Pro-poor growth or poverty trap? : estimating intergenerational income mobility in rural Philippines

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February 2013

Abstract

Using an intergenerational database covering nearly a quarter of a century, we explored the degree of intergenerational income mobility among individuals who had grown up in rural Central Luzon, the Philippines. We found that the intergenerational income elasticity is significantly lower than unity, at roughly 0.23, indicating that the average income growth rate is higher for children born to poorer families. The detailed analysis, however, revealed that its magnitude significantly varies across percentiles in a U-shape. The results provide supporting evidence of multiple equilibria or poverty trap.

Keywords: Rural Poverty, Economic Mobility, the Philippines
JEL classification: D31, I30, O12

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Abstract

Using an intergenerational database covering nearly a quarter of a century, we explored the degree of intergenerational income mobility among individuals who had grown up in rural Central Luzon, the Philippines. We found that the intergenerational income elasticity is significantly lower than unity, at roughly 0.23, indicating that the average income growth rate is higher for children born to poorer families. The detailed analysis, however, revealed that its magnitude significantly varies across percentiles in a U-shape. The results provide supporting evidence of multiple equilibria or poverty trap.

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1. Introduction

Poverty eradication has been the central political issue in most developing countries. In particular, the literature consistently demonstrates that a vast majority of the poor live in rural areas, suggesting that poverty is a predominantly rural phenomenon (e.g., Schultz, 1980; Takahashi and Otsuka, 2009).

Rural poverty is serious in not only its incidence, but also its duration. With insufficient investment capacity in productive assets, many rural poor households fall into a low-income trap, enduring poverty over extended periods, even across generations. Indeed, researchers often express pessimistic views of children born in poor households as being likely to remain poor because of their parents' limited investment capability toward education, insufficient land inheritance, and other factors.

Despite such concerns, the structure of intergenerational correlations remains relatively under-studied in the research on developing economies, mainly because of data unavailability.[1] This study intends to fill this significant research gap by exploring the degree of intergenerational income mobility in a developing country. For this purpose, we use unique panel data collected in the rural Philippines in 1979–2003, tracing the incomes of children who were school-age or younger (0–24-year-olds) in the first survey conducted in 1979, and were in the labor force (24–48-year-olds) and lived in the original provinces in the latest survey in 2003. Although this procedure involves sample selection, the survey structure provides us with an opportunity to match and compare children's living standards with those of parents.

The remaining part of this paper is organized as follows. Section 2 discusses

[1] This topic has attracted considerable attention in developed countries. See Becker and Tomes (1986), Behrman and Taubman (1990), and Solon (1992) for seminal works.

the data source, and examines changing socio-economic conditions across generations. Section 3 demonstrates our estimation strategy and Section 4 discusses the estimation results. Section 5 concludes the paper.

2. Data

2.1.Data Source

This study uses the data from Central Luzon Loop Survey (CLLS), collected by the International Rice Research Institute in collaboration with the Foundation for Advanced Study on International Development. CLLS is a set of recurrent sample surveys of rice-growing farmers in Bulacan, Nueva, Ecija, Tarlac, Pampanga, and Pangasinan Provinces of the Central Luzon, starting from 1966 and being updated almost every four years since then. The first CLSS in 1966 targeted for a total of 92 rice-growing farm households, excluding landless agricultural wage laborer class as well as non-farm households from the sample, in order to intensively examine evolutionary changes in rice production systems and living standards of farmers under the waves of modernization. Although it was desired to track the same set of households to construct a balanced panel data set, it suffered from a high rate of attrition both at the individual level and at the household level since 1966 largely because of death, migration, rejection of interview, and the retirement from rice production by respondents. Thus, the 1979 CLSS made a comprehensive re-sampling to increase observations with an aim to represent a population of the surveyed provinces at that time, which covered a total of 146 farmers selected from the same five provinces in 1966.

In 2003, an additional survey scheme was introduced to construct an

intergenerational database. A follow-up survey was conducted to trace the latest information of selected individuals who appeared in the 1979 survey as children or extended family members of the original respondent (hereafter, we just call them “children”, regardless of the true kinship), school-aged or younger at that time and in the labor force as of 2003. Since primary school starts at age 6, children can graduate from 5-year universities at the age of 21 if they do not repeat grades and do not fail entrance exams. However, since repeating and failing entrance exams are not uncommon, we consider children below 24 years old in 1979 as the target group. Due to these selection rules, the age-range of the sample is restricted between 24 and 49 years old as of 2003. To update the information, we first visited the original sample households and asked them to report on the basic socioeconomic conditions of the target children, such as completed years of education, current occupation, and contact address. Based on the information gathered, we conducted a detailed household survey by direct interviews with the target children as long as they were in their original provinces and earned any individual labor income at the time of survey.

2.2.Descriptive Statistics

Table 1 reports the sample distribution by labor status and workplace in 2003. Children are classified in “local” if they if they lived in the same provinces as reported in the 1979 survey.

In total, our sample comprises 499 children, of which approximately 65% resided in their original regions while the rest moved to either Metro Manila, other domestic regions, or abroad. Of the 242 individuals who lived in the local area and earned any sort of income in 2003, the detailed follow-up survey could cover 219

individuals.

Table 2 shows selected socio-economic variables across generations. The 1979 survey relies on data on parents, while the 2003 survey relies on data on children. The data on parental age, sex, and education reflect the head of household's information in 1979, while those of children reflect individual characteristics of the target children in 2003. Children's income is deflated by the consumer price index (CPI). To render income data as comparable, provincial-level spatial price differences are taken into account. The poverty threshold is drawn from the National Statistical Coordination Board (NSCB) in the Philippines. Following the NSCB method, we did not rescale per capita income (PCI) to the adult equivalent term.

The average age of the sample children is all round 35 years old, regardless of living place and working status in 2003. Children in local areas, but not working on the labor markets at the time of survey, are predominantly female. The female ratio is also higher among migrants to abroad. The education level of children improved markedly from that of parents. Among children, migrants' completed years of education are significantly higher than non-migrants. The highest education level is found among overseas migrants. This may be because high school diplomas are generally required for overseas workers in order to ensure fluent English communication with foreigners (Hayami and Kikuchi 2000).

A glance to the table also establishes that income and poverty profiles improved significantly after 1979. The average per capita household income (PCI) of the child generating income nearly doubled that of their parents in real terms. The driving force associated with the increased living standards lies in the expansion of non-farm income between the survey periods. The ratio of non-farm income

contributions to total household income increased sharply against agricultural income, rising from 41% to 62% between the two generations.

Economic opportunities expanded by the accumulation of human capital in the form of education and the development of non-farm activities seem to be associated with the improvement in economic conditions even for the lower end of income distribution, as indicated by decreasing incidence of the poor from 54% to 27% between 1979 and 2003, respectively. Fig. 1 illustrates the evolutionary changes in income distribution over time with cumulative distribution function of log real PCI between the two generations. The parental income curve clearly lies to the left of the children's income curve with no intersecting points, indicating first-order stochastic dominance. This result suggests that the declining trend of poverty is not sensitive to the designation of a particular poverty line and that economic gains accrued to all percentiles (Deaton, 1997). Whether this development process is truly pro-poor is an important question addressed in the subsequent sections.

3. Estimation Strategy

3.1.Estimation of Intergenerational Income Mobility

The degree of international income mobility is estimable by the following reduced form equation:

$$\ln Y^C = a + B \ln Y^P + \xi \qquad (1)$$

where $\ln Y^C$ represents the log of child permanent economic status, such as hourly wages, annual earnings, and household income, while $\ln Y^C$ represents the respective parent values. B shows the degree of intergenerational income mobility and can be interpreted in a similar way as the concept of absolute β-convergence in a standard

growth regression: B=1 indicates an economy without mobility, whereas B=0 indicates an economy with perfect mobility where parental income has no predictive power for child income; B>1 indicates intergenerational divergence, while 0<B<1 indicates intergenerational convergence where child income from richer families is, on average, higher than that from poorer families, but the income growth rate is higher for the latter.[2]

A common problem in the estimation of Equation 1 is that we rarely observe child and parent economic statuses over their life-cycle. Because the income obtained significantly changes during the life-cycle, the use of temporary information as a proxy for lifetime economic status tends to bias *B*. To eliminate life-cycle effects, we add children's ages and that of their parents at the time of survey into the regressors. To separate the gender effects, we also add children's gender into regressors.

3.2.Sample Selection

Because income data are available only for a subset of the entire sample, i.e., children currently working and living in the original provinces at the time of the 2003

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[2] Although *B* conceptually takes any number, including negative values, previous research commonly found *B* to lie between zero and unity, and interpreted it that the closer the coefficient is to zero, the higher the intergenerational mobility, whereas the closer the coefficient is to unity, the higher the intergenerational persistence. Researchers sometime adjust B in such a way that the value definitely ranges from -1 to 1. The adjustment is made by $p = B\frac{\sigma_{Y^P}}{\sigma_{Y^C}}$, where σ_{Y^P} and σ_{Y^C} represent the standard deviation of parental and child's income, respectively, and p is called the intergenerational income correlation. This equation shows that if the inequality, measured by the standard deviation, is increasing from parent to child generation, the income elasticity in regression becomes greater than the income correlation, and vice versa.

survey, observed samples do not represent the population. A truncated regression failing to account for the underlying selection mechanism in general causes estimates to be biased (Lanzona, 1998). To correct such selection bias, we first consider the following occupational-cum-migration alternatives *j*: =1 if not working but in the original province; = 2 if working in the original province (our main target); =3 if in Metro Manila; =4 if abroad; =5 if in the Philippines outside the Central Luzon region. Based on this classification, we estimate determinants of occupational-cum-migration choices by the multinominal logit model (MNL). Following Lee's (1983) generalized transformation of the error terms into normality, we then estimate the degree of intergenerational income mobility using the selectivity correction term, constructed from the MNL estimation as follows:

$$\ln Y^C = \gamma + \delta \ln Y^P + \hat{\lambda}_i p_j + e \quad (2),$$

where $\hat{\lambda}$ represents the selectivity correction term, defined as $\hat{\lambda} = \frac{\phi[\Phi^{-1}[(\hat{\Pr}(Y_{j=2} = 1)]]}{(\hat{\Pr}(Y_{j=2} = 1))}$, with $\phi[\cdot]$ and $\Phi[\cdot]$ representing the normal density and cumulative density functions, respectively, and $\hat{\Pr}_{ij}(Y_{j=2} = 1)$ being a predicted probability of choosing option 2 among five alternatives in the MNL. p controls for potential selectivity biases, which are statistically significant if sample selection matters. With the selectivity correction term, e represents a stochastic error term normally distributed with zero mean.

3.3.Heterogeneity

The proposed model measures the average degree of intergenerational income

elasticity, with the assumption that the coefficient is identical across the distribution. There is, however, no *a priori* reason to believe that it is identical for all percentiles (Laurini, 2007; Mello and Perrelli, 2003). Indeed, the possible non-linearity is often explained based on a human capital model (Becker and Tomes, 1986), which discusses that under the presence of credit market imperfection, families with binding credit constraints cannot invest in child education effectively, which strengthen links between parental and child income. In contrast, it is also possible that children of the relatively rich suffer from restrictions on schooling progression more than children of the poor, resulting in higher intergenerational income transmission for the rich-origin. Empirical evidence in Brazil shows such possibilities; the degree of intergenerational income persistence increases gradually with the quantiles up to the 70^{th} percentile, beyond which credit constraints matter less due to the sufficient richness (Andrade, *et al*., 2003).

To capture a possible non-linear relationship, we use a quantile regression to obtain differential coefficients at each point in the conditional distribution. We estimate the coefficients by linear programming (Koenker and Bassett, 1978). When heteroscedasticity occurs, however, the standard errors for the coefficients are problematic and likely to be underestimated (Deaton, 1997). To avoid such potential inaccuracy, we rely on the bootstrap procedure to obtain the variance-covariance matrix with 100 replications.

4. Estimation Results

Table 3 and 4 report the estimation results of the degree of international income mobility. We use log PCI as a measurement of parent and child incomes because the use

of individual earnings are inapplicable as many parents and children were engaged only in self-employed activities. In Table 3, Column (1) is the baseline result, Column (2) includes ages of parents and children as well as the gender of children as added regressors, and Column (3) adds the selective correction term. In Table 4, Columns (1) to (11) correspond to results of quantile regression at the 05th, 10th, 20th 30th, 40th, 50th, 60th, 70th, 80th, 90th, and 95th percentiles, respectively.[3]

Columns (1) to (3) of Table 3 demonstrate that the estimated intergenerational income elasticity is positive and statistically significant at the 1% level. A 1% increase in parent income corresponds to a 0.22-0.23% increase in child income, suggesting weak evidence of intergenerational income transmission, with child income in richer families on an average as being higher than that in poorer families. The elasticity lies in between zero and unity, however, meaning that the income growth rate is higher for the latter, an indication of pro-poor growth. Moreover, the magnitude is not as high as the one recently reported in urban China (Quheng et al., 2012); this in turn implies that the development process in the Philippines locale we study offers more opportunities for poorer families to climb-up from poverty than those available in urban China.

The detailed analysis by percentiles, however, reveals that income level does not universally converge across generations. Columns (1) to (11) in Table 4 present that the intergenerational income elasticity is in a U-shape with being highest at the poorest end of the distribution, decreasing with quantiles up to 50th percentile, and increasing thereafter. The results clearly demonstrate a higher degree of intergenerational

[3] The variables used in the first-stage MNL model include age, gender, and education level of children, age, gender, education level of household head in 1979, farm size in 1979 and provincial dummies. The results of the first-stage estimation as well as summary statistics of all variables are available from the author upon request.

persistence for poorest and richest segments as well as a greater degree of upward mobility in the middle class of society. According to Takahashi and Otsuka (2009), the development of the rural nonfarm sector coupled with improved human capital of children has created ample employment opportunities to a broad spectrum of economic classes, including children from landless and near landless households, which weakens linkages between parental wealth and child economic status in the lower to middle classes. However, children among the poorest of the poor might encounter greater difficulties in seizing such economic opportunities, presumably because their parents might have significant constraints on investing in education that could have enhanced employment opportunities in the nonfarm sector, leading to the stronger correlations of income and persistence of poverty across generations.

5. Conclusions

Using data from the rural Philippines, this study investigated the degree of intergenerational income mobility in a developing country, which is seldom investigated in the existing literature. We found that the elasticity of intergenerational income averages approximately 0.23, suggesting that the rate of income growth is higher for children born to poorer families. Although this result suggests evidence of pro-poor growth, more detailed analysis shows that income level does not universally converge across generations. Indeed, we found U-shared relationships between parent and child incomes, implying the existence of multiple equilibria or a poverty trap. To break the vicious cycle, it seems important to find a means for children in poor families to improve their human capital to enable them to take advantage of lucrative non-farm income opportunities.

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Figure 1. Cumulative Distribution Function of Log Real Per Capita Income

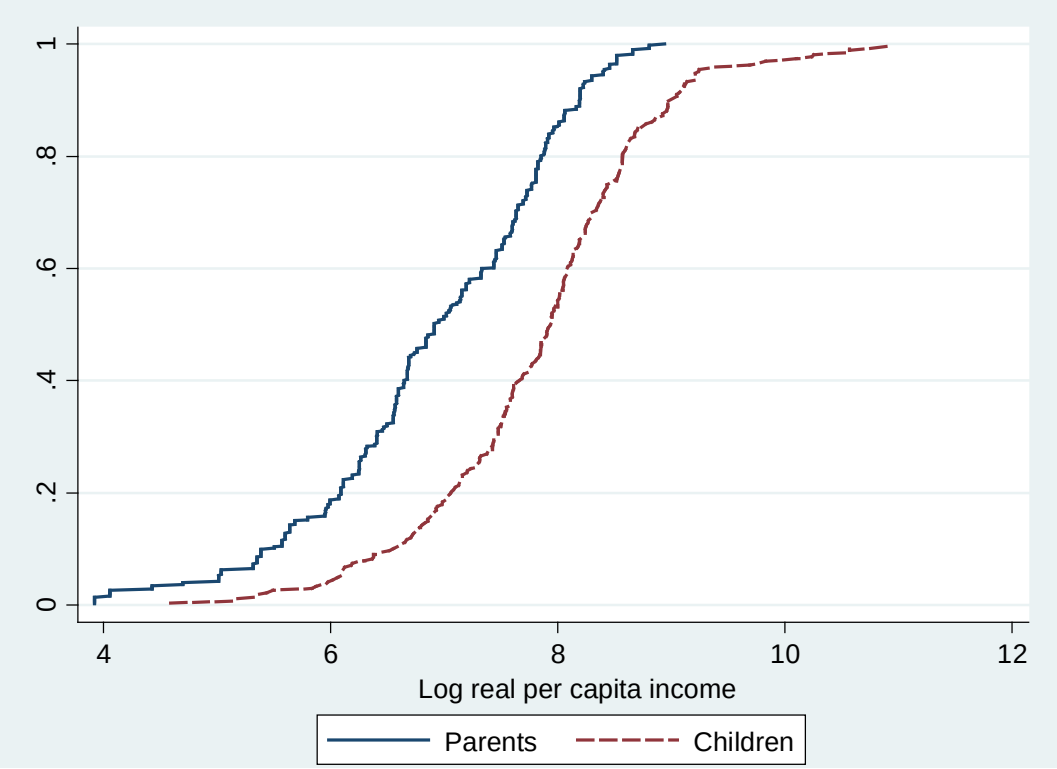

Table 1. The Distribution of Sample Children

	Frequency	%
Total	499	100.0
Local and Not Working	83	16.6
Local and Working	242	48.5
of which with detailed income data	219	43.9
Metro Manila	73	14.6
Other Domestic Regions	33	6.6
Abroad	68	13.6

Table2. Selected Socio-Economic Conditions of Two Generations

Place and Employment Status	Parents	Children				
		Local and Not Working	Local and Working	Metro Manila	Other Domestic Regions	Abroad
# Observation	126	83	242	73	33	68
Age	45.51	35.43	36.29	33.05	35.67	36.38
Gender (=1 Male)	0.96	0.07	0.70	0.48	0.58	0.35
Education	6.07	10.04	10.26	11.88	10.00	12.26
Real Per Capita Income (peso, constant 1979)	1550.78	n.a.	3979.84	n.a.	n.a.	n.a.
Composition of HH Income (%)						
Agriculture	59.28	n.a.	37.69	n.a.	n.a.	n.a.
Non-Agriculture	40.72	n.a.	62.31	n.a.	n.a.	n.a.
Incidence of Poverty	0.54	n.a.	0.27	n.a.	n.a.	n.a.

Note: The data on parental age, sex, and education reflect the head of household's information in 1979, while those of children reflect individual characteristics of the target children in 2003.

Table 3. The Degree of Intergenerational Income Mobility by Ordinary Least Squares

Dependent Variable: ln PCI of Children	(1)	(2)	(3)
ln PCI of Parents	0.218***	0.226***	0.233***
	(0.065)	(0.078)	(0.076)
Age of Child		-0.047***	-0.027*
		(0.016)	(0.015)
Gender (=1 male) of Child		-0.370***	0.703**
		(0.127)	(0.269)
Age of Head in 1979		0.016	0.017*
		(0.010)	(0.010)
Selection Correction Term			8.096***
			(1.630)
Constant	6.229***	7.374***	3.568***
	(0.460)	(0.530)	(0.911)
Observations	215	215	215
R-squared	0.052	0.145	0.212

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. The Degree of Intergenerational Income Mobility by Quantile Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
percentile	q05	q10	q20	q30	q40	q50	q60	q70	q80	q90	q95
ln PCI of Parents	0.375***	0.300*	0.133	0.129	0.145*	0.165**	0.145***	0.185***	0.237***	0.293***	0.297**
	(0.115)	(0.159)	(0.143)	(0.087)	(0.079)	(0.064)	(0.055)	(0.058)	(0.065)	(0.102)	(0.124)
Age of Child	-0.026	-0.043**	-0.009	-0.020	-0.019	-0.019	-0.023	-0.023	-0.030*	-0.047**	-0.036*
	(0.016)	(0.021)	(0.022)	(0.017)	(0.017)	(0.016)	(0.017)	(0.018)	(0.018)	(0.022)	(0.022)
Gender (=1 male) of Child	0.395	0.938**	1.242**	0.826	0.666	0.423	0.339	0.418	0.454	0.307	0.638*
	(0.480)	(0.451)	(0.571)	(0.565)	(0.504)	(0.346)	(0.314)	(0.316)	(0.399)	(0.392)	(0.329)
Age of Head in 1979	0.009	0.008	0.006	0.020*	0.014	0.013	0.012	0.016*	0.017	0.031**	0.033**
	(0.012)	(0.016)	(0.011)	(0.011)	(0.009)	(0.008)	(0.008)	(0.010)	(0.012)	(0.015)	(0.015)
Selection Correction Term	8.425**	11.176***	12.350***	9.959***	8.595***	5.823***	5.142***	5.448***	5.209*	3.544	4.813**
	(3.265)	(2.951)	(3.042)	(3.104)	(2.948)	(2.145)	(1.941)	(2.049)	(2.698)	(2.587)	(2.429)
Constant	1.511	1.802	1.792	2.875	3.742**	4.825***	5.593***	5.140***	5.251***	5.788***	5.019***
	(1.771)	(1.920)	(1.808)	(1.823)	(1.722)	(1.311)	(1.167)	(1.039)	(1.314)	(1.497)	(1.495)
Observations	215	215	215	215	215	215	215	215	215	215	215
Psedo-R-Squared	0.196	0.162	0.128	0.128	0.100	0.097	0.101	0.113	0.114	0.143	0.210

Bootstrap standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1