Estimating the potential contribution of redistribution to poverty reduction and pro-poor growth*

Background

Since the donor community established the target of reducing by half the proportion of the world's population living in extreme poverty by 2015, there has been discussion of the potential contributions of economic growth and income distribution to this goal. In this debate, two important and frequently used technical concepts are the growth elasticity of poverty and the rate of pro-poor growth.

The *growth elasticity of poverty* is the rate of reduction in poverty resulting from a 1% increase in average income. If, for example, the growth elasticity of poverty is 2, then we would expect an increase in average income of 2% per year to yield a reduction of 4% per year in poverty. Previous research has shown that the value of the growth elasticity is lower in countries with higher inequality, as measured by the Gini coefficient (Ravallion 2001, Hanmer and Naschold 2000). This means that policies which reduce inequality will increase the amount of poverty reduction associated with economic growth. (By economic growth we mean the increase in average income). This is not to say such policies will necessarily increase the amount of poverty reduction however, as they may also lower the rate of economic growth. This is the well-known trade-off between growth policies and redistribution.

The *rate of pro-poor growth* has been defined as the average increase in the incomes of the poor (Ravallion and Chen 2003).[1] This measure is also equal to the rate of reduction in one particular measure of poverty, referred to as the Watts poverty index, divided by the initial poverty headcount. If all incomes in a country are growing at the same rate, the rate of pro-poor growth is equal to the increase in average income (i.e. the rate of economic growth). However, if the incomes of the poor are growing more slowly than those of the rest of the population, the rate of pro-poor growth will be lower than the rate of economic growth. By contrast, if the incomes of the poor are growing at a faster rate than those of the rest of the population, the rate of pro-poor growth will be higher than the rate of economic growth. This means that policies which reduce inequality between the poor and the non-poor will tend to raise the rate of pro-poor growth above the rate of economic growth. However, they will not necessarily raise the rate of pro-poor growth, as they may also lower the rate of economic growth. This is the trade-off between growth and redistribution once again.

Arguably therefore, the most pressing issue for research is whether governments can reduce inequality without adversely affecting the rate of economic growth. Nevertheless, there is the need for researchers to document precisely *how much* additional poverty reduction, or additional pro-poor growth, could be brought about from a reduction in inequality, assuming that the latter *could* be achieved without an

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[1] Some (e.g. Kakwani *et al.* 2004) have argued instead for a 'relative' definition of pro-poor growth, but this has been criticised, by Ravallion (2004) and Osmani (2005), for placing too much emphasis on the relative dimensions of deprivation (e.g. having less purchasing power over essential commodities than others), and not enough on the absolute dimensions (e.g. not having the power to purchase essential commodities).

large adverse effect on the growth rate. Previous estimates of these magnitudes have been provided by Hanmer and Naschold (2000). This note describes the methods involved and presents some updated calculations for Zambia, Vietnam and Nigeria.[2]

Results

The methods by which one can estimate the additional poverty reduction, or additional pro-poor growth, resulting from a reduction in inequality are outlined in a technical annex to this note. Here we summarise the results. The most recent World Bank estimates of levels of poverty and inequality in Zambia, Vietnam and Nigeria are shown in Table 1. Figures 1-6 then show a) the projected rate of reduction in the poverty headcount each country and b) the projected rates of increase in income at each income percentile. (The latter are typically referred to as 'growth incidence curves'. The rate of pro-poor growth is the average rate of increase at all percentiles up to the poverty line). The projections are shown under alternative assumptions regarding changes in the distribution of income, but a constant rate of economic growth of 2% per year.

Figures 1 and 2 show the results for Zambia. The two scenarios shown are a) that the distribution of income does not change, and b) that the distribution of income becomes by the end of the period equal to that of Ghana in 1999 (a much more equal distribution, with a Gini coefficient of 0.41). Figure 1 shows that the poverty headcount falls by 22 percentage points under scenario (a), but 32 percentage points under scenario (b). Figure 2 shows that projected growth rates under scenario (b) are significantly higher at lower income percentiles, particularly at percentiles below 0.20. The rate of pro-poor growth is in fact 3.5% under scenario (b), compared with 2% under scenario (a).

Figures 3 and 4 show the results for Vietnam. The two scenarios in this case are a) that the distribution of income does not change, and b) that the distribution of income becomes by the end of the period equal to that of Malaysia in 1997 (a much less equal distribution, with a Gini coefficient of 0.49). Figure 3 shows that the poverty headcount falls by 29 percentage points under scenario (a), but by only 10 percentage points under scenario (b). Figure 4 shows that projected growth rates under scenario (b) are steadily higher at higher income percentiles, and are in fact negative at percentiles below 0.20. The rate of pro-poor growth is in fact -0.1% under scenario (b), compared with 2% under scenario (a).

Figures 5 and 6 show the results for Nigeria. Three scenarios are shown: a) that inequality remains the same, b) that the distribution of income becomes by the end of the period equal to that of South Africa in 2000 (a less equal distribution, with a Gini coefficient of 0.56), and c) that the distribution of income becomes by the end of the period equal to that of Ghana in 1999 (a more equal distribution, with a Gini coefficient 0.41). Figure 5 shows that the the poverty headcount falls by 14 percentage points under scenario (b), by 23 percentage points under scenario (a), and 33 percentage points under scenario (c). Figure 6 shows that projected growth rates among lower income deciles are higher under scenario (a) than scenario (b) for about

[2] The procedure can however be applied to any country for which information on current poverty levels and the current distribution of income are available.

80% of the population, and are particularly higher among the lowest income percentiles. The rate of pro-poor growth is 2% per year under scenario (a), 0.7% per year under scenario (b), and 2.8% per year under scenario (c).

Conclusions

The above calculations show that redistribution –increases in the share of total income received by poorer income deciles – can make a substiantial contribution to both poverty reduction and to the 'absolute' measure of pro-poor growth. The important caveat is the assumption in each case that the rate of economic growth is unaffected by redistribution. Although there is as yet no evidence that changes in income distribution are systematically related to economic growth (e.g. Ravallion and Chen 1997, Dollar and Kraay 2002), this does not imply that all redistributive policies have no effect on the growth rate.

The most pressing issue for research is therefore whether governments can reduce inequality without adversely affecting the rate of economic growth, and if so through which channels. However, the above results do at least suggest that the adverse effects of redistribution on growth would have to be quite large to offset the demonstrably large positive effects that redistribution can have on poverty reduction and pro-poor growth when adverse effects on growth are assumed to be absent.

Table 1

	Poverty headcount (%)	Gini coefficient	Year of estimate
Zambia	64 ($1-a-day)	0.53	1998
Vietnam	35 ($2-a-day)	0.36	1998
Nigeria	70 ($1-a-day)	0.46	1996

Source: World Bank.

Figure 1 Project rate of poverty reduction, Zambia

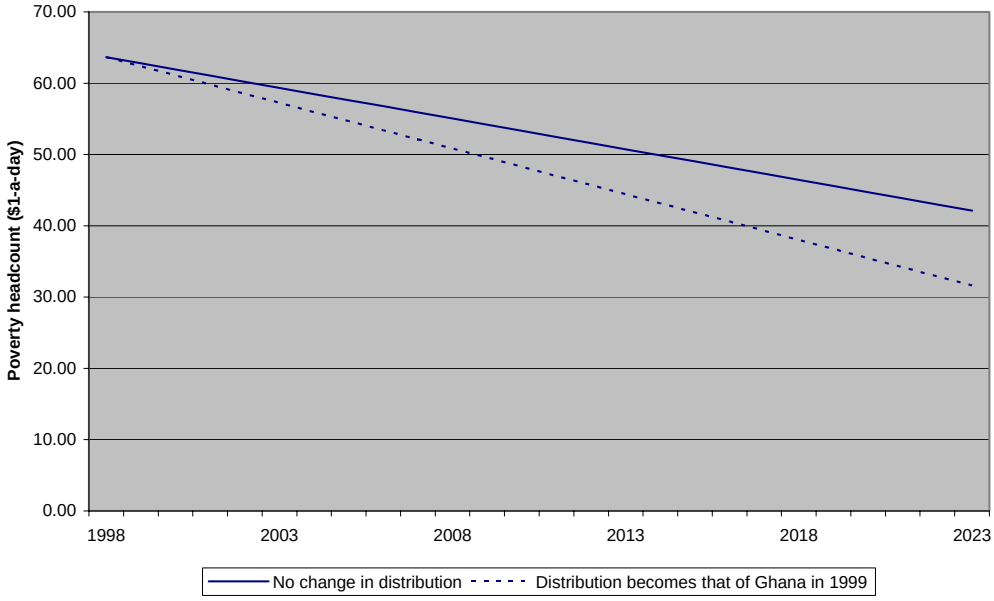


Figure 2 Projected rates of growth by income percentile, Zambia

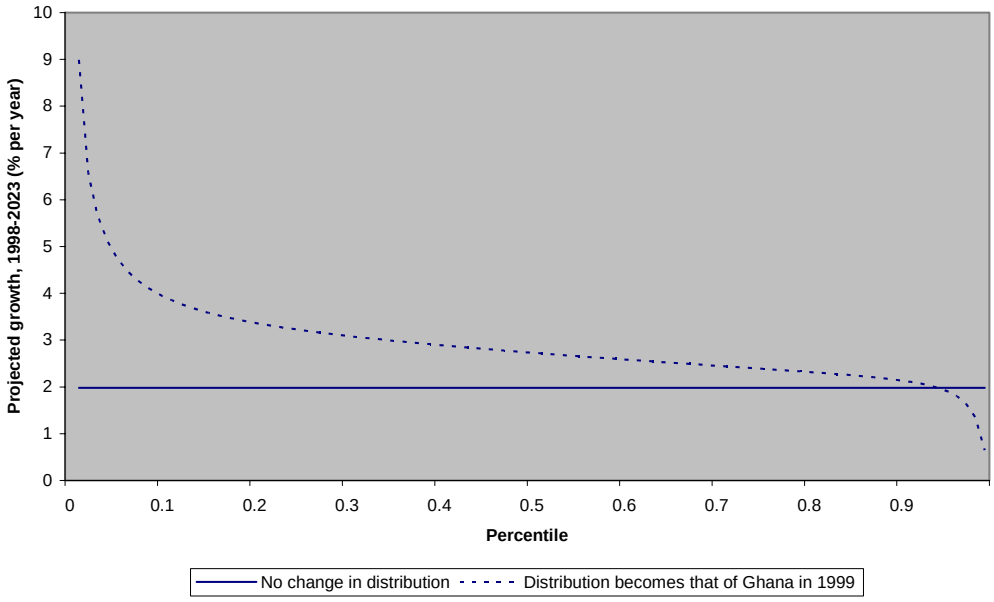


Figure 3 Projected rate of poverty reduction, Vietnam

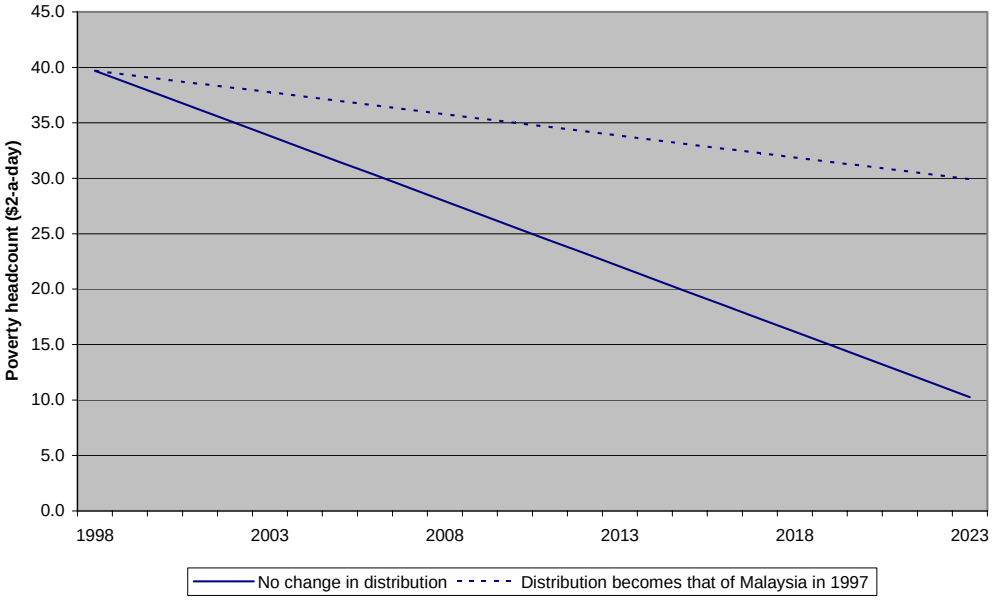


Figure 4 Projected rates of growth by income percentile, Vietnam

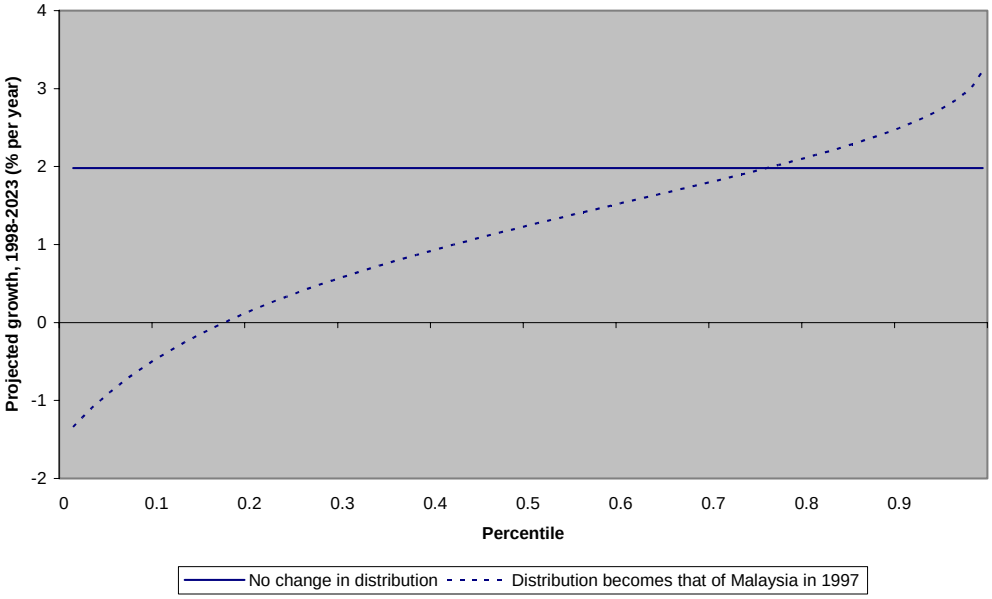


Figure 5 Projected rate of poverty reduction, Nigeria

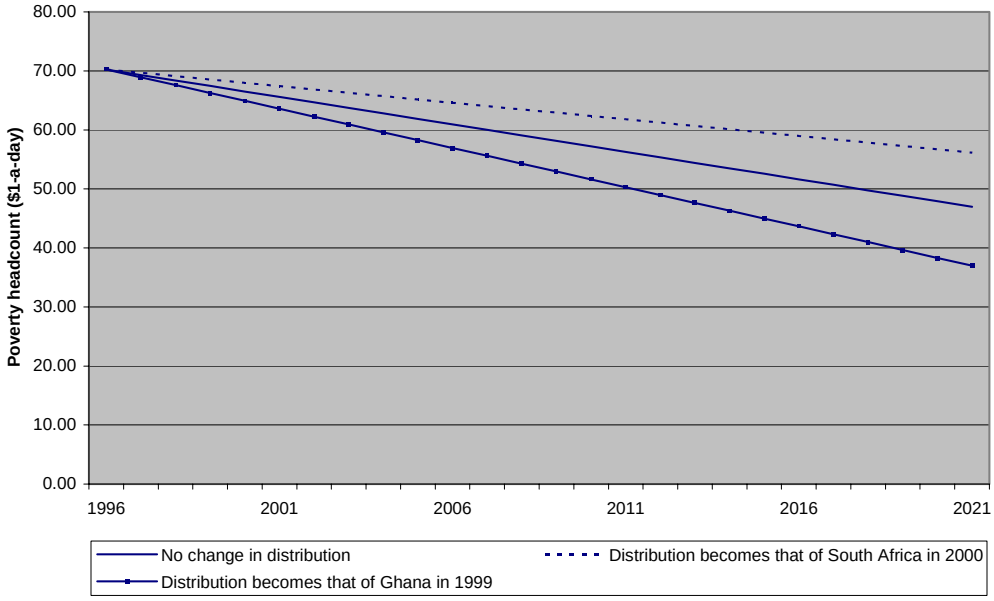
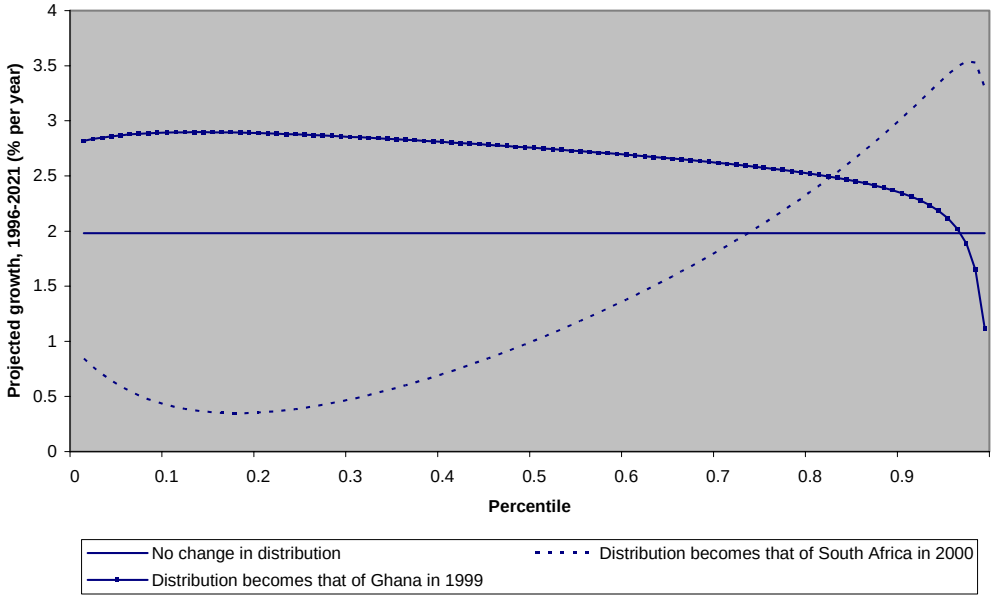


Figure 6 Projected rates of growth by income percentile, Nigeria



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Appendix

A1 Effects of redistribution on poverty reduction

Estimating the effect of a change in inequality on rates of poverty reduction can be done using the methodology developed at the World Bank for estimating poverty levels from information contained in household surveys. The underlying approach is set out clearly in Datt (1998) and need not be repeated in detail here. Basically, there are three steps, all of which are straightforward to carry out using the World Bank computer program POVCAL.[3]

The first step involves estimating the parameters of the Lorenz curve in a given country in some initial year. This requires estimates of the share of total income or expenditure received or spent by successive proportions of the population (e.g. deciles) ranked by their level of income or expenditure. POVCAL in fact calculates two sets of Lorenz curve parameters, one corresponding to the 'generalised quadratic' Lorenz curve and one corresponding to the 'beta' Lorenz curve. However, it also reports which specification provides a better fit for the observed Lorenz curve points and which should therefore be used in the analysis.

The second stage involves calculating the levels of poverty in the initial year. This requires an estimate of mean income or consumption (obtained from the same source as the income or expenditure shares) and setting a poverty line. POVCAL estimates three commonly-used poverty measures, the poverty headcount, the poverty gap, and the squared poverty gap, for any given poverty line. The calculations are based on the formulae for these poverty measures set out in Datt (1998).

The third stage involves re-calcuating the level of poverty in some future year following some specified increase in mean income or consumption. If, for example, we want to calculate the level of poverty following a 25-year period in which mean income or consumption grew by 2% per year, we would multiply initial mean income or consumption by a factor of 1.64. This re-calculation of poverty can be done in three ways:

- using the same set of Lorenz curve parameters, in which case the projected poverty rate will correspond to a 'growth only' scenario;
- using the Lorenz curve parameters of a country with higher income inequality, in which case the projected poverty rate will correspond to a 'growth with rising inequality' scenario;
- using the Lorenz curve parameters of a country with lower income inequality, in which case the projected poverty rate will correspond to a 'growth with falling inequality' scenario.

Two points are worth noting about this method. First, although it calculates the projected level of poverty in some future year, it does not calculate the time-path of poverty between the initial and future year; figures 1-3 simply assume that the reduction in poverty occurs at a constant rate. One could build a more accurate

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[3] Downloadable at: www.worldbank.org/html/prdph/lsms/tools/povcal.

picture of the time-path by carrying out the above calculations for each year rather than in the start and end years only, but this would add considerably to the time required to do the calculations. Moreover, under the assumptions that the projected rate of growth is relatively constant and that any shifts in the distribution of income are relatively gradual, it is plausible that the rate of reduction in poverty will be relatively constant (if not exactly constant as shown in the figures).

Second, it represents an improvement over an alternative approach based on the growth elasticity of poverty. Hanmer and Naschold (2000), for example, use econometric estimates of the growth elasticity of poverty in high and low inequality countries to forecast rates of poverty reduction over the period 1990-2015 in high and low inequality countries. The limitation here is that the growth elasticity of poverty tends to increase (in absolute terms) as economic growth takes place (Anderson 2005). This alternative approach will therefore tend to under-estimate the reduction in poverty resulting from a projected rate of economic growth. A further complication is that econometric estimates of differences in the growth elasticity of poverty between high and low inequality countries vary substantially, reflecting differences in the sample used, the measure of growth, econometric specification, and so on, yielding further uncertainty to the results.

A3 Effects of redistribution on pro-poor growth

Estimating the rate of pro-poor growth under alternative inequality scenarios involves two main steps. The first is to calculate the rate of growth at each percentile of the income or expenditure distribution. Following Ravallion and Chen (2003), this is given by:

$$g_t(p) = \frac{L_t'(p)}{L_{t-1}'(p)}(\gamma_t + 1) - 1,$$

where $g_t(p)$ is rate of growth of income or consumption at the *p*th percentile of the distribution, $L_{t-1}'(p)$ and $L_t'(p)$ are respectively the slopes of the Lorenz curve at the *p*th percentile in some initial and future year, and γ_t is the growth in mean income or consumption over the period. Graphs which plot the value of $g_t(p)$ at each value of *p* are referred to as growth incidence curves.

Given estimates of the Lorenz curve parameters in the initial year, obtained using POVCAL, the value of $L_{t-1}'(p)$ can be estimated using the formulae contained in Datt (1998). Given some projection of γ_t, the projected value of $g_t(p)$ at each percentile can then be calculated in three ways:

- using the same set of Lorenz curve parameters in each year, in which case the projected value of $g_t(p)$ will be the same at all levels of *p* (corresponding to a 'growth only' scenario);
- using the Lorenz curve parameters of a country with higher income inequality for the future year, in which case the projected value of $g_t(p)$ will tend to be

higher at higher values of *p* (corresponding to a 'growth with rising inequality' scenario);

- using the Lorenz curve parameters of a country with lower income inequality for the future year, in which case the projected value of $g_t(p)$ will tend to be higher at lower values of *p* (corresponding to a 'growth with falling inequality' scenario).

The second step is to calculate the mean rate of growth of the poor between the initial and future year. This is given by:

$$\tilde{g}_t = \frac{1}{H_t} \sum_{p=1}^{p=H_t} g_t(p),$$

where H_t is the headcount index of poverty in either the future or the initial year. This equation gives the Ravallion and Chen (2003) measure of pro-poor growth. One can obtain a single estimate of the rate of pro-poor growth by taking the average of the rates of pro-poor growth calculated using the initial headcount and the equivalent rate calculated using the future headcount.