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# Household Welfare and Poverty Dynamics in Burkina Faso

## Empirical Evidence from Household Surveys

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The benefits from growth following devaluation of the CFA franc in Burkina Faso in 1994 were undermined by increasing income inequality. Factors that fed that growth in income inequality: disparities in wages and in educational attainment and unequal access to productive assets.

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## Summary findings

Fofack, Monga, and Tuluy investigate the dynamics of poverty and income inequality in a cross-section of socioeconomic groups and geographical regions over the five-year growth period following the 1994 devaluation of the CFA franc in Burkina Faso.

Results show rapidly increasing urban poverty accompanied by rising income inequality, declining poverty-growth elasticities, and significant changes in the poverty map. In rural areas, the incidence of poverty remained the same and income inequality did not increase.

In contrast, the distribution of welfare across socioeconomic groups was more stable. The rank

ordering of socioeconomic groups on the welfare scale did not change during the post-devaluation growth period.

Poverty remains largely a rural phenomenon, whose inelastic nature may justify a shift toward growth-oriented policies that at least maintain the rural poor's share of income to reduce poverty in the medium term.

Among factors that feed into income inequality: disparities in wages and in educational attainment and unequal access to productive assets (especially human capital).

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This paper—a joint product of Macroeconomics 3 and Macroeconomics 4, Economic Management and Social Policy Group; and Burkina Faso, Mali, Mauritania, São Tomé and Príncipe Country Director's Office, Africa Region—is part of a larger effort in the region to better understand the dynamics of poverty and how the benefits of growth are distributed in Sub-Saharan African countries. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Nadege Nouviale, room J7-269, telephone 202-473-4514, fax 202-473-8466, email address [nnouviale@worldbank.org](mailto:nnouviale@worldbank.org). Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at [hfofack@worldbank.org](mailto:hfofack@worldbank.org), [cmonga@worldbank.org](mailto:cmonga@worldbank.org), or [htuluy@worldbank.org](mailto:htuluy@worldbank.org). April 2001. (32 pages)

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# Household Welfare and Poverty Dynamics in Burkina Faso: Empirical Evidence from Household Surveys

by

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*JEL classifications: C14; D31; D63; R12*

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## I. Introduction

Burkina Faso is a poor landlocked country with low endowment of natural resources and high vulnerability to adverse shocks, including terms of trade (two commodities accounted for over 60% of all exports in 1998) and other exogenous shocks.<sup>2</sup> Its economy is largely agricultural based: over 75% of active population continues to derive its income from agriculture, and the primary sector accounts for over 40 percent of GDP; it relies predominantly on export of traditional commodities, mainly cotton, for foreign exchanges. Since 1994, Burkina Faso has been recording strong economic growth, largely due to increased competitiveness of its economy, particularly in the production of export crops following the devaluation of the CFA Franc, and the successful implementation of structural reforms. The average growth rate over the past 5 years is over 5% and the 1998 economic growth is estimated at 6.2% (World Bank (1999)). Inflation pressures which followed the devaluation were also contained; the average inflation rate over the five post-devaluation years is about 4.5%. The relatively good performance of Burkina Faso's economy is further illustrated by increased government revenues and large reduction in the level of public deficit.<sup>3</sup>

Yet, despite relatively high growth rates recorded between 1994 and 1998, and positive results on the stabilization program, poverty remains widespread in Burkina Faso. The incidence of poverty did not decline during this growth period. Instead it remained relatively high, above 45 percent, implying a net increased absolute number of poor in presence of rapidly growing population.<sup>4</sup> Also, Burkina Faso continues to have one of the lowest per capita incomes in the developing world, even by Sub-Saharan African (SSA) standards. The apparent anomaly characterized by continued rising poverty under relatively high economic growth is not specific to Burkina Faso, however; other SSA countries experienced similar contrast in the nineties.<sup>5</sup>

The persistence of widespread poverty under sustained economic growth raises some key questions, particularly the medium- to long-run benefits to poor people of economic wide changes, and some concerns about the pattern of growth and its effects on household welfare and poverty dynamics. This paper investigates the dynamics of poverty and income inequality during the growth period that followed the 1994 CFA Franc devaluation (1994-98): assessing the trends in poverty and income inequality, the correlation between household welfare and determinants of poverty and income inequality in a cross-section of geographical regions and socioeconomic groups (SEG). It investigates the significance of changes in the distribution of welfare to assess the dynamics of poverty, using a nonparametric test of concordance. Assessing the poverty dynamics and their determinants are important to understanding the growth-poverty linkages, key to designing effective poverty-reducing programs and policies, and may prove particularly relevant to the Burkina context of widespread and rising poverty, amid growth.

The remainder of the paper is organized as follows. The next section provides a description of the data sets. Section III deals with measurements and estimation procedures. The poverty

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<sup>2</sup> Agricultural output and production are largely influenced by drought, especially in the Sahelian region.

<sup>3</sup> Expressed as a percentage of GDP, total revenue exceeded the program target of 13% and the overall fiscal deficit on a commitment basis, excluding grants fell below the projected value of 10.3% of GDP, see World Bank (1999).

<sup>4</sup> The population growth rate averaged over 2.5% between 1994 and 1998.

<sup>5</sup> The share of population living on less than \$1 a day, at 1993 purchasing power parity increased by over 1 percentage point to 49% between 1990 and 1996 in SSA, corresponding to over 46 millions additional poor; while a relative decline was recorded in most other regions (World Bank (2001)).

dynamics and evolution of welfare are assessed in Section IV: the results suggest rising urban poverty accompanied with rapidly increasing income inequality, persistence of large urban-rural bias, continued large contribution of rural areas to overall national poverty, and changes in the spatial poverty maps which suggest that the southern regions might have benefited from growth. The dynamics of poverty also reveal persistence of large differences across SEG. Particularly, subsistence farmers and export crops continue to account for the largest share of poor, despite the relative decline of headcount for the export farmers. In contrast, wage income earners from private sectors seem to have benefited from growth. Section V investigates the direction and strength of association between selected determinants of income inequality, parental education level, household ownership of key assets and household welfare. Results suggest a strong and positive association which is relatively stable over time with a large proportional variance of household welfare explained by these determinants. The test of significance of overtime changes in the distribution of welfare across geographical regions and SEG implemented in Section VI fails to reject the null hypothesis of no association between overtime poverty maps, suggesting lack of concordance in the distribution of welfare across geographical regions overtime, and significance of changes in the spatial poverty map. A test of overtime association between distributions of income across SEG rejects the null hypothesis in favor of the alternative, suggesting concordance in rank ordering. Section VII provides concluding remarks and policy implications.

## II. The Data

The study is based on the last two household priority surveys, Enquête Prioritaire I (EP1) and II (EP2), undertaken by the Burkina Faso "Institut National de la Statistique et de la Démographie" (INSD). These surveys are very similar in the scope of data collection, sampling design and coverage: they are nationally representative and the sample selection uses a two-stage stratified random sampling in both design.<sup>6</sup> Individual and household level information is collected on a relatively large sample: more than 8,600 households in the first, and about 8,500 in the second round. This relatively large coverage allows a spatial analysis of welfare which reflects the country administrative and economic regions.<sup>7</sup> The similarity in the sampling and questionnaire design also facilitates inferences on poverty trends and over time comparisons. The number of consumption items sampled is more disaggregated in the second round to reflect changes in the composition of household consumption baskets.<sup>8</sup> Such a disaggregation produces a large number of consumption items and sub-aggregates and may result in a much higher household total expenditure aggregate, see Deaton and Grosh (2000). However, by focusing on distributional shifts, and less on absolute levels of wealth, the similarity in the design can allow sound inferences on welfare.

Although these surveys collect information on household income and expenditures, we use

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<sup>6</sup> Twenty strata were formed, corresponding to 10 rural and 10 urban areas. Enumeration areas (Zones de dénombrement) were sampled in the first stage with probability proportional to the size of each unit; 20 households were systematically sampled in each enumeration area (ZD) in the second stage with fixed probability.

<sup>7</sup> Targeting public resources on the basis of this latter survey may even be more effective, in light of the modifications made to the sampling frame in the second round to reflect the changes allowed by the last population census.

<sup>8</sup> The number of consumption items sampled between the first and second round increases from 46 to 65; this coverage remains relatively low in comparison with expenditure components of more comprehensive Integrated Surveys (LSMS), and may cause the aggregate distribution of income to bias, see Fofack (2000).

expenditure as measure of welfare, partly because nonsampling errors due to under-reporting of income bias reported household income aggregate. This bias may be particularly large when income data is collected on a single visit to households, the frequency of data collection in the PS, see Marchant and Grootaert (1991), Fofack (2000). There are also strong theoretical reasons supporting the use of expenditure over income, even in the presence of more comprehensive surveys which have extensive information of high quality on income and expenditure, see Deaton and Muellbauer (1980).<sup>9</sup>

The expenditure values are in nominal terms, and may not reflect household composition and regional price differences. To account for these differences, we use adult equivalence scales to correct for household age composition effects. These correction factors are computed endogenously from the survey.<sup>10</sup> The transformed household aggregate per capita expenditure used for welfare inference reflects these corrections. Similarly, price differentials are important between urban and rural areas, and between the different economic regions, and may bias inference on spatial analysis. These differences are accounted for by correcting aggregate expenditure for spatial price effects using the regional price deflators with the "Centre Region" which includes Ouagadougou as reference region.<sup>11</sup>

The overtime price effects are captured by changes in the nominal prices of consumption items—reflected by variations in the level of household expenses between 1994 and 1998—and the adjustment to the 1994 poverty line to reflect the revised household consumption baskets and inflation effects, following either adjustment in the costs of living at the regional levels, or shifts in the consumption baskets of the poor, depending on the degree of substitution between the different consumer goods, and price demand elasticity.

This study uses the absolute poverty line for welfare inference. This official line was established at 41,099 CFA Francs in 1994 and corresponded to the minimum amount required to satisfy individual basic needs on food and non food items. The methodology first derives total estimates of basic food items needed to satisfy minimum daily calorie intake valued at market price. A non food consumption estimate is then added to food consumption to derive the poverty line.<sup>12</sup> The 1998 poverty line uses the same methodology. Accounting for overtime inflation, this line is established at 72,690 CFA Francs in 1998. These lines are used throughout the paper, and the poor represent the proportion of individuals whose total annual expenditures fall below these thresholds.

Table 1 below shows some empirical distribution characteristics for household per capita expenditure in 1994 and 1998. There has been a persistently large income gap between urban and rural areas. The ratio of urban-to-rural mean per capita expenditure remains high in 1998 (3.2) from (3.4) in 1994, despite the rightward shift in the distribution of household expenditure in the latter round illustrated by the much larger mean. However, this ratio reduces substantially when based on the median, suggesting high income variability due to occurrence of relatively large values at the top of the distribution. The trend towards higher urban income variance is further illustrated by

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<sup>9</sup> Aggregate distributions of household expenditure from more comprehensive surveys are also subject to low bias and non sampling errors because the relatively high frequency of visits to households increases recall and reduces under-reporting.

<sup>10</sup> A correction factor of .7 is affected to all household members aged less than 15 years, and a factor of 1 to others.

<sup>11</sup> For further details on the estimation of regional price deflators, see INSD (1998).

<sup>12</sup> The minimum daily calories intake is 2283; it accounts for age structure and composition, and depends on the selected household consumption basket valued at the market prices. For more methodological details, see INSD (1998).

significant increase in the range of the distribution and the sizable difference between the median and mode of the distribution of urban household per capita expenditure, and much higher coefficient of variation in the latter round.<sup>13</sup>

**Table 1: Empirical distribution characteristics**

<i>Statistics (000)</i>	<i>1994</i>			<i>1998</i>		
	<i>Urban</i>	<i>Rural</i>	<i>National</i>	<i>Urban</i>	<i>Rural</i>	<i>National</i>
<b>Mean</b>	219.9	64.4	94.6	303.1	94.4	141.5
<b>Median</b>	129.7	40.4	53.8	168.7	63.7	79.4
<b>Mode</b>	32.7	27.0	27.0	40.6	45.6	45.6
<b>SDV</b>	2938.6	1242.5	2075.5	68677.5	17062.5	42071.2
<b>CV</b>	1.4	1.93	2.2	22.66	18.1	29.74
<b>Range</b>	5853.5	1633.9	5861.1	15310.4	2764.9	15321.8

Sources: Authors' calculations (based on household Priority Surveys).

### III. Concepts and Estimation procedures

To assess the dynamics of poverty, we use the Foster-Greer-Thorbecke (FGT, 1984) class of poverty indices— which has the attractive attribute of being additively decomposable. The Gini index is used to assess the dynamics of income inequality. Although not additively decomposable, this measure is more sensitive to changes around the median of the distribution of income where the bulk of the poor is concentrated.<sup>14</sup> To specify these measures, let  $Y$  be the real per capita household expenditure corrected for regional variations in the cost of living and inflation over the sample period. Suppose that individuals and household members are ranked according to their expenditure, producing the following rank order:

$$Y_{(1)} \leq Y_{(2)} \leq \dots \leq Y_{(q)} < z < Y_{(q+1)} \leq \dots \leq Y_{(n)} \quad (1)$$

where  $z$  is the poverty line,  $n$  is the total population and  $q$  is the number of poor. Further, assuming that household weighted coefficients are represented by  $w_i$ , then the welfare indices are estimated from the following equation:

<sup>13</sup> Note that the coefficient of variation is a much better measure of spread for distributions of income which have large means.

<sup>14</sup> One could have selected the Theil index which is sensitive to changes in the top of the distribution to reflect large income variance and occurrence of large observations in the extreme tails; however, this measure, while capturing the income variance effect, fails to fully account for the poverty effect at the lower end of income distributions.



$$P_\alpha = (1/n) \sum_{i=1}^n w_i \left( \frac{z - y_i}{z} \right)^\alpha; \quad \alpha \geq 0 \quad (2)$$

Here, we rely primarily on the head-count ratio ( $\alpha = 0$ ) and the poverty gap ratio ( $\alpha = 1$ ). The first measure focuses on the fraction of poor in the population, irrespective of their income shortfall below the threshold, and does not account for the depth of poverty; the latter does. By accounting for the average shortfall of income of the poor from the poverty line, the latter measure is also used as a measure of vulnerability.

The decomposition feature of the FGT family of indices allows estimation of the relative contribution of different subgroups to national poverty. These sub-groups may include mutually exclusive geographical regions to account for spatial effects, and socioeconomic groups (SEG) to account for income group specific effects. Assuming that the total population is divided into subsets of mutually exclusive groups, if  $\mathcal{G}_j$  is the proportion of total population in group  $j$  and  $P_{\alpha,j}$  is the headcount in the same  $J^{\text{th}}$  group, then the overall national poverty  $P_\alpha$  can be expressed as the weighted sum of  $P_{\alpha,j}$ , and the relative contribution is the ratio of the poverty index in the sub-group over the national poverty rate weighted by the population in the sub-group.<sup>15</sup> More specifically, the group  $j$  relative contribution to national poverty is expressed as:

$$C_j = \frac{\mathcal{G}_j P_{\alpha,j}}{P_\alpha} \quad (3)$$

The Gini index is derived using the following discrete representation:

$$G = \left( \frac{1}{2n^2 x} \right) \sum_{i=1}^n \sum_{j=1}^n |x_i - x_j| \quad (4)$$

This measure of income inequality takes values between 0 (the minimum) and 1 (the maximum), with this maximum value representing perfect inequality.<sup>16</sup>

We also assess the direction and magnitude of correlation between household welfare, measured by income group level and other key household and individual characteristics, particularly education level of head and household ownership of assets, conditioning on economic regions and socioeconomic groups. We use the *Kendall Tau coefficient* as a statistical measure of correlation for inference on the direction of correlation. While the correlation analysis may not allow inference on direct poverty causation, it could provide some insights on the possible determinants of poverty.

We specify a nonparametric rank correlation test to assess the degree of concordance in the distribution of wealth across SEG and economic regions over time during the growth period. This rank correlation test is based on the pair of rank order variables  $(U_i, V_i)$  sorted such that for a given bivariate distribution  $(x, y)$ , the order statistics  $x_{(i)} < x_{(i+1)} < \dots < x_{(i+k)} < x_{(i+k+1)}$  has correspondence  $u_{(i)} < u_{(i+1)} < \dots < u_{(i+k)} < u_{(i+k+1)}$  and  $y_{(i)} < y_{(i+1)} < \dots < y_{(i+k)} < y_{(i+k+1)}$  has

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<sup>15</sup> For more details on decomposition and relative contribution to overall poverty, see Atkinson (1987), Ravallion (1992).

<sup>16</sup> For further details on Gini coefficient, see Osberg (1991), Kakwani (1980).

correspondence  $v_{(i)} < v_{(i+1)} < \dots < v_{(i+k)} < v_{(i+k+1)}$ , where  $u_i$  and  $v_i$  could be let say, rank of region  $R_j$  or SEG  $S_j$  on the income level during the two reference periods  $t_1$  and  $t_2$ . Nonetheless, to the extent that we are focusing on changes in the distribution across regions and SEG over the period 1994-98, we may want to represent the pair  $(U_i, V_i)$  as  $(U_{(i)}^1, U_{(i)}^2)$  for all practical purposes; where  $U_{(i)}^2$  stands for  $V_{(i)}$  in the former representation. If  $\rho^D$  is the Spearman rank correlation statistic, then it can be represented by:

$$\rho^D = 1 - \frac{6 \sum_{i=1}^n D_i^2}{n(n^2 - 1)} \quad (5)$$

where  $D_i = (U_{(i)}^1 - U_{(i)}^2)$  and  $n$  is the sample size. This statistic assumes that the probability of a tie within either set is equal to zero. It is bounded between  $(-1 \leq \rho^D \leq 1)$  and takes the lowest value when there is perfect disagreement, in which case the ordered pairs are in complete reverse order.<sup>17</sup> It attains the upper bound when there is perfect agreement, in which case  $U_{(i)}^1 = U_{(i)}^2$  for each  $i$ , and  $\rho^D = 0$  since  $D_i = 0$  for all  $i$ . Perfect agreement means that large values of one variable are associated with a correspondingly large value of the other variable, and small values are likewise associated.

This rank correlation test can be used to assess the distributional effects of growth across socioeconomic groups and geographical regions over time, where perfect agreement will suggest that regions with high per capita income at time  $t_1$  also have high per capita income at time  $t_k$ , for  $k > 1$ . And perfectly agreeable redistributive paths over time imply constancy in the poverty map, when the dimension of analysis is spatial. Similarly, perfect disagreement will suggest significant variation in the poverty map between the two periods, due to a conjunction of factors, including wealth accumulation and redistribution effects. Such a test can also be extended to assess the distributional effects of growth along other economic dimensions and socioeconomic characteristics. We use it primarily for inference on the degree of concordance in overtime distribution of wealth across SEG and geographical regions.

Inference on the dynamics of welfare supposes prior specification of testing of hypothesis. We close this section with the specification of the test of hypothesis for assessing the significance of wealth distribution effects between the two time periods. The null hypothesis assumes constance of poverty map, suggesting a rank-order preserving skim on the wealth and poverty scale across region and socioeconomic groups. The alternative we propose using assumes some changes in the poverty map and therefore significant differences in the rank ordering between the two periods. These two hypotheses are formally represented by the following set of equations:

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<sup>17</sup> For further details on this statistical test, see J. Gibbons (1985).

$$H_0 : R(\zeta_j | g(x), P_\alpha(x), t_1) = R(\zeta_j | g(x), P_\alpha(x), t_2)$$

$$H_a : R(\zeta_j | g(x), P_\alpha(x), t_1) \neq R(\zeta_j | g(x), P_\alpha(x), t_2)$$

where  $\zeta_j$  may be chosen to represent either economic regions ( $R_j$ ) or socioeconomic groups ( $S_j$ ), and  $R(\zeta_j | \bullet)$  is the ranking of these regions or SEG on the different welfare scales, particularly poverty incidence, poverty gap, and income share of each group and time  $t$ . The distribution of income, the poverty measure ( $\alpha$ -level) and the time  $t$  may also be used as conditioning variables in the above specified test. The null hypothesis is rejected if the rank order statistics  $\rho^D$  is larger than the critical value  $R$  for which the  $p$ -value is set to be reasonably small.

#### IV. Poverty Dynamics in Burkina Faso

There are important geographical differences in the patterns of welfare in Burkina Faso—illustrated by large urban-rural bias and important socioeconomic contrast. To capture these regional variations and socioeconomic differences, we assess the dynamics of poverty at the national level, across geographical regions and SEG.

##### *Scope and spatial poverty dynamics*

The growth recorded in the post-devaluation period (1994-98) did not reverse the increasing poverty trend. The poverty incidence remained at seemingly high level, even increasing from 44.5% to 45.5%. Though small in magnitude, this variation represents a sizable increase of poor in absolute term (over 370 thousand new poor, accounting for both population growth effects and poverty dynamics effects, where redistribution of growth led to net change in absolute number of poor as a result of either emergence of new pockets of poverty or changing welfare status of previously poor households), possibly due to a number of factors which may include rapidly growing population, constance in the pattern of growth, and concentration of wealth in higher income brackets. Indeed, the observed persistence of poverty is paralleled with high income inequality and continued large concentration of wealth among the wealthiest group: the two uppermost deciles—20% of the total population—continue to account for over 61% of aggregate national income, whereas the first two decile—the poorest group—account for less than 5% (Annex I); the Gini coefficient remains at a seemingly high level: .55.

The scope and depth of poverty also vary significantly across economic regions (see Table 2). The poor are largely concentrated in rural areas, irrespective of the time dimension, an indication of continued preeminence of rural poverty. All rural areas continue to have the largest contribution to national poverty, about 95%; and the incidence of poverty continues to be significantly much higher than the urban estimate, over 51%. Despite rapid increase in urban poverty rates, the urban-rural gap remains important. This persistence of a high poverty incidence in rural areas over time amid economic growth is also reflected in the relative decline of poverty-growth elasticity (see Table 3).

**Table 2: Distribution of welfare across Economic Regions**

<i>Regions</i>	<i>Headcount index</i>		<i>Poverty Gap index</i>		<i>Relative Contribution</i>	
	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>
Ouest	40.1	40.8	11.9	12.0	16.4	16.1
Sud	45.1	37.3	14.0	12.0	9.0	6.8
Centre-Sud	51.4	55.5	14.6	19.7	27.8	28.3
Centre-Nord	61.2	61.2	20.9	18.2	31.6	30.6
Nord	50.1	42.3	18.7	11.3	6.1	5.9
Sud-Est	54.4	47.8	18.7	12.2	5.3	6.8
Ouaga-Bobo	7.8	11.2	1.5	2.7	1.8	2.7
Autres Villes	18.1	24.7	4.9	6.3	2.0	2.8
All Urban	10.4	15.9	2.5	4.0	3.8	5.6
All Rural	51.1	50.7	16.1	15.8	96.2	94.5
National	44.5	45.3	13.9	13.9	-	-

Sources: Authors' calculations.

Vulnerability is another characteristic of rural poor which did not improve during the growth period. The poverty gap remains extremely high, even by Sub-Saharan African standards (16%).<sup>18</sup> A poverty gap this large reflects an initially large level of spread between average income of the poor and the poverty line, which persisted. Expressed as a fraction of the poverty line, the absolute deviation between the mean per capita expenditure and the poverty line in the first decile, though already high (60%), increased even further (65%), a sign of widening gap between the average income of the poor and the poverty line. This deterioration was systematic in all lowest deciles (Annex II).

However, while the incidence and contribution of rural areas to national poverty remain relatively stable, the urban contribution increased to about 6%, reflecting rapid deterioration of welfare which is apparent across all urban regions, including Ouaga-Bobo, where the poverty incidence increased to 11% in 1998. The incidence of poverty in "Autres Villes" exceeded the critical threshold of 20%. This rapid increase of poverty in urban areas contributed to emergence of numerous pockets of poverty in most urban suburbs and peripheral areas and is largely the result of massive internal migration which caused a significant increase in the population share of "Autres Villes" between 1994 and 1998.

This increase in urban poverty is also accompanied by persistence of high income inequality: the 10% of the population in the uppermost income decile continues to account for over 70% of aggregate national income, suggesting that the transfer of wealth from higher to lower income brackets did not occur; the Gini coefficient increased to .55 in 1998.<sup>19</sup> To the extent that rising

<sup>18</sup> This gap is much higher than Sub-Saharan African countries average which is less than 15%, World Bank (1996).

<sup>19</sup> Short-run variations in income distribution of this magnitude are not unusual. A study on a sample of Latin American Countries shows similar rates of changes in the 1980's where the increase of Gini to .56 is accompanied by significant poverty increase, see Birdsall and Londono (1997)

income inequality is likely to undermine the income redistribution and growth effects, this level of income inequality is likely to have negatively affected household welfare through reduction of poverty response to growth.<sup>20</sup> The declining sensitivity of poverty to growth is illustrated by the changes in poverty-growth elasticity which decreased substantially in absolute terms, from -3.2 to -1.9 percent. These elasticity measures have negative sign during the two periods, consistent with the view that rising income should translate into declining poverty. However, its reduction in scope suggests that declining poverty incidence following marginal increase in income is much smaller between 1994 and 1998.

The dynamics of poverty under growth also show significant changes in the poverty map in urban areas, reflected in dramatically increased estimated probability of being poor under the binomial assumption, where  $P$  and  $(1-P)$  are the probability of being poor and non poor, respectively. In the region "Autres Villes",  $P$  increased substantially, from .05 to .57. In Ouaga-Bobo, the trend towards further deterioration of welfare and rising  $P$  is also observed. However, the changes in the size of  $P$  which increased from .16 to .20, are of lesser magnitude. Figure 1 shows estimated probabilities of being poor in a cross-section of economic regions over time. Except the Sud where a slight decline in probability is observed, the probability  $P$  increased in all other regions, particularly in the Centre-Nord and Autres Villes where it reached .63 and .57, respectively.

A much higher disaggregation shows important variations across economic regions in the cross-section and time dimension. Centre-Nord, Sud-Est and Centre-Sud which were already the poorest regions, with poverty incidence much higher than the national average, remain the poorest regions in 1998, notwithstanding the changes in poverty map. There was a relative decline in poverty incidence in the Southern and Northern regions, both specialized in the production of millet and large recipient of foreign transfers (these two regions alone account for over 52% of total transfers)—particularly in the Nord and Sud where the incidence of poverty declined by over 15% and 17%, respectively—and the relative increase in Centre-Sud and urban areas. The incidence of poverty remained constant in the "Ouest", regions which relies heavily on agricultural production (this region alone accounts for over 45% of total agricultural production).

Figure 1 in Annex III shows the distribution of poor and non poor, expressed as a percentage of all poor and non poor in the cross section of economic regions over time. Darker lines represent the distributions of poor, with the thicker line for 1998 and thin one for 1994. Similarly, gray lines represent the distribution of non poor, with thicker lines for 1998 and thin one for 1994. This Figure may also be viewed as a graphic illustration of the dynamics of the poverty, to the extent that the sum across each dimensional unit corresponds to 100. The region Centre-Sud which accounted for the largest share of poor in 1994 has been relegated to second rank; Autres Villes now accounts for the largest share of poor, over 35%. An increase is also recorded in Ouaga-Bobo, which now accounts for over 8% of all poor. However, despite rising urban poverty, most well-off remain largely concentrated in urban areas, and Ouaga-Bobo alone accounts for over 30%. Altogether with Autres Villes, they account for over 60% of all non poor. One region which might have benefited from growth is the "Sud" which recorded a significant decline in poverty incidence accompanied by rising poverty-growth elasticity and declining poverty-income inequality elasticity from an already low level.

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<sup>20</sup> An increase in income affects overall welfare either through increased average income which generally has positive effects, or through changes in the income distribution which has a positive or negative effect on welfare depending on whether income inequality has lessened or increased.

**Table 3: Elasticities of Poverty Measures for Mean Income and Gini Index**

	<i>Gini Index</i>		<i>Poverty-Growth elasticity</i> $\zeta_{(G,P_0)}$		<i>Poverty-Income Inequality elasticity</i> $\zeta_{(I,P_0)}$	
	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>
<b>National level</b>	55.09	54.75	-1.13	-1.01	1.48	.949
<b>All Urban</b>	50.59	54.67	-3.21	-1.92	13.99	6.12
<b>All Rural</b>	45.86	43.77	-1.21	-1.07	.685	.31
<b>Ouest</b>	47.2	44.4	-1.3	-1.16	1.09	.57
<b>Sud</b>	47.16	40.89	-1.01	-1.2	.435	.419
<b>Centre-Sud</b>	39.1	45.5	-1.18	-1.01	.235	.371
<b>Centre-Nord</b>	46.2	37.1	-1.3	-1.16	.72	.12
<b>Nord</b>	45.1	46.6	-1.3	-1.32	.85	.98
<b>Sud-Est</b>	47.2	44.15	-1.18	-1.13	1.02	.43
<b>Ouaga-Bobo</b>	52.98	56.75	-1.95	-1.81	6.29	5.31
<b>Autres Villes</b>	49.33	51.32	-6.06	-.89	28.76	.47

Sources: Authors' calculations.

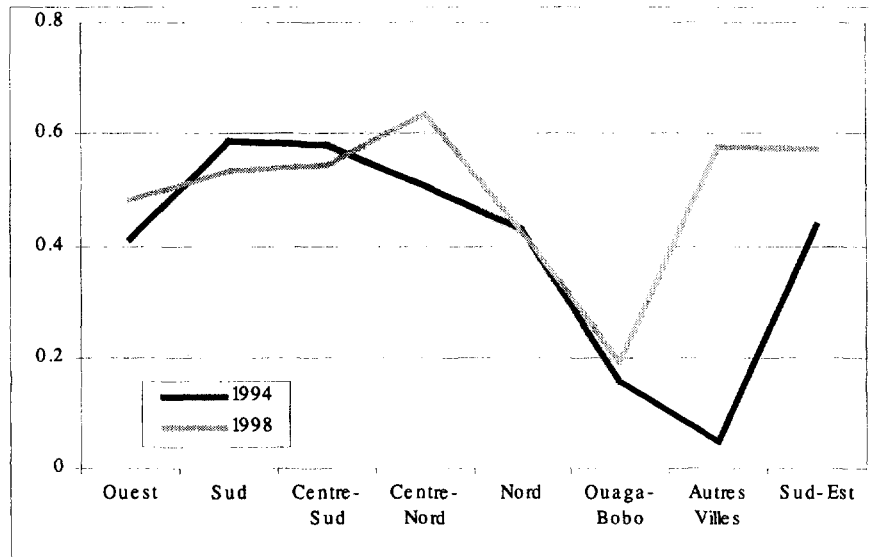
Note that the absolute magnitude of poverty-elasticity for mean income is greater than unity for all economic regions but "Autres Villes", where it fell from -6% to -.89%. Hence, poverty should have declined much faster than the rate of economic growth if the growth process was not accompanied by high income inequality. These elasticities are much higher in urban areas, reflecting the scope of urban inequality and the relatively small size of the initial level of poverty. Empirical results suggest that lower poverty measures are considerably more sensitive to changes in income inequality (redistribution effects) than to changes in the mean income (growth effects), see Kakwani (1990). Rapidly rising urban poverty may therefore be driven by large income inequality.<sup>21</sup>

However, the relatively important short-run variation in the spatial distribution of welfare cannot be explained solely by redistribution effects. Another relevant factor which might have contributed to the rapidly changing poverty map is the population dynamics effect. Nonetheless, while one may provide an updated poverty map, the population dynamics which caused internal migration to intensify during the growth period makes it difficult to determine the geographical regions which benefited most from growth on the sole basis of welfare indices. This is especially because, to a large extent, rural-to-urban migration which fueled the convergence of the traditionally rural population, largely poor to urban centers may be driven by quest for greater economic opportunities in most

<sup>21</sup> There may be other reasons why increased aggregate national income measured by GDP may not necessarily translate into declining poverty; these may include the nature and allocative patterns of public spending, especially if these are inherently oriented towards investment rather than consumption. Indeed, a decomposition of GDP in Burkina Faso between 1994 and 1998 shows that most of the gains achieved in the growth period was invested, which may benefit the poor in the long-run— assuming that these investments are productive and efficient— but not necessarily in the short-run. For further details on results of decomposition analysis, see Appendix A.

urban centers, likely to materialize either with time lag or in the medium to long-run.

**Figure 1: Probability of being poor across economic regions overtime**



### Poverty Dynamics across Socioeconomic Groups

The scope of poverty and its dynamics also varies significantly across SEG. A cross-section analysis focusing on 1994 identifies households deriving their income from food and export crops as the poorest, with poverty incidence much larger than the national average. Altogether, these two socioeconomic groups accounted for over 90% of all poor (see Table 4). Their relative contribution to national poverty remains stable, despite the steady decline in poverty among export crop farmers for which the incidence of poverty declined to 42.4%, following increased volume of exports, particularly in the cotton sub-sector after the 1994 CFA Franc devaluation.<sup>22</sup>

These two SEGs also have the largest poverty gap. The persistence of high poverty gap even when the distribution, as a result of increased mean, has shifted to the right in the second round may also suggest that the poor from this group might not have fully benefited from growth. The benefits of growth in a highly redistributive context would have reduced the gap between the poverty line and average income of the poor, had it been characterized by a trickle down effect, with much higher increase of income occurring at the lower end of the income distribution. Instead, this gap became larger for subsistence farmers, the largest and poorest SEG. Expressed as a fraction of the poverty line, the absolute deviation between the mean income in this poorest group and the poverty line in the

<sup>22</sup> An analysis of agricultural production during the 10 year periods pre- post-devaluation suggests large extensification of cotton production and increase volume in the post-devaluation, see INSD, 1998.

first decile increased to over 66% in 1998, from 58% in 1994.

**Table 4: Distribution of welfare across Socioeconomic Groups**

<i>Socioeconomic Groups</i>	<i>Headcount index</i>		<i>Poverty Gap index</i>		<i>Relative Contribution</i>	
	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>
Wage Public	2.2	5.9	.40	1.6	.20	.50
Wage Private	6.7	11.1	2.2	2.5	.40	.70
Artisans/Commerce	9.8	12.7	2.8	2.7	1.4	1.6
Other Actives	19.5	29.3	6.4	7.0	.30	.40
Export Farmers	50.1	42.4	13.8	12.5	11.8	15.7
Subsistence Farmers	51.5	53.4	16.3	16.5	78.9	77.1
Inactive <sup>23</sup>	41.5	38.7	14.5	12.1	7.1	4.0
<b>National</b>	<b>44.5</b>	<b>45.3</b>	<b>13.9</b>	<b>13.9</b>	-	-

Sources: Authors' calculations.

More surprising is the rising contribution of export crop producers to national poverty amid overall decline of poverty incidence in this particular group. The rising contribution of this SEG is largely attributed to the increased number of export crop farmers, particularly cotton producers, following the post-devaluation boom. Expressed as a percentage of total population, the share of export crops farmers increased by over 40%; and correlatively, the number of export crop farmers which accounted for about 10% of all poor in 1994 increased by over 5 percentage points, to nearly 15% in 1998. The number of non poor deriving their income from this source increased by nearly 4 percentage points, from 7 to 11%. The overall increase in the relative contribution to national poverty may reflect both the net effect exacerbated by population increase, and the much lower wealth or income redistribution effects.

Figure 2 shows the probability  $P$  of being poor in a cross-section of SEG over time at the national level. This probability increased across most SEG, including wage income earners from public and private sectors which are traditionally better off, and export crops farmers, where a significant decline in poverty incidence occurred. Top among the SEG exhibiting a high rate of increased probability are food crop producers and subsistence farmers. The conditional probability of being poor in this SEG, though already high, rose to .61. And to the extent that this SEG represents the largest group of active population, a magnitude of probability of this size represents a proportionate increase in poverty.

More revealing also is the similarity in the pattern and trend of these conditional probabilities between 1994 and 1998, which suggests relative stability in rank ordering of SEG on the welfare scale. Figure 2 in Annex III shows the distribution of all poor and non poor across SEG over time.

<sup>23</sup> Income received by household falling in this socioeconomic group is in the form of capital income (dividends, interest, rent income, imputed rent from residing in own dwelling), pensions, public transfers and remittances which represent important sources of income, particularly in the southern and northern regions of Burkina Faso.

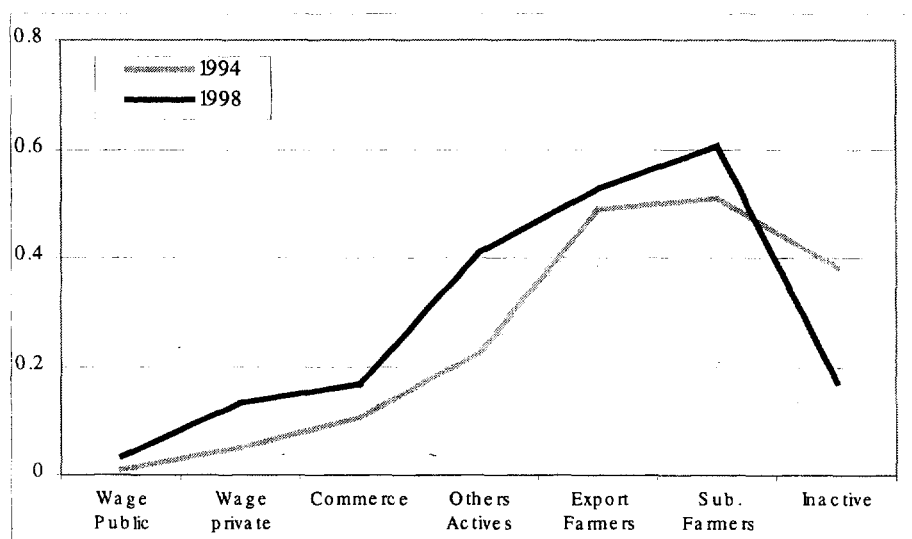


The sum across each cross-sectional and dimensional unit corresponds to 100. The poorest SEG remains the food crop farmers where over 79% of all poor continues to derive its income from subsistence agriculture. In contrast, the share of non poor deriving its income from subsistence agriculture declined to 47% in 1998, from over 53% in 1994. The declining share of non poor subsistence farmers and relative stability of the share of poor seem to suggest that this SEG may not have fully benefited from growth. The SEG which might have benefited the most include private sector salary workers whom the proportion of non poor expressed as a percentage of all "non poor" increased by over twofold, to 16%, from 6%.

When conditioned upon region— urban and rural areas— the variations in these conditional probabilities are even more important, with opposite trends observed in some cases (see Annex IV which provides estimated probability of being poor across SEG and over time in urban and rural areas). The variations along spatial dimensions are more important than the variations over time. For instance, depending on the SEG, the scaling factor attached to the probability of being poor varies from 1 to 2 between urban and rural areas on the average. Furthermore, a cross-section analysis focusing on each time period shows that the variations in probability are more important in 1998, both in urban and rural areas, where the graph representing the conditional probability distribution is less smooth.

The SEG which seems to have benefited from growth between 1994-98 are traders specialized in shipping of export crop; the probability of being poor declined slightly in this group. In contrast, the probability of being poor conditioned upon this SEG increased in rural areas, suggesting deterioration of welfare. Another SEG which failed to benefit from growth is "Other Actives" which includes mainly informal sector workers in rural areas. The conditional probability of being poor for this particular SEG more than doubled, reaching the level of subsistence farmers which continue to have the highest likelihood of being poor.

**Figure 2: Probability of being poor across socioeconomic groups**



## V. Other Correlates of Welfare

The welfare implications of assets ownership have been demonstrated. In a study on Latin American countries, Birdsall and Londono (1997) attributed the persistence of poverty to the scope of income inequality and unequal distribution of assets, both physical and human capital. By way of initiating the investigation of some of the determinants of poverty in Burkina Faso in the 1994-98 growth period, here we assess the strength and direction of association between education and household welfare; household asset ownership and welfare in a cross-section of economic regions and SEG.

### *Associations between parental education level and household welfare*

One of the key characteristics of the poor which remained consistent over time is their lack of basic education. Of all the poor, more than 93% had no education, and the rest who have attended any schooling failed to complete secondary education (see Annex V-A). Also, the distribution of population between poor and non poor across education level of head shows a systematic decline in proportion at increasing levels of education in the poor. At the highest level of education, almost everyone is non poor (99.4%). This educational bias persisted over the reference period.

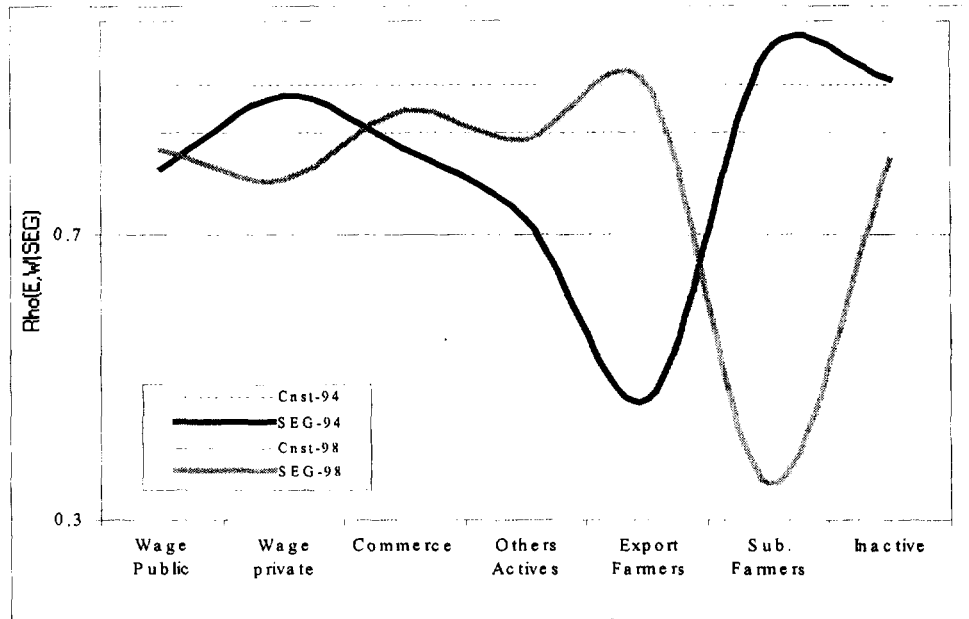
Here, we assess the direction and strength of association between parental education and household welfare measured by average expenditure across decile, using the Spearman correlation. Parental education level and household welfare are positively associated and the degree of association is relatively strong. The unconditional measures of association are  $\rho_{(94)}(E,W) = .90$  and  $\rho_{(98)}(E,W) = .85$ , further sustaining the hypothesis of rising income (therefore declining poverty) at increasing level of schooling. In a related study on Vietnam, Behrman et al. (1999) also found a positive association between enrollment and household income. A correlation coefficient this high implies that over 70% of the variation in welfare is explained by parental education. This association is also significant at the 10 percent level, suggesting that it is unlikely to have obtained a correlation this large by chance if the sample was drawn from a population whose correlation was zero. It is worth pointing out that overlaying maps on poverty and assets ownership across SEG shows that SEG which have relatively low assets endowment (both human and physical assets)— export and subsistence farmers also exhibit the highest probability of being poor, suggesting that poverty across SEG might be driven by assets ownership.

The direction of association is also spatial and time invariant. Its magnitude is affected by household location and SEG. These associations remain positive, relatively strong and largely significant. Hence, households reporting higher levels of parental education are most likely to have higher income and low poverty incidence. The proportional variance in household welfare explained by parental education is influenced by income sources. The income variance non explained by changes in parental education level is low and varies across SEG. Figure 3 provides smoothed curves of measured correlation across SEG. Annex VI provides these estimates with corresponding *p* – values . Note the overtime changes in the magnitude of the association.

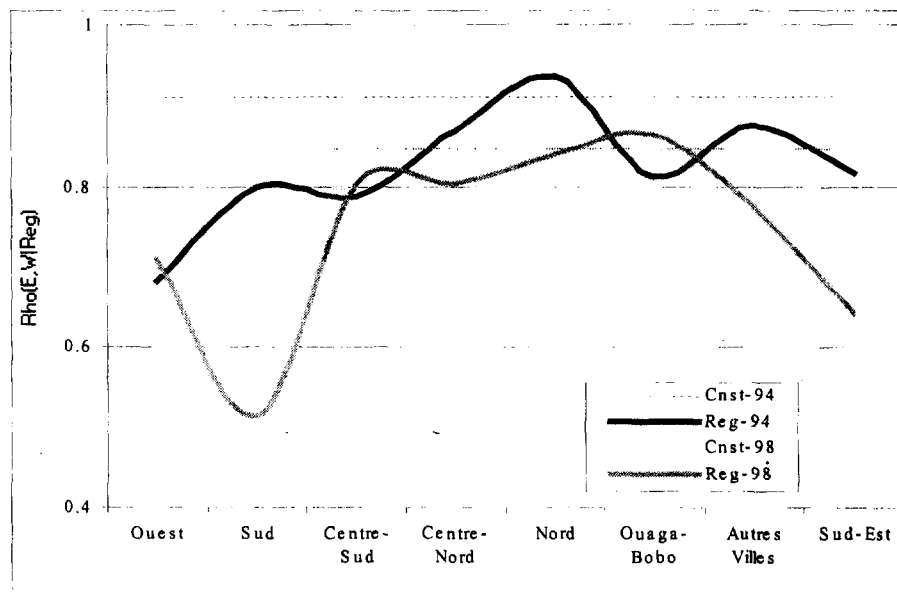
The time dimension appears less significant than spatial effects when the measured correlation is controlled for household location. The only exception is the "Sud" where the correlation coefficient declined to  $\rho_{(98)}(E,W | Sud) = .51$ . In all other regions, this association remains strong and significant, particularly in Centre-Nord where changes in parental education

explain over 70% of proportional variance in welfare. Figure 4 below shows smoothed correlation curves across regions. Annex VII provides these coefficients along with corresponding  $p$  – values .

**Figure 3: Correlation analysis education of head and household welfare across SEG**



**Figure 4: Correlation analysis education of head and household welfare across regions**



### *Associations between household ownership of assets and welfare*

Another characteristic of poor Burkinabés is their lack of physical assets. Here, we focus on the association between household ownership of assets and welfare.<sup>24</sup> The asset variable is constructed at the household level, by creating a dichotomized asset vector which assigns value  $A=1$  to households possessing a given asset and 0 otherwise. The sum across these variables produces the asset score which ranges between 0 (no asset) and 6 (all key assets selected).<sup>25</sup> The distribution of poor on the assets score is inversely related to the assets scores— the share of poor declines with rising asset scores, and there is no poor household beyond an asset score of three (Annex V-B). On the other hand, the distribution of non poor is directly proportional to increasing assets score. Households with large possession of assets are likely to be non poor.

This distributional pattern persisted in 1998. A relatively large share of households with no asset continues to be poor in rural areas (63%), at the national level (60%), and a much lower percentage in urban areas where asset ownership is more important (33%). Likewise, beyond the asset score of three, the total weight is allocated to non poor, suggesting some form of association between household asset ownership and welfare. In a related study on Thailand, Fofack and Zeufack (1999) found assets ownership to be one of the key determinants of income inequality.

We estimate the direction and strength of association between household assets ownership and welfare using the measured correlation coefficients. The unconditional correlation shows a relatively strong and positive association over time,  $\rho_{(94)}(A,W) = .936$ , and  $\rho_{(98)}(A,W) = .938$ , implying that over 87% of proportional variance of welfare is explained by household assets ownership in 1994 and 1998, respectively. This association is statistically significant at the 1 percent level.

It is also affected by household SEG and spatial location. The estimated measure ranges between  $(.7508 \leq \rho_{(94)}(A,W | SEG) \leq .916)$ , taking the lowest value ( $\rho_{(94)}(A,W | SEG) = .7508$ ) for public sector wage earners and the highest value  $\rho_{(94)}(A,W | SEG) = .916$  for Traders. These associations are statistically significant at 10 and 1 percent level. Figure 5 below shows smoothed curves of measured coefficients of correlation between household assets ownership and welfare in a cross section of SEG and over time. These graphs exhibit a much larger variability 1998, (Annex VI).

There are also important variations across geographical regions (Figure 6). The solid, darker and thicker line represents the variations in 1998, while the solid, gray and less thick represents the variations in 1994; the smallest lines, dashed and solid represent unconditional correlation measures during the two periods. Again, over time changes across economic regions appear more significant than the variations across SEG. Irrespective of time dimension and household spatial location, household assets ownership is positively correlated with household welfare. This association is much stronger in urban areas where assets distribution is more evenly spread, and even increased in Ouaga-Bobo to  $\rho_{(98)}(A,W | Ouaga - Bobo) = .967$ . This measured coefficient is large and significant across most economic regions, (Annex VII). The relative similarity in the pattern of the smoothed curves over time may further corroborate the fact that household asset ownership did not improve.

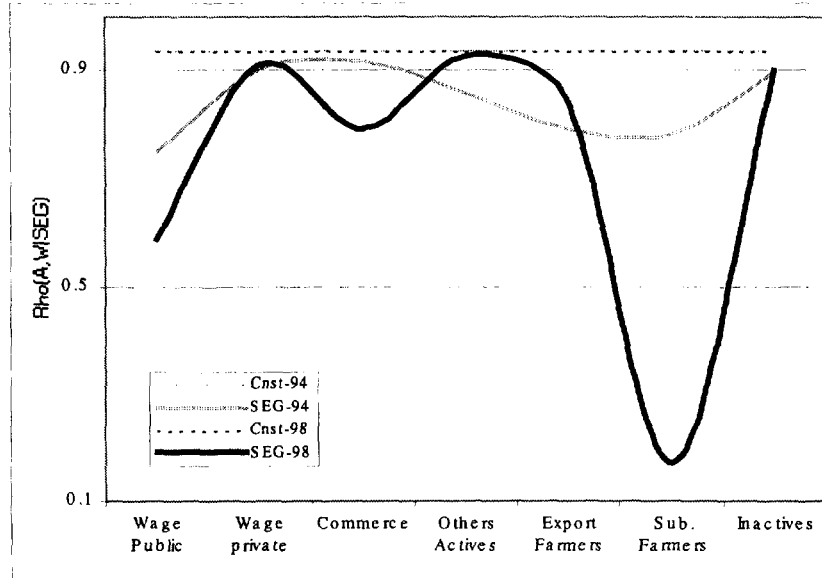
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<sup>24</sup> The latest World Development Report identifies lack of assets as one of the major causes of poverty, see World Bank (2001).

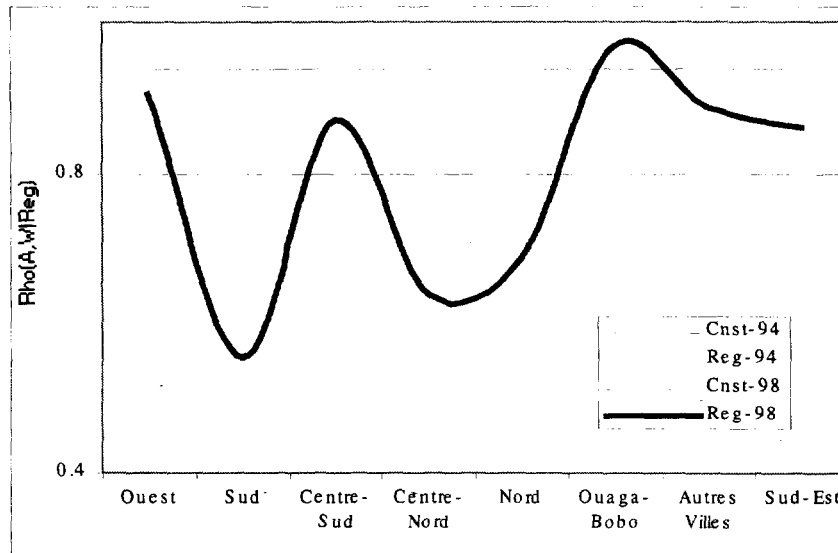
<sup>25</sup> These key assets include: television, refrigerator, gas stove, radio, improved stove, and sewing machine.

Over 90% of population continues to have at most one of the key assets.

**Figure 5: Correlation analysis household assets ownership and welfare across SEG**



**Figure 6: Correlation analysis household assets ownership and welfare across regions**



## VI. Testing for Significance of Changes in Distribution of Welfare

Here we construct a nonparametric test to assess the significance of overtime change in the distribution of welfare and wealth, drawing from the Spearman coefficient of rank correlation defined in (5). The dimension of analysis includes economic regions and socioeconomic groups. The test on the latter being further extended to urban and rural areas to account for urban-rural differences. The two related samples are the distribution of income across SEG in 1994 (sample 1) and 1998 (sample 2). And we are testing for significance in changes in distribution of wealth between these two periods on the welfare rank ordering scale. The other two related samples attempt to test for significance of overtime changes in the poverty map.

The null hypothesis specified in Section 3 asserts that the distributions of income  $f(x_{t_1} | \bullet)$  and  $f(x_{t_2} | \bullet)$  at time periods  $t_1$  and  $t_2$  are independent, implying that there is no association between the rank ordering of SEG and economic regions on the wealth sphere between the two periods. The conditioning factors for these distributions include spatial considerations and SEG. The alternative is a two-sided test asserting existence of association. However, accounting for the sign and magnitude of the test statistics ( $\rho^D > 0$ ), the inference is restricted to a one-sided direct association. The test of overtime changes in the poverty maps is based on the distributions  $P(x_{t_1} | \bullet)$  and  $P(x_{t_2} | \bullet)$ , where the conditioning factors include the poverty lines, the income distribution and the  $\alpha$ -level. Here, we focus on the incidence of poverty ( $\alpha = 0$ ), because overtime changes in the rank ordering of SEG and poverty maps are not significant for larger  $\alpha$ .

On the distribution of income, the highest ranking score is attributed to regions and SEG with the largest income share (i.e. the highest concentration of wealth, (Annex VIII and IX). Whereas on the welfare rank ordering scale which provides the distribution of total poor across geographical regions and SEG, the highest ranking score is affected to the region or SEG which has the largest concentration of poor (Annex VIII and IX). At the national level, the regions "Autres Villes" had the highest score on the rank ordering scale in 1994, and "Ouaga-Bobo" had the highest score in 1998. During these two periods, the "Sud" region continues to account for the lowest income share and thus had the lowest rank. The distribution of poor provides the region's or SEG's share of poor expressed as a percentage of all poor. When the dimension of analysis is restricted to economic regions, the "Centre-Nord" exhibits the large concentration of poor in 1994, and "Autres Villes" accounts for the largest share in 1998. The sum of square deviation on the rank ordering scale is relatively large ( $\sum D_i^2 = 74$ ) when the dimension of analysis is geographical regions, suggesting significant overtime changes in the poverty maps. This statistic is much smaller when the overtime comparison is based on the distribution of welfare across SEG, suggesting less variation in the rank ordering of SEG overtime; invariably, subsistence farmers have the highest rank.

Table 7 below provides the summary inferential statistics, the sum of squared deviation, the Spearman rank correlation, with their associated  $p$ -values. These statistics are derived for comparisons of overtime changes in the distribution of income and welfare across SEG in urban and rural areas, and at the national level, where the number of groups is restricted to ( $n = 7$ ). The statistics derived for these two distributions across geographical regions are based on a much larger number of groups ( $n = 8$ ). These statistics are proportional to the number of groups, and the sum of squares deviations ( $\sum D_i^2$ ) tends to increase with large  $n$ .

Note that irrespective of the distribution and dimension of analysis, the Spearman rank correlation statistic is positive ( $\rho^D > 0$ ). This is an indication of direct association, where geographical regions (socioeconomic groups) with large concentration of wealth at time period  $t_1$  also have large concentration of wealth at time period  $t_2$ . Similarly, geographical regions (SEG) with large concentration of poor at time  $t_1$  also have large concentration of poor at time  $t_2$ , suggesting tendency towards concordance in the rank ordering of geographical regions (SEGs) overtime.

**Table 7: Rank correlation test of overtime concordance in the distribution of welfare across socioeconomic groups and economic regions**

<i>Dimension of analysis</i>	<i>Number of groups (n)</i>	<i>Distribution of income</i>		<i>Distribution of poor population</i>	
		$\sum D_i^2$	<i>Statistics</i> $\rho^D$	$\sum D_i^2$	<i>Statistics</i> $\rho^D$
Socioeconomic groups Urban areas	7	24	.5710 [.100]***	20	.6428 [.069]***
Socioeconomic groups rural areas	7	18	.6785 [.055]***	16	.7143 [.044]**
Socioeconomic groups national level	7	24	.5715 [.100]***	24	.5714 [.100]***
Economic Regions	8	26	.6905 [.0350]**	74	.1191 [.397]

\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\*\*\* Significant at the 10 percent level.

The test rejects the null hypothesis of no association between the distribution of income across economic regions over the two periods in favor of the alternative. The concordance in rank ordering is preserved for several regions, and even when there is discordance, the absolute deviation is small, suggesting that regions with large concentration of income in 1994 also have large concentration of income in 1998. These regions include "Autres Villes" and "Ouaga-Bobo". The Spearman coefficient of rank correlation is  $\rho^D = .6905$  and the corresponding  $p$ -values for the right tail test  $P < .05$  suggesting a significant association at the 5 percent level. However, the test fails to reject the null in favor of the alternative when the comparison is based on the distribution of poor across economic regions. The sum of squared deviation is relatively large for the number of groups, reflecting the magnitude of change in the poverty maps between the two reference periods. The correlation rank statistics is relatively small ( $\rho^D = .119$ ), and the corresponding  $p$ -value is large ( $P = .397$ ).

When the dimension of analysis is taken to be SEG, the direction of inference is consistent, regardless of the reference distribution and level of disaggregation. In all cases, the test rejects the null hypothesis of no association between the distribution of income across socioeconomic groups in the two time periods in favor of the alternative, at the national level, but also in urban and rural areas. This association is significant at the 10 percent level. The SEG which were ranked high in 1994 also ranked high in 1998, suggesting relative stability in the distribution of income across SEG where the patterns of distribution are preserved. The persistence of similar distribution pattern where subsistence farmers continues to have the larger income share in rural areas suggests either that the redistribution effects of growth were not significant, reinforcing the scope of income inequality (which worsened, particularly in urban areas), limiting the growth impact and exacerbating the poverty level; or else absence of changes in the pattern of growth which remains largely driven by agricultural production, mainly subsistence farmers who have the lowest per capita income and the highest poverty incidence. In urban areas, wage income from public and private sector continue to have the highest rank score.

The test also rejects the null hypothesis of no association between the distribution of poor across socioeconomic groups in the two time periods in favor of the alternative, at the national level, but also in urban and rural areas. This association is significant at the 10 percent level in urban areas and 5 percent level in rural areas. The SEG which were ranked high in 1994 also ranked high in 1998. And irrespective of the regions, subsistence farmers have the highest rank, suggesting that they invariably account for the larger share of poor. This share is much lower for public and private sector wage income earners in the respective regions.

## **VII. Concluding Remarks and Policy Implications**

The five years following the post-devaluation period have been characterized by relatively strong economic growth in Burkina Faso, a country where poverty is widespread, and where income disparities across socioeconomic groups and geographical regions are significant. In a context of continued coexistence of high economic growth rates and widespread poverty, the benefits of growth and their welfare implications across economic regions and for the different socioeconomic groups over time becomes a key question of policy relevance.

This paper shows that the prospects of increasing the benefits of growth which followed the post-devaluation period to the poor were largely undermined by the scope of income inequality, which even increased during that period, limiting the potential for growth redistribution effects. A significant increase in poverty incidence was recorded in urban areas where the level of income inequality, already high, rose even further. Thus, household welfare was less sensitive to growth, as judged by the decline of poverty-growth elasticities in absolute terms. In rural areas where income inequality did not increase, the poverty incidence remained at its pre-devaluation levels. This rural poverty incidence was already substantially high in comparison to urban estimates. While poverty remains largely a rural phenomenon, its elastic nature is important and may justify a necessary shift towards growth oriented policies which at least maintain the income share of the poor to achieve greater poverty reduction in the medium term.

There are numerous determinants of income inequality which may include wage disparities, unequal access to productive assets and disparities in educational attainment, see Birdsall and Londono (1997), Fofack and Zeufack (1999). Parental educational level is relatively low in Burkina



Faso, with combined geographical and wealth bias. Poor living in rural areas have disproportionately lower rates of education achievement, and much lower rates of assets ownership. To the extent that unequal distribution of assets, especially human capital, has negative effects on overall growth redistribution— and disproportionately on the income level of the poor (see Birdsall et al. (1995), Birdsall and Londono (1997))— the direction and relative strength and stability of the association between parental education and household welfare, between asset ownership and household welfare, seems to suggest that the long-run impact of existing poverty-reducing growth policies could have been even more significant, if accompanied with measures to reduce the scope of bias in education attainment and assets ownership which exists between poor and non poor, and persisted in the growth period.

Unequal distribution of assets across economic regions and SEG, where the poor in rural areas have significantly much lower access to assets, could also be among the causes for continued persistence of large urban-rural bias and regional disparities. A large proportion of poor derive their income from subsistence agriculture, largely produced in rural areas. Top among SEGs which seem to have benefited from post-devaluation economic growth are private sector salary workers. The benefits of growth seem to have been less significant for other SEG deriving their income primarily from rural production, even export crop farmers, despite earlier expectations of improved welfare as a result of increasing competitiveness in the export sector, primarily cotton sub-sector, following the devaluation.

Also, while the benefit of growth and its redistribution effects over time were generally less significant across SEG, where rank ordering of SEG was preserved over the two time periods, the growth effects on the distribution of income and welfare across geographical regions suggests overtime changes in the poverty maps. The significance of changes in the poverty maps may reflect both the spatial effects, including population dynamics effects over space; geographical constraints which affects the scope of localized growth rates and the redistribution effects of growth to a certain extent. However, the extent and contribution of either component— spatial effects or growth redistribution effects— on the poverty dynamics in the short- to medium-term are not known. Future research will investigate the contribution of each component to the changing poverty map over time. Future research will also examine more closely the determinants of welfare, in particular, by further investigating the established correlation between household assets ownership and welfare.

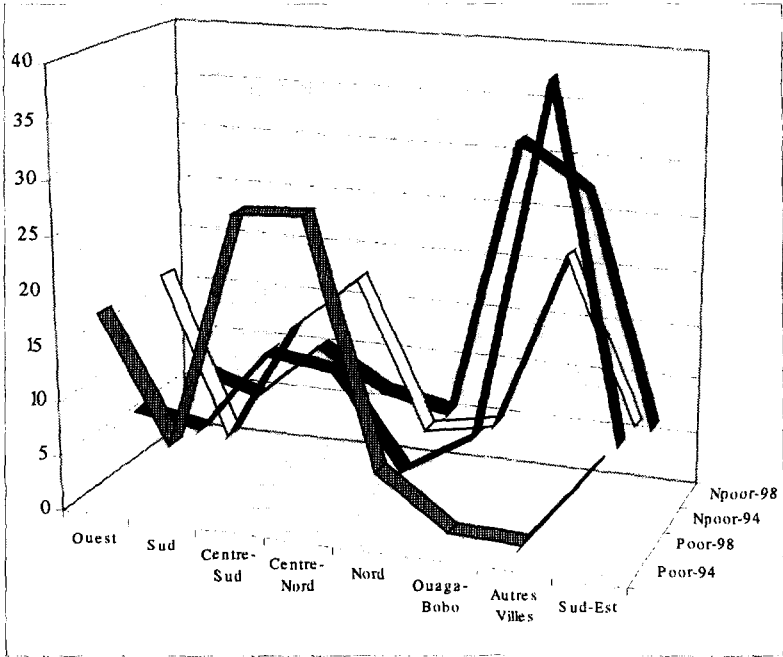
**Annex I: Empirical distribution of income across expenditure decile**

Decile	National level		Urban areas		Rural areas	
	PS-94	PS-98	PS-94	PS-98	PS-94	PS-98
1	1.8	1.8	.10	.10	3.2	3.3
2	2.6	2.7	.10	.40	4.7	4.9
3	3.2	3.4	.20	.50	5.7	6.1
4	3.9	4.1	.60	.90	6.6	7.0
5	4.7	4.8	.80	1.0	7.9	8.4
6	5.7	5.8	1.5	2.0	9.2	9.4
7	7.3	7.2	2.9	3.5	10.9	10.8
8	9.8	9.5	6.3	6.0	12.6	12.8
9	15	14.4	16.1	15.6	14.1	13.3
10	46.1	46.2	71.4	70	25.0	23.9
<b>All</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

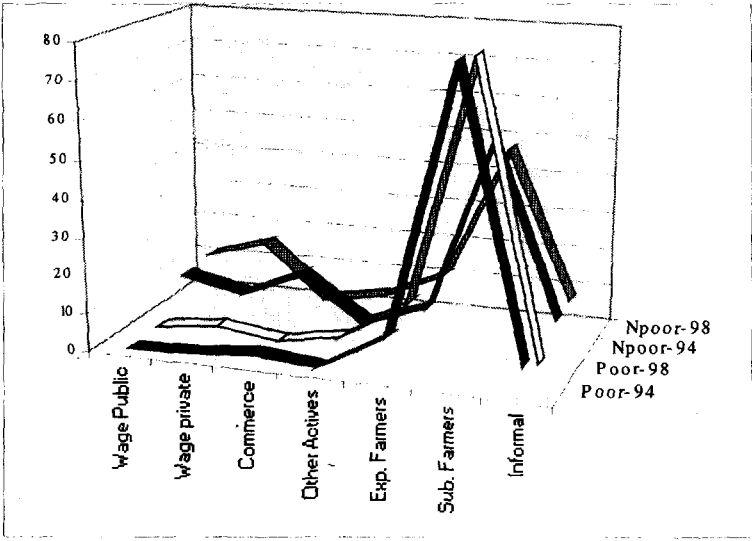
**Annex II: Absolute deviation between mean per capita expenditure decile expressed as fraction of the poverty line**

Decile	National level		Urban areas		Rural areas	
	PS-94	PS-98	PS-94	PS-98	PS-94	PS-98
1	-.591	-.655	-.557	-.647	-.592	-.655
2	-.397	-.475	-.391	-.466	-.397	-.475
3	-.256	-.338	-.251	-.341	-.256	-.337
4	-.108	-.211	-.098	-.204	-.109	-.208
5	.071	-.058	.081	-.065	.069	-.057
6	.314	.133	.321	.139	.313	.132
7	.672	.405	.699	.427	.665	.398
8	1.251	.854	1.307	.861	1.228	.851
9	2.451	1.812	2.506	1.878	2.410	1.43
10	9.652	8.032	10.015	8.794	8.892	6.446

Annex III - Figure 1: Distribution of poor and non poor across economic regions



Annex III - Figure 2: Distribution of poor and non poor across socioeconomic groups



Annex IV: Estimated probability of being poor across Socioeconomic Groups

<i>Socioeconomic Groups</i>	<i>Urban Areas</i>		<i>Rural Areas</i>	
	<i>1994</i>	<i>1998</i>	<i>1994</i>	<i>1998</i>
Salaries Public	.003	.027	.021	.054
Salaries Privé	.023	.101	.198	.242
Artisans/Commerçants	.0432	.085	.224	.225
Autres Actifs	.069	.165	.309	.635
Agriculteurs Rente	.134	.106	.489	.529
Agriculteurs Vivriers	.252	.419	.525	.619
Inactive	.079	.131	.559	.473

Annex V-A: Distribution of poverty status (poor and non poor) by education level of household head

<b>Education level</b>	<b>1994</b>		<b>1998</b>	
	<b>Poor</b>	<b>Non poor</b>	<b>Poor</b>	<b>Non Poor</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
No education	93.14	74.51	93.75	71.33
Primary not completed	4.21	7.03	2.85	10.44
Primary completed no secondary	2.29	6.70	2.06	6.13
Secondary not completed	.33	7.89	1.30	5.82
Secondary completed and higher	.03	3.86	.04	5.78
<b>All</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Annex V-B: Distribution of poverty status by household asset ownership**

Assets Scores	1994		1998	
	Poor	Non Poor	Poor	Non Poor
	(%)	(%)	(%)	(%)
0	63.33	42.41	55.66	34.28
1	28.28	34.95	40.66	41.4
2	3.04	12.51	3.38	11.55
3	.35	4.86	.20	5.06
4	0	3.06	.11	2.24
5	0	1.76	0	3.39
6	0	.45	0	2.08
<b>All</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Annex VI: Correlation analysis between selected determinants of welfare and poverty across socioeconomic groups ( $\rho_{(E,W|SEG)}$ ,  $\rho_{(A,W|SEG)}$ )**

Socioeconomic Groups	<i>Education and household welfare</i>		<i>Asset ownership and household welfare</i>	
	<i>PS - 1994</i>	<i>PS - 1998</i>	<i>PS - 1994</i>	<i>PS - 1998</i>
<i>Wage Public</i>	.792 [.111]	.8189 [.090]***	.7508 [.0517]***	.5883 [.165]
<i>Wage Private</i>	.895 [.0401]**	.7791 [.1204]	.902 [.005]*	.9096 [.0045]*
<i>Commerce</i>	.8206 [.088]***	.8762 [.0513]***	.916 [.0038]*	.7932 [.0599]***
<i>Other Activities</i>	.7228 [.168]	.8349 [.0785]***	.8586 [.0286]**	.9273 [.0026]*
<i>Export Farmers</i>	.4716 [.528]	.911 [.0896]***	.7918 [.1104]	.8445 [.0712]***
<i>Subsistence Farmers</i>	.957 [.0105]**	.3528 [.5603]	.7816 [.066]***	.1734 [.711]
<i>Inactive</i>	.918 [.027]**	.8044 [.1007]	.899 [.0058]*	.9012 [.0056]*

\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\*\*\* Significant at the 10 percent level.

**Annex VII: Correlation analysis between selected determinants of welfare and poverty across Economic Regions ( $\rho_{(E,W|REG)}$ ,  $\rho_{(A,W|REG)}$ )**

<i>Economic Regions</i>	<i>Education and household welfare</i>		<i>Asset ownership and household welfare</i>	
	<i>PS - 1994</i>	<i>PS - 1998</i>	<i>PS - 1994</i>	<i>PS - 1998</i>
<i>Ouest</i>	.683 [.204]	.7104 [.178]	.849 [.068]**	.9053 [.005]*
<i>Sud</i>	.800 [.104]	.5138 [.3758]	.7493 [.086]***	.5548 [.254]
<i>Centre-Sud</i>	.789 [.112]	.8034 [.1011]	.715 [.175]	.871 [.0108]**
<i>Centre-Nord</i>	.868 [.056]**	.8025 [.1021]	.5899 [.217]	.6382 [.1727]
<i>Nord</i>	.935 [.019]*	.8383 [.076]***	.889 [.110]	.6853 [.2017]
<i>Ouaga-Bobo</i>	.813 [.095]**	.8627 [.0598]***	.8835 [.0083]*	.9669 [.0004]*
<i>Autres Villes</i>	.874 [.053]**	.7748 [.1238]	.9528 [.0009]*	.8879 [.0076]*
<i>Sud-Est</i>	.817 [.091]**	.6431 [.2417]	.8701 [.0550]***	.8595 [.0131]**

\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\*\*\* Significant at the 10 percent level.

**Annex VIII: Rank ordering economic regions on distribution of income and welfare**

<i>Economic regions</i>	<i>Distribution of income</i>		<i>Distribution of poor</i>	
	$U_{(i)}^1$	$U_{(i)}^2$	$U_{(i)}^1$	$U_{(i)}^2$
<i>Ouest</i>	6	4	6	3
<i>Sud</i>	1	1	4	2
<i>Centre-Sud</i>	5	6	7	7
<i>Centre-Nord</i>	7	5	8	6
<i>Nord</i>	2	2	3	1
<i>Ouaga-Bobo</i>	4	8	2	4
<i>Autre Villes</i>	8	7	1	8
<i>Sud-Est</i>	3	3	5	5

**Annex IX-A: Rank ordering socioeconomic groups on the distribution of household welfare**

<i>Socioeconomic Groups</i>	<i>National level</i>		<i>Urban areas</i>		<i>Rural areas</i>	
	$U_{(i)}^1$	$U_{(i)}^2$	$U_{(i)}^1$	$U_{(i)}^2$	$U_{(i)}^1$	$U_{(i)}^2$
Wage Public	1	2	2	3	1	1
Wage Private	3	4	4	6	2	4
Commerce	4	1	6	2	4	2
Other Activities	2	5	3	4	3	5
Export Farmers	6	6	1	1	6	6
Subsistence Farmers	7	7	7	7	7	7
Inactive	5	3	5	5	5	3

**Annex IX-B: Rank ordering socioeconomic groups on the distribution of income**

<i>Socioeconomic Groups</i>	<i>National level</i>		<i>Urban areas</i>		<i>Rural areas</i>	
	$U_{(i)}^1$	$U_{(i)}^2$	$U_{(i)}^1$	$U_{(i)}^2$	$U_{(i)}^1$	$U_{(i)}^2$
Wage Public	6	5	7	6	6	5
Wage Private	4	6	5	7	2	4
Commerce	5	1	6	2	4	2
Other Activities	1	2	2	3	1	3
Export Farmers	2	3	1	1	5	6
Subsistence Farmers	3	7	3	4	7	7
Inactive	7	4	4	5	3	1

## Appendix A: Growth Decomposition between 1994 and 1998

The link between aggregate output per capita and consumption per capita in Burkina Faso is complex but we can carry out a straightforward accounting exercise to understand that relationship<sup>26</sup>. Starting with the well-known identity

$$(1) \quad Y = C + I + (X - M)$$

Where  $Y$  is the gross domestic product,  $C$  total consumption,  $I$  gross domestic investment,  $X - M$  the trade balance with exports and imports of goods and services in current prices. One can express the base year situation (1994 prices) as follows:

$$(2) \quad Y_0 = C_0 + I_0 + X_0 - M_0$$

Let's bring into the picture the adjustment of terms of trade over a given period,  $AT_0$ , which is the difference between the exports capacity to pay for the imports ( $X_{CM}$ ) and the ratio of export prices  $X_0$  (exports in current prices divided by export price index with 1994 base year). If, as stated,  $X_{CM}$  = Exports capacity to pay for the imports (exports in current prices divided by import price index with 1994 base year), then it follows that

$$(3) \quad AT_0 = X_{CM} - X_0$$

or

$$(4) \quad X_0 = X_{CM} - AT_0$$

Therefore, GDP at current prices in 1994 prices can be expressed as follows:

$$(5) \quad Y_0 = C_0 + I_0 + (X_{CM} - AT_0) - M_0$$

Which can be rearranged:

$$(6) \quad Y_0 - C_0 = I_0 + (X_{CM} - M_0) - AT_0$$

This equation helps measure the uses of GDP over any given period of time. Let  $\Delta$  be the change in base year prices between 1994 and 1998. Then

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<sup>26</sup>See Alan Gelb, *A Note on Growth and Poverty Alleviation in Africa*, September 1999.



$$(7) \quad \Delta Y_0 - \Delta C_0 = \Delta I_0 + \Delta(X_{CM} - M_0) - \Delta AT_0$$

Let divide both sides of equation (7) by the 1994 GDP,  $Y_0$

$$(8) \quad \Delta Y_0/Y_0 - \Delta C_0/Y_0 = \Delta I_0/Y_0 + \Delta(X_{CM} - M_0)/Y_0 - \Delta AT_0/Y_0$$

We can rearrange equation (8) as follows:

$$(9) \quad \Delta Y_0/Y_0 + \Delta AT_0/Y_0 = \Delta C_0/Y_0 + \Delta I_0/Y_0 + \Delta(X_{CM} - M_0)/Y_0$$

Since we know that gross domestic income at 1994 prices equals the gross domestic product of the same year—the terms of trade adjustment in the base year is obviously zero—we can write

$$(10) \quad \Delta Y_0/Y_0 + \Delta AT_0/Y_0 = \Delta GDI_0/Y_0$$

where  $GDI_0$  is gross domestic income at 1994 prices.

Therefore, equation (10) can be re-written

$$(11) \quad \Delta GDI_0/Y_0 = \Delta C_0/Y_0 + \Delta I_0/Y_0 + \Delta(X_{CM} - M_0)/Y_0$$

and used as the accounting framework for understanding how change in gross domestic income as percentage of gross domestic product has translated into change in consumption, change in investment, and change in import capacity of the resource balance—which is an important indication of how growth affects (or does not) poverty dynamics.

For Burkina Faso, a decomposition of the difference between changes in GDP and consumption over the 1994-98 period indicates the following: GDP rose by 22.2 percent and terms of trade gains added 3.4 percent—which gives a gross domestic income change ( $\Delta GDI_0/Y_0$ ) of 26.5 percent; Yet, consumption ( $\Delta C_0/Y_0$ ) only increased by [9.5] percent relative to GDP; investment ( $\Delta I_0/Y_0$ ) by [24.5] percent, and the deficit of the resource balance, that is, changes in the import capacity of the resource balance ( $\Delta(X_{CM} - M_0)/Y_0$ ) absorbed [13.2] percent of GDP. In other words, Burkina Faso has invested most of its GDI gains during the 1994-98 period, which may be good for long-run growth—assuming that these investments are productive and efficient—but not good for poverty reduction in the short- to medium-term.

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