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Foreword

The ERD Working Paper Series is a forum for ongoing and recently completed research and policy studies undertaken in the Asian Development Bank or on its behalf. The Series is a quick-disseminating, informal publication meant to stimulate discussion and elicit feedback. Papers published under this Series could subsequently be revised for publication as articles in professional journals or chapters in books.

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Abstract

Recent research employing cross-national regressions shows that the incomes of the poor move one-for-one with overall average incomes, suggesting that economic growth is virtually sufficient for poverty reduction. This paper attempts to probe beneath cross-country averages by analyzing provincial data on the poverty–growth nexus in the Philippines. The results show that economic growth explains a lot but not all about poverty. The balance that seems fairly large can be accounted for by other factors (e.g., infrastructure, human capital, and location-specific characteristics) and institutions (e.g., political economy and agrarian reform). Thus, while growth is indeed good for the poor, it is not good enough. How much is not good enough is illustrated by this paper and will become clearer as subnational analysis is extended to more countries. For policy purposes, an intracountry examination of the determinants of poverty reduction seems clearly superior to cross-country analysis.

I. Introduction

Recent empirical research suggests that economic growth is the key to poverty reduction in developing countries. Dollar and Kraay (2001), for example, find that the average incomes of the poorest quintile of the population move one-for-one with overall average incomes, implying that growth benefits the poor as much as everyone else in society. Moreover, their empirical results indicate that the relationship is invariant to "economic cycles", i.e., whether the economy is expanding or contracting. From a policy perspective, these results suggest that poverty reduction efforts involve nothing more than creating an environment conducive to rapid economic growth. Indeed, in a provocative paper, Bhalla (2001) asserts that "growth is sufficient."

Is that all there is about how to reduce poverty? Probably not. To begin with, the empirical work on the growth-poverty nexus has been based largely on the analysis of cross-national *averages*. However, as Ravallion (2001a) cogently argues, there is much more to this nexus than the cross-country averages would imply. Indeed, looking beyond averages, one sees very diverse country experiences, even for countries at similar stages of economic development. Moreover, even within a country, there are often large variations in the growth-poverty performance across subnational units (regions, states, provinces). These variations are evident in large countries, such as People's Republic of China (Fan et al. 2000); India (Datt and Ravallion 1998, Ravallion and Datt 1999, Chand 2001); and Indonesia (Hill 1996), as well as in relatively small countries, such as the Philippines (Balisacan 2000); Thailand (Booth 1997, Deolalikar 2002); and Viet Nam (Glewwe et al. 2000).

In revisiting the lessons from the so-called East Asian Miracle countries, Quibria (2001) concludes that: (i) the *main* lever of poverty reduction in the miracle economies was not any radical improvement in income distribution but rapid economic growth; (ii) growth, in turn, was spurred invariably by openness to trade and technology in conjunction with prudent macroeconomic principles, labor market flexibility, and a set of efficiency-enhancing institutions; (iii) neither land reform nor an initially high level of human capital was a precondition to sustained growth and poverty reduction; and (iv) growth in agriculture *per se* was not critical to the reduction of poverty in the miracle economies. These conclusions are debatable, however. The finding, for example, that neither the endowment of human capital nor the growth of agriculture mattered clashes with the received wisdom about the centrality of human capital and agricultural development in poverty reduction. Do these lessons shed light on poverty reduction strategies for other developing countries as well?

The foregoing revisit also relies largely upon studies using cross-country averages. Thus, the conclusions are to a large extent not surprising. But, as noted above, one has also to go beyond cross-national averages to determine the robustness of conclusions about the poverty-growth relationship. Is it the case, for example, that, within a country, the initial distribution of, say, land and other assets does not affect growth and poverty reduction in the constituent regions or provinces? Simple cross-country averages not only tend to mask more than reveal the "true" story about growth and poverty; the problem is compounded because the data are based on highly varied concepts and definitions of income, poverty, and inequality across countries.

Clearly, a deeper understanding of the economic and institutional determinants of poverty reduction requires probing beneath cross-national averages and, hence, an investigation of subnational units. Key questions of interest include:

(i) Why are some subnational units/provinces more successful than others in achieving growth, or in translating growth to poverty reduction, or in achieving both growth and poverty reduction?

(ii) What location-specific institutional arrangements, or features of the local economy and polity, facilitate or inhibit growth and poverty reduction? How do these interact with macroeconomic and/or external shocks? And how do they influence poverty reduction directly or through access to basic social services?

(iii) Can the experience of a relatively successful subnational unit be replicated in other areas (e.g., that of Kerala to the other states of India)?

A subnational approach has practical advantages over cross-country analyses in understanding the poverty-growth nexus. First, cross-country work is prone to omitted-variable bias and measurement errors (Forbes 2000, Ravallion 2001a). Numerous variables tend to systematically correlate with growth and poverty reduction, but these are usually difficult to measure and include in a cross-country regression. Some of these have to do with national politics and institutions, culture and social norms, macroeconomic and trade regimes, and perhaps even geographic and population attributes. The variety of these variables makes it difficult to predict *a priori* how they could affect estimates of the relationship between growth and poverty reduction. However, for subnational work, it may be reasonable to assume that these variables are largely common across subnational units; thus their omission will not bias estimates of the poverty–growth nexus. It may also be reasonable to assume that systematic measurement errors are far more problematic in cross-country data than in subnational data. These errors could result in either a negative or positive bias on the estimate of the response of poverty to growth, depending on the correlation between the measurement error and the growth variable (as well as the other variables in the regression). For example, if countries with high inequality grow slower (and thus reduce poverty more slowly) than lower-inequality countries but also tend to underreport their inequality statistics, the probable outcome would be a negative bias of cross-country estimates of the poverty–growth relationship.

Second, comparable cross-sectional and time-series data on subnational units of developing countries have increasingly become available. In the Philippines, the periodic conduct of comparable household surveys in the last 15 years has created opportunities for constructing a panel of subnational units, especially at the regional level. This development should facilitate systematic understanding of the determinants of growth and poverty reduction.

Third, cross-country work on poverty and growth does not directly address the important policy issue of *how growth within a country is related to poverty reduction within that country*. Indeed, as Rodrik (2001) emphatically noted, all that the high correlation between growth and the incomes of the poor "demonstrates is that the income distribution tends to be stable and rather unresponsive to policy changes." The practical question is not whether growth is good for poverty reduction, or vice versa. Rather, the key operational issue is whether the welfare of the poor should enter as a separate determinant of policy choices, in addition to growth-promoting policies, such as macroeconomic stability and good governance. Subnational work using panel estimation offers a direct approach to establishing the link between poverty and policy choices.

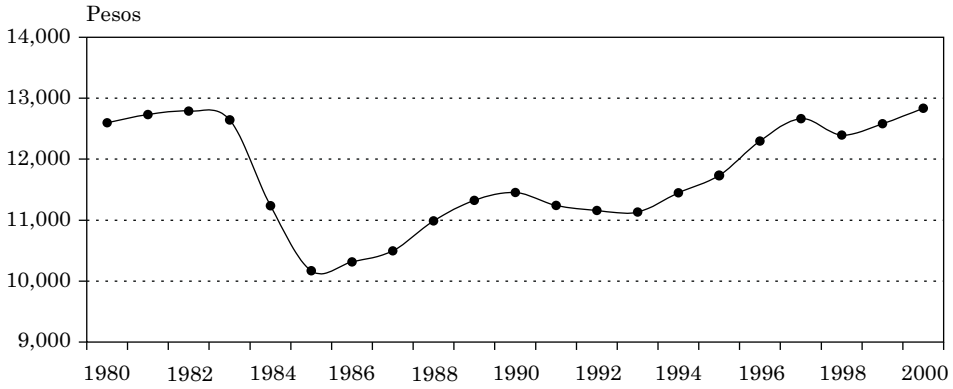
This paper attempts to shed light on the above issues, using comparable subnational data on the Philippines. The focus is on the 1980s and 1990s, a period characterized by "spells" of economic growth and decline, as well as fundamental changes in the character of the country's policies and institutions. The next two sections describe the national context for the subnational comparison, as well as data and measurement issues. The paper then uses consistently assembled provincial data to examine the robustness of the basic poverty-growth relationship. Further, it extends the analysis by formally examining the contribution of certain physical attributes, political economy, and time-varying economic factors, to the observed variation in provincial performance vis-à-vis changes in the average living standards of the poor. Finally, the paper concludes with implications for the design of pro-poor growth policies and institutions in the Philippines.

II. The National Context and Measurement Issues

For most of the 1980s and early 1990s, the Philippine economy performed poorly, especially against the backdrop of the robust performance of the other East Asian economies. During this period, spurts of growth were often followed by bust and stagnation. Not surprisingly, the country's per capita GDP at the turn of the 21st century was just about the same as that reached in the early 1980s (Figure 1).

However, the growth episodes in the 1990s, notwithstanding the interruption in 1998 owing to the combined impact of the Asian economic crisis and the El Niño phenomenon, appear to have a fundamentally different character from previous ones. The growth took place in an environment of political stability, economic deregulation, and institutional reforms. While policy coordination problems (e.g., in public investments) persisted, it can be said that the country at the end of the 20th century was closer to a market economy than it ever was in the past (see Bautista and Tecson 2001).

Figure 1. **Per Capita GNP (at 1985 prices)**



For this paper, we focus on four distinct phases that characterize the growth process from the mid-1980s to the late 1990s. Fortuitously, the available household surveys needed for examining the poverty performance across provinces roughly correspond to the end points of these phases. The first is a brief period of economic growth (1986-1989) after a sharp contraction in 1984 and 1985 when per capita GDP shrank by an average of 10 percent a year. The next four years (1990-1993) were a period of bust and stagnation, which was punctuated by political instability, natural disasters, and macroeconomic mismanagement. The three years thereafter (1995-1997) saw a recovery of growth, which coincided with the restoration of political stability and deepening of policy and institutional reforms. However, per capita GDP fell again at the end of the decade owing to the combined impact of the Asian economic crisis and the El Niño that ravaged agriculture in 1998. Data sources for poverty and inequality comparisons are mainly the various Family Income and Expenditures Survey (FIES) rounds from the mid-1980s to the late 1990s. Conducted every three years since 1985, these surveys are undertaken by the government's primary statistical agency, the National Statistics Office (NSO). While earlier surveys covering the 1960s and early 1970s are also available, we have excluded them since these are either beset by technical problems (thus not comparable with those for the 1980s and 1990s) or available only in published forms.[1] Unit record data are available for the 1985-1997 surveys.

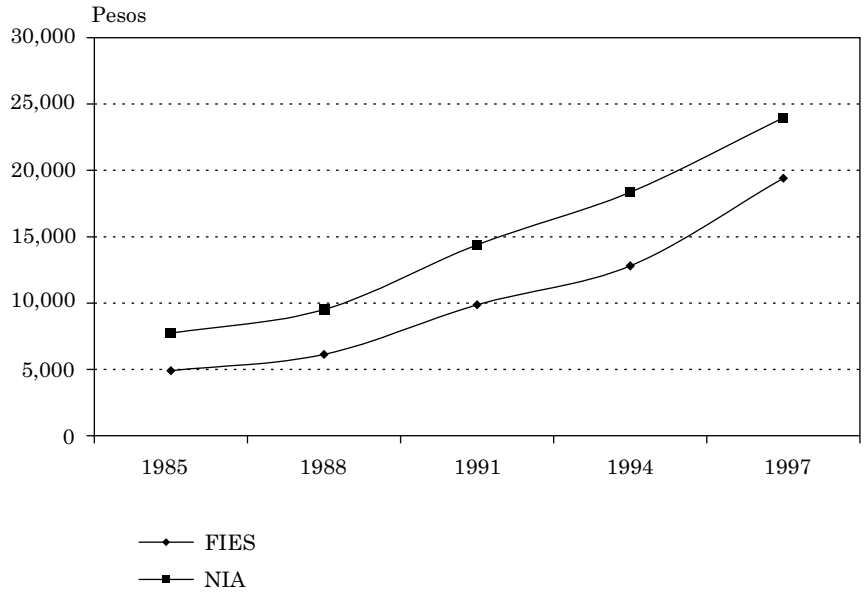
As the name of the survey suggests, the FIES provides data for the two popular broad indicators of household welfare: current income and current consumption expenditure. On both conceptual and practical grounds, we have chosen the latter. Standard arguments in microeconomic theory suggest that since welfare level is determined by "life-cycle" or "permanent" income, and since current consumption is a good approximation of this income, current consumption is an appropriate measure of not only current welfare level but also *long-term* average well-being. Indeed,

[1] See Balisacan (1994, 2001b) for an extensive discussion on the comparability of the FIES data. Of special note here is the problem posed by the periodic regrouping (and sometimes splitting) of provinces into regions, as well as the decadal reclassification of initially "rural" areas into "urban" areas. This problem makes the published tables unsuitable for spatial comparison of poverty reduction performance. In this paper, the unit record data of the FIES were used to reconstruct *spatially comparable* poverty profiles, i.e., the geographical boundaries of the provinces were kept constant throughout the period of interest.

measured consumption is invariably less variable than measured income (Deaton 2001). From a practical viewpoint, the difficulty of acquiring accurate information proves to be less severe for consumption than for income, especially in developing countries where governance infrastructure is weak and local markets are either nascent or simply absent (Deaton 1997, Ravallion and Chen 1997).

The National Income Accounts (NIA) is also a distinct source of data on the country's *average* welfare. The level of per capita GDP (or per capita GNP) is widely used for this purpose. However, closer to the concept of average welfare, as measured by households' command over resources, is the level of private personal consumption (PCE) per capita. In general, PCE, as measured in NIA, and household consumption expenditures (HCE), as measured in FIES, do not necessarily agree either as to their levels or their growth rates, largely because of differences in definitions, methods, and coverage.[2] PCE (which in the NIA is usually estimated as a residual) may, for example, exceed HCE simply because spending by the nonprofit sector (NGOs, religious groups, political parties) is often lumped with that by the household sector. Fortuitously, in the Philippine case, average per capita levels of PCE and HCE move in the same direction, at least for the 1980s and 1990s (Figure 2). This feature of the two data sources proves useful for our purposes, as will become evident below.

Figure 2. **PCE (NIA) versus HCE (FIES)**



[2] In a large number of empirical studies, growth pertains to GDP (or GNP) based on the NIA, while poverty pertains to current expenditures (or incomes) based on household surveys. Deaton (2001) and Ravallion (2001b) discuss empirical considerations that lead to the divergence between average living standards (in levels and growth rates) measured in NIA and those in household surveys. Ravallion (2001b), in particular, finds that, for developing and transition countries, the comparability problem is more serious for income than for expenditure measures.

The chosen indicator of household welfare has to be adjusted for spatial cost-of-living differences since prices vary significantly across provinces and regions of the country. Previous poverty and income inequality studies on the Philippines have been largely unsuccessful in making adjustments to either household incomes or expenditures, owing mainly to the absence of appropriately constructed spatial cost-of-living indices. For this paper, we have employed the 1997 provincial cost-of-living indices reported in Balisacan (2001b). The reference province is Metro Manila (i.e., the cost-of-living index for this province is 100), although any other province may likewise serve the same purpose. Since the concern in this paper also involves welfare comparisons over time, we have updated these indices to reflect nominal price movements during the 1980s and 1990s. This was done by applying the regional CPI to the provincial cost-of-living indices.[3]

III. Growth and Poverty Reduction: The National Picture

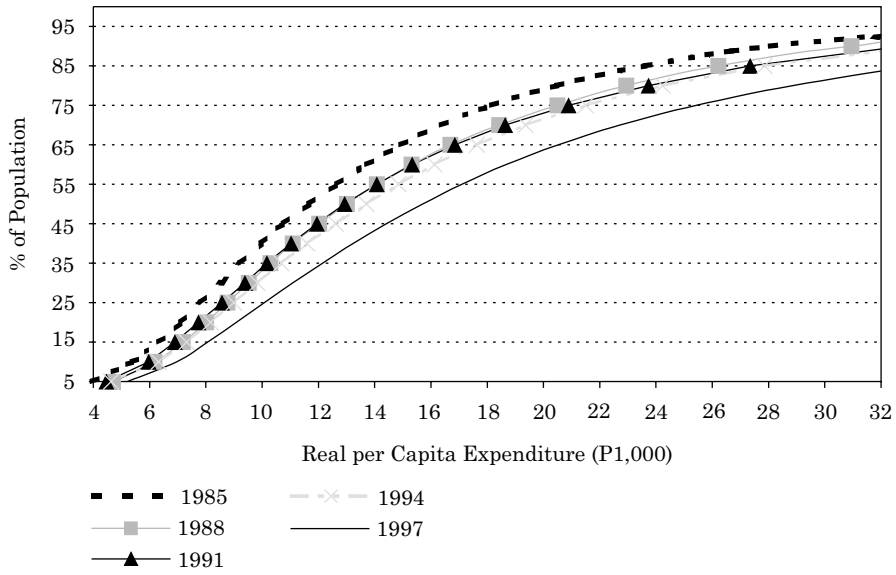
The resulting national distributions of per capita consumption expenditures for the various FIES years are shown in Figure 3. Note that the expenditures are in real terms (at 1997 prices) and have been adjusted for provincial cost-of-living differences. Thus, with the poverty line (in real terms) known, it is straightforward to obtain the poverty incidence from Figure 3 for the various years. For example, the national-average official poverty line of P11,319 per person implies a poverty incidence of 49 percent for 1985, 45 percent for 1988, 45 percent for 1991, 41 percent for 1994, and 37 percent for 1997.[4] Note, too, that aggregate poverty is unambiguously lower in 1997 than in any of the other years, regardless of the assumed (but plausible) poverty norm.

As shown by Foster and Shorrocks (1988), two nonintersecting cumulative distribution (CD) curves, such as those for 1985 and 1997 in Figure 3, also suggest that the direction of poverty change is unambiguous even for all other plausible poverty indices that satisfy certain appealing properties of a desirable poverty measure. The ambiguity in poverty change is evident for the comparison between 1988 and 1991, as well as between 1991 and 1994 (a period of virtually zero growth). In these cases, poverty in the first year is either higher or lower than that in the last year, depending on whether the poverty line is drawn to the left or to the right of the intersection of the pair of CD curves. Note that this ambiguity is peculiar to periods when overall mean income growth was low, as in 1988-1991 (1.6 percent a year), or when it was nil or negative, as in 1991-1994.

[3] Provincial CPIs are not available.

[4] Note that these estimates do not correspond to the officially published poverty estimates. The official approach to poverty estimation uses current income rather consumption expenditure as the welfare indicator, as well as poverty lines that vary, in real terms, across regions and between urban and rural areas. As shown in Balisacan (2001b), this approach fails the consistency test for poverty lines. Hence, it is not suitable for national poverty monitoring or assessing comparative performance across regions, provinces, or areas of the country—if the main *policy objective is to reduce absolute poverty*.

Figure 3. **Distribution of Living Standards**



Evidently, as Figure 3 suggests, significant poverty reduction took place between 1985 and 1997. Applying the spatially consistent poverty lines suggested by Balisacan (2001b) to the distribution of per capita expenditures, we obtain a poverty incidence of 41.5 percent for 1985 and 25.0 percent for 1997, or an average decline of about 1.4 percentage points a year. The decline occurred in tandem with rising mean per capita income, averaging 4.2 percent a year.[5] How important was this growth to the observed change in poverty?

The change in poverty during a given period can be decomposed into two components. One component pertains to the pure growth effect in mean living standards, defined as the change in poverty if all consumption groups share equally in the growth. The other component relates to the redistribution effect, defined as the change in poverty if the mean consumption of the population remains constant, given the redistribution that occurs. Table 1 gives the estimates of these components for the observed poverty reduction in 1985 and 1997.[6] Clearly, growth accounted for the bulk of poverty reduction observed during the period. If not for the increase of the Gini ratio from 0.41 to 0.45, the decline in poverty incidence, given the observed growth, would have been even faster (i.e., 20.5 percentage points instead of 16.5 percentage points). A similar result is suggested by the depth of poverty measure.

[5] In comparison, mean per capita expenditure rose by 41 percent between 1985 and 1997, or an average of 3.4 percent a year. The increase of real per capita GDP during the same period was much lower at 1.2 percent a year.

[6] In deriving these estimates, we have applied the procedure suggested by Kakwani (1997) and Kakwani and Pernia (2000) to identify the components of poverty change.

The ambiguity in poverty change for some periods makes it necessary to examine the various segments of the income distribution for robustness of conclusions regarding the relationship between growth and poverty. Thus, below, we explore the link between overall growth and poverty not only with respect to changes in poverty indices (which depend on specific poverty lines) but also in terms of the changes in average per capita expenditures of the various population subgroups.

Table 1. **Growth and Redistribution Components of Poverty Change**

Item	Incidence	Depth
1985	41.5	12.4
1997	25.0	6.4
Change:	-16.5	-6.0
Due to Growth	-20.5	-8.0
Due to Redistribution	4.0	2.0

Source: Authors' estimates.

The above decomposition results thus appear to confirm what has been found elsewhere regarding the close link between growth and poverty reduction, at least in so far as the national aggregate picture is concerned. We next turn to subnational evidence.

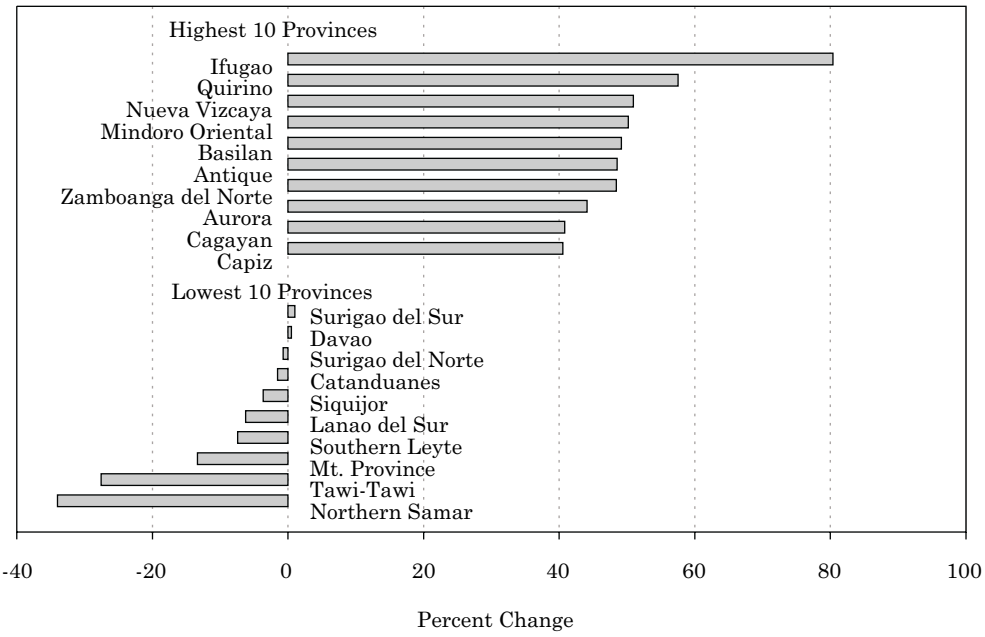
IV. Provincial Differences in Living Standards

Changes in average living standards of the poor during the 1980s and 1990s vary greatly across provinces. Figure 4 shows the extreme ranges (top 10 and bottom 10 provinces) of the distribution of changes in mean per capita expenditure for the 72 provinces.

At the provincial level, the living standards of the poor also appear to be influenced directly by the overall mean income. In Figure 5, provincial-level data covering the five survey years (a total of 360 observations) show a relatively strong positive correlation between overall average incomes and average living standards of the poor, defined here to comprise the bottom 20 percent of the population (based on ranking by per capita expenditure). The relationship is summarized by the fitted line, obtained by ordinary least squares (OLS) regression of the mean living standards of the poor on the overall mean income.[7] Note that both means are expressed in logarithms, hence,

[7] As is well known, simply regressing the mean per capita expenditure of the poor on overall mean per capita expenditure will likely yield inconsistent estimates of the parameter of interest, which in this case is the elasticity of the mean living standard of the poor with respect to overall living standard. Measurement error in per capita expenditure (which is also used to construct our measure of the living standard of the poor) will bias the estimate of this elasticity. Thus, in Figure 4, as well as in all the regressions (unless otherwise specified), we use average income to instrument overall average expenditure.

Figure 4. **Change in Mean Expenditure of Poor 20%, 1991 and 1997**



the slope of the fitted line can be interpreted as the elasticity of the living standards of the poor with respect to the overall average income, henceforth referred to as the *growth elasticity* of poverty.[8] This growth elasticity is about 0.7, indicating that a 10 percent increase in the overall mean income raises the living standards of the poor by 7 percent. At first glance, this is remarkably lower than that obtained from cross-country regressions. Dollar and Kraay (2001), for example, obtained an elasticity close to unity. Similarly, in reexamining cross-country evidence in poverty reduction from the late 1980s to the late 1990s, Bhalla (2001) estimated an elasticity of 0.8.

Unfortunately, the growth-poverty relationship is not as straightforward as Figure 5 might suggest. Simply regressing the mean living standards of the poor on overall average incomes through OLS estimation is likely to result in inconsistent estimates of the growth elasticity, for a number of reasons. One is the omission of variables that have direct impacts on the living standards of the poor and are correlated with overall average incomes or with any of the other explanatory variables. For example, infrastructure, local institutions (e.g., "social capital"), and agrarian structure vary considerably across provinces and correlate strongly with provincial mean incomes (Balisacan and Fuwa 2001).

[8] Note that "growth elasticity," as used here, is not the same as that presented in some earlier works (e.g., in Balisacan 2001a and Ravallion 1995) where the estimation refers to specific poverty lines and specific aggregate poverty indices.

Another problem pertains to measurement errors in the variables included in the regression. Of particular concern here is the potential correlation between the measurement errors in the mean living standards of the poor and those in overall average incomes, since both data come from the same household surveys.[9] However, in what follows, we invoke the principle that even when both mean income and mean expenditure come from the same household survey, the measurement error in both variables will not necessarily result in biased estimates (Dollar and Kraay 2001).

Further, there is the possibility that the living standards of the poor and overall mean incomes are jointly determined. Recent theory and evidence shows a link running from inequality (hence, the incomes of the poor) to subsequent overall income growth. One strand of the literature suggests that income (or asset) inequality inhibits subsequent overall income growth (Alesina 1998, Deininger and Strauss 1998), while another strand states the reverse (Forbes 2000, Li and Zou 1998).

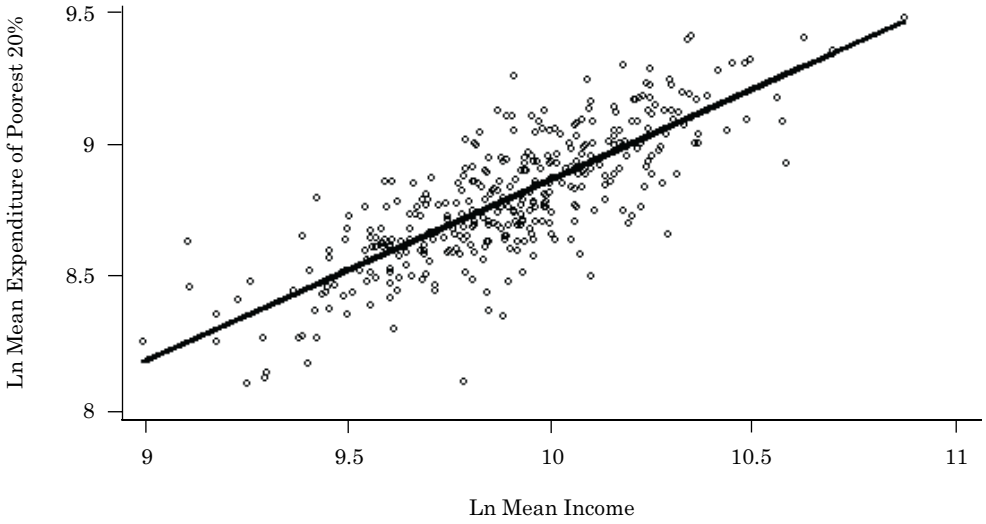
We attempt to address these problems below, examining the robustness of the growth elasticity estimates and exploring determinants of provincial performance in poverty reduction, in addition to overall average incomes.

First, we address the issue of omitted-variable bias. Here, we exploit the longitudinal nature of the provincial data and employ panel estimation techniques to control for differences in time-invariant, unobservable province-specific characteristics, thereby removing any bias resulting from the correlation of these characteristics with overall average income (or any other explanatory variables). Specifically, we fit the data to two standard estimation models—the fixed-effects model and the random-effects model—tailored for addressing unobserved fixed-effects problems. The first model utilizes differences within each province across time.[10] The second model, the random-effects model, is more efficient since it utilizes not only information across individual provinces but also across periods. Its main drawback, however, is that it is consistent only if the province-specific effects are uncorrelated with the other explanatory variables. Table 2 summarizes the results of the estimation. For comparison, we also show the OLS regression estimates implied by the fitted line in Figure 5.

[9] The use of overall mean *income* rather than overall mean *expenditure* in Figure 5 addresses perhaps only partly the measurement-error problem.[10]The technique is equivalent to regressing the average living standards of the poor on a set of intercept dummy variables representing the provinces in the data, as well as on overall mean incomes.

[10] The technique is equivalent to regressing the average living standards of the poor on a set of intercept dummy variables representing the provinces in the data, as well as on overall mean incomes.

Figure 5. **Average Expenditure of Bottom 20 Percent versus Overall Mean Income**



The estimation results indicate that, indeed, unobserved province-specific effects are significant. The new estimates, given in Table 2, suggest a somewhat weaker response than that suggested in Figure 5: the elasticity estimate falls from 0.7 to as low as 0.6.

Table 2. **Response of Poverty to Overall Average Income: Basic Specifications**

Item	OLS	Fixed Effects	Random Effects
Log of mean income	0.704 (.029)	0.553 (.033)	0.610 (.030)
Constant	1.833 (.286)	3.328 (.331)	2.758 (.293)
F-test		F=5.86	
Hausman specification test			R^2=13.49

Note: Dependent variable is logarithm of the mean expenditure for the bottom 20 percent of the population ranked by per capita expenditure. The F-test statistic pertains to a test of the null hypothesis that all provincial dummy coefficients are zero. The Hausman specification test statistic pertains to a test of the null hypothesis that the difference in coefficients between the random and the panel effects estimations is not systematic. Both hypotheses are rejected at one percent significance level. Figures in parentheses are robust standard errors. Data refer to the panel of 72 provinces and 5 years covering the 1980s and 1990s.

As is well known, panel estimation assumes certain structures for the unobserved fixed effects. These assumptions are rejected by the data. For example, the assumption that the error terms are not correlated with the explanatory variable is rejected by the provincial panel data.

An alternative procedure is to directly estimate the elasticity from differences in variable values over time. Such estimation yields an elasticity estimate of 0.5 (not shown in the table), which is of generally comparable magnitude to those obtained from panel estimations.

Earlier, we noted that there may be reverse causation in the poverty–growth relationship, i.e., overall mean income may systematically respond to changes in the average living standards of the poor. Here it appears that overall average income is not exactly exogenous as so far has been assumed in the above regressions. The above elasticity estimates may thus be biased and inconsistent.

We thus re-estimate the poverty–growth relationship by instrumenting for mean income using lagged mean income growth. For the difference form of the poverty–growth relationship, we instrument for the difference of mean income over three years using the initial mean income in the current three-year period and the growth of mean income for the past three years prior to the current period. The resulting parameter estimates are summarized in the second and third columns of Table 3. These yield a growth elasticity of 0.5 for the levels form and 0.6 for the differences form.

Table 3. **Endogenous Mean Income: Basic Specifications**

	IV Estimation		System
Item	Level	Difference	
Slope	0.502	0.622	0.700
	(.088)	(.100)	(.033)
Constant	3.832		1.861
	(.870)		(.331)

Note: Figures in parentheses are robust standard errors. Data refer to the panel of 72 provinces and 5 years covering the 1980s and 1990s.

By construction, it is expected that the slope for the levels form and that for the differences form are equal. Conventional tests indicate that, indeed, the two slopes are not statistically different from each other (at 95 percent confidence level).

Dollar and Kraay (2001) suggest that combining the information on both levels and differences of the data helps resolve the dilemma of having to choose an estimating model from either a levels form or a differences form. We follow this mode of analysis—estimating a system involving both levels and differences—but imposing the restriction that the coefficients in the levels

and differences equations are equal. The parameter estimates for the basic specification are shown in the last column of Table 3. The estimate of the growth elasticity is 0.7; the 95 percent confidence interval for this coefficient is [0.6, 0.8].

To sum up, the estimates of growth elasticity are far from suggesting a one-for-one correspondence between growth in the average living standards of the poor and overall average income growth. Other factors appear to have direct effects on the living standards of the poor, apart from any effects of the same factors on overall income growth. This result is consistent with those based on state-level and province-level analyses in India (Datt and Ravallion 1998, Ravallion and Datt 1999) and Thailand (Deolalikar 2001).

V. Other Determinants of Poverty Reduction

We now attempt to assess the impact of certain economic and institutional factors on poverty reduction in the various provinces. As in the above, the variable to be explained refers to the wide differences in the average per capita expenditures of the poor—defined initially to be those in the bottom 20 percent of the expenditure distribution—across provinces during the 1980s and 1990s. Guiding the specifications are parsimony, data availability, and expectations from development theory.

Because provincial data on explanatory factors are less complete for the 1980s than for the 1990s, we first proceed to estimate a system involving only a limited set of variables but utilizing the full panel (5 years covering the 1980s and 1990s, and 72 provinces). We then re-estimate the system utilizing the full set of variables but focusing on a shortened panel (3 years covering the 1990s only, and 63 provinces). We refer to the former as full panel and the latter as partial panel.

The explanatory variables for both full and partial panels are categorized into two groups, namely, initial-condition variables and time-varying policy variables. Included in the first group are province-specific human capital endowment, farm and land characteristics, social capital, geographic attributes, and political-economy characteristics. The time-varying variables, on the other hand, include relative price incentives, road access and electricity, agrarian reform, and overall average per capita income.

The proxy for the initial human capital endowment is the (three-year lagged) average years of schooling of household heads. Expected to be positively correlated with the average living standards of the poor, this variable is available for the full panel (1980s and 1990s). An alternative proxy is the access of the villagers (*barangay* residents) to school establishments. This variable is available for the early 1990s and is used in the partial panel.

Two variables representing farm characteristics are average farm size and irrigation. The latter, expressed as the ratio of irrigated land to total farm area, is a proxy for the quality of agricultural land. It is expected that both variables are positively correlated with mean per capita expenditure of the poor. Data on these variables are available only for the early 1990s; they are used for the partial panel.

Geographic attributes available for the full panel are an indication of spatial isolation or high transport cost (given by a dummy variable indicating whether a province is landlocked or not) and the average frequency of typhoons hitting the province. These variables are intended to capture geographic "poverty traps". A number of observers, for example, note that areas that are most frequented by typhoons have been among the poorest areas in the country (see, e.g., Balisacan 2001b). Using cross-country regressions, Gallup and Sachs (1998) also find that the geographic location of a country tends to influence the speed of its economic growth, noting in particular that landlocked countries tend to grow slower than those with direct access to sea transport.

The initial political-economy variables reflect the quality of local governance and access to fiscal resources. One variable for the full panel is local political dynasty, defined as the proportion of local officials—related to each other by blood or affinity—out of the total number of elective positions. This variable captures the extent of collusion or competition in local politics. We expect that political dynasty inhibits poverty reduction through its negative effect on the efficient operation of markets (i.e., restricting competition in local markets and creating rents for the political clan) and on the access of the poor to public goods.[11] The other variable pertains to the political party affiliation of the provincial chief executive. This is represented by a dummy variable indicating whether the provincial governor belongs to the national President's political party. The expectation is that resources for infrastructure, employment generation, and poverty reduction tend to flow more favorably to local governments that have direct ties to the ruling political leadership.

The time-varying price incentives variable is given by the agricultural terms-of-trade, defined as the ratio of the price of agricultural to nonagricultural products. Since poverty is concentrated in agriculture in developing countries (Pernia and Quibria 1999), including the Philippines (Balisacan and Pernia 2001), this variable is expected to be positively related to the average living standards of the poor. The variable is available for the full panel analysis.

The time-varying infrastructure variables pertain to road access and electricity.[12] Roads represent access to markets, off-farm employment, and social services. The variable is defined as quality-adjusted road length per square kilometer of land area. Electricity, on the other hand, is a proxy for access to technology, or simply the ability to use modern equipment. It is defined simply as the proportion of households with access to electricity. Both variables are available for the full panel analysis.

A time-varying policy variable relating to the government's redistribution (and empowerment) program is the Comprehensive Agrarian Reform Program (CARP). The agrarian

[11] Put differently, local governance by political dynasty may make feasible the concentration of economic power and control in a few hands, thereby leading to (perpetuating) high income inequality. High income inequality, in turn, may inhibit subsequent growth in the local economy, as suggested by recent development literature. Moreover, such governance structure may make public services that directly benefit the poor less accessible to them.

[12] The preferable variables would be government expenditures on infrastructure, rather than levels of physical infrastructure. The former variables relate a policy handle—spending on infrastructure—directly to the average living standards of the poor.

reform variable, defined as the proportion of cumulative agrarian reform accomplishments out of total potential land reform area, serves to proxy for households' ability to smooth consumption during shocks, given imperfections in credit markets. The variable is expected to be positively related to the average living standards of the poor. It is available for the full panel regression.

Certain variables may have strong complementarities, i.e., the impact of one variable on the living standards of the poor may be conditioned by the values of the other variables. Endogenous growth theory, for example, asserts that the rates of return to investment in technology are conditioned by the level of human capital stock. To allow for this possibility, we have introduced interaction terms on certain variables, as appropriate.

Detailed descriptions of the above variables are given in Annex 1 and the estimating model is spelled out in Annex 2. All the regression models are estimated as a system, i.e., both the levels equations (initial-condition and time-varying variables) and differences equations (time-varying variables) are estimated jointly, taking into account the endogeneity of overall mean income and its difference. Some variants of the model take into account the possibility that agrarian reform is endogenous, as suggested by Otsuka's (1991) earlier assessment of Philippine land reform implementation. The results for the full panel are summarized in Table 4, while those for the partial panel are given in Table 5.

In either the full panel or partial panel regressions, the response of the average living standards of the poor (bottom 20 percent) to overall average income growth is far lower than that suggested by cross-country studies (e.g., Dollar and Kraay 2001, Timmer 1997). The growth elasticity is only slightly higher than 0.5, suggesting that a 10 percent increase in overall per capita income raises the average per capita expenditure of the poor by just about 5 percent. This result suggests that the quality or type—not just speed—of growth also matters for poverty reduction. It further implies that the same growth brings about disproportionately higher welfare gains for some of the other quintiles of the population. We return later to the differential responses of the various quintiles to growth (and other factors).

The agrarian reform variable is significant in three of the four variants of the model. Interestingly, the estimated coefficient is positive and highly significant when the specification allows for the possibility that agrarian reform is endogenous and uses initial land inequality and tenancy as additional instruments (Variant 4). Note that in the full panel, these instruments, as well as irrigation and farm size, are not used since values for these variables are available only for the 1990s. It is thus plausible that, in the full panel regression, the agrarian reform variable is either capturing the effects of the omitted variables (Variant 1) or is inadequately instrumented (Variant 2). For this reason, the specification given in Variant 4 is suggestive of the positive impact of agrarian reform on the average living standards of the poor.

By itself (apart from its direct impact on overall mean income), overall schooling does not seem to have a direct impact on the well-being of the poor. The schooling coefficient is not significantly different from zero in all variants of the regression model. However, when schooling is interacted with the roads variable, which is a proxy for access to markets and social services, the coefficient is positive and significant in all the regressions. This suggests that complementarities

are important, and that returns to schooling are dependent on the availability of complementary factors.

The coefficient for roads is significant but, surprisingly, has a negative sign, implying that, by itself, access to markets and information may not necessarily have a favorable effect on plight of the poor. It appears that roads do not typically reach the areas where most of the poor live

Table 4. **Determinants of the Average Living Standards of the Poor (Bottom 20 Percent), Full Panel, 1980s & 1990s**

	Variant 1			Variant 2 (Agrarian Reform is Endogenous)		
Explanatory Variable	Coefficient	Std error		Coefficient	Std error	
"Initial" Conditions						
Schooling	0.061	0.092		0.080	0.093	
Local Dynasty	-0.124	0.033	***	-0.124	0.033	***
Political Party	0.027	0.016	*	0.033	0.016	**
Landlocked	-0.067	0.019	***	-0.067	0.019	***
Typhoon	-0.038	0.018	**	-0.054	0.020	***
Time-varying Variables						
Per Capita Income (Y)	0.535	0.044	***	0.499	0.045	***
Terms of Trade (Pa/Pna)	0.092	0.045	**	0.108	0.045	**
Roads	-0.320	0.095	***	-0.295	0.096	***
Electricity (x100)	0.110	0.085		0.121	0.086	
Agrarian Reform	0.028	0.010	***	0.063	0.016	
Interactions						
Schooling*Roads	0.157	0.050	**	0.144	0.051	***
Schooling*Electricity (x100)	0.058	0.038		0.035	0.039	
Y*year91	0.001	0.002		0.003	0.002	
Y*year94	-0.001	0.002		-0.000	0.002	
Intercept	3.241	0.392	***	3.542	0.406	***
R-squared	0.719,	0.400		0.707,	0.377	

"***", "**" and "*" denote significance at the 1, 5, and 10 percent level, respectively.

Note: Estimation is by three-stage least squares. Instruments are actual values of schooling, roads, electricity, political-economy and geographic variables, agrarian reform (except in variant 2), terms of trade, and lagged values of the other variables, including twice-lagged value of average income growth. Data are for full provincial panel covering five years of three-year intervals in the 1980s and 1990s. The R-squared values apply to the level and the difference form of the estimated log (per capita expenditure) function.

Table 5. **Determinants of the Average Living Standards of the Poor (Bottom 20 Percent), Partial Panel, 1990s**

	Variant 3			Variant 4 (Agrarian Reform is Endogenous)		
Explanatory Variable	Coefficient	Std error		Coefficient	Std error	
"Initial" Conditions						
Schooling	-0.072	0.091		-0.010	0.094	
Local Dynasty	-0.101	0.029	***	-0.104	0.030	***
Political Party	0.026	0.015	*	0.029	0.015	**
Landlocked	-0.062	0.019	***	-0.067	0.019	***
Typhoon	-0.042	0.017	**	-0.064	0.019	***
Irrigation	0.309	0.039	***	0.233	0.046	***
Farm Size	0.008	0.018		0.010	0.019	
Time-varying Variables						
Per Capita Income (Y)	0.602	0.044	***	0.544	0.047	***
Terms of Trade (Pa/Pna)	0.118	0.042	***	0.140	0.043	***
Roads	-0.208	0.095	**	-0.212	0.096	**
Electricity (x100)	0.051	0.086		0.049	0.086	
Agrarian Reform	-0.005	0.010		0.041	0.017	**
Interactions						
Schooling*Roads	0.109	0.051	**	0.110	0.051	**
Schooling*Electricity (x100)	0.016	0.037		0.007	0.038	
Intercept	2.865	0.385	***	3.324	0.406	***
R-squared	0.771,	0.394		0.758,	0.385	

"***", "**" and "*" denote significance at the 1, 5, and 10 percent level, respectively.

Note: Estimation is by three-stage least squares. Instruments are actual values of schooling, roads, electricity, political-economy and geographic variables, agrarian reform (except for variant 4), terms of trade, and lagged values of the other variables, including twice-lagged value of average income growth. For variant 4, two additional instruments are lagged land inequality and tenancy. Data are for provincial panel covering three years of three-year intervals in the 1990s. The R-squared values apply to the level and the difference form of the estimated log (per capita expenditure) function.

and, where they do, they may exert an adverse impact on the poor through such channels as factor-market and political-economy processes. Nevertheless, as pointed out above, road access can improve the well-being of the poor provided they have sufficient human capital to take advantage of it.

Electricity, together with its interaction with education, is not significant in all the regressions. This result is quite puzzling, considering the importance often attributed to access to technology as a factor in poverty reduction. It is possible that this variable is a poor proxy for access to technology. As expected, the terms-of-trade variable is positive and significant, indicating that changes in the price of agriculture relative to the price prevailing in other sectors of the local economy have a profound impact on poverty reduction.[13] This result reflects the favorable effects

on the poor of the trade and exchange rate reforms in the 1990s. These reforms have effectively reduced the degree of overvaluation of the local currency, thereby improving the price incentives for tradables relative to nontradables. Since agriculture is more tradable than either industry or services, the policy shift would have improved the relative profitability of agriculture. Further, since agriculture is more labor-intensive than industry, the reforms would have benefited labor, especially of the poor.[14]

Initial farm size is not significant, but irrigation is, suggesting that it is land quality, not farm size *per se*, that tends to positively influence the living standards of the poor. This result conforms to the common view that investment in productivity-enhancing land improvement, such as irrigation and drainage, is an important policy measure for poverty reduction in land-scarce, labor-abundant developing countries.

Interestingly, local political dynasty is highly significant and has the negative sign, indicating that the welfare of the poor tends to be lower in provinces governed by political dynasties than in provinces characterized by competitive politics, other things being equal. This is consistent with the view that dynasty in local politics inhibits economic performance—through its effects on economic efficiency—and restricts the access of the poor to basic services. The other political-economy variable—the political party affiliation of local chief executives—is likewise significant, suggesting that resources for employment generation and poverty reduction tend to flow more favorably to local governments run by administrators with direct ties to the country's ruling political party (or President).

The frequency of typhoons tends to depress the average living standards of the poor, as indicated by the consistently negative and highly significant coefficient of the typhoon variable in all variants of the regression model. Another geographic "poverty trap" is high transport costs, as evidenced by the estimated negative relationship between the average living standards of the poor and the variable "landlocked".

VI. Differential Effects on Various Quintiles

Do the welfare effects of the variables vary by income groups? If the upper ranges of the income distribution tend to benefit more than proportionately from overall economic growth, what policies or institutional arrangements could enhance the benefits of growth for the poor?

[13] As shown elsewhere (see Balisacan 2001b), income poverty in the Philippines is a largely rural phenomenon, regardless of the poverty norm employed. Of the rural poor, nearly two thirds of them are dependent on agriculture for employment and income. As such, improvement in the terms-of-trade in provinces where agriculture is a dominant component of the local economy tends to raise the welfare levels of the poor.

[14] The severe overvaluation of the peso in the 1970s and 1980s disproportionately penalized agriculture and the export-oriented manufacturing sector (see Bautista and Tecson 2001).

We address these issues by estimating Variant 4 of the model for each of the other four income quintiles. Recall that, in Variant 4, agrarian reform is endogenous and that the model is estimated using the partial panel data (i.e., the full set of variables but covering the 1990s only). The estimation results for each quintile are summarized in Table 6. For ready comparison, the last column in Table 5 is reproduced for the first quintile in Table 6.

Table 6. **Determinants of Average Living Standards by Income Quintile: Partial Panel, 1990s**

Explanatory Variable	1st Quintile (Poorest)	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile (Richest)
"Initial" Conditions					
Schooling	-0.010	0.080	0.107	0.075	-0.139
Local Dynasty	-0.104 ***	-0.069 ***	-0.055 **	-0.029	0.041
Political Party	0.029 **	0.013	0.022 *	0.022 *	0.030 **
Landlocked	-0.067 ***	-0.077 ***	-0.070 ***	-0.061 ***	0.041 **
Typhoon	-0.064 ***	-0.055 ***	-0.046 ***	-0.048 **	0.059 ***
Irrigation	0.233 ***	0.157 ***	0.093 ***	0.008	-0.115 **
Farm Size	0.010	-0.012	-0.011	0.010	0.072 ***
Time-varying Variables					
Per Capita Income (Y)	0.544 ***	0.621 ***	0.676 ***	0.798 ***	1.045 ***
Terms of Trade (Pa/Pna)	0.140 ***	0.149 ***	0.135 ***	0.119 ***	-0.051
Roads	-0.212 **	-0.264 ***	-0.215 **	-0.051	0.478 ***
Electricity (x100)	0.049	0.098	0.162 **	0.143 **	-0.006
Agrarian Reform	0.041 **	0.033 **	0.029 **	0.026 *	-0.009
Interactions					
Schooling*Roads	0.110 **	0.133 ***	0.102 ***	0.015	-0.251 ***
Schooling*Electricity (x100)	0.007	0.019	0.009	0.002	0.002
Intercept	3.324 ***	2.760 ***	2.418 ***	1.625 ***	0.491
R-squared	0.758, 0.385	0.833, 0.498	0.864, 0.576	0.879, 0.610	0854, 0.686

"***", "**" and "*" denote significance at the 1, 5, and 10 percent level, respectively.

Note: Estimation is by three-stage least squares. Instruments are actual values of schooling, roads, electricity, political-economy and geographic variables, terms of trade, and lagged values of the other variables, including land Gini, tenancy and twice-lagged value of average income growth. Data are for provincial panel covering three years of three-year intervals in the 1990s. The R-squared values apply to the level and the difference form of the estimated log (per capita expenditure) function.

In general, the results for the second quintile closely resemble those for the first quintile. This is significant considering that estimates of Philippine poverty vary widely—from 20 to 40 percent—depending on, among other things, the poverty norm employed. The official estimate roughly corresponds to the bottom 40 percent of the population.

Other observations are also worth noting. First, the growth elasticity of poverty tends to increase monotonically with income quintile. This confirms what has been noted above: the benefits of growth are unevenly spread throughout the various income groups.

Second, an improvement in the terms of trade for agriculture tends to raise average living standards in all quintiles, except in the top (richest) quintile. The average welfare of those in the top quintile does not respond directly to changes in the price of agriculture relative to nonagriculture, as they depend mainly on the nonagriculture sectors of the local economy for employment and income.

Third, the roads variable is significant but has a negative sign for the first three quintiles, suggesting that roads per se directly reduce the welfare of the poor unless complementary factors like schooling are present. In contrast, this variable is significant and has positive sign for the top quintile, indicating that roads raise directly the average welfare of the richest group in society, as expected.

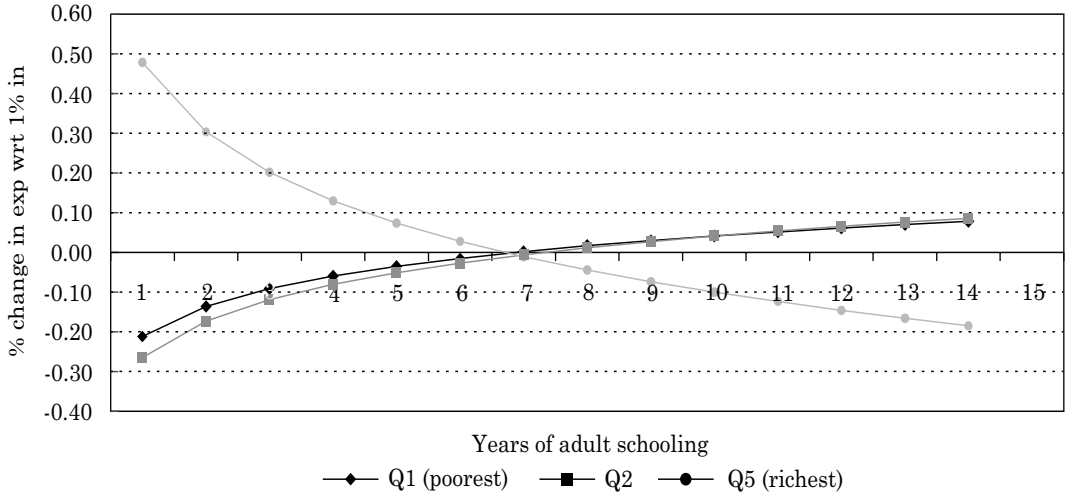
Fourth, apart from its impact through other channels, overall schooling does not seem to have a direct, significant effect on average welfare for all quintiles. However, as noted above, when interacted with roads, schooling tends to raise the average well-being in the first three quintiles. This suggests that complementarity matters for other quintiles as well. In Figure 6, the impact of raising average province-level schooling on returns (in terms of changes in qiantile mean expenditures) to roads is shown for the bottom two and the top quintiles. The contrast suggests that higher schooling allows the poor to benefit directly from overall road development.

Fifth, other things being equal, agrarian reform raises the average welfare of all quintiles, except the top one. Note, again, that those in the top 20 percent do not normally depend on agriculture for employment and income.

Sixth, irrigation tends to have a pro-poor bias. Farm size does not have significant effects on the average welfare of all but the richest group, implying that it is the quality of the land, not farm size per se, that favorably affects the welfare of the lower-income groups.

Finally, the local political economy appears to influence differently the welfare of the various population groups. Lack of political competition (political dynasty) hurts the lower-income groups, particularly the poorest.

Figure 6. **Schooling and Road Impact**



VII. Conclusion

Recent studies employing cross-national regressions report that the incomes of the poor move one-for-one with overall average incomes, suggesting that growth is sufficient, or nearly so, for poverty reduction. Simple country averages, however, tend to mask more than reveal the "true" story about poverty, inequality, and growth. The problem is compounded because these averages are based on highly varied concepts and definitions of income, poverty, and inequality across countries, not to mention differences in national institutions and policies. From a policy perspective, an examination at the subnational level of the determinants of poverty reduction seems clearly superior to cross-country analysis. Fortuitously, good-quality subnational data have become increasingly available for many Asian developing countries in recent years, thereby making investigations beyond cross-national averages feasible.

Newly constructed panel data for the Philippines spanning the 1980s and 1990s reveal substantial differences in the evolution of poverty across provinces. Econometric results based on these data indicate that the response of poverty to overall average income growth is far more subdued than suggested by cross-country analyses. The growth elasticity of poverty is, on the average, just above 0.5, indicating that income growth alone does not translate one-for-one to changes in the welfare of the poor. It seems clear that changes in poverty over time depend not only on the *rate* of economic growth but also on the *type* of growth. Put differently, the poor will benefit even more from growth if institutions and policies are reformed to favor them, or are at least made more neutral. This result is consistent with those of similar other subnational analyses, such as that on India and Thailand.

Apart from economic growth, other factors exert direct impacts on the welfare of the poor (as well as on that of the nonpoor). This paper has highlighted the importance of education, infrastructure, terms of trade, agrarian reform, governance, and certain geographic attributes. Schooling, if accompanied by complementary public investments, raises the welfare of the poor, apart from its indirect effect through economic growth. And so do the implementation of agrarian reform, investment in land-quality improvement, and removal of price distortions that diminish the profitability of agriculture relative to nonagriculture. Political dynasties seem to be bad for the poor as they not only constrain local economic growth but also restrict access of the poor to basic services. High transport costs lead to geographic "poverty traps" as the poor are impeded from taking advantage of economic opportunities elsewhere.

Overall, what the present study as well as similar other subnational analyses show is that economic growth explains a lot but not everything about poverty. The balance that seems fairly large can be accounted for by institutions and other factors. Thus, while growth is indeed good for the poor, it is not good enough. How much is not good enough can be uncovered by probing beneath cross-national averages. As subnational analysis is extended to more countries, perhaps greater confidence can be had in this conclusion, thereby helping better inform poverty reduction strategies and policies.

Appendix

Variable Definitions and Data Sources

Variable Name	Definition	Source of Basic Data
Mean Expenditure	Log (Average per capita expenditure of bottom 20 percent,adjusted for provincial cost-of-living differences)	FIES – NSO, 1985-95
Mean Income	Log (Average per capita income, adjusted for provincial cost-of-living differences)	FIES - NSO, 1985-97
Roads	Log (Concrete-equivalent roads per square kilometer)	DPWH and NSO, 1989 & 1997
Electricity	Proportion of households with access to electricity	FIES, 1985-97
Agrarian Reform	Proportion of cumulative CARP accomplishments to1990 potential land reform area	DENR and DAR CARP Accomplishment Reports, 1988-97
Farm Size	Log (Average farm size, in hectares)	1991 Census of Agriculture, NSO
Irrigation	Proportion of irrigated farm area to total farm area	1991 Census of Agriculture, NSO
Tenancy	Proportion of tenanted farm area to total farm area	1991 Census of Agriculture, NSO
Land Gini	Log (Gini ratio of agricultural landholding)	1991 Census of Agriculture, NSO
Education	Log (Mean years of schooling of household heads)	FIES – NSO, 1985-97
Terms of Trade	Log (Ratio of implicit price deflator for agriculture to implicit price deflator for nonagriculture)	NSCB regional accounts, 1988-97
Local Dynasty	Proportion of provincial officials & district representatives related to each other either by blood or affinity	COMELEC records and Congressional interviews
Political Party	Dummy variable (equal to 1 if the governor's party is the same as that of the President, 0 otherwise)	COMELEC Election Reports
Landlocked	Dummy variable (equal to 1 if province is landlocked, 0 otherwise)	Philippine map
Typhoon	Average annual number of typhoons for 1948-1998	PAGASA

Note: All values pertain to provinces, except for terms of trade, which pertain to regions.

The Estimating Model

The estimating model of the determinants of average household welfare at the provincial level has the general form

$$y_{pt}^{Qi} = \alpha_0 + \alpha_1 y_{pt} + \alpha_2' x_{pt} + \alpha_3' z_p + \upsilon_p + \varepsilon_{pt}, \qquad i = 1,2,...,5 \tag{1}$$

where the subscripts p and t index provinces and years, respectively; y^{Qi} is logarithm of mean per-capita expenditure for quintile i, y is logarithm of overall mean per-capita income; x is vector of time-varying factors other than income; z is set of observed province-specific factors; and $\upsilon+\bullet$ is a composite error term, including unobserved province effects. The main interest in the paper is the determinants of the mean per capita expenditure for $Q1$, the poorest 20 percent of the provincial population.

As discussed in the text, the appropriate household welfare indicator is consumption expenditures normalized by household size. To be consistent, the overall welfare indicator in the right-hand side of equation (1) ought to be also in terms of expenditures, not incomes. However, doing so will introduce correlations in any measurement errors between the right-hand side variable and the error terms $\bullet_{pt}$ since this variable and the left-hand side variable come from the same distribution. The effect would be biased estimates of the parameters of interest. By instrumenting expenditures with incomes, this source of potential biases is eliminated.

The difference form of equation (1) yields the growth in the mean per capita expenditure of the poor in province p over the time period from t-3 to t as a function of growth in overall income, as well as of changes in x variables, i.e.,

$$\left(y_{pt}^{Qi} - y_{pt-3}^{Qi}\right) = \alpha_1 \left(y_{pt} - y_{pt-3}\right) + \alpha_2' \left(x_{pt} - x_{pt-3}\right) + \tau_{pt}, \tag{2}$$

where direct OLS estimation of this equation gives unbiased estimates of growth elasticity (as well as responses of average welfare to other time-varying factors), but at the expense of losing information on the influence of certain fixed effects, which are also of interest to this study.

In equations (1) and (2), overall average income (and its growth) influences the average welfare level (and its growth) of the poor. But the reverse causation is also possible. One strand of the recent growth-empirics literature, for example, suggests that increasing the current welfare of the poor through, say, redistribution policies enhances subsequent overall growth. To see this, suppose, as in standard formulation of Barro-type growth regressions, that the overall per-capita income at time t is a function of initial income and initial income inequality, among other variables. Let the measure of income inequality be represented by the income share of the poor (here, the bottom quintile $Q1$) Then the overall per-capita income can be expressed as

$$y_{pt} = \beta_0 + \beta_1 \ln\left(\frac{Q1_{pt-k}}{0.2}\right) + \beta_2 y_{pt-k} + \beta_3' w_{pt} + \eta_p + \mu_{pt} \tag{3}$$

where w is a vector of other determinants of overall per capita income.

Clearly, from equations (1) and (3), the welfare level of the poor (y^{Q1}) also influences overall per capita income (y), provided $\bullet_1$ is not equal to zero. For example, high realization of $\bullet$ in equation (1) causes the incomes of the poor to rise relative to those of the nonpoor, which in equation (3) then raises the overall per capita income if $\bullet_1>0$, or lowers it if $\bullet_1<0$.

In obtaining estimates of $\bullet_1$ (as well as other parameters), the usual practice is to estimate either equation (1) or equation (2) by OLS. Given fixed effects, the disadvantage of estimating equation (1) is well known. On the other hand, as noted above, estimating equation (2) directly to obtain the parameters of the time-varying variables (y and x) results in loss of information. In this paper, as in Dollar and Kraay (2001), the information from both the levels and changes of the data is combined by estimating equations (1) and (2) simultaneously. Specifically, the system is estimated by three-stage least squares; the estimation imposes the restriction that the coefficients in the levels and differences equations are equal.

Among the time-varying x variables is agrarian reform, which is treated in the paper as an endogenous variable. Instrumenting for this variable are land inequality (given by the landholding Gini ratio) and tenancy incidence, as well as lagged values of per capita expenditure (of the poor) and of overall per capita income.

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