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**AGRICULTURE AND THE NEW INDUSTRIAL  
REVOLUTION IN ASIA**

**Romeo M. Bautista  
Dean A. DeRosa**

**Trade and Macroeconomics Division  
International Food Policy Research Institute  
1200 Seventeenth Street, N.W.  
Washington, D.C. 20036-3006 U.S.A.**

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## **AGRICULTURE AND THE NEW INDUSTRIAL REVOLUTION IN ASIA**

Romeo M. Bautista  
International Food Policy Research Institute  
1200 17<sup>th</sup> Street, N.W.  
Washington, D.C. 20036 U.S.A.

Dean A. DeRosa  
ADR International, Ltd.  
200 Park Avenue, Suite 202  
Falls Church, Virginia 22046 U.S.A.

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## Table of Contents

1. Introduction .....	1
2. Agriculture and Industrialization .....	3
Agriculture on the Road to Industrialization .....	3
Agriculture and International Trade .....	5
An Econometric Analysis .....	6
3. Experiences of Asian Countries .....	8
4. Conclusion .....	16
References .....	17
Table 1--Economic Statistics .....	20
Table 2--Cross-Country Regression Results: Measures of Economic Growth on Agricultural Growth and Export Growth in Developing Countries, 1970-93 .....	21

## 1. INTRODUCTION

Asia is arguably the most diverse and rapidly growing area of the world economy today. The remarkable development record of these countries has been widely noted and frequently held as an example for developing countries both within and outside Asia. Emphasizing the relatively "open" policies pursued by the most successful economies in Asia, the World Bank has termed the region's economic achievement the East Asian Miracle (World Bank 1993).

This paper takes up the issue of the role of agriculture and, more broadly, that of rural development, in the Asian Miracle. Discussions of the Asian Miracle have been couched almost exclusively in terms of Asia's growth of labor-using industries and exports of labor-intensive manufactures. Indeed, the industrial and export growth rates during 1980-93 for almost all the Asian countries<sup>1</sup> represented in Table 1 are markedly higher than the regional averages for other developing countries, suggesting that a "New Industrial Revolution in Asia" has been underway for the next tier of Asian developing countries following the development path of the newly industrializing economies (NIEs) of Asia. However, with the exception of South Korea and Taiwan which have already undergone the transition from agrarian to predominantly industrial economies,<sup>2</sup> agriculture still contributes significantly to total output, and especially to total employment,<sup>3</sup> in most developing countries in Asia. This is particularly the case in China and the major South Asian countries (Bangladesh, India, and Pakistan), where the preponderance of poor and low-income households are to be found in the region. The low per-capita levels of GNP that distinguish China and South Asian countries are closely related to the substantial share of agriculture in gross domestic output and employment in these countries. Moreover, even in the middle-income countries of

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<sup>1</sup> The sole exception is the Philippines, which in more recent years (since 1992) has also shown rapid industrial and export growth.

<sup>2</sup> Because Japan completed the transition to an industrial economy at a much earlier date during this century, its development record in relation to agriculture is not considered here. See Oshima (1987:Ch.4) for a perceptive analysis of the role of agriculture in Japanese industrial development.

<sup>3</sup> The share of agriculture in output in low- and middle-income countries is often biased downward by the economic policy-related repression of prices for agricultural commodities in these countries (see Section 2 below). Thus, the contribution of agriculture to total employment in such countries is often a more reliable indicator of economic importance of agriculture to the national economy.

Southeast Asia (Indonesia, Malaysia, the Philippines, and Thailand), agriculture continues to account for a large share of the national economy.

Table I indicates the dramatic economic strides that most Asian countries have made during the last two decades compared to the record of less developed countries in other regions but also that of the high-income OECD countries. That the growth rates of industry and exports generally exceed the growth rate of agriculture testifies to the emergence of industrialization and international trade as significant factors in economic growth in much of developing Asia. But such simple statistics may still mask the role of agriculture in supporting industrialization and economic growth in Asia, if for no other reason because the agricultural sector is often larger than other producing sectors and hence tends to exhibit smaller proportional gains in output.

Basic social statistics indicate the importance of agricultural and rural development in Asia. The population of the region is vast (over 2 billion in 1993), and is growing at high rates in the most populous Asian countries: 2.8 percent per annum in Pakistan, about 2.0 percent per annum in Bangladesh, India, and Indonesia, and 1.4 percent per annum in China during 1980-93. Most people in Asia live in rural areas and derive their livelihood from agriculture and activities related to agriculture. Thus, the acute social problems of many developing Asian countries, indicated by still high infant mortality rates and limited life expectancy, are visited substantially upon the inhabitants of rural areas. Of necessity in these circumstances, highly labor-using industrialization must be a major component of economic progress in the region. But also in these circumstances, the potential contributions of agricultural growth and rural development to economic growth and social welfare in Asia must also be recognized.

This view forms the basis of the central hypothesis of this paper, namely, that agricultural growth and rural development have a significant role to play in the sustained industrialization and economic growth of many Asian countries that are still heavily agricultural. This hypothesis is explored in broad conceptual and quantitative terms in Section 2, and with reference to some salient features of Asian-country experiences in Section 3. Some concluding remarks are given in the final section of the paper.

## 2. AGRICULTURE AND INDUSTRIALIZATION

### Agriculture on the Road to Industrialization

Sustained economic growth and development imply an inexorable decline in the relative importance of agriculture. As per capita incomes rise and labor skills, technology, and higher forms of human capital are augmented, demands for food and other staple agricultural commodities are usually satisfied by a smaller proportion of household incomes. Also, industrial and other nonagricultural sectors inevitably expand, both as a source of new employment and the origin of goods and services to meet the demands of wealthier households and new enterprises. Indeed, this has been the experience of increasing numbers of middle- and high-income developing countries since the 1960s.

The role that agriculture plays in the transition of less developed countries to higher levels of economic development, through progressive industrialization and greater employment of labor at higher (real) wage-levels, transcends simply diverting capital, labor, and other productive resources from agriculture to industry. This has been demonstrated by the wide failure of the import substitution-based strategies for industrialization pursued by many less developed countries during the 1950s and 1960s.<sup>4</sup> These early, mainly centrally-planned, strategies viewed agriculture as little more than a source of excess resources that could be diverted to industry through investments in industrial (and typically urban) infrastructure subsidized by combinations of domestic and foreign aid credits, direct taxation (mainly of traditional commodity exports), and other public policies to raise the domestic price of capital-intensive manufactures and nontraded goods relative to labor-intensive agricultural and other exportable goods behind high import tariff walls and overvalued exchange rates.

This strategy too often resulted in high-cost and inefficient production of industrial goods that faced little demand outside of the sheltered home market. It also too often resulted in reduced incentives for output and productivity growth in agriculture, with particularly adverse implications for food security and export earnings. In "choking off" agriculture, early industrialization strategies revealed the importance of a robust rural sector not

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<sup>4</sup> See, among others, Little, Scitovsky, and Scott (1971), Little (1982), and, in the context of Asian development, James (1990).

only as a source of resources for industrialization in less developed countries but also as a source of increased domestic demand for manufactures and services. With 50 percent or more of output originating in agriculture, significant and sustained growth in low-income developing countries, it was revealed, cannot be generated through promotion of industry alone. As contended by, among others, Johnston and Mellor (1961), Mellor (1966; 1995), and Johnston and Kilby (1975), sustained economic growth in less developed countries requires policies for economic development that yield incentives for efficient expansion of agriculture as well as industry.

Increases in agricultural output stimulate the demand for industrial inputs such as fertilizer and farm equipment as well as expand the supply of agricultural goods used as inputs to nonagricultural production. These two types of production linkage are referred to as "backward linkage" and "forward linkage," respectively. Agricultural crop and livestock production is generally characterized by a "weak" backward linkage and "medium-strong" forward linkage (Hirschman 1958:110).

Agricultural growth also raises the real income of farm households and hence their demand for food and other agricultural products as well as, and likely more so, for industrial goods and services. Mellor and Lele (1973) and more recently Ranis, Stewart, and Reyes (1989) show that such "consumption linkage" effects are critical to the influence of agricultural growth on the overall growth performance of the rural and national economy. Not only the total income gains from agricultural growth, but also its distribution among rural households, will determine the magnitude of the consumption linkage effects. Concentration of income gains to the richer segment of the rural population is not likely to result in a significant demand stimulus for nonagricultural production in the rural economy since affluent households, whether in rural or urban areas, tend to spend more on capital-intensive goods produced by urban industry or imported from abroad. A wider sharing of agricultural income growth leads to a greater incremental consumption demand for the labor-intensive products of rural industries. Rural industry growth in turn provides "additional impetus for further increases in agricultural productivity, leading to a mutually supportive cycle of agricultural and industrial growth" (Ranis and Stewart 1987:140).

Beyond the reinforcing effects on industrialization and economic growth, broadly based agricultural



growth has significant "spillover" effects that go to the heart of improving social welfare as part of the development process. As noted above, poor households in most low-income countries reside mainly in rural areas. Thus, more so than urban-based industrialization strategies, economic development strategies that recognize the importance of ensuring agricultural and rural development along with industrialization offer the promise of reducing poverty directly and, more generally, the disparity of access in rural areas relative to urban areas to social services, such as education and health-care. Such development strategies can also be expected to increase access to many privately-provided services, such as banking and retailing of consumer goods, in rural areas.

In sum, more even-handed policies towards agriculture and the rural sector, associated with greater equality of access to economic opportunities, physical infrastructure, and social-service facilities in rural areas,<sup>5</sup> should be expected to result in greater agricultural productivity and rural incomes, increasing the effective demand for manufactured producer and consumer goods. Such policies might also be expected to promote rural small-scale industries that can meet part of the industrial needs of agriculture while also significantly adding to the employment of the rural labor force. Finally, increased national food security and reduced pace of urbanization represent additional social benefits of more neutral government policies in less developed countries.

### **Agriculture and International Trade**

Today, vested interests in heavy protection for domestic industry that effectively repress agricultural incentives still hold considerable sway in many low-income countries. Moreover, inappropriate fiscal and other macroeconomic policies that give rise to high inflation and overvalued exchange rates also continue to hinder the development of agriculture in many developing countries.<sup>6</sup> Nonetheless, the sustained growth of the Asian NIEs, supported by relatively stable monetary and fiscal policies and led initially by rapid expansion of exports of apparel, electronic components, and other labor-intensive manufactures under increasingly liberal trade trade

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<sup>5</sup> On the importance of physical and social infrastructure to agricultural growth and rural development in low-income countries, see Ahmed and Donovan (1992).

<sup>6</sup> See Krueger, Schiff, and Valdés (1992) and Bautista and Valdés (1993) for in-depth case studies involving a wide range of developing countries.

regimes, has provided an important example for other developing countries.

In "frictionless" neoclassical economic models, marked by the free movement of resources between sectors and the resulting equalization of returns to identical factors of production in all uses, industrialization led by either agricultural growth or export growth might be expected to have very similar outcomes. For instance, trade liberalization in low-income countries to reduce protection for capital-intensive industries should be expected to induce significant expanded production and exports of labor-intensive manufactures but also of agricultural and other natural resource-based commodities that are traditionally in the comparative advantage of these countries. Moreover, through demand linkages between sectors, expansion of agriculture should be expected to reinforce the direct stimulus to sustainable industrialization provided by the elimination of protection for inefficient industries.

In the real world of structural and other rigidities hindering the smooth functioning of inter-sectoral adjustments to economic incentives, policies promoting one or both sources of industrial demand may be necessary to realize the economic gains predicted by neoclassical models. Thus public investment, which typically has an urban bias in developing countries, may need to be redirected toward the rural sector in order to hasten the development of rural infrastructure (both physical and social) and increase the participation of rural producers in the growth process. Such redirection of infrastructure policy is postulated in the simulation experiments based on a computable general equilibrium (CGE) model developed by Adelman (1984) to study alternative development strategies for South Korea. She finds that agricultural demand-led (ADL) industrialization outperformed export-led industrialization over the fifteen year period 1964-78, owing mainly to the prominence of agriculture and the greater labor-intensity of agricultural output than industrial output in South Korea during the early 1960s. The ADL growth strategy also resulted in greater alleviation of poverty and improvement in income distribution than the export-led strategy, because of the greater effects of the former on rural employment and incomes.<sup>7</sup>

### **An Econometric Analysis**

That agricultural development has a vital role to play in promoting sustained industrialization and

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<sup>7</sup> These and additional results obtained by Adelman (1984) are discussed more extensively below, in connection with the individual experiences of Asian developing countries with agricultural growth and industrialization.

economic growth is also supported by cross-country econometric evidence of the partial correlation between industrialization and economic growth, on the one hand, and agricultural growth and development, on the other hand. Following Bautista (1990), ordinary linear regression equations were fitted, using cross-sectional data compiled from statistics for a large sample of 94 developing countries over the period 1970-93, to investigate here the importance for industrialization and general economic growth of the same two sources of demand for domestic output considered by Adelman, namely, agricultural growth and export growth.

The econometric results, presented in Table 2, are mainly consistent with the hypothesis that agricultural development contributes significantly to industrialization and economic growth but also to economic welfare (where economic welfare is represented by growth in per capita output). During 1970-80, agricultural growth "dominates" export growth in the regression equations for the three alternative dependent variables. Not only is agricultural growth highly significant in each of the fitted growth equations, but the estimated coefficients of the agricultural growth variable are substantially greater in value than the estimated coefficients of the export growth variable. Thus, it is found that for each 1 percentage point increase in the growth of exports the rate of industrialization (GDP growth) increases by 0.3 percent (0.1 percent), but that for each 1 percentage point increase in the growth of agricultural output the rate of industrialization (GDP growth) increases by 1.3 percent (1.2 percent). Moreover, a 1 percentage point increase in agricultural growth is associated with an appreciably larger increase in economic welfare than a similar increase in export growth.

During 1980-93, the significant association between industrialization and general economic growth, on the one hand, and agricultural growth, on the other hand, is still found for the sample of developing countries. Agricultural growth, however, no longer dominates export growth in the fitted equations for industrial growth and GDP growth. Also, whereas the estimated coefficient and statistical significance of the export growth variable are higher than before in the regression equation for growth in per capita output, the agricultural growth variable is statistically insignificant in the same equation for growth in economic welfare.

The decline in absolute and relative significance of agricultural growth during 1980-93 might be explained by the fact that a number of previously lower-income developing countries have "graduated" in recent years to

higher levels of economic development in which the relative importance of their agricultural sectors has declined. Given that countries such as Chile, Korea, Mexico, and Taiwan have adopted more open economies and expanded their industrial base, growth of foreign demand for the exports of manufactures competitively-produced by these countries might have come to contribute more significantly to sustained industrialization but also continued growth of economic welfare. A second explanation for the econometric results might be that essential complementary growth of rural infrastructure, especially in Africa but also in other low-income developing areas, has slowed since 1980 because of the fiscal difficulties confronted by many countries in these regions, thereby lessening the positive impacts of agricultural growth not only on industrialization and general economic growth but also on rural incomes and poverty alleviation.

### 3. EXPERIENCES OF ASIAN COUNTRIES

The high growth rates of domestic industry <sup>that</sup> accompanied rapid agricultural growth in the four Southeast Asian countries during 1970-80 observed in Table 1 are consistent with the significant linkage between agricultural and industrial growth shown in the above regression results. On the other hand, the South Asian countries (excluding Nepal which has no comparable data on industrial growth) posted lower agricultural growth rates in the 1970s, and also lower industrial growth rates, than their Southeast Asian counterparts.

In the subsequent period 1980-93, agricultural growth in each of the latter countries decelerated, and was accompanied by a lower industrial growth rate--except Thailand, where the importance of agriculture had already diminished substantially. In the four South Asian countries, as well as in China, agricultural growth accelerated and industrial growth rates were at least as high during 1980-93 relative to 1970-80. Again, these findings conform to the hypothesized positive effect of agricultural growth on industrial growth.

Cross-country correlations and historical associations such as those indicated above are suggestive, but they do not establish causal relationships. It is necessary to undertake economic modelling, which permits *ex ante* analysis based on model simulations. Empirical models of the computable general equilibrium (CGE) type have been used increasingly in studies of Asian developing economies, especially in the quantitative evaluation of the

growth and distributional effects of development policies. CGE models emphasize the consistency of intersectoral linkages in production, consumption, and trade, and the endogenous determination of relative prices subject to relevant macroeconomic and institutional constraints (see, for example, Robinson 1989). Evaluation of the economywide effects of government policies is based on comparisons between the model's counterfactual equilibrium solutions and the base-period or base-run values.

A seminal contribution is the dynamic CGE model developed by Adelman and Robinson (1978) for South Korea, in which 29 producing sectors and several categories of households are distinguished.<sup>8</sup> In model simulations over a nine-year period, import substitution as an industrialization strategy is found to result in higher prices of manufactured goods (30 percent above the base run) and in lower prices of agricultural products (37 percent lower), the worsening terms of trade leading to significant shifts in income distribution and poverty incidence. The urban elite benefit at the expense of rural households whose average income decreases by 45 percent, and the proportion of households in poverty increases by 66 percent. The effect on economic growth is negative, the GDP growth rate being cut by about half a percentage point every year. Compared to import substitution, the strategy of labor-intensive, export-led industrial development actually followed by South Korea from the mid-1960s to the mid-1970s is also shown in model simulations to lead to a more rapid economic growth, lower income inequality, and reduced poverty incidence.

In a later study (alluded to above), Adelman (1984) investigates the comparative growth paths of a low-income, open economy implementing two alternative development strategies, based on simulation experiments on a CGE model of the South Korean economy with benchmark data for 1963. In that year South Korea exemplified the economic situation in many developing countries suffering from large deficits in food supply-demand and in the trade balance. The two development strategies are characterized (1) by industrial export-led growth, in which exporting sectors are given 60 percent export subsidies, import tariffs are eliminated, and the

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<sup>8</sup> The household categories include wage earners (with seven professional categories), self-employed (in manufacturing and services), capitalists, and agricultural (differentiating among laborers and four household classes by farm class).

domestic currency is depreciated by 10 percent, and (2) by agricultural demand-led (ADL) growth, in which (i) the agricultural terms of trade remains constant and (ii) the agricultural share in public investment is initially doubled and then gradually returned to the base-year level during the 15-year simulation period.

The results of model simulations indicate that the ADL strategy "generates the same rate of industrialization as does export-led growth but leads to a higher rate of labor absorption, a better distribution of income, better balance-of-payments results, less poverty, and a higher rate of growth per capita gross domestic product (GDP) than export-led growth" (Adelman 1984:939). The significantly more equal distribution of income associated with the ADL strategy is attributable to the larger income increases for rural households (42 percent higher than the base-year income, in sharp contrast to the unchanged urban household income) which initially accounted for the bulk of the "poor" population. Another striking finding is that domestic savings in the two growth paths are about the same, indicating that the increased income of rural households relative to urban households in ADL growth does not have the effect of lowering the aggregate saving rate. The latter is explained by the substantial rise in the rate of return on agricultural investments and hence in rural savings. Not surprisingly, the expansion of domestic demand, especially consumption demand of rural households, is found to be a major source of industrial growth in the ADL strategy--bearing out the significance of agricultural growth linkage effects. The resulting industrial structure is labor-intensive and geographically dispersed, matching the pattern of rural consumption expenditure.

It is also instructive to examine the case of the Philippines, which adopted heavily protective trade policies that sheltered import-substituting industries over a protracted period. Clarete and Roumasset (1987), employing a CGE model of the Philippine economy with seven production sectors, find that trade liberalization would have shifted capital and labor resources largely from the more capital-intensive import-substituting sector to the production of cash crops, agricultural food, and industrial exportables. The long-run income effects (relative to 1974 benchmark values) are quantified to be a 39 percent reduction for the former sector and increases of 24 to 31 percent for the latter sectors.

In fact, agricultural growth in the Philippines accelerated during the "green-revolution" period 1965-80,

attributable to the dramatic productivity increases not only in rice but also in other crops, including nontraditional export crops. Agricultural production expanded at an average annual rate of 5.9 percent over this period, nearly twice the corresponding rate of 2.9 percent for the preceding ten years (David, Barker, and Palacpac 1987). General-equilibrium analyses indicate a significant effect on GDP through the production and consumption linkages of agricultural growth (Balisacan and Bautista 1995). However, the economywide redistributive impact is found to be negative: incomes of the more affluent Metro Manila and large-farm households increase proportionately more than those of small-farm and "other rural" households. This implies a greater demand stimulus for urban-based, rather than rural-based, industrial growth. It is notable that, as late as the mid-1980s, about one-third of the country's GDP and more than one-half of total manufacturing value added were contributed by Metro Manila--where only one-eighth of the total population resided.

Historically, the "East Asian experience" of rural-based industrialization was spawned by the expansion of domestic demand for industrial goods and services that resulted from the growth of agricultural productivity and rural incomes, as argued by Oshima (1987). Getting the agricultural sector moving, however, is not enough. Not only the rate of agricultural growth, but also the structure of that growth, will influence the strength of the linkage with the rest of the economy and hence the overall growth and equity effects. The contrasting experiences of Taiwan and the Philippines are instructive in this regard.

In the early 1960s Taiwan had many similarities with the Philippine economy --in terms of per capita income, production structure, and degree of openness (Bautista 1992). Agricultural production in Taiwan grew at an average annual rate of 4 percent during 1960-73, which was accompanied by an 8.1 percent annual growth in manufacturing employment and a 7.7 percent annual increase in the real wage rate. Between 1965 and 1973 the agricultural sector expanded by an average 4.8 percent annually, while manufacturing registered an astonishing 21 percent growth rate. Rapid growth of farm output took place despite the resource movement out of agriculture concurrent with rapid industrialization. The output composition also changed from rice and other staples to higher-value products (livestock, fruits, and vegetables), and nontraditional agricultural exports (mushrooms, asparagus, etc.) became important. The agricultural labor force began to decline absolutely in the late 1960s but

production continued to increase due to improvements in labor productivity.

The rural-based, small-scale, and labor-intensive character of early Taiwanese industrialization is well documented (see, for example, Galenson 1979). The evidence shows a "preponderance of small establishments in the rural areas" (Ranis and Stewart 1987:141), whose average size and capital intensity were much lower than their urban counterparts. Contrary to the pessimistic conclusions of the Hymer-Resnick (1969) agrarian model with Z-goods, the dynamism and modernization of rural nonagricultural activities paved the way for rural development and the structural transformation of the Taiwanese economy. Rural industries participated significantly in Taiwan's export-led growth, initially exporting in the early 1960s manufactured products with high unskilled-labor content. Over time, with accumulation of human and physical capital, the composition of their exports shifted toward more skill- and capital-intensive products.

A remarkable aspect of Taiwan's development record is the continuous improvement in income distribution from 1953 to 1980 (Kuo 1983). This is a departure from the inverted U-shaped relationship commonly postulated between economic growth and income inequality in developing countries, demonstrating the possibility that a worsening income distribution is not an inevitable accompaniment to the growth process, even in the early stage of development. It is a consequence of the (initially) agriculture-led, labor-intensive, and decentralized industrial development process that was greatly facilitated by the growth of rural nonagricultural activities.

The Philippine development experience bears no resemblance to the Taiwanese case just described, except for the rapid agricultural growth achieved during 1965-80. The average annual GDP growth rate of 5.9 percent for the period pales in comparison with those of Taiwan and the other Asian NIEs (ranging from 8.6 to 10.1 percent) and those of neighboring Thailand (7.2 percent), Malaysia (7.4 percent), and Indonesia (8.0 percent).<sup>9</sup> What is worse, Philippine economic growth slowed sharply in the 1980s. Indeed, GDP per capita declined in absolute terms as the economy struggled under a heavy debt-service burden that resulted from the excessive

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<sup>9</sup> See Table 4.1 in Bautista (1995:114).



foreign borrowing in the previous decade.

In addition to the failure to sustain growth, the development record of the Philippines is blemished by the uneven sharing of the income gains from growth. The overall distribution of income (including both rural and urban households) has remained highly skewed, reflecting in part the high rates of labor unemployment and underemployment through the late 1970s which worsened in the 1980s. These dimensions of Philippine growth performance during 1965-80 would seem to indicate a case of agriculture-led development that failed. The accelerated agricultural growth did not translate into rapid and sustainable growth of the national economy. The observed gains in national income accrued to only a limited segment of the population, which in turn contributed to the inability to develop rural-based, labor-intensive industries that could have helped absorb the rapid expansion of the rural labor force during the period.

It has been argued that rapid agricultural growth in the Philippines during 1965-80 did not provide a strong impetus to overall economic growth in part because the agricultural income gains were not widely shared (Bautista 1995). The benefits from the green revolution in rice, for example, effectively bypassed a large segment of the farm population that had little or no access to irrigation water, including small-scale and upland farms. Although there was widespread adoption of modern seed varieties, the new technology was notably much less effective in raising yields in farms where water levels could not be strictly regulated. Also contributing to the bias against small farmers was the greater access of large producers to credit and fertilizer subsidies and to infrastructure investments (electricity and roads).

Landless rural families that depend on wage labor as their main source of income also did not benefit much from the accelerated agricultural growth. Agricultural wage rates in real terms fell significantly from the mid-1960s to 1974, after which there might have been some improvement (Bautista 1992). The "legislated" wage rate (in real terms) for nonplantation workers increased significantly from 1974 to 1980; however, agricultural employers appeared not to have fully complied with the legislated supplementary payments (cost-of-living and other allowances).

The distribution of income gains from agricultural growth has also been shaped by the distribution of

landholdings. With an unequal distribution of land and agricultural capital, technological change that increases land rent and the return to capital but not the real wage can be expected to worsen the distribution of rural income. As late as 1980, only 3 percent of all farms in the Philippines were larger than 10 hectares, but they accounted for about one-quarter of the total agricultural land area.

On the supply side, the inability of rapid agricultural growth in the Philippines to be translated into rapid overall growth has been attributed to inappropriate domestic policies that weakened the nonagricultural production response to the demand stimulus generated by the increased rural incomes (Bautista 1995). Two aspects of the policy environment during the 1960s and 1970s warrant particular attention, namely, the foreign trade regime and public expenditure. Their distortionary effects on producer prices and access to infrastructure had an adverse impact on the supply response of rural nonagricultural producers--which was critical to the further linkage effects of agricultural growth to the rest of the economy.

Apart from favoring import-substituting consumer goods production as indicated above, the existing trade policy discriminated against small producers and location in outlying regions. The bias toward large-scale manufacturing was reflected in the differential incidence of effective protection, as calculated in Anderson and Khambata (1981) for 1974, in which about 80 percent of employment in small industries, compared to only 45 percent in large industries, are found in the "underprotected" sectors. The foreign trade regime also influenced the spatial development of Philippine manufacturing. The heavy reliance on imported material inputs and capital equipment fostered by import-substitution created a strong inducement to locate industrial plants near the source of supply--Manila, the principal port--which in turn stimulated the development of nearby areas through agglomeration economies and spill-over effects. Furthermore, Metro Manila was the principal market for the import-competing industries that benefitted from heavy protection. The more geographically dispersed rural industries were effectively penalized as manufacturing establishments were drawn away from the small local markets and low-cost labor in the outlying regions.

The development of (physical) infrastructure had been a relatively neglected aspect of public expenditure in the Philippines. This is indicated by the markedly higher levels of road density and household access to

electricity in Taiwan during the 1960s and 1970s (Ranis and Stewart 1987). Metro Manila and to a lesser extent other urban areas received the bulk of the allocation of infrastructure funds. The resulting underdevelopment of rural infrastructure represented a supply-side constraint in the linkage effects of agricultural growth, impeding rural industrial growth and reducing the magnitude of employment and income multipliers.

The economywide income and equity effects of crop productivity growth during the green-revolution period 1965-80 under a (counterfactual) liberalized trade regime are examined quantitatively in Bautista and Robinson (1995) using a Philippine CGE model with 16 production sectors and 5 household groups. Trade liberalization is found to generally enhance the sectoral income benefits from agricultural productivity growth, especially for the trade-oriented sectors. The effect on GDP is significantly positive (11.2 percent of base income). All household groups benefit from trade liberalization, small-farm households receiving the largest income gains. Other rural households are made better off to a greater extent than Metro Manila and other urban households, reinforcing the pro-equity impact of trade liberalization. These simulation results support the conclusion that a substantial liberalization of the trade regime during the green-revolution period would have contributed to a more rapid and egalitarian growth of the Philippine economy.

As indicated above, small farmers have received less attention and support from the government compared to the large farmers and agricultural enterprises. How would the Philippine economy have fared during 1960-85 under conditions more favorable to small-farm agriculture? A common argument used against promoting small-farm production is based on the possible trade-off between equity and growth. However, the strong intersectoral growth linkages of small farms described earlier, including the direct and indirect consumption-linkage effects arising from the increased income of small-farm households, can lead to an outcome that is favorable to both equity and growth. Indeed, the latter result is obtained in Balisacan and Bautista (1995) from a counterfactual experiment promoting small-farm production<sup>10</sup> using a SAM (social accounting matrix) model of the Philippine economy. Interestingly, the proportionate income gains for household groups that do not depend on agriculture

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<sup>10</sup> Government investments and subsidies are redirected to small farms, raising the latter's productivity and value added and also the share of labor income in sectoral value added.

as the main income source (other rural, other urban, and Metro Manila) are even larger than for small-farm households. This is consistent with the expectation of stronger linkages from agricultural growth if it is broadly based. It can be inferred from these results that past discrimination of government policies against small farmers has had a significant cost in terms of both economic growth and poverty reduction.

#### 4. CONCLUSION

A large part of Asia is still heavily agricultural, especially China, the Central Asian countries, and most countries in South Asia and Southeast Asia. Despite the seemingly rapid industrial growth that has taken place recently, the rural-based populations in many Asian countries continue to be characterized by a high incidence of poverty.

This paper has argued that, without accompanying agricultural growth and rural development, the "New Industrial Revolution" is not likely to promote sustainable economic growth and poverty alleviation in those countries. Rising incomes of rural households provide an important source of demand stimulus to industrial growth which, given the labor-intensive and locally-oriented pattern of rural consumption expenditures, can contribute to a stable and equitable growth of the national economy. The supply response of rural nonagricultural producers is determined in large part by relative price signals and their access to infrastructure, which in turn are influenced by government policies.

In the light of past development experiences of selected Asian countries and of the simulation results from general-equilibrium modelling of those economies as described above, broadly based rural income growth is critically important to the achievement of rapid and equitable overall growth in most low-income Asian developing countries that are still predominantly agricultural. Existing policy biases, particularly against small farmers and other rural producers, in terms of price incentives and access to infrastructure, are likely to frustrate efforts to advance the twin objectives of growth and equity. The new industrial revolution will succeed only if those policy distortions are substantially redressed by pursuing more even-handed and neutral economic policies.

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Table 1 -- Economic Statistics, 1970-93

	Per Capita	GDP Growth		Agricultural Growth		Industrial Growth		Export Growth		Agriculture
	GNP 1993 (US\$)	1970-80	1980-93	1970-80	1980-93	1970-80	1980-93	1970-80	1980-93	Share in GDP (Empl.), 1993 (Percent)
		(Average annual rate, percent)								
China	490	5.5	9.6	2.6	5.3	8.9	11.5	8.7	11.5	19 (56)
East Asia										
South Korea	7,660	10.1	9.1	2.7	2.0	16.4	12.1	22.7	12.3	7 (15)
Taiwan	10,850	9	7.7	4	2.0	22.0	10.0	15.8	19.0	4 (11)
Southeast Asia										
Indonesia	740	7.2	5.8	4.1	3.2	9.6	6.3	6.5	6.7	19 (51)
Malaysia	3,140	7.9	6.2	5.0	3.5	8.7	8.2	3.3	12.6	n.a. (21)
Philippines	850	6.0	1.4	4.0	1.2	8.2	-0.1	7.2	3.4	22 (46)
Thailand	2,110	7.1	8.2	4.4	3.8	9.7	11.0	8.9	15.5	10 (57)
South Asia										
Bangladesh	220	2.3	4.2	0.6	2.6	5.2	5.2	-2.4	9.8	30 (66) a/
India	300	3.4	5.2	1.8	3.0	4.5	6.2	5.9	7.0	31 (66) b/
Nepal	190	2.0	5.0	0.5	3.6	n.a.	n.a.	n.a.	n.a.	43 (n.a.)
Pakistan	430	4.9	6.0	2.3	4.4	6.1	7.2	3.1	10.1	25 (48)
Sri Lanka	600	4.1	4.0	2.8	2.1	3.4	5.0	-1.4	7.3	25 (38)
Sub-Saharan Africa	520	3.8	1.6	1.7	1.7	3.8	0.9	1.0	2.5	20 (n.a.)
Latin America and the Caribbean	2,950	5.4	1.9	3.4	2.1	5.7	1.4	0.9	3.4	n.a. (n.a.)
Middle East and North Africa	n.a.	n.a.	2.2	n.a.	4.4	n.a.	n.a.	-0.8	-1.0	n.a. (n.a.)
Industrial Countries	23,090	3.2	2.9	0.8	n.a.	2.7	n.a.	6.0	5.1	n.a. (n.a.)

Sources: ADB (1983, 1995), USDA (1993), and World Bank (1995).

Notes: Growth rates are in real terms. a/ For 1990. b/ For 1991.



Table 2 -- Cross-Country Regression Results: Measures of Economic Growth on Agricultural Growth and Export Growth in Developing Countries, 1970-93

Dependent Variable	Independent Variables		R <sup>2</sup> (Number of Obs.)
	Agricultural Growth	Export Growth	
<u>1970-80</u>			
Industrial Growth	1.318** (7.25)	0.314** (3.68)	0.645 (65)
GDP Growth	1.234** (9.93)	0.130* (2.25)	0.713 (66)
Per Capita GDP Growth	0.613** (6.47)	0.094* (2.17)	0.554 (63)
<u>1980-93</u>			
Industrial Growth	0.438** (3.65)	0.477** (7.79)	0.734 (70)
GDP Growth	0.718** (8.41)	0.269** (6.18)	0.815 (70)
Per Capita GDP Growth	0.006 (0.57)	0.255** (4.47)	0.366 (68)

Sources: Estimates derived from ordinary least squares regressions using data from a sample of 94 developing countries. Data sources are UNCTAD (1988) and World Bank (1982; 1995).

Notes: Growth rates are average annual rates of change. Values in parentheses beneath the coefficient estimates are t-statistics. Asterisks denote estimated coefficients that are significantly different from zero at the 5 percent level (\*) and 1 percent (\*\*) level. Values of the regression coefficient of determination (R<sup>2</sup>) are adjusted for degrees of freedom.