Going Beyond Cross-Country Averages: Growth, Inequality and Poverty Reduction in the Philippines

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Abstract

This paper analyzes the processes of growth and poverty reduction simultaneously under a neoclassical growth model framework, using provincial data from the Philippines. We obtain a high rate of provincial income convergence and a trade-off between equity and growth. The lack of political competition inhibits growth. Land reform is positively associated with growth and poverty reduction while higher agricultural terms of trade facilitate poverty reduction. The 'growth elasticity of poverty reduction' is low by international standards but is sensitive to sectoral income composition and initial conditions in poverty incidence, mortality rate and irrigation coverage.

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1. INTRODUCTION

This paper analyzes the processes of growth and poverty reduction simultaneously under a framework based on a neoclassical growth model, using sub-national (provincial) level data from the Philippines. As shown in Table 1, both growth and poverty reduction performances in the Philippines lagged behind those of its Southeast Asian neighbors in the past few decades (e. g., Ahuja, *et al*. 1997, Balisacan, *et al*. forthcoming). While the percapita GDP roughly quadrupled between 1965 and 1995 among other Southeast Asian countries and China, for example, the percapita GDP of the Philippines increased by only less than 50 percent during the same period. Comparing the changes over time in poverty, both Malaysia and Thailand started with much lower levels of poverty incidence than did the Philippines in the mid-1970s and then virtually eliminated poverty all together during the next two decades, while Indonesia and China started with much higher levels of poverty incidence than did the Philippines and nevertheless had lower levels of poverty than that of the Philippines by the mid-1990s.[1]

(Table 1 here)

The relatively poor performaces in growth and poverty reduction in the Philippines raise a series of questions. Has the slow poverty reduction in the Philippines been simply due to slow income growth, or is it due also to the weak response of poverty reduction to a given rate of growth in aggregate income? Furthermore, the Philippines has long been known for its high level of inequality in the distribution of income and wealth. Has the high level of inequality been a main reason for slow growth and/or poverty reduction? In addition, the literature on Philippine politics suggests that the 'oligarchic' or non-competitive political system in the Philippines has been a major obstacle for implementing growth-enhancing policy reforms and thus for poverty reduction (e. g., Hutchcroft 1998, Riedinger 1995). Does the lack of competitive political regime hurt aggregate income growth and poverty reduction? Have various policy measures by the government, such as land reform, industrial protection policies, and infrastructure investment, had any discernible impact on poverty? For example, one of the factors that likely affected the rural development and poverty reduction performances in the Philippines appears to be the persistent policy of industrial protection which, by depressing the relative price of agricultural products, functioned as a disincentive to agricultural sector development, especially by small farmers (e. g., Balisacan, *et al.* forthcoming). In this paper, we revisit all of these questions regarding the growth and poverty reduction performances in the Philippines using a neo-classical growth regression framework.

In the course of examining the provincial income growth in the Philippines we also relate our findings to two of the issues under ongoing debate in the cross-country growth literature—i. e., the rate of income convergence across economies and the relationship between inequality and growth. For the former, Sala-i-Martin (1996) once observed that the (cross-sectionally) estimated rate of convergence tended to be in the neighborhood of about 2% across a wide variety of data sets including cross-country data (i .e., conditional rate of convergence) as well as regional data within currently developed countries (i. e., absolute rate of convergence). Caselli, *et al.* (1996), however, obtained a much higher rate of convergence of 10% based on GMM estimation applied to cross-country panel data, which in turn has been challenged by Bond, *et al* (2001) who obtain, again, a 2% convergence rate based on a modified GMM estimation technique applied to the same data set as Caselli, *et al* (1996)'s. Similarly with the relationship between inequality and subsequent growth, while the recent conventional wisdom tends to support the view that 'initial inequality hurts subsequent economic growth' (e. g., Pearsson and Tabellini 1994, Bénabou 1996a, Deininger and Squire 1998), the issue remains an unsettled controversy in the cross-country empirical literature and thus deserves greater scrutiny in light of more recent empirical studies finding positive relationships between inequality and growth (e. g., Forbes 2000, Quibria 2002).

The use of sub-national level data has major advantages in addressing these and other issues over cross-country regression studies.[2] For example, the problem of comparability across observation units of data on income, a serious caveat in any cross country study, is much less serious. The comparison of political characteristics across countries can also be difficult due to the diversity in historical experiences, cultural norms and institutional contexts; sub-national level studies would allow us to control for such contexts and to focus on specific aspects of the political system such as the degree of competitiveness among political actors, which we examine in this paper. In addition, one of the issues raised against the cross-section growth regressions is the potential bias due to the correlation between the initial income level and the unobserved individual (country)-specific effects (e. g., Caselli, *et al*. 1996); such bias is likely to be less serious in sub-national contexts since the major sources of such heterogeneity —technologies, tastes, etc.— are likely to be relatively similar within a country.

The rest of the paper is organized as follows. Section 2 outlines our methodology. Section 3 reports on the determinants of differential growth rates across provinces. Section 4 employs the same framework in an attempt to identify some determinants of the rate of poverty reduction across provinces. Section 5 examines the relationship between mean income growth and the rate of poverty reduction. And the final section summarizes our findings and concludes the paper with a discussion of some policy implications.

2. METHODOROGY: A NEOCLASSICAL APPROACH TO GROWTH AND POVERTY REDUCTION

Since the aggregate income growth is a major determinant of the pace of poverty reduction (e. g., Lipton and Ravallion 1995, Dollar and Kraay 2002), we first examine the patterns of provincial mean income (as measured by the consumption expenditure per capita) growth. Figure 1 shows the relationship between the log per-capita expenditures in 1988 and the average annual growth rate of per-capita expenditures between 1988 and 97, suggesting a pattern of absolute β-convergence as predicted by neoclassical growth theories. We therefore adopt the neoclassical growth model, using the growth episode between 1988 and 1997 in each province in the Philippines as the unit of observation.[3] As an initial step, we start our discussion by summarizing the growth regression results reported earlier (Balisacan and Fuwa 2003) explaining the differential rates of income growth across provinces by estimating the following equation:

$$\mathrm{GRPCEXP}_i = a + b\log(\mathrm{PCEXP88}_i) + \boldsymbol{\Sigma} c_k \mathbf{X}_{ik} + u_i, \qquad (1)$$

where $\mathrm{GRPCEXP}_i$ is the annual average growth rate of per-capita expenditures for province i between 1988 and 1997, $\mathrm{PCEXP88}_i$ is the levels of per-capita expenditures for province i in 1988 (initial year), X_{ik} is a set of determinants of the steady-state income level consisting of initial conditions and (time-varying) policy variables, and u_i is the error term.[4] The 'Beta convergence' coefficient (b) indicates the annual rate of (conditional) convergence.[5]

(Figure 1 here)

In our next step, we shift our attention from the mean income growth to the rate of poverty reduction between 1988 and 1997. Since the pace of poverty reduction is closely related to the speed of mean income growth, we suppose that a similar reduced form specification can be used for the analysis of the rate of poverty reduction as for the rate of mean income growth. We identify the major determinants of the rate of poverty reduction by estimating the following equation:

$$GRINCID_i = a + b\log(PCEXP88_i) + \boldsymbol{\Sigma}_k c_k \mathbf{X}_{ik} + u_i, \quad (2)$$

where the dependent variable, $GRINCID_i$, is the average annual rate of change in the headcount poverty ratio between 1988 and 1997 for province i, and the same set of right hand side variables are included as in the growth regression equation (1) as reported in Balisacan and Fuwa (2003); following the spirit of the neoclassical cross-country growth regressions, we initially included the following variables, as the X_k variables.[6]

(1) Initial economic conditions: initial human capital stock (as measured by (a) mortality rate per 1000 children age 0-5, (b) simple adult literacy rate, and (c) the average years schooling of household heads); proportion of irrigated farm area to total farm area; gini ratio of farm distribution.[7]

(2) Initial political characteristic: political 'dynasty' (proportion of provincial officials related to each other by blood or affinity, as a proxy for political competitiveness).

(3) Time Varying Policy variables (difference between 1988 and 1997)[8]: agricultural terms of trade (the ratio of implicit price deflator for agriculture to implicit price deflator for non-agriculture); electricity access (the proportion of households with electricity); road density; Comprehensive Agrarian Reform Program(CARP) implementation (the proportion of cumulative CARP accomplishments to 1990 potential land reform area)[9].

(Table 2 here)

We next attempt to examine the quantitative relationship between the aggregate income growth rate and the rate of poverty reduction. We address the question of whether the relatively poor performances in poverty reduction in the Philippines, vis-à-vis its Asian neighbors, is partially due to low responsiveness of poverty reduction to a given rate of aggregate growth by comparing the 'growth elasticity of poverty reduction' in the Philippines with its cross-country counterpart (Ravallion 2001). We estimate the growth elasticity by introducing the mean expenditure growth rate as an additional explanatory variable into equation (2). Since both the mean growth rate and the rate of poverty reduction are simultaneously determined in our framework, the former variable needs to be treated as endogenous. As we will see in section 4, we find that the 'dynasty' variable is a significant determinant of the mean expenditure growth rate but not of the rate of poverty reduction, and so we initially used 'dynasty' as the identifying instrument for the mean expenditure growth. The introduction of the mean expenditure growth rate into equation (2), however, tends to reduce the explanatory power (in the sense of both lower values of coefficient estimates and smaller values of t statistics) of some of the determinants of poverty reduction suggesting that much of the effects of these variables on poverty reduction work indirectly through increasing aggregate growth. Those independent variables whose estimated coefficients are no longer significant are subsequently dropped from the set of explanatory variables but instead are included as identifying instruments for the mean expenditure growth rate variable. Our equation for estimating growth elasticity is:

$$\mathrm{GRINCID}_i = a + e\,\mathrm{GRPCEXP}_i + \boldsymbol{\Sigma}_k c_k \mathbf{Z}_{ik} + u_i, \qquad (3)$$

where the $\mathbf{Z}_{ik}$ vector is the subset of the original $\mathbf{X}_{ik}$ vector consisting only of significant determinants of GRINCID after the introduction of GRPCEXP. The coefficient *e* gives our estimated growth elasticity of poverty reduction. We estimate both equations (1) and (3) as a system by three stage least squares (3SLS).

Finally, we make some initial attempts to explore the factors determining the growth elasticity. We re-estimate equation (3) by including as an additional explanatory variable the interaction term between the mean income growth ($GRPCEXP_i$) and potential determinants of the growth elasticity, including the change in the share of agricultural income, initial inequality, initial poverty incidence, and initial human capital stock. Following the approach taken by de Janvry and Sadoulet (2000), we do so by introducing the interaction term one at a time in separate regressions.

3. DETERMINANTS OF PROVINCIAL GROWTH RATES

We start with the neoclassical growth regression model explaining the differential rates of income growth across provinces. The estimation results based on equation (1), as originally reported in Balisacan and Fuwa (2003), are reproduced in Table 3.[10] In the final specification reported in column (b), all the insignificant variables are dropped. Since this regression result has been discussed earlier, we only highlight some key results here. We find a very rapid rate of conditional convergence of 9 percent per year.[11] Among the initial economic conditions, the initial level of human capital stock (as measured by the child mortality rate) and initial inequality in land distribution have significant effects. Furthermore, our variable representing an initial political condition, the 'dynasty' (measured by the proportion of provincial officials related by blood or affinity), has significantly negative effects on subsequent growth, in line with one of the major themes found in the literature on the Philippine politics; the lack of a competitive political system has been seen by many observers as one of the major factors leading to sub-optimal policy choices in the Philippine government and thus to the relatively poor economic performances compared to those of its Asian neighbors (e. g., Balisacan, *et. al.* forthcoming, Hutchcroft 1998, Montes 1991, Riedinger 1995). On the other hand, the estimated coefficients on many of what we regard as policy variables are found not to be significantly different from zero (Table 3 column (a)). The only exception is the increment of the land reform accomplishments under the Comprehensive Agrarian Reform Program (CARP).[12]

(Table 3 here)

A disturbing finding in our growth regression is the significantly *positive* relationship between the initial land inequality and growth.[13] From theoretical points of view, Bénabou (1996b) and Banerjee and Duflo (2000) argue that the relationship between growth and inequality could differ between the short-run and the long-run, and we should thus be cautious in drawing a definitive policy conclusion at this point regarding the trade-off between growth and equity. In addition, there are a few possible interpretations of this empirical result. Based on some micro-level evidence, one potential explanation could be that there emerged (possibly temporary) productivity differentials between small and large farms in the Philippines in the 1990s. While it is well documented that economies of scale do not operate in most of the developing agriculture, including that of the Philippines (e. g., Binswanger, *et al*. 1995, Hayami, *et al*. 1990), Hayami and Kikuchi (2000) reported significantly higher rice yields among larger farms than among smaller farms found in an East Laguna village (on Luzon Island) as of 1995 even though they had found no evidence of such scale-based productivity differentials during the 1970s and the 1980s.[14] Such productivity differentials by land size are attributed to the introduction of pump irrigation by larger farmers as a response to the deterioration of the national irrigation system, and the use of pump irrigation seems to have become increasingly common in rice growing villages in the Philippines in the 1990s. Hayami and Kikuchi (2000) contend, however, that, if rental markets for irrigation pumps are to develop —as was the case with tractors introduced earlier—, then such productivity differentials would (again) disappear. If the use of pump irrigation among larger farms—which was likely to be a short-term phenomenon applicable to our observation period—is indeed the main source of the positive effect of the land inequality on growth, then such positive relationship is also likely to be a short-term phenomenon. Given the rather speculative nature of our explanation at this point, however, a more definitive explanation of our positive inequality-growth relationship may have to come from further accumulation of micro-level evidence.[15]

Finally, the positive correlation between land reform implementations and growth may also seem to contradict the finding that land inequality is positively related to growth. One possibility is that the growth impact of land reform implementation could come through non-agricultural routes; land reform program re-distributed income from landowners to former tenants who subsequently invested in education and non-agricultural activities (e. g., Hayami and Kikuchi 2000). Village-level studies tend to find that the main source of the income growth in rural Philippines after the mid-1980s was the non-agricultural sector (e. g., Estudillo, Quisumbing and Otsuka 1999). In addition, the CARP implementation variable could be endogenous; the implementation of CARP was not random across regions but rather its implementation progressed faster in the areas with greater growth potentials. Indeed, Otsuka (1991) found that a higher yield increase in agriculture was a major determinant of the implementation of the agrarian reform program.[16]

4. REDUCED FORM DETERMINANTS OF POVERTY REDUCTION

We now shift our focus from mean income growth to the rate of poverty reduction between 1988 and 97 by extending our neoclassical growth framework. Table 4 presents our estimation results for the determinants of poverty reduction based on equation (2).[17] Since our dependent variable here is the annual rate of increase in the headcount poverty ratio between 1988 and 1997 for each province, a negative coefficient on a variable means that the variable has *positive* effects on *poverty reduction*. Not surprisingly, among the explanatory variables included in our analysis, the set of variables found to have a statistically significant association with the rate of poverty reduction was quite similar to those found to be significant determinants of the mean income growth.[18] Reflecting the income convergence property, the level of initial per-capita expenditures is significantly negatively related to the rate of subsequent poverty reduction; a one percent increase in the initial mean expenditure level is associated with roughly a 0.15 percentage point decrease in the rate of poverty reduction. Initial human capital stock, as measured by the child mortality rate, has significantly positive effects on the pace of poverty reduction; a one standard deviation decrease in the child mortality rate is associated with a 1.8 percentage point increase in the rate of poverty reduction. In accordance with our finding in the previous section, higher inequality in land distribution has significantly *positive* effects on the rate of poverty reduction; a one standard deviation increase in the gini coefficient is associated with a 1.9 percentage point increase in the poverty reduction rate. Also in line with our previous findings is the significantly positive association between agrarian reform (CARP) implementation and the rate of poverty reduction; a one standard deviation increase in the

CARP accomplishment is associated with a 1.6 percentage point increase in the rate of poverty reduction.

(Table 4 here)

In contrast with our results in the previous section, the 'dynasty' variable is not significantly associated with the rate of poverty reduction. Among the policy variables, however, the change in the agricultural terms of trade is significantly associated (albeit marginally) with poverty reduction. Our results suggest that a one standard deviation increase in the agricultural terms of trade is associated with a one percentage point increase in the rate of poverty reduction. Since this policy variable is not a significant determinant of the per-capita expenditure growth, it appears that the change in the agricultural terms of trade has independent positive effects on poverty reduction, quite apart from the change in the level of poverty induced by the mean income growth, by affecting income distribution.[19]

While the depression of the relative price of agricultural commodities through industrial protection policies was quite common in many developing countries before the 1980s (e. g., Krueger, *et. al*., 1988), such policies persisted for a much longer period in the Philippines than in other Asian countries (e. g,. Akiyama and Kajisa forthcoming). The crop-specific nominal protection rate (NRP: defined as the percentage difference between the domestic price and the comparable border price evaluated at the official exchange rate) measures indicate that commodities such as rice, coconut oil, copra, banana, pineapple, tobacco and abaca received negative rates of protection during the 1970s up to the mid 1980s.[20] Furthermore, based on the effective rate of protection (EPR: defined as the percentage excess of the protected —due to various trade restrictions— *value added* of a particular economic activity over its non-protected *value added*) measure, the prices of goods in the agricultural sector as a whole were relatively ‘penalized’ or depressed vis-à-vis those of the industrial sector during the period between 1965 and the early 1990s (Balisacan, et al. forthcoming). Akiyama and Kajisa (forthcoming) further suggest that the indirect effects of industrial protection policies, rather than the direct effects of agricultural protection policies, account for a larger portion of such distortion of the relative prices between agricultural and industrial sectors. Our result suggests that the persistence of the industrial protection policies was likely to be partially responsible for the slow poverty reduction in the Philippines vis-à-vis the pace of poverty reduction in other Asian countries.

By way of comparing the relative impacts on poverty reduction of the variables that could potentially be manipulated by policy interventions, a one standard deviation difference in the mortality rate, the gini ratio of farm distribution, CARP implementation and the agricultural terms of trade are associated with, respectively, 1.8, 1.9, 1.6 and 1 percentage point changes in the annual rate of poverty reduction. It appears, therefore, that the relative magnitudes of the effects of policy-related variables on poverty reduction are quite similar among each other, with a possible exception of the somewhat smaller quantitative impact of the agricultural terms of trade, assuming that the cost of changing these variables through policy interventions by the amount equivalent to one standard deviation is roughly equal across different policy variables. This may suggest that there is no single ‘policy lever’ that could make a dramatic difference in poverty reduction.

These results are obtained based on the rates of change in the headcount poverty ratios (the incidence of poverty) across provinces as the dependent variable. In addition, we also conducted similar analyses of the determinants of poverty reduction by replacing the headcount poverty ratios with alternative poverty measures such as the poverty gap (the ‘depth’ of poverty) and the squared poverty gap index (the ‘severity’ of poverty). Qualitative results are very similar with only one difference: the effects of the agricultural terms of trade are not statistically significant with the use of the alternative poverty measures (see Appendix).

5. HOW DOES POVERTY REDUCTION RESPOND TO GROWTH IN THE PHILIPPINES?

(a) Estimating the Growth Elasticity of Poverty Reduction

In this section we attempt to examine the quantitative relationship between the mean income growth and the rate of poverty reduction, by adding the growth rate of per-capita expenditure (GRPCEXP) as an additional (endogenous) explanatory variable into equation (2). Our estimation results of equation (3), based on 3SLS estimation by combining equations (1)[21] and (3), are reported in Table 5.[22] Once GRPCEXP is introduced, the initial income and the child mortality rate are no longer statistically significant, and thus are dropped from equation (3) but instead are included in the instrument set. The land gini is still marginally significant (at the 10% level) in explaining poverty incidence (i. e., headcount ratio) but insignificant in explaining poverty depth (i. e., poverty gap) or poverty severity (i. e., squared poverty gap). This appears to suggest that the effects of the initial conditions on poverty reduction, as we saw in the previous section, are mostly indirect, working through increasing the mean income growth. Among policy variables, the change in the agricultural terms of trade and the implementation of agrarian reform have direct effects in reducing poverty incidence (though the latter only marginally so), presumably through their re-distributive effects. The effects of the terms of trade on poverty reduction, however, is not quite robust with respect to the uses of alternative poverty measures; such effects are statistically significant only for the headcount poverty measure. The CARP implementation, on the other hand, has statistically significant effects on the change in the headcount ratios and the poverty gap (PG) index (though marginally again) but not in the squared poverty gap (SPG) index.

(Table 5 here)

As expected, there is a significant *positive* relationship between the rate of mean income growth and the rate of poverty *reduction*. Our estimated 'growth elasticity of poverty reduction' is around 1.6 based on the headcount poverty ratios (Table 5, 1st column).[23] The magnitude of the growth elasticity, however, appears to be relatively small compared to the similar estimates obtained from cross-country data. For example, Ravallion (2001) estimated the growth elasticity of poverty reduction by a bivariate regression of the proportionate change in the poverty rate on the proportionate change in mean income (with intercept) based on a sample of 47 developing countries in the 1980s and 1990s; he obtained an estimated elasticity of 2.50. An equivalent bivariate regression estimate (without any additional covariates and without instrumenting for the right hand side variable; not reported in the table) for our data from the Philippines is 1.63, which is about the same as the estimate from our full specification as reported in Table 5. Thus, the degree of responsiveness of poverty reduction to the aggregate income growth is about 35% smaller in the Philippines compared to the (cross-country) developing country average. A study using regional data from Thailand has obtained an estimated growth elasticity of 2.2, which is also close to the international average (Deolalikar 2001). Therefore, the disappointing performance in the rate of poverty reduction found in the Philippines vis-à-vis its Asian neighbors is partially attributable to the low responsiveness of poverty reduction to a given rate of aggregate growth.

In addition, it has been observed in the Philippines that while there was relatively little poverty reduction during the period of high aggregate income growth in the 1960s and 1970s, poverty reduction accelerated after the mid-1980s through the 1990s despite the fact that there was a series of booms and busts during the period (e. g., Balisacan, *et al*. forthcoming). Since our estimates are obtained from the 1988-97 period—the period of relatively higher responsiveness of poverty reduction to growth than in the 1970s—, it appears to indicate a rather grim picture that even the relatively high growth elasticity by *the Philippine standard* is relatively low by *the international standard*.

(b) Exploring Determinants of Growth Elasticity of Poverty Reduction

The relatively small value of the growth elasticity in the Philippines raises a question: what are the sources affecting the growth elasticity? In order to approach this question, we first examine the relationship between the change in the sectoral income composition and the magnitude of the growth elasticity of poverty reduction (using the headcount ratio as the poverty measure) by re-estimating equation (3) with the interaction term between the mean income growth and the growth of the agricultural (or non-agricultural)-sector income share as an additional right hand side variable. Table 6 reports the estimated coefficients on the mean income growth and the interaction term, as well as the implied growth elasticities corresponding to the observed highest and lowest growth in the agricultural income share.[24] The interaction term between the mean income growth and the agricultural income growth is statistically significant while a similar interaction term between the mean income growth and the non-agricultural income growth is not significant (thus not reported here). We find that an increase in the share of agricultural income is associated with higher growth elasticities with a substantial magnitude. Using the ratio of the agricultural income share in 1997 to the agricultural income share in 1988 as the measure of relative agricultural income growth, the implied growth elasticity for the province with the largest increase in the agricultural income share (East Samar) is 2.61, while the implied growth elasticity for the province with the largest decrease in the agricultural income share (Misamis Oriental) is 1.30 (Table 6, 1st row). The implied growth elasticity of the provinces with the largest increase in the agricultural income share coincides with the international average obtained by Ravallion (2001), while that of the province with the highest decline in the agricultural income share is about half the international average.

(Table 6 here)

Our finding that agricultural sector growth has stronger association with poverty reduction than does non-agricultural growth is consistent with that of Ravallion and Datt (1996) based on sub-national data from India as well as with some cross-country regression studies (e. g., Gugerty and Timmer 1999). In the case of the Philippines, the relatively larger effects of agricultural sector growth vis-à-vis that of non-agricultural growth on poverty reduction could be a result of the weak labor absorptive capacity of the industrial sector growth in the country (e. g., Balisacan 1993). While Hayami and Kikuchi (2000) observed that the poverty reduction during the 1990s in their study village located in a suburban Metro Manila area was mostly due to the expansion of the employment opportunities in non-agricultural sectors, such a strong poverty-reducing effect of non-agricultural growth in the Philippines could be limited to the outskirts of the Metro Manila area. Estudillo, *et. al.* (1999), for example, find that the growth in non-agricultural income was accompanied by an increase in the disparity between farm and landless households in the non-agricultural income levels in their sample villages located in one of the outer islands, suggesting a possibility that the growth in the non-agricultural sector in the Philippines was not as pro-poor in outer islands as it was in the surrounding provinces of Metro Manila.[25] Given the past patterns of industrialization with weak labor absorption in the Philippines, industrialization appears to reduce the responsiveness of poverty reduction to a given rate of aggregate growth.

In our additional attempt to identify possible determinants of growth elasticity, we also examined the potential impact of initial conditions on growth elasticity by re-estimating equation (3) introducing an additional set of interaction terms, one such term at a time in separate regressions, between the mean income growth and the initial condition variables, following the approach taken by de Janvry and Sadoulet (2000). While de Janvry and Sadoulet (2000) find that higher initial income inequality significantly reduces growth elasticity in Latin American countries, we find no such evidence in our Philippine context; the interaction term between the mean income growth and initial inequality (measured either by land or by expenditures) is not significant.[26] However, we do find, as did de Janvry and Sadoulet (2000), that the initial poverty incidence and the initial human capital are significantly associated with growth elasticity. High initial poverty incidence appears to reduce the implied growth elasticity significantly —ranging between 1.1 (the province of Bohol, with the highest poverty incidence in 1988) and 2.7 (the province of Pampanga, with the lowest poverty incidence in 1988) (Table 6, 2nd panel). As the level of poverty incidence decreases in the process of economic development, the responsiveness of poverty reduction to growth appears to accelerate. In addition, a high initial mortality rate also is negatively associated with growth elasticity, while irrigation investment is positively associated with growth elasticity; the range of the implied growth elasticity in each case is in a similar range of between 1 and 2.5 (Table 6, 3rd and 4th panels). Thus investment in human capital (as measured by mortality rate) appears to facilitate poverty reduction not only by raising the mean income growth rate but also by raising the growth elasticity, and irrigation investment also appears to contribute to the increase in the responsiveness of poverty reduction to growth. The ‘dynasty,’ however, is not found to have a significant effect on the growth elasticity.

6. CONCLUSIONS

In this paper, we analyzed the processes of growth and poverty reduction in the Philippines under a framework based on neoclassical growth theories. We started with the determinants of provincial mean income growth; we found a rather high rate of provincial income convergence and positive effects of higher initial human capital stock (measured by mortality rate) and *higher* inequality in the initial land distribution on growth. In addition, we find that the more the elected officials are related with each other by blood or affinity the lower is the subsequent income growth, confirming the popular perception found in the literature on Philippine politics. Among policy variables, greater implementation of agrarian reform (CARP) is positively related to growth.

The rate of poverty reduction across provinces can be explained by a similar set of variables as in the case of the mean income growth. Our regression results suggest, however, that most of the effects of the initial conditions affect poverty reduction only indirectly, through raising mean income growth. Terms of trade more favorable to agriculture, on the other hand, tend to facilitate poverty reduction directly presumably through their income re-distribution effects. As expected, faster economic growth helps poverty reduction, but the strength of such a relationship appears rather weak in the Philippines by international standards; the estimated growth elasticity of poverty reduction is around 1.6 while the international standard appears to be around 2.5. Therefore, the slow poverty reduction in the Philippines compared to its Asian neighbors can be attributable not only to the relatively slower aggregate income growth but also to the low responsiveness of poverty reduction to aggregate growth. We also find, however, that growth elasticity is rather sensitive to changes in the sectoral income composition and to some initial conditions**.**

We have identified a few policy areas that are effective in both enhancing mean-income growth and reducing absolute poverty, such as policy interventions to reduce child mortality rates and expanding the coverage of the Comprehensive Agrarian Reform Program (CARP). We also find that the policy reform to eliminate price distortions that depress the relative price of agricultural products (such as trade policies protecting the industrial sector) has a significant impact on poverty reduction (though not on growth). Our reduced form estimation result suggests that the quantitative impact on the rate of poverty reduction of a one standard deviation change in the child mortality rate, CARP coverage and the relative price of the agricultural sector vis-à-vis that of the industrial sector are, respectively, 1.8, 1.9 and 1. These estimates have a potential implication for the choice of efficient policy interventions for poverty reduction; with additional information (though not easily available) on the cost of changing these outcomes through policy interventions, it would be possible to identify policy instruments having relatively higher returns with respect to poverty reduction. If we assume that the cost of changing these policy outcomes by one standard deviation is similar, then our results imply that the policies to reduce child mortality and to accelerate CARP implementation would deserve priority attention by policy makers.

NOTE

[1] This is based on headcount poverty ratios applied to per-capita consumption expenditures using the World Bank's 'dollar a day' poverty line as reporetd in Ahuja, et al. (1997).

[2] See also Dutt and Ravallion (1998).

[3] We excluded the National Capital Region of Metro Manila, where industrial and financial centers are concentrated, from our analysis, and thus our observations consist of mostly rural provinces.

[4] The initial per capita expenditures and the dependent variable come from the same set of variables and thus there is a potential that the common measurement errors contained in both the dependent and the independent variables could lead to spurious correlation. In order to address this potential problem, we use instrumental variable estimation with the household income per-capita as the instrument for the initial per capita expenditure variable.

[5] An additional criticism regarding Barro and Sala-i-Martin's (1995) cross-section regressions is the potential inconsistency due to the correlation between the initial income level and the unobserved individual (provincial)-specific effect (e. g., Caselli, *et al*. 1996). While it would be difficult to address this issue fully without panel data (which we do not have at the moment), the problem is likely to be less serious in a single country context, as we argued earlier, than in cross-country contexts. Furthermore, Caselli, *et al* (1996) show that, to the extent this poses a problem, it leads to a downward bias in the estimate of the convergence coeffcient; thus, our main qualitative finding of a high convergence rate (as we see below) would not be affeted (but rather enhanced).

[6] See Table 2 for variable definitions, descriptive statistics and data sources.

[7] We use inequality in land distribution rather than income or expenditure distribution based on some empirical evidence that land (asset) distribution is a more robust predictor of growth than is income/expenditure distribution (e. g., Deininger and Squire 1998, World Bank 2000). In order to examine the robustness of our findings, we also estimated the same equation by replacing the land gini by the expenditure gini. See footnote 13.

[8] Agricultural terms of trade and CARP are defined at the 'regional' level, a higher-level aggregation of provinces, due to lack of data.

[9] As is often pointed out, cross-section growth regressions are potentially subject to endogeneity bias (e. g., Caselli, *et al*. 1996). While poilcy variables such as 'CARP implementation' are more likely to suffer from this problem (as we discuss below), we would expect the variables of our main interest here, such as land distribution and 'political dynasty', to be reasonably stable over time and thus likely to be relatively less 'endogenous' than are policy variables. We intend to address this issue more fully in our future work once a panel data set becomes available.

[10] Table 3 reports the results obtained from instrumental variable estimation (instrumenting the 1988 percapita expenditure by 1988 percapita income) but OLS estimation results produce quantitatively very similar results.

[11] Our estimate of the (absolute) rate of convergence is 0.107 (see Balisacan and Fuwa 2003 for more details). Compared to the historical β-coefficients estimated for regional income convergence in the United States, Japan and Europe, which are clustered around the neighborhood of 2%, the comparable estimate from the Philippines is thus strikingly high (Sala-i-Martin 1996).

[12] We must note here, however, that this variable is defined only at the level of the 'regions', which is a higher-level aggregation of provinces (due to the absence of the provincial level observations of the land reform accomplishment).

[13] Since this result runs directly counter to the recent conventional wisdom that 'initial inequality hurts subsequent economic growth,' we examined the robustness of this relationship. It turns out that the significantly positive coefficient on the 'land gini' variable tends to be quite stable among various specifications with various combinations of explanatory variables. In addition, we experimented with alternative measures of land distribution, such as the ratio of large to small land holdings, but we tend to find that an initially higher share of small or medium size farm holdings is negatively related to subsequent growth, and an initially higher share of large farm holdings positively related to subsequent growth. We also obtain similar positively significant relationship using the gini coefficient based on the distribution of consumption expenditures (rather than land distribution). We therefore find no evidence of the conventional wisdom and a rather robust positive relationship between high inequality in farm distribution and subsequent income growth.

[14] We should note, however, that their threshold level distinguishing 'larger' and 'smaller' farms is a quite low level of 2 hectares.

[15] Yet another possibility is that the land inequality variable may be picking up the effects of the high growth rate during our observation period of particular crops which tend to be grown on large scale plantations. Geographical distribution of the land gini variable suggests that many areas with high land inequality are found in the islands of Negros and Mindanao, where

export crops such as sugar (Negros), coconut, banana and pineapple (Mindanao) are mainly grown. While the production of banana grew relatively fast, however, the production growth of both coconut and sugar was quite low during our observation period. We in fact experimented by adding the percentage share by area planted of particular crops (as an individual crop or as a group, such as 'export crops') as an additional regressor but the positively significant coefficient of land gini was never affected.

[16] In addition, some might argue that the land reform 'implementation' might have had relatively little impact on the actual farm distribution inequality and thus on the agricultural sector growth. While the official record published by the Department of Agrarian Reform indicates a dramatic increase in the land reform 'accomplishment' during the Ramos administration (1992-1998) compared to the preceding Aquino and Marcos administrations (DAR 1998), little quantitative evidence appears to exist regarding how much impact such apparent 'accomplishments' had on the size distribution of farms (e. g., Riedinger 1995).

[17] Table 3 reports results by instrumental variable estimation (instrumenting the 1988 percapita expenditure by 1988 percapita income) but OLS results are quantitatively very similar.

[18] In addition, we have checked against the potentials for multicollinearity. The highest simple correlation coefficient among our regressors was 0.4 (mortality rate and change in agricultural terms of trade), nor do the variance inflation factors (calculated by the standard command using STATA version 8) indicate that multicollinearity is likely to be a serious problem.

[19] Here again, however, we must note that this variable is defined at the 'regional' level, a

higher-level aggregation of provinces, due to the absence of provincial-level data required to define the terms of trade.

[20] Exceptions, however, are corn and sugar which enjoyed positive nominal rate of protection during the same period.

[21] The coefficient estimates of equation (1) based on 3SLS are nearly identical to those reported in Table 3, and thus are not reported here.

[22] We have tested for the validity of the over-identifying restrictions and for the exogeneity of the mean expenditure growth rate. The tests of over-identifying restrictions (e. g., Greene 1997: 762) were not rejected, suggesting that the set of instruments used for our final specification was valid. Rather suprisingly, however, the Hausman-Wu test for the exogeneity (Hausman 1978) of the mean expenditure growth rate was not rejected either, suggesting that the expenditure growth rate could be treated as exogenous. Indeed the value of coefficients estimated by OLS are very similar to those estimated by 3SLS. While our discussion in the text is based on the estimates using 3SLS, our arguments are not affected whether the mean expenditure growth rate is treated as exogenous or endogenous in the estimation of our final model. Appendix 2 reports the results of these statistical tests as well as the results of our OLS estimates.

[23] The measures of the responsiveness of poverty reduction to mean income growth can be (and have been) defined in various ways. Lipton and Ravallion (1995), for example, collect such estimates based on the ‘growth elasticity’ with controlling for the income distribution, while our estimates and Ravallion (2001) do not control for change in distribution.

[24] Coefficients are estimated by OLS. We found that OLS and 3SLS estimates were

quantitatively quite similar, nor did Hausman-Wu test reject the exogeneity of PCEXP (fn. 22).

[25] In contrast, in the case of Thailand evidence suggests that rural poverty reduction in Thailand, especially in the Northeast, the poorest region, was mainly driven by non-agricultural sector growth rather than by agricultural growth (e. g., Ahuja, et al. 1997, Deolalikar 2001).

[26] Detailed results are not reported here but available upon request.

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Table 1. Per-capita GDP and Headcount Poverty Ratio in Selected Asian Countries

	Per capita GDP (1995 PPPUS$)		Headcount poverty ratio (%)[a]			
	1965	1995	1975	1985	1993	1995
Philippines	**1,736**	**2,475**	**35.7**	**32.4**	**27.5**	**25.5**
Malaysia	2,271	9,458	17.4	10.8	<1.0	<1.0
Thailand	1,570	6,723	8.1	10.0	<1.0	<1.0
Indonesia	817	3,346	64.3	32.2	17.0	11.4
China	771	2,749	59.5	37.9	29.7	22.2

source: Ahuja, Bidani, Ferreira and Walton (1997)

[a]: based on the 'PPP US$1 per day' poverty line calculated by the World Bank; — : not available

Table 2. Descriptive Statistics

Variable name	Description	mean	Standard deviation	min	Max
PCEXP88[a]	Per-capita consumption expenditure 1988	16,598.38	5,133.671	6,818.222	31,993.09
PCEXP97[a]	Per-capita consumption expenditure 1997	19,842.54	4,383.013	7,754.623	30,304.10
Lpcexp88[a]	Log of per-capita expenditures in 1988	9.672	0.303	8.827	10.373
Lpcexp97[a]	Log of per-capita expenditures in 1997	9.869	0.239	8.956	10.319
GRPCEXP[a]	Average annual growth rate of per capita expenditures	0.023	0.032	-0.090	0.105
GRINCID[a]	Annual average rate of change in headcount poverty rate	-0.016	0.065	-0.146	0.259
GRDEPTH[a]	Annual average rate of change in the depth of poverty	-0.022	0.089	-0.188	0.307
GRSEVER[a]	Annual average rate of change in the severity of poverty	-0.023	0.110	-0.234	0.323
Initial Conditions:					
Land gini[b]	Gini coefficient of farm distribution	54.16	6.55	36.49	75.77
Mortality Rate[c]	Mortality rate per 1000 children age 0-5	84.99	14.71	55.92	121.12
Literacy rate[d]	Simple adult literacy rate	87.57	7.37	56.7	96.6
Irrigation area[e]	Share of irrigated farm area	0.27	0.22	0.015	0.95
Dynasty[f]	Proportion of the provincial officials related by blood or affinity	0.815	0.199	0	1
Time Varying Variables:					
Chg.CARP[g]	Change in CARP accomplishment 1988-97	1.340	1.089	0.4730	4.6851
Chg.road dencity[h]	Change in road density 1988-97[k]	0.0820	0.0839	-0.2141	0.4047
Chg.Ag.terms of trade[i]	Change in agricultural terms of trade 1988-97[l]	0.4481	0.0784	0.24	0.58
Chg. Electricity[j]	Change in share of households with electricity 1988-97	11.3789	12.9160	-21	61.8

Sources: [a.] Family Income and Expenditure Survey (National Statistical Office); [b.] Census of Agriculture (National Statistical Office);[c.] 1990 Women & Child Health Indicators (National Statistical Coordination Board);[d.] FLEMMS (National Statistical Office);[e.] Census of Agriculture (National Statistical Office);[f.] collected by the authors by interviews;[g.] Department of Agrarian Reform;[h.] Department of Public Works and Highway;[i.] Regional Accounts of the Philippines (NSCB);[j.] Family Income and Expenditure Survey (National Statistical Office).

Additional definitions: [k] Total road length with quality adjustment by the average unit cost of upgrading roads across different types, divided by total land area; [l] Implicit agricultural GDP deflator divided by implicit non-agricultural GDP deflator.

Table 3. Reduced Form Provincial Growth Regression Results (Instrumental Variable Estimation: t-ratios in parentheses)

Dependent variable = annual growth rate of mean consumption per capita

Independent variables:	(a)[b]	(b)[b]
Initial conditions:		
Log (Per capita expenditure 1988)[a]	**-0.088(10.24)****	**-0.085 (11.59)**
Mortality rate	**-0.001 (3.04)****	**-0.0007 (-4.37)**
Literacy rate	0.0001 (0.16)	
Dynasty	**-0.026 (2.24)****	**-0.022 (2.17)**
Irrigation area	0.002 (0.14)	
Land gini	**0.001 (3.05)****	**0.001 (3.41)**
Policy variables:		
Chg. CARP	**0.006 (2.11)****	**0.006 (3.15)**
Chg. Electricity	-0.00003 (0.13)	
Chg. Ag. terms of trade	0.016 (0.52)	
Chg. road density	0.018 (0.64)	
Constant	0.849 (8.52)	0.833 (10.59)
Adj. R-squared	0.6799	0.6967
Sample size	65[c]	70

[a]Per capita income used as instrument. (see footnote 4 in text) [b]Outlier observation (Province of Sulu) excluded.
[c] Provinces where at least one explanatory variable is missing are excluded.
*: statistically significant at 10% level; **: statistically significant at 5% level.

Table 4. Reduced Form Provincial Poverty Reduction Regression Results: Headcount ratio (Instrumental Variable Estimation: t-ratios in parentheses)

Dependent variable = annual rate of change in the headcount poverty ratio (HC)

Independent variables	(a)[b]	(b)[b]
Initial conditions:		
Log (Per capita expenditure 1988)[a]	**0.145 (7.12)**[**]	**0.143 (7.89)**[**]
Mortality rate	**0.002 (2.97)**[**]	**0.001 (3.00)**[**]
Literacy rate	0.001 (0.96)	
Dynasty	0.039 (1.40)	
Irrigation area	0.029 (0.79)	
Land gini	**-0.003 (3.15)**[**]	**-0.003 (3.67)**[**]
Policy variables:		
Chg. CARP	**-0.019 (2.84)**[**]	**-0.014 (3.11)**[**]
Chg. Electricity	0.0003 (0.54)	
Chg. Ag. terms of trade	**-0.127 (1.79)**[*]	**-0.128 (1.89)**[*]
Chg. road density	-0.047 (0.69)	
Constant	-1.427 (6.04)	-1.266 (6.65)
Adj. R-squared	0.5038	0.5148
Sample size	65	70

[a]Per capita income used as instrument. (see footnote 4 in text) [b]Outlier observation (Province of Sulu) excluded.
[*]: statistically significant at 10% level; [**]: statistically significant at 5% level.

Table 5. Estimating Growth Elasticity of Poverty Reduction with Alternative Poverty Measures [a](3SLS: t-ratios in parentheses)

Independent Variables	*Poverty measure used as the dependent variable:* Headcount Ratio (HC)	Poverty Gap (PG)	Squared Poverty Gap (SPG)
GRPCEXP	**-1.6381**	**-2.2985**	**-2.8979**
	(-11.61)[** b]	**(-11.47)**[** b]	**(-10.57)**[** b]
Land gini	**-0.0010**	-0.0008	-0.0008
	(-1.79)[*]	(-1.01)	(-0.71)
Chg. CARP	**-0.0057**	**-0.0076**	-0.0088
	(-1.86)[*]	**(-1.78)**[*]	(-1.50)
Chg. Ag. terms of trade	**-0.0947**	-0.0857	-0.1233
	(-2.23)[**]	(-1.44)	(-1.51)
Constant	0.1254	0.1222	0.1516
	(3.25)	(2.26)	(2.05)
R-squared	0.7651	0.7702	0.7369
Sample size	70	70	70

[a]Equations (2) and (4) estimated as a system by three stage least squares. Outlier observation (Province of Sulu) excluded. [b]Identifying instruments for mean expenditure growth rate: dynasty, log(pc income 88), mortality.
[*]: statistically significant at 10% level; [**]: statistically significant at 5% level.

Table 6. Qualifiers of Growth Elasticity of Poverty Reduction[a]
(OLS: t-ratios in parentheses)

	Coefficient (t-ratio)	Implied overall growth elasticity	
		lowest	highest
Mean income growth rate interacted with agricultural income growth (ratio)			
GRPCEXP	-0.9510 (-2.48)	-1.304	-2.610
ag..income growth*GRPCEXP	-0.9035 (-1.83)	(Misamis Or.)	(E.Samar)
Mean income growth rate interacted with initial poverty incidence			
GRPCEXP	-2.7203 (-9.90)	-1.013	-2.677
Poverty incidence*GRPCEXP	0.01996 (4.34)	(Bohol)	(Pampanga)
Mean income growth rate interacted with initial mortality rate			
GRPCEXP	-2.8938 (-5.25)	-1.008	-2.023
mortality*GRPCEXP	0.01557 (2.36)	(W.Samar)	(Pampanga)
Mean income growth rate interacted with initial irrigation			
GRPCEXP	-1.2137 (-6.49)	-1.235	-2.589
irrigation* GRPCEXP	-1.4482 (-2.78)	(W.Samar)	(Tawi-tawi)

[a]The same set of additional explanatory variables as in Table 5 are included but not reported. Estimation by OLS.

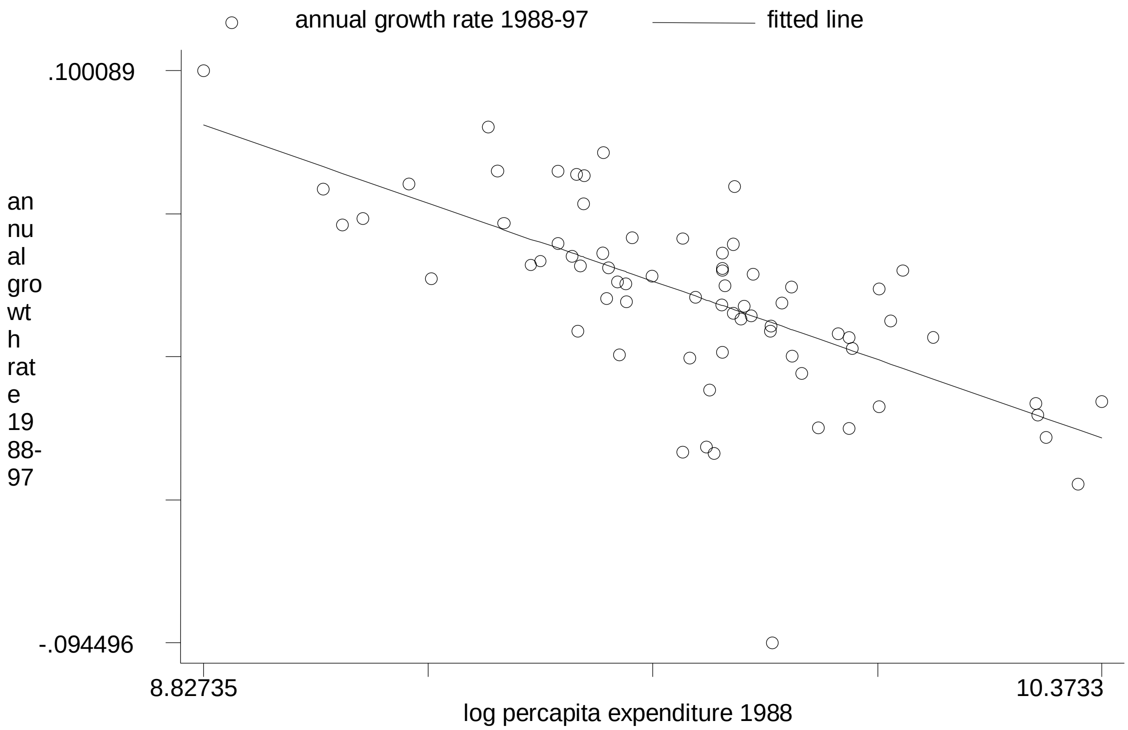

Figure 1. Absolute Beta Convergence across Provincial Income

* The outlier observation at the middle bottom is that of the province of Sulu.
(source: Family Income and Expenditure Survey)

Appendix 1: Reduced-Form Determinants of Poverty Reduction

Table A-1. Reduced Form Provincial Poverty Reduction Regression Results: Poverty Gap (Instrumental Variable Estimation: t-ratios in parentheses)

Dependent variable = annual rate of change in the poverty gap index (PG)		
Independent variables	(a)[b]	(b)[b]
Initial conditions:		
Log (Per capita expenditure 1988)[a]	**0.2022 (6.84)****	**0.1995 (7.62)****
Mortality rate	**0.0019 (2.48)****	**0.0014 (2.34)****
Literacy rate	0.0018 (1.08)	
Dynasty	0.0547 (1.35)	
Irrigation area	0.0306 (0.56)	
Land gini	**-0.0036(-2.79)****	**-0.0035(-3.03)****
Policy variables:		
Chg. CARP	**-0.0266(-2.68)****	**-0.0204(-3.07)****
Chg. Electricity	0.0005(0.75)	
Chg. Ag. terms of trade	-0.1200 (-1.16)	-0.1114 (-1.14)
Chg. road density	-0.1017 (-1.04)	
Constant	-2.0266 (-5.91)	-1.8044 (-6.54)
Adj. R-squared	0.4834	0.4924
Sample size	65	70

[a]Per capita income used as instrument. (see footnote 4 in text) [b]Outlier observation (Province of Sulu) excluded.
*: statistically significant at 10% level; **: statistically significant at 5% level.

Table A-2. Reduced Form Provincial Poverty Reduction Regression Results: Squared Poverty Gap (Instrumental Variable Estimation: t-ratios in parentheses)

Dependent variable = annual rate of change in the squared poverty gap index (SPG)		
Independent variables	(a)[b]	(b)[b]
Initial conditions:		
Log (Per capita expenditure 1988)[a]	**0.2567 (6.71)****	**0.2522 (7.43)****
Mortality rate	**0.0022 (2.25)****	**0.0015 (2.06)****
Literacy rate	0.0023 (1.06)	
Dynasty	0.0637 (1.22)	
Irrigation area	0.0605 (0.86)	
Land gini	**-0.0042(-2.47)****	**-0.0042(-2.80)****
Initial conditions:		
Chg. CARP	**-0.0353(-2.75)****	**-0.0253(-2.94)****
Chg. Electricity	0.0009 (1.02)	
Chg. Ag. terms of trade	-0.1516 (-1.13)	-0.1438 (-1.13)
Chg. road density	-0.1147 (-0.91)	
Constant	-2.5826 (-5.82)	-2.2739 (-6.36)
Adj. R-squared	0.4698	0.4787
Sample size	65	70

[a]Per capita income used as instrument. (see footnote 4 in text) [b]Outlier observation (Province of Sulu) excluded.
*: statistically significant at 10% level; **: statistically significant at 5% level.

Appendix 2: Testing the Validity of Instruments and Exogeneity of Mean Expenditure Growth Rate

Table A-3: Tests for over-identifying restrictions and Hausman-Wu test of exogeneity

Dependent variable	Headcount	Poverty gap	Squared poverty gap
Test of over-identification:[a]			
Chi-square test statistic (p-value)	0.8967 (0.64)	1.1765 (0.56)	1.9585 (0.38)
Hausman-Wu test of exogeneity of GRPCEXP: T-test statistic (p-value)	0.209 (0.84)	0.632 (0.53)	0.422 (0.68)

[a]Instruments: Dynasty; log (per-capita income 1988); mortality rate

Table A-4: OLS estimates of growth elasticity of poverty reduction (additional regressors: Land Gini, CARP, Ag. Terms of trade, w/o Sulu) (t-ratios in parenthesis)

Dependent variable	Headcount	Poverty gap	Squared poverty gap
Growth elasticity	-1.6193 (-13.57)**	-2.3452 (-14.02)**	-2.9522 (-12.89)**
Landgini	-0.0010 (-1.79)*	-0.0008 (-0.93)	-0.0007 (-0.64)
CARP	-0.0057 (-1.80)*	-0.0076 (-1.70)*	-0.0087 (-1.44)
Ag.terms of trade	-0.0940 (-2.14) **	-0.0902 (-1.47)	-0.1280 (-1.52)
Constant	0.1564 (2.09)	0.1225 (2.19)	0.1518 (1.98)
Adjust. R-squared	0.7585	0.7563	0.7210

*: statistically significant at 10% level; **: statistically significant at 5% level.