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**Working Paper**

## Revisiting Growth and Poverty Reduction in Indonesia: What Do Subnational Data Show?

ERD Working Paper Series, No. 25

**Provided in Cooperation with:**

Asian Development Bank (ADB), Manila

*Suggested Citation:* Balisacan, Arsenio M.; Pernia, Ernesto M.; Asra, Abuzar (2002) : Revisiting Growth and Poverty Reduction in Indonesia: What Do Subnational Data Show?, ERD Working Paper Series, No. 25, Asian Development Bank (ADB), Manila, <https://hdl.handle.net/11540/2066>

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**Arsenio M. Balisacan**  
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October 2002

ERD Working Paper No. 25

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October 2002

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Asian Development Bank  
P.O. Box 789  
0980 Manila  
Philippines

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October 2002  
ISSN 1655-5252

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## **Foreword**

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## Abstract

Indonesia has an impressive record of economic growth and poverty reduction over the past two decades. The growth-poverty nexus appears strong at the aggregate level. Newly constructed panel data on the country's 285 districts (*kotamadyas / kabupatens*), however, reveal huge differences in poverty changes, subnational economic growth, and local attributes. Results of econometric analysis show that besides growth, other factors directly influence the welfare of the poor, apart from their impact on growth itself. Among the critical ones are infrastructure, human capital, agricultural price incentives, and access to technology. Thus, while fostering economic growth is evidently crucial, a more complete poverty reduction strategy should take into account these relevant factors. In the context of decentralization, subnational analysis can be an instructive approach to examining local governance in relation to growth and poverty reduction.

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## I. INTRODUCTION

**B**y international standards, Indonesia has done remarkably well in both economic growth and poverty reduction. For two decades prior to the Asian financial crisis in the late 1990s, economic growth averaged 7 percent per annum. This was the norm for East Asia and was substantially higher than the average growth rate of 3.7 percent for all developing countries. At the same time, Indonesia's poverty incidence fell from 28 percent in the mid-1980s to about 8 percent in the mid-1990s, compared with the poverty reduction of from 29 to 27 percent for all developing countries (excluding People's Republic of China [PRC]).<sup>1</sup> Indonesia's record also compares well with those of the PRC and Thailand whose economies grew even faster.

The Asian financial crisis, exacerbated by domestic political turbulence, hit hard the Indonesian economy, causing GDP per capita to contract in 1998 by 13 percent, effectively to what it was in 1994. Poverty rose sharply, as indicated by both official and independent estimates (e.g., ADB 2000, Skoufias 2000, Suryahadi et al. 2000). Official figures suggest that the proportion of people deemed poor rose from 17.7 percent in 1996 to 24.2 percent in 1998. But just as the economic contraction caused a sharp increase in poverty rate, the rebound in 1999 and 2000, albeit modest, led to a drop again in poverty rate to nearly its precrisis level. Based on independent estimates (Suryahadi et al. 2000), poverty incidence in late 1999 was down to 10 percent, a level comparable to what it was in early 1996, after shooting up to 16 percent in mid-1998. These estimates suggest that poverty in Indonesia responds quite strongly and relatively quickly to large shocks.

While the Asian crisis adversely affected the welfare of the Indonesian people, the country's achievements in economic and human development during the past quarter-century remain impressive, especially seen against the performances of South Asia and other low and middle-income countries (Table 1). Indonesia's economic and social gains from the high-growth period could not so easily be wiped out by the crisis.

Indonesia's overall growth and poverty reduction experience appears to be consistent with the findings of studies using cross-country regressions (e.g., Dollar and Kraay 2001). Dollar and Kraay show that the incomes of the poor move one-for-one with overall average incomes, suggesting that poverty reduction requires nothing much more than promoting rapid economic growth.

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<sup>1</sup> According to World Bank's internationally comparable estimates based on a poverty line of approximately US\$1 a day (in 1993 PPP). See Chen and Ravallion (2001).



Table 1. Selected Social Indicators: Indonesia versus Other Developing Countries

| Indicator                                              | Beginning Period |               | Ending Period |               |
|--------------------------------------------------------|------------------|---------------|---------------|---------------|
|                                                        | <u>1970</u>      |               | <u>2000</u>   |               |
| Average Per Capita GDP (in 1999 PPP \$) <sup>a</sup>   |                  |               |               |               |
| Indonesia                                              | 940              |               | 2,882         |               |
| East Asia and Pacific                                  | 875              |               | 4,413         |               |
| South Asia                                             | 1,051            |               | 2,216         |               |
|                                                        | <u>1980</u>      |               | <u>1999</u>   |               |
| Infant Mortality (per 1,000 live births)               |                  |               |               |               |
| Indonesia                                              | 90               |               | 42            |               |
| East Asia & Pacific                                    | 55               |               | 35            |               |
| South Asia                                             | 119              |               | 74            |               |
| Low & Middle Income Countries                          | 86               |               | 59            |               |
| Life Expectancy at Birth (years)                       |                  |               |               |               |
| Indonesia                                              | 55               |               | 66            |               |
| East Asia and Pacific                                  | 65               |               | 69            |               |
| South Asia                                             | 54               |               | 63            |               |
| Low & Middle Income Countries                          | 60               |               | 64            |               |
| Primary Gross Enrolment Ratio (percent) <sup>b</sup>   |                  |               |               |               |
| Indonesia                                              | 107              |               | 113           |               |
| East Asia and Pacific                                  | 111              |               | 119           |               |
| South Asia                                             | 77               |               | 100           |               |
| Low & Middle Income Countries                          | 96               |               | 107           |               |
| Secondary Gross Enrolment Ratio (percent) <sup>b</sup> |                  |               |               |               |
| Indonesia                                              | 29               |               | 56            |               |
| East Asia and Pacific                                  | 44               |               | 69            |               |
| South Asia                                             | 27               |               | 49            |               |
| Low and Middle Income Countries                        | 42               |               | 59            |               |
| Adult Illiteracy (percent of people aged 15 and above) | <u>Male</u>      | <u>Female</u> | <u>Male</u>   | <u>Female</u> |
| Indonesia                                              | 13               | 27            | 9             | 19            |
| East Asia and Pacific                                  | 13               | 29            | 8             | 22            |
| South Asia                                             | 41               | 66            | 34            | 58            |
| Low and Middle Income Countries                        | 22               | 39            | 18            | 32            |

Notes:

<sup>a</sup> Figures are three-year averages, centered on the year shown.<sup>b</sup> The most recent data pertain to 1997, instead of 1999.

Sources: World Bank (2001) and IMF (2001).

There is, however, much more to the growth-poverty nexus than the national averages would imply. Growth and poverty reduction vary enormously across the island groups, provinces, and districts of Indonesia (Hill 1996, 2002; Tadjoeeddin et al. 2001; ADB 2001; Booth 2000; Asra 2000).<sup>2</sup> Evidence, though limited, shows that this variance is widening, not converging, and is becoming a politically sensitive issue, given its ethnic dimensions (Hill 2002). Recent history is replete with examples showing that social or political tensions arising from economic disparities tend to dampen the return to high growth and, hence, to winning the war against poverty.

An appropriate approach to socioeconomic disparities requires a clear understanding of policy and institutional factors that account for differences in the evolution of growth and poverty in the various districts of Indonesia. To what extent can differences in growth explain the observed differences in poverty reduction across provinces and districts? How important are government policies and programs, as well as geographic attributes and local institutions, in directly influencing poverty? What lessons can be learned from recent experience for promoting poverty reduction in the poorest areas?

Indonesia—as a case study for addressing the above questions—offers advantages that are not found in many developing countries. For one, as already noted, the country is very diverse, both in geographic and institutional attributes and in economic performance. It is this diversity that permits a critical assessment of the influence of economywide policies and “initial” conditions, including institutions and geographic attributes, on poverty. For another, comparable cross-sectional and time-series data on subnational units (provinces and districts) are available. The periodic conduct of comparable household surveys in the 1990s—a period characterized by marked changes in economic performance and policy environment—has created opportunities for constructing a panel of subnational units, especially at the district level. This facilitates a sufficiently disaggregative analysis and understanding of the determinants of growth and poverty reduction.

This paper examines the key determinants of poverty reduction in Indonesia during the 1990s. The next section describes data and measurement issues. The paper then uses consistently assembled district-level data to analyze the basic growth-poverty relationship. Further, it probes the contribution of certain physical attributes, political economy, and time-varying economic factors to the observed variation in district-level economic performance vis-à-vis changes in poverty. A main interest here is to assess the extent to which certain policy measures can enhance or diminish the impact of growth on the living standards of the poor. The paper concludes with implications for the design of pro-poor growth policies and institutions in Indonesia.

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<sup>2</sup> These variations are also evident in other developing countries, both large and small (see, e.g., Fan et al. 2000 for the PRC; Ravallion and Datt 2001 for India; Balisacan and Pernia 2002 for the Philippines; and Deolalikar 2002 for Thailand).

## II. DATA AND MEASUREMENT ISSUES

The National Socioeconomic Survey (*Survei Sosial Ekonomi Nasional* or SUSENAS) is the main source of data for poverty and inequality comparisons. The survey comes in two sets: the so-called *consumption module* and *core data* (hereafter referred to as SUSENAS module and SUSENAS core, respectively). The SUSENAS module provides detailed consumption data, is undertaken every three years, and allows disaggregation only up to the provincial level. For the 1990s, such data are available for 1993, 1996, and 1999. The SUSENAS core, on the other hand, covers not only consumption but also other socioeconomic indicators, though the specific indicators vary from year to year. Consumption data in the SUSENAS core are, however, not as detailed as those in the SUSENAS module. Indeed, consumption figures from the former are about 11 percent lower, on the average (for 1993-1999), than those from the latter. The advantage is that the data allow disaggregation up to the district level (urban district, *kotamadya*; rural district, *kabupaten*). Official government poverty figures calculated by the Central Bureau of Statistics (Biro Pusat Statistik, BPS) are based on the SUSENAS module.<sup>3</sup>

We have chosen to use the SUSENAS core since it yields a far greater number of observations for each survey year (285 districts vs. 26 provinces).<sup>4</sup> However, to obtain the same aggregate poverty profile as that given by the SUSENAS module, we have adjusted the consumption data from the SUSENAS core such that the expenditure means by quintile correspond to those obtained from the SUSENAS module.

Apart from consumption, the SUSENAS provides data for an equally popular broad measure of household welfare, current household income. The survey, however, has a much less extensive treatment of household income than it has of current consumption, which, for our purposes, is fortuitous. On both conceptual and practical grounds, consumption is preferable to income as a broad measure of household welfare. Standard arguments in microeconomic theory suggest that welfare level is typically determined by “life-cycle” or “permanent” income, and current consumption is a good approximation of such income. Indeed, measured consumption is invariably less variable than measured income (Deaton 2001); then, too, accurate information is less difficult to obtain for consumption than it is for income (Deaton 1997, Ravallion 2001, Srinivasan 2001).

The National Income Accounts (NIA) is also a distinct source of data on the country’s average welfare. The level of per capita GDP 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 personal consumption expenditure (PCE) per capita. In general, PCE, as measured in NIA, and household consumption expenditures (HCE), as measured in SUSENAS, do not necessarily agree either as to their levels or their growth rates, largely because of differences in definitions, methods, and

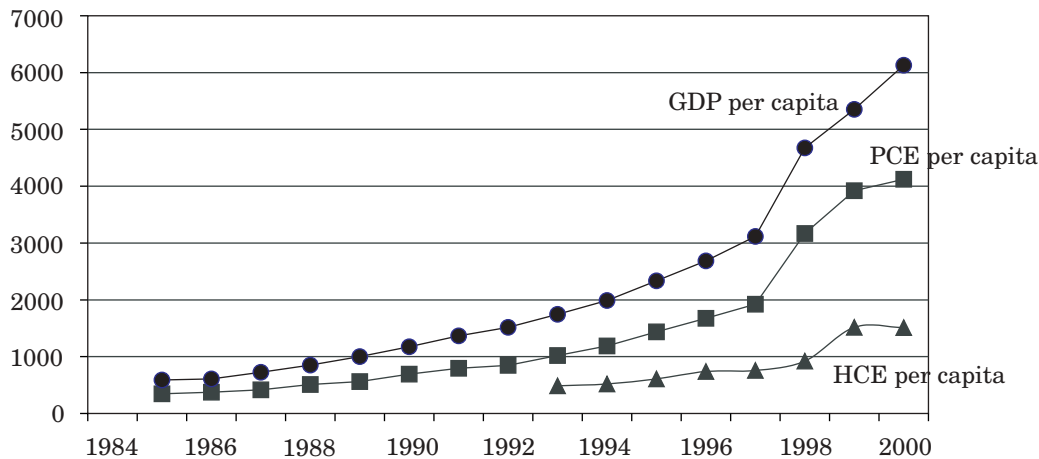
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<sup>3</sup> Although SUSENAS extends back to the 1960s, provincial-level data are strictly comparable only for the surveys beginning 1993 when the BPS implemented the heavily revised core questionnaire and expanded the core sample size from about 65,000 households prior to 1993 to around 200,000 households since then.

<sup>4</sup> The classification of districts pertains to that prevailing in 1993. The data exclude East Timor.

coverage.<sup>5</sup> 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. At any rate, in the Indonesian case, average per capita levels of PCE and HCE move broadly in the same direction, at least for the 1990s (Figure 1).

Figure 1. **Average Per Capita Expenditure:  
National Income Accounts versus SUSENAS**  
(In '000 rupiah at current prices)



The chosen indicator of household welfare, i.e., per capita expenditure, has to be adjusted for spatial cost-of-living (SCOL) differences since prices in any given year vary substantially across provinces and districts of the country. Previous poverty and income inequality studies on Indonesia have been largely unsuccessful in making the necessary adjustments to either household incomes or expenditures, owing mainly to the absence of appropriately constructed SCOL indices. In theory, the SCOL index is simply the ratio of the cost of attaining a reference level of utility in, say, province  $k$  to the cost of attaining the same in the reference province  $r$ . To the extent that spatial poverty lines are comparable in utility terms (i.e., they imply the same standard of living), then the ratio of the poverty line for province  $k$  to that for the reference province  $r$  is an appropriate SCOL index. For our purposes, we have used the 1999 official poverty lines for urban areas to approximate SCOL differences for the 26 provinces (excluding East Timor). There are at least two reasons for preferring the urban poverty lines to the rural lines or some combination of urban and rural lines. Firstly, periodic consumer price surveys intended for consumer price index (CPI) construction cover only urban areas. Secondly, it appears that rural poverty lines are not comparable with urban lines in terms of the living standards they imply since the construction of the two sets of lines is based on the respective consumption patterns for urban and rural areas. Thus, focusing

<sup>5</sup> Ravallion (2001) finds that, for developing and transition countries, the problem of comparability between survey and NIA data is more serious for income than for expenditure measures.

on urban lines and Jakarta as the reference province (Jakarta=100), we find large interprovincial differences in cost of living, ranging from 74 percent in South Sulawesi to 116 percent in Bengkulu (see Annex Table 1).

Comparison of household welfare over time also requires that the chosen welfare indicator, consumption expenditure, has to be adjusted for nominal price movements during the 1990s. A straightforward way to achieve this is to deflate the consumption expenditures using SCOL indices adjusted for province-specific CPI changes. For practical purposes, this would be sufficient if price movements were uniform across consumer goods during the period of interest. However, in reality the price movements vary across consumption items, especially during the economic crisis of the late 1990s.

We have constructed group-specific CPI to take account of the differential price regimes faced by the various population groups. The construction involves combining the information on province-specific price index with expenditure shares (weights) of quintile groups, based on the 1996 SUSENAS core, for the following commodity groups: food, prepared food and beverage, housing, clothing, health, education and recreation, and transport and communication. Table 2 summarizes the average quintile-specific price indices for 1993-1999.

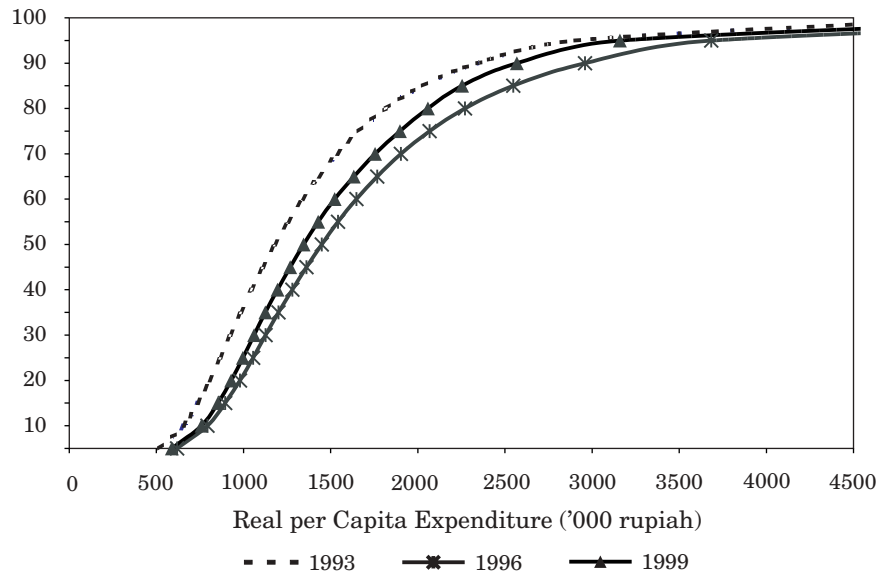
As a consequence of the sharp rupiah depreciation starting in July 1997, overall price inflation during 1996-1999 (120 percent) was much higher than in 1993-1996 (27 percent). In addition, while price changes between 1993 and 1996 (precrisis period) did not vary much across quintiles, they did so between 1996 and 1999 (crisis period). During the latter period, consumer price inflation was 128 percent for the bottom quintile, while it was only 109 percent for the top quintile. The very high inflation rate for the poor during the crisis period was caused by the marked increases in the prices of food, particularly rice, which accounts for a dominant share of the poor's consumption basket (Sigit and Surbakti 1999).<sup>6</sup>

Table 2. **CPI by Expenditure Quintile**

|                  | 1993  | 1996  | 1999  | Percent Change |         |
|------------------|-------|-------|-------|----------------|---------|
|                  |       |       |       | 1993-96        | 1996-99 |
| National average | 100.0 | 127.3 | 281.3 | 27.3           | 120.90  |
| <b>Quintile</b>  |       |       |       |                |         |
| First (poorest)  | 100.0 | 128.2 | 292.2 | 28.2           | 128.0   |
| Second           | 100.0 | 127.9 | 288.4 | 27.9           | 125.6   |
| Third            | 100.0 | 127.6 | 284.6 | 27.6           | 123.1   |
| Fourth           | 100.0 | 127.2 | 279.1 | 27.2           | 119.5   |
| Fifth (richest)  | 100.0 | 126.1 | 264.0 | 26.1           | 109.4   |

<sup>6</sup> A notable feature of the economic crisis in the late 1990s was that food prices rose much more sharply than nonfood prices. Food CPI rose by about 160 percent between 1996 and 1999, while nonfood CPI increased by only 76 percent during the same period.

Figure 2. **Distribution of Living Standards**



The resulting national distributions of per capita consumption expenditures for the three SUSENAS years are shown in Figure 2. Note that the expenditures are in real terms (at 1999 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 2 for the various years. For example, if the national-average (population-weighted) official poverty line of about Rp904,400 per person is used, the resulting poverty incidence would be 26 percent for 1993, 13 percent for 1996, and 16 percent for 1999.<sup>7</sup>

As shown by Foster and Shorrocks (1988), two nonintersecting cumulative distribution curves 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. This is the case for 1993 and 1996, as well as for 1996 and 1999. Thus, poverty is unambiguously higher in 1999 than in 1996, but still much lower than in 1993, for virtually all poverty norms and standard poverty measures that have been suggested in the literature.

To some extent, the pattern of poverty change shown above is qualitatively consistent with the observations reported in previous studies. Using their “consistent” estimates, Suryahadi et al. (2000) showed that poverty increased by 6.5 percentage points between 1996 and 1999, while the Asian Development Bank’s estimate (2000) of the change, based on official poverty lines, was roughly 6 percentage points. Our estimate of the increase in poverty rate from 1996 to 1999 is

<sup>7</sup> If no allowance was made for differences in provincial cost-of-living differences, i.e., if the only adjustment made on the SUSENAS expenditure data for the three survey years was on price changes over time, the estimate of poverty incidence would have been higher by 4.3 percentage points for 1993, 3.3 percentage points for 1996, and 3.4 percentage points for 1999.

approximately 3 percentage points. Note again, however, that our estimate takes account of substantial interprovincial cost-of-living differences.

A caveat on the welfare distribution estimates for 1996 and 1999 is in order. The difference between the two years is strictly not an estimate of the extent of change *during* the crisis. The crisis did not begin in February 1996 and end in February 1999, which were the months covered by the SUSENAS data used in this paper. Economic growth continued to be positive and surpassed population growth (while inflation remained moderate) for nearly a year and a half after the early 1996 survey. This could have caused further decline in poverty, which was the norm in the 1980s and the first half of the 1990s. Thus, the increase in poverty during the crisis was likely higher than the 3 percentage points as reflected in Figure 2.

### III. SUBNATIONAL DIFFERENCES IN AVERAGE WELFARE

Available data show enormous differences in natural endowment, agrarian structure, access to support services, and institutions, as well as effects of economywide pricing policies, across the country's 285 districts. Figure 3 highlights these differences for a few indicators, namely, schooling, farm characteristics, and access to information, technology and finance. The indicators (defined below in Section IV) pertain to district-level averages for the 1990s. In general, the values of these indicators are scattered widely around their overall (national) means. Moreover, even for districts with similar levels of real per capita income (expenditure), the dispersion is quite substantial.

By contrast, as can be seen in Figure 4, district-level data covering the three survey years in the 1990s (a total of 855 observations) show a strong positive correlation between district-level average expenditure and average welfare of the poor (the bottom 20 percent of the population based on ranking by per capita expenditure).<sup>8</sup> The relationship is summarized by the fitted line, obtained by ordinary least squares (OLS) regression of the mean welfare of the poor on the overall mean expenditure.<sup>9</sup> Note that both means are expressed in logarithms, hence, the slope of the fitted line can be interpreted as the elasticity of the average income of the poor with respect to the overall average income, henceforth referred to as the growth elasticity of poverty. This growth elasticity is close to 0.8, indicating that a 10 percent increase in the district-level income raises the living standards of the poor by 8 percent.<sup>10</sup> At first glance, this appears to be remarkably close

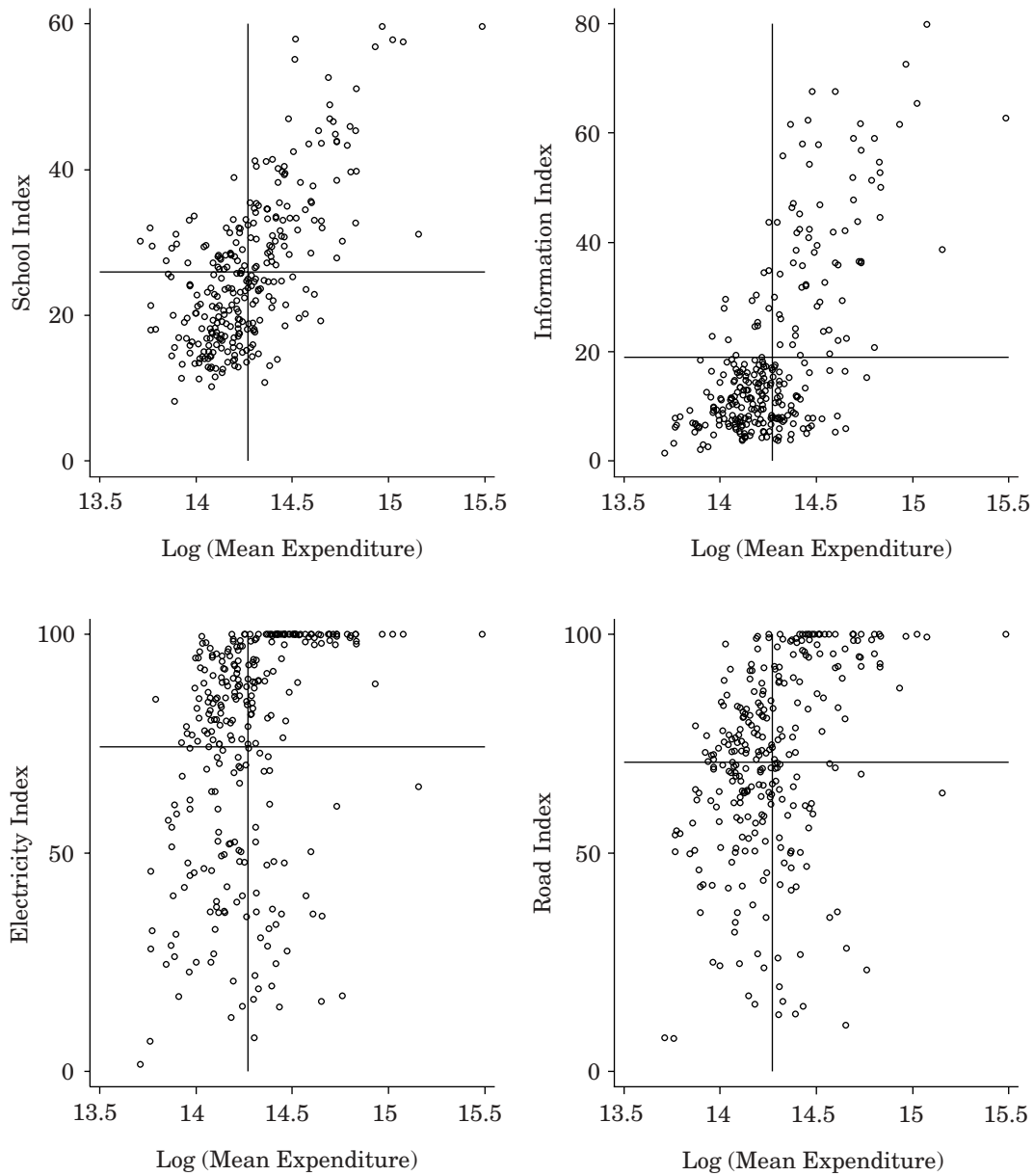
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<sup>8</sup> Alternatively, as in common practice, poverty can be defined in terms of an explicit poverty line, below which a person is deemed poor. However, for our purposes, this practice is not particularly appealing, since it makes the estimate of poverty response sensitive to assumption about the poverty line.

<sup>9</sup> From hereon, for expositional purposes, we use the term "mean per capita income" or simply "per capita income" for "mean per capita expenditure" for consistency throughout, unless otherwise specified. We also use the expression "mean welfare of the poor" or simply "welfare of the poor" or "living standards of the poor" for mean income or expenditure of the poor.

<sup>10</sup> The estimated elasticity for each year—0.773 for 1993, 0.768 for 1996, and 0.775 for 1999—indicates that the overall estimate of 0.8 is robust.

Figure 3. District-level Differences for Selected Indicators



Notes:

School index: District average for distance of villages to junior high school and distance to senior high school.

Information index: District average for proportion of villages with public phone, proportion of villages with TV, and proportion of villages with postal office.

Electricity index: Proportion of villages with access to state-run electricity.

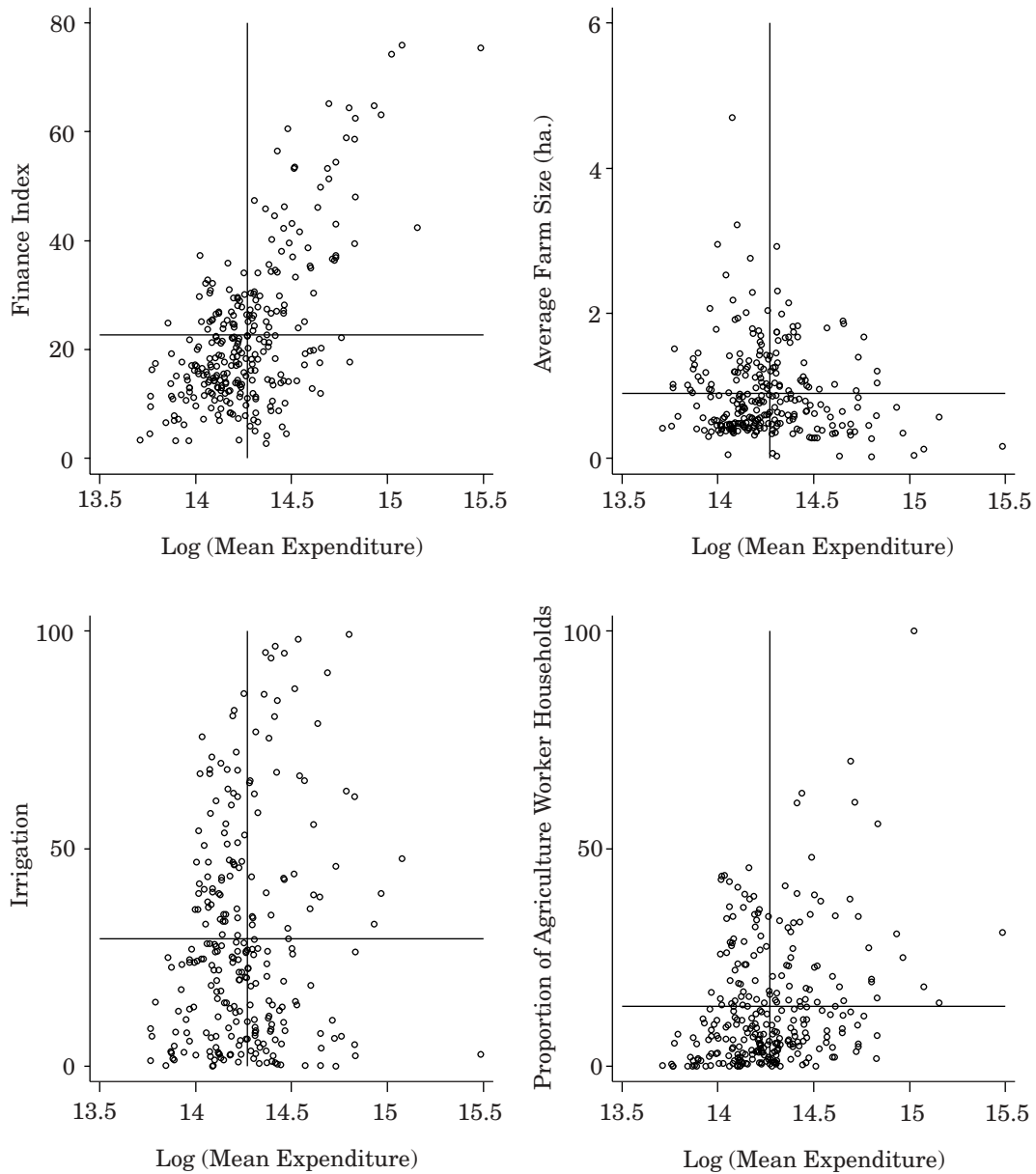
Road index: Proportion of villages with paved roads.

Source: Village Potential Statistics (PODES) for 1993, 1996, and 1999, BPS Indonesia.

*continued.*



Figure 3. (cont'd.)



Notes:

Finance index: District average for proportion of villages with banks and proportion of villages with coops.

Irrigation: Ratio of total irrigated area to the total area comprising wetlands, garden drylands, shifting cultivation lands, and grasslands.

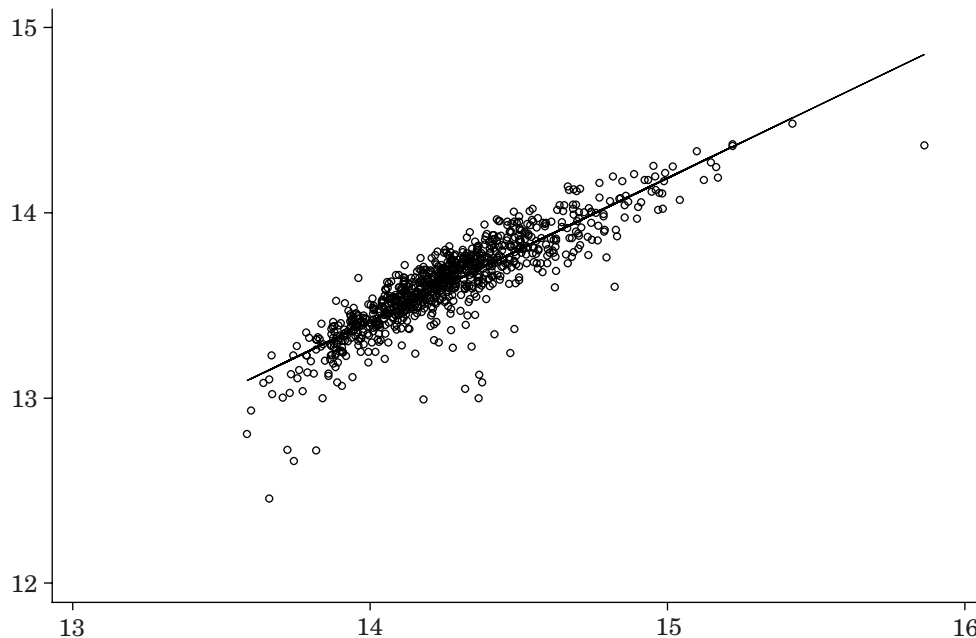
Proportion of agricultural worker households: Ratio of agricultural laborer households to total agricultural households.

Source: PODES 1993, 1996, and 1999, BPS Indonesia.

to those reported in studies based on cross-country national averages. Dollar and Kraay (2001), for example, obtained an elasticity of around unity. Similarly, in reexamining cross-country evidence on poverty reduction from the late 1980s to the late 1990s, Bhalla (2001) estimated a growth elasticity of 0.8.

Nevertheless, the growth-poverty relationship is not as straightforward as Figure 4 might suggest. Simply regressing the per capita income of the poor on overall per capita income likely yields an inconsistent estimate of the growth elasticity of poverty. Measurement errors in per capita income (which is also used to construct our measure of the average income of the poor) bias the estimate of this elasticity. Moreover, there is the possibility that the incomes of the poor and overall incomes are jointly determined. Recent theory and evidence show a link running from inequality (hence, 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 Squire 1998), while another strand says the reverse (Forbes 2000, Li and Zou 1998). Further, inconsistency of the parameter estimates of the growth-poverty relationship in Figure 4 arises from the omission of variables that have direct impact on the welfare of the poor and are correlated with overall average income, as shown in Figure 3. In addition, provincial indicators of human capital, infrastructure, and local institutions (e.g., “social capital”) also appear to correlate strongly with provincial mean incomes (Booth 2000, Kwon 2000, Garcia 1998).

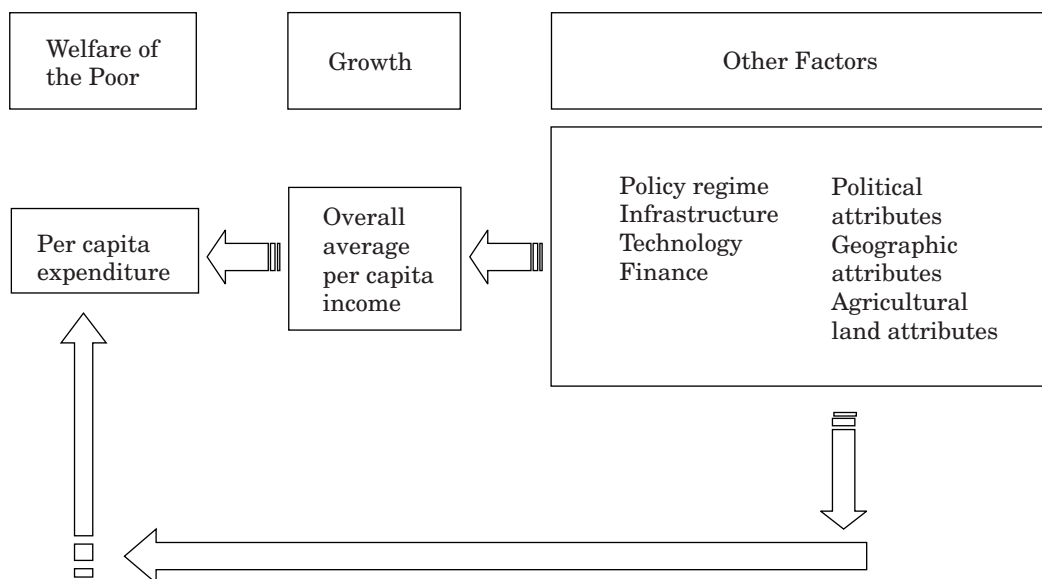
Figure 4. **Welfare of the Poor versus District Average Expenditure**



We attempt to address the above problems by examining the robustness of the growth elasticity estimates and exploring other determinants of district-level performance in poverty reduction. Figure 5 summarizes our empirical approach.

To deal with the measurement error, we could use average income to instrument for overall average expenditure. However, the income variable is not available at the district level. The alternative instrument is district-level expenditure growth, which also takes care of the endogeneity issue.<sup>11</sup> In the case of the omitted-variables bias problem, we exploit the longitudinal nature of the district-level data and employ panel estimation techniques to control for differences in time-invariant, unobservable province-specific characteristics. Specifically, we use two standard panel estimation models—the fixed-effects model and the random-effects model—suited for addressing unobserved fixed-effects problems, but doing so in such a way that the endogeneity of overall mean income is observed.<sup>12</sup> Table 3 summarizes the results of the estimation. For comparison, we also show the OLS regression estimates implied by the fitted line in Figure 4, as well as the instrumental variable (IV) regression estimates.

Figure 5. **Empirical Framework**



Note: Lagged endogenous variables (per capita expenditure and overall average per capita income) are not shown.

<sup>11</sup> The assumption is that the measurement error in overall mean expenditure is invariant to survey years.

<sup>12</sup> The first model, the fixed-effects model, utilizes differences within each district across time. The technique is equivalent to regressing the average income of the poor on a set of intercept dummy variables representing the districts in the data, as well as on overall mean incomes. The second model, the random-effects model, is more efficient since it utilizes not only information across individual districts but also across periods. Its main drawback, however, is that it is consistent only if the district-specific effects are uncorrelated with the other explanatory variables.

**Table 3. Basic Specifications: Elasticity of the Income of the Poor to Overall Income**

|                                                      | OLS              | IV              | 2SLS Fixed-Effects | 2SLS Random-Effects |
|------------------------------------------------------|------------------|-----------------|--------------------|---------------------|
|                                                      | (1)              | (2)             | (3)                | (4)                 |
| Log of mean expenditure                              | 0.774<br>(39.74) | 0.764<br>(8.65) | 0.712<br>(16.66)   | 0.714<br>(20.95)    |
| Constant                                             | 2.583<br>(9.30)  | 2.729<br>(2.16) | 3.474<br>(5.68)    | 3.442<br>(7.05)     |
| 95 percent confidence interval for growth elasticity | 0.73-0.81        | 0.59-0.94       | 0.63-0.79          | 0.65-0.78           |
| F-test that all district dummy coefficients are zero |                  | 5.58            |                    |                     |

Note: Dependent variable is logarithm of the mean expenditure for the bottom 20 percent of the population. Except for OLS, all estimations instrument for mean expenditure using lagged mean expenditure growth. Figures in parentheses are t-ratios. Data refer to the panel of 285 districts and 3 years covering the 1990s.

The panel estimation results indicate that, indeed, the unobserved district-specific effects are significant, leading to a reduction in the earlier OLS estimate of the growth elasticity of poverty at nearly 0.8 to about 0.7. This new elasticity estimate, including the values at 95 percent-confidence interval, is roughly the same from both panel estimation techniques. Hence, we employ the panel estimation technique, in particular the fixed-effects model that also allows for the endogeneity of the overall income variable. The assumption of the random-effects model that the unobserved district-level effects and the explanatory variables are uncorrelated is not supported by the data. This correlation problem applies as well to the IV estimation technique.

To sum up, our growth elasticity of poverty estimate is not nearly the one-for-one correspondence between increase in the welfare of the poor and growth in overall income, as shown in studies employing cross-country regressions. However, the estimate for Indonesia is higher than that for the Philippines, for which a similar study finds this elasticity to be about 0.5 (Balisacan and Pernia 2002). The comparison is instructive since the two countries are at roughly similar stages of economic development. Thus, while other factors appear to have direct effects on the welfare of the poor, in the Indonesian case, changes in the poor's welfare in response to overall economic growth seem fairly large. This could be explained by the relatively more labor-intensive and agriculture-based economic growth in Indonesia. Over the past two decades, growth of the agricultural sector was significantly faster in Indonesia than in the Philippines (3.7 percent in the 1980s and 2.2 percent in the 1990s for Indonesia vs. 1.9 percent and 1.8 percent for the Philippines).

#### IV. OTHER DETERMINANTS OF POVERTY REDUCTION

We now attempt to assess the impact of certain economic and social factors on poverty reduction in the various districts. As in the above, the variable to be explained refers to the wide differences in the per capita incomes of the poor across the country's 285 districts during the 1990s. Guiding our specifications are parsimony, development theory, and data availability. The explanatory variables include overall per capita income, relative price incentives, human capital, and access to infrastructure, technology, and finance.

The proxy for the human capital variable is the district-level average years of schooling of household heads, which is expected to directly influence the welfare of the poor, apart from its effect on district-level income growth. Numerous studies suggest that the higher the level of educational attainment, the higher is a person's expected earnings over a lifetime (Krueger and Lindhal 2001). For urban Java, the private rate of return on education is about 17 percent—higher than those found for most other countries (Byron and Takahashi 1989, as cited by Lanjouw et al. 2001). The social rate of return is also quite high, roughly 14 percent for junior secondary school and 11 percent for senior secondary school (McMahon and Boediono 1992).

Two alternative proxies for human capital are adult literacy and access to basic schooling. The first is defined as the proportion of the adult population who can read and write in Latin script. The second variable is defined as the average distance of villages to secondary (junior and senior high) schools. As is well known, since the late 1960s, Indonesia has witnessed an enormous expansion of educational opportunities at all levels. Duflo (2001) finds that each primary school constructed per 1,000 children led to an average increase of 0.12 to 0.19 years of education, as well as 1.5 to 2.7 percent increase in wages. Household data suggest, however, that while universal primary enrollment was reached as early as around 1986, secondary enrollment in the 1990s still varied quite enormously across provinces (Lanjouw et al. 2001; see also Figure 4). The large variation was true not only between islands, or between Java and the rest of the country, but also within major islands. For example, while West Kalimantan did badly in terms of education and poverty outcomes, the situation was far less worrisome in Central Kalimantan.

Roads represent access to markets, off-farm employment, and social services. This variable, defined as the proportion of villages with access to paved roads, may be seen as an indicator of spatial connectivity or, conversely, spatial isolation implying geographic "poverty traps."<sup>13</sup>

The presence of natural wealth (oil, gas, and minerals) is expected to influence growth and poverty reduction. This is defined in terms of the relative importance of oil, natural gas, and minerals in the local economy. The net effect of this variable on the welfare of the poor in resource-rich areas is, however, not *a priori* obvious.

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<sup>13</sup> In a somewhat related vein, Gallup et al. (1998) 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. An alternative variable is the distance to the subdistrict or district administrative offices; however, it did not turn out to be significant.

The price incentives variable is given by the local terms-of-trade, defined as the ratio of prices of agricultural to nonagricultural products. Since poverty is concentrated in agriculture in developing countries (Pernia and Quibria 1999), including Indonesia (Asra 2000), this variable is expected to be positively related to the incomes of the poor.

Electricity is a proxy for access to technology, or simply the ability to use modern equipment. It is defined as the proportion of villages with state-run electricity. The communication-information variable also serves as indicator of access to technology. It is given here by a composite index representing the proportion of villages with access to all, or any combination, of the following: (i) public telephone; (ii) public television; (iii) post office; and (iv) news agent. We further combine the electricity and communication-information variables into a single composite index referred to simply as technology. This variable is also expected to positively influence the welfare of the poor, apart from its positive impact on overall growth.

Access to credit is critical to managing household consumption, particularly insofar as the poor are concerned, because it affords them the means to smooth their incomes in the event of unfavorable shocks. It is likewise key to securing working capital, maintaining assets, and expanding businesses. This variable is denoted by the proportion of villages in the district with either banks or credit cooperatives, or both.

Table 4 summarizes the results of the econometric estimation, including the results of the first-stage fixed-effects regression (FSFE), which indicate the response of overall growth to the exogenous variables. Annex Table 2 provides the descriptive statistics on the variables.

After controlling for the influence of other factors (including unobserved district-specific fixed effects), the growth of overall income appears to exert significant influence on the incomes of the poor. Indeed, the estimate of the growth elasticity is quite robust, consistently around 0.7 in the various specifications. Surprisingly, this estimate is close to that obtained in basic specifications in which district-specific effects are controlled for (regressions 3 and 4 in Table 3).

Evidence on the direct effect of schooling is rather mixed. The mean years of schooling is insignificant (regression 1), although it is significant if the variable is defined for the poor only (regression 1a). It is possible that schooling years may not adequately reflect differences in human capital across the income spectrum. However, for the poor, schooling years may correspond well to achieved human capital since school quality may be less heterogeneous within the group.

Adult literacy also appears not to have a direct impact on the welfare of the poor (regression 2). However, it exerts a significant influence on overall growth, suggesting that improvement in human capital reduces poverty principally via the growth process. In other words, investment in human capital is good for growth and, indirectly, poverty reduction.

Table 4. **Determinants of the Welfare of the Poor (Bottom 20 percent)**

| Explanatory Variable                   | (1)                | FSFE                | (2)                | FSFE                | (3)                | FSFE                | (1a)               | FSFE                |
|----------------------------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|---------------------|
| Overall mean income (Y)                | 0.7244<br>(13.12)  |                     | 0.7144<br>(13.42)  |                     | 0.7149<br>(13.42)  |                     | 0.7228<br>(13.76)  |                     |
| Schooling                              |                    |                     |                    |                     |                    |                     |                    |                     |
| Years of schooling                     | -0.0392<br>(-0.40) | 0.0447<br>(0.60)    |                    |                     |                    |                     | 0.0166<br>(1.88)   | -0.0034<br>(-0.51)  |
| Adult literacy                         |                    |                     | 0.1290<br>(0.74)   | 0.3107<br>(2.32)    |                    |                     |                    |                     |
| Distance to schools                    |                    |                     |                    |                     | -0.0173<br>(-1.19) | 0.0166<br>(1.50)    |                    |                     |
| Terms of trade                         | 0.0006<br>(1.77)   | 0.0014<br>(4.83)    | 0.0005<br>(1.35)   | 0.0013<br>(4.57)    | 0.0006<br>(1.64)   | 0.0014<br>(5.04)    | 0.0006<br>(1.63)   | 0.0014<br>(4.94)    |
| Technology                             | 0.2153<br>(1.84)   | 0.0287<br>(0.33)    | 0.2063<br>(1.77)   | 0.0436<br>(0.50)    | 0.2046<br>(1.76)   | 0.0402<br>(0.46)    | 0.2266<br>(1.97)   | 0.0319<br>(0.35)    |
| Finance                                | 0.0351<br>(0.48)   | -0.0058<br>(-0.10)  | 0.0428<br>(0.58)   | -0.0124<br>(-0.22)  | 0.0335<br>(0.45)   | -0.0044<br>(-0.08)  |                    |                     |
| Roads                                  | -0.0143<br>(-0.52) | 0.0499<br>(2.34)    | -0.165<br>(-0.56)  | 0.0320<br>(1.41)    | -0.0116<br>(-0.42) | 0.0479<br>(2.26)    | -0.0176<br>(-0.79) | 0.0516<br>(2.53)    |
| Oil & gas                              | -0.1927<br>(-0.90) | 0.3843<br>(2.35)    | -0.2948<br>(-1.36) | 0.3641<br>(2.21)    | -0.2284<br>(-1.09) | 0.4253<br>(2.64)    | -0.2691<br>(-1.28) | 0.4155<br>(2.56)    |
| Lagged growth of Y                     |                    | 0.4566<br>(24.18)   |                    | 0.4678<br>(24.8)    |                    | 0.4611<br>(24.76)   |                    | 0.4583<br>(24.95)   |
| Intercept                              | 3.2778<br>(4.23)   | 13.9773<br>(101.54) | 3.2659<br>4.14     | 13.8259<br>(131.32) | 3.2958<br>4.27     | 14.1001<br>(277.83) | 3.1629<br>(4.15)   | 14.0700<br>(280.79) |
| R-squared                              | 0.741              |                     | 0.739              |                     | 0.732              |                     | 0.733              |                     |
| F-ratio                                |                    | 145.11              |                    | 145.23              |                    | 146.37              |                    | 169.81              |
| Wald $X^2$ (X1000)                     | 24141              |                     | 23759              |                     | 24267              |                     | 24507              |                     |
| Prob > $X^2$                           | 0                  |                     | 0                  |                     | 0                  |                     | 0                  |                     |
| F-test that all fixed effects are zero | 4.49               |                     | 4.69               |                     | 4.67               |                     | 3.46               |                     |
| No. of observations                    | 570                |                     | 558                |                     | 570                |                     | 570                |                     |

Note: Estimation is by 2SLS fixed-effects regression in which the dependent variable is the logarithm of mean per capita expenditure of the poorest 20 percent. FSFE is first-stage fixed-effects regression in which the dependent variable is the logarithm of overall mean per capita expenditure. Figures in parentheses are z-ratios for the 2SLS fixed-effects regression and t-ratios for FSFE.

Price incentives matter to poverty reduction, as indicated by the positive and significant coefficient of the terms-of-trade variable. This means that changes in the price of agriculture relative to the price prevailing in other sectors of the local economy have an impact on the welfare of the poor, both directly by affecting income redistribution and indirectly through its positive effect on overall growth.<sup>14</sup> It is worth noting that the country's price and trade policy regimes in the 1980s and 1990s tended to penalize agriculture relative to manufacturing. Although significant trade reforms took effect in the 1990s and some protection was afforded the primary sector directly, the protection regime as a whole continued to tax agriculture, though to a lesser extent (Garcia 2000). This would have limited the income gains from trade reforms in provinces dependent on agriculture. Evidently, since agriculture is more tradable than either industry or services, and since agriculture is more labor-intensive than industry, reducing trade and price distortions promotes both poverty reduction and growth objectives.<sup>15</sup>

The access-to-technology variable is positive and significant, supporting the expectation that it matters to the incomes of the poor. Recall that this refers to the availability of electricity and publicly provided information channels at the village level. Villagers in areas where these services are absent may simply not have an important avenue for raising the productivity of their assets (in agriculture, mainly land and labor). The coefficient estimates, which average around 0.2, suggest that an improvement in access to these services by 10 percent raises the poor's incomes by roughly 2 percent, all other things being equal.

Surprisingly, the finance variable is insignificant, which runs counter to the common claim that access to formal financial intermediaries, particularly in agriculture, is critical for poor people. This variable, defined as the proportion of villages with banks or cooperatives, may be a poor proxy for access to credit.<sup>16</sup> The specific location and scale of these financial intermediaries vis-à-vis the village population may give a better indicator, but such variable is not available. Moreover, the proxy finance variable correlates strongly with the technology variable. Nevertheless, deleting the finance variable in the estimating model does not significantly change the parameter estimates on the remaining variables.

The roads variable does not appear to be significant, but it has a strong impact on overall growth. This is consistent with the observation (e.g., Hill 1996) that the public provision of roads has not been designed as a vehicle for achieving intradistrict (or province) redistribution but rather as a part of a development strategy for spurring economic growth, especially in the countryside.

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<sup>14</sup> As noted earlier, income poverty in Indonesia is largely a rural phenomenon. Of the rural poor, the large majority are dependent on agriculture for employment and income. As such, an 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.

<sup>15</sup> Since labor in Indonesia is quite mobile (Manning 1997), even farmers in resource-poor areas should benefit from trade and price reforms.

<sup>16</sup> The proportion of villages with banks or coops may not be a good indicator of access to finance since two districts with the same proportion of villages with banks or coops could have different levels of accessibility (e.g., the number of banks or coops may differ between them).



The variable representing natural wealth is also not significant, although it does influence overall growth significantly. This supports the observation of Tadjoeiddin et al. (2001) that there is no strong correlation between natural resource endowment and community welfare, defined in terms of human development indicators.<sup>17</sup> However, revenues generated from natural resources have been an important means for financing development projects, especially those aimed at keeping interregional inequality low. Indeed, the government's New Order equalization policy—which was achieved mainly through fiscal policy instruments, such as central government transfer, interregional transfer, and other initiatives within the *Inpres* scheme for provincial governments—was quite effective in spurring growth outside the Java-Bali enclave, especially in the Outer Island provinces.

## V. DIFFERENTIAL EFFECTS ACROSS QUINTILES

Do the welfare effects of the variables vary across income groups? If the upper ranges of the income distribution tend to benefit more than proportionately from overall economic growth (as implied by the less-than-unity estimate of growth elasticity in Tables 3 and 4), what policies or institutional arrangements could enhance the benefits of growth for the poor?

We address these issues by estimating the model for each of the other four income quintiles. In particular, we focus on the variant of the model in which the finance variable is dropped and the relevant schooling variable pertains to the mean years of schooling for the relevant quintile.<sup>18</sup> Recall that in this variant we have used the mean schooling years of the poor (first quintile), rather than the overall (all-quintile) mean schooling years, as a regressor. This education variable yielded a positive and significant impact on the welfare of the poor. The estimation results for each quintile are summarized in Table 5. For ready comparison, the results for the first quintile reported in Table 4 (column 1a) is reproduced as the first column of Table 5.

In general, the results for the other quintiles resemble closely those for the first quintile. Apart from district mean income, average schooling in each income group directly and positively influences welfare of that group, as expected. Natural resource endowment (oil and gas), infrastructure (roads), and terms-of-trade exert their influence on welfare via their positive impact on overall income growth.

Note, however, that the growth elasticity of welfare tends to increase monotonically with income quintile, suggesting that the benefits of growth accrue more than proportionately to the higher income groups. Similar results have been found for the Philippines, except that the growth elasticities for the first two quintiles (bottom 40 percent of the population) are significantly higher for Indonesia.

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<sup>17</sup> Indicators for the “19 enclave districts” such as consumption, health, and HDI are more or less similar to those of the national average, regardless of these districts’ high level of per capita output. The 19 enclave districts include seven districts located in the four natural resource-rich provinces of Aceh, Riau, East Kalimantan, and Papua.

<sup>18</sup> Using any of the other model variants reported in Table 4 will not substantially change the results in terms of patterns of impact across quintiles.

**Table 5. Determinants of Average Welfare, by Quintile**  
[Q1=Poorest; Q5=Richest]

| Explanatory Variable               | Q1                          | Q2                          | Q3                          | Q4                          | Q5                           |
|------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
| Overall mean income (Y)            | 0.7228 ***                  | 0.7729 ***                  | 0.8324 ***                  | 0.9191 ***                  | 1.1900 ***                   |
| Years of schooling                 | 0.0166 **<br>[-0.0034]      | 0.0215 ***<br>[0.0026]      | 0.0211 ***<br>[0.0111]      | 0.0162 ***<br>[0.0056]      | 0.0164 ***<br>[-0.0043]      |
| Terms of trade                     | 0.0006 *<br>[0.0014] ***    | 0.0002<br>[0.0014] ***      | 0.0000<br>[0.0013] ***      | 0.0001<br>[0.0014] ***      | 0.0001<br>[0.0014] ***       |
| Technology                         | 0.2266 **<br>[0.0309]       | 0.1146<br>[0.0327]          | 0.0752<br>[0.0230]          | 0.0655<br>[0.0282]          | 0.1626 **<br>[0.0412]        |
| Roads                              | -0.0176<br>[0.0516] ***     | 0.0215<br>[0.0484] **       | 0.0044<br>[0.0450] **       | 0.0150<br>[0.0477] **       | -0.0199<br>[0.0496] **       |
| Oil & gas                          | -0.2691<br>[0.4155] ***     | -0.2628<br>[0.3950] **      | -0.1763<br>[0.3286] **      | 0.0278<br>[0.3727] **       | 0.0280<br>[0.4086] ***       |
| Lagged growth of Y                 | [0.4583] ***                | [0.4587] ***                | [0.4543] ***                | [0.4554] ***                | [0.4645] ***                 |
| Intercept                          | 3.1629 ***<br>[14.0705] *** | 2.7740 ***<br>[14.0429] *** | 2.1245 ***<br>[14.0033] *** | 1.0940 ***<br>[14.0214] *** | -2.2130 ***<br>[14.0910] *** |
| Wald $X^2$ (X1000)<br>Prob > $X^2$ | 24504<br>0                  | 54710<br>0                  | 70432<br>0                  | 94042<br>0                  | 52379                        |

Note: Estimation is by 2SLS fixed-effects regression. The dependent variable is logarithm of the quintile mean per capita expenditure adjusted for provincial cost-of-living differences. Figures in brackets are results of first-stage fixed-effects regressions in which the dependent variable is logarithm of the district mean per capita expenditure. “\*\*\*”, “\*\*”, and “\*” denote significance at the 1 percent, 5 percent, and 10 percent level, respectively.

It is also worth noting that returns to schooling are quite similar across quintiles. An additional year of schooling raises per capita income by roughly two percent, other things being equal.<sup>19</sup> This result thus affirms the common claim in the development literature that education represents an important avenue for raising household welfare, even more so for the poor whose access to land and other assets is very limited.

Finally, it appears that access to technology tends to directly influence the welfare of the poorest quintile and the richest quintile but not those in between.

<sup>19</sup> Note that average schooling years vary by quintile.

## VI. CONCLUSION

Newly constructed panel data on Indonesia's 285 districts (*kotamadyas / kabupatens*) reveal huge differences in poverty changes, subnational economic growth, and local attributes. Econometric analysis of these data shows that the welfare of the poor responds quite strongly to overall income growth. The growth elasticity of poverty is about 0.7, i.e., a 10 percent increase in overall income raises the incomes of the poor by 7 percent. This growth-poverty nexus seems significantly stronger than in the Philippines where the growth elasticity is estimated to be only about 0.5. This may be explained by the higher growth of agriculture in Indonesia, which is also likely to have been more employment-generating. Still, the growth-poverty relationship is far from the one-to-one correspondence revealed by studies based on cross-country regressions. Thus, growth is good for the poor in Indonesia as in the Philippines, but it is not good enough.

Besides economic growth, other factors exert direct effects on the welfare of the poor, apart from their impact on growth itself. Among the critical ones are terms-of-trade regime, schooling, infrastructure, and access to technology. Although often referred to in the literature as important to the poor, the access to credit variable as defined by available data did not come out significant. Future work has to go beyond physical indicators of financial services to include "meso" indicators pertaining to distribution of physical assets (particularly land) and social capital.

On the whole, the present study and similar other studies analyzing subnational data show that there is much more to poverty reduction than merely promoting economic growth. While fostering growth is evidently crucial and is a relatively straightforward objective to pursue, a more complete poverty reduction strategy must take account of various institutional factors that matter, if the aim is rapid and sustained poverty reduction. Indeed, paying attention to these other factors will be good for both growth and poverty reduction.

Annex Table 1. **Urban Poverty Line and Cost-of -Living Index, by Province (1999)**

|                    | Urban<br>Poverty Line | Cost of Living Index<br>(Jakarta=100) |
|--------------------|-----------------------|---------------------------------------|
| Aceh               | 78,286                | 0.869                                 |
| North Sumatera     | 84,342                | 0.936                                 |
| West Sumatera      | 100,131               | 1.111                                 |
| Riau               | 90,609                | 1.006                                 |
| Jambi              | 91,032                | 1.010                                 |
| South Sumatera     | 88,533                | 0.983                                 |
| Bengkulu           | 104,237               | 1.157                                 |
| Lampung            | 96,635                | 1.072                                 |
| DKI Jakarta        | 90,108                | 1.000                                 |
| West Java          | 88,471                | 0.982                                 |
| Central Java       | 80,369                | 0.892                                 |
| DI Yogyakarta      | 92,037                | 1.021                                 |
| East Java          | 83,223                | 0.924                                 |
| Bali               | 94,190                | 1.045                                 |
| West Nusa Tenggara | 84,449                | 0.937                                 |
| East Nusa Tenggara | 79,473                | 0.882                                 |
| West Kalimantan    | 95,767                | 1.063                                 |
| Central Kalimantan | 95,220                | 1.057                                 |
| South Kalimantan   | 87,134                | 0.967                                 |
| East Kalimantan    | 79,350                | 0.881                                 |
| North Sulawesi     | 85,886                | 0.953                                 |
| Central Sulawesi   | 83,579                | 0.928                                 |
| South Sulawesi     | 77,513                | 0.860                                 |
| Southeast Sulawesi | 66,290                | 0.736                                 |
| Maluku             | 95,556                | 1.060                                 |
| Irian Jaya         | 76,250                | 0.846                                 |

Annex Table 2. **Descriptive Statistics**

| Variable                                                                                                                                    | Mean      | Std. Dev. | Min      | Max       |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|----------|-----------|
| <i>Income of the poor: ln(Ave. per capita expenditure of bottom 20 percent)<sup>a</sup></i>                                                 | 13.62276  | 0.24862   | 12.45829 | 14.48235  |
| <i>Overall mean income: ln(Ave. per capita expenditure)<sup>a</sup></i>                                                                     | 14.27043  | 0.28212   | 13.58527 | 15.86398  |
| <i>Lagged growth of Y: growth of per capita expenditure in t-3 period, where t is current year<sup>a</sup></i>                              | 0.05307   | 0.19085   | -0.44098 | 0.50162   |
| <i>Years of schooling:<sup>a</sup></i>                                                                                                      |           |           |          |           |
| Average schooling years of adult heads                                                                                                      | 6.54491   | 1.18820   | 4.20000  | 10.39000  |
| Average schooling years of female adult heads                                                                                               | 5.36862   | 1.26067   | 2.67000  | 9.14000   |
| Average schooling years of adult heads in Poorest 20 percent                                                                                | 4.18174   | 1.37323   | 2.50000  | 16.00000  |
| <i>Adult literacy: proportion of household heads who can read and write<sup>b</sup></i>                                                     | 0.82311   | 0.11878   | 0.21500  | 0.99900   |
| <i>Distance to schools: distance of secondary schools from village<sup>c</sup></i>                                                          | 0.09434   | 0.10690   | 0.00065  | 0.70370   |
| <i>Terms of trade: agricultural output deflator/nonagricultural output deflator<sup>d</sup></i>                                             | 108.99210 | 13.7118   | 86.41000 | 156.77000 |
| <i>Technology: composite index representing the presence of public phone, TV, postal office, and electricity in the village<sup>e</sup></i> | 0.18957   | 0.16739   | 0.00170  | 0.87500   |
| <i>Finance: proportion of villages with banks and cooperatives<sup>f</sup></i>                                                              | 0.22664   | 0.17073   | 0.01565  | 0.97725   |
| <i>Roads: proportion of villages with paved roads<sup>g</sup></i>                                                                           | 0.70788   | 0.26905   | 0.01830  | 1.00000   |
| <i>Mineral: proportion of oil and gas in total provincial output<sup>h</sup></i>                                                            | 0.102345  | 0.161376  | 0.00150  | 0.65920   |

Notes/data sources:

<sup>a</sup> Computed from SUSENAS Core 1993, 1996, and 1999.<sup>b</sup> Estimates of ADB for 1993, 1996, and 1999.<sup>c</sup> District average for distance of villages to junior high school and distance of villages to senior high school; computed from the PODES district data for 1993, 1996, and 1999.<sup>d</sup> Computed from *Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin*, BPS for 1993, 1996, and 1999.<sup>e</sup> District average of the following: Proportion of villages with public phone (approximated by the presence of at least one of the following in the village: coin public phone, card public phone, telephone kiosk, post and telephone kiosk); proportion of villages with TV; proportion of villages with postal office; and proportion of villages with electricity; computed from PODES 1993, 1996, and 1999 district data.<sup>f</sup> District average of the (a) proportion of villages with banks and (b) proportion of villages with cooperatives; computed from PODES 1993, 1996, and 1999 district data.<sup>g</sup> Source is PODES district data for 1993, 1996, and 1999.<sup>h</sup> Computed from *Gross Regional Domestic Product of Provinces in Indonesia by Industrial Origin*, BPS for 1993, 1996, and 1999.

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