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The Poverty Elasticity of Growth

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Abstract

How much does economic growth contribute to poverty reduction? I discuss analytical and empirical approches to assess the poverty elasticity of growth, and emphasize that the relationship between growth and poverty change is non-constant. For a given poverty measure, it depends on initial inequality and on the location of the poverty line relative to mean income. In most cases, growth is more important for poverty reduction than changes in inequality, but this does not tender inequality unimportant. Reduction in inequality may be triple effective: (1) it will reduce poverty for a given level of income, (2) it will accelerate the poverty reducing impact of economic growth, and (3) according to cross-country growth regressions, it may contribute to a larger rate of growth.

Keywords: poverty, poverty reduction, economic growth, inequality

JEL classification: I31, O40

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The Growth Elasticity of Poverty

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Abstract

How much does economic growth contribute to poverty reduction? I discuss analytical and empirical approaches to assess the growth elasticity of poverty, and emphasize that the relationship between growth and poverty change is non-constant. For a given poverty measure, it depends on initial inequality and on the location of the poverty line relative to mean income. In most cases, growth is more important for poverty reduction than changes in inequality, but this does not render inequality unimportant. Reduction in inequality may be triple effective: (1) it will reduce poverty for a given level of income, (2) it will accelerate the poverty reducing impact of economic growth, and (3) according to cross-country growth regressions, it may contribute to a larger rate of growth.

JEL-codes: I31, O40.

1 Introduction

Soci l scientists h ve long deb ted the rel tionship between growth nd poverty. One side in this discussion is represented by growth-optimists, who believe in "trickle-down", i.e. the notion th t growth in ver ge incomes utom tic lly sinks down to nd benefit the poor. The opposing view puts the distribution of income nd we lth t the centre-st ge, nd rgue th t reductions in inequ lity re required to comb t poverty. This includes dherents of the notion of "immiserizing growth", i.e. the ide th t growth in ver ge income m y well occur t the s me time s l rge groups of people re being incre singly impoverished. During the 1990s, the prolifer tion of qu lity d t on income distribution from number of countries h s llowed rigourous empiric l testing of st nding deb tes such s this one.

D tt nd R v llion (1992) developed method to decompose ch nges in poverty into "growth effect", stemming from ch nge in ver ge income, nd "distribution effect", c used by shifts in the Lorenz curve holding ver ge income const nt. Using d t from Indi nd Br zil, they found the growth effect to expl in the l rgest p rt of observed ch nges in poverty. Simil r results h ve been found in number of other developing countries by other rese rchers. White nd Anderson (2001), looking not t poverty but t the income of the bottom 20 percent, lso found growth to be, on ver ge, much more import nt th n distribution l ch nge. Signific nt work h s lso been done b sed on cross-country comp risons of d t "spells", me ning inst nces where two or more comp r ble household surveys re v il ble from the s me country t different points of time. Such spells provide the d t needed for det iled household-level n lysis of growth, poverty nd inequ lity. An lyses b sed on spells h ve found th t incre ses (decre ses) in me n income tend to be strongly nd signific ntly ssoci ted with f lling (incre sing) poverty r tes (e.g., R v llion, 1995 nd 2001).

Fields (2001, pp. 97-98) summ rizes the liter ture this w y: "twenty ye rs of rese rch h s shown convincingly th t in cross section of countries, those with higher per c pit income or consumption h ve less poverty. The cross-section l version of the bsolute impoverishment hypothesis h s been thoroughly discredited". Moreover, there is subst nti l evidence to indic te th t, usu lly, distribution l ch nge is too little nd too slow to be relied upon for poverty reduction. Growth is, in pr ctice, the m in tool for fighting poverty (Bruno, R v llion nd Squire, 1998; Squire, 1993).

However, the imper tive of growth for comb ting poverty should not be misinterpreted to me n th t "growth is ll th t m tters". Growth is necess ry condition for poverty llevi tion, no doubt, but inequ lity lso m tters nd should lso be "on the gend " (K nbur nd Lustig, 1999). Growth nd distribution re interconnected in numerous w ys, nd the effectiveness with which growth tr nsl tes into poverty reduction depends cruci lly on initi l inequ l-ity. Although emph sized by R v llion (1997), this simple nd obvious f ct is too often overlooked. For ex mple, poverty projection studies by H nmer nd N schold (1999) nd Doll r nd Collier (2001) re b sed on const nt el sticity linking poverty reduction to the r te of growth. Such projections yield imprecise results bec use they f il to t ke ccount of how the growth el sticity of poverty depends on initi l inequ lity nd level of development (poverty line rel tive to me n income).

This short p per surveys the liter ture on the growth-poverty rel tionship, seeking to synthesise empiric l nd theoretic l work in this import nt nd still emerging field. I rgue th t the "growth-versus-distribution" dichotomy is f lse: the growth el sticity of poverty is non-const nt, nd depends on f ctors such s initi l inequ lity nd the level of development. Inequ lity therefore does m tter to poverty llevi tion.

2 Analytics of the growth elasticity of poverty

There re some precise n lytic l results on the growth el sticity of poverty provided one is willing to m ke the r ther dr stic ss

$$\eta_\theta = \frac{1}{\theta}\int_0^z x\frac{\partial P}{\partial x}f(x)dx. \tag{3}$$

This is lw ys neg tive. For he dcount poverty, this implies n el sticity of $\eta_H = -zf(x)/H$, which shows the percent ge of the poor who will cross the poverty line if ll incomes incre se by 1 percent (K kw ni, 1993 nd 2001). For the FGT-me sures with $\alpha \neq 0$, the el sticity is

$$\eta_\alpha = -\frac{\alpha(P_{\alpha-1} - P_\alpha)}{P_\alpha} \tag{4}$$

which will lw ys be neg tive. For the poverty g p me sure, $\alpha = 1$, this gives $\eta_1 = -\mu^*/(z-\mu^*)$, where μ^* is the ver ge income of the poor. Since μ^*/z is the inverse of the depth of poverty, this shows th t the poverty el sticity incre ses (decre ses) in bsolute v lue the lower (higher) is the depth of poverty. Chen nd R v llion (2001) use this formul to c lcul te the el sticity of P_1 poverty, nd find glob l ver ge of -2.39 for the 1$/d y line. The corresponding region l ver ges r nge from -4.4 for the Middle E st nd North Afric to just -1.67 for Sub-S h r n Afric , prob bly reflecting differences in the incidence of poverty.

2.2 An illustration

It m y be useful to illustr te these el sticities using re l-world income distributions. This helps bring out the m gnitudes nd the non-line rities involved in the growth el sticity of poverty for specific developing countries. To do so, I used household survey d t from Moz mbique, Vietn m nd South Afric . Moz mbique w s chosen for its high level of poverty, Vietn m for its equ l distribution nd r pid poverty reduction during the 1990s, nd South Afric for its high degree of inequ lity. T ble 1 summ rises for e ch country its he dcount r te (b sed on n tion l poverty lines, nd therefore not comp r ble cross countries), Gini coefficient, s mple size nd the source of the d t . All d t come from n tion lly represent tive household surveys. The income v ri ble used here is tot l re l per c pit d ily expenditure in line with most of the liter ture.

Table 1: Summary statistics for income data

	Moz mbique	Vietn m	South Afric
He dcount r tio	0.69	0.37	0.25
Gini index	0.396	0.345	0.586
S mple size	8250	5999	8783
d t source	IAF 1996-97	VLSS 1997-98	Integr ted Household Survey 1993-94

I simul ted the imp ct of distribution-neutr l growth by m int ining the income distribution fixed, nd c lcul ting the growth el sticity for r nge of

rtifici l "poverty lines" sp nning from the 1st percentile (where 99 percent re poor) to the 99th percentile, where just 1 percent is poor.[1] In Figure 1-4, the horizont l xis shows the loc tion of the poverty line, with the movement from left to right mimicking the imp ct of distribution-neutr l growth in terms of reducing $z/\overline{x}$. El sticities re shown on the vertic l xes. Figure 1 comp res the el sticities for he dcount poverty, η_H, for these three countries, Figure 2 comp res P_1 el sticities, η_{P_1}, nd Figure 3 η_{P_2}.

The figures show th t for given income distribution, the bsolute v lue of the poverty el sticity incre ses s ver ge income grows rel tive to the poverty line. Thus, poverty is more (less) el stic to growth the lower (higher) is poverty. For ny given loc tion of the poverty line nd P_α, poverty el sticities re l rgest (in bsolute v lue) in Vietn m, which h s the most equ l income distribution, nd lowest in South Afric , which is the most unequ l of these countries. The dependence of the poverty el sticity on $z/\overline{x}$ ppe rs even more pronounced for Vietn m th n for the other countries. This is bec use Vietn m is more equ l, lso t the bottom of the distribution, th n Moz mbique nd South Afric . It c n be seen th t the poverty el sticity incre ses with α: depth nd severity of poverty responds more el stic lly to growth th n the he dcount.

These results m y be h rd to underst nd intuitively. One m y sk, rigtly, if the imp ct of growth on poverty does not depend on the loc tion of the poverty line vis-à-vis the bulk of the income distribution? After ll, if m ny people re loc ted t, or slightly below, the poverty line, economic growth should h ve l rge imp ct. The key to underst nd the bove results is th t they refer to the *percentage change* in poverty, not the *absolute change* in the number of poor. To illustr te this point, I plot in Figure 4 the ch nge in he dcount level (number of people moving from below to bove the poverty line) for South Afric in response to ch nges in me n income. It c n be seen th t t the loc tion of the current n tion l poverty line (indic ted by vertic l b r), subst nti l number of people will be shifted out of poverty by distribution-neutr l growth. Yet the imp ct on the he dcount r te will quickly reduce in bsolute m gnitude if growth in me n income is sust ined. If, on the other h nd, me n incomes were to f ll, l rge number of people would be moving into poverty in South Afric .

The Development Assist nce Committee (DAC) of the OECD h s set some offici l development t rgets, one of which is to cut glob l poverty by h lf between 1990-2015. Existing projection studies (H nmer nd N schold, 1999; Collier nd Doll r, 2001) use const nt el sticities to nswer th t question. The ppro ch

[1] The following approximation was used:

$$\eta_\alpha(\frac{z}{\overline{x}}, \alpha; L) \simeq -\frac{[P_\alpha(z_j) - P_\alpha(z_{j-1})]/P_\alpha(z_{j-1})}{[z_j - z_{j-1}]/z_{j-1}}, j = 1, 2, ..., 99;\ \alpha = 0, 1, 2 \qquad (5)$$

where $\overline{x}$ is average income, L is the Lorenz curve (kept fixed), and j denotes the percentile of the income distribution. The nominator is the proportionate change in the FGT poverty measure (for $\alpha = 0, 1, 2$) and the denominator is the proportionate change in the poverty line as it is being shifted from the j-1 to the jth percentile. This illustrates the process of development and growth in real-world income distributions, but maintaining the assumption of no changes in distribution.

dopted in this section c n be used to provide more precise nswer. B sed on the ctu l d t for these three countries, I c lcul ted how much growth in me n household income is required to reduce poverty by h lf (rel tive to the survey ye r) in 25 ye rs. I ssume const nt distribution nd const nt sh re of household income to GDP. The result is shown in T ble 2. Moz mbique needs 2.1 percent re l nnu l per c pit growth to h lve poverty in 25 ye rs. For Vietn m just 1.1 percent growth p. . per c pit will suffice, where s for South Afric 1.8 p. . per c pit is required. Given their p st growth record, chieving the t rget of h lving he dcount poverty in 25 ye rs seems fe sible for Vietn m nd Moz mbique. South Afric will need subst nti l improvement in the r te of growth, in distribution, or in both to chieve the development t rget. This cle rly illustr tes the import nce of inequ lity: Vietn m's highly equ l income distribution me ns th t economic growth in th t country tr nsl tes into poverty reduction in very effective m nner. To chieve comp r ble r te of poverty reduction, countries with unequ l income distribution h ve to grow lot f ster. In this context, poverty llevi tion in South Afric is f cing the double hurdle of sluggish growth in income nd unequ l distribution.

Table 2: Actual and required growth rates

	Annu l re l per c pit growth r tes		
	Moz mbique	Vietn m	South Afric
Required to h lve poverty in 25 ye rs	2.1	1.1	1.8
Actu l GDP growth r te 1995-99	6.0	5.96	0.43

2.3 A log-linear approximation

Bec use inequ lity c n ch nge in countless w ys, it is h rd to s y nything gener l bout the growth-poverty rel tionship when the distribution is llowed to ch nge during growth. K kw ni (1993) developed formul for the inequ lity el sticity of poverty under the ssumption of n equ l proportion te ch nge in the Lorenz curve. Another ro d he d is to ssume p rticul r function l form for the income distribution, nd work out the growth-inequ lity-poverty rel tionship for th t distribution. In recent unpublished p per, Bourguignon (2000) does this, ssuming incomes follow the log-line r distribution. He derives n explicit formul linking the growth-el sticity of he dcount poverty to me n income nd inequ lity in the log-line r c se:

$$\widetilde{\eta_H} = -\frac{\Delta H}{H_t}\frac{1}{\Delta Log(\overline{x})} = \frac{1}{\sigma}\lambda[\frac{Log(z/\overline{x})}{\sigma} + \frac{\sigma}{2}] \qquad (6)$$

where $\Delta Log(\overline{x})$ is the proportion te ch nge in income, $\Delta H/H_t$ is the proportion te ch nge in he dcount poverty, σ is the st nd rd devi tion of log income nd λ is the r tio of the density to the cumul tive function - or h z rd r te - of the st nd rd norm l distribution. Expression (6) shows th t the growth el sticity of poverty is n incre sing function of development - the inverse of $z/\overline{x}$ - nd decre sing function of income inequ lity s me sured by σ. Bourguignon

(2000) lso develops formul for the el sticity of P_1 poverty. Both these formul e provide explicit proof, in the c se where income follows the log-norm l distribution, for the points m de bove, n mely th t the growth el sticity of poverty incre ses with development nd decre ses with rising inequ lity.

3 Regression estimates of the growth elasticity of poverty

In re lity, inequ lity c n nd does ch nge in numerous w ys in response to growth nd multiple other f ctors. How responsive is poverty to growth in me n income when the Lorenz curve is free to v ry? Cle rly, this is n empiric l issue. One might n ively try to ddress this issue by regressing the r te of poverty on me n income for r nge of countries. However, such level-b sed poverty comp rison cross countries suffers from numerous shortcomings, nd could potenti lly be misle ding due to problems rising from currency conversions, me surement errors nd omitted country-specific fixed effects correl ted with income (R v llion, 1995). Differencing provides solution bec use it removes ny country-specific fixed effects.

Therefore, s mentioned in the Introduction, d t on growth spells from multiple countries re ppropri te for helping to determine the size of the v- er ge poverty el sticity in ctu l growth experiences, i.e. without imposing distribution l ssumptions. D t on spells c n lso help determine if there is symmetry in the w y th t incre sing nd decre sing ver ge incomes ffect the poor. During the 1990s, there h s been r pid exp nsion in the number of n tion lly represent tive household surveys, nd m ny countries now h ve two or more surveys v il ble. This h s resulted in much better underst nding of the poverty-inequ lity-development nexus (Fields, 2001).

poverty line at 75 percent of median income for the full sample, and -0.69 when the poverty line was 100 percent of median income. The sample of household survey spells continues to grow. Based on 115 spells, Ravallion (2001) reports $\eta_0 = -2.5$ ($R^2 = 0.44$) based on the \$1/day international poverty line.

An implication of these studies is symmetry in the manner in which rising and falling median income affects the poor. Equal economies have high absolute value of the growth elasticity, implying that the poor gain larger share of growth and loose more from contraction. Conversely, unequal societies have small absolute η, and this protects the income of the poor during contraction.

The above regressions likely suffer from misspecification because they treat the growth-poverty relationship as governed by some fixed elasticity, ignoring its dependency on inequality and level of development. Recent literature has therefore moved on to address directly the dependence of the growth elasticity on inequality. Ravallion (1997) regressed the rate of poverty reduction (based on \$1.50/day PPP line) on an encompassing model including growth, inequality measured by the Gini index, interaction terms betwen them, and all of their squared terms. He found statistically acceptable restricted form of the general model to be

$$\frac{\Delta H}{H_t} = 4.435(1 - Gini_t)\frac{\Delta x}{x_t} + \text{residual} \quad (N = 41;\ R^2 = 0.36). \tag{7}$$

Based on this, Ravallion (1997) concludes that it is the *distribution-corrected rate of growth ([1- Gini]·the rate of growth)* that matters. The estimates imply that, at the lowest Gini in his sample (0.25), the growth elasticity of \$1.5/day headcount poverty is -3.3, while at the highest Gini (0.59) it is -1.8. At the median Gini index (0.41), the elasticity is -2.6. Ravallion (2001) repeated the exercise on a larger data set, and found a quite similar result: $\Delta Log P_0 = -3.74(1 - Gini_t)\Delta Log(x) + \text{residual}$ ($N = 115$; R^2 not reported).

The distribution-corrected rate of growth is an interesting concept that helps us understand better how inequality shapes the impact of growth on poverty. Since the distribution-corrected rate of growth does not explicitly take into account the dependence of the growth elasticity of poverty on the level of development ($z/\overline{x}$), it is potentially vulnerable to the misspecification of imposing constant elasticity to a more complex non-linear relationship. Ravallion (1997) tested for this and found (7) statistically acceptable. Future studies seeking to apply the distribution-corrected rate of growth as an explanatory variable will also need to pay careful attention to this issue.

Bourguignon (2000) explored various models based on a data set comprised of 116 growth spells from 52 different countries. The best fit was obtained by the following model

$$\frac{\Delta H}{H_t} = 0.05 + 5.23\Delta Gini - 1.14 x_t \widetilde{\eta_H} + \text{residual} \quad (N = 116;\ R^2 = 0.508) \tag{8}$$

where $\widetilde{\eta_H}$ is the theoretically expected value of the growth-poverty elasticity that can be obtained from equation (6) i.e., based on assuming incomes are

log-norm l. Bourguignon (2000) refers to this s n "identity check" on the logic l identity linking growth nd poverty (equ tion 6) under the ssumption th t incomes re log-norm l. This identity is "confirmed" by finding p r meter not signific ntly different from unity. Unfortun tely, Bourguignon (2000) did not directly comp re his model to the distribution-corrected r te of growth, $(1 - Gini_t)\Delta Log(x)$. However, lthough the regression in (8) incorpor tes the log-norm l growth-poverty "identity", it does not give perfect fit with 50 percent of the v ri tion in the d t un ccounted for. It therefore ppe rs th t re l-world distributions nd distribution l ch nges re more complex th n wh t is c ptured by the log-norm l. The best fit is likely to incorpor te non-line rities nd inter ctive terms between the poverty line rel tive to ver ge income, inequ lity nd growth.

4 Conclusions

Summing up, the conclusions of this p per re the following. First, the m gnitude of the poverty el sticity of distribution neutr l ch nges in me n income depends on the loc tion of the poverty line nd hence should not be tre ted s const nt cross countries or time. It incre ses monotonic lly with incre sing me n income, holding the poverty line const nt.

Second, s R v llion (1997) emph sized, the poverty el sticity depends strongly on the degree of inequ lity. An unequ l income distribution is serious impediment to effective poverty llevi tion. Third, s consequence of this the "growth versus redistribution" dichotomy is f lse. It is uninform tive to decompose poverty ch nges into growth nd distribution component. The growth effect is itself function of the degree of inequ lity.

It is true th t redistribution often h s limited potenti l nd th t growth is necess ry condition for poverty llevi tion. Yet the level of inequ lity, nd ch nges therein, still m tters. This is bec use (i) for ny given level of verge income, the level of inequ lity ffects the degree of poverty; (ii) inequ lity strongly ffects the growth el sticity of poverty, nd lower inequ lity contributes to n cceler tion of poverty reduction for given r te of growth; (iii) if recent cross-country regression studies re true, initi l inequ lity, especi lly sset inequ lity, is h rmful for growth (see for ex mple Deininger nd Olinto, 2000). For these re sons, inequ lity still m tters, nd the se rch for effective policies for reducing inequ lities, or t le st prevent them from rising, goes on.

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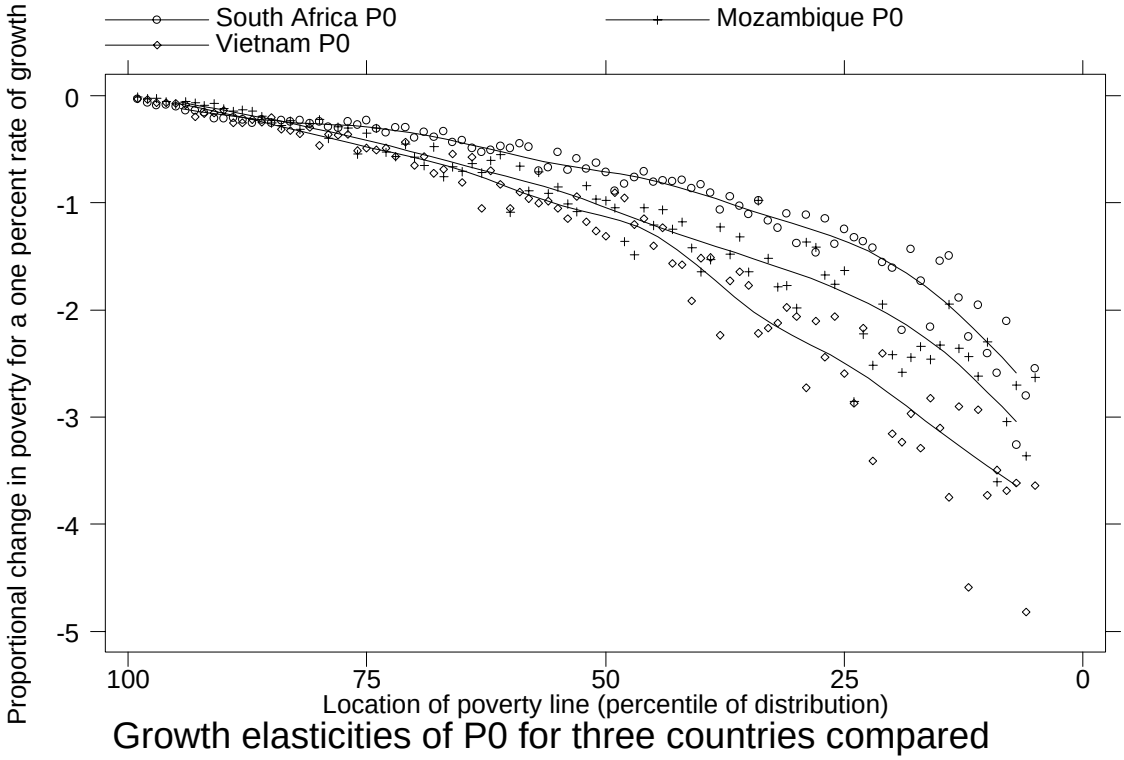
South Africa P0
Mozambique P0
Vietnam P0
Proportional change in poverty for a one percent rate of growth
0
-1
-2
-3
-4
-5
100
75
50
25
0
Location of poverty line (percentile of distribution)
Growth elasticities of P0 for three countries compared

Figure 1:

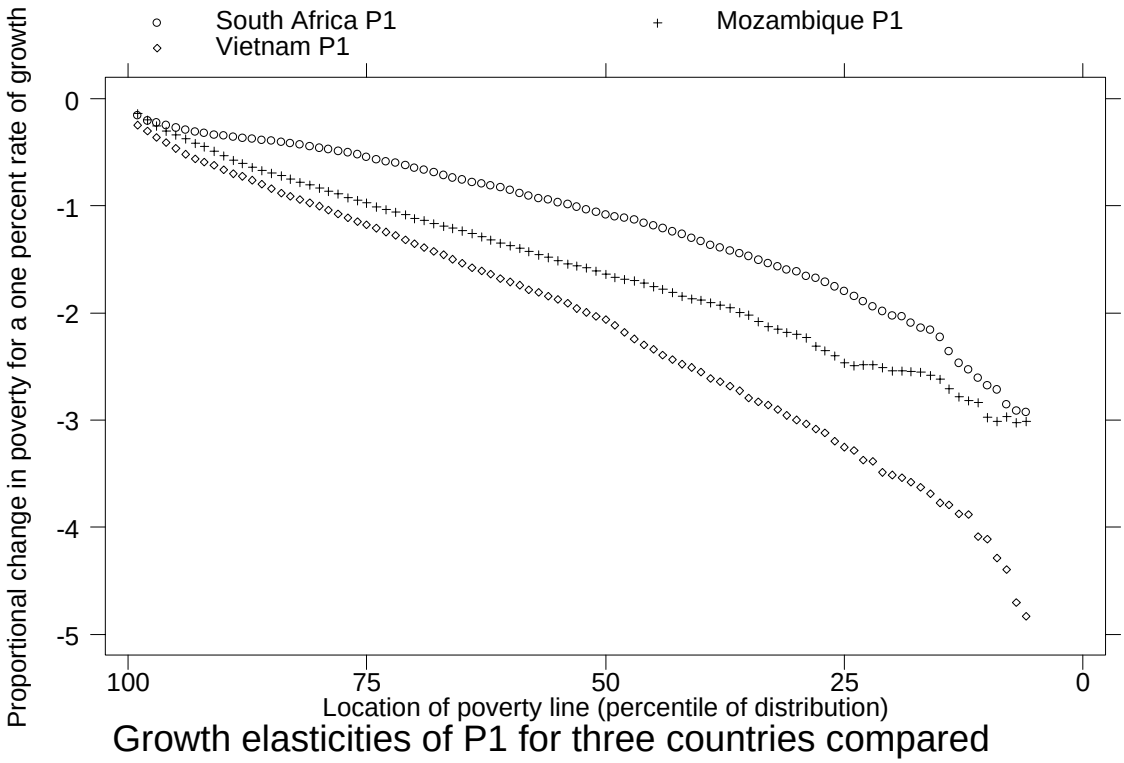
South Africa P1
Mozambique P1
Vietnam P1
Proportional change in poverty for a one percent rate of growth
0
-1
-2
-3
-4
-5
100
75
50
25
0
Location of poverty line (percentile of distribution)
Growth elasticities of P1 for three countries compared

Figure 2:

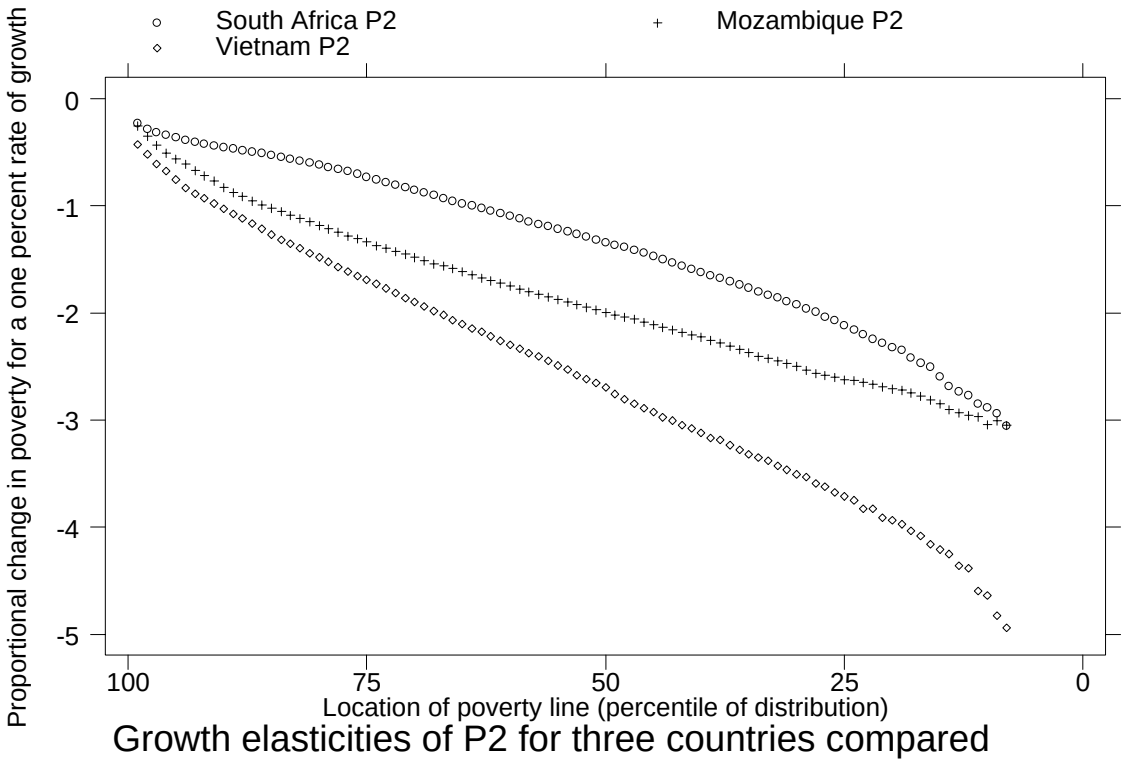
South Africa P2
Mozambique P2
Vietnam P2
Proportional change in poverty for a one percent rate of growth
0
-1
-2
-3
-4
-5
100
75
50
25
0
Location of poverty line (percentile of distribution)
Growth elasticities of P2 for three countries compared

Figure 3:

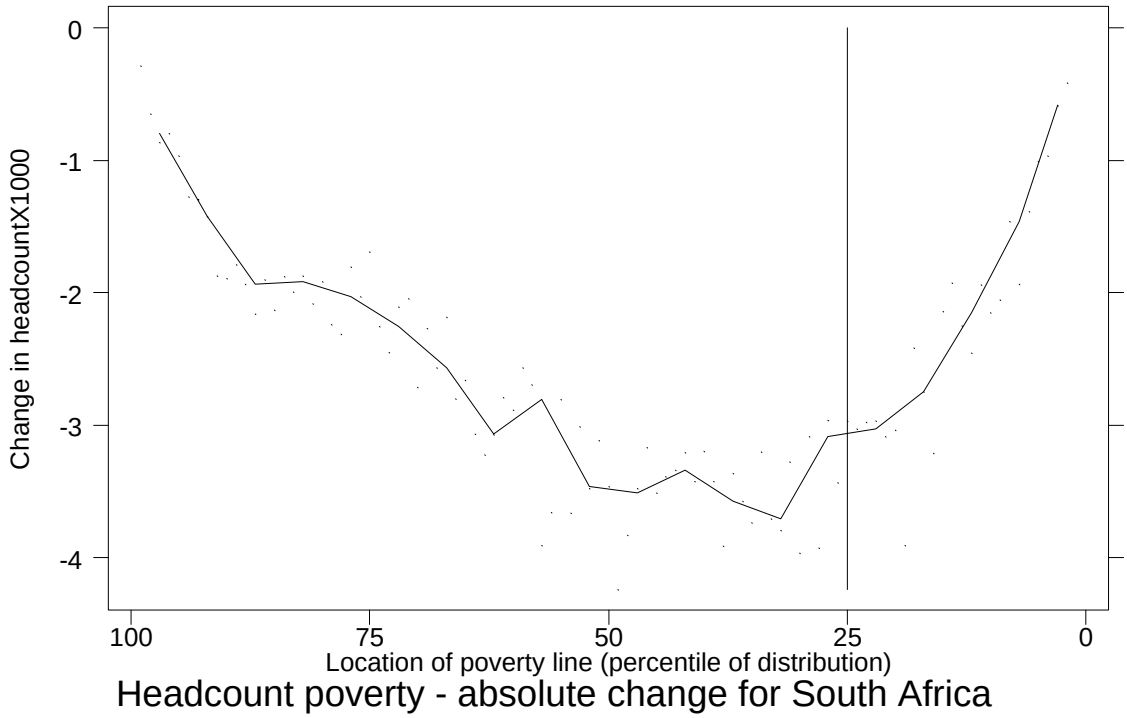
0
-1
-2
-3
-4
Change in headcountX1000
100
75
50
25
0
Location of poverty line (percentile of distribution)
Headcount poverty - absolute change for South Africa

Figure 4: