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## The Buoyancy of Ivory Coast Taxes

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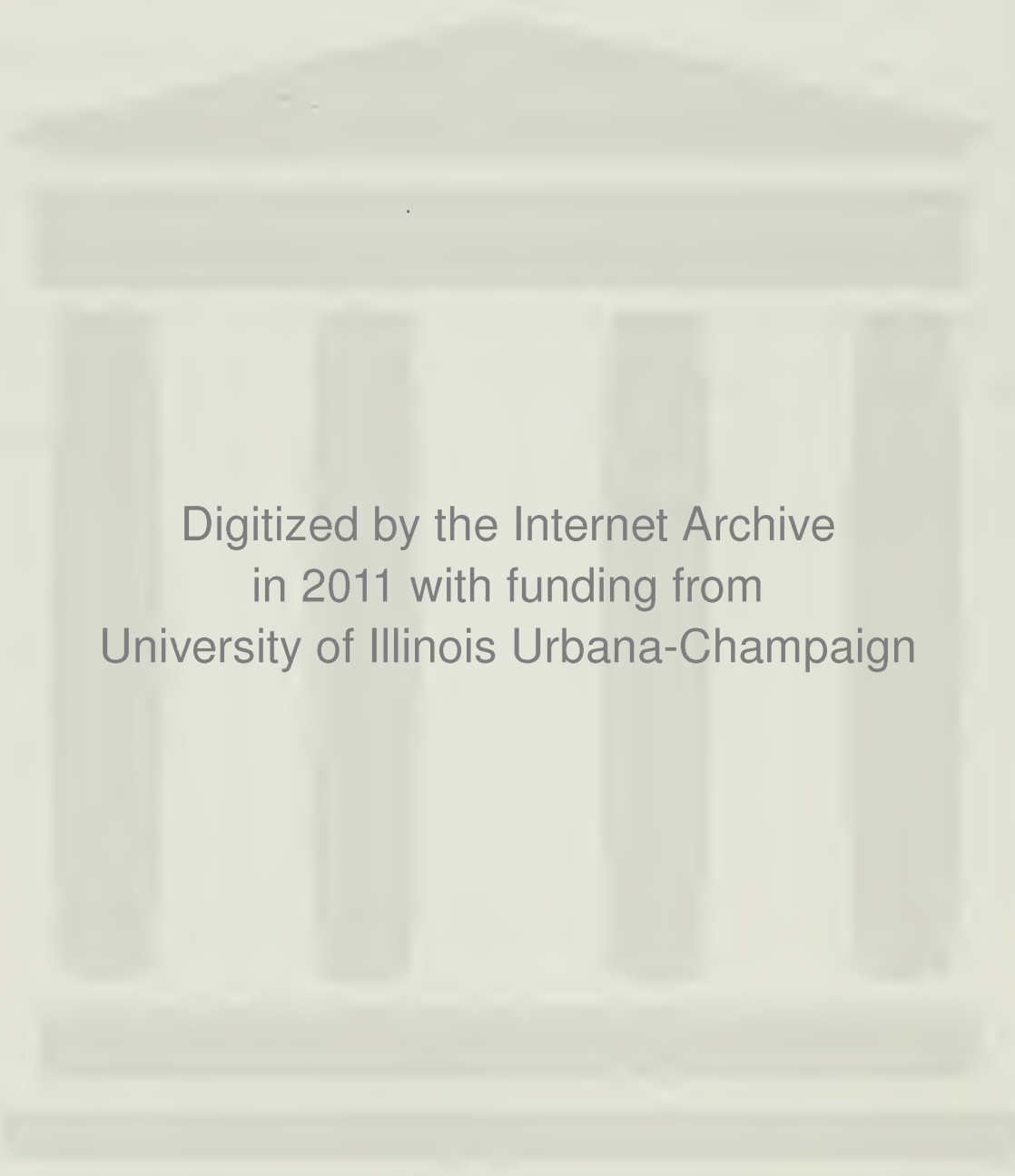
Abstract

Buoyancy reflects the ability of a tax structure to generate revenues during economic growth. In this study, the buoyancy of taxes in the Ivory Coast was estimated using annual data from the time period 1965 to 1975. Double-logarithmic functions relating tax receipts to GDP were estimated for each of the major Ivorian taxes. The most buoyant taxes were identified as the income taxes and the least buoyant were the customs duties and excises on alcohol and tobacco. The buoyancy of total taxes in the Ivory Coast was found to be less than in three other countries. The results of the study are helpful in understanding the fiscal system of the Ivory Coast.



# THE BUOYANCY OF IVORY COAST TAXES

Tax buoyancy measures the responsiveness of tax revenue to changes in national income or output, usually measured by GNP or GDP. A buoyancy of one means that a one percent increase in income (or output) will be accompanied by a one percent increase in tax revenue. A buoyancy greater than (less than) one means the percentage change in tax revenue will be greater than (less than) the percentage change in income. A tax whose buoyancy is greater than one is said to be buoyant. In measuring buoyancy, no attempt is made to control for discretionary changes in the tax system or administration. Consequently, buoyancy reflects both discretionary changes and automatic revenue growth.

The concept of tax buoyancy is important to policy makers. A buoyant tax is responsive to income growth and, in inflationary periods, buoyancy means that tax revenues will grow faster than income. Likewise, in deflationary periods, buoyancy means that tax revenues will fall faster than income. Consequently, the revenues from a buoyant tax system are less stable than those from a nonbuoyant tax system. The buoyancy of a tax system is a weighted average of the buoyancies of the taxes which make up that system. Hence, the buoyancy of the entire tax system can be increased by utilizing more heavily those taxes with higher buoyancies.

This study focuses on the buoyancy of taxes in the Ivory Coast (Cote d'Ivoire). It uses annual data from the time period 1965 to 1975 to estimate double logarithmic functions relating Ivorian tax receipts to GDP. In section I, the nature of the tax system in the Ivory Coast

is reviewed. Section II presents the methodology and results, and section III, the summary and conclusions.

## I. Ivorian Taxes

The Ivory Coast is identified by Tait et al. [1979] as having a high index of tax effort. This means that after controlling for taxable capacity or ability to pay taxes, the Ivory Coast has a high ratio of tax receipts to national income. The Ivorian tax ratio for the period of our study is shown in Table 1. The tax ratio averaged 21.2 over the period and showed no obvious trend. A regression analysis confirmed that the tax ratio is not affected significantly by per capita income nor by a time trend.

The composition of the Ivorian tax structure in 1975 is shown in Table 2. Direct taxation accounts for 24 percent of total revenue, indirect taxation for 43 percent, and customs duties for 33 percent. By far, the most important tax in the Ivory Coast is the value-added tax which accounts for about 27 percent of total revenue. Import and export duties are likewise important taxes.

The Ivorian value-added tax is similar to that in operation in European countries. The tax is applied to gross revenues from the sale of goods delivered and services used within the country. It is based on the value of the good at each stage of its manufacture or distribution with credit given for tax paid at the prior stage. The current standard rate of the value-added tax is 25 percent. Export sales, the payment of salaries, and agricultural activities are exempt from the tax.

TABLE 1

Total Tax Revenue as a Percent of GNP
for the Ivory Coast, 1965-1975

| Year | Tax Ratio |
|---|---|
| 1965 | 21.3 |
| 1966 | 20.4 |
| 1967 | 18.7 |
| 1968 | 22.7 |
| 1969 | 20.2 |
| 1970 | 21.2 |
| 1971 | 21.8 |
| 1972 | 23.3 |
| 1973 | 22.6 |
| 1974 | 20.5 |
| 1975 | 20.8 |

SOURCE: Own calculation.

TABLE 2

The Composition of the Tax Structure
in the Ivory Coast, 1975

| | | Percent of Revenue |
|---|---|---|
| DIRECT TAXATION | | 24.0 |
| Company Income Tax | 8.6 | |
| Individual Income Tax | 8.1 | |
| Other Direct Taxes | 7.3 | |
| INDIRECT TAXATION | | 42.9 |
| Value-added Tax | 27.1 | |
| Excise taxes on gasoline, tobacco and beverages | 13.7 | |
| Registration tax | 2.1 | |
| CUSTOM DUTIES | | 33.0 |
| Import duties | 16.9 | |
| Export duties | 16.1 | |
| TOTAL | | 99.9 |

SOURCE: Tax and Trade Guide to the Ivory Coast, Arthur Andersen & Co. Feb., 1978, p. 31.

Income taxes in the Ivory Coast more closely resemble European income taxes than those of some neighboring countries such as Ghana, Nigeria, and Liberia. Two types of income taxes are used: company taxes and individual income taxes. In 1975, the country collected roughly half of its income tax from companies and half from indivduals.

The company tax applies to income earned only within the Ivory Coast. The tax is a 50 percent tax with strong incentives for new investment. This is accomplished via an exemption for new factories, exploitations of mineral deposits, and construction and rental of housing. There is also a tax on the investment income of foreign companies operating in the Ivory Coast.

Individuals are subject to various types of income taxes depending on their sources of income. The income tax rates are graduated up to 60 percent. In calculating taxes, the taxpayer is allowed a number of "parts" related to the number of dependents. One part is allowed for the taxpayer and spouse and one-half part for each dependent minor child up to a maximum of five parts. Taxable income is divided by the number of parts, a tax figure is calculated, and this is multiplied by the number of parts to give tax due. This has the effect of reducing the effective tax rate so that the effective rate of tax on a married taxpayer with a $50,000 salary is about 20 percent.[1]

Customs duties, accounting for a third of tax revenue, consist of the import and export duties. Goods imported into the Ivory Coast are subject to a 40 percent import duty (in addition to the value-added tax). Export duties are imposed at a standard rate of 0.5 percent on the value of exported goods plus a 0.6 percent surcharge.

In the next section, the econometric method is described and the results presented.

## II. The Buoyancy Estimates

Buoyancies for individual taxes and for the tax system as a whole are obtained by estimating double logarithmic functions relating tax receipts to GDP. The data are for the period 1965-1975. Central government revenue is measured in CFAF billion as is GDP. Since the variables are measured in logs, the coefficient of GDP can be interpreted as the tax buoyancy. It measures the expected percentage change in tax revenue for a one percent change in GDP.

The ordinary least squares regression results appear in Table 3. Data problems necessitated shortening some of the data series to the period 1969 through 1975. The income and profits taxes and the value-added and import taxes were not reported separately prior to 1969. Regressions that were run on the shorter data series are noted with an asterisk.

The coefficient of the log of GDP, the buoyancy, tests significantly different from zero at the .99 confidence level in all equations. The $R^2$ statistic, measuring the goodness of fit of the regression equations, ranged from .92 to .99 suggesting that the model fit the data well. The Durbin-Watson statistic, an indicator of autocorrelation among the residuals, was inconclusive for the income tax, consumption tax, and value-added tax equations. The test indicated no problem of autocorrelation in the other equations. The standard error of estimate, SEE, measures the forecasting ability of the equation, with

TABLE 3

OLS Regression Results for Ivorian Taxes, 1965-1975

| Tax | Constant | Log GDP | $R^2$ | D.W. | SEE |
|---|---|---|---|---|---|
| All taxes | -1.74 | 1.02** | .99 | 1.852 | .05 |
| Income and profits taxes | -5.64 | 1.37** | .96 | 1.112 | .12 |
| Income taxes* | -7.006 | 1.40** | .95 | .984 | .11 |
| Profits taxes* | -6.185 | 1.33** | .98 | 1.299 | .05 |
| Consumption taxes* | -2.706 | .94** | .92 | .981 | .09 |
| Value added taxes* | -4.30 | 1.09** | .95 | .946 | .08 |
| Excise duties | -4.33 | 1.06** | .96 | 1.409 | .09 |
| Tobacco tax | -3.67 | .76** | .98 | 1.820 | .04 |
| Alcoholic beverage tax | -4.44 | .84** | .96 | 1.243 | .08 |
| Gasoline tax | -7.24 | 1.40** | .93 | 1.620 | .17 |
| Customs duties* | -1.498 | .89** | .98 | 1.795 | .04 |
| Import duties* | -2.02 | .90** | .99 | 2.701 | .03 |
| Export duties | -2.88 | .93** | .94 | 2.106 | .11 |

*Based on data for 1969-1975

**Significantly different from zero at .99 confidence level

smaller SEE's implying better forecasting ability. The equation for import duties performed best by this measure.

The buoyancy estimates from our study appear again in Table 4. For comparison, buoyancy estimates for Ivorian taxes by den Tuinder [1978] are also shown in the table. The den Tuinder study differs from ours in that it uses a slighly different time period, 1965 through 1973, two years shorter than ours. In general, the buoyancies estimated from our study are lower than those estimated by den Tuinder. For example, we estimate the overall buoyancy of the tax system to be 1.02 compared to his estimate of 1.11. The only exceptional case in which we find a buoyancy higher than den Tuinder's estimate is for export duties.

In both our study and the den Tuinder study, the income taxes are found to be buoyant; that is, to have buoyancies greater than one. This means that the revenues from these taxes can be expected to grow more rapidly than GDP. In contrast, total consumption taxes are found to have a buoyancy slightly less than one. However, the value added tax, an important consumption tax, has a buoyancy slightly greater than one. The least buoyant of the consumption taxes are the alcoholic beverages tax and the tobacco tax. Here we differ with den Tuinder in that he finds the alcoholic beverages tax to be highly buoyant while we find it not to be buoyant. Finally, we find the customs duties to be not buoyant taxes. Their revenues are likely to grow less rapidly than does GDP.

For further comparison, the buoyancies estimated in this study are shown in Table 5 together with buoyancy estimates from studies of other countries. The studies confirm that income taxes tend to be more buoyant than other taxes. Import taxes are found not to be buoyant except in

TABLE 4

Buoyancies of Ivorian Taxes

| | This Study | den Tuinder Study* |
|---|---|---|
| All taxes | 1.02 | 1.11 |
| Income & profits taxes | 1.37 | ** |
| Income taxes | 1.40 | ** |
| Profit taxes | 1.33 | 1.52 |
| Consumption taxes | .94 | ** |
| Value added tax | 1.09 | 1.42 |
| Excise duties | 1.06 | ** |
| Tobacco tax | .76 | .94 |
| Alcoholic beverages tax | .84 | 1.88 |
| Gasoline tax | 1.40 | 1.73 |
| Customs duties | .89 | ** |
| Import duties | .90 | .95 |
| Export duties | .93 | .86 |

*Source: den Tuinder [1978], p. 71

**Not given

TABLE 5

Comparison of Tax Buoyancies in Other Countries

| Category of Tax | Malaysia[a] | Kenya[a] | Paraguay[b] | Ivory Coast[c] |
|---|---|---|---|---|
| Income taxes | 1.84 | 1.48 | 1.42 | 1.37 |
| Import taxes | .96 | .88 | 1.82 | .90 |
| Export taxes | .83 | -- | -.89 | .93 |
| Excise taxes | -- | 1.31 | .39 | 1.06 |
| Total taxes | 1.70 | 1.42 | 1.69 | 1.02 |

[a]Source: Choudhry [1979], Tables 3 and 4, pp. 104-105.

[b]Source: Mansfield [1972], Table 5, p. 440.

[c]Source: This study.

the case of Paraguay. Export taxes are likewise found not to be buoyant, while the results for excise taxes are indeterminate. In Kenya and the Ivory Coast, excise taxes appear to be buoyant while they appear to be not buoyant in Paraguay. The buoyancy of total taxes is greater than one for all four countries, but least for the Ivory Coast. It is difficult to explain why this is the case. One explanation may be the heavy reliance placed by the Ivory Coast on the less buoyant taxes.

## III. Conclusions

The purpose of this study was to estimate the buoyancy of taxes in the Ivory Coast. This was accomplished by means of a double logarithmic regression relating tax receipts to GDP. We found the Ivorian tax system to be somewhat less buoyant than did an earlier study by den Tuinder [1978]. The most buoyant taxes were identified as the income taxes and the least buoyant were the customs duties and excises on alcohol and tobacco. The buoyancy of total taxes in the Ivory Coast was found to be less than in three other countries. This may be due to heavy reliance in the Ivory Coast on consumption taxes and customs duties.

Should the Ivory Coast move to increase the buoyancy of its tax system by increasing reliance on more buoyant taxes such as the income taxes? This is a difficult question. On the one hand, a buoyant tax system allows government spending to grow more rapidly than GDP. If government invests the funds wisely, this can be desirable. On the other hand, with a buoyant tax system, fluctuations in tax receipts will be greater than fluctuations in income. This leads to instability of tax receipts. The latter must be weighed against the former.

Some shortcomings of this study should be noted. First, our data series was short and did not permit us to explore other influences on tax receipts. A longer data series would be highly desirable. Second, we were not able to control for discretionary changes in tax receipts because of lack of information about such changes. Our goal for future research is to collect a longer data series and information on discretionary tax changes so that these might be incorporated into our study. Despite these shortcomings, we feel that our study has contributed to the understanding of the Ivorian tax system.

FOOTNOTES

[1]Arthur Andersen & Co. (1982), p. 15.

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