

THE IMPACT OF GROWTH AND DISTRIBUTION ON POVERTY IN PAPUA NEW GUINEA

John Gibson

Department of Economics

University of Waikato

Private Bag 3105

Hamilton

NEW ZEALAND

fax: 64-7 838-4331

e-mail: jkgibson@waikato.ac.nz

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ABSTRACT: Changes in poverty in Papua New Guinea during the 1990s adjustment program are analysed. Data from urban household surveys in 1986 and 1996 are used to calculate the change in the incidence, depth and severity of poverty. The change in poverty rates is decomposed into distribution and growth components, using a methodology proposed by Datt and Ravallion (1992). There was a rise in both the depth and severity of poverty in the 1990s, with the major contributor being the growth in inequality.

I. INTRODUCTION

Has poverty increased? This is one of the most important questions that countries would like answered. It is also helpful to know what the source of any increase in poverty is. The two most likely causes are declines in average per capita incomes, and increased inequality in the distribution of incomes. Because the appropriate policies for remedying these sources of increased poverty differ, economists have invested considerable efforts in finding ways to quantify the relative contribution of growth versus redistribution to changes in poverty measures.¹

The objective of this paper is to analyse the changes in poverty that occurred in Papua New Guinea over a ten-year period, which includes structural adjustment programs introduced in 1990 and 1995. Data from household surveys in 1986 and 1996 are used to calculate the change in the incidence, depth and severity of poverty. The change in poverty rates is decomposed into distribution and growth components, using a methodology proposed by Datt and Ravallion (1992). There is little known about the causes of poverty in Papua New Guinea, so this decomposition may help to identify the transmission mechanisms through which particular economic policies affect poverty. One restriction of the paper is that data availability limits the results to urban households. This may not be too serious because the main effects of structural adjustment - higher prices and reduced employment - are more likely to have been felt by urban households because rural households tend to be self-employed and produce much of what they consume.

II. METHODS AND DATA

The distribution and growth decomposition of poverty changes suggested by Datt and Ravallion (1992) is appropriate for poverty measures that can be fully characterised in terms of the poverty line, the mean income of the distribution, and the Lorenz curve representing the level of relative income inequalities. Let the poverty measure P_t at date t be written as:

$$P_t = P(z/\mathbf{m}_t, L_t) \quad (1)$$

where z is the poverty line, \mathbf{m} is the mean income, and L_t is a vector of parameters fully describing the Lorenz curve. The growth component of a change in the poverty measure between date t and date $t+n$ is computed as the change in poverty due to a change in the mean while holding the Lorenz curve constant at some reference level L_r :

$$G(t, t+n; r) = P(z/\mathbf{m}_{t+n}, L_r) - P(z/\mathbf{m}_t, L_r). \quad (2)$$

Often the reference period r will be the starting date for the decomposition, so that $r=t$. The distribution component is computed as the change in poverty between dates t and $t+n$ due to a change in the Lorenz curve while keeping the mean income constant at the reference level \mathbf{m} :

$$D(t, t+n; r) = P(z/\mathbf{m}_r, L_{t+n}) - P(z/\mathbf{m}_r, L_t). \quad (3)$$

Therefore, a change in poverty between the dates t and $t+n$ can be decomposed as:

$$P_{t+n} - P_t = G(t, t+n; r) + D(t, t+n; r) + R(t, t+n; r) \quad (4)$$

where $R(t, t+n; r)$ is the residual, which will vanish only if either the mean income or the Lorenz curve remain unchanged over the decomposition period.

The well-known P_a class of poverty measures developed by Foster, Greer and Thorbecke (1984) can be fully characterised by z , \mathbf{m} , and L_t , so it is used in this study. The general formula for the P_a class is:

$$P_a = \frac{1}{n} \sum_{i=1}^q \left(\frac{g_i}{z} \right)^a, \quad (5)$$

where n is the total population, q is the number of poor individuals, z is the poverty line, and g_i is the poverty gap for individual i , $g_i = z - y_i$, (where y_i is the income of the i th individual). When $\mathbf{a}=0$, the P_0 measure is the head-count index, which measures the *incidence* of poverty. When $\mathbf{a}=1$, the P_1 measure is the poverty gap index, which measures the average *depth* of poverty. Neither the P_0 nor P_1 measures are sensitive to the distribution of incomes amongst the poor, but this property holds for values of the poverty aversion parameter, $\mathbf{a} > 1$. The P_2 index, which weights the shortfall of the poor from the poverty line by the square of their poverty gap, is distributionally sensitive and measures the *severity* of poverty.

Datt and Ravallion (1992) derive formulae for the P_a poverty measures for each of two parametric specifications of the Lorenz curve: the Beta model of Kakwani (1980) and the general quadratic (GQ) model of Villasenor and Arnold (1989). These formulae have also been incorporated into the POVCAL program (Chen, Datt and Ravallion, 1991) which calculates inequality and poverty statistics from grouped data on household incomes.

The data for the poverty comparison comes from the 1985-87 Urban Household Survey, carried out by the National Statistical Office (NSO, 1987) and from a 1996

household survey carried out as part of a World Bank poverty assessment (Gibson and Rozelle, 1998). The only urban area with a sufficient number of observations in each survey to allow a valid comparison is the national capital, Port Moresby, with 325 observations in 1986 and 106 observations in 1996.² The income variable used for measuring poverty is household expenditure (excluding durables) per adult-equivalent, where children aged 0-6 years count as 0.5 adult-equivalents and everyone else counts as 1.0.³

The poverty line for each date is based on a basket of 46 foods that provides 2200 calories per person per day. This basket of foods is formed from the diets of the poorest one-quarter of households in 1986. The cost of this basket of foods is the food poverty line, z^F . An allowance for basic non-food needs is obtained in each year by adding to the food poverty line the typical value of non-food spending by households whose total expenditure just equals z^F . This “cost-of-basic-needs” method of setting the poverty line is further described by Ravallion and Bidani (1994). The annual value of the poverty line is K484 per adult-equivalent in 1986 and K956 in 1996.⁴

III. RESULTS

Table 1 contains a description of urban poverty in Papua New Guinea for 1986 and 1996. The results in this table for both inequality and poverty measures are based on the GQ Lorenz curve, which fits the data best, and are estimated with the POVCAL program (Chen, Datt and Ravallion, 1991). Almost one-fifth of the urban population was poor in 1986, with a slight fall in the poverty incidence rate, to 19 percent

in 1996. However, the conclusion that poverty has declined does not hold given the movement in the other two poverty measures. The P_1 measure shows that the average depth of poverty – the shortfall between the income of the poor and the poverty line – doubled between 1986 and 1996. The sharp rise in the P_2 measure suggests that the increase in poverty gaps was greatest for the poorest of the poor, so the severity of poverty suffered by some people has also worsened.

Table 1 also contains the elasticities of each of the poverty measures with respect to changes in mean income (the “growth elasticity”) and changes in inequality (the “Gini elasticity”). Two features of these elasticity estimates stand out: the poverty measures are more sensitive to changes in inequality than to changes in average incomes, and the elasticities are smaller in 1996 than in 1986. Apparently, poverty is becoming less easily alleviated by either economic growth or redistribution, but of those two options, income redistribution may have the greatest impact.

Has this rise in the depth and severity of poverty been caused by slow growth in average incomes or by a worsening distribution of incomes? Table 1 shows that average incomes, m have increased more rapidly than the poverty line, z but inequality (as measured by the Gini index, G) has also increased. This suggests that the rise in inequality is the cause of the increase in urban poverty and the decomposition reported in Table 2 confirms this.

Except for the head count index (P_0), the results in Table 2 show that the distribution component dominates the growth component of the change in urban poverty in Papua New Guinea between 1986 and 1996. For both the P_1 and P_2 poverty measures, the rise

in poverty caused by an increasingly unequal distribution of incomes overwhelms the reduction in poverty that would have resulted from distributionally neutral growth, with the residual playing a negligible role.

IV. CONCLUSIONS

This paper has shown that the depth and severity of poverty increased between 1986 and 1996 in the main urban area of Papua New Guinea. This ten-year period includes structural adjustment programs introduced in 1990 and 1995. A decomposition of the change in poverty rates suggests that increased income inequality, rather than slow growth in average incomes, is the major contributor to the rise in poverty.

Evidence from other countries, such as Mexico (Székely, 1995), suggests that structural adjustment policies are the cause of increased income inequality and poverty. However, whether this is the case for Papua New Guinea cannot yet be determined, because we do not know what would have happened to inequality and poverty in the absence of structural adjustment. One long-term feature of the Papua New Guinea economy has been the failure of employment growth to keep pace with population growth (McMurray, 1995), and this could cause a secular rise in inequality and poverty, even in the absence of structural adjustment programs.

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Table 1. *Urban poverty in Papua New Guinea*

Measures	1986			1996		
	Value	Growth	Gini	Value	Growth	Gini
		Elasticity	Elasticity		Elasticity	Elasticity
P_0	19.64	-2.59	3.26	18.93	-1.42	2.21
P_1	3.73	-4.27	7.63	7.64	-1.48	4.87
P_2	0.94	-5.93	11.98	4.28	-1.57	7.58
m	1093.07			2450.67		
G	37.90			40.33		
z	484			956		

Note: Results based on a general quadratic Lorenz curve, calculated from grouped data using POVCAL.

Table 2. *Decomposition of change in urban poverty in Papua New Guinea*

Measures	Total Change	Growth	Distribution	Residual
P_0	-0.71	-6.12	3.00	2.41
P_1	3.91	-1.74	5.47	0.18
P_2	3.34	-0.55	4.27	-0.38

Notes

¹ Amongst recent attempts to decompose poverty changes are ones suggested by Datt and Ravallion (1992) and Kakwani (1993).

² Port Moresby was a separate stratum in each survey, so the samples are statistically representative for each year, and differ only in their sampling rates.

³ Gibson and Rozelle (1998) report evidence in favour of this adult-equivalence scale for Papua New Guinea.

⁴ K1.00=US\$1.03 in 1986 and US\$0.76 in 1996.