0.011	0.011	0.025	0.021	0.012	0.013	0.021	0.028	0.074	0.075	0.092	0.095
Other	0.005	0.004	0.003	0.024	0.021	0.003	0.002	0.000	0.003	0.003	0.003	0.004	0.004
Petroleum tax	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.073	0.049	0.052	0.077	0.103
Taxes on income and property	0.064	0.057	0.082	0.120	0.144	0.117	0.107	0.138	0.161	0.208	0.241	0.239	0.210
Employees	0.033	0.031	0.033	0.045	0.042	0.027	0.033	0.033	0.035	0.040	0.037	0.039	0.044
Self-employed income tax	0.000	0.000	0.008	0.009	0.031	0.023	0.022	0.021	0.016	0.032	0.031	0.026	0.025
Company tax	0.029	0.025	0.034	0.054	0.067	0.062	0.047	0.082	0.106	0.128	0.168	0.167	0.133
Interest and dividend tax	0.000	0.000	0.000	0.001	0.003	0.001	0.005	0.001	0.002	0.000	0.000	0.000	0.000
Rent income tax	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000
Others	0.001	0.000	0.006	0.010	0.001	0.004	0.000	0.000	0.000	0.007	0.006	0.007	0.008
Nontax revenue	0.030	0.030	0.027	0.037	0.033	0.108	0.114	0.123	0.090	0.085	0.100	0.072	0.103
Grants	0.000	0.000	0.001	0.006	0.005	0.004	0.027	0.029	0.042	0.054	0.070	0.110	0.113

Source: Republic of Ghana (1992).

Figure 20 — Lorenz Curve for All Taxes for 1978, 1982, 1987, 1990

1978 Progressivity coefficient: -0.081
1982 Progressivity coefficient: -0.054
1987 Progressivity coefficient: -0.009
1990 Progressivity coefficient: 0.016

regressive, and to the same extent in each year. This simply reflects the dominance of cocoa in the tax structure. By 1987, however, the tax system had much less regressive as excise taxes, income taxes, and sales taxes became increasingly important. The data for 1990, the most recent available, show further improvement to a proportional overall tax burden. Thus, the tax policies of the ERP appear to have had a favorable effect on the overall distributional impact of Ghana's tax system.

5. CONCLUDING THOUGHTS ON TAX POLICY IN GHANA

It is important to remember that progressivity is not the only measure of a good tax. Policy makers must also consider the tax's impact on economic efficiency (distortions to the allocation of resources), its administrative efficacy (whether it is a good "tax handle"), and, of course, the utility of the corresponding government expenditures. Nevertheless, progressivity does matter, not least at the political level where arguments that a tax "hurts the poor" are often more persuasive than considerations of economic or administrative efficiency.

The calculations I have presented here, while rough, can help to inform the debate on tax policy in Ghana in several ways. First, the broad-based taxes are either proportional (in the case of the sales tax) or progressive (the income taxes). Because broad-based taxes are usually less distortionary than particular excise taxes or taxes on trade, it appears that moving toward a greater reliance on broad-based taxes would improve both equity and economic efficiency.[17] To that end, the government's project to establish a value-added tax (VAT) is welcome. A VAT's incidence should be similar to the sales tax, but collection is self-enforcing and thus more efficient administratively. Along the same lines, the government's continuing attempts to assess reasonable presumptive taxes on self-employed enterprises, while the cause of much complaining, appear to be an equitable source of revenue.

Despite the intention to establish better broad-based taxation, the government has in fact increasingly turned to two narrow taxes, on petroleum and cocoa, in the past two years. The 1993 budget statement (Botchwey 1993) shows petroleum taxes providing about one-third of all revenues and cocoa duties another 20 percent. As I have shown, the petroleum tax appears to be proportional or slightly progressive in Ghana, so complaints that the recent gasoline price increases are falling disproportionately on the poor appear unfounded.[18] In addition, other economic arguments favor taxing petroleum products: there are negative externalities associated with their consumption (pollution); their consumption is correlated with the use of public services (roads); and demand for petroleum products is probably inelastic, so that the efficiency consequences are minor. One should doubt whether these factors have been considered explicitly in setting the current tax rates, but they do favor some level of taxation on petroleum. Within the group of petroleum products, the consumption patterns in the GLSS suggest that taxes on kerosene are regressive, while those on other products are comparably progressive. Thus, a government concerned about the

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[17] The only open question is the administrative costs associated with collecting such taxes.

[18] This calculation, however, is subject to a considerable margin of error.

effect of petroleum taxes on the poor might tax gasoline and diesel oil more heavily than kerosene.

There are no comparable arguments to defend the cocoa duty. Because of the tradition of cocoa taxation in Ghana and the monopoly on marketing, this tax provides a good tax handle, but it is clearly distortionary and also appears to be regressive. A principal goal of tax policy in Ghana should be to replace this duty with other revenues that are more efficient and equitable. The consumption and production patterns in the GLSS show that the latter criterion is easily met: virtually any tax (with the possible exception of non-petroleum excise taxes) is more equitable than the cocoa duty. It also seems likely that the cocoa duty is among the most distortionary taxes in Ghana, because it discourages production of one of the country's most competitive exports.

Overall, the concern that fiscal stabilization has hurt the poor in Ghana seems unfounded. Reduced reliance on cocoa duties and increased recourse to more progressive direct taxes and the petroleum duty have lessened the poor's share of the overall tax burden. This does not mean that the poor are not paying more in taxes than they used to — virtually everyone in Ghana is probably paying more — but the increased burden on the poor has been less relative to their incomes (and, *a fortiori*, absolutely) than that for the rich. It is still possible, of course, that the overall changes in fiscal policy have hurt the poor, but only if the incidence of the benefits of government expenditure is highly regressive. While a careful examination of such incidence would be a difficult project (see Meerman 1979, or Selowsky 1979), Sahn (1990) and Alderman (1990) cast doubt on whether adjustment has shifted expenditures toward the wealthy in Africa and Ghana. Thus, to argue that the ERP's fiscal policy reforms have hurt the poor in Ghana seems implausible.

APPENDIX I
DESCRIPTION OF TAX CALCULATIONS

This appendix describes in detail how I have estimated the different taxes paid by each household in the GLSS. The data come from the 1987-88 survey only, and I use a somewhat reduced data set (3,035 households instead of 3,200) based on extensive cleaning done at the Cornell Food and Nutrition Policy Program (see Alderman and Higgins 1992).[19] Given the assumption of zero price and income elasticities, which is inherent in this paper, I could apply any set of tax rates to the data, but I have chosen the 1988 rates wherever possible.

DIRECT TAXES

The GLSS asks each person over six years old about his/her primary and secondary jobs in the past week and the past year. For each job, the survey also asks whether income taxes were withheld. For those jobs where the respondent reports having taxes withheld, I have calculated the amount based on the 1988 tax tables (Table A.1), applied to each job.[20] In theory, employees may file tax returns at the end of the year to claim a refund (or pay additional amounts owed), but in practice they do not, so I take the amount withheld as a final tax. I based the tax rate applied to a job on the income that the job would generate in an entire year (as the tax authorities do when they establish a withholding amount), even though the total amount paid in taxes is a function of the number of weeks worked at the job in the past year. A progressive tax schedule implies that those working less than 52 weeks in the previous year at a job have had too much tax withheld. On the other hand, those that have more than one job have had too little withheld, even if both jobs are subject to withholding. After calculating taxes paid by each individual, I sum at the household level.

In addition to wage income, taxes were withheld on dividend income at a rate of 30 percent in 1988.[21] I have calculated the tax by multiplying this rate by the household's reported annual dividend income.

Other information on direct taxes comes directly from the survey. For households involved in self-employed activities, the GLSS asks about costs for "daily taxes" and "annual taxes and licenses." The revenue authorities collect daily taxes from certain small enterprises (taxi drivers, market traders, small

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[19] For details on the survey, see World Bank (1989).

[20] The tax authorities have no way to match a person across jobs, so they do not withhold based on total income, but only income from a particular job.

[21] The rate is now 10 percent and the tax is final.

Table A.1 — 1988 Personal Income Tax Schedules

Annual Income	Rate (Percent)
First 24,000 cedis	Free
Next 30,000 cedis	5
Next 30,000 cedis	10
Next 225,000 cedis	20
Next 225,000 cedis	30
Next 225,000 cedis	40
Next 225,000 cedis	50
Above 984,000 cedis	55

retail operations, etc.) as a presumptive income tax. Tax collectors establish an amount that the self-employed businessperson is presumed to make based on his or her activity, inventory, etc., and collect that amount on a daily basis. The rationale for this is that it enables operations that are surely liquidity-constrained to avoid paying a large amount of taxes at one time. Again, the business person is allowed, theoretically, to file a return at the end of the year to claim a refund, but no one actually does so, so the amount withheld is the amount paid.

Larger enterprises do file tax returns and pay income taxes based on the year's profits. These could be either individual returns or corporate returns, depending on the nature of the operation. While I have included all of these taxes under "self-employment tax" in this paper, some of it probably should fall under the "company tax." License fees apply to a variety of formal and informal activities.

Finally, in the section of the survey that deals with household expenditures, there is a question about taxes paid in the past year. I have included this amount as a property tax, although this risks double-counting with the information from family businesses. This is the most likely category for this item, because our own experience at CFNPP suggests that survey respondents are generally unaware of the amount withheld from their paychecks or the amount of sales/excise tax implicit in the goods they buy, so any reporting of taxes paid is likely to refer to either self-employed activities or property taxes, where payment is explicit.

INDIRECT TAXES

In 1988, the standard sales-tax rate was 25 percent, and the authorities levied the tax on producers at the factory gate. To calculate the amount of tax implicit in the purchase price of goods, I have assumed that retailers mark up prices by 50 percent of the wholesale price and, in conjunction with the 25 percent tax rate, worked backward to a wholesale price, which I then multiply by 25 percent to get the amount of tax paid. Table A.2 lists all the purchased consumption items that the GLSS survey asks about, along with an indication of whether sales taxes are likely to apply to these items. In the case of durable goods, I have assumed that sales tax is paid only on the "use value" of the item for the current year, as calculated by Johnson, McKay, and Round (1989).

For the excise taxes on alcoholic beverages, soft drinks, and tobacco, the National Revenue Secretariat provided me with estimates of the markups for 1993. I have used those estimates — 0.34, 0.31, and 0.42, respectively — in a similar calculation to work backward from purchase price to tax paid per unit. Because the vast majority of alcoholic beverages consumed is beer, I have used the tax rates and markups that apply to it only. One cannot separate beer from other alcohol, including traditional drinks like akpteshie, in the GLSS survey.

Table A.2 —Consumption Items Covered in the Ghana Living Standard Survey

Item	Sales Tax Applies?
Lottery tickets	No
Cigarettes, tobacco, cola nuts	Yes
Commercial or home-made soap	Yes
Other personal care and health products	Yes
Home maintenance products	No
Charcoal or wood	No
Matches and candles	Yes
Other fuel for cooking or lighting	No
Gasoline and motor oil	No
Shoes for adults	Yes
Children's shoes	Yes
Domestic or imported cloth	Yes
Material for adult clothing	Yes
Material for children's clothing	Yes
Adult clothing	Yes
Children's clothing	Yes
Repairs and other expenses for vehicles	No
Public transport, taxis, etc.	No
Home repairs, painting, insurance, etc.	No
Books, notebooks, newspapers, stationary, etc.	No
Table top stoves and coal pots	Yes
Medicines	Yes
Medical services and expenses	No
Kitchen equipment	Yes
Lanterns and lamps	Yes
Furniture	No
Linen	Yes
Envelopes, writing paper, stamps, and telephones	No
Hairdressing, haircuts, etc.	No
Domestic servants	No
Jewelry, watches	Yes
Entertainment	No
Taxes	No
Reimbursement of loans and interest	No
Susu	No
Weddings and dowries	No
Funerals	No
Gifts	No
Bread or wheat flour	Yes
Macaroni and spaghetti	Yes
Biscuits and cakes	Yes
Refined oil	Yes
Butter or margarine	Yes
Alcoholic beverages	Yes
Non-alcoholic beverages	Yes
Maggi™ cubes	Yes
Milk or milk powder	Yes
Milk products (except butter)	Yes
Other foods eaten away from home	Yes
All other food items	No

Note: For the following items, I assume that sales tax is applied to the use value only: Sewing machines, gas or other full-sized stoves, refrigerators or freezers, air conditioners, fans, radios, radio/cassette players, phonographs, stereo equipment, video equipment, washing machines, black-and-white TV sets, color TV sets, bicycles, motorbikes, cars, other vehicles, and cameras.

Petroleum taxes are more difficult to get information on, largely because of their political sensitivity. To calculate the percentage of retail price that went to taxes in 1988, I have divided the total 1988 petroleum tax revenue (8.485 billion cedis) by the volume of all petrol products consumed (930 million liters) for an implied average tax take of 9.12 cedis per liter. I then distribute this amount proportionally among gasoline, diesel, and kerosene by assuming that the ratio of tax rates on these three items was the same in 1988 as in 1991 (the only year for which I have actual tax rates). This yields a tax rate of 10.6 cedis per liter for gasoline, which I apply to the item "gasoline and motor oil," and 8.5 cedis per liter for kerosene, which I apply to "other fuel for cooking or lighting (gas, kerosene, etc.)." To get a percentage of retail price, I divided the 1988 average price of gasoline and kerosene in Accra by these amounts, yielding ratios of 0.203 and 0.156, respectively.

The last major tax that I consider is the cocoa duty. The World Bank (1991) estimates that cocoa duties were 128,677 cedis per metric ton for the 1987/88 crop year. I have applied that amount to farmers' reported physical output to calculate their payments of cocoa taxes. Note that this calculation does not include any part of the costs of the Cocoa Marketing Board as a tax, even though that institution is quite inefficient.[22]

DATA CLEANING

To eliminate outliers from the data set, I calculated the mean and standard deviation of the proportion of each consumption item or direct tax payment in total household expenditures (after first eliminating households with proportions greater than one). Any household with a proportion more than five standard deviations from the mean or greater than an item-specific cut-off value (shown in Table A.3) I set to the mean expenditure proportion and recalculated expenditures (and taxes) from that proportion. Table A.3 shows the means, standard deviations, cut-off values, and the number of changes I made to each tax and expenditure item in the study.

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[22] Marketing costs were 286,787 cedis per ton in 1987/88, more than twice tax revenue and farmers' proceeds.

Table A.3 - Information on Outlier Corrections in the Sample

Proportion of Expenditures Allocated to:	Number of Households	Mean	Standard Deviation	Alternate Cutoff	Number of Outliers
Alcoholic beverages	1,199	0.0016	0.0019	0.10	0
Weddings and funerals	2,332	0.0119	0.0277	0.10	18
Non-alcoholic beverages	413	0.0008	0.0009	0.05	0
Gasoline	47	0.0869	0.0849	0.10	1
Kerosene	2,650	0.0233	0.0218	0.10	18
All items with sales tax	3,019	0.1664	0.0984	0.70	19
Tobacco	915	0.0589	0.0667	0.10	7
Public transport	2,714	0.0040	0.0048	0.10	2
Reported tax payments	2,181	0.0027	0.0071	0.45	0
Cocoa[a]	376	35.5	51.9	—	4
Daily income tax	695	0.0287	0.0478	0.45	1
Annual income tax	349	0.0181	0.0372	0.45	1
Taxes on dividend income	27	0.0192	0.0277	0.30	2
Wage/Salary withholding	878	0.0231	0.0624	0.45	3

[a] Cocoa data are for yield (in kilos per acre).

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