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An Illustration of the Average Exit Time Measure of Poverty

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Abstract

The goal of the World Bank is 'a world free of poverty' but the most widely used poverty measures do not show when poverty might be eliminated. The 'head-count index' simply counts the poor, while the 'poverty gap index' shows their average shortfall from the poverty line. Neither measure reflects changes in the distribution of incomes amongst the poor, but squaring the poverty gap brings sensitivity to inequality, albeit at the cost of intuitive interpretation. This paper illustrates a new measure of poverty [Morduch, J., 1998, Poverty, economic growth and average exit time, *Economics Letters*, 59: 385-390]. This new poverty measure is distributionally-sensitive and has a ready interpretation as the average time taken to exit poverty with a constant and uniform growth rate. The illustration uses data from Papua New Guinea, which is the country with the highest degree of inequality in the Asia-Pacific region.

Keywords

growth; inequality; poverty

JEL Classification

O15

I. Introduction

The goal of the World Bank is 'a world free of poverty'. To measure progress in meeting this goal, the World Bank regularly prepares and publishes estimates of the number of poor people in the world. It is well known that simply counting the poor and calculating their proportion in the population can be a misleading indicator of poverty because no allowance is made for how far below the poverty line they fall (other problems with these world poverty counts are discussed by Deaton, 2000). A further problem with this head-count measure of poverty is that it may give perverse incentives to target poverty reduction towards the least poor because a given transfer will push more of them over the poverty line. Even 'poverty gap' measures, based on the average shortfall between the incomes of the poor and the poverty line, can be criticised because they are invariant to regressive transfers to a poor person from someone who is poorer (Sen, 1976).

But despite these shortcomings, the head-count and poverty gap measures remain the most widely used indicators of poverty, and this popularity may not just reflect their simplicity. Other poverty indicators that are sensitive to inequality amongst the poor, and thus are superior on theoretical grounds, may convey less meaningful information because these measures can be interpreted only in an *ordinal* sense (Foster, 1994). Thus, even though the poverty gap can be transformed into an inequality-sensitive measure, by squaring or cubing it (Foster, Greer, Thorbecke, 1984), such a transformation may reduce the cardinal usefulness of the measure.

Differences between poverty measures that satisfy theoretical axioms but have only ordinal interpretations and simpler measures with direct, cardinal, meaning would not matter if all poverty measures always gave the same conclusions. But determining the effect of particular economic policies often depends on the choice of poverty measure. For example, if the price of rice rises in Java, Indonesia, headcount measures of poverty fall because most poor households are farmers, who are net producers of rice. But distributionally-sensitive poverty measures rise because the very poorest households are net rice consumers, and this group get the biggest weight in measures that are sensitive to inequality (World Bank, 1990, p.28).

This paper illustrates a new measure of poverty that has been developed by Morduch (1998) from an existing measure (the Watts index) that has appealing ordinal properties. Morduch shows that a simple linear transformation of the Watts index gives it cardinal properties that can be useful as well. Hence, wider use of the poverty measure developed by Morduch might overcome the dilemma between distributionally-sensitive measures on the one hand and cardinally meaningful measures on the other. This poverty measure is sensitive to inequality amongst the poor (indeed, it nests the common Theil measure of inequality) and it has a ready interpretation as the average time taken to exit poverty with a constant and uniform growth rate. Thus, the measure illustrates an aspect of the income distribution that is associated with an interesting economic question – how long might it take to be free of poverty? Yet despite its potential usefulness, the average exit time measure is yet to have an impact on the empirical poverty literature.[1]

While it would be possible to illustrate the use of this new poverty measure with world-wide estimates of poverty, that task is beyond the current paper. Instead, we use data from the developing country of Papua New Guinea to calculate poverty values using the average exit time measure and some other well-known measures. This particular country has the highest degree of inequality in the Asia-Pacific region, with a Gini coefficient of 0.51 for per capita expenditures (World Bank, 2001).[2] Hence, this is a setting where distributionally-sensitive poverty measures may be especially applicable, but it is also a setting that needs easily interpretable measures because few policy makers have advanced education.

II. Poverty Axioms And Poverty Measures

A. Poverty Axioms

There are a variety of axioms that a desirable poverty measure should obey, with the two most fundamental proposed by Sen (1976):

Monotonicity Axiom: Other things being equal, a reduction in income of a person below the poverty line should increase the poverty measure.

Transfer Axiom: Other things being equal, a transfer of income from a person below the poverty line to a person who is richer must increase the poverty measure.

In addition, Kakwani (1980) proposed the monotonicity-sensitivity and transfer-sensitivity axioms. Under the monotonicity-sensitivity axiom, the poorer an individual is, the larger should be the increase in the poverty index due to a reduction in their income. The transfer-sensitivity axioms suggest that society should become less concerned about inequality between poor people as they become richer. For example, if *A* and *B* have incomes of $100 and $50, then transferring $1 from *A* to *B* should reduce the poverty index by at least as much as would a similar transfer when *A* and *B* have incomes of $300 and $250.

In addition to these axioms, the property of additive decomposability is considered desirable because it means that the poverty index for a given society is just a weighted average of the poverty indexes for sub-groups in the society. Thus, if the population shares for these sub-groups stay constant, an increase in the level of poverty in one sub-group will increase overall poverty. This property helps in the construction of poverty profiles, which show how poverty varies across population sub-groups and how each sub-group contributes to overall poverty.

B. Some Existing Poverty Measures

A widely used class of poverty measures is due to Foster, Greer and Thorbecke (1984) - hereafter FGT. Say $y=(y_1, y_2 \ldots y_n)$ is a vector of incomes ranked from lowest to highest. A poverty line z is an income level such that, by definition, people whose incomes are lower than z are poor, and an individual' s poverty gap is defined as:

$$\begin{aligned} g_j &= z - y_j \qquad && y_j \leq z \\ &= 0 && y_j > z\,. \end{aligned}$$

The general formula for the FGT class of poverty measures is:

$$P_\alpha = \frac{1}{n}\sum_{j=1}^{q}\left(\frac{g_j}{z}\right)^{\alpha} \qquad \alpha \geq 0 \tag{1}$$

where n is the total population, and q is the number of poor persons. The parameter α reflects poverty aversion; larger values put higher weight on the poverty gaps of the poorest people. If α=0, equation (1) reduces to q/n, which is the commonly used head-count ratio, *H*. Setting α=1 amounts to aggregating the proportionate poverty gaps, which shows the shortfall of the poor's income from the poverty line expressed as an average over the whole population. This gives the normalised poverty gap measure, *PG*. For example, with a poverty line of $1000 and a population of four persons, two of whom have incomes of $700 and two of whom have incomes above the poverty line, $PG = (0.3 + 0.3)/4 = 15\%$ (or alternatively, an aggregate poverty gap of $600 expressed as a ratio to $n \times z = \$4000$). Setting α=2 amounts to weighting each proportionate gap by itself and this squared poverty gap is a distributionally-sensitive measure, which is often called the poverty severity index, *PS*. Continuing the previous example, if $200 is taken from one of the poor persons and given to the other, the *PG* measure will not change because the *average* shortfall from the poverty line is unchanged, but the poverty severity index will increase from $(0.3^2 + 0.3^2)/4 = 4.5\%$ to $(0.1^2 + 0.5^2)/4 = 6.5\%$. These three poverty indicators, *H*, *PG*, and *PS* are widely used in World Bank poverty assessments and in the academic literature on poverty, although Sen's monotonicity axiom is satisfied only for α>0, the transfer axiom is satisfied only for α>1, and Kakwani's transfer-sensitivity axiom is satisfied only for α>2.

The popularity of the FGT class of poverty measures is shown in Table 1, which reports frequency of use for various poverty measures. The sample is empirical (quantitative) articles about poverty in five leading journals in development economics over the 1984-2000 period. In addition to measures from the FGT class, the other poverty measure shown in Table 1 is the Sen Index, which combines head-count and poverty gap measures with the Gini coefficient measuring inequality amongst the poor.

Almost two-thirds of the articles use the FGT class of poverty measures, with α=0,1, and 2. However, it is also notable that one-quarter of the academic articles just use the head-count index, in spite of the fact that this measure satisfies none of the standard axioms. This continued use of the head-count index suggests that for many purposes a poverty measure that is cardinally meaningful is more useful than measures that obey the various axioms. It is also the experience of the authors, that even when using the FGT class of poverty measures, it is easiest to discuss and interpret the head-count and poverty-gap indexes, in contrast to the poverty-severity index (α=2) which has only an ordinal interpretation.

III. The Average Exit Time Measure Of Poverty

To derive the average exit time measure of poverty, Morduch (1998) starts with an existing distributionally-sensitive measure, due to Watts (1968):

$$W = \frac{1}{n}\sum_{j=1}^{q}\left[\ln(z) - \ln(y_j)\right] \qquad (2)$$

where there are j individuals in the population indexed from 1 to n in ascending order of (positive) income and q is the number of people with income y_j below the poverty line z. Despite being sensitive to inequality amongst the poor, additively decomposable, and satisfying the transfer-sensitivity axiom (unlike the *PS* index), the Watts measure has not proven popular, as Table 1 indicates. This lack of use may be because, in common with other distributionally-sensitive measures (including the *PS* index), the Watts measure of poverty has no cardinal interpretation.

However, Morduch (1998) shows that simply dividing the Watts poverty measure by some hypothetical growth rate g, where g>0, gives it an interesting cardinal interpretation. This transformed index reflects the average number of years that it would take the population to exit poverty if it were possible to ensure that all incomes grow at rate g. In other words, this average exit time maps the income distribution to the space of time. It thus provides a simple metric of the potential for economic growth to reduce poverty and in this way it may help to illuminate a contested policy debate (see, for example, Dollar and Kraay, 2000).

Morduch (1998) shows that if the income of a poor person, y_j grows at a constant positive rate g per year, the number of years it will take them to reach the poverty line is:

$$t_g^j = \frac{\ln(z) - \ln(y_j)}{g}. \qquad (3)$$

For example, if the poverty line is set at \$1000, someone with an income of \$700 that grows by 3% per year will reach the poverty line, and hence exit poverty, after 12 years. The average exit time is simply t_g^j averaged over the whole population, including the non-poor for whom t_g^j=0:

$$T_g = \frac{1}{N}\sum_{j=1}^{N} t_g^j = \frac{1}{N}\sum_{j=1}^{q} \frac{\ln(z) - \ln(y_j)}{g} = W/g. \qquad (4)$$

In addition to the average exit time across the whole population, T_g, the average exit time just for the poor can be obtained, either from a separate calculation on the sub-sample of poor households, or more directly by scaling up by the head-count ratio of poverty: T_g/H.

Because equation (4) is just a transform of the Watts index, the sensitivity to inequality is preserved. Carrying on the example of a poverty line of \$1000 and a growth rate of 3%, for someone whose income is \$900 it takes 3.5 years to exit poverty while for someone whose income is only \$500 it would take 23.1 years to reach the poverty line.

Thus the average exit time in this two-person society is 13.3 years [(3.5+23.1)/2], which is higher than the 12 year exit time that would apply if the incomes of these two persons were equalised at $700. The sensitivity to inequality occurs because the average exit time measure nests the Theil index of inequality, in much the same way that the Sen index nests the Gini coefficient (Morduch, 1998).

IV. A Poverty Profile For Papua New Guinea

To compare the performance of the average exit time measure of poverty with that of the more familiar FGT class of poverty measures, data are used from a 1996 survey of households in Papua New Guinea, collected for a World Bank poverty assessment (Gibson, 2000). This survey measured the expenditures of a random sample of 1144 households, located in 73 rural and 47 urban communities. The survey did not attempt to measure incomes, but this is no disadvantage because expenditure is the preferred monetary indicator of living standards when measuring poverty (Deaton, 2000). In addition to the 'clustering' of the data, the sample was weighted and stratified, so the results reported below take account of these sample design features.

There is considerable spatial price variation in Papua New Guinea because of the rugged terrain and poor transport infrastructure. To control for this variation, a spatial price index (set for five different regions) was applied to the nominal expenditure estimates for each household, so as to convert them into national average prices prior to the calculation of the poverty measures. This spatial price index was based on a "cost-of-basic-needs" poverty line (Ravallion and Bidani, 1994) calculated from the cost of a diet of locally consumed foods providing 2200 calories per day, with an additional allowance for non-food spending. The household expenditures are also deflated for differences in household size and composition by dividing by the number of adult-equivalents, where children aged 0-6 years count as 0.5 of an adult (Gibson, 2000). The average value of deflated household expenditures is K900 per adult-equivalent per year (US$700 at the market exchange rate of US$0.76 prevailing at the time of the survey). However, there is a considerable skew in the distribution of expenditures, so the median expenditure level is only K580 (or K510 in *per capita* terms when no allowance is made for differences in consumption needs of children and adults).

Table 2 reports the FGT and average exit time poverty measures for Papua New Guinea in 1996. These poverty measures are based on a cost-of-basic-needs poverty line of K400 per adult-equivalent per year. The first two FGT poverty measures show that 30.4% of the population are classified as poor and that the aggregate poverty gap is equivalent to 9.1% of the value of the poverty line averaged over the whole population (equivalently, a gap of 30% averaged over just the poor). The aggregate shortfall from the poverty line can also be calculated in monetary terms, by multiplying the *PG* index by the value of the poverty line and by the population size (4.3 million adult-equivalents). This calculation shows that it would require perfectly targeted (and costless) transfers of K160m per year to eliminate poverty in Papua New Guinea. Although the magnitude of these first two poverty indicators, *H* and *PG*, is easily grasped, neither of them reflects the distribution of living standards amongst the poor. The poverty severity index, which is sensitive to inequality amongst the poor, has a value of 3.9% but there is no easily intuitive interpretation of this value, except in comparison to other values of the same index.

The average exit time measures in Table 2 are calculated for a potential growth rate of real consumption per adult-equivalent of 2% per year, which is consistent with the medium-term performance of the Papua New Guinea economy. The average time taken to exit poverty would be 6.2 years if this growth rate was continuous and uniform across the population. This is clearly an unrealistic, best-case, scenario because growth is rarely uniform and even more rarely continuous. However, the poverty gap measure conveys meaningful information under equally unrealistic conditions – perfect targeting and costless redistribution – but that has not diminished its usefulness.

One reason why the average exit time is ‘only’ 6.2 years is that more than two-thirds of the population are above the poverty line, so their exit time is zero. The more useful indicator for policy discussions may be the average exit time amongst the poor because otherwise policy makers might conclude that poverty can be quickly eliminated, neglecting to remember that many people are already non-poor. The average exit time for the poor population in Papua New Guinea is 20.5 years with a 2% annual growth rate. It is also possible to demonstrate the contribution of inequality to this average exit time. The average expenditure level of the poor is K280 per adult-equivalent per year,[3] and starting from this point and growing by 2% per year, it would take 17.8 years to reach the poverty line. The exit time using the average income of the poor can be denoted t_g^{avg} and Morduch (1998) shows that this is related to the average exit time of the poor by:

$$T_g \big/ H = t_g^{avg} + L_g \tag{5}$$

where L_g is the Theil index of inequality amongst the poor, divided by the growth rate g. Thus, in Papua New Guinea inequality amongst the poor adds almost three years to their average exit time.

How does the pattern of poverty vary across population sub-groups in Papua New Guinea? Table 3 reports sub-group poverty estimates and contributions to total poverty for three splits of the population; urban versus rural, male-headed versus female-headed households, and households headed by illiterates versus those headed by someone who can read. These splits are chosen to illustrate particular aspects of the poverty measures, although they are also common in poverty profiles because of their policy implications.

All poverty measures are considerably lower in the urban sector of Papua New Guinea but the gap between the sectors becomes especially apparent when using distributionally-sensitive measures. While the head-count index for the rural population is approximately three times that of the urban population, the expected number of years to exit poverty is five times that of the rural sector and the poverty severity index is five times higher. The increasing 'ruralness' of poverty as the poverty index becomes distributionally-sensitive can also be shown using the additive decomposability property of both the FGT and average exit time poverty measures. The results in the bottom half of Table 3 show that while the urban sector contains 15% of the population, it has only 5.8% of the head-count poor and contributes even less to either the average exit time or to the poverty severity index (3.4% and 2.7%).

The comparison of poverty rates for male-headed and female-headed households illustrates the importance of relying on more than just the head-count index of poverty. At first glance, it appears that poverty is higher for those in female-headed households, with the head-count rate five percentage points higher. However, all of the other poverty measures suggest the opposite conclusion. The average income of poor, male-headed, households is lower than that of poor, female-headed, households (also shown by the larger *PG* index) and it would take a poor person in a male-headed household an average of six years more to exit poverty. Calculating t_g^{avg} from the average expenditure levels of K277 and K305 for male-headed and female-headed households shows that five years of this gap is due to the lower income of the male-headed households, and one year of the gap is due to the greater inequality (a Theil index of 0.052 for poor, male-headed households versus 0.027 for female-headed households).

The reinforcing effects of a lower average and a greater inequality in expenditures amongst the poor is also apparent in the effects of literacy on poverty. Inequality amongst the poor whose household head is illiterate raises their average exit time by 3 years, as opposed to only a 1.5 year increase amongst the 'literate poor'. Thus, the group with illiterate household heads make an even larger contribution – two-thirds or more – to the $T_{2\%}$ and *PS* indexes than to the head-count index. In general, across the three population splits in Table 3, the average exit time measure shows similar patterns to the more widely used *PS* index.

Because the average exit time maps a static income distribution into the dimension of time, raising the growth rate in the calculation automatically reduces exit times, and so may be uninformative (Morduch, 1998). But there could be heuristic value in such an exercise if it can demonstrate a potential effect of unbalanced growth. For example, if annual consumption growth in the rural sector is only, say, 1% while in the urban sector it is 3%, this unbalanced growth combines with the initially lower incomes in the rural sector to produce a large gap in exit times. This is apparent from Figure 1, which shows T_g/H for each sector as *g* varies. At a 1% growth rate, the average exit time for the poor in rural areas is 42 years, while at a 3% growth rate the average exit time for the urban poor is only 7.5 years. This gap of 35 years may catch the attention of policy makers more than simply reporting the 2% difference in sector growth rates.

V. Temporal Poverty Comparisons

In addition to describing the cross-sectional pattern of poverty, the average exit time measure can also be used for temporal comparisons, to test whether poverty is increasing. In Papua New Guinea, the only previous poverty estimates are for the capital city, Port Moresby, and are based on a survey of 325 households in 1986. The expenditure estimates from this survey do not include services from dwellings and durables (in contrast to the estimates used above) and the poverty line has a more generous allowance for non-food items. Therefore the expenditure estimates for the 106 households in the 1996 survey from Port Moresby were adjusted to be comparable with the earlier data, and the poverty line was updated from its 1986 value of K620 (in the higher capital city prices rather than in national average prices).

With these adjusted expenditures and poverty lines, the head-count poverty rate in 1986 is 33.7% and in 1996 it is 29.7%. This difference is not statistically significant ($p<0.60$) so policy makers might be tempted to conclude that there had been no change in poverty over this 10-year period, at least in Port Moresby. A similar conclusion would be reached when using the poverty gap index, which although rising, does so in a statistically insignificant way.

However, a much different message about the change in poverty comes from the distributionally-sensitive measures. The poverty severity index doubled between 1986 and 1996 and the hypothesis of no change in poverty rates would be rejected, at least at the $p<0.10$ level. This rise in the *PS* index while the head-count poverty rate is falling suggests a substantial worsening of the income distribution amongst the poor. Reflecting this rising inequality, one would also expect the average exit time for the poor to rise. Table 4 shows this effect clearly, with $T_{2\%}/H$ increasing by 13.5 years during this period, which is a statistically significant change ($p<0.02$). Further evidence on the rise in inequality comes from the Theil index for the poor, which increased from 0.026 to 0.076. When rescaled into units of time, inequality amongst the poor added 1.3 years to their average exit time in 1986 and 3.8 years in 1996. The remaining 11-year increase in $T_{2\%}/H$ is due to the fall in the average living standards of the poor, with mean expenditures at only 59% of the poverty line in 1996, compared with 74% in 1986.

These divergent trends in poverty measures since 1986 once again emphasise the importance of using poverty indicators that are sensitive to inequality amongst the poor – poverty is about much more than just how many are poor and how big is their average shortfall from the poverty line. Even though the average exit time measure is designed to demonstrate the potential effects of growth on poverty, it is also a useful tool in settings, such as Port Moresby, where a major contributor to poverty appears to be rising inequality amongst the poor.

VI. Conclusions

This paper has demonstrated the practical usefulness of the average exit time measure of poverty developed by Morduch (1998). This average exit time measure of poverty is distributionally-sensitive, additively decomposable and satisfies the standard poverty axioms and its performance in cross-sectional and temporal poverty comparisons is shown here to be comparable to that of the more widely used poverty severity index. But a key advantage of the average exit time is that it is cardinally meaningful; the particular values of this poverty measure can be used to answer an interesting economic question: under best-case conditions of continuous and evenly distributed growth, how long would it take to be free of poverty?

Using the average exit time measure, as either a supplement to the popular FGT poverty measures or else as a replacement for the poverty severity index, does not reduce the need for poverty analysts to develop data-sets that show the actual dynamics of poverty. The limited set of longitudinal studies available in developing countries show that many people move repeatedly into and out of poverty (see, for example, World Bank, 1990, p.35). Rather than being a replacement for the data needed to study this transient poverty, the average exit time measure provides a framework for thinking about what a given income distribution implies about the dynamics of poverty reduction. Indeed, the average exit time measure could be used as a type of frontier for exercises that use actual longitudinal data on poverty spells to measure the cost – in terms of longer duration of poverty – of unevenly distributed and unstable economic growth.

Notes

[1] The Social Science Citation Index records only one article that has cited Morduch (1998), and this reference is only as an aside. Hence, except for the initial illustrations by Morduch himself, the average exit time measure does not appear to have been used in applied poverty research.

[2] In comparison, the Philippines which is usually considered to have a high degree of inequality, has a Gini coefficient of only 0.46.

[3] This average can be calculated as $(PG/H)\times z$, or (0.091/0.304)×400 in the current case.

References

Deaton, A. (2000). *Counting the World's Poor: Problems and Possible Solutions*. (Mimeo) Princeton, NJ: Research Program in Development Studies, Princeton University.

Dollar, D., & Kraay, A. (2000). *Growth is Good for the Poor.* Washington, DC: The World Bank.

Foster, J., (1994). Normative measurement: Is theory relevant? *American Economic Review,* **84** (2), 365-370.

Foster, J., Greer, J. & Thorbecke, E. (1984). A class of decomposable poverty measures. *Econometrica*, **52** (3), 761-766.

Gibson, J. (2000). The Papua New Guinea Household Survey. *Australian Economic Review*, **33** (4), 377-380.

Kakwani, N. (1980). On a class of poverty measures. *Econometrica,* **48** (2), 437-446.

Morduch, J. (1998). Poverty, Economic growth and average exit time. *Economics Letters*, **59** (3), 385-390.

Ravallion, M., & Bidani, B. (1994). How robust is a poverty profile? *The World Bank Economic Review,* **8** (1), 75-102.

Sen, A.K., (1976). Poverty: An ordinal approach to measurement. *Econometrica,* **44** (2), 219-231.

Watts, H., (1968). An economic definition of poverty. In Daniel P. Moynihan (Ed), *Understanding Poverty* (pp. 316-329). New York: Basic Books.

World Bank, (1990). *World Development Report.* New York: Oxford University Press.

World Bank, (2001). *World Development Indicators*. New York: Oxford University Press.

TABLE 1

Popularity of Poverty Measures in Academic Journals, 1984-2000

Poverty Measure	Frequency	Percentage
FGT class (*H*, *PG*, and *PS*)	19	61.3%
Head-count index (*H*) only	8	25.8%
Poverty-gap index (*PG*)	1	3.2%
Head-count and poverty severity (*PS*) indexes	1	3.2%
Sen Index	1	3.2%
Head-count, poverty-gap and Sen indexes	1	3.2%
TOTAL	31	100.0%

Source: Author's calculations from articles in *Economic Development and Cultural Change, Journal of Development Economics, Journal of Development Studies, World Bank Economic Review and World Development.*

TABLE 2

Aggregate Poverty In Papua New Guinea, 1996[a]

FGT Poverty Measures			Average Exit Time Measures	
H (α=0)	*PG* (α=1)	*PS* (α=2)	($T_{2\%}$)	($T_{2\%}/H$)
30.4	9.1	3.9	6.2	20.5
[2.6]	[1.1]	[0.6]	[0.8]	[1.6]

[a] Standard errors in [ ] are adjusted for the clustering, weighting and stratification of the data.

Source: Author's calculations from 1996 Papua New Guinea household survey data.

TABLE 3

Distribution of Poverty by Population Sub-Groups in Papua New Guinea

	Location		Characteristics of Household Head			
	Rural	Urban	Male	Female	Literate	Illiterate
Head-count index (*H*)	33.6	11.8	30.0	35.4	22.1	40.6
Poverty gap index (*PG*)	10.4	2.3	9.2	8.4	5.9	13.2
Poverty severity (*PS*)	4.5	0.7	4.0	3.0	2.2	6.1
Average exit time ($T_{2\%}$)	7.1	1.4	6.3	5.3	3.8	9.2
$T_{2\%}/H$	21.0	11.9	20.9	14.9	17.1	22.7
Mean income of poor	277	322	277	305	293	270
Contribution to total						
Population	85.0%	15.0%	93.5%	6.5%	55.4%	44.6%
Head-count index (*H*)	94.2%	5.8%	92.4%	7.6%	40.4%	59.6%
Poverty gap index (*PG*)	96.2%	3.8%	94.0%	6.0%	35.8%	64.2%
Poverty severity (*PS*)	97.3%	2.7%	95.1%	4.9%	30.9%	69.1%
Average exit time ($T_{2\%}$)	96.6%	3.4%	94.5%	5.5%	33.8%	66.2%

Source: Author’s calculations from 1996 Papua New Guinea household survey data.

TABLE 4

Poverty Comparisons for Port Moresby, Papua New Guinea, 1986 and 1996[a]

	FGT Poverty Measures			Average Exit Time Measures	
	H (α=0)	*PG* (α=1)	*PS* (α=2)	($T_{2\%}$)	($T_{2\%}/H$)
1986	33.7	8.9	3.1	5.5	16.5
	[3.7]	[1.3]	[0.6]	[0.8]	[1.3]
1996	29.7	12.1	6.3	8.9	30.0
	[6.7]	[2.9]	[1.8]	[2.3]	[5.1]
t-test for difference	*t*=0.53	*t*=1.04	*t*=1.71	*t*=1.36	*t*=2.58
p-value	0.60	0.30	0.09	0.18	0.01

[a] Standard errors in [ ] and *t*-tests are adjusted for the clustering, weighting and stratification of the data.

Source: Author's calculations from 1986 and 1996 Port Moresby household survey data.

FIGURE 1
Average Exit Time of the Poor Population