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ECONOMIC GROWTH AND POVERTY REDUCTION: MEASUREMENT AND POLICY ISSUES

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Attached is a preliminary draft of a note synthesising the policy debates surrounding the relationship between economic growth and poverty reduction. As requested by the Povnet at its 30-31 March 2004 meeting, the note looks at both income and non-income dimensions of poverty as well as the roles of private sector development, agriculture and infrastructure in supporting a pro-poor growth policy agenda.

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ECONOMIC GROWTH AND POVERTY REDUCTION: MEASUREMENT AND POLICY ISSUES

EXECUTIVE SUMMARY

This short paper examines three issues in the policy debates surrounding pro-poor growth. First, it examines the debate about the measurement of pro-poor growth, where there have been discussions about relative or absolute definitions of pro-poor growth. After clarifying these terms, I argue that it would be best to use a relative definition to answer the question ‘Was growth pro-poor or not?’ while using an absolute definition for measuring the ‘extent’ of pro-poor growth. Maximizing that extent could then become a useful policy target and having growth pro-poor in the relative sense will usually help maximize that target.

Second, the paper argues that the pro-poor growth debate has unfortunately focused entirely on the income dimension of poverty and thus has again narrowed policy debates about poverty. This is not necessary though as the useful methods developed in that literature, including the growth incidence curve and the Ravallion-Chen measure of pro-poor growth, can easily be applied to non-income dimensions of poverty. The second aim of the paper is therefore to illustrate the application of these instruments to non-income dimensions of well-being in Bolivia. It shows important new insights about differences between the developments of income and non-income dimensions of well-being along different points in the distribution. One surprising finding, which may not be true in other country contexts, is that well-being growth has been more pro-poor in the non-income dimensions than in the income dimension.

Third, this paper discusses the role of agriculture, private sector development, and infrastructure in supporting a pro-poor growth policy agenda. It emphasizes that all three issues should receive renewed attention in a pro-poor growth agenda as all three are focusing on the poor producer as the subject of any pro-poor growth strategy who needs an enabling environment for income generation. The renewed emphasis on these three issues should not, however, be quite in the ways they have been thought of in the past. Regarding agriculture, the focus should be on productivity improvements (rather than merely price reforms). Private sector development should encompass producers large, small, and micro and infrastructure development should be focused on removing demand-identified bottlenecks to productivity improvements and reduced transaction costs (rather than be supply driven activities).

1. Introduction

With the MDGs having moved to the center stage of development policy debates, reducing poverty and deprivation has become the central challenge for policy-makers. Recent findings in policy research have shown that the pace of poverty reduction will depend both on the rate of average income growth, the initial level of inequality, and changes in the level of inequality (e.g. World Bank, 2000, Bourguignon, 2003, Klasen, 2003). In addition, there might be linkages between initial (income or asset) inequality and growth where the balance of evidence seems to suggest that high initial inequality is harmful for overall economic growth, and thus for poverty reduction, at least in environments of very high (income or asset) inequality (e.g. World Bank 2000, Deininger and Squire 1998; Klasen, 2003; Ravallion and Datt, 2000). Similar results also appear to hold for gender inequality, particularly gender inequality in education (Klasen, 2002; Knowles, et al. 2002, World Bank 2001).

As a result, policy-makers have been calling for 'pro-poor growth' as a way to accelerate poverty reduction. Following from the above, ideally such pro-poor growth would combine high average growth with inequality reduction (pertaining to income, asset, and gender inequality) to have the maximum impact on poverty reduction. While everyone would agree with this characterization as the first-best option, there is some debate whether and to what extent growth is 'pro poor' if it is accompanied by only one of the two conditions, high growth or inequality reduction. I will comment on this issue below which is a first aim of this note.

A somewhat unfortunate (and presumably unintended) side-effect of this debate about pro poor growth has been that it is entirely focused on the income dimension of poverty, and thus exclusively concentrated on MDG1. While one can hope that achieving the income goal will help achieve the other goals, this is far from guaranteed. Moreover non-income dimensions of poverty (such as poor health and education) are intrinsically valuable as development goals (thus their status as separate MDGs, see also Sen 1998, Klasen 2000). Finally, progress on non-income dimensions might also help achieve MDG1. Fortunately, the tool box developed to assess pro-poor growth is not exclusively applicable to income poverty but can be extended to examine education poverty, health poverty, and the like. A second aim of the paper will therefore be to illustrate the use of the pro poor growth instrumentarium for non-income dimensions of poverty. In particular, we will apply this instrumentarium to analyzing pro-poor growth in the dimensions

of education, health, nutrition, and a composite indicator of well-being in Bolivia between 1989 and 1999 and compare it to pro-poor growth in the income dimension.

Thirdly, as the ‘pro-poor growth’ debate is ultimately about economic policy (for governments and for donors to support these governments), the last part of the paper will examine three particular areas of policy which are deemed to be central to promoting pro-poor growth. They are agricultural development, infrastructure, and private sector development, three policy areas which have received increased attention in recent years.

2. Measuring Pro Poor Growth (income dimension)

While there are a number of definitions that have been proposed for pro-poor growth (e.g. Ravallion and Chen, 2003; Son, 2004; Kakwani and Pernia, 2003; Hanmer and Booth, 2001; McCulloch and Baulch, 1999; White and Anderson 2000, Klasen 2003; Duclos and Wodon, 2004) and they differ along several dimensions (as discussed in detail in Klasen 2003 and Duclos and Wodon, 2004), in the policy community this appears to have been boiled down to an ‘absolute’ versus a ‘relative’ camp (e.g. OECD 2004).

Relative growth

The ‘relative’ camp is easier to characterize as it suggests that growth can only be called pro-poor if the growth rate of income of the poor (suitably aggregated) exceeds the average income growth rate, i.e. growth has had a relative bias to the poor in the sense that it increased their incomes by more.¹ The main justification for this type of approach is that, biasing growth in this relative sense and holding average growth constant, will lead to faster poverty reduction. As mentioned for example by Datt and Ravallion on India (2002), had India succeeded in biasing its relatively high growth of the 1990s more towards the poor (or at least the states where the poor are concentrated), poverty reduction would have been much faster. One could, of course, also defend such an approach by arguing that growth that is pro-poor in this sense means that inequality must have been reduced (at least inequality between the poor and the non-poor), and

1 . There are complications here as well such as the question whether the growth of *every* poor (or every poor quantile) must have exceeded average growth, or whether this is only true in *average* (see Duclos and Wodon, 2004 for a discussion and proposed axioms to resolve it)

this might be of value in its own right as many ethical and empirical approaches to welfare measurement suggest (e.g. Grün and Klasen, 2003).²

Absolute growth

As for the ‘absolute’ camp, there are two different kinds of ‘absolutes’:

a) The first holds that growth is pro-poor only if the absolute income increases of the poor are larger than those on average (or those of the rich), which I call ‘strong absolute’ pro poor growth. As shown empirically by White and Anderson (2000), this would be a rather difficult requirement to meet as it would mean that the growth rate of the poor would have to be larger by a factor calculated as the initial income ratio of the non-poor to the poor. Thus growth must be much more biased in favor of the poor than proposed by the ‘relative’ definition. While in practice hard to achieve, it has recently gained some proponents who argue that we too often think of inequality in relative terms and disregard the fact that absolute inequality might be widening even if relative inequality is shrinking (e.g. Atkinson and Brandolini, 2004; Duclos and Wodon, 2004; Klasen 2003). As I will discuss below in some more detail, this absolute approach may be particularly suitable for assessing pro-poor growth in the non-income dimension. For example, while we might agree that a 5% growth for the poor is ‘pro-poor’ if it exceeds the average rate of 4% even though the latter is much larger in absolute magnitudes, translating this to education improvements sounds quite different. For example, it would be hard to argue that a 20% increase in years of schooling was pro-poor (because the increase of the non-poor was, say, only 10%) if it means that the education of the poor expanded by just ¼ year and that of non-poor by a year.

b) The other ‘absolute’ that has been the focus of much policy discussion goes in an entirely different direction and suggests that we can speak of pro-poor growth if the growth rate of the poor (suitably aggregated) was greater than 0 (e.g. OECD 2004). I will call this ‘weak absolute’ pro-poor growth. The main argument in support of this is to hold that high income growth of the poor is all that matters, not how that growth compares to the growth of the non-poor. The empirical argument used is that high but inequality-increasing growth in a country such as China over the past 10 years should be viewed as preferable to low, but equitable growth in a

2. Clear members of this camp are the contributions by Kakwani and Pernia (2000), McCulloch and Baulch (1999), and both the suggestions by Klasen (2003) as well as by Ravallion and Chen (2003) can be interpreted in this way as well if one compares their proposed rates of pro-poor growth with the average growth rate.

country such as Ghana, if the absolute income increases of the poor were larger in the former than the latter. Taking this argument to the extreme, however, could be quite problematic. Arguing that any, even miniscule, income growth of the poor is ‘pro-poor growth,’ even it was much lower than average income growth (and thus distribution worsened) seems to hark back to old notions of ‘trickling down’ growth.³

Trade offs between growth and distribution

The question ultimately underlying this debate is whether there is a trade-off between growth and inequality reduction. If one firmly believes that there are ways to reduce inequality without compromising average income growth (or maybe even enhancing it), then it is perfectly plausible to say that, for example, China could have had higher poverty reduction in the 1990s if it had pursued policies to prevent the rise in inequality without compromising its overall growth rate. This would therefore argue for a relative definition. If one, however, firmly believes that reducing inequality will invariably have a negative growth effect, then the thought experiment underlying the relative definition (i.e. if growth had been accompanied by inequality reduction, there would have been more poverty reduction) does not make any sense as inequality reduction would have led to less growth (and thus less poverty reduction). Unfortunately, we do not have good empirical evidence on this important question. We seem to know that high initial inequality is bad for subsequent growth, but know little about whether *changes* in inequality will improve economic growth. This is due to the fact that there have been very few significant changes in inequality over the past decades so that this question is hard to sort out (e.g. see Forbes 2000, Lundberg and Squire, 2001; Klasen, 2003, Banerjee and Duflo 2003).⁴

There really is no need to choose between this ‘weak absolute’ and the relative version of the definition but is instead useful to combine the two as they seem to be answers to two different questions. If the question is - has growth been pro-poor, yes or no? - it appears plausible to stick to the relative definition as one would presume pro-poor involves some bias in favor of the poor. And it gives us a sense of how much the opportunities afforded by a given rate of growth have been used to reduce poverty. If the question is, however, - how large was the rate of income

3. If focusing on the level of pro poor growth, the proposal by Ravallion and Chen (2003) as well as that of Klasen (2003) would fit into that camp.

4. A recently completed country case study of Bolivia as part of the OPPG project suggests that trade-offs exist for certain policies while other policies improve growth and distribution. See Klasen et al. (2004).

growth of the poor? - then some aggregation of the income-growth rate of the poor, such as the one inherent in the Ravallion and Chen measure would give the answer. It would then tell us how much the poor were benefiting from whatever growth happened to be in a country and maximizing that rate could be a useful policy target.⁵ Thus one could usefully make a distinction between the existence of pro poor growth measured in the relative sense, and the rate of poverty-relevant growth using an absolute measure. As shown below, one can nicely illustrate this intuition by examining the shape and position of growth incidence curves for the income and non-income dimensions.

3. Measuring Pro Poor Growth in a Non-Income Dimension

So far, the discussion (including the entire literature on pro-poor growth) has focused exclusively on the income dimension. This is highly lamentable as this debate has therefore effectively narrowed the debate to the income dimension of poverty and MDG1, thereby neglecting all the progress made in taking a broader view of poverty which considers the non-income dimensions as well (e.g. World Bank 2000, Sen 1998). For example, all the OPPG case studies were explicitly charged to focus exclusively on pro-poor growth in the income dimension and all other non-income dimensions were only of interest to the extent they relate to that income poverty focus. This is quite contrary also to the spirit of the MDGs which consider non-income dimensions of well-being (particularly education, health, and gender equity) as being of equal importance to income poverty.

There are three further reasons to explore measuring pro-poor growth in the non-income dimension:

- One great methodological advantage of the pro-poor growth debate has been the use of the growth incidence curve which plots the income growth by centile of the population and thus allows policy-makers to track changes along the entire income distribution. In contrast, progress towards non-income goals are usually monitored by looking at mean achievement levels (e.g. mortality or enrolment rates) and neglect this important dimension of examining the distribution of these changes in achievement. Extending the methods from the pro-poor growth literature to non-income dimensions thus offers new insights for policy-makers concerned about tracking the MDGs.

5. If one chooses the approach, as DFID apparently has done, to take maximizing the rate of pro-poor growth as measured by Ravallion and Chen as the policy goal, then one can possibly by-pass the question of whether growth was pro-poor or not and thus would not have to come to the questionable conclusion of the 'weak absolute' approach that would call any income of the growth of the poor 'pro-poor'.

- It allows careful consideration of the relationship between income and non-income dimensions of poverty along the entire distribution. Thus we can learn whether achieving income poverty and health poverty goals are complementary along the entire distribution, or whether one needs to tackle the two separately at some points in the distribution (e.g. the very poor).
- The income poverty measure is particularly weak in measuring gender differentials as it is usually based on household incomes and says little about the distribution of that income (e.g. Klasen, 2004). Looking at the non-income measures of well-being allows policy-makers to track progress by gender along the entire distribution which is impossible using income indicators. Thus it is well worth exploring to what extent the toolbox developed for pro-poor growth can be applied to non-income dimensions of poverty.

Fortunately, it is perfectly possible to apply the pro-poor growth tool box to non-income measures of poverty. Here we will illustrate ways of (Ravallion and Chen 2003) applying it for purely illustrative purposes to non-income indicators in Bolivia from 1989 to 1999, where we happen to have the required data at hand.⁶ The purpose of this section, which is based on an input paper by Grosse and Harttgen (2004) specifically written for this study, is to examine the feasibility of doing so and seeing whether this yields new insights into the performance of non-income indicators as well as their linkage to income measures.

As with the income measures, we use the growth incidence curve (GIC) as the basic building bloc for the analysis and then calculate pro-poor growth rates using the Ravallion and Chen (2003) approach. We consider growth incidence curves for education, child survival, child vaccination, nutrition, and a composite welfare index made up of these components. The data we use are from the 1989 and 1998 Demographic and Health Survey for Bolivia. As income data are not available in that survey, they have been imputed using methods described in detail in Klasen et al. (2004).⁷ We will always present two kinds of GICs, which we call *unconditional and conditional GICs*, and also calculate the respective pro poor growth rates. In the *unconditional* indicator, we will line up centiles according to non-income indicator in question, e.g. from the

6. As the OPPG case studies were entirely focused on income poverty, what we present here complements our analysis done in that process.

7. The imputation is based on an adaptation of the poverty mapping methodology used by the World Bank. For details, refer to Klasen et al. (2004). The results here are not entirely in agreement with the results in Klasen et al. (2004) as there we used another survey for the final year. But the analysis here is purely for illustrative purposes and not meant to focus particularly on Bolivia. The data base used here has the advantage of containing detailed non-income data. It has the disadvantage that this data is only available for selected members of the household. For example, education is not available for children living in the household, and nutrition, immunization, and survival information is only available for children

education poor to the education rich, and then plot the growth of the non-income indicator on the y-axis. In the *conditional GIC*, we will line up centiles according to their per capita income and but also plot the growth of the non-income indicator on the y-axis to see how their non-income growth compares to their income growth. A number of problems and issues need to be confronted when designing growth incidence curves in these non-income dimensions. (These are considered further in the Annex)

The results of the illustrative analysis are shown in Tables 1-5 and the associated Growth Incidence Curves are shown in 1-12 attached at the end of the paper. Tables 1 and 2 show descriptive statistics for the income and non-income indicators by decile in Bolivia where the deciles are sorted according to the relevant non-income indicator in Table 1 and the income indicator in Table 2. These points are worth noting.

- The disparity in the income indicator is larger than all non-income indicators. While the ratio of the 10th to the first decile in incomes is nearly 40:1, it is about 30:1 for the education indicators, only 4:1 for the nutrition indicator, and much less than 2 for the mortality indicator.⁸ This illustrates already some of the points made in the Annex.
- In all income and non-income indicators, there has been an improvement in all deciles. In the education and health indicators, the improvements are particularly noticeable at the lower end, suggesting that improvements were percolating down to these groups. This last point need not be true in other places where overall education and health achievements are much lower and improvements might be larger for richer groups. For example, it is quite likely that the situation in some African countries might look much worse where particularly poorer sections of the population might have suffered the most from overall declining education opportunities and health care access.⁹ Doing such an analysis for a range of African countries would therefore be most interesting to see how the shape of the non-income GICs differ from the ones presented here.
- Table 2 suggests that there is a considerable differential in non-income indicators. When households are sorted by the income indicator, the disparity is much smaller suggesting that some households that are income poor are not doing so badly on some non-income dimensions. In fact, the differential in the health and nutrition indicators is not very large at all anymore while it is still substantial in the education measures (see also Klasen, 2000).

8. Given that the poorest deciles sorted by vaccination had 0 vaccinations in 1989, the ratio is not defined.

9. Also, one would imagine that in a country with poor overall education achievements, advances in education initially favor the rich and then trickle down to other groups. As Bolivia happens to be more advanced here, we are in a stage where the poor are catching up to the rich.

Table 3 shows Gini-coefficients and correlations between the income and the non-income indicators. Following from the above, the Gini-coefficients in non-income achievements are considerably smaller than those of the income indicator. In the case of mortality, they are very small due to the low incidence of mortality concentrated in some households. The Ginis have also decreased significantly in the education, vaccination, and nutrition indicators, while the improvement is much smaller in the income indicator. While there are positive and significant correlations between income and non-income indicators, they are smallest for the health components, suggesting the randomness of mortality outcomes, while they are largest for education and the composite welfare indices (see also Klasen, 2000).

Figure 1 shows a growth incidence curve for the income indicator (GIC) and an unconditional and a (original and smoothed) conditional educational growth incidence curve (NIGIC). Figure 2 shows the same, but now plotting absolute increases rather than growth rates. In line with the discussions of section 1, the curves can be interpreted as follows. If they are downward sloping, they indicate pro-poor growth in the relative dimension, i.e. growth of the poor exceeded those of the non-poor. If the curve is downward-sloping even when absolute improvements (rather than rates) are shown (Figure 2), then growth was absolutely larger for the poor than the non-poor and thus meets the ‘strong absolute’ criterion of above. If they are above 0 among the poor (in either Figure), the growth could be called pro-poor according to the ‘weak absolute’ definition discussed above.

The following items are of note. Using the income indicator, there appears to have been considerable pro-poor growth using both the relative and the ‘weak absolute’ criterion. When switching to the education indicator, growth was also strongly pro-poor using the relative and the ‘weak absolute’ criterion. The educational growth rates of the education poor was very high indeed, but as discussed above, this is largely related to the low base from which they are growing from. This point is brought out nicely by comparing the curves showing absolute and percentage increases in education in Figure 2. The absolute educational growth incidence curve is essentially flat, suggesting that the education-poor have not been able to expand their education by more than the rich, in fact by slightly less. So education growth has not been pro-poor in this ‘strong absolute’ sense. The same is true for income growth. Figure 2 shows that the income GIC is upward sloping suggesting that the absolute increments of incomes of the rich were much larger than those of the poor so that growth was pro-rich in the ‘strong absolute’ sense. Figure 1 also

shows the educational growth incidence curve when households are sorted by income. That curve is much more volatile, but still shows pro-poor educational growth, albeit at a lower level, in both the relative and the 'weak absolute' sense. It thus appears that the income poor did experience faster educational growth rates. It is likely that this situation is specific to Bolivia and need not apply elsewhere where the conditional GIC could look very different.

Figures 3 and 4 examine the same curves now applied to vaccination rates. Also here we see strongly pro-poor growth in the weak absolute and the relative sense. Figure 4 shows that the absolute growth of vaccinations was highest in deciles 1-3, leaving out those with the poorest vaccination record who still go without any vaccination. Figure 3 also shows the problem described above. The vaccination growth curve is flat for the last 4 deciles as the children were fully vaccinated already in 1989. Figures 5 and 6 examine survival. Here the poorest percentile appears to have suffered from worse survival prospects (which might be due to measurement error), while the other poor have improved their survival. For the 9 top deciles, that curve is flat as there was 100% survival in the first and second period. The conditional GIC shows no real pattern suggesting that mortality changes were largely unrelated to the position in the income distribution.

Figures 7 and 8 examine the stunting indicator. Also here, reductions in stunting appear to have been pro-poor in a weak absolute and relative sense, but this is much less clear when households are sorted by income. But stunting improvements have also been absolutely pro-poor in the strong sense as shown in Figure 6; the improvements in the Z-score were larger for the poor than the non-poor. But as discussed above, this result must be treated with some caution as the potential (and utility) of increasing height among the already well-nourished is limited.

Figures 9-12 examine pro poor growth using the composite indices using the small and the large sample. They basically summarize the results from the on-going discussion. In particular, they suggest that composite measures of non-income well-being show pro-poor growth in the relative but also the strong absolute sense while this was not the case with incomes where the absolute increments to the rich were much larger than those of the poor (see GIC in Figures 10 and 12).

Based on the graphs, Table 5 and 6 calculate the rates of pro-poor growth using the Ravallion and Chen (2003) approach for the various income and non-income indicators. Table 5 shows that growth in income and non-income dimensions has been pro-poor in a relative sense as

the rates of pro-poor growth are larger than the mean growth rates (with the exception of vaccination rates); and it has been in a weak absolute sense as the rates are all above 0. When households are sorted by incomes (conditional), pro-poor growth has been much smaller as some of the non-income improvements affected nearly as much those with higher incomes as those with lower ones. Table 6 calculates absolute pro-poor growth. In line with the graphs, the results show that educational growth was not particularly pro-poor in the strong absolute sense and anti-poor in some indicators. This is not true for the health, vaccination, stunting indicator, and composite welfare indicators where it was generally pro-poor also in an absolute sense.

Lessons learned

What have we learned from the preceding discussion of extending the pro-poor growth concept to non-income indicators? Four lessons are particularly worth noting.

- In principle it is possible and worthwhile to extend the analysis to non-income dimensions. It shifts the focus from average achievements in these dimensions to the distribution of improvements which is certainly important. Extending this framework has the additional advantage of explicitly examining how improvements in income and non-income dimensions are related at different points of the income distribution which is of importance as a tool for monitoring whether policies to improve poverty in non-income dimensions are reaching the income poor. In contrast to the income growth analysis, the non-income growth analysis can also more easily be extended to examine gender differentials. While it is exceedingly difficult to say much about gender and income poverty (Klasen, 2004), it is perfectly feasible to analyze non-income growth incidence curves for education and health by gender and see how gender differentials are playing out at different points of the distribution of these non-income indicators.
- There are some conceptual and practical difficulties with measuring pro-poor growth in non-income dimensions, particularly regarding the health and nutrition indicators.
- The non-income indicators lend some more support to considering not only growth rates in achievements but also absolute improvements. Thus all three senses of pro-poor growth, the weak and strong absolute as well as the relative sense, generate interesting insights about changes in the distribution of non-income well-being.
- Growth tends to be more pro-poor in all three ways when non-income indicators are used, while it is virtually always anti-poor when the strong absolute criterion is applied. Whether this is true in other contexts would be interesting to analyze.

4. Policies and Pro-Poor Growth: Focus on Agriculture, Infrastructure, and Private Sector Development

The pro-poor growth debate is ultimately about policy measures that can be developed to accelerate poverty reduction in developing countries. This paper will therefore move to this topic and consider three areas of policy that have undergone some reassessment in light of the findings from the research on pro-poor growth.

Before turning to them, it is useful to briefly summarize some of the findings from the pro-poor growth literature as it pertains to policy. A first point of note is that there are direct and indirect ways to promote pro-poor growth (see Klasen 2003). The former need to increase the incomes of the poor where they are and using the factors they possess, while the latter can happen through redistributive tax and transfer policies of the state. Where feasible, the former approach is clearly preferable to the latter, as it empowers the poor, is more sustainable, and not contingent on the domestic political economy or the weaknesses of public sector capacities.

In Klasen (2003) a matrix of policy and process issues were presented to identify the areas of consensus as well as those for further study or unresolved disagreements. These two tables are reproduced as Tables A and B below. Rather than going through the entire matrix, we will focus on the three areas agriculture, private sector development, and infrastructure. While the three issues are, in many ways, quite distinct (agriculture is an economic sector, private sector development is a particular approach to generating incomes, and infrastructure development is an important means of supporting production), thinking about the three together is useful in several ways. In particular, focusing on these three issues in a pro-poor growth agenda reveals an emphasis on taking the poor producer as the focus of efforts and thinking through the constraints this poor producer has to face. In most contexts (particularly in Africa and South Asia), the poor producer is likely to be involved in agriculture for subsistence, some local or even some international sales, (see OECD 2004 for a discussion of issues); sustainable poverty reduction can only happen if this poor private producer faces an enabling environment for production and sales of agricultural production that will depend on the enabling environment for private sector development as well as the state of infrastructure serving a poor producer. Thus the role of the public sector here is to support poor producers. This will involve at least the provision of an enabling environment (e.g. access to finance, access to technology, infrastructure, price incentives). As argued in Klasen (2003), providing an enabling environment, however, might not

be enough for poor producers. More may need to be done, including active policies to transfer technology, to improve productivity, to develop export markets, and to support production for the domestic market. These issues will be highlighted below when dealing with the individual issues.

Agriculture

It is clear that agriculture must feature prominently in any attempt to promote pro-poor growth using the direct linkage. The vast majority of the poor are in rural areas, a majority depend directly or indirectly on agriculture for their livelihood, and the factor of production the poor possess and use most is labor, sometimes land, and even more rarely human capital (see Alderman et al, 2000a; Ames et al. 2000; World Bank 2000a, Ravallion and Datt, 2000; Eastwood and Lipton, 2001). Pro-poor growth must therefore be focused on rural areas, improve incomes in agriculture, and make intensive use of labor. While conceptually quite obvious, they are often forgotten and not clearly reflected in public policies or in the allocation of public funds by national governments or donors (World Bank 2000c; Lipton, 1977). The majority of empirical analyses of these linkages have indeed borne out these relationships (for a survey, see Lipton and Ravallion, 1995, Eastwood and Lipton, 2001). The experience of virtually all successful developers suggest that rapid growth and poverty reduction always involves an emphasis on improving productivity and incomes in agricultural and non-farm rural occupations (Timmer, 1988, World Bank, 2000c; Lipton and Ravallion 1995).

A set of studies by Datt and Ravallion on the impact of the sectoral composition of growth in India highlight some interesting further linkages. First, they find that rural growth did indeed reduce poverty in both rural and urban areas, while urban growth only had some impact on urban poverty. By sector, they showed that output growth in the primary and tertiary sectors reduced poverty in rural and urban areas, presumably because those sectors are where the poor are and make heavy use of their labor (Ravallion and Datt, 1996, 2000).¹⁰ In a later study, they find that farm output has the same large impact on poverty reduction everywhere in India, but that non-farm output has a variable impact on poverty reduction. This variability depends largely on the level of female literacy, urbanization, urban-rural disparities, and farm yields. States with high female literacy, high urbanization, low disparities, and high initial farm yields experience a higher elasticity of poverty to non-farm output, with the effect of female literacy being by far the

10. See also White and Anderson (2001) for a similar finding in a cross-country context.

strongest.¹¹ These findings not only confirm the importance of agriculture for poverty reduction, but also the complementarities between income and gender inequality and poverty reduction, particularly related to non-farm rural growth. Related analyses in Eastwood and Lipton (2001) confirm that both in-country studies as well as in cross-country analyses, improvements in labor productivity in agriculture have been more pro-poor than improvements in non-agriculture. But cross-country analyses suggest that such improvements in agriculture may have a much smaller or even negligible effect in high inequality countries, further emphasizing the need to tackle distributional issues.

Regarding agricultural policies, there is a clear consensus that pro-poor policies must focus on improving agricultural productivity and incomes, as the poor disproportionately depend on agriculture. It is also largely agreed that past policies failed as they did not provide sufficient incentives and were strongly biased against agriculture (Mkandawire and Soludo, 1999; World Bank, 2000c). Structural adjustment programs have attempted to alter the incentives (primarily through devaluations and the abolition of marketing boards and the reduction of export taxes) and have had some success in doing so (World Bank, 1994, Christiaenson, Demery, and Paternostro, 2002). But it is now recognized that, due to other market failures, sometimes a change in price incentives does not filter to the individual farmer or that improving price incentives are not sufficient for a dynamic agricultural sector. Moreover, a reliance on improving price incentives will help poor agricultural producers, but will hurt poor food consumers so that the net impact on poverty can be small. To achieve a significant poverty impact, much greater emphasis must be placed upon improving agricultural productivity (Eastwood and Lipton, 2001; Bolt, 2004). To achieve this, more public investment in agricultural, including basic and applied research, extension, rural infrastructure, irrigation, market development, rural credit is urgently needed (OECD, 2004). There is also consensus on the burden of agricultural protectionism in the North on agricultural incomes and market access in developing countries (World Bank, 2000c; Eastwood and Lipton, 2001, OECD, 2004). But disagreements remain regarding the extent of state activism in the promotion of non-traditional agricultural exports, the role of input subsidies, and on measures to ensure successful extension services.

11 . This last findings confirms that low gender inequality in education not only boosts national economic growth, but also increases the regional poverty impact of such growth.

Private Sector Development

Private sector development should be seen more as an overall approach to policy-making rather than a particular sectoral strategy. Private sector development is important for a range of development goals but has too often been equated with privatization of state-owned enterprises, and enabling environment for foreign direct investment and domestic industrial producers. While these policies may be useful in furthering overall growth and development, from a pro-poor perspective, a much broader approach is needed that focuses on the poor small farmer or agricultural worker, or informal sector entrepreneur. The recent focus on investment climate usefully broadens the focus of private sector development to specifically include the poor producer.

The experience of past decades of development has shown that an appropriate division of labor between the public and private sector in promoting pro-poor growth is that the public sector can be of great assistance in helping the poor build up their human and physical assets, through investments in education, land reform, and assistance with agricultural productivity and knowledge. Turning assets into incomes depends essentially on poor producers themselves being able to invest in production, use markets, and take calculated risks associated with entrepreneurship. Here the role of the public sector can often only be one of facilitation. In selected circumstances, more direct forms of support (e.g. targeted credit, input subsidies, etc) can be useful if they are designed to combat market failures or high risks faced by poor producers.

Of particular importance are ensuring the functioning of markets, particularly in remote areas, reducing transaction costs, assistance with credit, reliable infrastructure, and targeted support for small producers. Ensuring success here is less dependent on supply-driven approaches than to have open channels of communication between the government and the private farming and non-farming sectors to identify the particular needs and ways to address them.

The state can also play a constructive role in using innovative safety nets to assist with private sector development to further a pro-poor agenda. If safety nets are not primarily focused on targeted transfers to the poor but try to target and support productive activities of the poor, they might be able to play a larger role in supporting pro-poor growth and private sector development. Among the issues to consider are vouchers for poor farmers to purchase vital inputs, training and extension services, the use of micro credit for rural production, and demand-side transfers to promote investments in the asset base of the poor.

Infrastructure

The role of infrastructure, particularly rural infrastructure, has undergone a similar reassessment in light of a pro-poor agenda (see for example Ali and Pernia, 2003). Infrastructure investments of the past were often supply-driven following policy agendas of national governments and larger producers. An infrastructure agenda for poverty reduction must instead focus on ways how infrastructure can promote income-earning opportunities of the poor. As suggested by Ali and Pernia (2003) in their conceptual framework, infrastructure can affect the income-earnings potential of the poor by raising their agricultural productivity, raising their non-agricultural employment, or raising non-agricultural productivity. Investments in irrigation and rural roads that demonstrably lower transaction costs and thus improve profit margins for poor producers can be ways to raise their agricultural productivity (see Klasen et al. 2004). Rural roads and in some cases rural electrification can assist with improving opportunities for non-agricultural employment and/or non-agricultural productivity. But in each of these cases, it is critical to start with a careful analysis of the situation of poor producers in a given area and then investigate whether infrastructure investments in these areas can have an impact on removing particular constraints faced by the poor such as lowering transaction costs and thus improving productivity. In cases where this advice was heeded, it appears that the poverty impact of investments in targeted infrastructure can help with poverty reduction. Also here, the question might be just as much an issue of process as one of actual projects. Developing demand-driven approaches to infrastructure investments as pioneered with some success by social funds or decentralized mechanisms for planning and execution of infrastructure might be of particular relevance here.

5. Conclusions

This note has examines three issues related to a pro-poor growth agenda. First, we discussed how one should conceptualize pro-poor growth where we emphasized that it is important to combine insights from the relative, the weak absolute, and the strong absolute approaches to defining and measuring pro-poor growth. Second, we examined ways to measure pro-poor growth in a non-income dimension and found that this can usefully complement the traditional focus on incomes. It generates new insights about the linkages between income and non-income dimensions of poverty and their development over time at different levels of the distribution. Third, we briefly examined three priority issues which have received renewed

attention in the pro-poor growth debates. Clearly, agricultural development, with a particular focus on raising agricultural productivity is back on the agenda and has to be pursued with renewed vigor, particularly in areas where progress had proven elusive in the past (such as the semi-arid areas of Sub-Saharan Africa). And new approaches to private sector and infrastructure development can usefully complement a pro-poor growth agenda if they start their analysis from the point of view of the poor producers and then set out to remove constraints and bottlenecks faced by them which restrict their income-earnings potential.

ANNEX

Beginning with the *education indicator*, our basic indicator is the average years of schooling of respondents (all of whom are women aged 15-49) and their partners in a household. A potential problem with this indicator is that it has a considerable amount of in-built inertia which is less of a problem when one considers household incomes. As most people do not add to their years of schooling after they reach about age 25, 30 year-old women in 1989 (who will be 39 years old in 1998) will have the same education so that virtually all change will come from a replacement of older cohorts by more educated younger cohorts. In order to reduce this problem, we also do an analysis where we simply concentrate on the education of female respondents who are 20-30 in both surveys. Secondly, while from a welfare point of view, the education of all members of the household is relevant, for the economic opportunities of the household, the education of the best educated member may be most relevant (Basu and Forster, 1998). Thus we also use the maximum education of all adult members of the household and of respondents aged 20-30 in both survey years. Third, we will consider percentage increases in years of schooling (analogously to the income growth rate) but also absolute increases in the years of schooling. It may be of little consolation to the poor that their years of schooling expanded by 30% if that means going from an average of 0.5 years to an average of 0.65 years; examining the absolute increases will help us to see whether education growth was pro poor in the absolute sense as discussed above (see also discussion below). Fourth, there are two issues about which we can do very little. One is that it is not a priori clear that one can treat years of education in a similar

cardinal fashion as income. For example, the increase from 1 years to 2 years of education may do little if that still means a person is illiterate while an increase from 5 years to completed primary (6 years) might be much more valuable. Also, we only measure years of schooling which ignores educational quality. This last problem could, in principle, be remedied with better data (such as test scores that are comparable over time and linked to household income data).

Matters are more difficult with the *survival indicator*. We use the one-year and five-year survival probability (the inverse of the infant and under five mortality rates) as well as the vaccination rate (of 8 possible vaccinations against polio, dpt, and measles) of children 1-5 years¹² as our indicators. The first problem is that it is difficult to devise a reliable survival indicator at the household level. Mortality probabilities within households are relatively low and contain a lot of randomness. In our sample, fewer than 10% of households experienced any child having died before age 5. As a result, the unconditional growth incidence curve for the richest 9 deciles will be flat as there was no change in survival in these households in either period. Thus they will not yield very interesting information in those ranges and all action is in the first quintile. But the conditional growth incidence curves are still useful to examine as they show how mortality is linked to incomes. The problem is similar but somewhat less acute with vaccination rates. There children in the top three deciles have all 8 vaccinations (for polio, dpt, and measles) in both years and thus no potential for further growth. Also here, the conditional growth incidence curves (sorted by incomes) might be more interesting than the unconditional ones.

As far as *nutrition* is concerned, we use the average height for age Z-score of the last born child between 1-5 years in a household, an indicator of stunting or chronic undernutrition.¹³ Here we first face the problem that the Z-Score ranges from about -6 to +6. We remedy this by simply adding the lowest Z-score in both data-sets to all Z-Scores to get strictly positive numbers. Two substantive problems remain. First, the Z-score is a purely probabilistic assessment of nutritional status. While it is most likely that a low Z-score is due to nutritional problems, individual children might have small Z-scores simply because they have genetically short

12. We only include one-year old children as the usual vaccination schedule of 8 vaccinations is only complete at about 9-12 months. We have to stop at age 5 as data for older children is not available.

13. The Z-score is calculated as the actual height of a child at a certain age minus the median of the reference population (the WHO reference standard), divided by the standard deviation of the reference population. We only include children over age 1 as stunting usually does not set until about 6-12 months. There will remain an age bias problem as 1-year old children are, on average, less stunted than 3-4 year old children.

parents.¹⁴ Conversely, chronically malnourished children might appear o.k. simply due to the fact they have genetically longer parents. This can influence the ranking of households and thus make the interpretation more difficult. Lastly, it is not nutritional status linearly improves with the score. In fact, children above a Z-score of 2 are extremely tall for their age and it is unclear that they are any better off than children with a Z-Score of 0.¹⁵ Thus the nutrition indicator also has to be treated with some caution.

The composite welfare indicator combines years of schooling, the survival rate to age 1, the average vaccination rate of children 1-5, and the stunting Z-score for the last born child, age 1-5.¹⁶ The indicator is created in a similar manner to the Human Development Index by subtracting an individual value from the minimum value observed in the data set and dividing it by the range observed in the data set.¹⁷ The scores for the remaining four indicators,¹⁸ which are thus normalized to the range of 0 to 1 are then simply averaged. Here all the advantages and disadvantages of composite indicators come into play which we do not need to discuss here. We mainly use it to get a summary assessment and to deal with some of the difficulties associated with the health and nutrition indicators discussed above. A particular difficulty with using such a composite measure at the household level is that the data is not available for all indicators in each household one either has to cut the sample significantly and in a non-random fashion (which we call the 'small sample' in the tables) or one has to generate the composite score using fewer indicators in some households (which we do in the 'big sample').

14 . For a related discussion, see Klasen (1999).

15 . One could just treat all Z-scores over 0 as well-nourished and just consider those with numbers below 0 as undernourished. This is currently under investigation.

16 . We also report results for a composite welfare indicator including income as a sixth component.

17 . The HDI does not use maxima and minima defined by the data but uses 'fixed' goalposts instead. For our illustrative purposes, it seems better to use the entire variation of the data and thus use the goalposts implicit in the data.

18 . The survival rate and the average vaccination rate form a subindex for health calculated as the simple average of the scores for survival rate and average vaccination rate.

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Table A: Policies to Promote Pro-Poor Growth: Research Findings, Consensus Policies, and Remaining Debates

Policy Issue	Research Finding	Agreed Policy Implication	Areas of Debate
Macroeconomic Stability (see also individual areas of macro policy)	Macroeconomic stability critical necessary (though not sufficient) condition for pro poor growth; poor hurt particularly by high inflation and high macro volatility.	Monetary and exchange rate policy should aim for low inflation and competitive exchange rates; fiscal policy should aim for low budget deficits;	Role of exchange rate policy to fight inflation; pace and extent of stabilization during crises.
Monetary and Exchange Rate Policy	Overvalued exchange rates and high black market premia hurt economic growth and tend to be anti-poor.	A competitive and possibly undervalued exchange rate a critical ingredient to ensure macro stability; government intervention necessary to manage capital inflows.	Fixed or floating rates? Role of capital controls to manage inflows and outflows during crises?
Fiscal Stance	Large budget deficits hurt growth and are unsustainable. Rapid expenditure cuts can often undermine delivery and quality of critical services (e.g. health and education) and hurt the poor.	Governments should aim for moderate budget deficits through broadening of the tax base and, if necessary, a refocusing of expenditures (esp. cuts in subsidies to state-owned enterprises and unproductive sectors). During crises not feasible or desirable to cut expenditures fast.	Mix of tax increases, tax broadening, and expenditure cuts?
Privatization	Loss-making state-owned enterprises undermine fiscal stability, with negative implications for the poor. Some privatizations have been captured by local elites and have not led to better services for poor.	Reform of loss making state-owned enterprises and parastatals critical. Privatization processes must be transparent and competitive.	How to ensure expansion of services for the poor? Use of cross-subsidies for vital services?
Financial Sector	Severe financial repression hurts savings and promotes capital flight. Poorly sequenced financial sector reforms can be counter-productive and destabilizing.	Capital account and financial sector reform should be phased slowly, be implemented only if macro stability has been achieved, and be accompanied by tight regulation, competition policies, and policies to improve access of the poor.	State allocation of credit to priority sectors? State involvement in credit for the poor? Policies to mobilize domestic savings?
Trade Policy	Anti-export bias hurts growth and the poor; import liberalization can be anti-poor and not sufficient to generate supply response. Diversification essential for long-term growth.	Focus on removal of anti-export bias (competitive exchange rate, duty draw-back schemes, etc); provision of infrastructure to assist exports, esp. for export diversification.	More activist state intervention to boost non-traditional exports (e.g. export subsidies, subsidized credit for exporters)?
Agriculture	Raising agricultural productivity critical for pro poor growth. Removal of price distortions necessary but not sufficient in the presence of other market failures. Protection and subsidies in North hurt poor in South.	Renewed emphasis on agricultural research and extension, rural infrastructure, and competitive marketing and input supplies. Open access to OECD markets and removal of OECD subsidies critical.	How to stimulate non-traditional agricultural exports? Role of subsidies to promote new seeds and fertilizer use?

Industrial Policy	Removal of distortions necessary but not sufficient for vibrant industrial sector, esp. small and medium enterprises.	Focus on providing infrastructure and services to industrial sector.	Activist industrial policy? State credit or subsidies? Cluster initiatives?
Human Capital	Lack of human capital of the poor hurts growth and poverty reduction. Education and health services have suffered greatly under economic crises and SAPs. Credit constraints and high costs for health significant deterrent for the poor.	Increased investment in education and health, particularly basic education and primary health care; greater focus on quality; reallocation of public spending to the poor, lowering costs of primary health care and education through greater subsidies and use subsidized community insurance.	How to finance expansion of primary education and health care (esp. in Africa)? Phasing out of all user fees for primary health care and education?
Asset Inequality	Asset inequality (in particular land) reduces economic growth and poverty impact of growth.	On land inequality: Removal of subsidies to large landowners, land taxes to increase land for sale; land redistribution necessary. Other asset inequalities: microcredit and subsidies for infrastructure extensions for the poor (e.g. electricity hook-ups)	On land inequality: Market- and subsidy-based land reform versus quick one-off (partly) confiscatory land reform. Other asset inequalities: role of land and inheritance taxes to reduce asset inequality?
Income Inequality	High income inequality associated with higher poverty and lower poverty impact of growth; high initial income inequality may reduce subsequent growth	Safety nets, social funds, and some targeted cash and in-kind transfers to the poor.	Increasing progressivity of tax system (e.g. luxury VAT and import duties, greater reliance on personal income tax for formal sector employed)? Scaling up of redistributive transfer programs (e.g. Progresra)?
Gender Inequality	Gender inequality reduced growth and makes growth less pro poor.	More supply of education for girls plus targeted subsidies to boost enrollments; removal of restrictions on female control of other assets; political empowerment of women.	How to fund expansion of female education? Role of affirmative action policies in labor market?
Regional Inequality	Regional inequality can sharply reduce impact of growth on poverty; possibility of regional poverty traps.	Targeting of state transfer programs and safety nets on regions with high poverty concentration; Focus on improving infrastructure; Regional inequality to be considered in programs of decentralization and fiscal equalization	How to promote economic growth in backward Regions? The role of regionally targeted Industrial policy? Role of incentives to move industries or people?
Population Policy	High fertility among the poor a constraint to pro poor growth. Inequality reduction often a result of fertility decline among the poor.	Emphasis on female education and employment as well as access to reproductive health services.	Role of family planning policies? How to alter incentives for large families among the poor?
Security	Physical and social security essential for pro poor growth	Safety nets and greater physical security essential measures to promote pro poor growth	Public and private roles in safety net, e.g. credit and insurance provision? How extensive? How funded?

Table B: Process Issues in Promoting Pro-Poor Growth: Research Findings, Consensus Policies, and Remaining Debates

Policy Issue	Research Finding	Agreed Policy Implication	Areas of Debate
Governance	Poor governance, corruption, political instability and civil strife a major deterrent to investment, growth, and poverty reduction. Poor suffer more under poor governance.	Reducing incentives and possibilities for corruption by simplifying rules and regulations that invite rent-seeking behavior; merit-based pay and recruitment; increase public accountability through greater transparency, better institutional oversight of governments (parliaments, independent boards), and decentralization. Donor support for conflict prevention, resolution, and post-conflict reconstruction critical.	Role of privatization to improve governance? How to improve governance when public sector is contracting? Role of the state where state capacity is weak? Reliance on parliaments or extra-parliamentary means for public oversight? How to ensure decentralization that reduces incentives and possibilities for corruption?
Private Sector	Indigenous private sector critical for employment growth and dynamic economy.	State assistance with capacity-building, finance (esp. microfinance), dialogue between state and domestic private sector.	Role of national vs. Multinational companies?
Political Economy of Reform	Domestic political economy crucial for success. Pro-poor coalitions necessary to implement package.	Dialogue to replace donor conditionality. Empowerment of poor and local analytical and research capacity critical for implementation.	Role of financial aid and conditionality under some circumstances? Empowerment from outside possible/desirable?
Donor Policies	Donors can assist with pro poor growth when aid and advice is focused on poorest countries and those with highest poverty impact of policies.	Aid should be focused on poorest countries that promote pro poor growth, should flow through budget and be accounted for using national processes, and observe country leadership.	What to do in poor countries with poor policies? Interactions between donors and civil society? How to ensure accountability of resources?

Table 1: Deciles of Non-Income Indicators and Income for Bolivia, Unconditional 1989 and 1998

Indicator	1	2	3	4	5	6	7	8	9	10	Mean
Income*	21.88	40.27	57.50	77.33	100.61	132.39	177.08	246.12	368.36	863.39	265.68
Education**											
Average education	0.42	1.74	2.76	3.75	4.81	6.27	7.99	9.68	11.61	14.59	7.89
Average education of respondents (between 20 and 30)	0.32	2.00	2.99	4.60	5.99	7.52	9.51	11.78	11.78	14.69	9.33
Maximal education per household	0.98	3.00	4.61	6.00	7.00	8.43	11.50	11.50	15.04	17.51	11.16
Maximal education of respondents (between 20 and 30)	0.34	2.00	3.00	4.60	4.60	7.11	9.52	9.52	11.81	15.03	10.85
Health											
Under 5 child survival rate (%)	96.33	100	100	100	100	100	100	100	100	100	96.36
Under 1 child survival rate (%)	97.83	100	100	100	100	100	100	100	100	100	97.87
Average vaccination per child (age>=1)	0.00	0.00	0.85	3.25	5.04	6.06	7.09	8.00	8.00	8.00	5.10
Nutrition											
Stunting z-score	1.60	2.73	3.21	3.60	3.89	4.22	4.53	4.89	5.38	6.69	4.39
Composite welfare index											
Small sample	0.27	0.33	0.37	0.41	0.45	0.49	0.53	0.57	0.63	0.72	0.52
Big sample	0.11	0.29	0.38	0.47	0.53	0.57	0.62	0.68	0.76	0.88	0.63
Income*	36.37	63.60	89.26	119.22	155.89	203.15	269.64	369.20	555.27	1242.66	352.08
Education**											
Average education	1.16	2.97	4.50	5.75	6.75	7.96	9.16	10.19	12.54	15.81	8.35
Average education of respondents (between 20 and 30)	0.99	3.45	5.00	6.45	7.98	8.99	9.99	9.99	13.71	16.59	10.17
Maximal education per household	1.96	4.62	6.57	8.00	9.00	10.00	10.00	13.27	16.55	18.60	11.34
Maximal education of respondents (between 20 and 30)	1.00	3.44	5.00	6.00	7.63	9.00	10.00	10.00	13.90	16.72	11.74
Health											
Under 5 child survival rate (%)	97.26	100	100	100	100	100	100	100	100	100	97.22
Under 1 child survival rate (%)	98.20	100	100	100	100	100	100	100	100	100	97.83
Average vaccination per child (age>=1)	0.00	2.15	3.90	4.93	5.89	6.94	7.50	8.00	8.00	8.00	5.51
Nutrition											
Stunting z-score	2.12	3.28	3.79	4.13	4.43	4.72	5.08	5.49	5.99	7.14	4.76
Composite welfare index											
Small sample	0.34	0.42	0.46	0.50	0.53	0.56	0.60	0.63	0.68	0.75	0.55
Big sample	0.19	0.38	0.46	0.51	0.56	0.60	0.65	0.70	0.76	0.88	0.64

Notes: * Real household income per capita in Bolivianos per month (1995=100). - ** All variables for education are measured in single years per household.

Source: Own calculations.

Table 2: Deciles of Non-Income Indicators and Income for Bolivia, Conditional 1989 and 1998

Indicator	1	2	3	4	5	6	7	8	9	10	Mean
Mean of income-deciles (conditional), 1989											
Income*	21.88	40.27	57.50	77.33	100.61	132.39	177.08	246.12	368.36	863.39	265.68
Education**											
Average education	3.23	3.74	4.36	5.01	6.03	6.49	7.46	8.23	9.19	11.01	7.89
Average education of respondents (between 20 and 30)	3.28	4.47	4.89	5.72	6.54	7.70	8.50	8.52	9.28	10.49	9.33
Maximal education per household	4.57	5.09	5.79	6.50	7.59	8.16	9.20	10.00	11.20	13.09	11.16
Maximal education of respondents (between 20 and 30)	3.22	4.31	4.69	5.51	6.31	7.57	8.46	8.24	9.48	10.91	10.85
Health											
Under 5 child survival rate (%)	97.31	96.34	93.27	96.89	96.36	95.18	96.07	96.76	97.28	97.36	96.32
Under 1 child survival rate (%)	98.29	98.30	97.22	97.48	98.12	97.99	97.95	97.53	97.73	97.78	97.87
Average vaccination per child (age>=1)	4.00	3.89	4.41	3.99	4.43	4.88	4.90	5.40	5.71	5.89	5.10
Nutrition											
Stunting z-score	3.79	3.85	3.87	4.03	4.16	4.46	4.43	4.25	4.88	4.86	4.39
Composite welfare index											
Small sample	0.41	0.43	0.44	0.45	0.48	0.51	0.52	0.53	0.59	0.63	0.52
Big sample	0.39	0.43	0.47	0.47	0.52	0.54	0.58	0.61	0.64	0.72	0.63
Mean of income deciles (conditional), 1998											
Income*	36.37	63.60	89.26	119.22	155.89	203.15	269.64	369.20	555.27	1242.66	352.08
Education**											
Average education	4.15	4.81	5.58	6.10	6.82	7.45	8.38	9.15	10.08	12.10	8.35
Average education of respondents (between 20 and 30)	4.56	5.21	5.76	7.30	7.62	8.60	8.83	9.76	10.46	11.83	10.17
Maximal education per household	5.60	6.20	7.00	7.49	8.31	9.14	10.06	10.90	11.85	13.79	11.34
Maximal education of respondents (between 20 and 30)	4.34	4.99	5.54	6.99	7.50	8.42	8.55	9.65	10.38	12.25	11.74
Health											
Under 5 child survival rate (%)	96.37	96.50	96.61	98.02	96.38	97.17	97.95	95.75	98.67	98.51	97.22
Under 1 child survival rate (%)	98.14	98.34	98.00	98.15	98.15	97.84	98.61	97.36	98.61	99.02	97.83
Average vaccination per child (age>=1)	4.98	4.89	4.76	5.23	5.13	5.56	5.70	5.87	5.97	6.47	5.51
Nutrition											
Stunting z-score	4.04	4.22	4.33	4.42	4.54	4.67	4.85	4.95	5.02	5.39	4.76
Composite welfare index											
Small sample	0.47	0.49	0.50	0.52	0.54	0.56	0.59	0.60	0.63	0.69	0.55
Big sample	0.46	0.47	0.49	0.52	0.53	0.57	0.60	0.63	0.66	0.74	0.64

Notes: * Real household income per capita in Bolivianos per month (1995=100). ** All variables for education are measured in single years per household.

Source: Own calculations.

Table 3: Gini-Coefficients and Correlations of Income and Non-Income Indicators for Bolivia, 1989 and 1998

Indicator	Gini-coefficient		Correlation
	1989	1998	
Income*	0.56	0.54	GIC
Education**			
Average education	0.40	0.33	0.64
Average education of respondents (between 20 and 30)	0.39	0.31	0.49
Maximal education per household	0.36	0.29	0.59
Maximal education of respondents (between 20 and 30)	0.40	0.32	0.48
Health			
Under 5 child survival rate (%)	0.03	0.03	0.14
Under 1 child survival rate (%)	0.02	0.02	0.35
Average vaccination per child (age>=1)	0.41	0.29	0.30
Nutrition			
Stunting z-score	0.19	0.17	0.74
Composite welfare index***			
Small sample	0.16	0.13	0.62
Big sample	0.24	0.19	0.72
Composite welfare index*** (including income)			
Small sample	0.16	0.13	0.62
Big sample	0.25	0.20	0.78

Notes: * Real household income per capita in Bolivianos per month (1995=100). –**All variables for education are measured in single years per household. –***The composite welfare index includes average education of household, under one survival rate, average vaccination per child (age>=1), and stunting

Source: Own calculations.

Table 4: Mean Growth Rates and Pro-Poor Growth Rates for Bolivia, 1989-1998

Indicator	NIGIC 1998-1998 (unconditional)		NIGIC 1998-1998 (conditional)	
	Rate of pro-poor growth****	Growth rate in mean	Rate of pro-poor growth****	Growth rate in mean
Income*	4.53	3.88	4.53	3.88
Education**				
Average education	3.59	1.85	1.90	1.42
Average education of respondents (between 20 and 30)	3.23	1.86	1.76	1.42
Maximal education per household	2.61	1.45	1.47	1.06
Maximal education of respondents (between 20 and 30)	3.20	1.72	1.73	1.35
Health				
Under 5 child survival rate (%)	0.14	0.11	0.12	0.11
Under 1 child survival rate (%)	0.05	0.03	0.03	0.04
Average vaccination per child (age>=1)	1.20	1.68	1.74	1.41
Nutrition				
Stunting z-score	1.65	1.29	1.01	0.91
Composite welfare index***				
Small sample	1.79	1.39	1.26	1.09
Big sample	1.78	0.80	0.74	0.55
Composite welfare index*** (including income)				
Small sample	1.78	1.38	1.26	1.08
Big sample	2.09	0.92	0.90	0.67

Notes: * Real household income per capita in Bolivianos per month (1995=100). –**All variables for education are measured in single years per household. –***The composite welfare index includes average education of household, under one survival rate, average vaccination per child (age>=1), and stunting.–****The headcount is 77%.

Source: Own calculations.

Table 5: Absolute Growth and Absolute Pro-Poor Growth for Bolivia, 1989-1998

Indicator	NIGIC 1998-1998 (unconditional)		NIGIC 1998-1998 (conditional)	
	Absolute pro-poor growth****	Absolute growth	Absolute pro-poor growth****	Absolute growth
Income*	47.32	88.60	47.32	88.60
Education**				
Average education	1.39	1.27	1.02	0.98
Average education of all respondents	1.58	1.39	1.08	1.07
Average education of respondents (between 20 and 30)	1.41	1.37	1.01	1.05
Maximal education per household	1.19	1.23	1.01	0.91
Maximal education per household of all respondents	1.56	1.41	1.08	1.05
Maximal education of respondents (between 20 and 30)	1.31	1.24	0.96	0.99
Health				
Under 5 child survival rate (%)	1.31	1.02	1.07	1.06
Under 1 child survival rate (%)	0.39	0.32	0.28	0.40
Average vaccination per child (age>=1)	1.04	0.81	0.81	0.71
Nutrition				
Stunting z-score	0.55	0.56	0.41	0.40
Composite welfare index***				
Small sample	7.84	7.05	6.13	5.74
Big sample	5.53	4.46	3.59	3.04
Composite welfare index**** (including income)				
Small sample	5.93	5.38	4.64	4.36
Big sample	4.27	3.44	2.94	2.51

Notes: * Real household income per capita in Bolivianos per month (1995=100). -**All variables for education are measured in single years per household. -***The composite welfare index (here: multiplied with 100) includes average education of household, under one survival rate, average vaccination per child (age>=1), and stunting. -****The headcount is 77%.

Source: Own calculations.

Figure 1: GIC versus Conditional and Unconditional NIGIC for Average Education

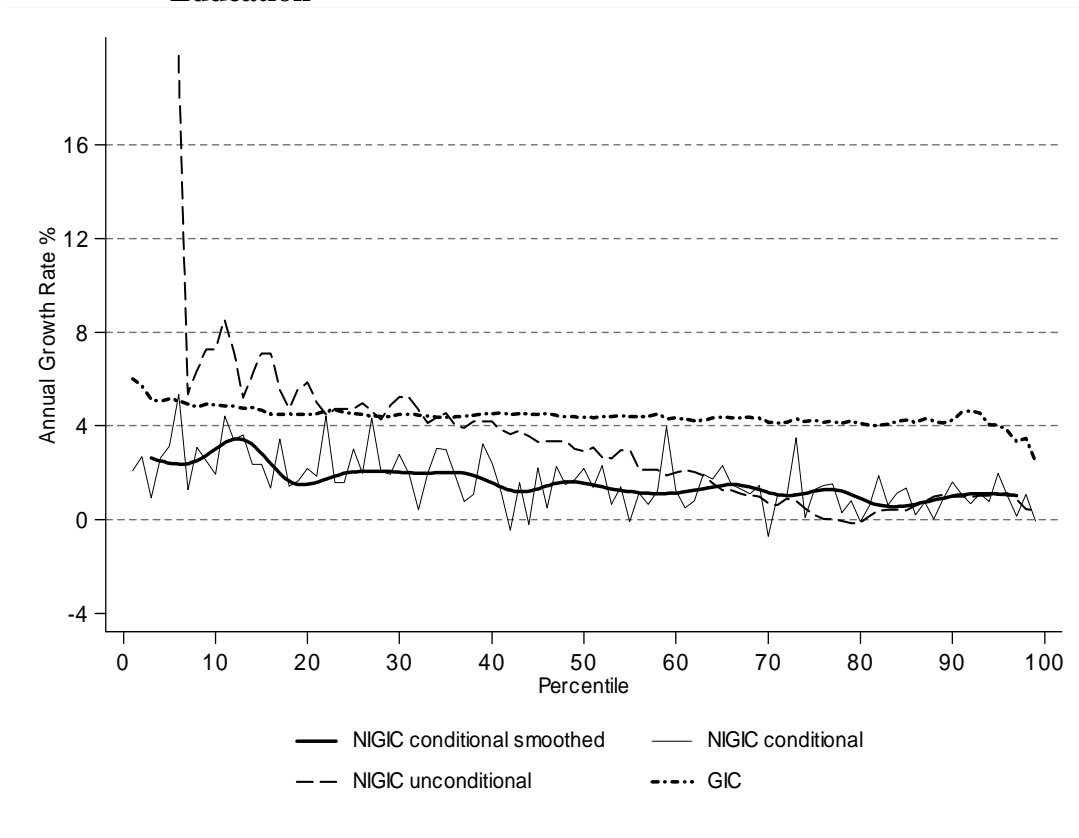


Figure 2: Absolute Change and Growth of Unconditional NIGIC for Average Education versus Absolute Change in Income

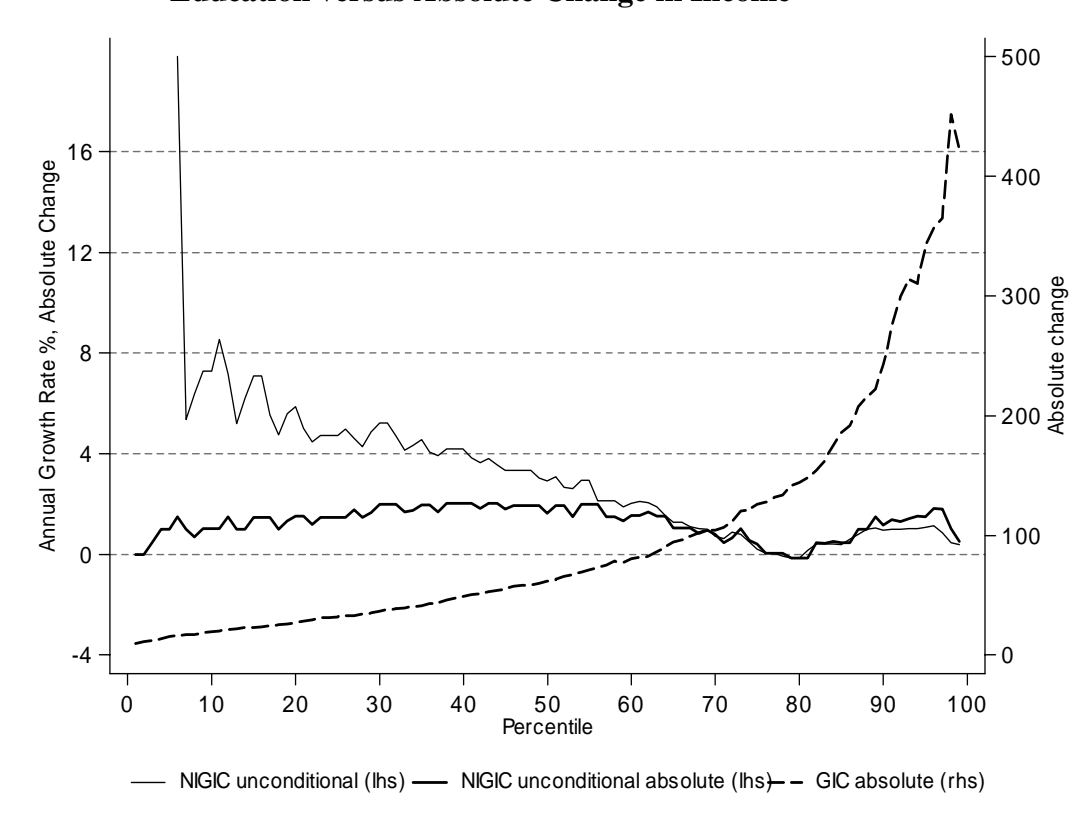


Figure 3: GIC versus Conditional and Unconditional NIGIC for Average Vaccination

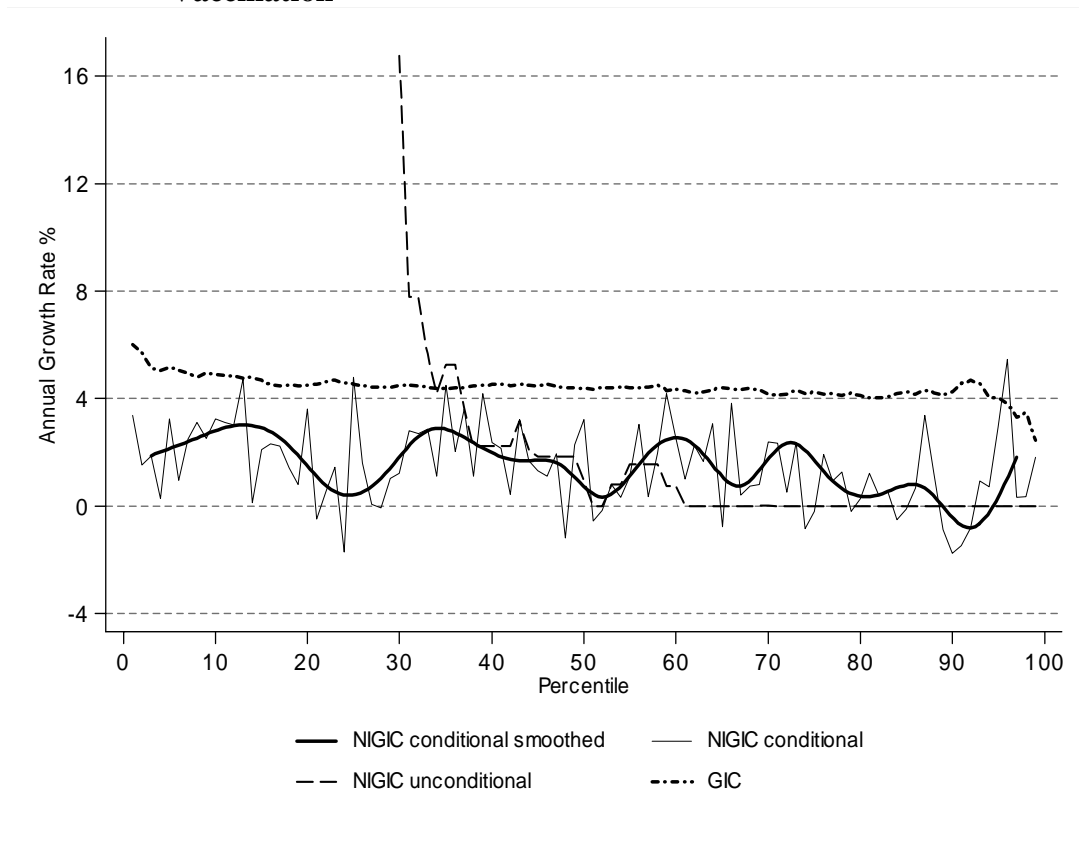


Figure 4: Absolute Change and Growth of Unconditional NIGIC for Vaccination versus Absolute Change in Income

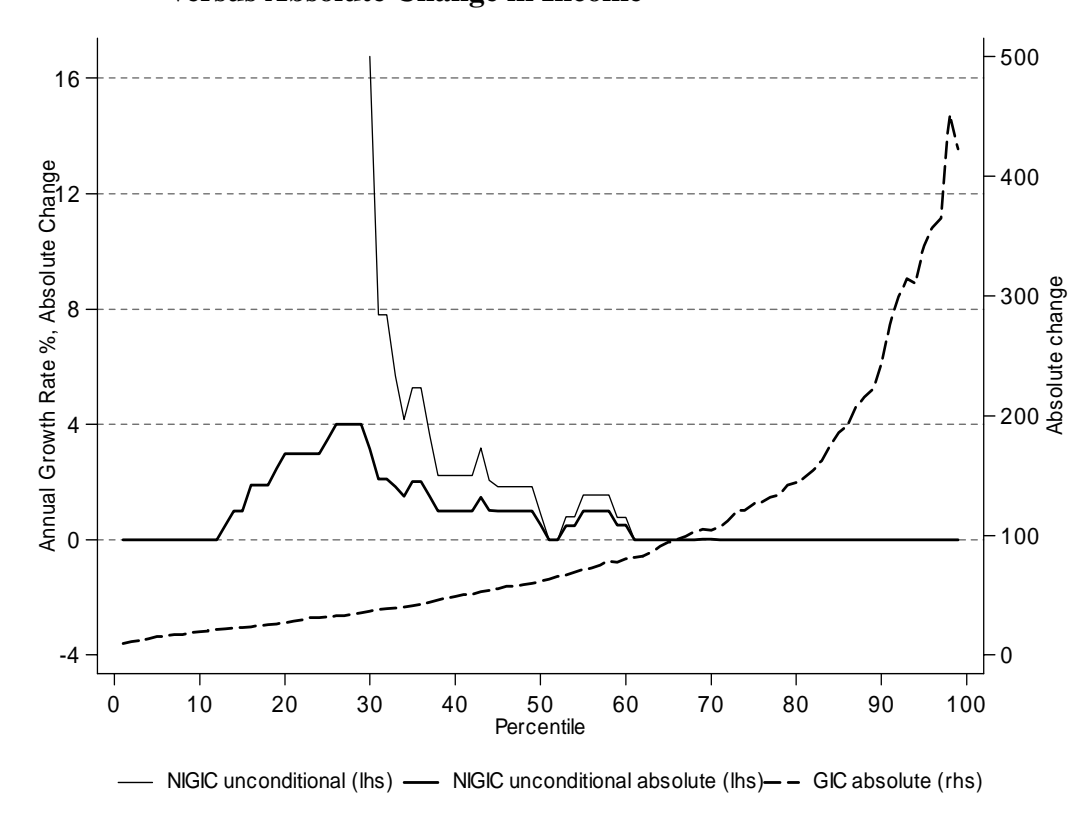


Figure 5: GIC versus Conditional and Unconditional NIGIC for Under 5 Survival

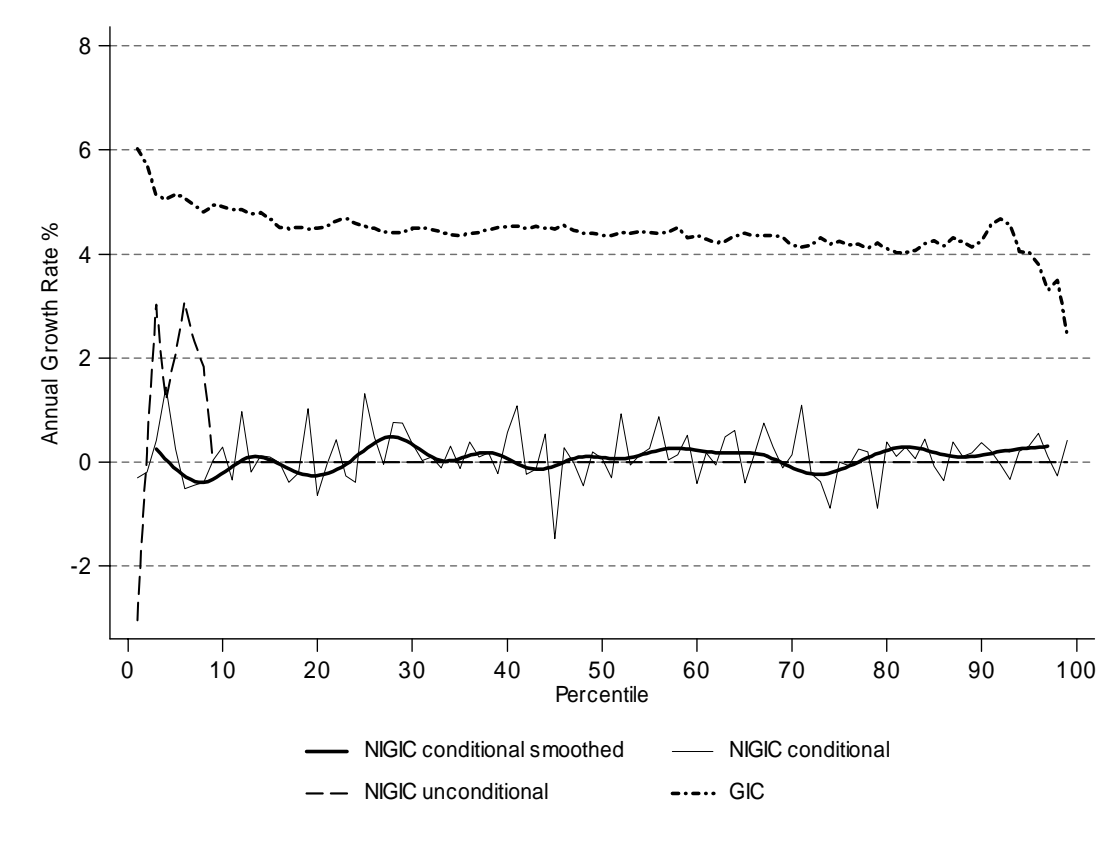


Figure 6: Absolute Change and Growth of Unconditional NIGIC for Under 5 Survival versus Absolute Change in Income

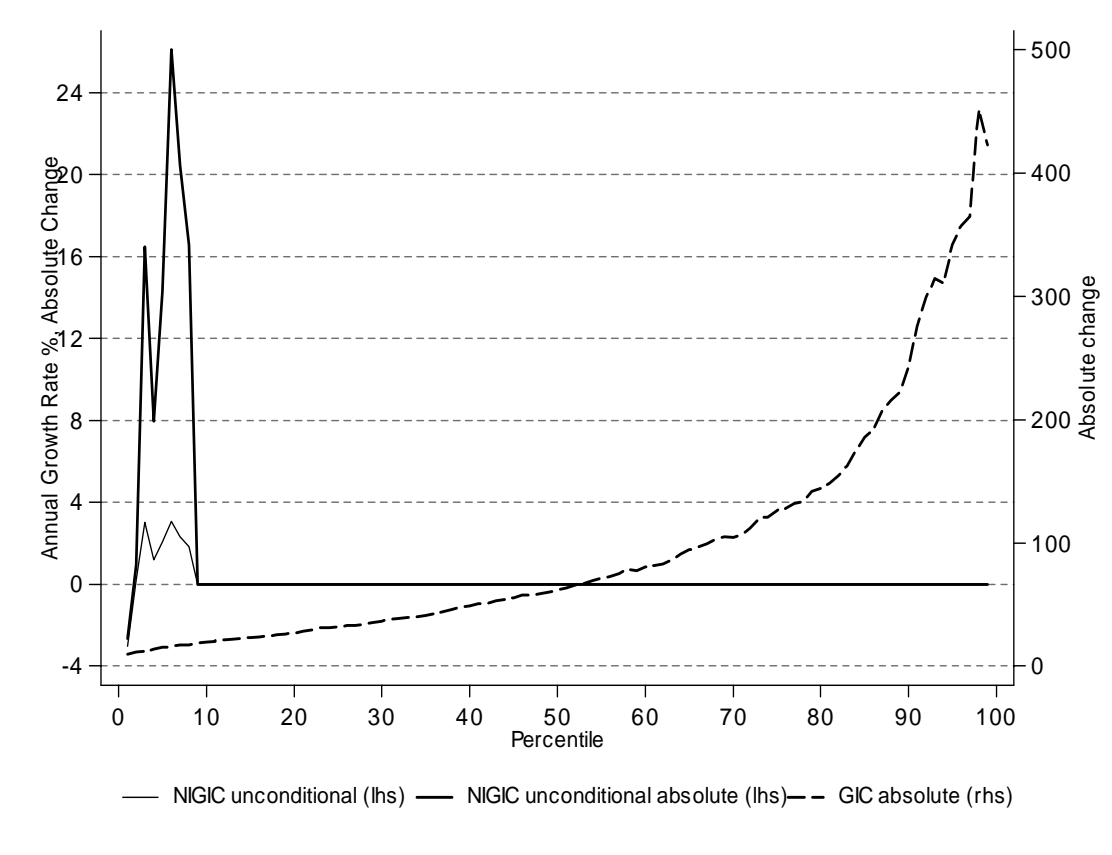


Figure 7: GIC versus Conditional and Unconditional NIGIC for Stunting

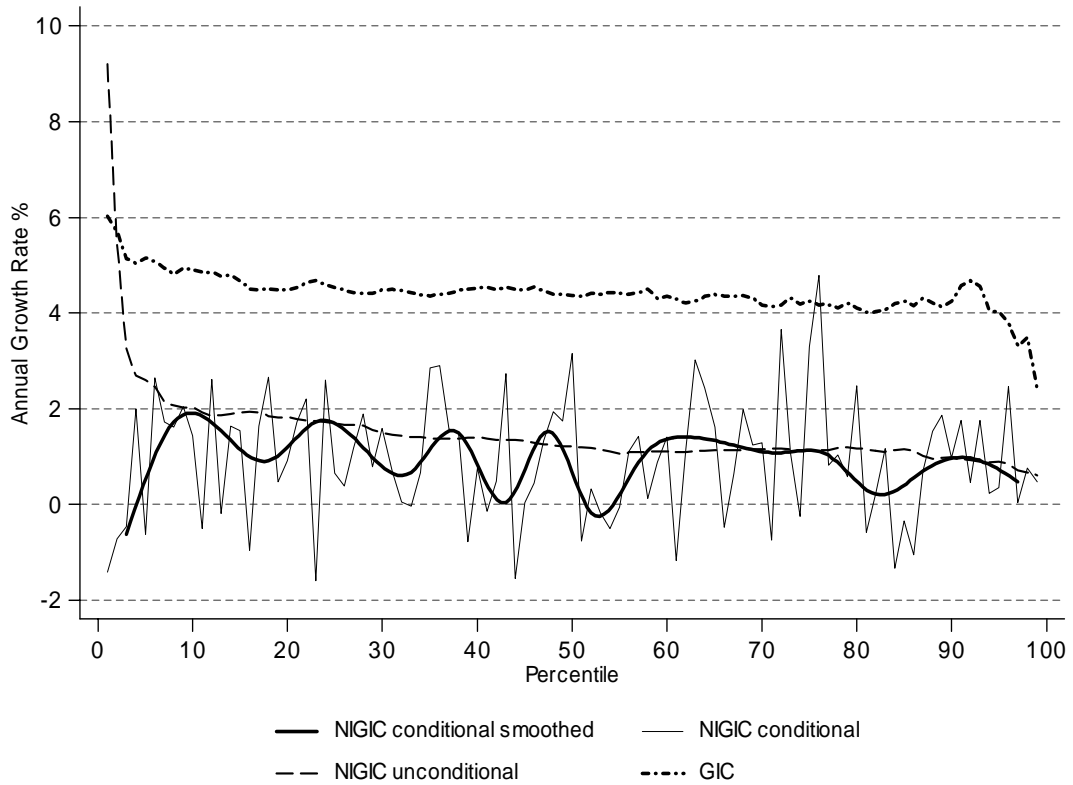


Figure 8: Absolute Change and Growth of Unconditional NIGIC for Stunting versus Absolute Change in Income

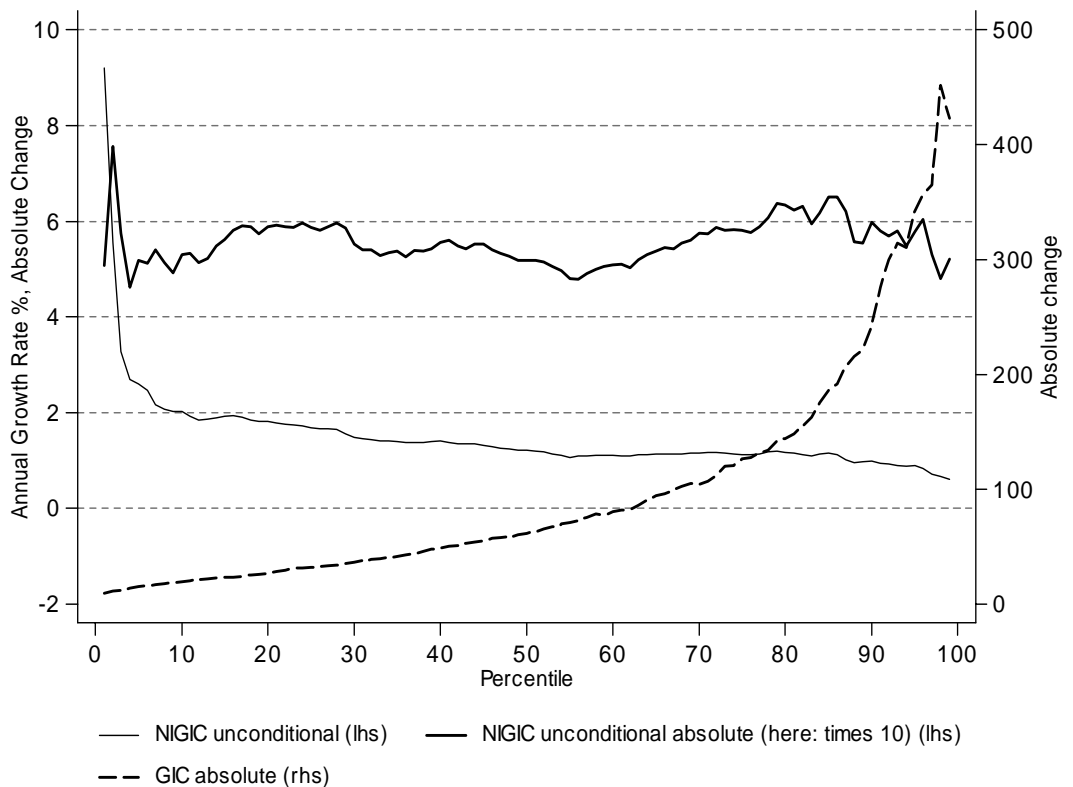


Figure 9: GIC versus Conditional and Unconditional NIGIC for Composite Welfare Index (Small Sample)

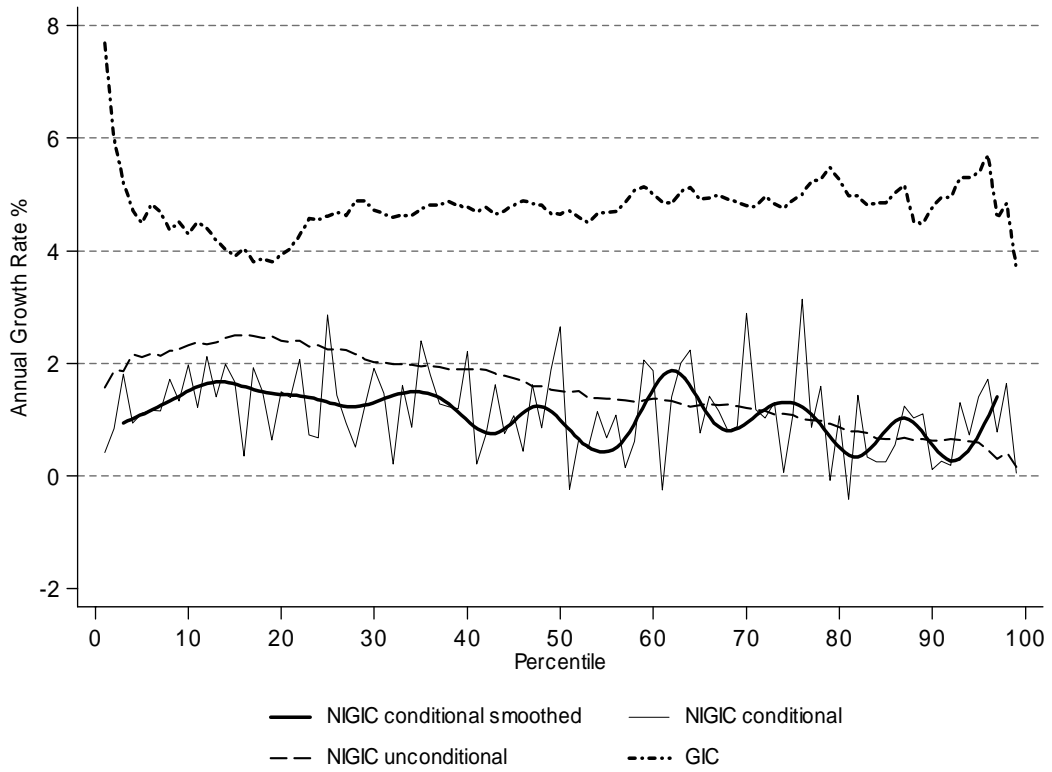


Figure 10: Absolute Change and Growth of Unconditional NIGIC for Composite Welfare Index (Small Sample) versus Absolute Change in Income

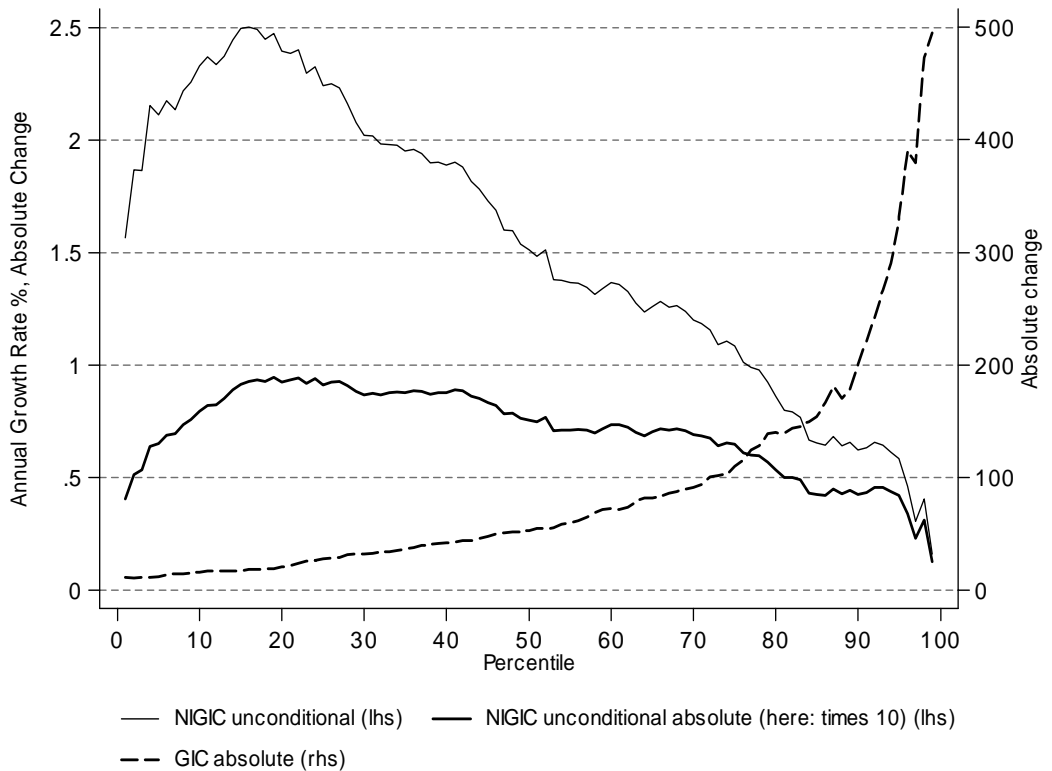


Figure 11: GIC versus Conditional and Unconditional NIGIC for Composite Welfare Index (Big Sample)

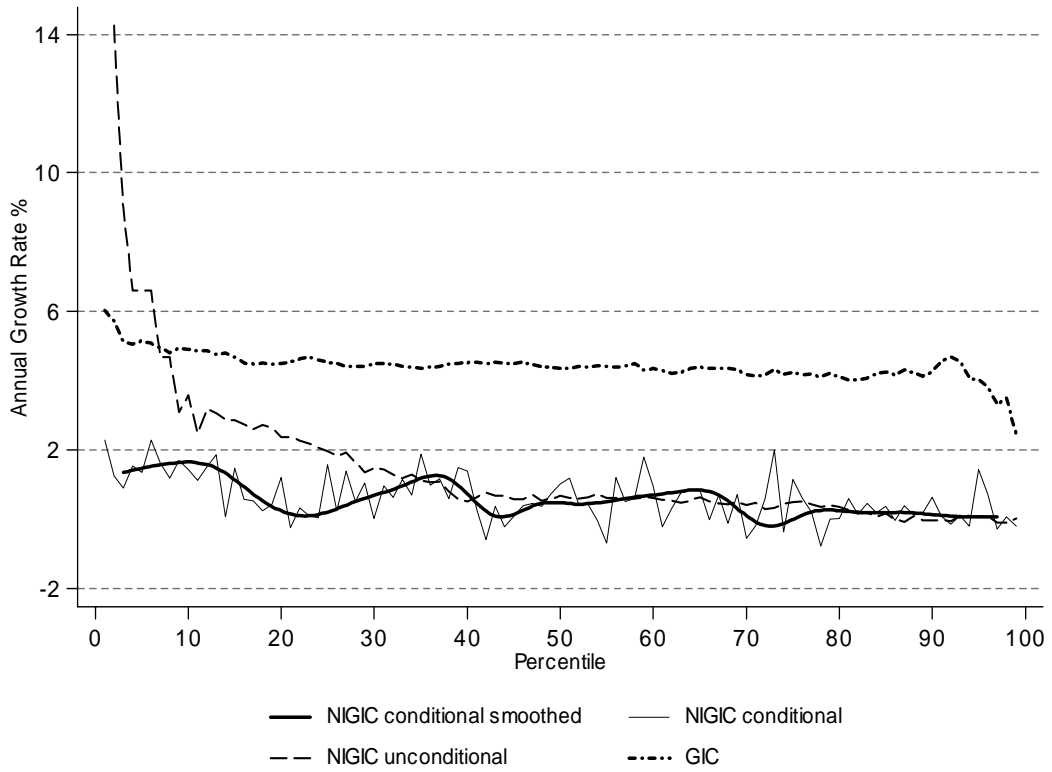


Figure 12: Absolute Change and Growth of Unconditional NIGIC for Composite Welfare Index (Big Sample) versus Absolute Change in Income

