Influence of the Fiscal System on Income Distribution in Regions and Small Areas: Microsimulated CGE Model for Côte d'Ivoire

By

Bédia F. Aka
Université de Bouaké, Côte d'Ivoire

and

Souleymane S. Diallo
Centre Ivoirien de Recherches Economiques et Sociales (CIRES), Côte d'Ivoire

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Abstract

The objective of this paper is to examine how a small open economy such as Côte d'Ivoire (CI) can obtain growth-based internal tax resources, and how the tax system affects households and individuals through relative prices. A microsimulated CGE model is used to analyse the effects of an alternative tax system on households by utilizing a survey. It is postulated that the military and political crisis that started in 1999 with the first coup d'etat in Côte d'Ivoire is transitory and that CI has an internal tax policy capacity. This paper indicates that an alternative tax structure can reduce distortion in regional poverty, inequality for households, and in cities and small areas of the country. A model is formulated using Côte d'Ivoire's 1998-based social accounting matrix and the 1998 population survey of 4,200 households. The main findings of this study are that the post-crisis tax policies envisioned by the government (reducing the tax rate on firms, reducing import taxes and increasing taxes on household income) result in an increase in poverty and inequality at the regional, city and small area levels.

JEL classification: F15, O12, O47, C31, C32, C33

Key words: Trade liberalization, regional integration, fiscal policy, poverty, inequality, welfare, microsimulated CGE,beta convergence, sigma convergence, stochastic convergence, panel data, spatial econometrics, spatial autocorrelation, cointegration, economic integration econometrics, spatial autocorrelation, cointegration, economic integration

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1. Introduction

From 1960 to 1979, Côte d'Ivoire's economic development was characterized by a relatively long period of growth due to an increase in the international prices of coffee and cocoa, favourable terms of trade and growth in the industrial sector. The average growth rate of GDP per capita was approximately 5.7%.

During this period of the Ivorian economic miracle, services represented 51% of GDP while agriculture and industry only represented 34% and 15%, respectively. In 1998 the relative share of industry grew to 28% of GDP, which exceeded the share of agricultural value added in GDP (27%), while the services sector remained the most prominent at 44%.

This economic structure led to growth in agricultural exports and revenues that was managed by the CAISTAB[1 2]. These revenues helped the government to undertake various investment programmes in all sectors of the economy. Total investments represented more than 15% of GDP and grew at a rate of 20%, on average, over the period 19601979.

The growth process slowed at the end of 1979 due to a decline in the prices of agricultural products. From the early 1980s the macroeconomic situation worsened, and the emergence of persistent budget deficits constrained government spending which led to a reduction in investment for development programmes that had been initiated. Facing the persistent decline in agricultural prices from the 1980s, the government was forced to engage in structural adjustment programmes (SAPs) suggested by the Bretton-Woods institutions in order to restore macroeconomic equilibrium, improve the efficiency of the economy and enhance growth.

In addition to the SAPs imposed by international financial institutions on Côte d'Ivoire (CI) from the beginning of the 1990s, public enterprises were privatized and there was liberalization in agriculture, mainly cocoa and coffee which came to represent the core of the state's financial system. Alongside these developments, the CFA Franc was devalued by 100%[3] on 12 January 1994.

This set of reforms was translated internally into a decrease in the fiscal base of the state, mainly through the decrease of harbour dues and the deterioration of public infrastructure. Internationally, the increasing liberalization of the CI economy resulted in a loss of revenue from export taxes, requiring more suitable new fiscal instruments.

Moreover, the harmonization of the fiscal system and adoption of the external common tariff (ECT) among West African Economic and Monetary Union (WAEMU) member countries had reduced these governments' external fiscal receipts. The importance of import and export taxes in governments' income required them to reorganize their internal fiscal system according to the limits fixed by the union in order to save their income level. The capacity for growth in these countries is based on setting up and maintaining a solid internal fiscal system. These alternative systems will undoubtedly have an impact on income distribution.

The diversification of the resources of the state is brought about by the modification of the internal fiscal system which will have an impact on economic agents, mainly on households' poverty and income distribution, government revenue, and private-sector activities.

In African countries, and particularly in CI, fiscal reforms generally had a strong social and distributional impact in the past two decades. In effect, the incidence of poverty rose from 10% in 1985 to 38% in 2002. Along with this increase in poverty there was an increase in income inequality. After devaluation there was a loss of revenue for the poorest social categories and an increase in the revenue of the richest, thereby increasing the gap between the two groups of the population. Between 1993 and 1998 the share of revenue of the poorest 10% of the population decreased from 1.4% to 1.2%, while the richest 5% of the population saw their share increase from 25.3% to 29.2% (Grimm et al., 2001).

The distributive impact of fiscal policy merits attention due to the fact that when analysing households' welfare, their income and level of consumption are the main indicators of their standard of living. Any change in fiscal policy necessarily implies a change in price structure which affects consumer preferences (Essama-Nssah, 2000). This change can affect households indirectly through the change in the cost of production factors, and thereby their income. Moreover, the fiscal system could have a direct effect through households' disposable income or the price of goods and services, in other words, on households' preferences and level of consumption.

Despite the consequences of potential fiscal policy choice on the welfare of the population, few detailed studies are related to the distributive effect of fiscal systems in developing countries. Two reasons could explain this lack of research. First, adequate information is not readily available and, second, the major part of fiscal receipts in these countries is derived from indirect taxes which are difficult to evaluate. In order to evaluate the incidence of various taxes, particularly indirect taxes, it is necessary to have a CGE model where production and demand are clearly modelled, as well as a microeconomic database detailing consumption expenditures (Bourguignon, 1999).

The objective of this study is to see how a small open economy such as CI could base its growth on internal fiscal resources and how the fiscal system effects are transmitted to households through the change in relative prices.

Using the hypothesis that the crisis situation in CI is transitory and that the country has an internal fiscal capacity (see Table 1 in the following section), microsimulation CGE techniques are used to model internal fiscal policy reforms and simulate their effects on households and individuals. This shows how internal fiscal policy could be implemented while modifying distortions in terms of poverty and regional inequality for households.

The structure of the rest of the paper is as follows. After Chapter 2, which presents the Ivorian fiscal system, a brief literature review is given in Chapter 3. In Chapter 4 the methodology is discussed, including the microsimulated CGE model, as well as the various income distribution indexes, and the data used in this study. Finally, the simulations results are given in Chapter 5, while Chapter 6 presents the conclusions.

2. Ivorian fiscal system

The tax structure in Côte d'Ivoire was modified on 1 January 2000 by WAEMU agreements between the eight member countries[4]. The involvement of Côte d'Ivoire in the economic integration process indicated its adherence to a harmonized fiscal system that implied some changes to the tax system. The common external tariff (CET) adopted in 1994 was based on: (a) determining a variable custom duty according to four categories of goods[5]; and (b) member states fixing a value added tax (VAT) of between 15% and 20%. This new environment modified the Ivorian government's income sources by changing the structure of direct taxes, indirect taxes and customs duties.

Direct taxes

Direct taxes are composed of seven types of tax, namely general income tax (IGR); tax on industrial and commercial (BIC) and agricultural profits (BA); tax on non-commercial profit (BNC); tax on salaries and treatments (ITS); tax on personal property; tax on contributions and licences; and land tax.

1) General income tax (IGR) is collected on the annual global income of all physical persons resident in Côte d'Ivoire with a revenue exceeding CFAF300,000, relative to a family quotient. This tax is collected at source and Table 1 summarizes the rates:

Table 1: General income tax rates

Class of income (CFA Francs)			Tax rate
301,000	to	525,000	10%
526,000	to	900,000	15%
901,000	to	1,350,000	20%
1,351,000	to	2,250,000	25%
2,251,000	to	3,750,000	35%
3,751,000	to	7,500,000	45%
		> 7,500,000	60%

Moreover, firms transfer 2.5% of the amounts paid to workers to the government.

2) Tax on industrial and commercial (BIC) and agricultural profits (BA) is placed on the profit of commercial, industrial, and artisan professions, and forest exploitation and agricultural and mineral firms. There are two regimes of taxation, real and simplified.

In addition, a first category of firms[6] with an annual turnover of more than CFAF150,000,000 and a second category of firms involved in other activities than the preceding first category, of which the annual turnover including tax is more than CFAF75,000,000, are subject to the real profit regime, while firms in first category with a turnover of less than CFAF150,000,000, or CFAF75,000,000 (in the second category), become subjected to a simplified real or synthetic tax.

A minimum tax is placed on physical or legal persons subject to the real turnover regime. In this case, the tax rate is 0.5% of turnover including tax, which cannot be less than CFAF200,000, except for fuel stations where this minimum is fixed at CFAF500,000.

The minimum lumpsum rates are 0.10% for firms producing and transforming petroleum products or producing and distributing water and electricity, and 0.15% for banking and financial, insurance and reinsurance firms. The maximum limit for the lump sum tax is fixed at CFAF30,000,000.

3) Tax on non-commercial profit (BNC) is placed on liberal professions, with a normal tax rate of 35% of profit, and a lump sum rate of 5% of turnover.
4) Tax on salaries and treatments (ITS), pensions and life annuity, which apply to public and private treatments, carry a rate of 1.5%.
5) Tax on personal properties is composed of two components. The first one is tax on stocks and shares[7] (IRVM), with the following rates: 10% for dividends, 15% for obligations, 6% for products issued in Côte d'Ivoire and refundable within five years, and 12% for all other products. The second is a tax on debt income[8] (IRC), with a rate of 18%.
6) Tax on contributions and licences is variable according to two zones: The district of Abidjan and the rest of CI. This tax applies to wholesalers and semi-wholesalers, with a proportional rate of 18.5%.
7) Land tax applies to built land with a rate of 15% on locative value, and 4% on other land. On non-built land the rate is 4% during the two years following the purchase of the land, 5% after the third year and 6% from the fourth year.

Indirect taxes

Indirect taxes comprise of two parts. The main one is value added tax (VAT), with a normal rate of 20% and a reduced rate of 11% on the before-tax amount, and the other is the tax on goods and services (GST) with a rate of 10% which applies to bank interest and fees.

Customs duties

Customs duties comprise of import and export taxes. Imports are subject to various taxes including: (a) a customs duty with a unique rate of 5%; (b) a fiscal duty with a rate varying between 5% and 30%; (c) a statistical tax of 2.5%; (d) a tax of 0.6% on sea imports; and (e) an inspection before expedition tax rate of 0.75% on free on board (FOB) value.

For exports, a tax called “Droit Unique de Sortie” (DUS) is applied to coffee, cocoa, wood, kola nuts and karite nuts. The rate of this tax varies frequently[9].

The fiscal receipts from these taxes between 1995 and 2004 are shown in Table 2.

Table 2: Public finances of Côte d’Ivoire (billions of CFAF)

	1995	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
Total receipts and gifts	1138.1	1272.5	1372.2	1439.1	1336.5	1270.5	1358	1473	1577	1636
- Fiscal receipts	897.3	1040.7	1112.9	1142.1	1149.1	1077.5	1167	1233	1301	1395
- Direct taxes	202.1	229.5	303.6	327.7	322.3	334.4	326	341	373	406
- Indirect taxes	695.2	811.2	809.3	814.4	826.8	743.1	841	892	928	989
. Goods & services, petrol excluded	167.3	200.3	*227.3*	*240*	*241.1*	*258.3*	*289*	*310*	*333*	*356*
. Imports, petrol included	350.6	382.5	*408.8*	*416.4*	*408.9*	*321.4*	*552*	*582*	*595*	*633*
. Exports	177.4	205.7	*173.2*	*158*	*176.8*	*163.4*	..	..	..	..
- Non-fiscal receipts	205.8	191.3	215.2	246.5	122.5	159.5	168	200	231	191
- Surplus CSSPPA	135.9	70.1	84	131.6	1	8.5	6	7	8	9
- Contrib. social security	52.2	74.3	83.1	79.2	83.7	102.7	114	115	123	132
- Other non-fiscal receipts	17.7	46.9	48.1	35.7	37.8	48.3	29.9	38	40	50
- Telecom charges.							18.1	40	60	0
- Gifts	35	40.5	44.1	50.5	64.9	33.5	23	40	45	50

Source: IMF (2006)

Fiscal receipts increased from 1995, but slowed down in 2000 due to the decline of customs duties in 19981999. This decline is reflected in public finances, which show a decline in non-fiscal receipts, mainly due to the disappearance of the stabilization revenue after CAISTAB was dismantled (see Table 2).

3. Literature review

Various approaches have been used in the literature to quantify the effects of tax on income distribution. Some authors were interested in the lifetime of income (see Bernheim, 1994; Attanasio et al., 1995), while others used CGE models. A third group used microsimulation which encompasses the other two approaches (see Chernik and Reschovsky, 1990; Dickert et al., 1994; Gale et al., 1996). There have been several criticisms against and arguments for these methods (see Gale et al., 1996). The main critiques are concerned with the fact that the lifetime of income is related to the availability of data.

Concerning CGE models, it is shown that intra-group variance is not fixed (Decaluwé et al., 1999). The study on empirical data for CI within the CGE model shows, for example, that intra-group inequality is higher than inter-group inequality which suggests taking into account the heterogeneity among households of the same group (Aka, 2006).

However, despite these insufficiencies, several models have been developed to analyse the negative impacts of adjustment programmes on income distribution and poverty. Bourguignon et al. (1991) developed a macroeconomic model used by Bourguignon et al. (1989) to simulate adjustments in two economies (an African low-income country and a Latin American mid-income country).

In developing countries, research on fiscal reform effects has always followed one of two approaches. First is the CGE approach. Dahl et al. (1986), Mitra (1992), and Dahl and Mitra (1989) examined the macroeconomic effects of fiscal reform without sectoral details. Second, Ahmad and Stern (1987) and Jha and Srinivasan (1989) employed a disaggregated approach, where strong macroeconomic hypotheses are made mainly according to the fixity of factor prices.

Combining the two approaches, Delfin and Mitra (1998) derived the macroeconomic and sectoral effects of trade liberalization with a disaggregation of production in India. Several other studies illustrate the use of CGE models in developing countries, including Rimmer (1995), Dervis et al. (1982), Adelman and Robinson (1988), Sadoulet and de Janvry (1990, 1995), and Keuning and Thorbecke (1989).

In the OECD project, a common structure was developed for the CGE model and applied to various countries to study the impacts of adjustment policies on income distribution. Some of these studies are: Morrisson (1991) for Morocco, Meller (1991) for Chile, and Demery and Demery (1991) for Malaysia. De Janvry et al. (1991) use a CGE model for Ecuador and find that the reduction of current expenditure is the main route to restoring growth and protecting the poor in rural areas. Thorbecke (1991) uses a much-disaggregated CGE model for Indonesia to analyse the impacts of stabilization and structural adjustment programmes. Using several scenarios, he finds that adjustment programmes lead to restored equilibrium and improved income distribution. Lambert et al. (1991) use this structure of the model for Côte d'Ivoire. Their simulation results show that the reduction of public expenditure by cutting wages of employees in the public sector reduces inequality, but it is not sufficient to effectively reduce poverty. An increase of export taxes is regressive in terms of income distribution. Only devaluation can reduce both inequality and poverty in Côte d'Ivoire.

Although CGE models take into account all the interdependencies, they are attacked for their hypotheses on household preference function and for their level of aggregation which does not allow capturing the changes in fiscal policy in detail.

The microsimulation method is found in the works of Orcutt (1957) and Orcutt et al. (1961). Bourguignon et al. (2000) developed microsimulation models using household surveys, but without a CGE model. Decaluwé et al. (1999) present a microsimulated CGE model with 150 households and fictional data, which show that intragroup variances are important. Microsimulated CGE studies using real data were done by Cogneau (1999), Cogneau and Robillard (2000), and Cockburn (2001). Our study follows Cockburn (2001) and we use a microsimulated CGE model to understand the interrelations between the different variables and to analyse their impact on household poverty.

4. Methodology and data

The CGE model containing several representative household categories is the general framework for various studies on the micro impact of macroeconomic policies. The model is used to simulate the modification in the mean income of each household category following a change in consumption prices (see Aka, 2006).

The only way to take into account the heterogeneity among households is modelling each household individually and relaxing the representative agent hypothesis. In the microsimulation CGE method, Cockburn (2001) shows that this implies the construction of a model which includes as many categories as the household survey.

Microsimulated CGE model

In this section, the characteristics of the CGE model and the procedure to implement microsimulation are briefly introduced. The CGE[10] model will be calibrated using a disaggregated recent Social Accounting Matrix (SAM) for Côte d'Ivoire, which will include several accounts. The SAM includes four factors of production: Skilled and unskilled labour, capital and land, which are presented in Appendix A. The equations of the CGE model are presented in Appendix B.

Production

A Leontief-type function, and value added and intermediate consumption are combined to determine production. Value added is obtained according to sectors. In vegetal production branches (food agriculture and export agriculture), it is obtained by combining land and a composite capital-labour factor using a CES function. The composite factor is a combination of labour and capital using CES technology. In other production branches, the value added results from a combination of labour and capital using a CES function.

Income, savings and taxes

Households' income is derived from the remuneration of production factors (capital, labour and land), and transfers from the government, rest of the world and firms. Disposable income, after direct taxes paid to government and transfers to the rest of the world, is used to buy goods and services to satisfy consumption needs. Household savings should be the disposable income residual after consumption.

Firms gain revenue through the return to capital, as well as aid from the government and the rest of the world. Government revenue is collected from fiscal receipts through tax on production, imports and exports and from the return on capital. Public savings is the difference between government revenue and consumption.

Prices

Let us suppose that Côte d'Ivoire is a small, open economy and that the country has no influence on international import and export prices, which are exogenous. Consumption prices help to guarantee equilibrium between supply and demand. It is a function of domestic prices including taxes and import prices plus import taxes. The investment price is a geometric mean of composite goods prices.

Demand

Aggregate demand for each tradeable sector comprises households' consumption expenditure, intermediate consumption and investment expenditures. The structure of households' final consumption is derived from the maximization of an LES function subject to budget constraints.

International trade

The model of external trade is based on the Armington Hypothesis (Armington, 1969) for a small economy with a constant elasticity substitution between imported and domestic goods. From the supply side, producers strive for an optimal distribution of their production between sales in the domestic market and exporting those goods according to a constant elasticity of the transformation function.

Equilibrium and closure of the model

Equilibrium is defined by equality between the supply and demand of goods, combined with factors on all markets. Fiscal reforms are often analysed in "revenue neutral" terms to ensure that the results are not driven by changes induced by the level and composition of investment if the policy simulations produce changes in government saving. Total savings are equal to total investment. Total investment is considered to be exogenous and public savings are fixed, therefore, the equilibrium between investment and savings is obtained by adjusting private savings. Moreover, the current account balance is considered fixed so that equilibrium in the export and import markets is realized through an adjustment of the real exchange rate.

We also assume in the model that public investment, government savings and foreign savings are fixed. Following fiscal reform, government revenue decreases (increases), resulting in the decrease (increase) of government savings, as public investment is fixed. For the equilibrium between total investment and total savings to be realized, private investment must decrease (increase) and there will therefore be less (more) supply than demand (excess demand, or excess supply). It follows that the consumer price index (CPI) will increase (decrease). For example, in the case of an increase in the CPI, the real income of households will decrease and thus poverty will increase in the population.

Introducing microsimulation

First, we use income and expenditure vectors constructed from the household survey data. In the SAM, consumption goods, income and expenditure have to correspond to the categories in the ENV98 survey.

When the two databases are aligned, we increase the number of household categories in the CGE model to match the number of households in the survey (4,200) and we introduce income, expenditure and individual savings. Income and expenditure are multiplied by their weight in the sample before including them in the model. Moreover, labour is segmented between skilled and unskilled in order to analyse the labour market.

Income distribution indexes

Before studying poverty and inequality, welfare, or standard of living, needs to be defined. The living standard for an individual is measured as the individual's level of utility, obtained by the maximization of the individual's utility function for a given income and price system. Given the difficulties with income measurement, surveys in Côte d'Ivoire rely on consumption criteria, and expenditure per capita is therefore retained as welfare indicator. This method follows the utilitarian paradigm, derived from modern microeconomic theory, where welfare is the sum of consumption expenditure on all goods and services. This conception is based on the capacity of individuals to obtain goods, thus on their preferences. The use of per capita consumption allows the identification of several poverty lines in Côte d'Ivoire. The DSA[11] survey (1993) estimated the poverty line as CFAF101,340 per capita income per annum and 32.3% of the population lived below this line (according to official figures). In 1995, the poverty line was CFAF144,000 and 36.8% of the population was below this relative poverty line. This approach arbitrarily determines the poverty line. Sen (1976, 1981, 1985, 1987) proposed the concept of using basic needs, but the utilitarian view is still the main approach in welfare analysis.

Measuring welfare

Various indexes are used in the literature to measure social welfare, for example the Atkinson, S-Gini and Theil indexes, but one of the most used is the Atkinson index (1987) which is defined by:

$$W = \int_0^1 U(Q(p))\omega(p;\rho)dp \tag{1}$$

where ω(p;ρ) is the density of poor, and U(Q(p)) is the living standards utility function Q(p). The social welfare function is then the expected utility for the poorest individual in a sample of ρ individual, 1<ρ<2. In this index, the parameter ρ indicates the weight given to the gap from the mean of living standards. It is an ethical parameter indicating an aversion to inequality.

However, in a CGE model the equivalent variation (EV) and compensatory variation (CV) are also often used to measure social welfare by comparing the utility of households at a price and income in a reference situation, to the utility in the new situation (see Varian 1992; Decaluwé et al. 2001). In fact, it is shown (Willig, 1976; Weber, 2003) that the difference between the two measures is small if the change in welfare is due to a price change of a market commodity, but can be arbitrarily large when the welfare change is induced by a change in a non-market public good, depending on the degree of substitutability between the public good and the commodities on other market (Randall and Stoll, 1980; Hanemann, 1991).

The equivalent and compensating variation are the welfare measures in standard demand theory (Hicks, 1939) that directly correspond to willingness to accept (WTA) and willingness to pay (WTP) (Hanemann, 1991). In this study we use equivalent variation (EV)[12] which is defined as:

$$EV = \left(\frac{P_1^0}{P_1^1}\right)^{\gamma}\left(\frac{P_2^0}{P_2^1}\right)^{1-\gamma} YM_1 - YM_0 \tag{2}$$

where: P_{10}: price of good 1 at base year (before simulation); P_{11}: price of good 1 at year 1 (after simulation);
P_{20}: price of good 2 at base year (before simulation); P_{21}: price of good 2 at year 1 (after simulation); and
YM_0: Household income at base year (before simulation); YM_1: Household income at year 1 (after simulation).

If: EV>0 increase in household welfare; EV<0 decrease in household welfare.

Measuring inequality

Several indexes exist that measure inequality (such as Atkinson, S-Gini, Generalized Entropy), but one of the most used is the Gini index, which is the ratio of the difference between the perfect equality line and the Lorenz curve (see Sen, 1997, for presentation) which is defined by:

$$\frac{GINI}{2}\int_0^1 (\mathrm{p} - \mathrm{L}(\mathrm{p}))dp \tag{3}$$

The Gini coefficient is not properly decomposable into within and between-group inequality and thus will be used at the aggregate level of study. For a disaggregated study of inequality, we will use the Generalized Entropy (GE) inequality index, which is also decomposable by subgroup. The Generalized Entropy inequality indices are also an alternative to the usual Gini index. The Generalized Entropy class of inequality indexes is given by:

$$GE(a) = \frac{1}{a(a-1)}\sum_{i=1}^{n} f\left(\frac{y_i}{\mu}\right)^a - 1;\ a = 0, a \approx 1 \tag{4}$$

where μ is the mean income.

$$GE(1) = \sum_{i-1}^{n} f_i\left(\frac{y_i}{\mu}\right)\left[\log\left(\frac{y_i}{\mu}\right)\right]$$

$$GE(0) = \sum_{i-1}^{n} f_i\left[\log\left(\frac{y_i}{\mu}\right)\right]$$

Each $GE(a)$[13] index can be additively decomposed as $GE(a) = GE_W(a) + GE_B(a)$, where $GE_W(a)$ is within-group inequality and $GE_B(a)$ is between-group inequality.

$$GE_W(a) = \sum_{k=1}^{k=K}\left[v_k^{(1-a)}\right]\left[s_k^a\right]GE_k(a)$$

, where $v_k = N_k / N$ is the number of persons in subgroup k divided by the total number of persons (subgroup population share), and s_k is the share of total income held by k's members (subgroup income share). $GE_k(a)$, inequality for subgroup k, is calculated as if the subgroup were a separate population, and $GE_B(a)$ is derived assuming every person within a given subgroup k received k's mean income μ_k.

Measuring poverty

The determination of the poverty line is controversial when studying income distribution, because of its important political implications (Sen, 1976, 1981; Ravallion, 1996). Two approaches are frequently used to determine the poverty line. The first uses the notion of living standard equivalent distributed equally (EDE), while the second combines the living standard and poverty line in a poverty gap.

In this study, we use the poverty line constructed for Côte d'Ivoire (see Aka, 2006) based on the constant basic needs (CBN) approach by Ravallion and Bidani (1994). Using the ENV98 survey, we chose a basket of 20 goods[14] from the survey,[15] among the 37 items available. With the calorie content of these goods (daily needs fixed at 2,400 calories) and their respective prices (from INS, 2001), we determined the food poverty line in Côte d'Ivoire as CFAF292,030.04 per year (US$1.23 per day). Next, taking into account the regional price index (RPI) for the five strata of the ENV98 survey, this poverty line was determined as CFAF288,816.58 per year (US$1.21 per day), which is used in the study. As we use weights in the survey to compute the poverty line, the poverty line is measured per adult equivalent.

With the poverty line determined, several indexes help to characterize poverty (FGT index; Watts's index, 1968; and Clark, Hemming and Ulph's, or CHU, index, 1981). The FGT index (Foster, Greer, Thorbecke, 1984) is used in this study as it is a more general index. Given y_i, the income for individuals of a population, the FGT[16] index is:

$$P(z;\alpha) = \int_0^1 g(p,z)^\alpha \, dp \tag{5}$$

where α 0 (see Ravallion, 1996). When $\alpha = 0$, the FGT index indicates the proportion P_0 of poor persons whose expenditure level is under the poverty line, and it measures the incidence of poverty. When a=1, the index indicates the poverty gap index, also known as the depth or intensity of poverty, i.e., the mean of the gap between poor people's living standard and the poverty line. When $\alpha = 2$ the index is the poverty severity index, which is sensitive to the distribution of living standard among the poor.

Estimating areas' income distribution

To better capture the shocks of the transmission mechanism on areas, we will classify regions; first, according to the strata of the survey and, second, we will suppose that factors are mobile between strata according to the cities of the survey. A classification based on the 10 new regions in the country is also possible. These classifications will help to study poverty and inequality impacts at a much more disaggregated level.

The data

The empirical base of our CGE model is the Social Accounting Matrix (SAM) that was constructed from the 1997 inputoutput table by Aka (2006), and modified by Diallo, Koné and Kamagaté (2004). The first version of this SAM (built in 2002) included 44 production sectors, two production factors (labour and capital), and 12 institutional agents, including nine categories of households, with the government, firms and the rest of the world added. The initial version was modified by aggregating the production sectors, which were streamlined to 16 sectors. In addition to this modification, the latest version used in this study (see Appendix A) includes four factors of production instead of two. Land, which constitutes a significant factor, was introduced into the agricultural sectors and labour was disaggregated into skilled and unskilled labour. Moreover, modifications are introduced to the value added distribution between the production factors in order to correct for the capital intensive overestimates as they appear in the national accounts. This effort is justified by the fact that the impact of the economic policies can be strongly dependent on the sources of income of households and the factor income of the production that they hold.

We also use the data from the household survey. The ENV98 survey conducted in 1998 for Côte d'Ivoire includes 4,200 households and 25,594 individuals, organized according to five strata (Abidjan, Other Cities, Forest East, Forest West, and Savannah). This survey is the most relevant to Côte d'Ivoire as it was conducted before the political crisis. Finally, we use households from the 1998 census as target population for conditional moments estimations, as its data are closer to the 1998 household survey.

5. Statistical results and policy experiments

Based on the methodological tools and the data presented in the preceding section, we first analyse the poverty and inequality in the base year and then compare the results with the analysis after policy simulations. These results are presented for the five strata of the household survey as well as for the 10 administrative regions and, most importantly, for the cities and small areas of Côte d'Ivoire.

Poverty and inequality analysis in the base year

Following Ravallion and Bidani (1994) who used an absolute poverty line (see Aka, 2006), we find that, overall, the poverty incidence in the base year is 30.90% in Côte d'Ivoire, the same as the figure calculated by Aka (2006). Considering the five strata of the survey, Forest West is the poorest region, followed by Other Cities and Abidjan. When we consider the 10 administrative regions,[17] we can see that Abidjan is the poorest region followed by Bondoukou, Man and Odienne. For small cities and areas the situation is more diverse as the poverty incidence ranges from the highest at 75% (Bingerville), to a low of 5%.

The overall Gini inequality index is 0.60, indicating high inequality in the whole population. Considering the five strata, the results show that inequality is highest in Abidjan, followed by Other Cities and Forest West. When we examine the 10 regions, we see that inequality is highest in Abengourou, followed by Abidjan and Bondoukou. High levels of inequality exist among cities and areas such as Abengourou (0.94), Cocody (0.86), Koumassi (0.79) and Daloa (0.75). A number of cities in these regions have an inequality index which is higher than that of the whole population (0.60).

Poverty and inequality analysis after simulation

Taking into account that import taxes and direct taxes (mainly from firms and production) represent the major part of the country's tax revenue (see Table 2), we first simulate the effects of direct tax on firms, then on import taxes, and thereafter tax on household income. Three arguments support these simulations. First, Côte d'Ivoire is planning a reduction in tax on firms after the crisis in order to foster growth. We simulate this policy by reducing tax on firms (Simulation 1). Second, one of the hypotheses discussed in the WTO and Doha trade liberalization round is the reduction of import tariffs for member countries. The rate of reduction would depend on their level of development;

in the case of Côte d'Ivoire we simulate a reduction in import taxes (Simulation 2). Finally, the Ivorian government decided in 2008 to modify taxes on household income. This policy, which should have been launched in 2009, envisions increasing tax rates for all household categories which could have a negative impact on poverty indexes. Here we simulate a mean increase of households' income tax (Simulation 3). Specifically, we simulate the following:

- A reduction of 10% in taxes on firms (Simulation 1): Reducing tax on firms (Simulation 1) should result in an increase in firms' income and savings. Therefore, private investment should increase leading to excess supply and a decrease in the consumer price index (CPI), which could induce an increase in the real income for households and result in a lower rate of poverty.
- A reduction of 24% in import taxes (Simulation 2): On the other hand, reducing import taxes (Simulation 2) should lead to a decrease in government revenue. As public savings and investment are fixed, private investment will decrease leading to excess demand and thus to an increase in the CPI and, consequently, an increase in poverty.
- An increase of 5% in household income taxes (Simulation 3): Increasing taxes on households' income should result in a reduction of their disposable income and, therefore, a decrease in their consumption and an increase in poverty.

The following results analyse how simulations impact macroeconomic and sectoral variables, and how different prices are determined at the national level.

Following the reduction of tax on firms (Simulation 1), production in all sectors contracts, except in the mining and services sector where outputs expand (see Table C1 in Appendix C). The contraction of production in other sectors could be explained by the fact that several modern firms are financed by foreign capital. Foreign firms have no obligation to invest locally due to Côte d'Ivoire's investment code, which is favourable to foreign capital and enables them to export their savings. Therefore, the expected investment from a tax reduction would not be realized, leading to a decline in production. It is believed that only the mining and services sectors would expand because the resource curse continues. A reduction in import taxes (Simulation 2) also leads to decreased production in all sectors except for mining and services. Export prices and the domestic prices of all goods decrease. Increasing tax on household income (Simulation 3) leads to a decrease in their disposable income and a decrease in the demand for all goods in all sectors but services, which results in a decrease in consumption.

The attention now turns to how simulations affect households in each region and each city of the country. Here we will present the results, firstly, according to the five strata of the household survey (Abidjan, Other Cities, Forest East, Forest West, and Savannah), and, secondly, according to the 10 administrative regions of the country: 1 South (Abidjan); 2 Centre-West (Daloa); 3 North (Korhogo); 4 Centre North (Bouaké); 5 Centre East (Abengourou); 6 West (Man); 7 Centre (Yamoussoukro); 8 North East (BondoukouBouna); 9 South West (San Pedro); and 10 North West (Odienné). Finally, we follow the clusters of the survey containing detailed information about cities and small areas. Concerning cities, for example, Abidjan is divided into nine areas[18] (see Table C6, Appendix C). Other cities are similarly classified.

At the five-regional-strata level (see Table 3), it appears that poverty increases in Forest East following Simulation 1. Poverty also increases in all regions following Simulation 2 and Simulation 3. Poverty increases at a much higher rate in the Abidjan region following Simulations 2 and 3, and appears to be much deeper and more severe in that region, compared with other cities.

Table 3: Poverty in the five regions (percentage variation from base year)

Indexes	Strata	Base year	Simulation 1	Simulation 2	Simulation 3
	Abidjan	0.30	0.00	7.99	4.53
	Other Cities	0.36	0.00	2.55	1.33
p0	Forest East	0.27	0.09	4.35	0.93
	Forest West	0.37	0.00	2.55	0.42
	Savannah	0.25	0.00	3.13	0.81
All		0.31	0.02	3.54	1.31
	Abidjan	0.09	1.43	11.91	4.78
	Other Cities	0.13	1.08	8.33	3.43
p1	Forest East	0.12	0.58	4.57	1.57
	Forest West	0.15	0.82	6.30	2.41
	Savannah	0.11	0.66	5.11	1.88
All		0.12	0.86	6.71	2.60
	Abidjan	0.04	1.82	14.91	5.89
	Other Cities	0.06	1.34	10.67	4.42
p2	Forest East	0.07	0.78	6.10	2.14
	Forest West	0.08	1.03	8.16	3.13
	Savannah	0.07	0.80	6.28	2.31
All		0.07	1.05	8.33	3.23

Source: Authors' calculations

At the 10-region level (Table 4), the overall poverty increases following the three simulations. Under Simulation 1 (10% reduction in tax on firms), poverty increases only in the Forest West region (Man), while in Simulation 2 (24% reduction in import taxes) and Simulation 3 (5% increase in household income taxes) poverty increases in all regions, except North-East region (BondoukouBouna). Following Simulations 2 and 3, poverty increases much more in the San Pedro and Abidjan regions. These two regions have sea ports and are linked to import activities, therefore the poverty result following Simulation 2 is to be expected, as government revenue and private investment decrease. The results from Simulation 3 in these two regions are self-explanatory.

Poverty is much more diversified at the city and small area level. While the poverty incidence (P_0)[19] increases with the simulations, depending on areas, the depth, or intensity (P_1) and severity (P_2), of poverty also increases in all areas following the simulations. Poverty distribution among the areas shows a high poverty level for all big cities in the base year, as well as after the policy shocks (see Table C2 in Appendix C).

Table 4: Poverty in the ten regions (percentage variation from base year)

Indexes		Base year	Simulation 1	Simulation 2	Simulation 3
	(1) Abidjan	0.36	0.00	4.71	2.42
	(2) Daloa	0.28	0.00	3.71	1.21
	(3) Korhogo	0.27	0.00	4.63	2.21
	(4) Bouake	0.25	0.00	2.15	0.19
p0	(5) Abengourou	0.33	0.00	4.02	0.00
	(6) Man	0.34	0.18	1.95	0.20
	(7) Yamoussoukro	0.32	0.00	0.17	0.00
	(8) Bondoukou	0.35	0.00	0.00	0.00
	(9) San Pedro	0.27	0.00	11.15	0.39
	(10) Odienne	0.33	0.00	2.64	2.64
All		0.31	0.02	3.54	1.31
	(1) Abidjan	0.13	1.04	8.36	3.21
	(2) Daloa	0.12	0.69	5.36	1.90
	(3) Korhogo	0.12	1.02	8.00	3.74
	(4) Bouake	0.10	0.81	6.14	2.35
p1	(5) Abengourou	0.15	0.75	5.75	2.41
	(6) Man	0.15	0.73	5.54	2.13
	(7) Yamoussoukro	0.12	0.95	7.17	2.90
	(8) Bondoukou	0.14	0.82	6.24	2.37
	(9) San Pedro	0.08	1.24	10.11	3.36
	(10) Odienne	0.14	0.68	5.32	2.11
All		0.12	0.86	6.71	2.60
	(1) Abidjan	0.06	1.29	10.29	3.95
	(2) Daloa	0.07	0.90	7.08	2.52
	(3) Korhogo	0.07	1.31	10.35	4.94
	(4) Bouake	0.06	0.96	7.61	2.85
p2	(5) Abengourou	0.09	0.91	7.21	3.00
	(6) Man	0.08	0.91	7.14	2.68
	(7) Yamoussoukro	0.06	1.19	9.43	3.71
	(8) Bondoukou	0.07	1.13	8.96	3.34
	(9) San Pedro	0.04	1.26	10.29	3.40
	(10) Odienne	0.08	0.74	5.88	2.34
All		0.07	1.05	8.33	3.23

Source: Authors' calculations

The results indicate that overall inequality decreases from the base year following the policy shocks, but at the disaggregated cities and small areas level various inequality situations prevail (see Table C5 in Appendix C). In all cases, within-group inequality is higher than between-group equality (see Table C4 in Appendix C).

At the five-stratum level (top panel, Table 5) the Gini and the GE[20] indexes indicate a decrease in inequality for all simulations, except for Forest West. At the ten-region level (bottom panel, Table 5), the inequality situation is much more diversified. There is no variation in inequality following Simulation 1, while in Simulations 2 and 3 inequality increases in all regions, except Daloa and Odienne.

At the cities and small-areas level (see Table C5 in Appendix C), inequality is much more diversified, with cities having higher inequality than the overall inequality, and cities below the general inequality index.

Table 5: Inequality in regions

Regions	Base year			Sim 1			Sim 2			Sim 3		
5 regions	**GE(0)**	**GE(1)**	**Gini**	**GE(0)**	**GE(1)**	**Gini**	**GE(0)**	**GE(1)**	**Gini**	**GE(0)**	**GE(1)**	**Gini**
Abidjan	1.78	3.17	0.87	1.03	2.01	0.73	1.03	2.02	0.73	-42.25	-36.29	-15.90
Other Cities	1.5	3.31	0.82	0.93	1.63	0.68	0.94	1.64	0.68	-37.59	-50.31	-16.91
Forest East	0.54	0.48	0.53	0.52	0.46	0.51	0.52	0.46	0.51	-3.94	-4.30	-3.31
Forest West	0.65	0.55	0.56	0.64	0.56	0.57	0.64	0.56	0.57	-1.45	1.36	1.04
Savannah	0.47	0.44	0.49	0.43	0.39	0.47	0.43	0.39	0.47	-9.18	-12.49	-4.78
	Base year			**Sim 1**			**Sim 2**			**Sim 3**		
10 regions	**GE(0)**	**GE(1)**	**Gini**	**GE(0)**	**GE(1)**	**Gini**	**GE(0)**	**GE(1)**	**Gini**	**GE(0)**	**GE(1)**	**Gini**
(1) Abidjan	0.91	1.2	0.69	0.91	1.2	0.69	0.92	1.22	0.7	1.14	1.44	0.98
(2) Daloa	0.57	0.58	0.54	0.57	0.58	0.54	0.57	0.57	0.54	0.04	-1.18	0.01
(3) Korhogo	0.57	0.53	0.54	0.57	0.53	0.54	0.57	0.53	0.55	0.23	0.90	1.07
(4) Bouake	0.53	0.46	0.51	0.53	0.46	0.51	0.53	0.46	0.51	-0.43	-0.69	0.75
(5) Abengourou	1.87	3.82	0.86	1.87	3.82	0.86	1.88	3.84	0.86	0.31	0.49	0.04
(6) Man	0.51	0.44	0.5	0.51	0.44	0.5	0.51	0.44	0.5	0.49	-0.78	0.94
(7) Yamoussokro	0.58	0.55	0.55	0.58	0.55	0.55	0.58	0.55	0.55	0.48	0.71	0.34
(8) Bondoukou	0.7	0.65	0.6	0.7	0.65	0.6	0.7	0.65	0.6	0.53	-0.52	-0.24
(9) San Pedro	0.59	0.55	0.56	0.59	0.55	0.56	0.59	0.55	0.56	0.28	-0.59	0.42
(10) Odienne	0.46	0.42	0.49	0.46	0.42	0.49	0.46	0.41	0.49	-0.27	-1.68	0.56

Source: Authors' calculations

6. Conclusion and policy implications

This work analysed the effects of alternative taxes on income distribution in Côte d'Ivoire using a microsimulated CGE model that takes into account both the interdependence and heterogeneity among households.

The main findings of the study suggest that in the base year the overall poverty incidence in Côte d'Ivoire is 30.90%, the same as that computed by Aka (2006). At a disaggregated level, considering the five strata of the survey, it was seen that Forest West is the poorest region, followed by Other Cities and Abidjan. When we consider the 10 new regions[21], we can see that Abidjan is the poorest region, followed by Bondoukou, Man and Odienne. For small cities and areas the situation is more diversified and the poverty incidence ranges from the highest at 75% (Bingerville) to the lowest at 5%.

Regarding inequality in the base year, the overall Gini index of 60% indicates high inequality in the whole population. Considering the five strata, the results show that inequality is high in Abidjan, followed by Other Cities and Forest West. When we examine the 10 regions, we see that inequality is highest in Abengourou, followed by Abidjan and Bondoukou. High levels of inequality were also prevalent among cities and areas, such as Abengourou (94.2%), Cocody (86.4%), Koumassi (79.8%) and Daloa (75.4%). There are a number of cities with an inequality index higher than that of the whole population (60%).

The overall poverty increases following the three tax policy simulations. At the five-regional-strata level, it appears that poverty increases in Forest East following Simulation 1. Following Simulation 2 and Simulation 3, poverty increases in all regions. At the 10-region level, poverty increases only in the West region (Man) under Simulation 1, while in Simulations 2 and 3 poverty increases in all regions except the North East (BondoukouBouna).

Poverty is much more diversified at the city and small area level. While the poverty incidence (Po) increases through simulations, depending on the area, the depth, or intensity (P1) and severity (P2), of poverty increases in all areas following the simulations. Poverty distribution among areas shows a high poverty level in all big cities in the base year, as well as after the policy shocks.

The results indicate that the overall inequality decreases from the base year following the policy shocks, but at the disaggregated level various situations prevail. At the five-stratum level the Gini and the GE indexes indicate a decrease in inequality for all simulations, except for Forest West. At the 10-region level, the inequality situation is much more diverse. There is no variation in inequality following Simulation 1, while under Simulations 2 and 3 inequality increases in all regions except Daloa and Odienne. At the cities and small areas level, inequality is even more diversified, with cities registering higher inequality than the overall level, while others are below the general inequality index.

The overall results of this study indicate that, in all cases, within-group inequality is higher than between-group inequality, as found in previous studies. The findings allow for locating poverty and inequality in very small areas in the country, thereby enabling policy makers to tackle poverty and inequality at the various area levels presented in this study.

The results show that the fiscal policy envisioned by the Ivorian government could have non-expected negative poverty and inequality impacts. In effect, the nine-year political crisis has exacerbated income distribution inequality among the population, as indicated in the last 2008 household income survey by the INS (Institut National de la Statistique). Therefore, it can be concluded that policy makers should research alternative tax rates and combinations thereof before implementing policies.

Notes

1. Caisse de Stabilisation et de Soutien du prix des produits agricoles (public marketing boards).

2. The liberalization policy suggested by international financial institutions to mitigate the economic crisis led to the dismantling of the CAISTAB into five entities: the ARCC (Autorité de Régulation de Café et Cacao), FRC (Fonds de Régulation de Café et Cacao), BCC (Bourse du Café et du Cacao), FGCCC (Fonds de Garantie des Coopératives Café Cacao), and FDPCC (Fonds de Développement et de Promotion des Activités des Producteurs de Café et de Cacao). Since June 2008 all the managers of these entities have been imprisoned for mismanagement, and there are calls to return to an entity similar to the former organization, CAISTAB.

3. The rate of devaluation is computed as follows: (FCFA100 - FCFA50)/ FCFA50=1*100=100%. Note that the CFA Franc is linked to the euro through the French Franc with a parity of 1 euro=655.957 FCFA; while 1 euro=6.559 French Franc.

4. Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo.

5. Social goods (0%), first necessity (5%), semi-processed products (10%), final consumption goods and other goods not recorded elsewhere (20%).

6. Property dealers and lotisseurs, selling of goods, objects, stationery and foodstuffs to be taken or to be consumed on the spot, supply of housing, agricultural companies and breeding.

7. Rate: 12% for all products except stocks, 25% on stocks paid to stockholders, 6% on all products, 18% for distributed value added which is not subject to value added tax (BICS) or a reduced rate.

8. Rates: 18%, but 13.5% on personal deposits and 16.5% for firms.

9. See APEX-CI (an association for exports promotion); APEX CI, Association pour la Promotion des Exportations de Côte d'Ivoire, Abidjan.

10. Inspired by Decaluwé et al. (1999), and based on Aka (2006).

11. Dimension structurelle de l'adjustement.

12. Equivalent variation (EV) uses current prices as a base and asks: What income change is needed to make a person as well off as without the change? It is the *minimum* amount of compensation an individual is *willing to accept*, or the *maximum* amount he is *willing*

to pay, for a move from the initial to the final situation. The objective is to leave them as well off as in the original situation than they would have been without the change.

13. The inequality indexes differ in their sensitivities to income differences in different parts of the distribution. The more positive a is, the more sensitive *GE(a)* is to income differences at the top of the distribution; the more negative a is, the more sensitive it is to differences at the bottom of the distribution. *GE(0)* is the mean logarithmic deviation, *GE(1)* is the Theil index, and *GE(2)* is half the square of the coefficient of variation. The more positive $e>0$ (the 'inequality aversion parameter') is, the more sensitive *A(e)* is to income differences at the bottom of the distribution. The Gini coefficient is most sensitive to income differences in the middle (more precisely, the mode).

14. 1 Rice; 2 maize; 3 milo; 4 fresh cassava; 5 flour cassava; 6 yam; 7 banana plantain; 8 taro; 9 palm nut; 10 groundnut butter; 11 okra, onion and tomato; 12 fruits; 13 tomato paste; 14 sugar; 15 attiéké; 16 pasta; 17 biscuits; 18 fish and shellfish; 19 poultry; and 20 beef, mutton, goat and pork.

15. List of 37 foodstuffs from ENV98: 1 Rice; 2 maize; 3 milo; 4 fresh cassava; 5 flour cassava; 6 gari and tapioca; 7 other cassava; 8 yam; 9 banana plantain; 10 taro; 11 palm nut; 12 groundnut butter; 13 other nuts; 14 okra onion and tomato; 15 palm oil; 16 fruits; 17 game meat 18 eggs; 19 alcohol; 20 sugar; 21 milk product; 22 bread; 23 attiéké; 24 pasta; 25 biscuits; 26 fish and shellfish; 27 manufactured oil; 28 poultry; 29 beef, mutton, goat, and pork; 30 butter; 31 salt; 32 non-alcoholic drinks; 33 stock cube; 34 tomato paste; 35 meal cooked outside; 36 meal consumed outside; and 37 other foods.

16. The FGT indexes are decomposable, which helps to focus on the contributions of different groups of households to global poverty. The contribution of each socioeconomic group to global poverty is given by: $C_j = K_j P_{x_j} / P_\alpha$
where Px,j is the poverty index for group j, and Kj the proportion of the population in group j. The Atkinson and the Generalized Entropy Inequality indexes are also decomposable for within-group and between-group inequalities. In effect, the knowledge of groups' contributions to the total index could be useful for formulating more precise economic policies geared at the most vulnerable groups.

17. 1 South (Abidjan); 2 Centre West (Daloa); 3 North (Korhogo); 4 Centre North (Bouaké); 5 Centre East (Abengourou); 6 West (Man); 7 Centre (Yamoussoukro); 8 North East (BondoukouBouna); 9 South West (San Pedro); and 10 North West (Odienné). This subdivision corresponds to the 10 administrative regions of Côte d'Ivoire (division made in March 1991). But actually the country is composed of 19 administrative regions (division made in 2000).

18. 1 Abobo; 2 Adjame; 3 Attecoube; 4 Cocody; 5 Koumassi; 6 Marcory; 7 Port-Bouet; 8 Treichville; and 9 Yopougon.

19. P_0 is the poverty incidence, indicating the proportion of poor people whose expenditure level is under the poverty line.

20. Inequality is estimated on the basis of per capita expenditure and measured using a General Entropy Class measure with a parameter value of 0. This is often referred to as the Theil L measure, or the mean log deviation, and is a measure that places considerable weight on inequalities among the poor. In fact, GE(0) is the mean logarithmic deviation, while GE(1) is the Theil index.

21. 1 South (Abidjan); 2 Centre West (Daloa); 3 North (Korhogo); 4 Centre North (Bouaké); 5 Centre East (Abengourou); 6 West (Man); 7 Centre (Yamoussoukro); 8 North East (BondoukouBouna); 9 South West (San Pedro); and 10 North West (Odienné).

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Appendixes

Appendix A: Aggregate one household SAM

	NQLAB	QLAB	GLAB	CAP	LAND	HH	FIRM	GOV	ROW	TP	TI	TIM	TIE
NQLAB													
QLAB													
CAP													
LAND													
HH	983	890	304	1,356	852		65	769	10				
FIRM				624				54	74				
GOV				179		225	247		-44	189	253	136	292
ROW						425	191	30					
TP													
TI													
TIM													
TIE													
AGV													
AGIE													
AAG													
SEXPL													
EPPC													
INDM													
INDAG													
INDTB													
INDTH													
INDBO													
INDCH													
INDME													
PDEL													
CACTI													
SER													
NTSER													
AGV						717							
AGIE						66							

continued next page

Appendix A: Continued

	NQLAB	QLAB	GLAB	CAP	LAND	HH	FIRM	GOV	ROW	TP	TI	TIM	TIE
AAG													
SEXPL						97							
EPPC						177							
INDM													
INDAG						823							
INDTB						75							
INDTH						227							
INDBO						139							
INDCH						457							
INDME						178							
PDEL						40							
CACTI						301							
SER						633							
NTSER								873					
AGV									3				
AGIE									1,125				
AAG													
SEXPL									9				
EPPC									2				
INDM									62				
INDAG									520				
INDTB													
INDTH									151				
INDBO									178				
INDCH									560				
INDME									109				
PDEL									29				
CACTI									26				
SER									245				
NTSER													
ACC						649	249	-248	165				
TOTAL	983	890	304	2,158	852	5,229	752	1,4778	3,224	189	253	136	292

Appendix A: Continued

AGV	AGIE	AAG	SEXPL	EPPC	INDM	INDAG	INDTB	INDTH	INDBO	INDCH	INDME	PDEL	CACTI	SER	NTSER
111	83	4	12	91	5	114	1	53	46	31	82	2	51	299	
62	27	3	3	22	7	89	6	28	40	149	26	22	155	251	
															304
48	104	9	17	12	23	201	10	118	148	283	133	29	251	461	311
477	375														
	-1				1	7	13	1	5	5	5	46	2	105	
	270					10			7	5					
74				4		74				1					14
						95	12	29		22					
1	19														
						2			127					3	
				4		170									1
					3	4			8	245			18	16	
				10		245				1					13
				2		5		74	1	6	1			1	7
	10			1	1	16		6	42	13	2	2	77	32	15
14	91	2	12	5	7	69	10	59	35	266	12	14	117	195	58
23	24		37	5	3	73	1	13	21	43	172	23	119	148	52
						14		7	9	9	3	15	2	22	43
2	6	1			2	1		1	9	2	1	1	3	37	22
27	318	2	126	29	20	199	14	72	130	377	173	17	49	276	60
839	1,326	20	207	185	72	1,389	67	460	629	1,459	611	188	844	1,855	873

continued next page

Appendix A: Continued

AGV	AGIE	AAG	SEXPL	EPPC	INDM	INDAG	INDTB	INDTH	INDBO	INDCH	INDME	PDEL	CACTI	SER	NTSER
45	17			183	219	242	1	36	16	440	474	1		906	
						29	7	14	4	89	99	4		6	
6	3					36		6	3	33	49				
835															
	201														
		20													
			199												
				183											
					9										
						869									
							67								
								309							
									451						
										898					
											502				
												159			
													818		
														1,610	
															873
886	221	20	199	366	229	1,176	75	366	473	1,461	1,125	164	818	2,522	873

continued next page

Appendix A: Continued

AGV	AGIE	AAG	SEXPL	EPPC	INDM	INDAG	INDTB	INDTH	INDBO	INDCH	INDME	PDEL	CACTI	SER	NTSER	ACC	TOTAL
																	983
																	890
																	304
																	2,158
																	852
																	5,229
																	752
																	1,478
																	3,224
																	189
																	253
																	292
3																	839
	1,125																1,326
																	20
			9														207
				2													185
					62												72
						520											1,389
																	67
								151									460
									178								629
										560							1,459
											109						611
												29					188
													26				844
														245			1,855
																	873

continued next page

Appendix A: Continued

AGV	AGIE	AAG	SEXPL	EPPC	INDM	INDAG	INDTB	INDTH	INDBO	INDCH	INDME	PDEL	CACTI	SER	NTSER	ACC	TOTAL
																2	886
-																3	221
																	20
																-30	199
																13	366
																-66	229
																84	1,176
																	75
																40	366
																118	473
																39	1,461
																190	1,125
																	164
																429	818
																	2,522
																	873
																	3
																	1,125
																	0
																	9
																	2
																	62
																	520
																	0
																	151
																	178
																	560
																	109
																	29
																	26
																	245
																	0
																	816
3	1,125		9	2	62	520		151	178	560	109	29	26	245		816	

Appendix B: Model equations

Production and factors demand

1. $CI_i = io_i * XS_i$

2. $VA_i = v_i * XS_i$

3. $DI_{i,j} = aij_{i,j}\ CI_j$

4. $$CF_{agr} = A^{cfl}_{agr}\left[\alpha^{cl}_{agr} LD^{-\rho^{cfl}_{agrr}}_{agr} + (1-\alpha^{cfl}_{agr}) KD^{-\rho^{cf}_{agr}}_{agr}\right]^{-1/\rho^{cf}_{agr}}$$

5. $$VA_{nagr} = A^{kl}_{nagr}\left[\alpha^{kl}_{nagr} LD^{-\rho^{kl}_{ngr}}_{nagr} + (1-\alpha^{kl}_{nagr}) KD^{-\rho^{kl}_{ngr}}_{nagr}\right]^{-1/\rho^{kl}_{ngrr}}$$

6. $$VA_{gse} = A^{kl}_{gse}\left[\alpha^{kl}_{gse} LD^{-\rho^{kl}_{gse}}_{gse} + (1-\alpha^{kl}_{gse}) KD^{-\rho^{kl}_{gse}}_{gse}\right]^{-1/\rho^{kl}_{gse}}$$

7. $$CF_{agr} = A^{cfl}_{agr}\left[\alpha^{cl}_{agr} LD^{-\rho^{cfl}_{agrr}}_{agr} + (1-\alpha^{cfl}_{agr}) KD^{-\rho^{cf}_{agr}}_{agr}\right]^{-1/\rho^{cf}_{agr}}$$

8. $$\frac{LAND_{agr}}{CF_{agr}} = \left[\left(\frac{1-\alpha^{ll}_{agr}}{\alpha^{ll}_{agr}}\right)\left(\frac{rc_{agr}}{rl_{agr}}\right)\right]^{\rho^{ll}_{ngse}}$$

9. $$\frac{KD_{ngse}}{LD_{ngse}} = \left[\left(\frac{1-\alpha_{ngse}^{kl}}{\alpha_{ngse}^{kl}}\right)\left(\frac{w_{ngse}}{r_{ngse}}\right)\right]^{\sigma_{ngse}^{kl}}$$

10. $$LD_{gse} = \frac{P_{gse}XS_{gse} - \sum_{i} DI_{i,gse}PD_{i}}{w_{gse}}$$

11. $$LDi = A_i^q\left[\alpha_i^q QLD_i^{-\rho_i^q} + (1-\alpha_i^q)NQLD_i^{-\rho_i^q}\right]^{-1/\rho_i^q}$$

12. $$\frac{NQLD_i}{QLD_i} = \left[\left(\frac{1-\alpha_i^q}{\alpha_i^q}\right)\left(\frac{wq_i}{wnq_i}\right)\right]^{\sigma_i^q}$$

13. $PV_i * VA_i = P_i * XS_i - \sum_j PC_j DI_{j,i}$

14. $r_{nagr} * KD_{nagr} = PV_{nagr} * VA_{nagr} - w_{nagr} * LD_{nagr}$

15. $r_{agr} * KD_{agr} = rc_{agr} * CG_{agr} - wag_{agr} * LD_{agr}$

16. $rc_{agr} * CF_{agr} = PV_{agr} * VA_{agr} - rl_{agr} * LAND_{agr}$

17. $w_{nagr} * LD_{nagr} = wq_{nagr} * QLD_{nagr} + wnq_{nagr} * NQLD_{nagr}$

18. $PD_i = PL_i$

19. $PM_m = (1+tm_m) * e * PWM_m$

20. $PE_x = e * Pfob_x/(1+te_x)$

21. $P_x * XS_x = PD_x * D_x + PE_x EX_x$

22. $P_{nx} * XS_{nx} = PD_{nx} * D_{nx}$

23. $PC_{m} * Q_{m} = (1+ctax * tx_{m}) * [PD_{m} * D_{m} + PM_{m} * IM_{m}]$

24. $PC_{nm} * Q_{nm} = (1+ctax * tx_{nm}) * [PD_{nm} * D_{nm}]$

25. PINV = $PINV = \prod_{i} \left(\frac{PC_{i}}{\mu_{i}} \right)^{\mu_{i}}$

26. $PINDEX = \sum_{i} \delta_{i} * PV_{i}$

International trade

27. $EXD_{x} = EXDO_{x} \left[{Pwe_{x}} \big/ {Pfob_{x}} \right]^{\varepsilon_{x}}$

28. $XSx = B_{x}^{e} \left[\beta_{x}^{e} EXS_{x}^{k_{x}^{e}} + (1 - \beta_{x}^{e} D_{x}^{k_{x}^{e}} \right]^{1/k_{x}^{e}}$

29. $\frac{Dx}{EXSx} = \left[\left(\frac{1-\beta_{x}^{e}}{\beta_{x}^{e}} \right) \left(\frac{PE_{x}}{P_{x}} \right) \right]^{\varepsilon_{x}^{e}}$

30. $XS_{nx} = D_{nx}$

31. $Qm = A_{m}^{im} \left[\beta_{m}^{im} * IM_{m}^{-k_{m}^{im}} + \left(1 - \beta_{m}^{im}\right) * D_{m}^{-k_{m}^{im}} \right]^{-1/k_{m}^{im}}$

32. $\frac{IMm}{Dm} = \left[\left(\frac{1-\beta_{m}^{im}}{\beta_{m}^{im}} \right) \left(\frac{PM_{m}}{PD_{m}} \right) \right]^{\varepsilon_{xm}^{im}}$

33. $Q_{nm} = D_{nm}$

34. $$CAB = \sum_{ngse} r_{gse} * \lambda r^{row}_{ngse} * KS^{row}_{ngse} + \sum_{agr} r_{agr} * \lambda l^{row}_{agr} * LANS^{row}_{agr} + \sum_{i} Pwm_i * IM_i + \sum TRF^{row}_{agnt} PINDEX - \sum_{x} Pfob * EX_x - \sum_{agn} TRF^{row}_{agn} PINDEX$$

Income and savings

35. $$YH_h = \sum wq_{ii} * \lambda wq^h_i * QLS^h_i + \sum_i wnq_i * \lambda wnq^h_i * NQLS^h_i + \sum_{ngse} r_{gse} * \lambda r^h_{ngse} * KS^h_{ngse} + \sum_{agr} r_{agr} * \lambda l^h_{agr} * LANS^h_{agr} + \sum_{agnt} TRF^h_{agnt} * PINDEX$$

36. $$YF = \sum_{ngse} r_{gse} * \lambda r^{firm}_{ngse} * KS^{firm}_{ngse} + \sum_{agr} r_{agr} * \lambda r^{firm}_{agr} * LANS^{firm}_{agr} + \sum_{agnt} TRF^{firm}_{agnt} * PINDEX$$

37. $$YG * Pindex = \sum_{ngse} r_{gse} * \lambda^{gov}_{ngse} * KS^{gov}_{ngse} + \sum_{agr} r_{agr} * \lambda l^{gov}_{ngse} LANS + \sum TI_i + \sum_{agnt} TRF^{gov}_{agnt} * PINDEX$$

$$\sum_{agnt} TRF^{gov}_{agnt} * PINDEX$$

38. $$YDH_h = YH_h - DTH_h - \sum_{agn} TRF^h_{agn} * PINDEX$$

39. $SH_h = pms*cpms_h*YDH_h + SHO_h*PINDEX$

40. $$SF = YF - DTF - \sum_{agn} TRF^{firm}_{agn} * PINDEX$$

41. $SG * PINDEX = YG - \sum_i {}_i G_i - \sum_{agn} TRF_{agn}^{gov} * PINDEX$

Taxes

42. $TI_m = ctax * tx_m * [PD_m * D_m + PM_m * IM_m]$

43. $TI_{nm} = ctax * tx_{nm} * [PD_{nm} * D_{nm}]$

44. $TIM_m = tm_m (e * PWM_m * IM_m)$

45. $TE_x = te_x (PWE_x EX_x)$

46. $DTH_h = cty * ty_h * YH_h$

47. $DRF = tyf * YF$

48. $TIP_i = (tp_i + ctp_i + tp_i * ctp_i) * P_i * XS_i$

Demand

49. $CTH_h = YDH_h - SH_h$

50. $C_{h,i} * PC_i = \overline{CMIN}_{h,i} * PC_i + \lambda_{h,i} \left(CTH_h - \sum_j \overline{CMIN}_{h,j} * PC_j \right)$

51. $CG_i * PC_i = G_i$

52. $INV_i * PC_i = \mu_i * IT$

53. $ITVOL * PINV = IT$

54. $DITi = \sum_{j} DI_{i,j}$

Equilibrium

55. $Q_i = \sum_{h} C_{h,i} + CG_i + DIT_i + INV_i$

56. $EXS_x = EXD_x$

57. $IT = \sum_{h} SH_h + SF + SG + CAB * e$

Factors

58. $\sum_{h,i} \lambda wq_i^h * QLSh = \sum_{i} QLD_i$

59. $\sum_{h,i} \lambda wnq_i^h * NQLS_h = \sum_{i} NQLD_i$

60. $\sum_{agn,ngse} \lambda r_{ngse}^h * KS_{agn} = \sum_{ngse} KD_{ngse}$

61. $\sum_{agn,agr} \lambda l_{agr}^h * LANS_{agn} = \sum_{agr} LAND_{agr}$

62. $$EVh = \prod_{i} \left(\frac{PCO_i}{PC_i} \right)^{\lambda_{h,i}} * \left(CTHh - \sum_{i} \overline{C}_{h,i} PC_j \right) - \left(CTHO_h - \sum_{i} \overline{C}_{h,i} PCO_i \right)$$

Variables

Prices

W (I)	Average weighted wage rate
Wq (I)	Skilled wage rate
Wnq (I)	Unskilled wage rate
r (NGSE)	Rate of return to capital in sector
rl (AG)	Rate of return to agricultural land
rc (AG)	Return to composite factor
P (I)	Producer price of good I
PD (I)	Domestic price of good TR including tax
PV (I)	Value added price for Sector I
PL (I)	Domestic price of good excluding tax
PC (I)	Price of composite good
PM (M)	Domestic price of imported good
PE (X)	Domestic price of exported good
PFOB (X)	Exported price (free on board)
PWM (M)	World price of import (foreign currency)
PWE (X)	World price of export (foreign currency)
PINDEX	Producer price index
PINV	Price index of investment
e	Exchange rate

Production

XS (I)	Production of Sector I
VA (I)	Value added in Sector I (volume)
DI (I, J)	Intermediate consumption of good TR in Sector J
CI (I)	Total intermediate consumption of Sector I

Factors

KD (NGSE)	Sector NGSE demand for capital
LAND (AG)	Agricultural land
CF (AG)	Composite agricultural capital-labour factor
LD (I)	Sector I demand for aggregate labour
QLD (I)	Sector I demand for skilled labour
NQLD (I)	Sector I demand for unskilled labour
KS (AGN)	Capital supply
LANS (AGN)	Land supply
QLS (H)	Skilled labour supply
NQLS (H)	Unskilled labour supply

Demand

C (I, H)	Household H consumption of good (volume)
CTH (H)	Household H total consumption (value)
INV (I)	Investment in good (volume)
IT	Total investment (value)
ITVOL	Total investment (volume)
DIT (I)	Intermediate demand for good
G (I)	Total public consumption (value)
CG (I)	Total public consumption (volume)
D (I)	Demand for domestic good
Q (I)	Demand for composite good

International trade

IM (M)	Imports of good
EXS (X)	Exports supply of good
EXD (X)	Exports demand of good
CAB	Current account balance

Income and savings

YH (H)	Household H income
YDH (H)	Household H disposal income
YF	Firms’ income
YG	Government income
SH (H)	Household H savings
TRSH (H)	Transitory savings for household H
SF	Firms’ savings
SG	Government savings
TRF (AGN, AGNT)	Transfers
TI (I)	Receipts from indirect tax
TIP (I)	Receipts from production tax
TIM (M)	Receipts from import duties
TIE (X)	Receipts from tax on exports
DTH (H)	Receipts from direct taxation on household H income
DTF	Receipts from direct taxation on firms income
cmps	Adjustment variable for household savings
adj	Adjustment variable for indirect taxes

Others

EV (H)	Equivalent variation for household H

Parameters

Parameters in CES between labour and capital in private sectors

A_kl (NAG)	Scale parameter (CES between labour and capital)
alpha_kl (NAG)	Share parameter (CES between labour and capital)
sigma_kl (NAG)	Substitution elasticity (CES capital labour)
rho_cf (AG)	Substitution parameter (CES capital labour)

Parameters in CES between composite factor and land in agriculture sectors

A_cf (AG)	Scale parameter (CES between composite factor and land)
alpha_kl (NAG)	Share parameter (CES between composite factor and land)
sigma_cf (AG)	Substitution elasticity (CES composite factor land)
rho_sk (AG)	Substitution parameter (CES composite factor land)

Parameters in CES between labour and capital in agriculture

A_cf (AG)	Scale parameter (CES between skilled labour and unskilled labour)
alpha_sk (I)	Share parameter (CES between skilled labour and unskilled labour)
sigma_sk (I)	Substitution elasticity (CES between skilled labour and unskilled labour)
rho_sk (I)	Substitution parameter (CES between skilled labour and unskilled labour)

Parameters in production functions

io (I)	Coefficient (Leontief total intermediate consumption)
v (I)	Coefficient (Leontief value added)
aij (I,J)	Inputoutput coefficient
delta (I)	Share of Sector I in total value added

Parameters in income and savings

gamma (H,I)	Marginal share of good I in LES consumption function
C_MIN (H, I)	Minimum consumption of good I (LES consumption function)
mps (H)	Propensity to save for household H
SHO(H)	Transitory saving for household H
mu (I)	Share of the value of good I in total investment
lambda (AGN, AGR)	Share of sectoral land income received by agent AGN

lambda_r (AGN, I)	Share of sectoral capital income received by agent AGN
lambda_wq (H, I)	Share of sectoral skilled labour income received by household H
lambda_wnq (H, I)	Share of sectoral unskilled labour income received by household H

Taxation rate

te (X)	Tax on exports on good
tm (M)	Import duties on good
tx (I)	Tax rate on good
tp (I)	Tax rate on good
tyh (H)	Direct income tax rate for household H
tyf	Direct income tax rate for firms
tp (I)	Production tax rate for sector I

Parameters in export function

sigma_x (X)	Export demand elasticity
B_E (X)	Scale parameter (CET function)
beta_e (X)	Share parameter (CET function)
kappa_e(X)	Transformation parameter (CET function)
tau_e (X)	Transformation elasticity (CET function)

Parameter in import function

A_M (M)	Scale parameter (CES function)
rho_m (m)	Substitution parameter (CES function)
alpha_m (M)	Share parameter (CES function)
sigma_m (M)	Substitution elasticity (CES function)

Sets

Set

I Sectors	AGV	Agricultural food crop
	AGIE	Agricultural export
	AAG	Activity related to agriculture
	SEXPL	Forestry
	EPPC	Fishing and livestock
	INDM	Mining industry
	INDAG	Food industry
	INDTB	Tobacco industry
	INDTH	Textile industry
	INDBO	Wood industry
	INDCH	Chemistry industry
	INDME	Metallurgy industry

	PDEL	Electricity production and distribution
	CACTI	Construction
	SER	Services
	NTSER	Non-tradeable services
M (I) Import sectors	AGV	Agricultural food crop
	AGIE	Agricultural export
	SEXPL	Forestry
	EPPC	Fishing and livestock
	INDM	Mining industry
	INDAG	Food industry
	INDTB	Tobacco industry
	INDTH	Textile industry
	INDBO	Wood industry
	INDCH	Chemistry industry
	INDME	Metallurgy industry
	PDEL	Electricity production and distribution
	SER	Services
NM (I) Non-import sectors	AAG	Activity related to agriculture
	CACTI	Construction
	NTSER	Non-tradeable services
X (I) Export sectors	AGV	Agricultural food crop
	AGIE	Agricultural export
	SEXPL	Forestry
	EPPC	Fishing and livestock
	INDM	Mining industry
	INDAG	Food industry
	INDTB	Tobacco industry
	INDTH	Textile industry
	INDBO	Wood industry
	INDCH	Chemistry industry
	INDME	Metallurgy industry
	PDEL	Electricity production and distribution
	CACTI	Construction
	SER	Services
NX (I) Non-export sectors	AAG	Activity related to agriculture
	NTSER	Non-tradeable services
GSE (I) Public sectors	NTSER	Non-tradeable services
NGSE (I) Private sectors	AGV	Agricultural food crop
	AGIE	Agricultural export
	AAG	Activity related to agriculture

		SEXPL	Forestry
		EPPC	Fishing and livestock
		INDM	Mining industry
		INDAG	Food industry
		INDTB	Tobacco industry
		INDTH	Textile industry
		INDBO	Wood industry
		INDCH	Chemistry industry
		INDME	Metallurgy industry
		PDEL	Electricity production and distribution
		CACTI	Construction
		SER	Services
AGR (I)	Agricultural sectors	AGV	Agricultural food crop
		AGIE	Agricultural export
NAGR (I)	Non-agricultural private sectors	AAG	Activity related to agriculture
		SEXPL	Forestry
		EPPC	Fishing and livestock
		INDM	Mining industry
		INDAG	Food industry
		INDTB	Tobacco industry
		INDTH	Textile industry
		INDBO	Wood industry
		INDCH	Chemistry industry
		INDME	Metallurgy industry
		PDEL	Electricity production and distribution
		CACTI	Construction
		SER	Services
H Households			

Appendix C: Tables

C1. Macroeconomic impacts

Table C1: Sectoral impacts

Simulation 1 : reduction of tax on firms		Price change											Volume change									
Sectors		**VPM**	**VPD**	**VPC**	**VPE**	**VP**	**VPV**	**Vr**	**Vrl**	**Vwq**	**Vwnq**	**Vw**	**VM**	**VD**	**VQ**	**VEX**	**VXS**	**VLD**	**VQLD**	**VNQLD**	**VCI**
sec1	Agricultural food crop	-0.37	-0.50	-0.49	-0.01	-0.13	-0.07	-0.22	-0.22	0.43	0.38	0.40	-0.14	-0.33	0.04	-0.14	-0.15	-0.55	-0.58	-0.53	-0.14
sec2	Agricultural export	-0.37	-0.39	-0.39	0.00	0.00	0.25	0.22	0.22	0.43	0.38	0.39	-0.03	-0.08	-0.02	-0.06	-0.06	-0.16	-0.19	-0.15	-0.03
sec3	Activity related to agriculture	0.00	-0.18	-0.18	0.00	0.20	0.35	0.30	0.00	0.43	0.38	0.40	-0.04	0.00	0.00	-0.04	-0.04	-0.08	-0.11	-0.07	-0.04
sec4	Forestry	-0.37	-0.59	-0.59	-0.04	-0.21	0.35	0.33	0.00	0.43	0.38	0.39	-0.02	-0.36	0.23	-0.04	-0.04	-0.05	-0.09	-0.05	-0.02
sec5	Fishing and livestock	-0.37	-0.25	-0.31	0.06	0.13	0.36	0.09	0.00	0.43	0.38	0.39	-0.24	-0.05	-0.34	-0.24	-0.14	-0.26	-0.30	-0.26	-0.24
sec6	Mining industry	-0.37	-0.34	-0.37	0.00	0.01	0.36	0.34	0.00	0.43	0.38	0.41	-0.02	0.06	-0.03	0.01	0.05	-0.06	-0.08	-0.04	-0.02
sec7	Food industry	-0.37	-0.57	-0.52	-0.04	-0.14	0.49	0.57	0.00	0.43	0.38	0.40	0.08	-0.31	0.23	-0.01	-0.09	0.15	0.13	0.17	0.08
sec8	Tobacco industry	-0.37	-0.54	-0.54	-0.02	-0.17	0.22	0.08	0.00	0.43	0.38	0.42	-0.13	-0.38	0.09	-0.13	-0.13	-0.30	-0.31	-0.27	-0.13
sec9	Textile industry	-0.37	-0.50	-0.48	-0.01	-0.09	0.32	0.27	0.00	0.43	0.38	0.39	-0.04	-0.29	0.07	-0.10	-0.12	-0.11	-0.14	-0.10	-0.04
sec10	Wood industry	-0.37	-0.52	-0.51	-0.02	-0.11	0.42	0.43	0.00	0.43	0.38	0.40	0.01	-0.26	0.14	-0.04	-0.05	0.02	0.00	0.04	0.01
sec11	Chemistry industry	-0.37	-0.48	-0.45	-0.02	-0.08	0.52	0.58	0.00	0.43	0.38	0.42	0.06	-0.16	0.14	0.01	-0.05	0.14	0.14	0.18	0.06
sec12	Metallurgy industry	-0.37	-0.42	-0.40	-0.01	-0.04	0.41	0.42	0.00	0.43	0.38	0.39	0.01	-0.07	0.06	0.00	-0.03	0.03	0.00	0.04	0.01
sec13	Electricity product & distrib	-0.37	-0.48	-0.48	-0.02	-0.09	0.42	0.42	0.00	0.43	0.38	0.42	0.00	-0.18	0.11	-0.02	-0.02	0.00	0.00	0.04	0.00
sec14	Construction	0.00	-0.41	-0.41	0.01	-0.03	0.29	0.19	0.00	0.43	0.38	0.41	-0.09	0.00	-0.03	-0.09	-0.09	-0.20	-0.21	-0.17	-0.09
sec15	Services	-0.37	-0.21	-0.27	0.01	0.14	0.52	0.67	0.00	0.43	0.38	0.40	0.13	0.41	-0.07	0.16	0.25	0.24	0.22	0.26	0.13
sec16	Non-tradeable services	0.00	0.12	0.12	0.00	0.12	0.34	0.34	0.00	0.00	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Table C1: Continued

Simulation 2 : Reduction of import taxes	Price change											Volume change									
Sectors	**VPM**	**VPD**	**VPC**	**VPE**	**VP**	**VPV**	**Vr**	**Vrl**	**Vwq**	**Vwnq**	**Vw**	**VM**	**VD**	**VQ**	**VEX**	**VXS**	**VLD**	**VQLD**	**VNQLD**	**VCI**
sec1 Agricultural food crop	-4.72	-3.91	-3.95	-0.24	-1.86	-1.54	-2.64	-2.64	2.04	1.77	1.87	-1.01	0.26	1.46	-1.01	-0.94	-3.99	-4.14	-3.91	-1.01
sec2 Agricultural export	-5.35	-2.77	-3.01	-0.02	-0.15	1.50	1.42	1.42	2.04	1.77	1.84	-0.07	3.17	0.13	-0.91	-0.54	-0.37	-0.54	-0.31	-0.07
sec3 Activity related to agriculture	0.00	-1.34	-1.34	0.00	0.75	1.69	1.53	0.00	2.04	1.77	1.88	-0.14	0.00	0.00	-0.14	-0.14	-0.31	-0.45	-0.22	-0.14
sec4 Forestry	-2.08	-3.89	-3.89	-0.29	-1.78	1.15	0.59	0.00	2.04	1.77	1.82	-0.49	-3.34	1.78	-0.59	-0.59	-1.09	-1.28	-1.04	-0.49
sec5 Fishing and livestock	-2.08	-1.86	-1.97	0.25	0.23	1.64	-0.06	0.00	2.04	1.77	1.83	-1.51	-1.17	-1.47	-1.51	-1.34	-1.67	-1.85	-1.62	-1.51
sec6 Mining industry	-2.13	-2.14	-2.13	-0.04	-0.04	2.41	2.66	0.00	2.04	1.77	1.92	0.23	0.16	0.23	0.19	0.16	0.66	0.55	0.79	0.23
sec7 Food industry	-5.16	-4.25	-4.47	-0.36	-1.52	2.33	2.78	0.00	2.04	1.77	1.89	0.39	0.76	2.18	-0.67	-0.32	0.78	0.65	0.89	0.39
sec8 Tobacco industry	-2.08	-3.80	-3.79	-0.19	-1.76	0.10	-1.30	0.00	2.04	1.77	1.99	-1.26	-3.87	1.12	-1.27	-1.29	-2.91	-2.95	-2.72	-1.26
sec9 Textile industry	-5.51	-3.75	-3.96	-0.20	-1.20	1.31	0.93	0.00	2.04	1.77	1.86	-0.34	1.69	1.19	-1.09	-0.75	-0.83	-0.98	-0.75	-0.34
sec10 Wood industry	-5.74	-3.58	-3.67	-0.23	-1.18	1.85	1.82	0.00	2.04	1.77	1.90	-0.02	2.86	1.41	-0.57	-0.44	-0.07	-0.19	0.04	-0.02
sec11 Chemistry industry	-3.73	-3.47	-3.55	-0.22	-0.96	2.33	2.55	0.00	2.04	1.77	1.99	0.19	-0.11	1.31	-0.51	-0.37	0.49	0.45	0.68	0.19
sec12 Metallurgy industry	-4.28	-3.51	-3.90	-0.19	-1.23	1.20	0.69	0.00	2.04	1.77	1.84	-0.45	0.40	1.13	-0.80	-0.19	-1.01	-1.19	-0.96	-0.45
sec13 Electricity product & distrib	-2.08	-3.35	-3.34	-0.23	-1.13	2.03	2.04	0.00	2.04	1.77	2.02	0.01	-2.18	1.38	-0.24	-0.26	0.02	0.00	0.24	0.01
sec14 Construction	0.00	-3.06	-3.06	-0.11	-0.97	1.07	0.33	0.00	2.04	1.77	1.97	-0.66	0.00	0.65	-0.70	-0.70	-1.45	-1.51	-1.28	-0.66
sec15 Services	-2.08	-1.51	-1.72	-0.06	0.49	3.00	4.33	0.00	2.04	1.77	1.89	1.17	2.17	0.34	1.29	1.61	2.15	2.02	2.26	1.17
sec16 Non-tradeable services	0.00	0.12	0.12	0.00	0.12	1.49	1.49	0.00	0.00	0.00	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Table C1: Continued

Simulation 3: increasing tax on hhds' income	Price change											Volume change								
Sectors	**VPM**	**VPD**	**VPC**	**VPE**	**VP**	**VPV**	**Vr**	**Vrl**	**Vwq**	**Vwnq**	**Vw**	**VM**	**VD**	**VQ**	**VEX**	**VXS**	**VLD**	**VQLD**	**VNQLD**	**VCI**
sec1 Agricultural food crop	-0.68	-1.63	-1.58	-0.13	-0.95	-0.92	-1.41	-1.41	0.63	0.58	0.59	-0.45	-1.88	0.79	-0.45	-0.53	-1.80	-1.83	-1.78	-0.45
sec2 Agricultural export	-0.68	-1.00	-0.97	0.00	-0.06	0.27	0.20	0.20	0.63	0.58	0.59	-0.06	-0.93	0.03	-0.45	-0.49	-0.35	-0.38	-0.34	-0.06
sec3 Activity related to agriculture	0.00	-0.47	-0.47	0.00	0.22	0.47	0.36	0.00	0.63	0.58	0.60	-0.10	0.00	0.00	-0.10	-0.10	-0.21	-0.24	-0.20	-0.10
sec4 Forestry	-0.68	-1.11	-1.11	0.00	-0.42	-0.21	-0.87	0.00	0.63	0.58	0.59	-0.59	-1.27	0.03	-0.62	-0.62	-1.30	-1.34	-1.29	-0.59
sec5 Fishing and livestock	-0.68	-0.58	-0.63	0.14	0.10	0.48	-0.51	0.00	0.63	0.58	0.59	-0.89	-0.74	-0.83	-0.89	-0.81	-0.98	-1.02	-0.97	-0.89
sec6 Mining industry	-0.68	-0.70	-0.68	0.00	0.00	0.58	0.56	0.00	0.63	0.58	0.60	-0.01	-0.06	-0.01	-0.04	-0.06	-0.04	-0.06	-0.01	-0.01
sec7 Food industry	-0.68	-1.38	-1.21	-0.08	-0.47	0.48	0.36	0.00	0.63	0.58	0.60	-0.11	-1.50	0.48	-0.45	-0.71	-0.21	-0.24	-0.19	-0.11
sec8 Tobacco industry	-0.68	-1.35	-1.35	-0.02	-0.67	-0.62	-1.54	0.00	0.63	0.58	0.62	-0.84	-1.84	0.14	-0.84	-0.85	-1.94	-1.95	-1.90	-0.84
sec9 Textile industry	-0.68	-1.28	-1.21	-0.05	-0.42	0.13	-0.19	0.00	0.63	0.58	0.59	-0.29	-1.47	0.28	-0.56	-0.67	-0.70	-0.73	-0.69	-0.29
sec10 Wood industry	-0.68	-1.16	-1.14	-0.05	-0.36	0.34	0.18	0.00	0.63	0.58	0.60	-0.14	-1.03	0.33	-0.31	-0.34	-0.37	-0.40	-0.35	-0.14
sec11 Chemistry industry	-0.68	-1.03	-0.91	-0.05	-0.24	0.60	0.59	0.00	0.63	0.58	0.62	-0.01	-0.71	0.27	-0.19	-0.37	-0.03	-0.03	0.01	-0.01
sec12 Metallurgy industry	-0.68	-0.84	-0.76	-0.02	-0.14	0.51	0.44	0.00	0.63	0.58	0.59	-0.06	-0.34	0.12	-0.10	-0.22	-0.13	-0.17	-0.12	-0.06
sec13 Electricity production and distrib	-0.68	-1.04	-1.03	-0.04	-0.31	0.43	0.27	0.00	0.63	0.58	0.62	-0.14	-0.76	0.26	-0.22	-0.22	-0.32	-0.32	-0.28	-0.14
sec14 Construction	0.00	-1.02	-1.02	-0.01	-0.33	0.09	-0.34	0.00	0.63	0.58	0.62	-0.39	0.00	0.09	-0.40	-0.40	-0.85	-0.87	-0.82	-0.39
sec15 Services	-0.68	-0.11	-0.32	-0.01	0.49	1.37	2.29	0.00	0.63	0.58	0.60	0.82	1.80	0.06	0.93	1.24	1.51	1.48	1.53	0.82
sec16 Non-tradeable services	0.00	0.03	0.03	0.00	0.03	0.38	0.38	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C2. Income distribution in cities

Table C2: Poverty in cities and areas (percentage variation from base year)

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
1-Abobo	0.25	0.07	0.03	0.00	1.69	2.07	10.55	11.99	14.80	3.62	5.77	7.16
2-Adjame	0.44	0.14	0.06	0.00	1.40	1.74	8.11	9.86	12.37	8.11	4.49	5.38
3-Attecoube	0.22	0.07	0.03	0.00	1.20	1.86	0.00	7.82	12.46	0.00	3.57	6.01
4-Cocody	0.22	0.05	0.01	0.00	3.25	5.50	0.00	20.12	38.03	0.00	12.22	21.75
5-Koumassi	0.28	0.07	0.02	0.00	1.78	1.88	8.15	15.01	14.22	7.26	6.75	5.78
6-Marcory	0.09	0.02	0.00	0.00	2.91	3.75	38.64	19.95	26.59	0.00	9.14	12.54
7-Port-Bouet	0.43	0.17	0.08	0.00	1.03	1.61	9.53	7.40	10.88	0.00	3.45	5.39
8-Treichville	0.10	0.03	0.01	0.00	1.42	2.06	0.00	9.37	14.36	0.00	3.62	5.24
9-Yopougon	0.25	0.07	0.03	0.00	1.43	1.95	5.74	9.32	13.39	0.00	4.42	6.30
10-Anyama	0.20	0.05	0.02	0.00	1.45	1.48	0.00	9.48	10.36	0.00	3.79	4.00
11-Bingerville	0.75	0.26	0.13	0.00	0.98	1.25	0.00	6.44	8.50	0.00	2.65	3.71
12-Tiassale	0.30	0.16	0.11	0.00	0.50	0.65	16.67	4.53	4.45	16.67	1.79	2.01
13-Dabou	0.25	0.07	0.03	0.00	1.39	1.91	20.00	14.25	14.08	20.00	5.57	6.14
14-Daloa	0.63	0.15	0.05	0.00	1.89	2.49	0.00	12.18	17.68	0.00	5.50	7.60
15-Gagnoa	0.21	0.06	0.02	0.00	2.19	2.08	0.00	13.77	15.05	0.00	7.75	7.29
16-Issia	0.25	0.06	0.02	0.00	1.68	2.55	0.00	11.03	17.64	0.00	4.15	6.79
17-Boundiali	0.20	0.10	0.05	0.00	1.70	2.63	25.00	13.68	17.93	25.00	8.59	11.96
18-Korhogo	0.31	0.13	0.06	0.00	1.58	2.25	0.82	9.86	15.22	0.00	6.35	9.53
19-Beoumi	0.30	0.10	0.04	0.00	1.14	1.60	0.00	7.43	11.05	0.00	3.24	4.48
20-Bouake	0.37	0.12	0.06	0.00	1.15	1.29	3.46	7.49	8.96	0.00	3.38	3.89

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Table C2 Continued

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
21-Dabakala	0.45	0.20	0.10	0.00	0.80	1.18	11.11	6.13	8.01	11.11	2.71	3.83
22-Sakassou	0.35	0.11	0.04	0.00	1.40	1.89	0.00	9.02	13.04	0.00	4.28	5.76
23-Abengourou	0.40	0.13	0.05	0.00	0.89	1.35	0.00	5.94	9.31	0.00	2.04	3.14
24-Bangolo	0.45	0.18	0.10	0.00	0.75	0.89	0.00	4.92	6.19	0.00	1.99	2.25
25-Danane	0.30	0.15	0.09	0.00	0.64	1.10	0.00	4.16	7.26	0.00	2.09	3.75
26-Man	0.42	0.18	0.10	0.00	0.78	1.00	10.52	5.17	6.78	0.00	2.35	3.11
27-Toulepleu	0.55	0.16	0.06	0.00	1.61	2.29	0.00	10.29	15.60	0.00	5.15	7.76
28-Yamoussoukro	0.40	0.19	0.11	0.00	0.67	0.83	0.00	4.34	5.70	0.00	2.03	2.47
29-Tiebissou	0.45	0.19	0.09	0.00	0.83	1.34	0.00	5.36	9.04	0.00	2.54	4.31
30-Bouna	0.25	0.09	0.03	0.00	1.46	2.77	0.00	9.23	18.73	0.00	5.32	10.59
31-Sans Pedro	0.21	0.05	0.02	0.00	1.62	2.33	2.28	10.95	16.31	2.28	4.64	6.49
32-Soubre	0.25	0.06	0.03	0.00	1.25	1.27	0.00	8.35	9.00	0.00	2.75	2.90
33-Odienne	0.55	0.16	0.07	0.00	1.71	2.16	0.00	10.89	14.76	0.00	5.77	7.65
34-Bongouanou	0.30	0.14	0.07	0.00	1.13	1.90	0.00	7.12	12.64	0.00	4.35	7.50
35-Dimbokro	0.30	0.08	0.02	0.00	1.58	2.79	0.00	10.27	19.06	0.00	4.36	8.11
36-Bocanda	0.40	0.15	0.08	0.00	0.78	1.00	0.00	5.16	6.82	0.00	1.97	2.76
37-Oume	0.20	0.06	0.02	0.00	1.11	1.68	0.00	7.41	11.69	0.00	2.51	3.76
38-Sinfra	0.30	0.11	0.05	0.00	1.49	2.49	0.00	9.41	16.44	0.00	5.53	9.93
39-Zuenoula	0.10	0.03	0.01	0.00	1.28	1.07	50.00	13.92	7.87	50.00	3.95	2.84
40-Bonoua	0.40	0.15	0.06	0.00	1.14	1.62	0.00	7.37	11.04	0.00	3.66	5.29
41-Grand-Bassam	0.20	0.04	0.01	0.00	1.98	3.46	0.00	13.08	24.13	0.00	4.47	8.26
42-Divo	0.27	0.08	0.03	0.00	1.36	1.89	11.56	9.74	13.13	0.00	4.01	5.62
43-Lakota	0.30	0.11	0.06	0.00	1.30	1.53	0.00	8.28	10.29	0.00	4.64	5.83
44-Akoupe	0.25	0.11	0.06	0.00	0.67	0.99	0.00	4.42	6.67	0.00	1.88	2.81
45-Agboville	0.25	0.12	0.06	0.00	0.55	1.03	0.00	3.63	6.95	0.00	1.36	2.58

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Table C2 Continued

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
46-Begata	0.50	0.26	0.16	0.00	0.42	0.63	0.00	2.77	4.30	0.00	1.00	1.59
47-Boboniessoke	0.25	0.11	0.06	0.00	0.72	0.92	0.00	4.71	6.21	0.00	1.99	2.66
48-Kribleguhe	0.35	0.17	0.09	0.00	0.61	1.02	0.00	3.95	6.84	0.00	1.83	3.03
49-Loboguiguia	0.30	0.18	0.11	0.00	0.32	0.62	16.67	2.84	4.22	16.67	0.82	1.57
50-Domangbeu	0.70	0.39	0.25	0.00	0.37	0.56	0.00	2.46	3.79	0.00	0.90	1.37
51-Guemenedou	0.10	0.05	0.03	0.00	0.44	0.74	0.00	2.87	4.94	0.00	1.19	2.02
52-Dignago	0.35	0.18	0.11	0.00	0.53	0.70	14.29	4.01	4.73	0.00	1.49	1.96
53-Dragno Gagnoa	0.10	0.07	0.04	0.00	0.26	0.47	0.00	1.75	3.15	0.00	0.67	1.18
54-Aboka	0.35	0.18	0.10	0.00	0.49	0.83	0.00	3.22	5.56	0.00	1.32	2.35
55-Guibouo	0.30	0.16	0.11	0.00	0.47	0.57	0.00	3.10	3.84	0.00	1.32	1.63
56-Krizabouo	0.20	0.08	0.04	0.00	0.90	1.11	0.00	5.83	7.59	0.00	2.68	3.28
57-Vaou	0.20	0.09	0.05	0.00	0.64	0.98	0.00	4.21	6.60	0.00	1.76	2.83
58-Danzerville	0.45	0.20	0.10	0.00	0.58	0.95	0.00	3.85	6.45	0.00	1.45	2.44
59-Vrouo 1	0.35	0.19	0.11	0.00	0.45	0.74	14.29	3.38	4.94	0.00	1.25	2.07
60-Diourouzon	0.25	0.12	0.08	0.00	0.57	0.65	0.00	3.73	4.45	0.00	1.57	1.79
61-Danipleu	0.15	0.08	0.05	0.00	0.59	1.07	0.00	3.77	7.03	0.00	2.02	3.67
62-Blapleu	0.10	0.06	0.04	0.00	0.38	0.64	0.00	2.46	4.27	0.00	1.14	1.91
63-Bieutouo	0.20	0.12	0.08	0.00	0.34	0.47	0.00	2.29	3.21	0.00	0.87	1.19
64-Blody	0.60	0.33	0.19	0.00	0.52	0.84	8.33	3.81	5.72	8.33	1.66	2.45
65-Guessabo-Guere	0.55	0.24	0.12	0.00	0.58	0.80	0.00	3.92	5.54	0.00	1.30	1.78
67-Beoue	0.20	0.12	0.09	0.00	0.31	0.36	0.00	2.06	2.47	0.00	0.77	0.89
68-Douele	0.10	0.06	0.03	0.00	0.41	0.78	0.00	2.72	5.21	0.00	1.08	2.05
69-Petit Gbepleu	0.10	0.03	0.02	0.00	0.93	1.10	0.00	6.19	7.66	0.00	2.24	2.63
70-Semien	0.20	0.10	0.07	25.00	0.77	0.57	0.00	5.76	4.11	25.00	2.64	1.61

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Table C2: Continued

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
71-Sogb Zone Central	0.25	0.06	0.03	0.00	1.29	1.32	20.00	9.08	9.36	0.00	2.92	2.98
72-Kpote	0.15	0.03	0.01	0.00	1.85	3.26	0.00	12.04	22.30	0.00	4.91	9.32
73-Balokouya	0.45	0.07	0.02	0.00	2.72	2.55	0.00	17.49	18.96	0.00	7.60	6.86
74-Zegreboue	0.15	0.04	0.02	0.00	2.10	1.11	0.00	13.42	8.47	0.00	6.70	3.49
75-Trahaglounkro	0.25	0.10	0.05	0.00	0.72	1.17	0.00	4.77	7.93	0.00	1.85	3.11
76-Gbletia	0.00	0.00	0.00	-	-	-	-	-	-			
77-Gnogboyo	0.20	0.08	0.04	0.00	0.76	1.23	0.00	4.99	8.27	0.00	2.16	3.56
78-V1 Plamindustrie Ottawa	0.45	0.11	0.04	0.00	1.43	1.50	0.00	9.44	10.62	0.00	3.35	3.65
79-Idioke	0.30	0.18	0.11	0.00	0.36	0.68	33.33	3.52	4.57	0.00	1.00	1.86
80-Diegonefla	0.15	0.07	0.03	0.00	0.82	1.28	0.00	5.33	8.65	0.00	2.59	3.95
81-Kouamefla	0.20	0.09	0.04	0.00	0.84	1.56	0.00	5.37	10.32	0.00	2.82	5.26
82-Attinguie	0.35	0.09	0.02	0.00	1.94	3.58	0.00	12.39	25.24	0.00	6.30	12.46
83-Palmindus Anguededou V2	0.35	0.13	0.06	0.00	0.99	1.47	14.29	6.40	9.92	0.00	3.04	4.70
84-Tiebissou	0.35	0.14	0.07	0.00	0.90	1.17	0.00	5.84	7.94	0.00	2.72	3.51
85-Botinde	0.60	0.19	0.10	0.00	1.43	1.24	8.33	9.66	8.62	0.00	4.49	4.22
86-Akoure	0.35	0.23	0.16	0.00	0.24	0.43	0.00	1.61	2.92	0.00	0.55	1.03
87-Debrimou	0.40	0.17	0.10	0.00	0.67	0.69	0.00	4.41	4.79	0.00	1.70	1.72
88-Yassap B	0.40	0.18	0.09	0.00	0.67	1.26	0.00	4.39	8.44	0.00	1.94	3.60
89-Kouassi Beniekro	0.30	0.14	0.08	0.00	0.59	0.88	0.00	3.90	5.93	0.00	1.67	2.41
90-Ahuasso Allangouanou	0.25	0.09	0.03	0.00	1.61	2.89	20.00	10.97	19.74	0.00	5.93	11.10
91-Heredougou	0.30	0.12	0.07	0.00	0.70	0.55	0.00	4.69	3.87	0.00	1.60	1.21
92-N'guessankro	0.40	0.21	0.13	0.00	0.44	0.60	0.00	2.90	4.09	0.00	1.14	1.58
93-Missoumihian 1	0.25	0.08	0.03	0.00	1.19	1.53	0.00	7.74	10.46	0.00	3.35	4.65
94-Nema	0.40	0.21	0.13	0.00	0.57	0.69	0.00	3.73	4.67	0.00	1.79	2.15
95-Assuotianon	0.25	0.17	0.13	0.00	0.29	0.39	0.00	1.88	2.57	0.00	0.92	1.27

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Table C2: Continued

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
96-Kotobi	0.15	0.07	0.04	0.00	0.94	1.28	0.00	5.98	8.57	0.00	3.43	4.74
97-Brou Akpaoussou	0.40	0.15	0.07	0.00	0.99	1.19	12.50	7.06	8.26	0.00	2.99	3.55
98-Ngohinou	0.55	0.17	0.08	0.00	1.03	1.06	0.00	6.83	7.40	0.00	2.46	2.57
99-Angouakro	0.45	0.18	0.09	0.00	1.00	1.40	0.00	6.46	9.42	0.00	3.18	4.51
100-Attanou	0.05	0.03	0.01	0.00	0.48	0.96	0.00	3.19	6.48	0.00	1.20	2.42
101-Zaguieta	0.20	0.07	0.03	0.00	1.27	1.78	0.00	8.21	12.04	0.00	4.00	5.93
102-Liadjenoufla 2	0.10	0.07	0.05	0.00	0.23	0.46	150.00	7.71	3.35	150.00	1.23	1.25
103-Biakro-Tiekorodougou	0.35	0.18	0.11	0.00	0.58	0.88	0.00	3.80	5.90	0.00	1.77	2.81
104-Porabenafla	0.30	0.14	0.08	0.00	0.68	0.88	0.00	4.45	5.91	0.00	2.01	2.78
105-Toumanguie	0.40	0.29	0.23	0.00	0.23	0.38	0.00	1.48	2.49	0.00	0.72	1.17
106-Dadiesso	0.45	0.17	0.09	0.00	0.98	1.22	0.00	6.36	8.19	0.00	3.03	4.10
107-Akounougbe	0.55	0.23	0.11	0.00	0.72	1.11	0.00	4.73	7.55	0.00	1.84	2.92
108-Grand-Bassam	0.55	0.20	0.09	0.00	0.97	1.35	0.00	6.36	9.27	0.00	2.74	3.78
109-Dogozo	0.20	0.04	0.01	0.00	2.51	2.50	0.00	16.01	18.28	0.00	7.98	7.79
110-Petit Bouake Sodepalm	0.55	0.20	0.09	0.00	0.93	1.26	0.00	6.07	8.72	0.00	2.57	3.37
111-Palmindustrie V2	0.60	0.27	0.14	0.00	0.58	0.88	0.00	3.87	5.95	0.00	1.47	2.24
112-Hermankono	0.45	0.20	0.09	0.00	0.53	0.96	11.11	4.24	6.60	11.11	1.17	2.07
113-Zego	0.30	0.17	0.11	0.00	0.49	0.77	0.00	3.16	5.17	0.00	1.59	2.49
114-Tadjedou	0.30	0.16	0.09	0.00	0.49	0.90	0.00	3.22	6.02	0.00	1.42	2.70
115-Asseudji	0.50	0.24	0.12	0.00	0.62	1.12	0.00	4.08	7.52	0.00	1.77	3.21
116-Becouefin	0.45	0.16	0.07	0.00	0.93	1.42	11.11	6.42	9.60	0.00	2.41	3.96
117-Diangobo	0.20	0.10	0.06	0.00	0.52	0.67	0.00	3.42	4.61	0.00	1.44	1.64
118-Ehouguie	0.45	0.22	0.13	0.00	0.63	0.98	0.00	4.09	6.49	0.00	1.94	3.20
119-Ake Douanier	0.25	0.15	0.10	0.00	0.38	0.65	0.00	2.51	4.36	0.00	1.11	1.92
120-Ouelle	0.45	0.24	0.15	0.00	0.44	0.64	0.00	2.93	4.31	0.00	1.21	1.72

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Table C2: Continued

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
121-Yakasse Attobrou	0.35	0.11	0.05	0.00	1.56	1.68	0.00	9.92	12.17	0.00	5.35	6.07
122-Ziasso	0.20	0.07	0.03	0.00	0.94	1.37	0.00	6.16	9.30	0.00	2.61	3.88
123-Kofiple	0.15	0.11	0.08	0.00	0.25	0.50	33.33	2.30	3.24	0.00	0.80	1.66
124-Kong	0.20	0.07	0.03	0.00	1.18	1.73	0.00	7.67	11.83	0.00	3.48	5.16
125-Marha	0.35	0.12	0.05	0.00	1.00	1.26	0.00	6.58	8.71	0.00	2.74	3.36
126-Kafagavogo	0.25	0.10	0.06	0.00	0.62	0.75	0.00	4.13	5.16	0.00	1.39	1.77
127-Ngandana	0.25	0.16	0.12	0.00	0.30	0.51	0.00	1.98	3.36	0.00	0.88	1.57
128-Seyelihouo	0.20	0.12	0.08	0.00	0.36	0.56	0.00	2.34	3.75	0.00	0.99	1.58
129-Foro	0.25	0.12	0.09	0.00	0.57	0.46	20.00	5.48	3.22	20.00	1.98	1.50
130-Abayansi	0.25	0.14	0.11	0.00	0.44	0.56	0.00	2.88	3.67	0.00	1.34	1.94
131-Duekoue	0.25	0.11	0.06	0.00	0.68	1.12	0.00	4.44	7.51	0.00	1.94	3.21
132-Bourebo	0.20	0.11	0.07	0.00	0.36	0.53	0.00	2.39	3.59	0.00	0.88	1.32
133-Tchimou Assekro	0.10	0.05	0.02	0.00	0.79	1.52	0.00	5.08	9.92	0.00	2.54	5.34
134-Komballasso	0.10	0.06	0.04	0.00	0.36	0.45	0.00	2.42	3.04	0.00	0.95	1.19
135-Diaradougou	0.05	0.04	0.04	0.00	0.13	0.26	0.00	0.83	1.67	0.00	0.45	0.90
136-Tortiya	0.45	0.13	0.06	0.00	1.41	1.41	0.00	9.18	9.80	0.00	4.05	4.20
137-Mandeke-Kponkouakoukro	0.30	0.20	0.13	0.00	0.28	0.50	0.00	1.82	3.37	0.00	0.74	1.35
138-Kandopleu	0.25	0.13	0.09	0.00	0.58	0.75	0.00	3.79	4.99	0.00	1.83	2.57
139-Niamkey-Konankro	0.35	0.15	0.08	0.00	0.83	1.01	0.00	5.40	6.82	0.00	2.60	3.18
140-Koimoi-Dibikro	0.20	0.07	0.03	0.00	1.46	2.50	0.00	9.22	16.58	0.00	5.36	9.39
141-Kossou	0.45	0.10	0.03	0.00	1.49	2.07	0.00	9.87	14.48	0.00	3.44	4.98
142-Min Kouadiokro	0.25	0.09	0.05	0.00	1.40	1.06	0.00	8.90	7.76	0.00	5.03	3.64
143-Dimandougou	0.40	0.17	0.10	0.00	0.74	0.73	0.00	4.86	5.06	0.00	2.00	1.99
144-Maahui	0.40	0.17	0.08	0.00	0.62	0.92	0.00	4.14	6.30	0.00	1.43	2.12

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Table C2: Continued

Sub-population	Base year			Estimates								
				Simulation 1			Simulation 2			Simulation 3		
	p0	p1	p2	p0	p1	p2	p0	p1	p2	p0	p1	p2
145-Djorkeredougou	0.25	0.15	0.09	0.00	0.36	0.68	20.00	3.19	4.60	20.00	1.01	1.88
146-Kinandouo	0.00	0.00	0.00	-	-	-	-	-	-			
147-Bougousso	0.40	0.22	0.15	0.00	0.48	0.64	0.00	3.11	4.29	0.00	1.44	2.07
148-Kadiasso	0.30	0.15	0.09	0.00	0.63	0.85	16.67	4.89	5.76	0.00	1.95	2.64
149-Zebenin	0.55	0.26	0.15	0.00	0.60	0.70	9.09	4.06	4.76	0.00	1.61	1.86
150-Aouma Broukro	0.15	0.10	0.06	0.00	0.30	0.60	0.00	1.96	3.94	0.00	0.85	1.73
151-Dorifla	0.20	0.10	0.06	0.00	0.48	0.63	25.00	3.27	4.32	0.00	1.16	1.60
152-Gouehizra	0.25	0.13	0.08	0.00	0.40	0.47	20.00	2.93	3.25	0.00	0.89	1.03
153-Sononzo	0.30	0.17	0.11	0.00	0.35	0.49	0.00	2.33	3.35	0.00	0.88	1.21
154-Sanakoro	0.40	0.16	0.07	0.00	0.81	1.21	0.00	5.31	8.23	0.00	2.22	3.32
155-Silakoro	0.40	0.14	0.07	0.00	1.10	1.24	0.00	7.17	8.48	0.00	3.26	3.95
156-Dasso	0.35	0.15	0.10	0.00	0.59	0.47	0.00	3.92	3.35	0.00	1.37	1.07
157-Monzona	0.40	0.14	0.07	0.00	1.02	1.02	0.00	6.66	7.08	0.00	3.00	2.93
158-Kassere	0.50	0.25	0.14	0.00	0.44	0.75	0.00	2.53	4.60	0.00	1.02	1.75
159-Sinematiali	0.20	0.12	0.07	0.00	0.11	0.22	0.00	0.69	1.44	0.00	0.34	0.70
160-Sipilou	0.25	0.09	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161-Seguela	0.45	0.25	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	0.31	0.12	0.07	0.02	0.86	1.05	3.54	6.71	8.33	1.31	2.60	3.23

Table C3: Population and income share

Cities and areas	Pop. share	Income share			
		Base year	Simulation 1	Simulation 2	Simulation 3
1-Abobo	0.02	0.02	0.02	0.02	0.02
2-Adjame	0.02	0.01	0.01	0.01	0.01
3-Attecoube	0.01	0.01	0.01	0.01	0.01
4-Cocody	0.00	0.01	0.01	0.01	0.01
5-Koumassi	0.02	0.05	0.05	0.05	0.05
6-Marcory	0.00	0.00	0.00	0.00	0.00
7-Port-Bouet	0.01	0.01	0.01	0.01	0.01
8-Treichville	0.00	0.00	0.00	0.00	0.00
9-Yopougon	0.01	0.01	0.01	0.01	0.01
10-Anyama	0.00	0.00	0.00	0.00	0.00
11-Bingerville	0.01	0.00	0.00	0.00	0.00
12-Tiassale	0.01	0.01	0.01	0.01	0.01
13-Dabou	0.01	0.01	0.01	0.01	0.01
14-Daloa	0.01	0.01	0.01	0.01	0.01
15-Gagnoa	0.01	0.01	0.01	0.01	0.01
16-Issia	0.01	0.01	0.01	0.01	0.01
17-Boundiali	0.01	0.01	0.01	0.01	0.01
18-Korhogo	0.02	0.02	0.02	0.02	0.02
19-Beoumi	0.01	0.01	0.01	0.01	0.01
20-Bouake	0.04	0.04	0.04	0.04	0.04
21-Dabakala	0.00	0.00	0.00	0.00	0.00
22-Sakassou	0.00	0.00	0.00	0.00	0.00
23-Abengourou	0.00	0.06	0.06	0.06	0.06
24-Bangolo	0.01	0.01	0.01	0.01	0.01
25-Danane	0.00	0.00	0.00	0.00	0.00
26-Man	0.01	0.01	0.01	0.01	0.01
27-Toulepleu	0.01	0.01	0.01	0.01	0.01
28-Yamoussoukro	0.02	0.01	0.01	0.01	0.01
29-Tiebissou	0.01	0.01	0.01	0.01	0.01
30-Bouna	0.01	0.01	0.01	0.01	0.01
31-Sans Pedro	0.01	0.01	0.01	0.01	0.01
32-Soubre	0.01	0.02	0.02	0.02	0.02
33-Odienne	0.01	0.00	0.00	0.00	0.00
34-Bongouanou	0.00	0.00	0.00	0.00	0.00
35-Dimbokro	0.00	0.00	0.00	0.00	0.00
36-Bocanda	0.01	0.01	0.01	0.01	0.01
37-Oume	0.01	0.01	0.01	0.01	0.01
38-Sinfra	0.00	0.00	0.00	0.00	0.00
39-Zuenoula	0.00	0.00	0.00	0.00	0.00
40-Bonoua	0.00	0.00	0.00	0.00	0.00
41-Grand-Bassam	0.01	0.01	0.01	0.01	0.01
42-Divo	0.01	0.01	0.01	0.01	0.01
44-Akoupe	0.01	0.01	0.01	0.01	0.01
45-Agboville	0.00	0.00	0.00	0.00	0.00
46-Begata	0.01	0.01	0.01	0.01	0.01
47-Boboniessoke	0.01	0.01	0.01	0.01	0.01
48-Kribleguhe	0.01	0.01	0.01	0.01	0.01
49-Loboguiguia	0.01	0.01	0.01	0.01	0.01
50-Domangbeu	0.00	0.00	0.00	0.00	0.00

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Table C3: Continued

Cities and areas	Pop. share	Income share			
		Base year	Simulation 1	Simulation 2	Simulation 3
51-Guemenedou	0.00	0.00	0.00	0.00	0.00
52-Dignago	0.00	0.00	0.00	0.00	0.00
53-Dragno Gagnoa	0.01	0.01	0.01	0.01	0.01
54-Aboka	0.01	0.01	0.01	0.01	0.01
55-Guibouo	0.01	0.01	0.01	0.01	0.01
56-Krizabouo	0.01	0.01	0.01	0.01	0.01
57-Vaou	0.01	0.01	0.01	0.01	0.01
58-Danzerville	0.01	0.01	0.01	0.01	0.01
59-Vrouo 1	0.01	0.01	0.01	0.01	0.01
60-Diourouzon	0.00	0.00	0.00	0.00	0.00
61-Danipleu	0.00	0.00	0.00	0.00	0.00
62-Blapleu	0.00	0.00	0.00	0.00	0.00
63-Bieutouo	0.01	0.01	0.01	0.01	0.01
64-Blody	0.00	0.00	0.00	0.00	0.00
65-Guessabo-Guere	0.00	0.00	0.00	0.00	0.00
67-Beoue	0.00	0.00	0.00	0.00	0.00
68-Douele	0.01	0.01	0.01	0.01	0.01
69-Petit Gbepleu	0.00	0.00	0.00	0.00	0.00
70-Semien	0.00	0.00	0.00	0.00	0.00
71-Sogb Zone Centrale	0.01	0.01	0.01	0.01	0.01
72-Kpote	0.01	0.02	0.02	0.02	0.02
73-Balokouya	0.01	0.01	0.01	0.01	0.01
74-Zegreboue	0.00	0.00	0.00	0.00	0.00
75-Trahaglounkro	0.01	0.02	0.02	0.02	0.02
76-Gbletia	0.01	0.02	0.02	0.02	0.02
77-Gnogboyo	0.01	0.01	0.01	0.01	0.01
78-V1 Plamindust Ottawa	0.00	0.00	0.00	0.00	0.00
79-Idioke	0.01	0.00	0.00	0.00	0.00
80-Diegonefla	0.00	0.00	0.00	0.00	0.00
81-Kouamefla	0.01	0.01	0.01	0.01	0.01
82-Attinguie	0.00	0.00	0.00	0.00	0.00
83-Palmindust Anguededou V2	0.00	0.00	0.00	0.00	0.00
84-Tiebissou	0.01	0.01	0.01	0.01	0.01
85-Botinde	0.01	0.01	0.01	0.01	0.01
86-Akoure	0.00	0.00	0.00	0.00	0.00
87-Debrimou	0.01	0.01	0.01	0.01	0.01
88-Yassap B	0.00	0.00	0.00	0.00	0.00
89-Kouassi Beniekro	0.00	0.00	0.00	0.00	0.00
90-Ahuasso Allangouanou	0.01	0.01	0.01	0.01	0.01
91-Heredougou	0.00	0.00	0.00	0.00	0.00
92-N'guessankro	0.00	0.00	0.00	0.00	0.00
93-Missoumihian 1	0.00	0.00	0.00	0.00	0.00
94-Nema	0.01	0.01	0.01	0.01	0.01
95-Assuotianon	0.00	0.00	0.00	0.00	0.00
96-Kotobi	0.00	0.00	0.00	0.00	0.00
97-Brou Akpaoussou	0.00	0.00	0.00	0.00	0.00
98-Ngohinou	0.00	0.00	0.00	0.00	0.00

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Table C3: Continued

Cities and areas	Pop. share	Income share			
		Base year	Simulation 1	Simulation 2	Simulation 3
99-Angouakro	0.00	0.00	0.00	0.00	0.00
100-Attanou	0.01	0.01	0.01	0.01	0.01
101-Zaguieta	0.01	0.02	0.02	0.02	0.02
102-Liadjenoufla 2	0.00	0.00	0.00	0.00	0.00
103-Biakro-Tiekorodougou	0.00	0.00	0.00	0.00	0.00
104-Porabenafla	0.01	0.01	0.01	0.01	0.01
105-Toumanguie	0.00	0.00	0.00	0.00	0.00
106-Dadiesso	0.01	0.01	0.01	0.01	0.01
107-Akounougbe	0.01	0.01	0.01	0.01	0.01
108-Grand-Bassam	0.01	0.01	0.01	0.01	0.01
109-Dogozo	0.00	0.00	0.00	0.00	0.00
110-Petit Bouak Sodepalm	0.00	0.00	0.00	0.00	0.00
111-Palmindustrie V2	0.00	0.00	0.00	0.00	0.00
112-Hermankono	0.00	0.00	0.00	0.00	0.00
113-Zego	0.00	0.00	0.00	0.00	0.00
114-Tadjedou	0.01	0.01	0.01	0.01	0.01
115-Asseudji	0.00	0.00	0.00	0.00	0.00
116-Becouefin	0.01	0.00	0.00	0.00	0.00
117-Diangobo	0.00	0.00	0.00	0.00	0.00
118-Ehouguie	0.00	0.00	0.00	0.00	0.00
119-Ake Douanier	0.00	0.00	0.00	0.00	0.00
120-Ouelle	0.00	0.00	0.00	0.00	0.00
121-Yakasse Attobrou	0.00	0.00	0.00	0.00	0.00
122-Ziasso	0.01	0.01	0.01	0.01	0.01
123-Kofiple	0.01	0.01	0.01	0.01	0.01
124-Kong	0.01	0.00	0.00	0.00	0.00
125-Marha	0.01	0.01	0.01	0.01	0.01
126-Kafagavogo	0.01	0.01	0.01	0.01	0.01
127-Ngandana	0.00	0.00	0.00	0.00	0.00
128-Seyelihouo	0.01	0.00	0.00	0.00	0.00
129-Foro	0.00	0.00	0.00	0.00	0.00
130-Abayansi	0.01	0.00	0.00	0.00	0.00
131-Duekoue	0.01	0.01	0.01	0.01	0.01
132-Bourebo	0.01	0.00	0.00	0.00	0.00
133-Tchimou Assekro	0.01	0.01	0.01	0.01	0.01
134-Komballasso	0.01	0.01	0.01	0.01	0.01
135-Diaradougou	0.01	0.01	0.01	0.01	0.01
136-Tortiya	0.01	0.01	0.01	0.01	0.01
137-Mandeke-kponkouakou	0.01	0.00	0.00	0.00	0.00
138-Kandopleu	0.01	0.01	0.01	0.01	0.01
139-Niamkey-Konankro	0.01	0.01	0.01	0.01	0.01
140-Koimoi-Dibikro	0.01	0.01	0.01	0.01	0.01
141-Kossou	0.01	0.00	0.00	0.00	0.00
142-Min Kouadiokro	0.01	0.01	0.01	0.01	0.01
143-Dimandougou	0.01	0.01	0.01	0.01	0.01
144-Maahui	0.01	0.01	0.01	0.01	0.01

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Table C3: Continued

Cities and areas	Pop. share	Income share			
		Base year	Simulation 1	Simulation 2	Simulation 3
145-Djorkeredougou	0.01	0.01	0.01	0.01	0.01
146-Kinandouo	0.01	0.01	0.01	0.01	0.01
147-Bougousso	0.00	0.00	0.00	0.00	0.00
148-Kadiasso	0.00	0.00	0.00	0.00	0.00
149-Zebenin	0.00	0.00	0.00	0.00	0.00
150-Aouma Broukro	0.01	0.01	0.01	0.01	0.01
151-Dorifla	0.01	0.01	0.01	0.01	0.01
152-Gouehizra	0.01	0.01	0.01	0.01	0.01
153-Sononzo	0.01	0.01	0.01	0.01	0.01
154-Sanakoro	0.01	0.00	0.00	0.00	0.00
155-Silakoro	0.01	0.01	0.01	0.01	0.01
156-Dasso	0.01	0.00	0.00	0.00	0.00
157-Monzona	0.00	0.00	0.00	0.00	0.00
158-Kassere	0.00	0.00	0.00	0.00	0.00
159-Sinematiali	0.00	0.00	0.00	0.00	0.00
160-Sipilou	0.00	0.00	0.00	0.00	0.00
161-Seguela	0.01	0.01	0.01	0.01	0.01

Table C4: Within and between-group inequality

Base year			Change from base year (%)					
			Simulation 1		Simulation 2		Simulation 3	
Cities and areas								
	0	1	0	1	0	1	0	1
					Within group			
GE_W(a)	0.56	0.78	0.01	0.02	0.08	0.18	0.08	0.18
					Between group			
GE_B(a)	0.15	0.28	-0.01	0.10	-0.10	0.76	-0.10	0.76
10 Large regions					GE_W(a)			
					Within group			
GE_W(a)	0.66	1.00	-0.01	0.03	-0.03	0.26	-0.03	0.26
					Between group			
GE_B(a)	0.05	0.06	0.15	0.19	1.01	1.41	1.01	1.41
5 Strata								
					Within group			
GE_W(a)	0.69	1.04	0.00	0.04	0.05	0.33	0.05	0.33
					Between group			
GE_B(a)	0.02	0.01	-0.20	-0.20	-1.44	-1.47	-1.44	-1.47

	Simulation 1	Simulation 2	Simulation 3
Gini coefficient	.60	.60	.60
Theil mean log deviation measure	.70	.70	.70

Table C5: Inequality in cities and areas

Cities and areas	Base year			Simulation 1			Simulation 2			Simulation 3		
	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k
1-Abobo	0.91	1.20	0.69	0.00	0.00	0.00	0.62	1.17	0.27	0.62	1.17	0.27
2-Adjame	0.25	0.31	0.39	0.00	0.00	0.00	0.61	0.62	0.35	0.61	0.62	0.35
3-Attecoube	0.40	0.45	0.48	0.00	0.00	0.00	0.16	-0.11	0.03	0.16	-0.11	0.03
4-Cocody	1.90	2.96	0.86	0.00	0.00	0.00	0.93	0.63	0.21	0.93	0.63	0.21
5-Koumassi	1.40	2.54	0.80	0.00	0.00	0.00	0.00	0.25	-0.02	0.00	0.25	-0.02
6-Marcory	0.55	0.67	0.57	0.00	0.00	0.00	0.18	0.12	0.04	0.18	0.12	0.04
7-Port-Bouet	0.70	0.84	0.62	0.00	0.00	0.00	0.66	1.04	0.35	0.66	1.04	0.35
8-Treichville	0.51	0.53	0.53	0.00	0.00	0.00	-0.08	-0.17	-0.02	-0.08	-0.17	-0.02
9-Yopougon	1.06	2.10	0.74	0.00	0.00	0.00	0.01	0.72	-0.02	0.01	0.72	-0.02
10-Anyama	0.79	0.83	0.64	0.00	0.00	0.00	-0.16	-0.26	-0.06	-0.16	-0.26	-0.06
11-Bingerville	0.44	0.50	0.51	0.00	0.00	0.00	1.10	0.71	0.40	1.10	0.71	0.40
12-Tiassale	0.86	0.57	0.57	0.00	0.00	0.00	-0.36	-0.50	-0.18	-0.36	-0.50	-0.18
13-Dabou	0.69	0.60	0.59	0.00	0.00	0.00	1.45	1.19	0.50	1.45	1.19	0.50
14-Daloa	1.22	2.34	0.75	0.00	0.00	0.00	-1.67	-2.22	-0.55	-1.67	-2.22	-0.55
15-Gagnoa	0.46	0.38	0.48	0.00	0.00	0.00	-0.38	-0.60	-0.24	-0.38	-0.60	-0.24
16-Issia	0.55	0.53	0.55	0.00	0.00	0.00	-0.72	-0.77	-0.29	-0.72	-0.77	-0.29
17-Boundiali	0.64	0.59	0.57	0.00	0.00	0.00	2.38	1.96	1.03	2.38	1.96	1.03
18-Korhogo	0.67	0.59	0.58	0.00	0.00	0.00	0.94	0.35	0.12	0.94	0.35	0.12
19-Beoumi	0.61	0.45	0.51	0.00	0.00	0.00	-0.10	-0.11	0.03	-0.10	-0.11	0.03
20-Bouake	0.74	0.68	0.61	0.00	0.00	0.00	0.18	0.12	0.03	0.18	0.12	0.03
21-Dabakala	0.63	0.48	0.52	0.00	0.00	0.00	0.72	0.62	0.25	0.72	0.62	0.25
22-Sakassou	0.61	0.49	0.54	0.00	0.00	0.00	0.59	0.71	0.30	0.59	0.71	0.30
23-Abengourou	4.37	2.87	0.94	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00
24-Bangolo	0.69	0.64	0.60	0.00	0.00	0.00	0.13	0.32	0.13	0.13	0.32	0.13
25-Danane	0.52	0.42	0.49	0.00	0.00	0.00	0.69	0.66	0.28	0.69	0.66	0.28
26-Man	0.72	0.57	0.57	0.00	0.00	0.00	0.16	0.07	0.01	0.16	0.07	0.01
27-Toulepleu	0.59	0.52	0.55	0.00	0.00	0.00	-0.11	-0.10	-0.12	-0.11	-0.10	-0.12
28-Yamoussoukro	0.68	0.56	0.58	0.00	0.00	0.00	0.01	0.03	0.03	0.01	0.03	0.03
29-Tiebissou	0.60	0.56	0.57	0.00	0.00	0.00	0.17	0.15	0.09	0.17	0.15	0.09

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Table C5: Continued

Cities and areas	Base year			Simulation 1			Simulation 2			Simulation 3		
	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k
30-Bouna	0.81	0.65	0.61	0.00	0.00	0.00	0.90	0.90	0.44	0.90	0.90	0.44
31-Sans Pedro	0.63	0.60	0.58	0.00	0.00	0.00	0.40	0.47	0.19	0.40	0.47	0.19
32-Soubre	0.83	0.66	0.61	0.00	0.00	0.00	-0.22	-0.22	-0.10	-0.22	-0.22	-0.10
33-Odienne	0.18	0.19	0.33	0.00	0.00	0.00	2.24	1.81	1.14	2.24	1.81	1.14
34-Bongouanou	0.58	0.40	0.48	0.00	0.00	0.00	1.33	0.48	0.12	1.33	0.48	0.12
35-Dimbokro	0.27	0.33	0.40	0.00	0.00	0.00	0.71	0.65	0.40	0.71	0.65	0.40
36-Bocanda	0.94	0.91	0.67	0.00	0.00	0.00	0.31	0.36	0.13	0.31	0.36	0.13
37-Oume	0.52	0.40	0.49	0.00	0.00	0.00	-2.94	-2.02	-1.13	-2.94	-2.02	-1.13
38-Sinfra	0.60	0.59	0.57	0.00	0.00	0.00	1.20	1.24	0.44	1.20	1.24	0.44
39-Zuenoula	0.53	0.48	0.53	0.00	0.00	0.00	0.21	0.34	0.08	0.21	0.34	0.08
40-Bonoua	0.69	0.69	0.60	0.00	0.00	0.00	-0.06	-0.27	-0.04	-0.06	-0.27	-0.04
41-Grand-Bassam	0.61	0.60	0.57	0.00	0.00	0.00	-0.15	0.41	0.03	-0.15	0.41	0.03
42-Divo	0.81	0.75	0.64	0.00	0.00	0.00	0.00	0.22	0.07	0.00	0.22	0.07
44-Akoupe	0.70	0.65	0.60	0.00	0.00	0.00	0.07	0.09	0.08	0.07	0.09	0.08
45-Agboville	0.56	0.41	0.49	0.00	0.00	0.00	0.82	0.76	0.29	0.82	0.76	0.29
46-Begata	0.60	0.62	0.55	0.00	0.00	0.00	0.18	0.42	0.01	0.18	0.42	0.01
47-Boboniessoke	0.34	0.30	0.42	0.00	0.00	0.00	-0.29	0.10	-0.17	-0.29	0.10	-0.17
48-Kribleguhe	0.40	0.29	0.41	0.00	0.00	0.00	0.01	-0.04	-0.07	0.01	-0.04	-0.07
49-Loboguiguia	0.69	0.53	0.55	0.00	0.00	0.00	-0.18	-0.05	-0.06	-0.18	-0.05	-0.06
50-Domangbeu	0.42	0.44	0.50	0.00	0.00	0.00	-0.10	-0.15	-0.05	-0.10	-0.15	-0.05
51-Guemenedou	0.27	0.22	0.36	0.00	0.00	0.00	-1.41	-1.43	-0.67	-1.41	-1.43	-0.67
52-Dignago	0.64	0.47	0.53	0.00	0.00	0.00	0.14	0.43	0.21	0.14	0.43	0.21
53-Dragno Gagnoa	0.27	0.21	0.35	0.00	0.00	0.00	-0.08	-0.18	-0.06	-0.08	-0.18	-0.06
54-Aboka	0.34	0.24	0.37	0.00	0.00	0.00	0.09	-0.54	-0.50	0.09	-0.54	-0.50
55-Guibouo	0.34	0.25	0.38	0.00	0.00	0.00	0.32	0.17	0.00	0.32	0.17	0.00
56-Krizabouo	0.30	0.26	0.38	0.00	0.00	0.00	-0.19	-0.16	-0.31	-0.19	-0.16	-0.31
57-Vaou	0.38	0.28	0.41	0.00	0.00	0.00	0.77	0.98	0.50	0.77	0.98	0.50
58-Danzerville	0.72	0.63	0.59	0.00	0.00	0.00	-0.09	-0.03	-0.03	-0.09	-0.03	-0.03
59-Vrouo 1	0.44	0.36	0.47	0.00	0.00	0.00	0.56	0.55	0.23	0.56	0.55	0.23

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Table C5 Continued

Cities and areas	Base year			Simulation 1			Simulation 2			Simulation 3		
	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k
60-Diourouzon	0.30	0.23	0.37	0.00	0.00	0.00	0.00	-0.16	0.08	0.00	-0.16	0.08
61-Danipleu	0.62	0.64	0.58	0.00	0.00	0.00	1.07	1.17	0.47	1.07	1.17	0.47
62-Blapleu	0.49	0.52	0.52	0.00	0.00	0.00	0.36	0.49	0.17	0.36	0.49	0.17
63-Bieutouo	0.48	0.40	0.47	0.00	0.00	0.00	0.11	0.27	0.09	0.11	0.27	0.09
64-Blody	0.70	0.60	0.58	0.00	0.00	0.00	0.22	0.12	-0.03	0.22	0.12	-0.03
65-Guessabo-Guere	0.88	0.77	0.65	0.00	0.00	0.00	0.13	0.25	0.08	0.13	0.25	0.08
67-Beoue	0.61	0.46	0.51	0.00	0.00	0.00	0.05	0.49	0.05	0.05	0.49	0.05
68-Douele	0.22	0.17	0.31	0.00	0.00	0.00	0.07	0.19	0.19	0.07	0.19	0.19
69-Petit Gbepleu	0.22	0.18	0.33	0.00	0.00	0.00	-0.90	-0.35	-0.13	-0.90	-0.35	-0.13
70-Semien	0.61	0.53	0.55	0.00	0.00	0.00	0.45	0.54	0.29	0.45	0.54	0.29
71-Sogb Zone Centrale	0.62	0.51	0.55	0.00	0.00	0.00	-0.07	0.21	0.05	-0.07	0.21	0.05
72-Kpote	0.48	0.37	0.47	0.00	0.00	0.00	0.42	0.27	0.11	0.42	0.27	0.11
73-Balokouya	0.37	0.41	0.47	0.00	0.00	0.00	0.53	0.51	0.25	0.53	0.51	0.25
74-Zegreboue	0.39	0.32	0.44	0.00	0.00	0.00	0.54	0.65	0.34	0.54	0.65	0.34
75-Trahaglounkro	0.73	0.57	0.57	0.00	0.00	0.00	-0.64	-1.10	-0.50	-0.64	-1.10	-0.50
76-Gbletia	0.26	0.25	0.38	0.00	0.00	0.00	0.04	0.62	0.15	0.04	0.62	0.15
77-Gnogboyo	0.33	0.25	0.39	0.00	0.00	0.00	-0.39	-0.25	-0.09	-0.39	-0.25	-0.09
78-V1 Plamindustrie Ottawa	0.45	0.57	0.51	0.00	0.00	0.00	-0.15	-0.18	-0.07	-0.15	-0.18	-0.07
79-Idioke	0.32	0.24	0.38	0.00	0.00	0.00	0.20	0.09	0.04	0.20	0.09	0.04
80-Diegonefla	0.46	0.38	0.48	0.00	0.00	0.00	0.46	0.98	0.61	0.46	0.98	0.61
81-Kouamefla	0.40	0.31	0.43	0.00	0.00	0.00	-1.31	-2.21	-0.81	-1.31	-2.21	-0.81
82-Attinguie	0.57	0.50	0.54	0.00	0.00	0.00	0.38	0.19	0.10	0.38	0.19	0.10
83-Palmindust Anguededou V2	0.85	0.71	0.62	0.00	0.00	0.00	0.31	0.24	0.12	0.31	0.24	0.12
84-Tiebissou	0.67	0.53	0.55	0.00	0.00	0.00	0.09	0.30	0.26	0.09	0.30	0.26
85-Botinde	0.59	0.64	0.57	0.00	0.00	0.00	0.71	0.11	0.22	0.71	0.11	0.22

continued next page

Table C5 Continued

Cities and areas	Base year			Simulation 1			Simulation 2			Simulation 3		
	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k
86-Akoure	0.75	0.60	0.57	0.00	0.00	0.00	-0.08	-0.24	-0.09	-0.08	-0.24	-0.09
87-Debrimou	0.77	0.70	0.61	0.00	0.00	0.00	-0.42	-0.25	-0.19	-0.42	-0.25	-0.19
88-Yassap B	0.64	0.55	0.56	0.00	0.00	0.00	0.13	0.22	0.10	0.13	0.22	0.10
89-Kouassi Beniekro	0.49	0.39	0.49	0.00	0.00	0.00	0.30	0.29	0.12	0.30	0.29	0.12
90-Ahuasso Allangouanou	0.64	0.52	0.55	0.00	0.00	0.00	0.57	0.22	0.11	0.57	0.22	0.11
91-Heredougou	0.56	0.44	0.51	0.00	0.00	0.00	-0.01	0.44	0.15	-0.01	0.44	0.15
92-N'guessankro	0.52	0.43	0.50	0.00	0.00	0.00	0.05	0.47	0.13	0.05	0.47	0.13
93-Missoumihian 1	0.48	0.39	0.48	0.00	0.00	0.00	0.97	0.73	0.35	0.97	0.73	0.35
94-Nema	0.66	0.51	0.55	0.00	0.00	0.00	0.42	0.73	0.31	0.42	0.73	0.31
95-Assuotianon	0.80	0.63	0.59	0.00	0.00	0.00	-0.29	0.65	0.02	-0.29	0.65	0.02
96-Kotobi	0.49	0.44	0.50	0.00	0.00	0.00	0.89	0.94	0.51	0.89	0.94	0.51
97-Brou Akpaoussou	0.76	0.70	0.62	0.00	0.00	0.00	-1.24	-1.51	-0.57	-1.24	-1.51	-0.57
98-Ngohinou	0.74	0.66	0.61	0.00	0.00	0.00	-0.64	-0.74	-0.29	-0.64	-0.74	-0.29
99-Angouakro	0.79	0.68	0.62	0.00	0.00	0.00	0.18	-0.04	-0.01	0.18	-0.04	-0.01
100-Attanou	0.18	0.17	0.30	0.00	0.00	0.00	-0.41	-0.63	-0.16	-0.41	-0.63	-0.16
101-Zaguieta	0.57	0.49	0.52	0.00	0.00	0.00	-0.52	-0.62	-0.37	-0.52	-0.62	-0.37
102-Liadjenoufla 2	0.44	0.34	0.45	0.00	0.00	0.00	-0.16	-0.01	0.01	-0.16	-0.01	0.01
103-Biakro-Tiekorodougou	0.41	0.28	0.40	0.00	0.00	0.00	0.59	0.43	0.24	0.59	0.43	0.24
104-Porabenafla	0.37	0.27	0.40	0.00	0.00	0.00	0.51	0.58	0.31	0.51	0.58	0.31
105-Toumanguie	0.93	0.62	0.60	0.00	0.00	0.00	0.48	0.65	0.27	0.48	0.65	0.27
106-Dadiesso	0.54	0.48	0.53	0.00	0.00	0.00	-0.33	-0.36	-0.26	-0.33	-0.36	-0.26
107-Akounougbe	0.49	0.55	0.54	0.00	0.00	0.00	-0.69	-1.13	-0.32	-0.69	-1.13	-0.32
108-Grand-Bassam	0.98	0.80	0.66	0.00	0.00	0.00	0.05	0.26	0.11	0.05	0.26	0.11
109-Dogozo	0.48	0.49	0.52	0.00	0.00	0.00	0.10	0.57	0.09	0.10	0.57	0.09

continued next page

Table C5: Continued

Cities and areas	Base year			Simulation 1			Simulation 2			Simulation 3		
	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k
110-Petit Bouake Sodepalm	0.65	0.59	0.58	0.00	0.00	0.00	0.14	0.26	0.09	0.14	0.26	0.09
111-Palmindustrie V2	1.01	0.94	0.69	0.00	0.00	0.00	-0.04	0.02	-0.03	-0.04	0.02	-0.03
112-Hermankono	0.63	0.52	0.55	0.00	0.00	0.00	-0.31	-0.09	-0.03	-0.31	-0.09	-0.03
113-Zego	0.51	0.35	0.45	0.00	0.00	0.00	0.24	0.41	0.25	0.24	0.41	0.25
114-Tadjedou	0.59	0.40	0.48	0.00	0.00	0.00	-0.37	-0.38	-0.22	-0.37	-0.38	-0.22
115-Asseudji	0.55	0.49	0.53	0.00	0.00	0.00	0.29	0.12	0.06	0.29	0.12	0.06
116-Becouefin	0.48	0.43	0.51	0.00	0.00	0.00	0.18	0.54	0.29	0.18	0.54	0.29
117-Diangobo	0.49	0.34	0.45	0.00	0.00	0.00	0.02	0.05	0.04	0.02	0.05	0.04
118-Ehouguie	0.75	0.79	0.63	0.00	0.00	0.00	0.43	0.00	0.03	0.43	0.00	0.03
119-Ake Douanier	0.43	0.29	0.41	0.00	0.00	0.00	0.23	0.26	0.11	0.23	0.26	0.11
120-Ouelle	0.56	0.55	0.53	0.00	0.00	0.00	-0.41	-0.35	-0.14	-0.41	-0.35	-0.14
121-Yakasse Attobrou	0.50	0.40	0.49	0.00	0.00	0.00	1.28	1.01	0.44	1.28	1.01	0.44
122-Ziasso	0.33	0.25	0.38	0.00	0.00	0.00	-0.14	-0.04	-0.03	-0.14	-0.04	-0.03
123-Kofiple	0.65	0.61	0.57	0.00	0.00	0.00	1.26	1.59	0.61	1.26	1.59	0.61
124-Kong	0.38	0.42	0.46	0.00	0.00	0.00	0.41	0.54	0.28	0.41	0.54	0.28
125-Marha	0.57	0.53	0.55	0.00	0.00	0.00	-0.60	0.67	0.16	-0.60	0.67	0.16
126-Kafagavogo	0.24	0.17	0.31	0.00	0.00	0.00	-1.24	-1.21	-0.68	-1.24	-1.21	-0.68
127-Ngandana	0.68	0.68	0.55	0.00	0.00	0.00	0.73	0.69	0.20	0.73	0.69	0.20
128-Seyelihouo	0.43	0.33	0.44	0.00	0.00	0.00	0.67	1.40	0.73	0.67	1.40	0.73
129-Foro	0.69	0.63	0.58	0.00	0.00	0.00	0.24	0.80	0.30	0.24	0.80	0.30
130-Abayansi	0.37	0.24	0.36	0.00	0.00	0.00	0.98	0.59	0.27	0.98	0.59	0.27
131-Duekoue	0.32	0.23	0.36	0.00	0.00	0.00	0.55	0.58	0.31	0.55	0.58	0.31
132-Bourebo	0.30	0.24	0.37	0.00	0.00	0.00	-0.06	-0.05	-0.05	-0.06	-0.05	-0.05
133-Tchimou Assekro	0.27	0.24	0.38	0.00	0.00	0.00	-0.05	-0.49	-0.20	-0.05	-0.49	-0.20
134-Komballasso	0.28	0.19	0.34	0.00	0.00	0.00	0.21	0.33	0.20	0.21	0.33	0.20

continued next page

Table C5: Continued

Cities and areas	Base year			Simulation 1			Simulation 2			Simulation 3		
	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k	GE(0)	GE(1)	Gini_k
135-Diaradougou	0.33	0.29	0.40	0.00	0.00	0.00	0.61	0.68	0.33	0.61	0.68	0.33
136-Tortiya	0.62	0.65	0.58	0.00	0.00	0.00	-0.13	0.10	-0.06	-0.13	0.10	-0.06
137-Mandeke-Kponkouakoukro	0.43	0.30	0.41	0.00	0.00	0.00	0.10	0.10	0.01	0.10	0.10	0.01
138-Kandopleu	0.39	0.32	0.42	0.00	0.00	0.00	0.76	0.65	0.33	0.76	0.65	0.33
139-Niamkey-Konankro	0.41	0.35	0.46	0.00	0.00	0.00	1.20	1.51	0.70	1.20	1.51	0.70
140-Koimoi-Dibikro	0.44	0.42	0.48	0.00	0.00	0.00	0.35	-0.14	-0.11	0.35	-0.14	-0.11
141-Kossou	0.27	0.32	0.40	0.00	0.00	0.00	-1.37	-1.80	-0.59	-1.37	-1.80	-0.59
142-Min Kouadiokro	0.24	0.19	0.34	0.00	0.00	0.00	1.58	1.93	1.06	1.58	1.93	1.06
143-Dimandougou	0.73	0.69	0.59	0.00	0.00	0.00	-0.60	-0.78	-0.25	-0.60	-0.78	-0.25
144-Maahui	0.47	0.41	0.49	0.00	0.00	0.00	-0.50	-0.49	-0.22	-0.50	-0.49	-0.22
145-Djorkeredougou	0.40	0.29	0.42	0.00	0.00	0.00	0.93	1.29	0.70	0.93	1.29	0.70
146-Kinandouo	0.22	0.25	0.37	0.00	0.00	0.00	-2.37	-3.18	-1.05	-2.37	-3.18	-1.05
147-Bougousso	0.48	0.37	0.48	0.00	0.00	0.00	0.76	0.29	0.10	0.76	0.29	0.10
148-Kadiasso	0.24	0.20	0.34	0.00	0.00	0.00	0.59	0.64	0.33	0.59	0.64	0.33
149-Zebenin	0.34	0.34	0.42	0.00	0.00	0.00	-0.10	0.03	-0.01	-0.10	0.03	-0.01
150-Aouma Broukro	0.36	0.24	0.37	0.00	0.00	0.00	0.66	0.74	0.42	0.66	0.74	0.42
151-Dorifla	0.32	0.27	0.41	0.00	0.00	0.00	0.00	0.31	0.08	0.00	0.31	0.08
152-Gouehizra	0.32	0.24	0.38	0.00	0.00	0.00	-0.04	0.28	0.21	-0.04	0.28	0.21
153-Sononzo	0.39	0.26	0.38	0.00	0.00	0.00	-0.14	-0.20	-0.12	-0.14	-0.20	-0.12
154-Sanakoro	0.29	0.29	0.41	0.00	0.00	0.00	-0.14	-0.06	-0.11	-0.14	-0.06	-0.11
155-Silakoro	0.47	0.45	0.50	0.00	0.00	0.00	-1.46	-2.47	-0.81	-1.46	-2.47	-0.81
156-Dasso	0.63	0.59	0.57	0.00	0.00	0.00	-2.01	-2.67	-1.02	-2.01	-2.67	-1.02
157-Monzona	0.26	0.23	0.37	0.00	0.00	0.00	-1.55	-1.72	-0.90	-1.55	-1.72	-0.90
158-Kassere	0.62	0.53	0.55	0.00	0.00	0.00	-1.31	-0.71	-0.69	-1.13	-0.55	-0.65
159-Sinematiali	0.69	0.57	0.57	0.00	0.00	0.00	-2.07	-1.91	-0.79	-2.07	-1.91	-0.79
160-Sipilou	0.45	0.39	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161-Seguela	0.62	0.47	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C6: Cities

Num.	Department	Areas				
1	Abidjan	Abobo				
2	Abidjan	Abobo				
3	Abidjan	Abobo				
4	Abidjan	Abobo				
5	Abidjan	Abobo				
6	Abidjan	Abobo				
7	Abidjan	Abobo				
8	Abidjan	Abobo				
9	Abidjan	Abobo				
10	Abidjan		Adjame			
11	Abidjan		Adjame			
12	Abidjan		Adjame			
13	Abidjan		Adjame			
14	Abidjan			Attecoube		
15	Abidjan			Attecoube		
16	Abidjan			Attecoube		
17	Abidjan			Attecoube		
18	Abidjan				Cocody	
19	Abidjan				Cocody	
20	Abidjan				Cocody	
21	Abidjan					Koumassi
22	Abidjan					Koumassi
23	Abidjan					Koumassi
24	Abidjan					Koumassi
25	Abidjan					Koumassi
26	Abidjan				Marcory	
27	Abidjan				Marcory	
28	Abidjan				Marcory	
29	Abidjan			Port-Bouet		
30	Abidjan			Port-Bouet		
31	Abidjan			Port-Bouet		
32	Abidjan			Port-Bouet		
33	Abidjan		Treichville			
34	Abidjan		Treichville			
35	Abidjan		Treichville			
36	Abidjan	Yopougon				
37	Abidjan	Yopougon				
38	Abidjan	Yopougon				
39	Abidjan	Yopougon				
40	Abidjan	Yopougon				
41	Abidjan	Yopougon				
42	Abidjan	Yopougon				
43	Abidjan	Yopougon				

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