

DOCUMENT DE TRAVAIL

DT/2005-08

Inflation Inequality and the Measurement of Pro-Poor Growth

Michael GRIMM
Isabel GÜNTHER

DIAL • 4, rue d'Enghien • 75010 Paris • Téléphone (33) 01 53 24 14 50 • Fax (33) 01 53 24 14 51
E-mail : dial@dial.prd.fr • Site : www.dial.prd.fr

INFLATION INEQUALITY AND THE MEASUREMENT OF PRO-POOR GROWTH

Michael Grimm

Department of Economics, University of Göttingen, Germany,
DIAL Paris, France and DIW Berlin, Germany
mgrimm@uni-goettingen.de

Isabel Günther

Department of Economics, University of Göttingen, Germany,
Isabel.guenther@wiwi.uni-goettingen.de

Document de travail DIAL

Juillet 2005

ABSTRACT

The theoretical literature on pro-poor growth as well as its applications have not paid sufficient attention to the issue of varying inflation rates across the income distribution. Ignoring inflation inequality in pro-poor growth measurements can however severely bias assessments of pro-poor growth. Hence, we suggest simple methods which are able to redress such biases. As an empirical illustration we use the case of Burkina Faso and the growth incidence curve and poverty change decompositions as pro-poor growth measurements.

Key words: Pro-Poor Growth, Differential Inflation, Burkina Faso.

JEL Codes: D12, D63, I32, O12.

RESUME

La littérature théorique sur la croissance en faveur des pauvres ainsi que ses applications n'ont jusqu'à présent pas accordé suffisamment d'attention à l'aspect des variations des taux d'inflation au travers de la distribution des revenus. Ignorant l'inégalité de l'inflation dans les mesures de la croissance en faveur des pauvres peut cependant significativement biaiser l'analyse. Nous suggérons des méthodes appropriées simples pour redresser ce biais. Pour une illustration empirique, nous utilisons le cas du Burkina Faso ainsi que la courbe d'incidence de croissance et des décompositions des changements de pauvreté comme mesures de la croissance en faveur des pauvres.

Mots clés : Croissance en faveur des pauvres, Inflation différentielle, Burkina Faso.

Contents

1. INTRODUCTION 4

2. MEASUREMENT OF PRO-POOR GROWTH..... 4

3. THEORY AND EMPIRICAL EVIDENCE OF INFLATION INEQUALITY 6

4. METHODOLOGY 8

 4.1 Growth Incidence Curve with ‘PPIs’ 8

 4.2 A ‘Triple’ Decomposition of Poverty 9

5. EMPIRICAL ILLUSTRATIONS 11

 5.1 The Data 11

 5.2 Growth Incidence Curve with ‘PPIs’ 13

 5.3 ‘Triple Decomposition of Poverty Changes 14

5. CONCLUSION 15

REFERENCES 17

List of tables

Table 1 : CPI vs HH-Survey based expenditure budget shares, Burkina Faso, 2003 19

Table 2 : Price Indices, Burkina Faso, 1994-2003..... 19

Table 3 : Percentile Specific Price Indices (PPIs) 19

Table 4 : Pro-Poor Growth Rates, Burkina Faso, 1994-2003 20

Table 5 : Decomposition of the change in the national headcount index, ΔP_0 , Burkina Faso, 1994-2003 20

List of figures

Figure 1 : National Growth Incidence Curves CPI and PPIs used as deflators, Burkina Faso, 1994-2003 21

Figure 2 : Decomposition of the change in the national headcount index, ΔP_0 , Burkina Faso, 1994-2003 22

1 Introduction

¹ Pro-poor-growth (PPG), or how much the poor benefit from economic growth, has over the past years become one of the central issues within the development community. In this context also the question of how one should define and measure pro-poor growth has been intensively debated and a wide range of definitions and measurements of pro-poor growth have been provided by several authors (for a comprehensive overview and comparison of the various measurements see e.g. Son, 2003a or Klasen, 2004). This paper does however neither intend to contribute to the debate of definitions nor does it mean to develop a new measurement of pro-poor growth.

The objective of this paper is to show both from a theoretical as well as from an empirical perspective that there is one point that has in most PPG measurements or at least in their respective applications so far not received sufficient attention: the issue of differential or household specific inflation rates, i.e. the phenomenon of substantially varying inflation rates or changes in the cost of living across households along the income distribution. If this aspect of differential inflation is ignored, independent of which definition or measurement of pro-poor growth is used, we might not be able to derive an appropriate assessment of whether and to what extent growth was pro-poor in a specific country. But this paper shows how this aspect can easily be incorporated into any PPG measurements, using the *Growth Incidence Curve* (Ravallion and Chen, 2003) and the *Datt-Ravallion Decomposition of Poverty* (Datt and Ravallion, 1992) as two illustrative examples.

The remainder of the paper is organized in 5 sections. Section 2 briefly reviews and also attempts to classify the different concepts and measurements of pro-poor growth. Section 3 discusses the issue of differential inflation, i.e. the issue of income correlated inflation rates, both from a theoretical and an empirical perspective as well as the corresponding implications for PPG measurements. Section 4 first outlines the standard methods to construct *Growth Incidence Curves* and to perform the *Datt-Ravallion Decomposition of Poverty* and then suggests for both measurements, alternative methods which are able to take into account different inflation rates among poor and rich households. Section 5 illustrates the difference and importance of using such adjusted PPG measurements for the case of Burkina Faso. Section 6 concludes.

2 Measurement of Pro-Poor Growth

Almost all of the numerous PPG measurements are built on one of two broader ‘conceptual’ categories on the one and on one of two broader ‘methodological’ categories on the other hand. Concerning the two ‘conceptual’ categories, one can distinguish between an ‘absolute’ concept of pro-poor growth, which defines growth to be pro-poor if absolute poverty declines with growth, irrespective of whether inequality in- or decreases (e.g. Kraay, 2003; Ravallion, 2004) and a ‘relative’ concept of pro-poor growth, which only classifies growth to be pro-poor if the poor benefit relatively more than the rich from economic growth, i.e. where growth has to be accompanied by decreasing inequality (e.g. Kakwani and Pernia, 2000; Klasen, 2004).

Although at a first glance the latter definition seems to be ‘stricter’ than the first, since it requires growth to reduce poverty as well as inequality in order to be considered

¹We thank Philippe de Vreyer, Stephan Klasen and Martin Ravallion for very useful comments and suggestions. Nevertheless, any errors remain our responsibility.

pro-poor, some authors (e.g. Cord, Lopez and Page, 2003) have argued that the ‘relative’ definition runs the risk of ignoring overall economic performance and of favoring a lower over a higher growth rate among the poor, when the latter arises with increasing inequality.

In addition to this ‘conceptual’ difference, PPG measurements might also be subdivided into two ‘methodological’ categories. ‘Growth decompositions’ analyze the changes in income over the whole income distribution, i.e. they compute income specific disaggregated growth rates to analyze which segments of the income distribution benefited most from a specific growth process (e.g. Chenery, Ahluwalia, Bell *et al.*, 1974; Klasen, 1994; Son, 2003b; Ravallion, 2004). The advantage of these measurements is that they do not need to specify a poverty line and that also changes in the income of the poorest of the poor can be taken into account. A problem with those measurements is that they are sometimes not able to provide a clear index if a certain growth process was more pro-poor than another.

The second group within such a ‘methodological’ subdivide might be called ‘poverty decompositions’. All of those measurements link in some way or the other the general changes in poverty of a country to average changes in growth and inequality (e.g. Datt and Ravallion, 1992; Kakwani, 2000; McCulloch and Baulch, 2000; Kakwani and Pernia, 2000). The advantage is that in contrast to the ‘growth decompositions’ they are able to provide a specific pro-poor growth index which facilitates pro-poor growth comparisons across countries and time. The problem is that they are based on country specific poverty lines which makes the outcome of such measurements very sensitive to the poverty line chosen and to the country’s initial income distribution and initial level of economic development (see Bourguignon, 2003).

Obviously, whether (or to what extent) a growth process in a specific country over a period of time was pro-poor might in a lot of cases be assessed differently by the various PPG measurements, dependent on which concept and methodology they are based on. But such a divergence in results should not lead to the conclusion that a certain PPG assessment is not robust to different measurements or that some measurements do not capture pro-poor growth appropriately. In contrast, different concepts and methodologies look at pro-poor growth from different perspectives and together help to get a more detailed and comprehensive picture. Different measurements should therefore be considered as complementary rather than as substitutable methodologies.

However, there is one thing that all PPG measurements have in common, no matter if they are based on the ‘absolute’ or ‘relative’ concept of pro-poor growth or if they fall into the category of ‘growth’ or ‘poverty’ decompositions. They all consider pro-poor growth (at least partly) as a function of growth rates among the poor. Certainly, here the real increases in purchasing power among the poor and not nominal growth rates are of interest, leading to the essential question of which deflator should be used to compare incomes over time. In most applications of PPG measurements the general consumer price index (CPI) is used for this purpose, which might however in many cases, and as shown in Section 3, not be an appropriate deflator for poor households. As a result, ‘growth decompositions’ should use income-group specific deflators instead of using one single deflator such as the CPI, and ‘poverty decomposition’ should, besides a growth and an inequality component, also take into account a third ‘relative price shift’ component (or ‘poverty line’ component). This ‘relative price shift’ component would then measure the poverty impact of the difference between the changes in the cost of living of the ‘average household’ to the changes in cost of living of poor households.

For a methodological and empirical illustration of how this can be done, the *Growth Incidence Curve* (GIC), as proposed by Ravallion and Chen (2003), and the *Decomposi-*

tion of Poverty Headcount Changes as suggested by Datt and Ravallion (1992), will be applied in Section 4 and 5. The former falls into the ‘methodological’ category of ‘growth decompositions’ whereas the latter falls into the category of ‘poverty decompositions’. Both can give insights into the extent to which growth was pro-poor in ‘absolute’ as well as in ‘relative’ terms. An additional motivation to use those two measurements for illustrative purposes is the fact that both are now widely used by international organizations in the current assessment of the pro-poor growth performance of developing countries.²

3 Theory and Empirical Evidence of Inflation Inequality

Whenever we are interested in how the purchasing power of people has evolved over time, i.e. whenever we are interested in real growth rates, nominal incomes have to be deflated with an appropriate price deflator, which should ideally represent the change in cost of living in real terms. Usually such a ‘real’ index of cost-of-living can however not be provided by statistical offices. Hence in most cases the CPI is used as an approximate estimate. CPIs usually measure the average change in prices over time paid by consumers for a specific and constant bundle of consumption items. This specific consumption basket is either constructed using as weights the aggregate expenditure shares as they are measured in National Accounts or the expenditure shares of a hypothetical representative household. Obviously such a CPI does not account for differences in consumption patterns and as a result also not for differences in the changes in the cost of living across the income distribution.

Moreover, and what is most interesting for pro-poor growth analysis, because of the averaging process in its construction, the CPI usually gives more weight to the consumption pattern of richer households, bypassing the consumption pattern of the majority of the (poorer) population (see Prais, 1959; Deaton, 1998). If the CPI is computed via National Accounts this is simply due to the fact that expenditures of richer households are much higher and therefore determine largely the aggregate weights (expenditure shares) for each consumption item. If the ‘representative household approach’ is used this stems from the fact that often an urban ‘formal’ household is chosen as a representative household. This means that the CPI is not based on a ‘democratic’ basis, where each household’s expenditure shares would get an equal weight, but on a ‘plurocratic’ basis where households are weighted according to their total expenditure.

This bias would obviously not matter if there was no systematic relationship between total household expenditure and the expenditure pattern of households or if there was no significant variation of inflation rates across consumption goods. However, since most of the time none of the two conditions hold, which is very well documented in the theoretical literature as well as supported by various empirical studies, we often observe inflation rates which differ significantly by household income, both in industrialized (e.g. Slesnick, 1993; Crawford and Smith, 2002; Hobijn and Lagakos, 2003) as well as in developing countries (e.g. Guénard, 1998; Pritchett, Suharso, Sumarto *et al.*, 2000; Deaton, 2003).

In poor countries the most important difference between poor and rich households’ expenditure pattern is the share of total income spent on food. Most people would agree that food represents the ‘first necessity’ of households’ consumption. Hence, we should assume that very poor households spend by far the highest share of their income on food items. In addition, since we would also assume that food items are characterized by rather low income elasticities, the household budget share devoted to food expenditures

²The Operationalizing Pro-Poor-Growth Project sponsored and managed by the World Bank, DFID, AFD, GTZ and KfW is a case in point (see <http://www.worldbank.org>).

should substantially decrease with increasing total income. This relationship between total household income and the allocation of household resources between food and non-food items was already analyzed in the early economic literature (Engel, 1895) and became known as the *Engel curve*, which states that the food share in total consumption decreases as total per capita expenditure increases. This ‘phenomenon’ is still valid today and is supported by a wide range of recent empirical studies (see e.g. Deaton, 1997).

Certainly, differences in the consumption pattern between poor and rich households alone would not lead to different inflation rates, as long as the various goods households consume would show equal price movements. If this were however usually the case we would not even need to construct a CPI: if we assumed that price movements were highly correlated over time we would simply have to measure the price change of only one consumption good over time to construct a consumer price deflator.

There are circumstances where changes in relative prices are beneficial to the rich, i.e. increasing their purchasing power relative to the poor, as well as changes in relative prices beneficial to the poor, i.e. increasing their purchasing power relative to the rich. For instance, a devaluation of the local currency will normally first of all hurt richer people consuming imported non-food items. In contrast, a price increase in basic food items will first of all have a negative impact on the inflation rates of poor households.

In developing countries, it is especially the prices of domestically produced staple foods which do often not show any correlation with general price movements (see e.g. Pritchett *et al.*, 2000; Marouani and Raffinot, 2004). This empirical finding is theoretically not very surprising, given the fact that food crop production in these countries is to a very large extent heavily dependent on fluctuating climatic conditions and less dependent on macro-economic policies which might influence other sectors of the economy much more. Since staple foods are characterized by a low price elasticity of demand and developing countries still face significant transport and trade constraints, food crop production fluctuations usually lead to large price swings. As basic food items do not only account for a much larger share in poor households’ budgets but as poor households have also generally very limited substitution possibilities, those relative price changes can lead to considerable differential inflation rates between the rich and the poor.

And since the general CPI is usually based on a consumption basket that reflects the consumption pattern of rather rich households, the CPI is very close to a ‘rich specific’ computed price index. Whereas in industrialized countries this is sometimes recognized and price indices are computed for several groups, defined by socio-economic status and household structure, this is only rarely done in developing countries, and even then, these indices are still too rough to account for the heterogeneity in inflation rates across the income distribution.

Given the fact that all pro-poor growth measurements are to some extent interested in the change of the purchasing power among the poor, using the CPI for these welfare measurements seems therefore not very appropriate. This is true for both, PPG measurements which analyze the growth rates among the poor relative to the non-poor (growth decompositions) and PPG measurements which focus on changes in poverty rates (poverty decompositions). Instead, we should use price indices which take the prices relevant to the poor into account both to deflate expenditures as well as to inflate poverty lines. How this can be done is shown in the next two sections.

4 Methodology

4.1 Growth Incidence Curve with ‘PPIs’

The Growth Incidence Curve (GIC), as proposed by Ravallion and Chen (2003), calculates the growth rate in income per capita (or alternatively the growth rates in expenditure per capita) at each percentile point along the income distribution. If this GIC is positive at all points up to some point z , then poverty has fallen for all headcount, gap and severity indices up to z or in other words, then growth has been pro-poor up to point z . Moreover, the poverty decline is greater or the growth process is more pro-poor if the GIC shifts upward at all points along the income distribution. The GIC is hence defined as:

$$g_{t(p)} = \frac{y_{t(p)}}{y_{t-1(p)}} - 1 \quad (1)$$

where $g_{t(p)}$ is the growth rate in income y of the p th percentile between t and $t - 1$. Obviously the GIC and the thereof derived rate of pro-poor growth, which is defined as the area under the GIC up to the poverty line z , first of all focus on the absolute income growth of the poor. However, the GIC also allows concluding about the relative extent to which growth was pro-poor by comparing the mean of the percentile specific growth rates with the average income growth rate. More precisely, the mean of percentile specific growth rates is defined as:

$$g_{p,t} = \frac{1}{100} \sum_{p=1}^{100} g_{t(p)} \quad (2)$$

Conversely, the average income growth rate (or growth rate in mean) is defined as:

$$g_{\mu,t} = \frac{\mu_t}{\mu_{t-1}} - 1 \quad (3)$$

where μ_t is the mean income of the whole sample at time t . Whenever the growth rate in equation (2), which is population weighted and hence gives more weight to the income growth of the poor, is higher than the growth rate in equation (3), which is empirically often largely determined by growth gains of the richest two quintiles (Klasen, 1994), growth should be more pro-poor in relative terms. Alternatively, the shape of the GIC can be analyzed: if the GIC is downward sloping over the whole income distribution, then the distributional pattern of growth was to the benefit of the poor, and we can expect that inequality decreased, whereas if the GIC is upward sloping over the whole income distribution the upper end of the income distribution benefited relatively more from the overall growth process.

Equation (1) first of all represents the GIC in nominal terms. In empirical analysis we are however interested in real and not nominal percentile specific growth rates. Hence, applications of the GIC usually use the CPI to deflate $y_{t(p)}$. The real GIC is hence calculated as:

$$g_{t(p)} = \frac{y_{t(p)} \cdot \frac{1}{1+i_t}}{y_{t-1(p)}} - 1 \quad (4)$$

where i_t is the inflation rate between t and $t - 1$ usually approximated by the national CPI. Such an approach would only be reasonable if the inflation rate different households face in the course of economic development, were constant across all percentiles of the

income distribution. However, and as argued in the previous section, the CPI is generally very close to the computed price index of the rich but might be significantly different from the computed price index of the poor.

Using such a biased, and for most households non-representative, price index as a deflator to compare incomes over time is certainly less problematic if applied to national means. In contrast, if we make the effort to calculate percentile specific incomes with micro-economic household survey data, we should also use percentile specific price indices (PPIs) for the computation of percentile specific growth rates. If we ignore the dimension of differential inflation, and use the general CPI instead of percentile specific deflation rates when computing GICs, we are not only inconsistent in our methodological approach, but might also draw wrong conclusions about the ‘pro-poorness’ of growth of a country in both absolute as well as relative terms. As a result the real GIC should be calculated as follows:

$$g_{t(p)} = \frac{y_{t(p)} \cdot \frac{1}{1+i_{t(p)}}}{y_{t-1(p)}} - 1 \quad (5)$$

where $i_{t(p)}$ is the specific inflation rate of the p th percentile, which should be approximated by PPIs, which take into account the - with the household surveys observed - specific consumption basket of the households at the p th percentile at time t . In contrast to the CPI which represents a Laspeyres index, these percentile specific price indices constitute a Paasche index, whose quantities (or weights) reflect those of the ‘households under consideration’ in the current period.

Obviously, both the Paasche as well as the Laspeyres index have their strength and weaknesses in adjusting nominal consumption aggregates. However, when the consumption pattern of the households whose aggregate expenditures need to be deflated can be directly observed, or put differently whenever household specific inflation rates and not average inflation rates are constructed, it is more appropriate to apply a Paasche instead of a Laspeyres index (see also Deaton and Zaidi, 2002).

4.2 A ‘Triple’ Decomposition of Poverty

The objective of a decomposition of poverty changes over time, as suggested by Datt and Ravallion (1992), is to determine how much of an observed poverty change as measured by the headcount index can be explained by general income increases and how much can be explained by changes in income inequality, i.e. by the fact that growth rates are heterogeneous across population groups. Hence, two components are calculated: (i) the change in poverty that we would have seen if the observed growth rate had occurred without any changes in inequality and (ii) the change in poverty that would have occurred if the observed changes in inequality happened in the absence of growth. In addition a residual is computed, which represents the interaction term between the growth and distribution component and is calculated as the poverty change not explained by the sum of the growth and the redistribution components. Such a poverty decomposition can be written as:

$$\Delta P_{t+1,t} = [P(\mu_{t+1}, L_t) - P(\mu_t, L_t)] + [P(\mu_t, L_{t+1}) - P(\mu_t, L_t)] + R_{t+1,t} \quad (6)$$

where $P(\mu_t, L_t)$ is the poverty measure with a mean income of μ_t and a Lorenz curve L_t in period t . The first component of the equation then corresponds to the change in poverty explained by the growth component with a constant relative income distribution while the second component corresponds to the change in poverty explained by

the distribution effect. R is the residual.³ Such a decomposition of observed poverty changes obviously requires that the poverty line is kept constant in real terms over time. This means, that the inflation rate underlying the poverty line should be equal to the inflation rate underlying the income variables, which is generally assumed to be the CPI. However, and as shown in Section 3, the consumption pattern of poor households often differs significantly from the one of the ‘average’ household. In consequence if prices of items of first necessity move in a different way than prices of other consumption goods, the implicit inflation rate of the poverty line might be substantially different from the inflation rate of the CPI. This can lead to a poverty line in $t + 1$ whose real value in terms of purchasing power has remained constant but whose real value in relation to a hypothetical CPI inflated poverty line has considerably changed.

This means, that besides the growth and the redistribution component, we have to compute a third component when decomposing poverty changes: a ‘relative price shift’ or ‘poverty line’ component, which is the change in poverty explained by the difference of the inflation rate of the poverty line to the inflation rate of the general CPI, or in other words the change in poverty explained by a relative price shift between the bundle of goods consumed by the poor and the bundle of goods consumed by the ‘average’ household. We can then write this new ‘triple’ poverty decomposition as:

$$\begin{aligned} \Delta P_{t+1,t} = & [P(\mu_{t+1}, L_t, z_t) - P(\mu_t, L_t, z_t)] + [P(\mu_t, L_{t+1}, z_t) - P(\mu_t, L_t, z_t)] \\ & + [P(\mu_t, L_t, z_{t+1}) - P(\mu_t, L_t, z_t)] + R_{t+1,t} \end{aligned} \quad (7)$$

where $P(\mu_t, L_t, z_t)$ is the poverty measure with a mean income of μ_t , a Lorenz curve L_t and a poverty line z_t in period t . Again, the first component corresponds to the change in poverty explained by the growth component (with a constant real poverty line) and the second component corresponds to the change in poverty explained by the distribution effect (again with a constant real poverty line). The third component now corresponds to the change in poverty explained by relative price changes, i.e. caused by the inflation difference between the poverty line and the national CPI, in a growth- and distributional neutral case. To derive the impact of this relative to the CPI ‘real’ change in the poverty line, the poverty line z_{t+1} is calculated by inflating z_t with the price change of the consumption basket underlying the poverty line relative to the change of the CPI between t and $t + 1$.

It is worth to note, that in this ‘triple’ decomposition the growth component has to be interpreted a bit differently than in a ‘dual’ decomposition. It represents the change in poverty that would have occurred with the observed growth rate given that the poor had experienced the same increase in cost-of-living than the CPI. The ‘poverty line’ component then represents the change in poverty that can be explained by relative price shifts (or differential inflation rates) between the bundle of goods consumed by the poor and the bundle of goods consumed by the non-poor. Hence, although closely related to the adjustments for inflation inequality that were made for GICs, here instead of percentile specific inflation rates only two different inflation rates are taken into account: one for the poor (represented by the implicit inflation rate of the poverty line) and one for the non-poor (represented by the CPI).

³In this equation the initial year of the observed period is used as the reference year. However, since the magnitude of both components depends on the decomposition path, i.e. it depends on whether the initial or the final year is taken as the reference period, instead of taking the initial year as the reference period, in many empirical applications, first the initial and then the final year is taken as a reference period. In a second step, the decomposition results are averaged over the two possible decomposition paths. However, there is no methodological necessity to do so.

5 Empirical Illustration

5.1 The Data

We take the case of Burkina Faso during the period 1994 to 2003 to empirically illustrate the implications of inflation inequality adjusted *Growth Incidence Curves* and *Poverty Decompositions*. This case will clearly show to what extent a pro-poor growth assessment for a specific country depends on whether adjustments for different changes in the cost of living are made or not. The analysis is based on three household surveys, *Enquêtes Prioritaires* (EPI, EPII, EPIII), which were all undertaken by the *Institut National de la Statistique et de la Démographie* (INSD) with the financial and technical assistance of the World Bank in 1994, 1998 and 2003. The respective sample sizes are 8,642, 8,478 and 8,500 households. All three surveys contain detailed information on disaggregated expenditure data of households, which are needed to calculate household expenditure per capita as well as percentile specific inflation rates (PPIs). For a detailed discussion of the data see also Grimm and Günther (2004).

To estimate PPIs, for each household in the household survey of 2003 the respective budget shares of the seven expenditure categories represented in the CPI (food crops, other food items, rent and utilities, education, health, transport and others) were first calculated. Table 1 shows the average expenditure budget shares of the first and last decile in the Burkinabè per capita household expenditure distribution in comparison with the respective expenditure weights used in the national CPI. As can be seen, the main difference between poor and rich households' expenditure pattern, and between the expenditure shares underlying the CPI, is the share of income spent on staple food (representing the sum of households' expenditure spent on maize, millet and sorghum), which adds up to almost 40 percent of total expenditure for the poorest households, but accounts for only 10 percent of total expenditure of the very rich.

[please insert Table 1 about here]

In a second step, we analyzed the price changes for staple foods between 1994 and 2003. These prices were taken from the Burkinabè *Grain Market Price Surveillance System* (Ministry of Trade, Burkina Faso, 2004), which collects prices of the major cereals on various regional markets in Burkina Faso on a weekly base. As documented in Table 2, the prices of these goods of first necessity increased much faster than those for most other goods between 1994 and 2003. Whereas the CPI only increased by 31.4 percent, the prices for cereals increased by 125.2 percent during the same period. Moreover, this massive price distortion mainly occurred between 1994 and 1998, when food crop prices increased by 152.2 percent and the CPI only increased by 22.7 percent. Conversely, between 1998 and 2003, prices for food crops decreased whereas the CPI continued to rise. These massive grain price shifts were mainly due to a very severe drought which Burkina Faso had to support in 1997/98, but were also partly driven by the Burkinabè price liberalization of food crops between 1993 and 1996 (Grimm and Günther, 2004).

[please insert Table 2 about here]

Combining the results of Table 1 with those of Table 2, one can easily derive PPIs which take into account the specific consumption pattern of households in 2003 and the relative price change between staple foods and other consumption goods that occurred in Burkina Faso between 1994 and 2003. More precisely, first the average budget shares for

food crops and ‘other consumption goods’ over expenditure percentiles were computed. In a next step these shares were used as weights for the computation of percentile specific price indices, accounting for the specific price changes of food crops, as measured by the *Grain Market Price Surveillance System* and of ‘other consumption items’, as measured by the CPI with the price change of food crops netted out.⁴ Since we can only observe budget shares and not quantities in the household surveys we have to rewrite the Paasche index at a specific percentile p along the income distribution as:

$$P_{t(p)} = \frac{\sum p_t q_{t(p)}}{\sum p_{t-1} q_{t(p)}} = \left[\sum w_{t(p)} \frac{p_{t-1}}{p_t} \right]^{-1} \quad (8)$$

where p_t is the price of a certain good at time t . $q_{t(p)}$ would be the quantity consumed of this good at the p th percentile. But since we cannot observe q with our household surveys we then use $w_{t(p)}$ as the share of households’ total budgets devoted to this item, averaged across the percentile p of the income distribution at time t .

Given the only illustrative purpose and to keep the analysis simple we only distinguished between food crops and ‘other consumption items’. Of course one could be more specific and distinguish between the eight expenditure categories as outlined in Table 1 and thus derive even more refined household deflators. However, since the main difference in consumption patterns as well as in relative price changes were between staple foods and other goods (see Table 1 and Table 2) this simplified approach should be good enough to demonstrate the impact of inflation inequality. Moreover, most expenditure categories in the CPI for which we have disaggregated price information, represent very heterogeneous categories (with the exception of food crops). For instance, transport expenditures among rich households might be composed of quite different expenditure items than among poor households and we do not possess price deflators which are more disaggregated than ‘transport expenditure’. Therefore it would be very difficult to derive differential inflation rates based on a much finer disaggregation level.

These household surveys constructed PPIs can then be used to convert nominal expenditures into real expenditures using 1994 as a base year. These PPIs do certainly more appropriately than the CPI reflect the changes in the purchasing power of households along the income distribution. In our case, they clearly show that the cost of living of the poor increased much faster than rich households’ costs, leading to a redistribution of purchasing power in favor of the rich, which is not appropriately reflected in the general CPI (see Table 3).

[please insert Table 3 about here]

Similar to the construction of the PPIs, the poverty line for 1994 and 1998 was computed, using the nominal value of the official poverty line for 2003, and the staple food and ‘other consumption items’ budget shares as they are observed in the lower part of the expenditure distribution (1st and 2nd quintile) in the respective household survey of 2003. The staple food component was then deflated to 1998 and to 1994 using the observed price changes for the corresponding food crops. The remaining food and non-food component was deflated using the CPI with the price change of food crops netted out. Both components together then yield poverty lines for 1994 and 1998 respectively.

⁴Obviously, such price information from government price surveys is not a perfect data source and one would prefer price information directly observed in household surveys. But given the fact that in the Burkinabè household surveys, households only reported total expenditures for each consumption category, and no information on quantities or prices was given, these prices were the best available to us.

5.2 Growth Incidence Curve with ‘PPIs’

Figure 1(a) shows the national growth incidence curve (GIC), the average expenditure growth rate and the mean of percentile specific growth rates as described in Section 4.1 computed with both the general Burkinabè CPI and with PPIs. Figure 1(b) and Figure 1(c) show the same curves separately for urban and rural households respectively. If we first take a look at the GICs, where the general CPI was used to convert nominal into real household expenditure per capita (represented by the grey lines in Figure 1(a)-(c)), we observe that household per capita expenditure increased to a significant extent over the whole income distribution on the national as well as on the rural level but not so in urban areas. Hence, on the national level as well as in rural areas growth was clearly pro-poor in the sense of Ravallion and Chen (2003) independent of where the poverty line is set. In contrast, in urban areas growth is only slightly pro-poor up to the 20th percentile, then up to the 80th percentile growth rates are negative but then again positive thereafter. Also, the mean of the percentile specific growth rates lies above the growth rate in mean for both the national and the rural level, whereas the contrary is true for urban areas. This indicates that national and rural growth was also pro-poor taking the relative concept of pro-poor growth. In contrast, growth among urban households was also not pro-poor using the relative definition of pro-poor growth (see also Table 4).

[please insert Figure 1 about here]

If we now compare those CPI deflated growth incidence curves with the once which use PPIs as a deflator (represented by the black lines in Figure 1(a)-(c)) it can clearly be shown, that growth in Burkina Faso between 1994 and 2003 was less pro-poor both in absolute as well as in relative terms than it was suggested when the CPI was used. Among rural households as well as on a national level there is a substantial difference between the percentile specific growth rates as computed with the CPI and as computed with PPIs. This difference is as expected considerably smaller among urban households and for households in the upper part of the income distribution; reflecting the fact that their specific consumption pattern is closer to the weights underlying the CPI (see Table 1). Since the food crop share among urban rich households is in several cases smaller than the one underlying the CPI, those households’ specific inflation rate is even lower than the CPI (see also Table 3), leading to a crossing of the urban PPI and CPI deflated GICs at the 75th percentile of the income distribution.

But not only in absolute but also and especially in relative terms was growth in Burkina Faso less pro-poor if one uses the more appropriate PPIs. With the PPIs the mean of the percentile specific growth rates lies below the growth rate in mean for national, urban and rural households. This implies that the poor benefited relatively less than the rich from growth, which stands in contrast to the empirical results derived with the CPI-deflated GICs, where the poor (at least on the national and rural level) seemed to have benefited more than the rich from economic growth (see Table 4). Comparing growth rates in mean and means of percentile specific growth rates calculated with the general CPI on the one hand and calculated with PPIs on the other hand, also nicely shows that applying the CPI as a deflator to national averages is less problematic than to income level specific growth rates. As expected, the CPIs and PPIs computed mean growth rates are much closer than the means of percentile specific growth rates (see Table 4).

[please insert Table 4 about here]

If we focus on the shape of the curves, we see that in contrast to the CPI deflated GICs now all PPI deflated curves show a massive ‘up-swing’ of growth rates at the upper-end of the income distribution, implying that due to their specific consumption pattern households along these upper percentiles of the income distribution were less affected by the massively increasing food prices between 1994 and 2003, and hence gained in relative purchasing power. This loss of relative purchasing power of the poor is however not appropriately reflected in the GICs if the CPI is used as a deflator.

Last, one might emphasize that the use of PPIs does of course not necessarily lead to GICs that are less pro-poor than GICs calculated with the general CPI. At least for the case of Burkina Faso, the different inflation rates we could observe across the income distribution were not correlated over time. This means that household groups which experienced higher than average inflation rates than others in one period did not face higher than average inflation rates in the next period. Over the period 1994-1998 poor households were confronted with substantial higher inflation rates than households at the upper end of the income distribution; however between 1998 and 2003 the reverse was the case but to a lower extent, leading to the already stated differences in inflation rates between 1994 and 2003. Thus between 1998 and 2003 the application of PPIs instead of the CPI led to GICs which were more pro-poor both to an absolute as well as to a relative extent (figures not presented here).

5.3 ‘Triple’ Decomposition of Poverty Changes

Table 5(a) and Figure 2 show the results of a ‘triple’ decomposition of poverty changes for the case of Burkina Faso between 1994 and 2003. As stated, the impact of all three components on poverty changes is calculated keeping the respective other two components constant. As also often done for ‘dual’ poverty decompositions, decomposition results are averaged over the two possible decomposition paths, i.e. first the initial year is taken as the reference year for the computation of the components, then the final year is taken as the reference year and in a last step for each component the average over the two decomposition paths is calculated. As can be seen in Table 5(a) and Figure 2, the impact of the ‘poverty line’ component on changes in poverty can be significantly negative (between 1994 and 1998 and between 1994 and 2003) as well as positive (between 1998 and 2003) and might in some cases even outweigh the impact of the growth as well as the redistribution component.

[please insert Figure 2 about here]

Again, it should be emphasized that the ‘poverty line’ component in this case does not indicate the share of poverty reduction explained by an adjustment of the poverty line in real terms, which would question the utility of such a ‘triple’ decomposition, since when comparing the evolution of absolute poverty over time, one would always want to keep the poverty line constant in real terms. In fact, and as described in Section 5.1, the poverty line is kept constant in real terms but inflated with the price change of the consumption basket underlying the poverty line. Since the consumption basket underlying the poverty line significantly differs from the one underlying the CPI, the poverty line shows a different implicit inflation rate than the CPI and hence the poverty line changed in real terms as compared to a hypothetical CPI inflated poverty line. All this implies that, independent of income and inequality changes, relative price shifts between goods primarily consumed by the poor and goods primarily consumed by the

non-poor had a significant impact on poverty changes in Burkina Faso between 1994 and 2003.

One might however add, that such a ‘triple’ decomposition seems not only quite useful whenever the development of the price index specific to the consumption of the poor differs significantly from the development of the general CPI, but also for long term poverty decompositions. Several authors have stated that in the course of economic development it is very unlikely that the poverty line can be kept absolutely constant over time, even when our objective is to measure absolute poverty (see e.g. Kilpatrick, 1973; Jäntti and Danziger, 2000). Since the concept of absolute poverty cannot be seen independently of the social and economic development of a country, i.e. as a country develops the definition of who is absolutely poor and who is not will certainly change, significant economic progress usually leads to a real increase of poverty lines.

[please insert Table 5 about here]

As a result, and for a better understanding of the driving forces behind changes in poverty, it should be useful to include a ‘relative price shift’ or ‘poverty line component’ into decompositions of poverty changes in any case. Or, to be consistent with the ‘dual’ methodology, as proposed by Datt and Ravallion (1992), one has to make sure, that the poverty line is kept constant in real terms over time, which means that the income variables and the poverty line have to be de- or inflated with the same price index. This can be achieved by inflating the poverty line of the base year with the deflator which is also used to deflate the income variables (usually the CPI). This approach might however, and as described in Section 3, change the underlying real purchasing power of the poverty line and is therefore in many cases not a desirable approach. This is documented in Table 5(b).

A much better alternative might thus be to use the implicit inflation rate in the poverty line as a deflator for the income variables (see Table 5(c)). This approach also allows to keep the poverty line constant in real terms but maintains the purchasing power of the poverty line. The growth component of this decomposition then reflects the poverty change explained by the specific growth of the purchasing power of the poor and is, as expected, quite different both in magnitude and direction from the growth component of the ‘triple’ decomposition which uses the CPI as a deflator (see Table 5(a)). Obviously, both described alternative methodologies lead again to a poverty line component which is equal to zero and hence constitute a ‘dual’ decomposition.

6 Conclusion

We started our analysis by arguing that relative price shifts between goods primarily consumed by the poor and goods primarily consumed by the non-poor, or in other words differential inflation rates along the income distribution, often constitute an important phenomenon of countries in the course of economic development. Based on this, we have shown conceptually and empirically that such relative price shifts have to be included into any PPG measurements. We think that any pro-poor growth measurements intend to measure the real and not the nominal change of purchasing power of the poor (often relative to the non-poor) and that as a result, PPG measurements should use appropriate and distinctive temporal price deflators for the poor and non-poor. But surprisingly, this is so far often not done and the issue of differential inflation is usually ignored in these types of dynamic welfare measurements. Hence, we proposed a simple and

straightforward methodology to take this aspect into account by using percentile specific price deflators for PPG ‘growth decompositions’ and introducing a ‘relative price shift’ component into PPG ‘poverty decompositions’.

We further showed that these alternative methodologies are not only of theoretical importance, but that they might also have a non-neglectable impact on our perception of the pro-poor growth of a certain growth process (in the case of growth decompositions) as well as on our conclusions about what the driving forces behind the changes in poverty were (in the case of poverty decompositions). As an empirical illustration we used the case of Burkina Faso during the period 1994 to 2003, where we showed that if relative price changes and the specific consumption habits of the poor are not taken into account, computed PPG measurements are indeed biased and misleading. However, this issue is most likely not specific to the Burkinabè case and should arise in many other developing countries as well.⁵

Thus we think that from a theoretical perspective this paper can be a useful contribution to the current debate on the measurement of pro-poor growth since to our knowledge the issue of inflation inequality, although widely recognized, has so far not been incorporated into pro-poor growth measurements. From a policy perspective these findings have the implication, that only if we consider the changes in the cost of living of the poor relative to the non-poor, we appropriately measure how successful countries were in succeeding pro-poor growth; and when estimating the pro-poor growth of certain policies, besides their impact on economic growth and inequality, also their impact on relative price changes should be carefully analyzed. Last, including the aspect of inflation inequality in PPG measurements might also considerably alter the obtained results from pro-poor growth cross country studies.

⁵The study of Pritchett *et al.* (2000) and Klasen *et al.* (2004) are cases in point.

References

- Bourguignon F., 2003. The growth elasticity of poverty reduction: explaining heterogeneity across countries and time periods, in: Eicher, T., Turnovsky, S. (Eds.), *Growth and Inequality*. MIT Press, Boston, pp. 3–26.
- Chenery, H.B., Ahluwalia, M., Bell, C., Duloy, J., Jolly, R., 1974. *Redistribution with growth*. Oxford University Press, New York.
- Cord, L., Lopez, H., Page, J., 2003. When I use a word. Mimeo. World Bank, Washington D.C.
- Crawford, I., Smits, Z., 2002. Distributional aspects of inflation. Mimeo. The Institute for Fiscal Studies, London.
- Datt, G., Ravallion, M., 1992. Growth and redistribution components of changes in poverty measures. A decomposition with applications to Brazil and India in the 1980s. *Journal of Development Economics* 38, 275–295.
- Deaton, A., 1997. *The Analysis of Household Surveys*. Johns Hopkins University Press, Baltimore.
- Deaton, A., 1998. Getting Prices Right: What should be done? *Journal of Economic Perspectives* 12(1), 37–46. Deaton, A., 2003. Prices and Poverty in India 1987–2000. *Economic and Political Weekly*, January 25, 362–368.
- Deaton, A., Zaidi, S., 2002. *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*. World Bank, Washington D.C.
- Engel, E., 1895. Die Lebenskosten Belgischer Arbeiter-Familien. Früher und Jetzt. *International Statistical Bulletin* 9, 1–74.
- Grimm, M., Günther, I., 2004. How to achieve pro-poor growth in a poor economy. The case of Burkina Faso. Report for the ‘Operationalizing Pro-Poor-Growth’-Project sponsored by the Worldbank, DFID, AFD, GTZ, and KFW. University of Göttingen.
- Guénard, C., 1998. Evolution de la structure des prix et impact sur les inégalités de niveau de vie à Antananarivo de 1990 a 1997. Working Paper DT/98/05. DIAL, Paris.
- Hobijn, B., Lagakos, D., 2003. Inflation Inequality in the United States. Staff Report no. 173. Federal Reserve Bank of New York, New York.
- Jäntti, M., Danziger, S., 2000. Income Poverty in Advanced Countries, in: Atkinson, B., Bourguignon, F. (Eds.), *Handbook of Income Distribution*. North-Holland, Amsterdam, pp. 309–378.
- Kakwani, N., 2000. On measuring growth and inequality. Components of Poverty with Application to Thailand. *Journal of Quantitative Economics* 16, 67–80.
- Kakwani, N. Pernia, E., 2000. What is Pro-Poor Growth? *Asian Development Review* 18, 1–16.

- Klasen, S., 1994. Inequality and Growth: Introducing Inequality-Weighted Growth Rates to Reassess Postwar US Economic Performance. *Review of Income and Wealth* 40, 251–272.
- Klasen, S., 2004. In Search of the Holy Grail. How to Achieve Pro Poor Growth, in Stern, N., Tungodden, B. (Eds.), *Towards Pro Poor Policies. Proceedings of the Annual Bank Conference on Development Economics (ABCDE) Europe Conference*. World Bank, Washington D.C.
- Klasen, S., Grosse, M., Thiele, R., Lay, J., Spatz, J., Wiebelt, M., 2004. Report for the ‘Operationalizing Pro-Poor-Growth’-Project sponsored by the World Bank, DFID, AFD, GTZ, and KfW. IAI Discussion Paper 101. Ibero America Institute, Göttingen.
- Kilpatrick, R.W., 1973. The Income Elasticity of the Poverty Line. *The Review of Economics and Statistics* 55(3), 327–332.
- Kraay, A., 2003. When is Growth Pro-Poor? Evidence from a Panel of Countries. Mimeo. World Bank, Washington D.C.
- Kuznets, S., 1966. *Modern economic growth*. Yale University Press, London.
- Marouani, M., Raffinot, M., 2004. Perspectives on growth and poverty reduction in Mali. Working Paper DT/2004/05. DIAL, Paris.
- McCulloch, N., Baulch, B., 2000. Tracking pro-poor growth. ID21 insights No.31. Institute of Development Studies, Sussex.
- Prais, S.J., 1959. Whose cost of living? *Review of Economic Studies* 26, 126–134
- Pritchett, L., Suharso, Y., Sumarto, S., Suryahadi, A., 2000. The evolution of poverty during the crisis in Indonesia, 1996 to 1999. Social Monitoring and Early Response Unit. World Bank, Washington D.C.
- Ravallion, M., Chen, S., 2003. Measuring Pro-Poor Growth. *Economics Letters* 78, 93–99
- Ravallion, M., 2004. Pro-Poor Growth: A Primer. Policy Research Working Paper No. 3242. World Bank, Washington D.C.
- Son, H.H., 2003a. Approaches to Defining and Measuring Pro-Poor Growth. Mimeo. World Bank, Washington D.C.
- Son, H.H., 2003b. A note on pro-poor growth. *Economics Letters* 82, 307–314.
- Slesnick, D.T., 1993. Gaining Ground: Poverty in the Postwar United States. *Journal of Political Economy* 101(1), 1–38

Tables and Figures

Table 1
CPI vs. HH-survey based expenditure budget shares
Burkina Faso, 2003

	CPI	HH Budget Shares	
		1st Decile	10th Decile
Food Crops	0.10	0.36	0.12
Other Food Items	0.24	0.30	0.27
Rent and utilities	0.11	0.22	0.15
Education	0.03	0.01	0.02
Health	0.04	0.01	0.06
Transport	0.16	0.00	0.07
Transfers	0.00	0.00	0.06
Others	0.33	0.10	0.25
Total	1.00	1.00	1.00

Source: Consumer Price Index (CPI): *Institut National de la Statistique et de la Démographie* (INSD). Household Budget Shares: EPIII, computations by the authors.

Table 2
Price Indices
Burkina Faso, 1994-2003

	1994	1998	2003
CPI	100.0	123.7	131.4
Food Crops	100.0	252.2	225.2
CPI w/o Food Crops	100.0	108.3	121.0

Source: Consumer Price Index (CPI): INSD. Food Crops: *Burkinabè Grain Market Price Surveillance System*. CPI w/o Food Crops: computations by the authors.

Table 3
Percentile Specific Price Indices (PPIs)
Burkina Faso, 1994-2003

	1994	2003
20th Percentile	100.0	147.7
40th Percentile	100.0	143.3
60th Percentile	100.0	140.8
80th Percentile	100.0	136.1
100th Percentile	100.0	123.6
CPI	100.0	131.4

Source: Source: EPI, EPIII; computations by the authors.

Table 4
Pro-Poor Growth Rates
Burkina Faso, 1994-2003

		National	Urban	Rural
CPI	$g_{\mu,t}$	2.6	0.3	3.4
	$g_{p,t}$	3.1	-0.2	3.5
PPIs	$g_{\mu,t}$	2.3	0.5	2.9
	$g_{p,t}$	2.3	-0.5	2.6

Notes: CPI: growth rates calculated with the general consumer price index. PPIs: growth rates calculated with percentile specific price indices. $g_{\mu,t}$: average income growth rate or growth rate in mean. $g_{p,t}$: mean of percentile specific growth rates. Both refer to annual growth rates in household expenditure per capita.

Source: EPI, EPIII; computations by the authors.

Table 5
Decomposition of the change in the national headcount index, $\Delta P0$
Burkina Faso, 1994-2003

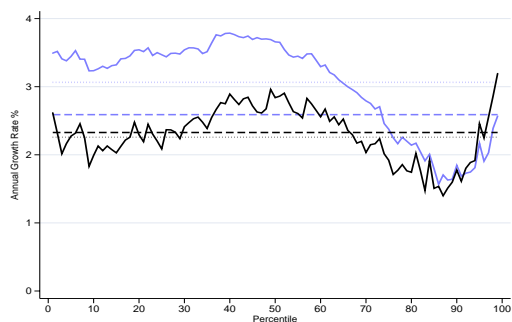
Year	1994-1998	1998-2003	1994-2003
$\Delta P0$	6.3	-14.6	-8.3
a) Growth (CPI)	-4.4	-9.1	-13.1
Redistribution	-2.3	-1.3	-4.8
Poverty Line (PLPI)	12.9	-4.5	9.1
<i>Residual</i>	0.1	0.2	0.5
$\Delta P0$	-8.8	-9.9	-18.6
b) Growth (CPI)	-4.8	-10.2	-13.4
Redistribution	-4	0.4	-5.3
Poverty Line (CPI)	0	0	0
<i>Residual</i>	0	0	0
$\Delta P0$	6.3	-14.6	-8.3
c) Growth (PLPI)	8.6	-13.3	-3.5
Redistribution	-2.3	-1.3	-4.8
Poverty Line (PLPI)	0	0	0
<i>Residual</i>	0	0	0

Notes: CPI: consumer price index used as a deflator. PLPI: poverty line price index, i.e. the implicit inflation rate in the poverty line is used as a deflator.

Source: EPI, EPII, EPIII; computations by the authors.

Figure 1

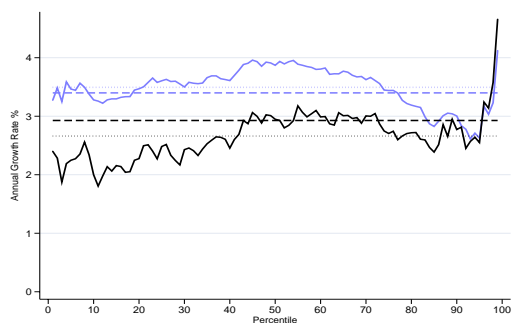
(a) National Growth Incidence Curves
CPI and PPIs used as deflators
Burkina Faso, 1994-2003



(b) Urban Growth Incidence Curves
CPI and PPIs used as deflators
Burkina Faso, 1994-2003



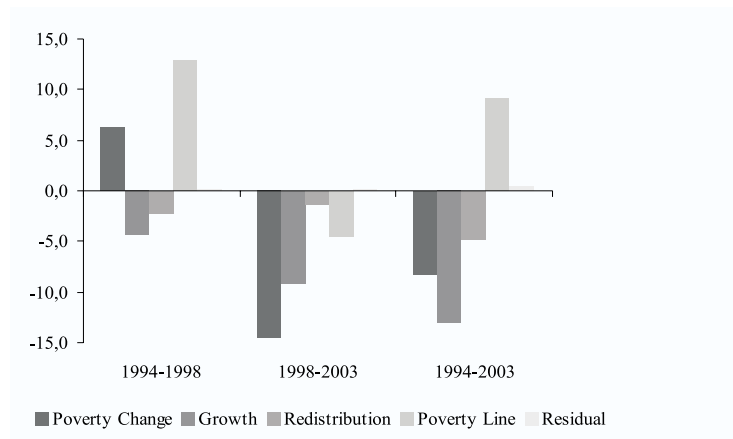
(c) Rural Growth Incidence Curves
CPI and PPIs used as deflators
Burkina Faso, 1994-2003



Notes: All growth rates correspond to annualized growth rates of household expenditure per capita (in percent).
— = Growth incidence curve; - - - = Growth rate in mean; ··· = Mean of percentile specific growth rates; Grey lines: CPI as deflator; Black lines: PPIs as deflators.

Source: EPI, EPIII; computations by the authors.

Figure 2
 Decomposition of the change in the national headcount index, $\Delta P0$
 Burkina Faso, 1994-2003



Notes: Illustrated impacts correspond to Table 5(a).

Source: EPI, EPII, EPIII; computations by the authors.