This document was prepared as part of the 'Operationalising Pro-Poor Growth' work programme, a joint initiative of AFD, BMZ (GTZ, KfW Entwicklungsbank), DFID and The World Bank.

# Tools for analysing growth and poverty: An introduction

Prepared by Andy McKay[1]

November 2005

This document does not necessarily represent the views of the sponsoring agencies. We would welcome your comments on this document. Please send them to DFID's Pro-Poor Growth Team: growth@dfid.gov.uk.

[1] ODI and University of Bath (a.mckay@odi.org.uk or a.mckay@bath.ac.uk). I gratefully acknowledge helpful comments on earlier drafts by Louise Cord, Ignacio Fiestas, Will Gargent, Manu Manthri, Christian Rogg and participants at the OPPG Synthesis Conference, Washington DC, February 2005. However, I accept full responsibility for any inaccuracies.

## Introduction

This paper is prepared as an output of the Operationalising Pro-poor Growth (OPPG) work programme. This was a joint two-year initiative between four partners: Agence Française de Développement (AFD), Department for International Development (DFID), German Development Policy (BMZ, GTZ, KfW), and the World Bank. The work programme aimed to provide better advice to governments on policies that facilitate the participation of poor people in the growth process. As part of this programme, a series of 14 country case studies were conducted, looking at relationships between growth and changes in poverty over relatively long time horizons, typically the decade of the 1990s and sometimes longer. The case studies addressed a common set of questions, and involved the use of a number of analytical tools aimed at gaining a better understanding of a country's growth experience and its links to inequality and poverty reduction. Of key importance was to gain a better understanding of the pathways by which poor people contribute to and benefit from growth, the role of country conditions in affecting the impact of policies on growth and poverty outcomes, and the extent to which specific policies are good for growth and bad for poverty reduction or vice versa.

The purpose of this note is to provide a brief introduction to the main tools used by case study authors. This note does not explain the tools in detail, nor discuss how to implement them in practice. A more thorough, detailed and analytic explanation of this is provided in the methodological note prepared for this project by Fiestas and Cord (2004), as well as the background paper by Ravallion (2004). Rather this note seeks to give an intuitive explanation for non-specialists as to why the tools can be useful in practice, illustrated with reference to specific examples from OPPG case studies. In reading the note it is important to remember that generic tools are only one part of this analysis; their application needs to be accompanied by a detailed understanding of the country context, and other country-specific analysis.

In terms of analytic tools, this set of questions calls for both macro and micro level analysis. More specifically, it requires a detailed analysis and disaggregation of growth itself; a detailed analysis of the changes in poverty and inequality that accompany this; and an understanding of the factors that link these. This note discusses analytic tools used to address these three different issues in turn. It is important to remember though that much analysis of this focuses on income (in practice often consumption) dimensions of poverty and inequality, but several of the methods can also be applied to non-income dimensions. This note provides some examples of this application to non-income dimensions. A full listing of the contents, along with a summary explanation of the purpose of each technique is set out at the end of this introduction.

A key concept in this discussion is the meaning of the term "pro-poor growth", which has been interpreted in many different ways by different authors. This has also been the subject of considerable debate, including among researchers and donor agencies. Broadly speaking, and as set out in the recent DFID Growth Team Briefing Note (DFID, 2004), it is possible to consider both absolute and relative concepts of pro-poor growth. The relative concept of pro-poor growth is one that emphasises the distributional pattern of growth: growth is pro-poor in relative terms if the incomes of the poor grow at a faster rate than those of the non-poor (such that inequality between the poor and the non-poor falls). An absolute concept is that growth is pro-poor if it reduces poverty; the key focus then is on the rate of growth for the poor (the rate of pro-poor growth – see below). While different commentators and researchers may prefer one concept over another, in reality both are important for these debates. There are many reasons to be concerned with the distributional pattern of growth and the adverse effects of rising inequality on growth and poverty reduction. But focusing solely on the relative concept distracts from a sufficient focus on the rate of growth itself. In this note it is assumed that both growth and distribution are important.

The three subsequent sections discuss in turn disaggregating growth; examining changes in poverty and inequality in relation to growth; and explaining the links between growth, inequality and poverty reduction, in each case drawing primarily on techniques used in the OPPG project. The specific techniques, and a brief explanation of their purpose, are summarised in the following index table.

| Page | Tool | Purpose |
|---|---|---|
| *Building a disaggregated picture of growth* | | |
| 3 | Macro and micro concepts of growth | To emphasise the distinction between overall economic growth and income growth experienced by individuals and households – the key focus here |
| 3 | Sectoral analysis of growth | To identify variations in growth rates across different productive sectors |
| 5 | Growth accounting analysis | To see to what extent growth is due to increased factor inputs (labour, physical capital etc.) or due to increased overall productivity |
| 6 | Spatial and other subnational disaggregation of growth | To identify variations in growth across different groups of the population using micro level data |
| *Examining the distributional and poverty impact of growth* | | |
| 8 | Profiling changes in poverty and inequality | To understand the pattern of changes in poverty and inequality disaggregated across different categories of individuals and households |
| 10 | Ravallion-Huppi decomposition | To assess the importance of poverty reductions within different groups, and migration between groups in accounting for poverty change |
| 11 | Datt-Ravallion Decomposition | To determine the extent to which a change in poverty is accounted for by growth in average income and by a change in the its distribution |
| 13 | Growth and inequality elasticities of poverty | A summary measure of the extent to which growth or a change in inequality reduces poverty |
| 15 | Growth incidence curves for income | A graphical tool for looking at the distributional pattern of growth |
| 17 | Rate of pro-poor growth | A summary measure of growth experienced by the poor |
| 19 | Non-income growth incidence curves | The extension of growth incidence curves to look at the distributional pattern of change of non-monetary indicators |
| *Explaining the links between growth, inequality and poverty reduction* | | |
| 21 | Intra-country regression analysis | Identifying key factors that are important for growth and poverty reduction drawing on subnational variations |
| 23 | Labour market analysis | Selected methods for looking at the role of labour markets in linking growth and poverty reduction |
| 26 | CGE modelling and related techniques | A modelling technique to simulate distributional and other impacts of policy change |
| | | |

# 1 Disaggregating growth

## *1.1 Macro and micro concepts of growth*

At the outset it is important to recognise that there are both macro and micro based concepts of growth, and both are relevant in considering pro-poor growth. At the macro level growth is viewed as a change in GDP or GDP per capita, measured as part of the national accounts and generally at a country level (though occasionally at a state level as in India). Being aggregate data, this can generally be disaggregated by productive sector or type of expenditure (consumption versus investment) – but not by poverty or income groups for example. To look at the distributional impact of growth (e.g. by location, income group, personal or household characteristics etc.) generally calls for micro level data, usually derived from household surveys that measure income and/or consumption.

These two concepts of growth (and the income concepts on which they are based) are different from each other. Often they are highly correlated, as for instance in Ghana where the household survey suggests an annual increase in consumption per adult of 3.1% between 1991 and 1998, while the national accounts suggests a 2.9% increase in per capita private consumption over essentially the same period. But this is not necessarily the case. In Romania, where GDP per capita showed an average increase of 0.2% per annum over the period 1996-2002, households surveys showed a 3.0% per annum average decline over the same period.

Another distinction between the macro and micro concepts of growth is the frequency with which the information on growth rates is available. GDP growth (or growth in total private consumption) is measured on an annual basis, whereas growth of household income can only be computed between the years when appropriate household surveys are available – typically two or three instances in time, with intervals of a few years in between (in Ghana twice over the 1990s with a seven year gap in between). Therefore in looking at growth based on micro data, it is important to know whether these years are in any way "atypical".

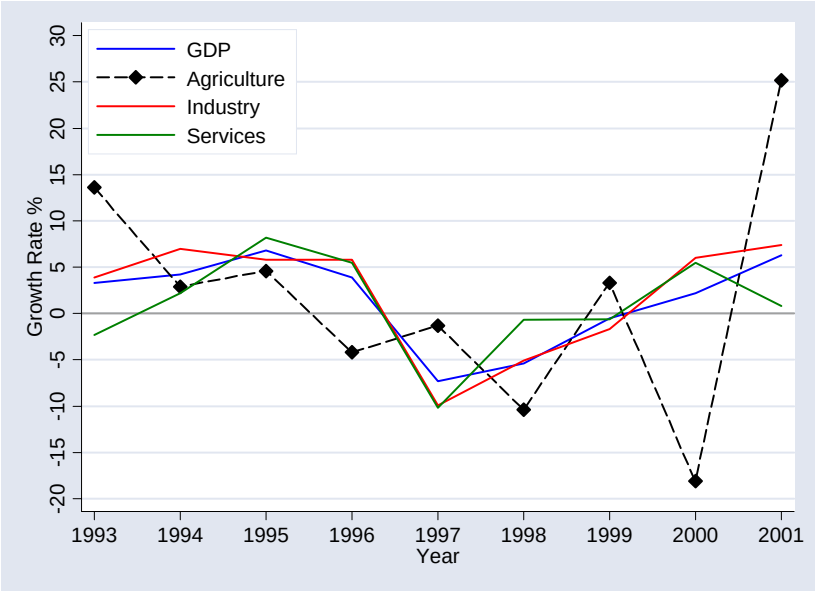
Both measures of growth are important in looking at the issues raised by the OPPG project, and provide complementary evidence. In understanding the distributional pattern of growth we are specifically looking at the relationship between macro-level economic growth and changes in individual household incomes or consumption levels.

## *1.2 Sectoral patterns of growth*

A key first question for policy makers is to know about the sectoral pattern of growth. Which sectors are expanding or contracting more quickly? This enables an initial understanding of the nature of growth (which sectors are driving growth or accounting for the decline?) and how it relates to the sectors in which the poor are predominantly employed.

For example, total and sectoral growth rates for Romania since 1993 are plotted in Figure 1. This shows a significant variation in overall growth performance over the period, with negative growth between 1997 and 1999. By sector, the largest variations in growth rates are apparent in agriculture. In general the performance of the industrial and services sectors is strongly associated with the overall pattern or growth, because agriculture accounts for a smaller share of GDP.

**Figure 1: Growth rates in Romania by sector, 1993-2001**




*Source: derived from Romania OPPG case study.*

It is also important to consider sub-sectors, i.e. to look at activities within the three broad categories of agriculture, industry and services. Bangladesh over the 1990s (Table 1) was a case of consistent positive growth. The fastest rate of growth was in the industrial sector, with the largest contribution to growth in this sector coming from manufacturing and construction. Growth rates in agriculture were slower, although fast growth in fishing made a significant contribution to overall growth. The largest overall contribution to growth in Bangladesh in the 1990s came from the services sector, even though growth rates were lower than in the industrial sector.

**Table 1: Growth rates in selected sectors in Bangladesh, 1991-2000**

| Sector (selected subsectors in italics) | Average growth rate, 1991-2000 (% per annum) | Contribution to overall growth, 1991-2001 (%) |
|---|---|---|
| Agriculture | 3.2 | 18.8 |
| *Fishing* | *8.2* | *9.1* |
| Industry | 7.0 | 34.2 |
| *Manufacturing* | *6.9* | *20.4* |
| *Construction* | *7.5* | *11.0* |
| Services | 4.5 | 47.0 |
| *wholesale and retail trade* | *5.7* | *15.4* |
| GDP | 4.8 | 100.0 |

*Source: Bangladesh OPPG study.*

### *1.3 Growth accounting analysis*

It is important for policy makers to understand the nature and sources of economic growth (or its absence), including the factors that account for it. As well as the level of growth attained, other central issues include its distributional impact and its sustainability. Growth accounting analysis can provide some insights on these questions.

The level of GDP, or total production, in an economy depends on key inputs to that production, in particular physical capital, labour and human capital. Growth can come about through increased levels of these inputs, due to investment, growth in the labour force, or human capital formation; or from these inputs being used in a more efficient and more productive manner (including through new technology). Growth accounting analysis allows for an assessment of the relative importance of these different factors in accounting for growth or its absence. It identifies the proportion of growth over a period that is due to increased use of factor inputs. Output growth not accounted for by a growth in inputs is attributed to changes in total factor productivity (TFP); this inevitably captures a number of features including changes in technology and institutional changes (as well as measurement problems and deviations from the assumptions of the underlying implicit model[2]).

Table 2 shows an example of an application of the method in El Salvador, considering just two inputs in this case, labour and capital.

**Table 2: Growth accounting analysis for El Salvador**

| Years | Average GDP growth rate | Contribution to GDP growth | | |
|---|---|---|---|---|
| | | Capital | Labour | TFP |
| 1970-1979 | 3.8 | 2.4 | 2.7 | -1.3 |
| 1980-1989 | -2.1 | 0.3 | 0.8 | -3.2 |
| 1990-1995 | 5.8 | 1.7 | 1.0 | 2.5 |
| 1996-2000 | 2.9 | 1.7 | 2.0 | -0.8 |

*Source: OPPG El Salvador study*

Growth in El Salvador was negative in the 1980s, but positive in the other periods shown here. In the 1980s both investment and the labour force grew slowly, but the poor growth performance predominantly reflected strongly negative total factor productivity. This suggests a sharp reduction in efficiency over this period. However, this was sharply reversed in the first half of the 1990s when TFP grew again, and this was accompanied by increased investment.

A similar analysis for Ghana, conducted on a per-worker basis, also takes account of the effect of education in accounting for growth (Table 3). While education always contributes positively to growth in this example, once again change in TFP is the major factor accounting for the volatility of growth over this period. Poor investment performance also played an important role in accounting for growth performance in the 1980s.

[2] For example, the assumption of constant returns to scale, so that for example if all inputs increase by, say, 10% then output would also increase by 10%.

**Table 3: Growth accounting-based decomposition of sources of growth in Ghana**

| Period | Growth in Real GDP per worker | Contribution of | | |
|---|---|---|---|---|
| | | Physical capital per worker | Education per worker | Residual (TFP) |
| 1980-84 | -3.94 | -0.93 | 0.66 | -3.66 |
| 1985-89 | 2.32 | -0.40 | 0.72 | 2.01 |
| 1990-97 | 1.27 | 0.75 | 0.41 | 0.11 |
| Total: 1960-97 | -0.12 | 0.52 | 0.50 | -1.15 |

*Source: Ghana OPPG case study*

The value of growth accounting analysis is that it helps identify the extent to which changes in inputs account for the levels of growth and their fluctuations over time. But two important issues in its application are the imprecision of the method, and the difficulty of interpreting the total factor productivity term. This TFP term is a hybrid, a "catch-all" for many different factors that could affect growth performance.

### *1.4 Spatial and Other Subnational Growth Analysis*

It is also important that policymakers are aware of spatial patterns to growth in a country, given the potential political sensitivity of this issue and its relevance for poverty reduction. For example, in the case of Ghana, growth at the national level over the 1990s was spatially concentrated, mainly in higher potential or better connected areas. The northern savannah area, where poverty levels were highest to begin with, experienced little growth and so little poverty reduction over this period. Thus growth was less effective at reducing poverty because of its spatial pattern, and spatial inequality increased along what in this case is a politically sensitive dimension.

Most spatial growth analysis is based on household survey data, and this can provide valuable insights about differential experiences of growth across regions. One straightforward disaggregation is between urban and rural areas as shown in Table 4 below for the case of Uganda. Between 1992 and 1997 growth occurred at similar rates in urban and rural areas, but in the three subsequent years, when growth increased, this occurred to a much greater extent in urban areas compared to rural areas, contributing to increased spatial inequality.

**Table 4: Urban-rural disaggregation of growth in Uganda**

| **Location** | **Average annual growth in household expenditure per adult equivalent** | | |
|---|---|---|---|
| | **1992-1997** | **1997-2000** | **2000-2003** |
| National | 3.0% | 4.9% | 0.4% |
| Rural | 3.0% | 3.7% | 0.1% |
| Urban | 2.5% | 8.4% | 0.7% |

*Source: based on OPPG Uganda study, Table 3.*

Given the heterogeneity of urban and rural areas, policymakers and analysts should look for much more detailed spatial disaggregation. In the case of Burkina Faso for example, a regional disaggregation reveals important differences. Selecting predominantly cotton growing regions (Table 5), the general pattern is of falling average per capita expenditure in most regions, but to differing extents, and with important exceptions as in the case of *Cascades*. A comparison between the Centre West and Centre South shows different trends in adjacent regions. This raises the important question of what underlies these differences in trends.

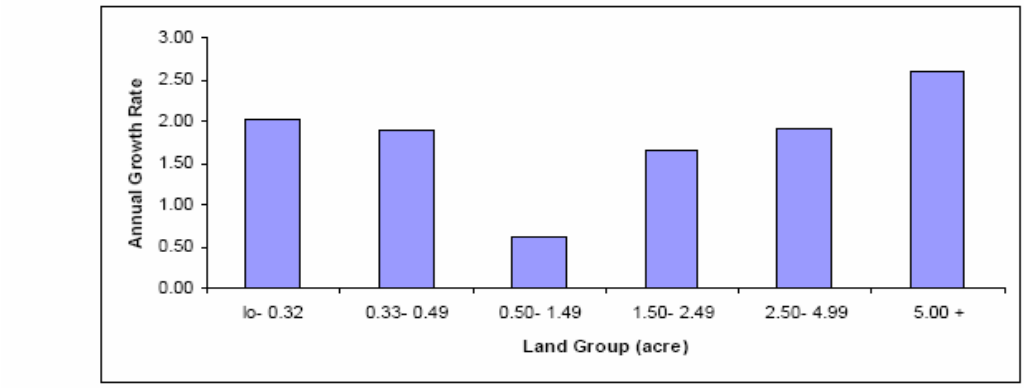
**Table 5: Growth rates in selected localities of Burkina Faso**

| Region | Real household expenditure per capita (index, mean=100) | | |
|---|---|---|---|
| | 1994 | 1998 | 2003 |
| Rural | 75 | 78 | 81 |
| Urban | 227 | 217 | 186 |
| *Areas with more than 40% producing cotton* | | | |
| Hautes Bassin | 130 | 120 | 115 |
| Mouhoun | 86 | 85 | 68 |
| South West | 100 | 81 | 73 |
| Cascades | 92 | 113 | 115 |
| *Areas with more than 20% producing cotton* | | | |
| Centre West | 92 | 95 | 101 |
| Centre South | 75 | 73 | 63 |

*Source: OPPG Burkina Faso study.*

In addition to spatial disaggregation, growth data can be disaggregated in many other dimensions, including occupation level, education level, gender, ethnicity etc. An example of disaggregating growth by occupational category is presented in section 3.2. Figure 2 shows a disaggregation of growth rates by landownership categories in Bangladesh. In this case growth rates are highest for the largest landholding category, and for the two smallest.

**Figure 2: Growth rates by landownership category in Bangladesh, 1991/92 – 2000**




*Source: Bangladesh OPPG study.*

In summary, in focusing on the distributional pattern of growth it is important to disaggregate growth to the extent permitted by available data, not just by productive sector as in the national accounts (following standard practice) but also between different groups of households, defined in different relevant dimensions such as location, occupation, and relevant household characteristics (such as gender, size and education level).

## 2 Poverty and inequality changes in relation to growth

The analysis of changes over time in poverty and inequality will be based on micro level information, which will generally be required at the national level – that is, to cover the entire country. The OPPG project involved a substantial focus on income or consumption poverty. This was based on a measure of household wellbeing computed from household survey data as the total income, or more often consumption, of the household adjusted for household size and composition and relevant price differences; combined with a national poverty line. This concept is sometimes referred to below as income poverty for brevity and in accord with common usage, while recognising in practice it will in fact often be based on consumption data. The OPPG case studies also contain significant discussion of non-income dimensions of poverty.

In both cases, disaggregation is key in understanding the distributional pattern of growth and its link to poverty reduction. The importance of disaggregating income or consumption poverty and inequality has long been recognised. The same survey data sets usually also collect data on a number of non-income indicators of living conditions. There is scope to exploit this further in future work, including in looking at the impact of growth on other dimensions of poverty. Many of the same techniques can be applied, as illustrated in some examples below.

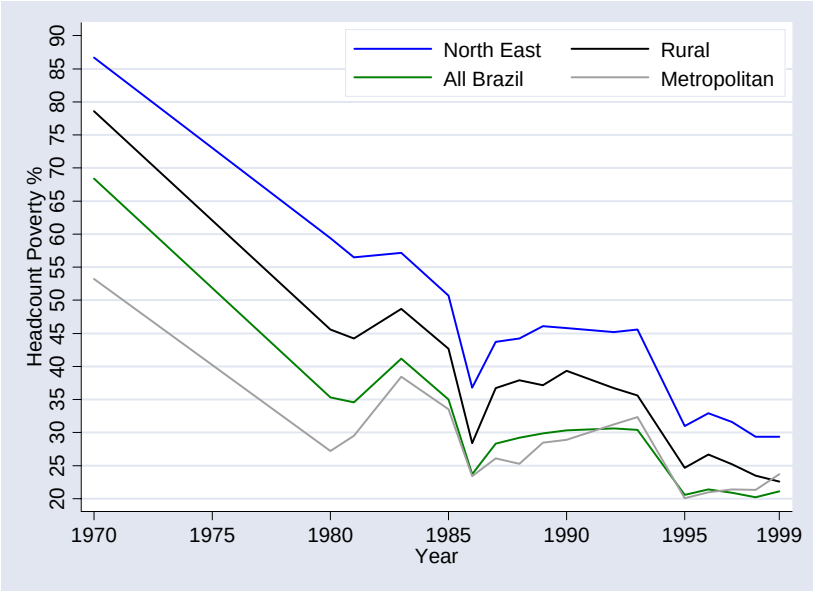
### *2.1 Profiling changes in poverty and inequality*

Just as growth rates vary across different groups of a population, so do levels of poverty and inequality and their changes over time. Policymakers focused on poverty reduction will therefore want a disaggregated picture of poverty in a country, and its changes over time. Given the objectives of the OPPG project, the following discussion focuses on these changes over time.[3]

As with the subnational growth analysis, this disaggregation is enabled by household survey data. Estimates of poverty and inequality and their changes over time can be disaggregated across relevant population groups defined along many different dimensions, including location, occupational category, household demographic characteristics, ethnicity, education level and land ownership. For these purposes income poverty is typically calculated relative to a national poverty line, but it is also common practice to report extreme poverty (relative to a lower poverty line). The extent of poverty is commonly summarised as a headcount measure (the proportion of a given population that are poor), but is often also reported using the poverty gap index (which takes account of the average shortfall below the poverty line) and a poverty severity index (which places still greater weight on the poorest among the poor). Similar principles apply for the disaggregation of inequality among different groups, where a distinction can be made between inequality within each of the different groups and inequality between them. Non-income concepts of poverty and inequality and their changes can also be disaggregated by groups as part of producing a profile of poverty and distributional change.

[3] Thus for example we do not discuss poverty mapping here, a very valuable technique for building a much more detailed picture of the spatial pattern of poverty but which has not yet been applied to looking at changes in poverty at this level. Consequently, this technique was not used significantly in the OPPG case studies.

**Figure 3: Time series trends in poverty in Brazil, disaggregated by location**




*Source: OPPG Brazil case study.*

For instance in the case of Brazil it is possible to look at disaggregated trends in the headcount measure of poverty over a long time period (Figure 3). While trends are similar across the different localities here, poverty levels are highest in the North East. Table 6 shows changes in the poverty gap index for both moderate and extreme poverty in Bolivia, disaggregated according to the age composition of the household and language spoken. In this case poverty and extreme poverty, measured by the poverty gap index, are somewhat higher among households with lower proportions of members in the key working age group, and in non-Spanish speaking households. All show reductions in the extent of poverty between 1994 and 2002, though in general the gap between these two groups does not narrow.

**Table 6: Selected disaggregations of changes in the poverty gap index in Bolivia between 1994 and 2002**

| Category | Moderate poverty | | Extreme poverty | |
|---|---|---|---|---|
| | 1994 | 2002 | 1994 | 2002 |
| *Proportion of household members aged between 15 and 65 years* | | | | |
| Less than or equal to 0.5 | 50.2 | 40.9 | 32.0 | 20.0 |
| Greater than 0.5 | 31.3 | 23.5 | 16.6 | 9.8 |
| | | | | |
| *Language spoken by household head* | | | | |
| Spanish | 32.5 | 23.0 | 16.4 | 8.3 |
| Indigenous | 63.8 | 42.1 | 45.8 | 21.8 |

*Source: Bolivia OPPG study.*

Similar disaggregation of measures of income inequality can be conducted. Inequality can be measured in different ways including decile or quintile shares (the overall income or consumption of the poorest 10% or 20% respectively of the population expressed as a share of the total), by means of the well-known Gini coefficient or by a range of other summary indices.[4] Here the key focus interest is in disaggregating income inequality.

[4] McKay (2002) provides an introduction to the measurement of inequality, including an explanation of the Gini coefficient.

Table 7 shows changes in Gini coefficients in Bolivia disaggregated between the departmental capital cities, towns and rural areas. Over this three year period there was a quite large upward movement in the Gini coefficient. By disaggregating it is clear that this reflected a sharp increase in inequality in the capital cities because the Gini coefficients in the remaining locations changed very little. What this does not tell us though is how inequality between the capital cities and the remaining locations (an important contributor to overall inequality) changed over this period.

**Table 7: Gini coefficients for Bolivia disaggregated by location, 1999 and 2002**

| Location | 1999 | 2002 |
|---|---|---|
| Capital cities | 0.480 | 0.540 |
| Towns | 0.455 | 0.452 |
| Rural | 0.423 | 0.421 |
| National | 0.525 | 0.551 |

*Source: Bolivia OPPG Case Study, from table 3.*

A decomposition of a different inequality index for Uganda (Theil index) enables an assessment of changes in inequality between as well as within groups. Disaggregating the population by urban and rural location, 19.5% of inequality in 2002/03 reflects the inequality between urban and rural areas (Table 8). The remaining 80.5% reflects inequality within each of urban and rural areas. The relative importance of urban-rural differentials as a contributor to inequality in Uganda has increased since 1992.

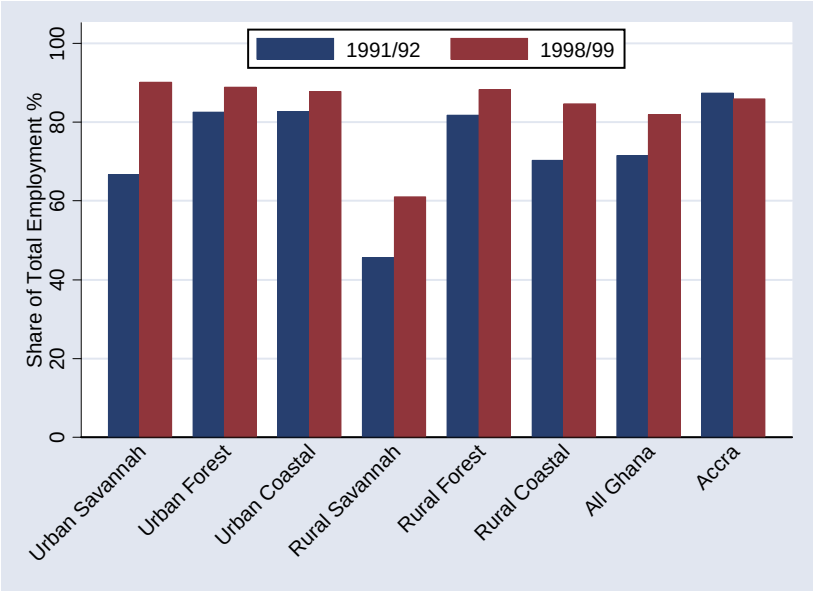
**Table 8: Inequality in Uganda decomposed by urban/rural location**

| Decomposition of inequality by urban/rural location | 1992/1993 | 1999/2000 | 2002/2003 |
|---|---|---|---|
| Within group inequality (%) | 83.9 | 77.1 | 80.5 |
| Between group inequality (%) | 16.1 | 22.9 | 19.5 |

*Source: OPPG Uganda study*

The focus so far has been on disaggregating income concepts of changes in poverty and inequality but analogous techniques can also be applied to non-income indicators. Thus for instance figure 4 shows change in primary school enrolment rates for girls in Ghana disaggregated by location. Here the fastest rate of growth is in the poorest savannah region, which contrasts with the pattern for income poverty, highlighting the value of looking at non-income dimensions.

**Figure 4: Changes in net enrolment rates of girls in primary school in Ghana**




*Source: based on Coulombe and McKay (2003).*

### *2.2 Summarising contributions to poverty change: the Ravallion-Huppi decomposition*

When changes in poverty is disaggregated by location, sector or other groups, as discussed above, it is helpful to be able to summarise the contribution of each sector to overall poverty change. An easily applied decomposition developed by Ravallion and Huppi (1991) provides a means of doing this, while also taking account of changes in poverty due to migration between groups, that is people moving from one group (say rural areas) to another (urban areas). This is illustrated in Table 9 for the case of Uganda and Ghana, where households have been disaggregated into groups according to their principal economic activity.

**Table 9: Decomposing poverty reduction in Ghana and Uganda by sector of activity**

| | Population Share (1992) (%) | Percentage point change in poverty | Share of poverty reduction (%) | | Population Share (1991) (%) | Percentage point change in poverty | Share of poverty reduction (%) |
|---|---|---|---|---|---|---|---|
| | **Uganda (1992-2003)** | | | | **Ghana (1991/92-1998/99)** | | |
| Crop agriculture | 66.6 | 13.2 | 48.9 | Food crop farmers | 43.6 | 8.6 | 30.6 |
| Cash crops agriculture | 5 | 18.8 | 5.3 | Export farmers | 6.3 | 25.4 | 13 |
| Mining/ Construction | 1.5 | 13.5 | 1.1 | Private informal employ. | 3.1 | 13.3 | 3.3 |
| Manufacturing | 4 | 16 | 3.5 | Public sector employment | 13.5 | 12 | 13.2 |
| Trade | 7.4 | 9.1 | 3.7 | Private formal employ. | 3.9 | 19 | 6.1 |
| Transport/ Comm.. | 1.7 | 16.2 | 1.5 | Non-farm self-employ. | 27.6 | 9.8 | 22 |
| Government services | 8.1 | 24.2 | 10.8 | Not working | 2 | 1.6 | -0.2 |
| Other services | 2.6 | 5.4 | 0.8 | | | | |
| Not working | 3.3 | 26.7 | 4.9 | | | | |
| Total intra-sectoral effect | | | 80.4 | Total intra-group effect | | | 88.0 |
| Total migration effect | | | 20.9 | Total migration effect | | | 10.6 |
| Residual | | | -1.2 | Residual | | | 1.4 |

Source: Uganda and Ghana OPPG case studies.

Taking the case of Uganda, 80.4% of overall poverty reduction is associated with falling poverty in the different economic activity categories identified, but nearly 21% reflects the impact of increased numbers of households working in activities where poverty levels are lower. Movement between activities has played an important part in the poverty reduction that has occurred. Nearly half of poverty reduction in Uganda (48.3%) represents reductions in poverty among non-cash crop farmers, but this large effect is a consequence of the large size of this group. Relative to the size of the group, povety reduction has been faster among those engaged in cash crop agriculture. In Ghana the migration effect is smaller, but similar effects are observed in relation to food crop and cash crop farmers.

### *2.3 Datt-Ravallion Decomposition*

A central concern for policymakers will be to understand why poverty levels are increasing or decreasing over a period of time. As a starting point in answering this, a convenient decomposition (Datt-Ravallion decomposition; Datt and Ravallion, 1992) helps identify the relative contributions of two proximate determinants: growth (i.e. changes in the average levels of household incomes) and redistribution (changes in inequality that accompany growth). This initial decomposition will obviously need to be accompanied by a deeper understanding of the factors that account for these changes in average income and inequality.

The technique relies on the definitional relationship between average income (or consumption), inequality and absolute poverty. Where the poverty line remains fixed in real

terms (as is reasonable over a few years), then poverty will be lower when average income is higher (for a given level of inequality); and (in most cases) poverty will be higher when inequality is higher (for a given average income). The Datt-Ravallion decomposition uses this fact to decompose a change in absolute poverty into three terms:

(i) a growth effect: the change in absolute poverty which would have occurred if the observed growth in the average income level had been the same for everyone;
(ii) a redistribution effect: the change in absolute poverty which would have happened if the observed change in inequality had occurred without the mean income changing; and
(iii) a residual term, representing the inexact nature of the above decomposition in practice.[5]

The growth and redistribution effects are artificial constructs (because both average income and inequality will change in any real situation), but this decomposition does allow an assessment of the relative importance of growth and inequality in accounting for changes in poverty.

Selected instances of decompositions of the poverty head count are presented in Table 10. By definition the growth, redistribution and residual components add up to the change in the poverty measure; it is therefore possible to identify the relative importance of different components. In general the growth component predominates, both in cases of reductions in poverty or increases (as in Romania). In some instances the redistribution component partly offsets the impact of growth on poverty. This is the case in Brazil, Uganda and Vietnam where increases in inequality reduce the impact of growth on poverty reduction. Similarly a reduction in inequality in Romania slightly moderated the effect of falling average incomes on poverty. However, in Bolivia and especially Burkina Faso, reductions in inequality play an important part – the majority in Burkina Faso – in contributing to reductions in poverty. In general the impact of redistribution on the poverty headcount measure can be quite large. This can operate in either direction, depending on whether inequality increases or decreases with growth (where there is no standard pattern across the OPPG case study countries).

**Table 10: Changes in headcount measures of poverty decomposed into growth and redistribution effects, selected OPPG countries**

| Country and years | Change in poverty | Growth component | Redistribution component | Residual |
|---|---|---|---|---|
| Bolivia, 1989-2002 (moderate poverty) | -9.9 | -6.4 | -3.5 | 0.0 |
| Brazil, 1981-2001 (extreme poverty) | -7.1 | -8.9 | 1.8 | 0.0 |
| Burkina Faso, 1994-2003 | -8.3 | -3.2 | -4.5 | -0.6 |
| Ghana, 1991-1998 | -12.3 | -13.1 | 0.9 | 0.0 |
| Romania, 1996-1999 | 6.3 | 8.3 | -0.9 | -1.1 |
| Uganda, 1992-2003 | -18.0 | -26.3 | 8.3 | 0.0 |
| Vietnam, 1993-2002 | -29.8 | -34.7 | 4.9 | 0.0 |

*Source: selected OPPG case studies.*

[5] The residual term is difficult to interpret, reflecting what is referred to in economics as an index number problem. In practical terms the decomposition is difficult to interpret when the residual term is large relative to the growth and inequality components (as for example in the Indonesia case study due to the effects of large price changes). It is common practice to use procedures to eliminate the residual although there is no scientifically rigorous basis for this.

The same decomposition can be applied for subgroups of the population (by location, occupational groups, etc.), for different poverty lines and different poverty indices. This can highlight important differences. The effect of changes in inequality (the redistribution component) will be greater for poverty indices such as the poverty gap or poverty severity index that take account of the depth of poverty.

The same information provided by the Datt–Ravallion decomposition can be demonstrated in another manner, as shown by the example of poverty reduction in urban Bangladesh (Table 11). Urban poverty fell sharply in the first half of the 1990s, but rose slightly in the second half of the decade. Urban inequality also rose over this period, offsetting the growth effect in the first half of the decade and contributing to the increase in poverty in the second half. The simulation summarised below demonstrates the extent to which urban poverty would have fallen faster in the first half of the decade if it had not been accompanied by increasing inequality. It also shows that poverty would not have risen in the second half of the decade had inequality not increased.

**Table 11: The effect of inequality on urban poverty in Bangladesh**

| | 1991/92 | 1995/96 | 2000 |
|---|---|---|---|
| Gini coefficient | 36.2 | 38.6 | 40.5 |
| Headcount index – actual | 38.2 | 29.8 | 31.3 |
| Headcount index—simulated if inequality unchanged | 38.2 | 25.8 | 25.3 |

*Source: Bangladesh OPPG study.*

The Datt Ravallion decomposition is a convenient summary of the extent to which changes in poverty relate to growth and distributional change but it needs to be complemented by an understanding of the factors accounting for the distributional pattern of growth.

### *2.4 Growth and inequality elasticities of poverty*

Many policymakers agree on the importance of growth for poverty reduction. But it is helpful to have a measure of how effectively growth is translated into poverty reduction – as well as to identify the factors that might enhance this effectiveness.

The growth elasticity of poverty provides such an indicator. It measures the percentage change in poverty in response to a one percent increase (or decrease) in average income. Such growth elasticities will generally be negative: absolute poverty will fall if average income increases, and rise if average income decreases. Table 12 reports some estimated growth elasticities for selected Indian states based on the historical patterns of growth and poverty reduction.

**Table 12: Estimated growth elasticities of poverty for selected Indian states**

| State | Growth elasticity of poverty |
|---|---|
| Kerala | -1.2 |
| Maharashtra | -0.4 |
| Uttar Pradesh | -0.6 |
| West Bengal | -1.2 |

*Source: OPPG India case study.*

Thus in Kerala a 1% increase in real per-capita income translates into a 1.2% reduction in the poverty headcount measure, on average. As the table demonstrates, the magnitudes of the

growth elasticities of poverty vary from state to state, so that growth in Maharashtra has been much less effective in bringing about poverty reduction compared to West Bengal. These elasticities though are not fixed parameters. Rather they can be influenced by a number of factors, including policy actions. For example, in the case of India a number of factors are found to be important in influencing the responsiveness of poverty to growth, including greater access to finance; investment in education; more effective ways of regulating labour markets; and greater political accountability.

Growth elasticities of poverty can change significantly over time, as illustrated by the case of Indonesia during and following the East Asian crisis (see table 13).

**Table 13: Growth elasticity of poverty in Indonesia over the 1990s**

| Year | Annual % change in per capita income | Growth elasticity of poverty |
|---|---|---|
| 1993-96 | 5.2 | -1.2 |
| 1996-99 | -3.2 | -3.0 |
| 1999-2002 | 2.5 | -3.3 |

*Source: OPPG Indonesia case study.*

In general, many factors will influence the size of the growth elasticity of poverty. These include the initial level of inequality (where inequality is higher initially, the elasticity will tend to be lower) and the distributional pattern of growth itself (where growth is associated with increasing inequality, this will mean less poverty reduction), but is also depends on many other factors including the average income level, the poverty line and the extent to which the poor are located close to, or far from, the poverty line. As such cross-country comparisons of the growth elasticity of poverty can be hard to interpret. However, such comparisons may be more valuable across regions within a country, as demonstrated in the OPPG case studies of Brazil and India; this then prompts an analysis of why elasticities are high in some locations than others (see India OPPG case study).

The extent to which changes in inequality affect poverty can be summarised by an analogous elasticity, the inequality elasticity of poverty. This reports the percentage decrease in poverty as a result of a 1% decrease in inequality (generally measured as the Gini coefficient).

**Table 14: Poverty elasticities for El Salvador, 1991-2002**

| | Poverty | Extreme poverty |
|---|---|---|
| Growth elasticity | -1.1 | -1.5 |
| Inequality elasticity | 1.1 | 2.8 |

*Source: El Salvador OPPG study.*

In the case of El Salvador (Table 14), the inequality elasticity of poverty is 1.1; in other words, a 1% reduction in the Gini coefficient would reduce poverty by 1.1%. The elasticity is much larger when extreme poverty is considered. In this case there is potentially a high return to policy measures to reduce inequality.

The examples above related to elasticities for the headcount measure of poverty. But the same elasticities can be computed for other measures of poverty, including for example the poverty gap and poverty severity measures. The size of the inequality elasticity of poverty is generally larger for these latter measures, as the following example from rural Bangladesh demonstrates (Table 15). This is because a reduction in inequality will generally benefit the

poorest. In this case the growth elasticity is also larger for the poverty gap and severity measures, but this is not a general result.

**Table 15: Growth and poverty elasticities for rural Bangladesh, 2000**

| | Growth elasticity of poverty | Inequality elasticity of poverty |
|---|---|---|
| Poverty headcount index | -1.9 | 0.6 |
| Poverty gap index | -2.8 | 2.1 |
| Poverty severity index | -3.7 | 3.7 |

*Source: Bangladesh OPPG study.*

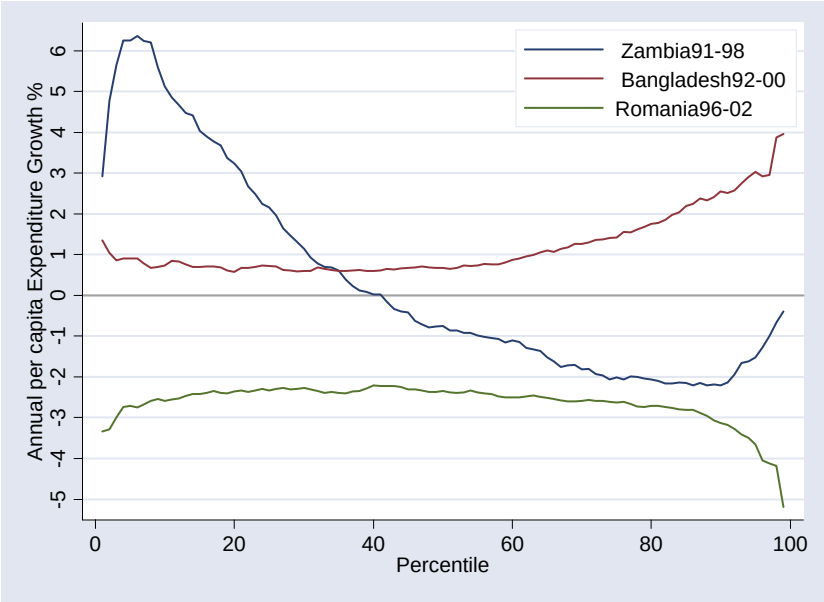
### *2.5 Growth incidence curves*

Policy makers will frequently be interested in understanding how different individuals fared over a period of time – whether their living conditions improved or deteriorated, and how this varied across different groups of the population. A growth incidence curve (GIC) is a graphical technique that allows us to look at this. GICs can be examined in relation to different measures of well being, both income (or consumption) and non-income measures. This section considers the income GIC, and its application to non-income indicators is discussed in section 2.7.

Some examples of growth incidence curves are presented for different countries in Figure 5. To explain the meaning of these curves, consider the case of Bangladesh. The GIC is based on a comparison between survey data at two points in time, in this example 1992 and 2000. The horizontal axis of the graph represents the different percentile groups of the population: the first percentile (the poorest 1% of the population), the second percentile (the next poorest 1%), and so on up to the 100$^{th}$ percentile (the richest 1%). The graph represents on the vertical axis the annual change in the consumption measure between these two points in time for each percentile group.[6]

[6] Note that what is being compared is the averages for the corresponding percentile groups in each of the two years; the same households or individuals are not being compared.

**Figure 5: Selected growth incidence curves**

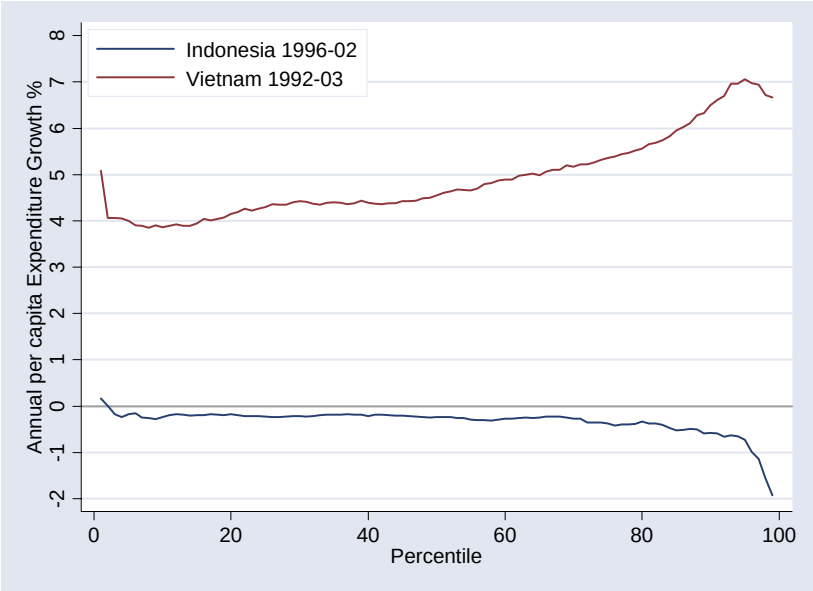



*Source: relevant OPPG case studies*

The shape and position of the GIC will vary from case to case, and this provides important insights into changes in poverty and distributional patterns of growth. If the GIC is always above zero (as in the example of Bangladesh), then this indicates that there has been growth (incomes or consumption levels have increased) at all points of the distribution. This will also imply that absolute poverty has fallen over this period for all conceivable poverty lines (and all conventional measures of poverty). The same obviously applies in reverse if the GIC is always below zero (example of Romania in Figure 5). On the other hand if the GIC is sometimes above and sometimes below zero (example of Zambia in figure 6), whether or not poverty has fallen will depend on where the poverty line is drawn.

In addition, the shape of the GIC provides information about the distributional pattern of growth. In the example of Vietnam in Figure 6, the GIC is broadly upward sloping. Thus consumption levels increased in all percentile groups over this period, but they increased at faster rates in higher percentile groups compared to lower percentile groups. Therefore inequality increased over this period. In the example of Indonesia (Figure 6), consumption levels fell in the majority of percentile groups over this period (reflecting the impact of the East Asian crisis over this period), but the curve is broadly downward sloping. The crisis hit higher percentile groups harder than lower percentile groups. Thus inequality fell over this period. These examples highlight the difference between absolute and relative concepts of pro-poor growth. In Vietnam growth was pro-poor in an absolute sense, and poverty fell; but it was not pro-poor growth in a relative sense. In Indonesia inequality fell (pro-poor change in a relative sense), but growth was negative and poverty increased. Thus growth was clearly not pro-poor in an absolute sense.

**Figure 6: Examples of upward and downward sloping income growth incidence curves**




*Source: relevant OPPG case studies.*

In general GICs will show both upward and downward sloping intervals across the range from the lowest to the highest percentile. But this still provides important information about the distributional pattern of growth or decline. However, it is important to discount the patterns at the extreme ends of the distribution because here the effects of measurement error are most severe.

**Figure 7: Urban and rural growth incidence curves for Zambia**


*Source: Zambia OPPG study*.

While the GICs presented so far all relate to the national level, it can be very valuable to apply the same technique to subgroups of the population, for example distinguishing urban and rural areas, or different regions. This is important for policy purposes, because there are often important regional variations in levels and distributional patterns of growth, which are

not revealed in the national-level GICs. For example, in the case of Zambia over the period 1991-98 (Figure 7), the national GIC shows positive consumption growth up to the 35$^{th}$ percentile, and negative thereafter. But plotting separate rural and urban GICs shows a very different pattern between these locations. The rural GIC shows positive growth up to the 94$^{th}$ percentile; whereas the urban GIC shows decline throughout the entire distribution. This pattern partly accounts for the shape of the national GIC, but this crucial information about the differential urban and rural experiences is not evident from the national GIC alone. Similarly, in the case of Ghana, the national level GIC suggested positive growth in all percentile groups over the period considered. But computing GICs for subnational groups revealed that there has been negative growth for substantial numbers of households in the northern savannah region. This information was not revealed in the national GIC because of the averaging it implies.

### *2.6 Rate of pro-poor growth*

Frequently it can be valuable to have a summary measure of the extent to which the poor are participating in, or benefiting from, growth. An appropriate summary measure for this purpose is the rate of pro-poor growth. There are both absolute and relative concepts of this. The OPPG project focused more on the absolute concept, which is therefore discussed in more detail below. But for many purposes analysts may prefer to compute relative conepts instead or in addition; examples of such concepts are discussed by Kakwani and Pernia (2000), Son (2003) and Kakwani and Son (2004), among others.

The absolute concept of the rate of pro-poor growth is the average growth rate in the incomes of the poor. This is a direct measure of whether and to what extent growth is benefiting the poor (or decline is hurting the poor). This relates to an absolute concept of pro-poor growth, by answering the question of whether growth reduces poverty. However, in interpreting this measure, it is important to compare it with the mean growth rate for the whole population (ordinary growth rate). If the rate of pro-poor growth is higher than the ordinary growth rate, this indicates that growth is pro-poor in a relative sense; if it is less this indicates that growth is associated with increasing inequality between poor and non-poor households.

Some rates of pro-poor growth from selected OPPG case studies are presented in Table 16, along with the mean growth rates for the entire population. In all cases presented here the pro-poor growth rates are positive, except in the case of Romania (over a period of sharp economic decline). Thus in all cases except Romania, growth was pro-poor in an absolute sense, and poverty fell. But there is a big variation in the rate of pro-poor growth, with Vietnam having by some way the highest pro-poor growth rate. Ghana and Uganda had similar mean growth rates overall, but the rate of pro-poor growth was somewhat higher in Uganda compared to Ghana.

**Table 16: rates of pro-poor growth, and mean overall growth rates, for selected OPPG countries (% per annum)**

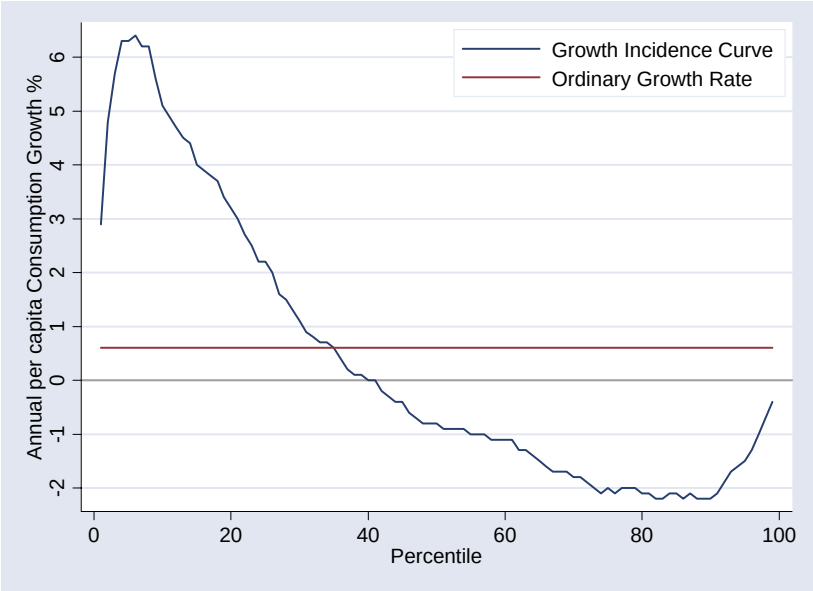
| | Rate of pro-poor growth | Mean growth rate |
|---|---|---|
| Bangladesh, 1991/92-2000 | 0.8 | 2.4 |
| Brazil, 1981-2001 | 1.0 | 2.7 |
| Bolivia 1989-2002 | 1.8 | 1.7 |
| Burkina Faso, 1994-2003 | 1.0 | 0.8 |
| Ghana, 1991-1998 | 2.1 | 3.2 |
| Romania, 1996-1999 | -6.8 | -7.3 |
| Uganda, 1992-2003 | 2.7 | 3.0 |
| Vietnam, 1993-2002 | 4.9 | 5.5 |
| Zambia, 1991-1998 | 1.1 | 0.4 |

*Source: Various OPPG Case Studies*

The comparison of the rate of pro-poor growth with the overall growth rate gives an indication of whether or not growth was pro-poor in a relative sense. In the case of Burkina Faso, the growth rate for the poor was faster than that for the population overall, indicating pro-poor growth in a relative sense (at least for this poverty line). The same applies to Bolivia and Zambia; and in the case of Romania the decline hit the poor slightly less hard than the overall population. In the remaining cases though growth is not pro-poor in a relative sense; the poor experienced growth at slower rates than the population as a whole, and so inequality between the poor and the non-poor increased.

The relationship between the rate of pro-poor growth and the mean growth rate can be illustrated by adding to the GIC a horizontal line for the overall growth rate. This is shown in Figure 8 for the case of Zambia. The GIC lies above the ordinary growth rate up to the 37$^{th}$ percentile and below it thereafter. This means that the consumption growth of the poorest 37% of all households exceeded the ordinary rate of growth.

**Figure 8: Growth incidence curve for Zambia compared to mean growth rate**




*Source: based on data for OPPG Zambia case study*

The rate of pro-poor growth can be computed for subgroups of the population as well. In the case of Zambia the situation was very different for urban and rural areas (-1.8% and 4.0% respectively), as was apparent from the discussion of the separate GICs in the previous section.

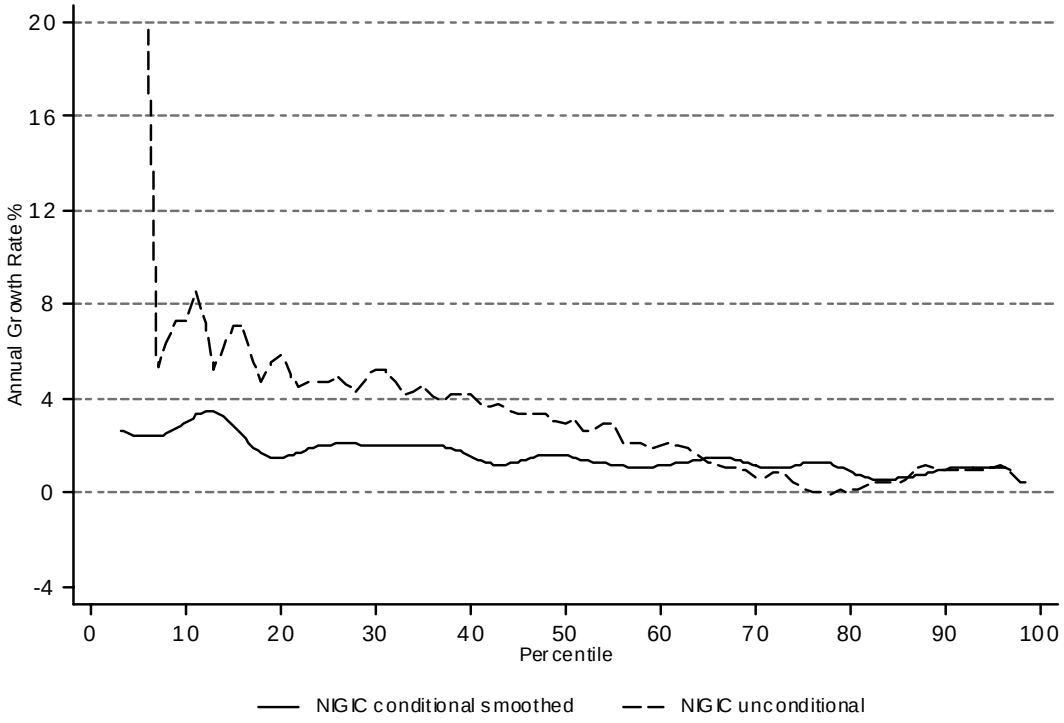
Rates of pro-poor growth can be computed for different poverty lines, and will be specific to the poverty line chosen. This can be of value in looking at rates of growth among the poorest. Again experiences vary. In the case of Bolivia, those lying below the extreme poverty line experienced a faster rate of pro-poor growth between 1989 and 2002 (2.2%) than those below the moderate poverty line (1.8%). In the case of Ghana those below the 20$^{th}$ percentile had a pro-poor growth rate of 1.3% between 1991 and 1998, compared to a rate of 2.1% for the poor as a whole.

### *2.7 Non-income growth incidence curves*

The growth incidence curves discussed above were based on income or consumption indicators, but policymakers are also likely to be as interested in knowing about the distributional pattern of changes in non-income indicators of living standards. A corresponding concept can be defined for such indicators – the non-income growth incidence curve (NIGIC).

There are two variants of this: the conditional NIGIC considers changes in the non-income indicator with reference to income percentile groups, and the unconditional NIGIC considers changes in the non-income indicator with reference to percentile groups of that indicator. Though these were not used in OPPG case studies, it is a straightforward extension. Consider as an example figure 9, which shows conditional and unconditional NIGICs for years of education completed by young adults in Bolivia.

**Figure 9: Growth incidence curves for years of education for adults aged 20-30 years in Bolivia**




*Source: Klasen (2004).*

The conditional NIGIC for the average number of years of education is plotted in Figure 9 as the solid line. This shows the percentage increase in years of education in each income percentile group. The curve lies above zero everywhere (average educational levels improve in all income percentile groups), and is broadly downward sloping (faster growth in education among the income poor). A comparison of this curve with the income GIC (Klasen, 2004) shows that the percentage growth in education is less than the percentage growth in income among almost all income percentile groups (the conditional NIGIC lies almost always below the income GIC).

The dashed line in the figure above shows an unconditional NIGIC for the same indicator, where here the percentiles on the horizontal axis are defined based on a ranking of years of education from the lowest on the left to the highest on the right. The interpretation of the NIGIC is entirely analogous to the income GIC. Because the curve lies above zero almost everywhere, this indicates positive growth in the average number of years of education throughout (with the exception of two or three percentiles in the eighth educational decile group). The growth rates are very fast in lower percentiles, reflecting a very low base to begin with. The broadly downward sloping pattern of the curve, especially strong in the lowest percentiles, shows that growth rates have been faster for those that had fewer years of education to start with. In other words educational inequality in Bolivia according to this indicator has fallen; there has been pro-poor growth in a relative sense – as well as an absolute sense – in the average number of years of education[7]. This is much more strongly

[7] Of course this reduction in inequality in years of education in Bolivia partly reflects the fact that there are practical upper limits to the likely level of education for many people. Moreover, it may also

the case here compared to the income GIC (Klasen, 2004). In addition, because the unconditional NIGIC has a much steeper slope than the corresponding conditional NIGIC, the growth in education is much more strongly related to initial education level than it is to the initial income level.

The same technique can be applied to other non-income indicators which show sufficient variation across different groups of the population; however they are unlikely to be informative in the case of indicators which are zero-one in nature (such as whether someone is literate or not).

# 3 Explaining the links between growth, inequality and poverty reduction

Having discussed ways in which patterns of growth and changes in poverty and distribution can be analysed, the next step is to understand the factors underlying the relationship between growth and poverty reduction – beyond the proximate determinants discussed above. This is a very large area of investigation; three areas are briefly reviewed below with illustrations from the OPPG project. Two of these essentially involve modelling approaches.

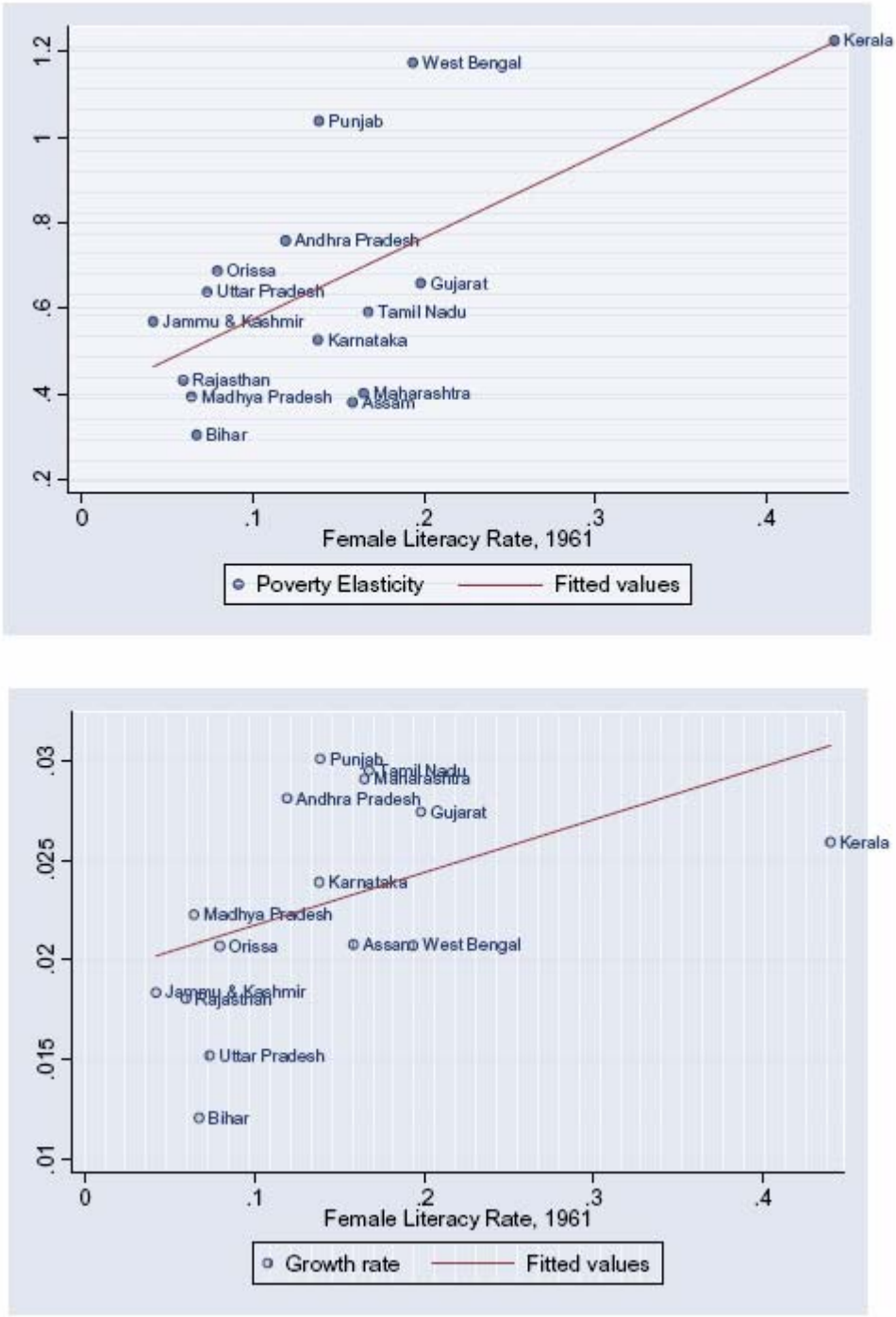
## *3.1 Intra-Country Regression Analysis to Identify Correlates of Growth*

Where data availability permits, intra-country panel data regression analysis of growth or changes in poverty can be a powerful tool for identifying important correlates of growth and poverty reduction. This is similar to cross-country panel growth regressions but applied within a country. Such methods can be applied at a household level where panel or longitudinal data is available (repeated observations of the same household). However, this method may be more a powerful technique where it can be applied for states, provinces or other geographic areas because many key determinants of growth may operate at that level (e.g. local institutional quality or infrastructure).

Among the OPPG case studies, such methods were applied in the case of Brazil (across 17 states and five time periods) and India (across 16 states with observations covering a period of 30 to 40 years). Such analysis can take various forms. Thus it is possible to use cross-state correlations to see how the growth elasticity of poverty, as well as growth rates, vary with the characteristics of a state, as done in the India OPPG case study. This is illustrated in Figure 10 for the case of initial period female literacy. Across states those with higher initial female literacy have higher growth elasticities of poverty reduction as well as higher growth rates, though with a lot of variation about the line of best fit. Of course these are straightforward correlations between two variables, and so do not control for other factors, but can still be informative as indicating patterns which require a more thorough analysis.

reflect relatively high levels of educational attendance to start with; this result will not necessarily apply to poorer countries with low levels of educational attendance to begin with.

**Figure 10: Plot of state level growth elasticity of poverty (upper panel) and average growth rate against initial female literacy**




*Source: India OPPG study.*

Panel multivariate regression models can then help provide this by modelling the effect of key explanatory variables on growth, or poverty reduction. Across states in India, in terms of gender variables, the regression analysis (Table 17) shows that, other things being equal, states that have a higher proportion of females working in general, and working specifically as managers, has a strong association growth (as does the state female literacy rate). This clearly highlights the importance of gender inequality in this case.

**Table 17: Regression relationship between state level growth rates and gender equality variables.**

| | Log total real output pc | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Model | OLS | OLS | IV | IV |
| Female-to-male managers | 1.43*** | | 5.13*** | |
| | (7.27) | | (2.92) | |
| Female-to-male workers | | 1.00*** | | 4.93*** |
| | | (3.45) | | (3.00) |
| Female literacy rate | 1.14*** | 0.93*** | 1.47** | -0.21 |
| | (3.05) | (2.44) | (2.36) | (0.22) |
| Male literacy rate | 0.14 | -0.19 | -0.67 | -1.18 |
| | (0.13) | (0.20) | (0.41) | (0.60) |
| Adjusted $R^2$ | 0.92 | 0.92 | 0.99 | 0.99 |
| Number of observations | 289 | 289 | 244 | 244 |

Source: Esteve-Volart (2004). Standard errors adjusted for clustering by state. Absolute t statistics in parentheses. *significant 10% level, **significant 5% level, ***significant 1% level. Female-to-male managers (workers) is the ratio of female managers to male managers (total workers). Total workers is the sum of managers, employees, self-employed workers, and family workers). All columns include the following controls: population growth, ratio of urban to rural population, ratio of manufacturing capital to labor, percentage of scheduled tribe and scheduled caste population, total workforce, political competition, voter turnout, and an election year dummy. All columns also include year and state fixed-effects. Two regression models are used: OLS (Ordinary Least Squares) and IV (Instrumental Variables). The IV results in columns (3)-(4) have been calculated using as instrument the number of prosecutions launched divided by the number of complaints received under the Maternity Benefit Act (1961). Sample is a panel of 16 main Indian states 1961-1991.

*Source: India OPPG study*

Similarly, the OPPG case study of Brazil looks at the relationship between state poverty reduction and state level growth, and factors that condition this. Thus, for example, the impact of growth on poverty reduction is found to be higher in states that are more urbanised.

Intra-country regression can be applied for a wide range of different indicators. But three points of caution are appropriate in the use of multivariate regression analysis. First there needs to be a sufficient number of observations so that the results to be statistically significant and meaningful. Second, the results should not be interpreted as implying causality. And third particular care is needed where the explanatory variables in the model may be endogenous or simultaneously determined with the variable being explained. For example slower population growth may enable faster growth rates to be achieved; but increased income levels associated with faster growth rates may in turn contribute to lower fertility rates.

### *3.2 Labour market analysis*

The labour market plays a key role in the links between growth, inequality and poverty reduction. Labour is a key asset for many of the poor, as the central means of earning their livelihood. The labour market has played a key role in many successful poverty reduction experiences. Migration has also frequently been an important factor in poverty reduction, including through remittances sent back by migrants. The labour market here needs to be interpreted sufficiently broadly to include not just working for an employer but also own account work in agriculture or non-farm businesses, the latter being the dominant form of employment in many low income countries.

**Table 18: Composition of poor and non poor working-age population in Burkina Faso by labour market status**

*Population over 15 years.*

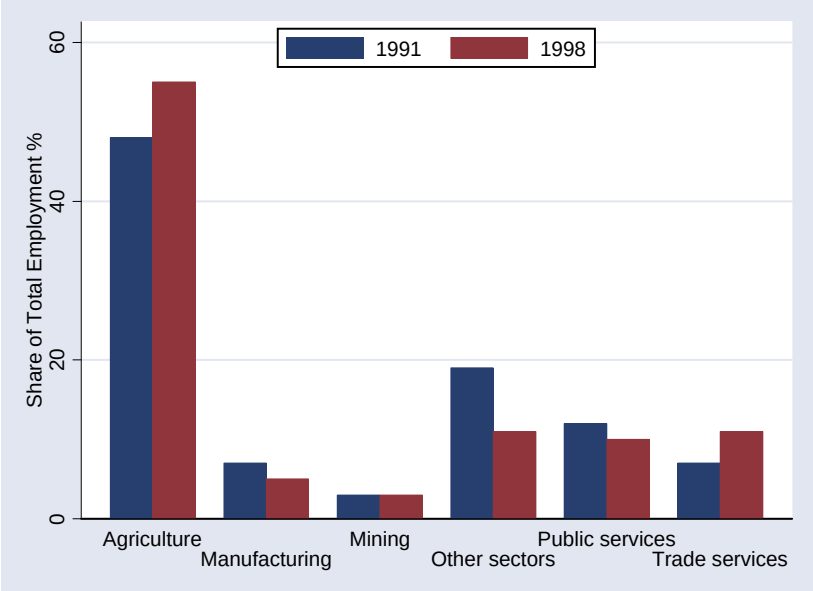
| Category | 1994 | | 2003 | |
|---|---|---|---|---|
| | Poor | Non-poor | Poor | Non-poor |
| Employed | 87.7% | 75.4% | 88.9% | 79.3% |
| Unemployed | 0.6% | 3.1% | 1.2% | 3.2% |
| Inactive | 11.8% | 21.5% | 10.0% | 17.6% |

*Source: Bernabé and Krstić (2005), from Table 3.*

A straightforward starting point is to examine the relationship between employment status and poverty, shown for example in Table 18 for Burkina Faso. Here it is clear that in both years the poor are somewhat more likely to be employed and less likely to be unemployed and "inactive" (outside the labour force) compared to the non-poor. However, it is important to bear in mind that this may be partly reflecting an urban-rural difference, combined with the fact that poverty levels are higher in rural areas. Also the importance of unemployment and its relationship to poverty may vary between countries as well as between rural and urban areas.

Another important starting point is to examine the relationship between sectoral employment trends and sectoral growth trends: are workers moving out of declining sectors and into expanding sectors? Unfortunately this is difficult to do in practice because of the poor quality – or simple absence – of employment data in many low and even middle-income countries. Sometimes survey data can be used to examine employment trends. In the case of Zambia, survey-based employment data (Figure 11) show an increase in employment in the agricultural sector and in trade services over a period of stagnant growth and increasing poverty (1991-98). This shift into agriculture appears to be associated with a reduction in employment in the public sector and in manufacturing.

**Figure 11: Sectoral distribution of employment in Zambia, 1991 and 1998**




*Source: based on Zambia OPPG Case Study.*

In Romania there was a significant shift of employment into the agricultural sector against a background of weak economic performance and a sharp decline in industrial employment. In both cases these movements in employment are likely to be associated with increases in poverty over the period, but of course poverty may have increased even more in the absence of these movements.

It is also of interest to look at growth in income or expenditure levels by occupational category. Table 19 shows such a disaggregation for Burkina Faso derived from the household surveys. Average expenditure levels of subsistence farmers and cotton farmers – the poorest groups by some way to begin with – increased modestly over this period, while the expenditures of the other three categories fell. This resulted in reduced inequality between these groups. These average data though provide no information on the distribution within these groups.

**Table 19: Disaggregation of growth rates in Burkina Faso by main occupation**

| Region | Real household expenditure per capita (index, mean=100) | | |
|---|---|---|---|
| | 1994 | 1998 | 2003 |
| Public | 351 | 306 | 314 |
| Private | 274 | 296 | 228 |
| Informal | 199 | 213 | 163 |
| Subsistence | 71 | 73 | 75 |
| Cotton | 75 | 86 | 85 |

*Source: OPPG Burkina Faso study.*

As already seen the composition of employment categories change over time as households move out of one category into another. This can contribute to the changes in average expenditure levels such as shown in Table 19. The Ravallion-Huppi decomposition discussed above (section 2.2) can be informative in separating out the changes due to increasing income or expenditure levels within groups from the effects due to movements between groups, as seen in the example in Table 9 above. This enables identification of the extent to which different occupational categories were able to participate in growth.

Changes in expenditure levels within employment categories are most likely to reflect changes in earnings in those activities; hence it is of value to look at earnings data directly where such data are available. Frequently earnings data are only available for wage employees, being much more difficult to compute for those working for themselves. Table 20 presents a summary of growth of wage earnings in different sectors in Vietnam. The fastest earnings growth is observed in the formal services sector and the least fast in the informal services sector. The fact that monthly earnings in the formal services sector are growing faster than hourly earnings implies that hours worked have increased in this sector.

**Table 20: Vietnam mean real monthly (net) earnings and change in mean real monthly and hourly (net) earnings for all wage employed 1993-98, annual averages *(thousand Dong)***

| | 1993 '000 Dong | 1998 '000 Dong | % change Monthly Earnings | % change Hourly Earnings |
|---|---|---|---|---|
| **Total** | **335.1** | **548.7** | **10.4** | **8.3** |
| Formal industry | 377.5 | 619.9 | 10.4 | 10.9 |
| Formal services | 230.3 | 594.1 | 20.9 | 13.8 |
| Informal industry | 378.1 | 609.6 | 10.0 | 9.2 |
| Informal services | 343.1 | 483.0 | 7.1 | 1.1 |

*Source: Bernabé and Krstić (2005), from Table 9.*

Finally, where longitudinal or panel data are available, this can be very valuable in examining labour market transitions for individuals, not just for groups of workers. Among OPPG case study countries, panel data with quite good quality labour market information was available for Vietnam. Table 21 presents a disaggregation of those escaping poverty between 1993 and 1998 (the time period of the panel data) according to the sectors in which they worked initially (1993, in the rows) and finally (1998, in the columns). 64.3% of those escaping poverty worked in the agricultural sector in both years, but nearly 14% of those that worked in agriculture in 1993 and escaped poverty had changed occupation by 1998, mostly moving into the informal industry or services sectors.

**Table 21: Vietnam Percentage of employed that moved out of poverty by employment status and sector (1993-1998)** *(population over 15yrs)*

| 1993 | 1998 | | | | | |
|---|---|---|---|---|---|---|
| | Agriculture | Industry formal | Services formal | Industry informal | Services informal | Total |
| Agriculture | 64.3% | 0.6% | 0.9% | 6.4% | 6.0% | 78.2% |
| Industry formal | 1.0% | 0.2% | 0.1% | 1.0% | 0.6% | 2.8% |
| Services formal | 1.0% | 0.1% | 0.6% | 0.3% | 2.4% | 4.2% |
| Industry informal | 3.0% | 0.2% | 0.0% | 3.8% | 1.3% | 8.4% |
| Services informal | 2.2% | 0.1% | 0.2% | 0.8% | 3.2% | 6.5% |
| **Total** | **71.4%** | **1.1%** | **1.8%** | **12.2%** | **13.5%** | **100.0%** |

Source: *Bernabé and Krstić (2005).*

### *3.3 CGE modelling and related techniques*

Ultimately policymakers are concerned with identifying the likely impact that specific current and proposed policies have on growth, poverty and distribution. In practice this impact can be very difficult to identify and quantify, especially when many factors can change simultaneously. One approach to addressing this is through modelling.

Computable general equilibrium (CGE) modelling is one such technique, which seeks to simulate the impact of policy changes on different actors within an economy. It typically has a focus on distributional change. The model itself is based on a representation of the behaviour of key actors in the economy, including consumers, producers, government and the rest of the world, and allows the interactions between these agents through different market and non-market channels. Simulations using the model enable linkages to be made between macro or sectoral policy changes, and outcomes at a more micro level. While many CGE models are static in nature, for looking at growth related issues this needs to be extended to a dynamic model, in particular incorporating the modelling of investment.

In the past CGE models have been constructed at quite a high level of aggregation of household categories – the key sector for looking at detailed poverty impacts. However, recent work has built stronger links between CGE models and household survey data to build a micro-simulation model which enables poverty and distributional effects to be considered in some detail (Bourguignon, Robillard and Robinson, 2003). Where CGE models were applied in the OPPG case studies, such micro simulations were conducted.

Construction of a CGE model, especially one that captures dynamics, is a significant undertaking in its own right. The results also depend highly on the assumptions underlying the model (e.g. about market clearing). But where available, it can be one useful technique to simulate expected future growth and poverty trends. For example, in the Zambia OPPG case study, the authors consider a number of different future policy scenarios, and simulate the

impacts on sectoral growth of these different scenarios using a CGE model, complemented by a micro-simulation model to look at poverty and distributional effects in some detail.

**Table 22: Simulated future sectoral growth rates for Zambia under different scenarios.**

| | Contribution to average annual GDP growth rate (%) | | | | |
|---|---|---|---|---|---|
| | 1999-01 *renewed growth*[1] | 2001-15 *current growth path* | 2001-15 *copper-led growth* | 2001-15 *agriculture-led growth* | 2001-15 *non-agric-led growth* |
| GDP at factor cost | 3.7 | 4.0 | 5.0 | 5.0 | 5.0 |
| Physical capital | 0.2 | 1.2 | 2.2 | 1.4 | 1.4 |
| Human capital | 2.0 | 0.8 | 0.8 | 0.8 | 0.8 |
| Total factor productivity | 1.5 | 2.0 | 2.0 | 2.8 | 2.8 |
| GDP at factor cost | 3.7 | 4.0 | 5.0 | 5.0 | 5.0 |
| Agriculture | 0.5 | 1.2 | 0.7 | 2.3 | 1.0 |
| Mining | 0.2 | 0.2 | 1.2 | 0.1 | 0.1 |
| Manufacturing | 0.4 | 0.8 | 0.6 | 0.7 | 0.8 |
| Services | 2.6 | 1.8 | 2.4 | 1.9 | 3.0 |

Source: Zambia CGE-micro model results.
1. The growth decomposition for the *renewed growth* period during 1999-2001 (see Table 2.1).

*Source: OPPG Zambia case study.*

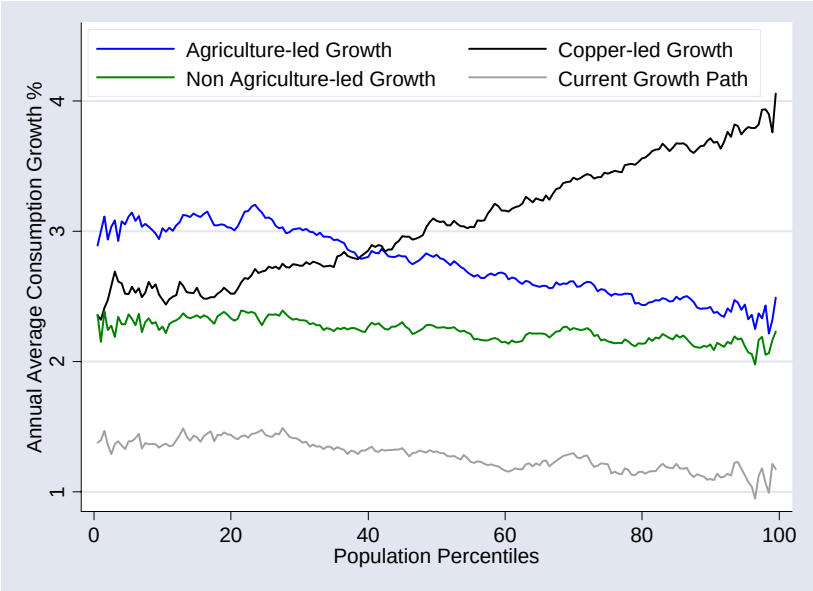
Different scenarios are distinguished depending on the lead sector for growth, and estimated future levels and patterns of growth are identified (Table 22). This then forms the basis for simulating future poverty trends as shown in Table 23. This reports that the current growth path is estimated to produce limited reduction in the headcount measure of poverty by 2015. The best scenarios to reduce poverty more quickly are the copper-led growth path (especially for urban poverty) and the agricultural-led growth path (especially for rural poverty). The authors are also able to simulate estimated future GICs for the different scenarios (Figure 12), showing for example that the copper-led scenario is likely to be one accompanied by increasing inequality.

**Table 23: Estimated future poverty levels from different policy scenarios in Zambia**

| | Initial poverty in 2001[1] | Final poverty rate in 2015 | | | |
|---|---|---|---|---|---|
| | | *current growth path* | *copper-led growth* | *agriculture-led growth* | *non-agric-led growth* |
| Headcount (P0) | 75.4 | 68.3 | 56.6 | 59.4 | 63.9 |
| Rural | 85.6 | 78.4 | 74.7 | 68.1 | 76.4 |
| Small-scale | 86.4 | 79.0 | 76.5 | 68.1 | 77.2 |
| Medium-scale | 80.3 | 69.5 | 63.3 | 56.3 | 65.2 |
| Urban | 58.3 | 51.4 | 26.5 | 45.0 | 42.9 |
| Squared poverty gap (P2) | 25.6 | 20.4 | 15.9 | 15.1 | 18.3 |
| Rural | 33.3 | 26.5 | 23.0 | 19.2 | 24.7 |
| Small-scale | 33.7 | 26.6 | 23.7 | 18.7 | 24.9 |
| Medium-scale | 27.7 | 21.1 | 18.6 | 15.5 | 19.6 |
| Urban | 12.6 | 10.2 | 4.0 | 8.2 | 7.7 |

*Source: Zambia OPPG study*

**Figure 12: Growth incidence curves for different future growth paths in Zambia**




*Source: Zambia OPPG study*

The estimates for future growth and distributional changes (including poverty reduction) need to be considered with caution, especially over this time horizon. But these estimates are still valuable. For example, they highlight the relatively modest poverty reduction that is likely to occur in the current scenario in Zambia. In addition they help to identify the relative impact of different scenarios and their anticipated distributional effects. They also form a starting point for a discussion about why different scenarios produce divergent results.

CGE modelling (also used in the Bolivia case study) is only one modelling approach for trying to simulate the likely growth and poverty impact of different future policy scenarios. A different approach used in the Burkina Faso and Romania case studies is (variants of) the Poverty Analysis Macroeconomic Simulator (PAMS) model developed by the World Bank for looking at the poverty impact of macroeconomic policy. The modelling is based on interactions of three core modules: a macro module (looking at sectoral patterns of growth), a labour market module (distinguishing different groups and focusing on employment and earnings) and a poverty module (linking labour market outcomes to income and expenditures for different groups of households and individuals). Simulations can be conducted in an analogous manner to the CGE model above, and this provides an alternative method of assessing the likely distributional pattern of different growth scenarios.

## References (other than OPPG case studies)


Bernabé, Sabine and Gorana Krstić (2005), "Labor Productivity and Access to Markets Matter for Pro-Poor Growth. The 1990s in Burkina Faso and Vietnam", OPPG Synthesis Paper, draft version, 3 May 2005.

Bourguignon, François, Anne-Sophie Robilliard, Sherman Robinson (2003), "Representative versus real households in the macro-economic modeling of inequality", Working paper DT 2003-10, DIAL.

Coulombe, Harold and Andrew McKay (2003), "The Evolution of Poverty and Inequality in Ghana over the 1990s: A Study Based On The Ghana Living Standards Surveys", paper prepared for World Bank "Poverty Dynamics in Africa project, final draft, December.

Datt, Gaurav and Martin Ravallion, 1992, "Growth and Redistribution Components of Changes in Poverty: A Decomposition with Application to Brazil and India", *Journal of Development Economics*, 38: 275-295.

DFID (2004), "What is Pro-Poor Growth and Why Do We Need to Know?", Pro-Poor Growth Briefing Note 1, February.

Kakwani, Nanak and Ernesto M. Pernia, "What is Pro-poor Growth?", *Asian Development Review*, vol. 18, no. 1, pp. 1-16.

Kakwani, Nanak, Shahidur Khandker and Hyun Hwa Son, "Pro-poor growth: concepts and measurements with country case studies", International Poverty Centre (IPC) Working Paper No. 1. Brazil: IPC.IPC Working Paper 1, August 2004.

Klasen, Stephan (2004), "Economic Growth And Poverty Reduction: Measurement And Policy Issues", paper prepared for DAC Network on Poverty Reduction, OECD, Paris, November.

McKay, Andrew (2002), "Defining and Measuring Inequality", DFID-ERC Briefing Paper on Inequality No. 1. Available at: http://www.odi.org.uk/PPPG/publications/briefings/inequality_briefings/01.pdf

Ravallion, Martin (2004), "Pro-poor growth: A primer", Policy Research Working Paper WPS 3242, World bank, Washington D.C.

Ravallion, Martin and Monika Huppi (1991), "Measuring Changes in Poverty: A Methodological Case Study of Indonesia during an Adjustment Period", *World Bank Economic Review*, vol. 5(1), pages 57-82.

Son, Hyun Hwa (2004), "A note on pro-poor growth", *Economics Letters*, Volume 82, Issue 3, pp. 307-314.