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Industrialisation, Trade Policy and Poverty Reduction:
Evidence from Asia*

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Abstract

Over recent decades, most of the developing economies of Asia achieved reductions in absolute poverty incidence, but these reductions varied greatly in size. Differences in the rate of aggregate economic growth explain part, but not all of these differences. One factor that could be important is the sectoral composition of the growth. This paper examines the relationship between poverty reduction outcomes and the rate of growth in the agricultural, industrial and services sectors. It assembles available data on the headcount measure of poverty incidence in East Asia (Taiwan), Southeast Asia (Thailand, Indonesia, Malaysia and the Philippines) and South Asia (India), from the 1960s to the 1990s. It then uses these data to analyze the economic determinants of changes in poverty incidence. It is concluded that growth of agriculture and services consistently contribute to poverty reduction but that the contribution of industrial growth crucially depends on the trade policy environment in which the growth occurs.

JEL Classification: O15, D31

Key words: Poverty incidence; economic growth; industrial policy.

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1. Introduction

Among economists, the presumption that economic growth reduces poverty is relatively uncontroversial.[1] This expectation is based on the statistical definition of absolute poverty incidence and two empirical observations. Absolute poverty incidence is defined as the proportion of the population whose incomes or expenditures fall below a given threshold, the 'poverty line', a level of income or expenditure whose nominal value is adjusted over time to hold its real purchasing power constant.[2] The level of real income represented by this threshold is essentially arbitrary, but once it is determined, poverty incidence depends simply on the size of the economic pie and its distribution. The two empirical observations are: (i) whereas the size of the pie (real national income) can change considerably over time, the degree of inequality generally changes only slowly; and (ii) changes in inequality are not systematically related to the rate of growth (Fields 2001). Changes in poverty incidence must therefore normally be closely related to changes in the size of the pie -- via economic growth or its reversal. Exceptions should be rare, but they are possible.

The available empirical evidence strongly supports this expectation: on average, the faster the growth, the greater the reduction in absolute poverty. Nevertheless, while differences in aggregate rates of growth explain much of the observed differences in rates of poverty reduction, they do not explain all of it. Obviously, distributive policies, technological change and changes in the international environment may all affect poverty incidence, but the nature of the growth itself may also be important.

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[1] Among non-economists, there is much less agreement on this. In the author's view, the lack of consensus usually derives from a failure to distinguish between the concepts of absolute poverty and relative inequality.

[2] Some countries base poverty incidence estimates on household incomes (including Taiwan, Thailand, Malaysia and the Philippines), while others use household expenditures for this purpose (including India and Indonesia).

The literature on economic development has emphasized the sectoral composition of growth as a possible determinant of its distributional implications, although this emphasis has been based primarily on *a priori* theorising, rather than empirical analysis. The most obvious argument is that in most poor countries a majority of the poor live in rural areas and are employed in agriculture. From this it has seemed probable that growth of agriculture is more important for poverty reduction than growth of industry or services. Many authors in the development economics field have taken this view, but the conclusion does not necessarily follow.

People are potentially mobile. Given sufficient time, even poor people can presumably move to whichever sector is generating the growth and thereby generating incomes. Rural poverty may therefore be reduced by urban-based growth, drawing the poor away from rural areas at a rate which depends on the degree of labour mobility. When intersectoral factor mobility is taken into account, it is not obvious that the sectoral composition of growth is important for poverty reduction.

Of course, labour may not be fully mobile, even in the long run. Moreover, even if labour was fully and instantaneously mobile, poverty incidence could still be affected by the sectoral composition of growth. To a first order of approximation, the level of absolute poverty incidence depends on the incomes of the poor, which presumably depends on the demand for the factors of production that they own - especially unskilled labour and agricultural land. Growth in different sectors has differential effects on the demands for these factors, depending on these sectors' factor intensities, and may therefore have different effects on poverty. Finally, it is important that the distinction rural / urban is not synonymous with the distinction agriculture / non-agriculture. Much agricultural production may occur in full or part-time farming on the fringes of urban areas and much industrial and services activity may actually occur in rural areas.

This paper explores these issues for three regions of Asia: *South Asia*, represented by India; *East Asia*, represented by Taiwan; and *Southeast Asia*, represented by Thailand, Indonesia, Malaysia and the Philippines. These six economies were chosen for their wide geographical coverage and for the availability of data on aggregate poverty incidence covering a significant number of years in each case.[3] The analysis explores the role of the sectoral composition of economic growth in explaining differences in poverty reduction outcomes in these six economies and the way these effects may depend on the policy environment within which the growth occurs.

The limited availability of data which may support statistical analysis has been an impediment to the systematic study of poverty incidence. Some recent studies have attempted to explore the relationships involved by analyzing cross sectional data sets across countries, or across regions or households for individual countries, while others have attempted to assemble long-term time series data sets on poverty incidence for individual countries. The time series approach is generally preferable, in that it makes possible a direct study of the determinants of changes in poverty at an aggregate level.

Unfortunately, in most developing countries, the consumer income and expenditure surveys on which studies of poverty incidence must be based are conducted only intermittently. Data are thus generally available at most only with intervals of several years between observations. India and Taiwan are two notable exceptions. For India 29 observations can be assembled for the years 1957 to 1997 and for Taiwan 24 observations are available for the years 1964 to 1995. For the countries of Southeast Asia data have been assembled for Thailand and the Philippines since the 1960s and for Indonesia and Malaysia since the 1970s, but the intervals between observations vary from two years to 5 or even more. When all available time series observations on

[3] 'Economies' is used here rather than 'countries' to avoid dispute over whether Taiwan is a 'country'.

poverty incidence at a national level are assembled for Thailand, the total number is only 10. For Indonesia it is 9, for the Philippines 7 and for Malaysia 5.

This paper uses the time series approach and does so via three case studies: South Asia (India), East Asia (Taiwan) and Southeast Asia (Thailand, Indonesia, Malaysia and the Philippines). Pooling the data for the Southeast Asian countries is necessary because the number of observations listed above is insufficient to sustain formal statistical analysis for any one of them. But when all four countries are pooled, the total number of observations is 31. The present study thus pools the data for these four Southeast Asian countries, while still recognizing the possible differences between them.

The justification for pooling data for these four countries is as follows. First, these counties have roughly similar economic structures. All four are market-oriented economies with agricultural sectors which consist primarily of small farming units and which dominate total employment, but not national output. In all four, industrial production has combined export-oriented production with protected production for domestic markets. All four have large services sectors which provide residual employment opportunities for those not employed in agriculture or industry. In all four, the rural populations dominate the total numbers of poor people, but rural to urban migration has been a prominent feature of the long-term development process. These facts suggest that the underlying relationship between sectoral growth and poverty reduction might be similar among these four countries, whereas this may not apply within groups of countries whose structural features differ widely.

Second, despite their structural similarities these countries have somewhat different economic histories. Except for The Philippines, all four experienced growth rates above their long-term historical norms during the boom decade from the mid-1980s to the mid-1990s, during which aggregate poverty incidence declined, followed by deep

recessions from 1997 onwards, during which poverty incidence increased. But aside from this similarity their detailed experiences have been quite different. Thailand has grown most rapidly in all three sectors than the other three countries and the Philippines the least rapidly. The rates at which agriculture has contracted as a share of GDP during the process of long-term economic growth have differed, along with rates of industrialization. The above facts suggest that these counties provide four different sets of empirical experience around a similar underlying structure, the circumstances in which pooling data is most likely to be appropriate.

Section 2 reviews the data to be studied and Section 3 summarizes the analytical approach to be used. Section 4 discusses the results and Section 6 concludes.

2. Poverty and Growth in India, Taiwan and Southeast Asia

We begin with the time series data for each economy. Figures 1 to 6 summarize the available data on poverty incidence in the six Asian economies listed above. The data are presented as aggregate poverty incidence and its rural and urban components. The data are summarized in Table 1, which shows the mean values of annual rates of change of aggregate, rural and urban poverty incidence. The relationships between these aggregates may be understood as follows.

We shall write N, N^R and N^U for the total, rural and urban populations, respectively, where $N = N^R + N^U$. We write $\alpha^R = N^R / N$ and $\alpha^U = N^U / N$ for the rural and urban shares of the total population, respectively, where $\alpha^R + \alpha^U = 1$. The total number of people in poverty is given by $N_P = N_P^R + N_P^U$, where N_P^R and N_P^U denote the number in poverty in rural and urban areas, respectively. Aggregate poverty incidence is given by

$$P = N_P / N = (N_P^R + N_P^U) / N = \alpha^R P^R + \alpha^U P^U, \quad (1)$$

where $P^R = N_P^R / N^R$ denotes the proportion of the rural population that is in poverty and $P^U = N_P^U / N^U$ the corresponding incidence of poverty in urban areas.

Now, differentiating (1) totally, we obtain a key relationship,

$$dP = \alpha^R dP^R + \alpha^U dP^U + (P^R - P^U) d\alpha^R. \quad (2)$$

From (2), the change in poverty incidence may be decomposed into three parts: (i) the change in rural poverty incidence, weighted by the rural population share, (ii) the change in urban poverty incidence weighted by the urban population share, and (iii) the movement of populations from rural to urban areas weighted by the difference in poverty incidence between these two areas.

The last of these terms is described by Anand and Kanbur (1985) and by Ravallion and Datt (1996) as the 'Kuznets effect'. As the population moves from rural to urban areas, a change in aggregate poverty incidence will occur even at constant levels of rural and urban poverty incidence, provided that the levels of poverty incidence in these two sectors is different. In growing economies, we expect to find that the rural population share is falling ($d\alpha^R < 0$) and that the incidence of poverty in rural areas typically exceeds that in urban areas ($(P^R - P^U) > 0$). Thus, the expected sign of $(P^R - P^U) d\alpha^R$ is negative. How important the Kuznets effect is as a determinant of overall poverty reduction is, of course, an empirical matter.

Table 1 shows that significant poverty reduction was achieved in all six economies but the rate of reduction in Taiwan and in each of the four countries of Southeast Asia was larger than that in India. In India the incidence of absolute poverty declined from 60 per cent of the total population in 1957 to 41 percent in 1992, an average annual rate of

reduction of 0.67 per cent. This means that over this 35 year period the proportion of the population deemed to be poor declined by an average of two thirds of one per cent per year. The comparable rate of reduction for Taiwan was 1.57 per cent per year and for the countries of Southeast Asia the average rate was 1.45 per cent (Thailand 1.86, Indonesia 1.41, Malaysia 1.59 and the Philippines 0.94 per cent).

First, we discuss the decomposition of the data on poverty incidence themselves. Table 1 shows the results of this decomposition. All results shown in this table are evaluated at the mean values of the data set. For example, the mean annual change in the aggregate level of poverty incidence for Thailand was -1.86 percentage points per year (i.e. an annual reduction, on average, from numbers like 20 per cent to numbers like 18.14 per cent). Equation (2), above, is an identity and must apply at all points in the data set. It must therefore apply at the means of the data. The equation shows that this mean aggregate change in poverty incidence can be decomposed into three components: average poverty reduction in urban areas, average poverty reduction in rural areas, and the movement of population between these two areas.

The second half of the table normalizes the decomposition by dividing all values by this mean change in aggregate poverty (-1.86 for Thailand, for example) and multiplying by 100. For Thailand reductions in rural poverty accounted for 56 per cent of the overall reduction in poverty, reduced urban poverty for 10 per cent and migration for 34 per cent. Migration effects was even more important for Indonesia, but for all six economies reductions in rural poverty account for more than 40 per cent of the total reduction in poverty incidence that occurred.

The above calculations are, of course, merely descriptions of the data. We wish to know what caused these observed changes in poverty incidence to occur and, in particular, what caused the differences across countries. Poverty incidence and its

changes over time obviously depends on many factors, of which economic variables are only part of the story and among the economic variables many issues aside from simply the overall rate of growth will be relevant. Changes in commodity prices will play a role, along with tax policies. The sectoral composition of growth and the degree to which it is directed towards export markets or domestic markets may also be important. Nevertheless, the data suggest superficially that the overall rate of growth may be an important part of the story. The data on real GDP growth per person are summarized in Table 2, covering the same time periods as the poverty data reviewed above.

The growth of real GDP per person followed a pattern roughly similar to these data on poverty incidence. The growth rates of real GDP per person, covering the same periods as the poverty data above, were: India 1.91, Taiwan 6.88, and Southeast Asia 3.46 per cent (Thailand 4.19, Indonesia 4.25, Malaysia 4.32, and the Philippines 1.09 per cent). India's rate of GDP growth was the second lowest of these six economies (after the Philippines), and its rate of poverty reduction the lowest. Taiwan's rate of economic growth was the highest and its rate of poverty reduction the third highest, after Thailand and Malaysia, and higher than the average for Southeast Asia. Among the Southeast Asian countries, *reductions in poverty have been achieved in each of the four* countries but the rate of reduction was lowest in the Philippines, where the average rate of growth was also lowest.

At the level of individual economies, a relationship between the rate of poverty reduction over time and the rate of growth over time also seems possible. For example, in Thailand poverty incidence fell throughout the period indicated except for the recession period of the early 1980s, when measured poverty incidence increased and again in the Asian crisis period of the late 1990s when it increased again. Of course,

crude correlations between average GDP growth rates and average rates of poverty reduction, extending over long periods of time, do not necessarily indicate that the differences in GDP growth rates *caused* the differences in rates of poverty reduction.

2. Analytical Framework

We now turn to the manner in which poverty incidence is affected by economic growth. A central conceptual issue must be discussed first. Drawing a causal connection between economic growth and poverty reduction may seem strained because economic growth is not in itself a policy instrument, nor is it exogenous to the economic system. Economic growth is an outcome, determined by policy, external forces and the way market participants respond to them. Poverty reduction is similarly an outcome of the economic system. Drawing a causal connection between the two may thus appear to be an example of attempting to find stable relationships among endogenous variables of a causal system. In general, such relationships do not exist. The conceptual basis for relating poverty to economic growth is summarized in Figure 7.

The assumption being made is that one of the ways in which economic policies and other variables influence poverty is via their effects on output. That is, output is a conduit through which these variables act on poverty. They may affect it additionally through other channels as well, as indicated by the box 'redistributional effects' in the figure, but these effects are assumed to be minor. We do not expect that all changes in poverty can be attributed to changes in output, but it is being assumed that one significant channel through which policy influences poverty is through its effect on output. This is the channel between policy and poverty that is studied by looking at the statistical relationship between poverty and growth.

In this framework, the possibility that changes in poverty incidence could have causal feedback effects on the rate of growth is explicitly excluded. Likewise, we exclude the possibility that the *source* of growth significantly influences its ultimate impact on poverty incidence. In this system, GDP and its sectoral components are (causally) an intermediate outcome of policy, as well as other factors, and poverty is a subsequent outcome. By studying the causal link between output (growth) and poverty, we are thus studying one component of the link between policy and external shocks, on the one hand, and poverty incidence, on the other.

Poverty and aggregate growth

For simplicity of exposition it is convenient to hypothesize initially that the total number of households in poverty, N_p, depends on the *aggregate* level of real income, Y, and the size of the population, N. The sectoral composition of the growth will be introduced later.

We now turn to the manner in which poverty incidence is affected by economic growth and, for simplicity, we hypothesize initially that the total number of households in poverty, N_p, depends on the aggregate level of real income, Y, and the size of the population, N. Thus

$$N_p = \varphi(Y, N). \tag{3}$$

Poverty incidence is thus

$$P = N_p / N = \varphi(Y, N) / N. \tag{4}$$

Totally differentiating this equation,

$$dP = (\varphi_Y Y / N)y + (\varphi_N - \varphi / N)n, \tag{5}$$

where lower case Roman letters represent the proportional changes of variables

represented in levels by upper case Roman letters. Thus $y = dY / Y$ and $n = dN / N$ are the growth rates of aggregate real income and of population, respectively. In the special case where the function $\varphi(.)$ is homogeneous of degree one in Y and N, (3) may be written $N_P = \varphi_Y Y + \varphi_N N$ and (5) reduces to

$$dP = (\varphi_Y Y / N)(y - n). \tag{6}$$

In this case the change in poverty incidence depends on the growth of per capita income. If this assumption is not imposed, then we can estimate relationships of the kind

$$dP = a^1 + b^1 y + c^1 n, \tag{7}$$

and test whether the coefficient b^1 is significantly greater than zero. We could also test whether $b^1 = -c^1$, that is, whether the growth of per capita income is the determinant of the change in poverty incidence, as in (6), or whether population growth affects the reduction in poverty incidence in some other way.

We wish to study the way economic growth affects each of the components of the change in aggregate poverty incidence, as given by (2). Ravallion and Datt apply an ingenious method for estimating decomposed equations systems of this kind. We have a four equation system, consisting of (7) and:

$$\alpha^R dP^R = a^2 + b^2 y + c^2 n \tag{8}$$

$$\alpha^U dP^U = a^3 + b^3 y + c^3 n \tag{9}$$

$$(P^R - P^U) d\alpha^R = a^4 + b^4 y + c^4 n. \tag{10}$$

But from the identity given by (2), these equations are linearly dependent. Equation (7) is identically the sum of equations (8), (9) and (10). Of these four equations, only three need to be estimated. The parameters of the fourth can be computed from (2), using the identities $a^4 = a^1 - a^2 - a^3$, $b^4 = b^1 - b^2 - b^3$ and $c^4 = c^1 - c^2 - c^3$.

Poverty and Sectoral growth

Whether the sectoral composition of economic growth affects poverty reduction can now be investigated as follows. The level of real GDP is given by $Y = Y_a + Y_i + Y_s$, where Y_a, Y_i, and Y_s denote value-added (contribution to GDP) at constant prices in agriculture, industry and services, respectively. The overall rate of growth can be decomposed into its sectoral components from

$$y = H_a y_a + H_i y_i + H_s y_s, \tag{11}$$

where $H_k = Y_k / Y$, $k = (a,i,s)$, denotes the share of sector k in GDP. The effect of sectoral growth can now be studied by substituting (11) into equations (7), (8) and (9). By estimating the equation

$$dP = a^1 + b_a^1 H_a y_a + b_i^1 H_i y_i + b_s^1 H_s y_s + c^1 n \tag{12}$$

and testing whether $b_a^1 = b_i^1 = b_s^1$, we may test directly whether the sectoral composition of growth affects the rate of poverty reduction.

An alternative way of viewing this relationship is to decompose equation (12) into a component depending on the aggregate rate of growth and a component depending on changes in its composition. Noting that $Y_a = (Y_a / Y)Y = H_a Y$,

$$y_a = y + h_a, \tag{13}$$

where $h_a = dH_a / H_a$ denotes the proportional change in agriculture's sectoral share of GDP. It follows that

$$b_a^1 H_a y_a + b_i^1 H_i y_i + b_s^1 H_s y_s = (b_a^1 H_a + b_i^1 H_i + b_s^1 H_s) y + b_a^1 H_a h_a + b_i^1 H_i h_i + b_s^1 H_s h_s. \tag{14}$$

The impact of sectoral growth can be broken into two parts: one involving the aggregate rate of growth (with the coefficient in parentheses), and a second involving changes in its composition (the final three terms). Clearly, this expression reduces to a

term in y alone if and only if the final three terms sum to zero. Now, by differentiating the identity $H_a + H_i + H_s = 1$, we see that

$$H_a h_a + H_i h_i + H_s h_s = 0. \tag{15}$$

Therefore, a sufficient condition for the final three terms of (14) to vanish is that $b_1 = b_2 = b_3$, as discussed in relation to equation (12), above. Clearly, to apply this decomposition, no additional econometrics is necessary beyond the estimation of equations like (12). Estimation of the parameters of (12) is sufficient to support the decomposition represented by (14).

Applying the method of equations (7), (8) and (9) above, we estimate the system

$$dP = a^1 + b_a^1 H_a y_a + b_i^1 H_i y_i + b_s^1 H_s y_s + c^1 n \tag{16}$$

$$\alpha^R dP^R = a^2 + b_a^2 H_a y_a + b_i^2 H_i y_i + b_s^2 H_s y_s + c^2 n \tag{17}$$

$$\alpha^U dP^U = a^3 + b_a^3 H_a y_a + b_i^3 H_i y_i + b_s^3 H_s y_s + c^3 n \tag{18}$$

The parameters of the fourth equation of the system

$$(P^R - P^U) d\alpha^R = a^4 + b_a^4 H_a y_a + b_i^4 H_i y_i + b_s^4 H_s y_s + c^4 n \tag{19}$$

are then computed using identities derived from (2), as before: $a^4 = a^1 - a^2 - a^3$, $b_a^4 = b_a^1 - b_a^2 - b_a^3$, and so forth.

4. Results[4]

The regression results are summarized in Tables 3 to 6. For expositional reasons it will be convenient to present the results for Taiwan first, followed by Southeast Asia and then India. The statistical analysis for Taiwan, Southeast Asia and India use the same format, but are conducted independently. For Southeast Asia, the method of

[4] The results reported draw in part on work contained in Warr and Wang (1999), Warr (2002) and (2003).

pooling requires explanation. Considering the differences between these countries in the measurement of poverty, the real value of the poverty lines, the position and shape of the cumulative income distribution and the detailed structure of the four economies, it could hardly be expected that the same numerical relationship between poverty incidence and economic growth could obtain in all four.

The method used here employs dummy intercept variables to capture these differences. Dummy variables are used for three of the four countries. Their coefficients amend the intercept coefficients estimated for the fourth country. The results are the same whichever country is selected as the "fourth". It is, of course, being assumed in this pooling process that the slope coefficients are the same for all four Southeast Asian countries, but this assumption applies only among the four Southeast Asian countries; no such assumption is being made with regard to Taiwan and India.

If sectoral economic growth and population growth affected poverty reduction jointly through their effects on *per capita* sectoral growth, equation (16) could be re-written

$$dP = a^1 + b_a^1 H_a (y_a - n) + b_i^1 H_i (y_i - n) + b_s^1 H_s (y_s - n), \qquad (20)$$

and similarly for equations (17) to (19). That is, (16) to (19) would each satisfy the restriction that $b_a^j H_a + b_i^j H_i + b_s^j H_s = c^j$, $j = (1,..,4)$. When this restriction was imposed on the estimates of equations (16) to (18) it was rejected at the 95 per cent level of significance in the case of Taiwan and India and at the 10 per cent level of significance for Southeast Asia. We shall therefore not impose this assumption. It is convenient to focus the discussion on the equation for aggregate poverty incidence, equation (16).

For Taiwan (Table 3), the estimated coefficients for all three sectors, agriculture, industry and services were negative (growth of each of these sectors was associated with

poverty reduction) but only the coefficient for industry was significantly different from zero. The null hypothesis that the coefficients for each sector were the same was rejected by an F-test at the 90% confidence level.

For Southeast Asia (Table 4), the estimated coefficients for agriculture and services were negative and significantly different from zero at the 95 per cent confidence level. Growth of agriculture and services was thus strongly associated with reductions in poverty. The coefficient for industry was in positive, but small and not significantly different from zero. The null hypothesis that the three coefficients were the same was again rejected by an F-test at the 95 per cent level.

For India, the results will first be presented for the years 1957 to 1991, corresponding to the period covered in an important paper by Ravallion and Datt (1996). Again, the null hypothesis that the three coefficients were the same was again rejected by an F-test at the 95 per cent level. The results are similar to those derived earlier for India by Ravallion and Datt, despite differences in methodology.[5] Growth in agriculture and services each produce reductions in poverty and the coefficients are significantly different from zero at the 95 per cent confidence level. Growth of industry was associated with *increases* in poverty and this coefficient was also significantly different from zero at the 95 per cent confidence level. Ravallion and Datt also obtained a positive estimate for this coefficient (it was significant at the 90 per cent confidence level), but these authors do not offer an economic explanation for the result.

According to these results, growth of agriculture and services are consistently associated with poverty reduction. The differences arise with industrial growth. In

[5] In the Ravallion and Datt methodology the dependent variable is the proportional change in poverty incidence, rather than the absolute change, as in the present study. When poverty incidence is low, small absolute changes in poverty incidence produce large proportional changes, distorting the results. In addition, Ravallion and Datt seemingly suppress the intercept term in their regression, forcing the regression to pass through the origin. This imposes the unwarranted assumption that zero growth implies zero change in poverty.

Taiwan, growth of industry was strongly associated with poverty reduction. In India (1957 to 1991) it was associated with *rising* poverty. The results for Southeast Asia are exactly intermediate. Industry growth was neutral with respect to poverty incidence. An obvious explanation is available. The trade policy regimes under which the industrial growth occurred were radically different in these three case studies.

In Taiwan, growth of industry was not based on import-substitution policies. Industry received little protection and agriculture was the more highly protected sector. The result was a pattern of industrialization that was relatively labour-intensive, contained a substantial small enterprise component and was closely linked to rural areas. In India heavy protection of industry led to a capital intensive, large scale and urban based pattern of industrialization. Southeast Asian industrial policies were exactly intermediate between these two extremes. They were not as protectionist as India's, not as liberal as Taiwan's.

The Stolper-Samuelson theorem (Lloyd 2000) leads us to expect that a capital-intensive industrial strategy will reduce real wages by reducing the demand for labour and increase the return to capital. It is well understood that a strongly protectionist trade policy will reduce the rate of growth. The above results suggest that, in addition, it will promote a pattern of industrial growth that does not serve the objective of reducing poverty.

The Indian experience offers a possible test of this hypothesis. Since 1991 India has embarked on a program of trade liberalization that has seemingly changed its pattern of industrial growth (Srinivasan 2000; Jha 2003). If the trade-policy explanation of the results obtained in Tables 3 to 5 is correct, India's industrial growth since 1991 should have been more pro-poor. Table 6 shows the results obtained when the Indian data are updated to the latest year currently available, 1997. The estimated coefficients for

agriculture and services barely change. But the estimated coefficient for industry declines sharply and while still positive, is no longer statistically different from zero.

If the coefficient of 2.11 for the full time period (1957 to 1997), based on 29 data points, is a weighted average of the coefficient of 0.75 pre-reform period (1957 to 1991), based on 24 data points, and an unknown coefficient for the post-reform period (1992 to 1997), with 5 data points, with the number of data points as weights, then the unknown post-reform coefficient must be negative (growth producing poverty reduction) and large. These results are strongly suggestive that since its reform India's pattern of industrial development has become significantly more pro-poor.

5. Conclusions

The three Asian case studies presented in this paper suggest the following provisional conclusions. Output growth in the agriculture and services sectors consistently reduces poverty. But the contribution of industrial growth depends on the trade policy environment in which the growth occurs. Taiwan's outward oriented trade policy apparently induced a pattern of industrialization which was conducive to a massive reduction of poverty incidence, occurring in both rural and urban areas. In Southeast Asia, moderately protectionist industrial policies produced a pattern of industrial growth which made little contribution to poverty reduction. In India's pre-reform period high protection of industry produced a pattern of industrial growth which actually increased poverty. This effect was reversed in the more liberal post-reform period. The effect that industrial growth has on poverty reduction depends on the trade regime because in a poor country protection of capital-intensive industries can not only reduce the rate of growth, but by reducing the demand for unskilled labour it can greatly diminish the poverty-reducing capacity of the growth.

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Table 1. Data Decomposition: Annual Rate of Change of Poverty Incidence[a]

	India	Taiwan	Thailand	Indonesia	Malaysia	Philippines
			Actual			
Years covered	1957 to 1992	1964 to 1995	1969 to 1999	1976 to 1999	1976 to 1995	1965 to 1997
Aggregate[b]	-0.665	-1.573	-1.862	-1.414	-1.589	-0.941
Rural[c]	-0.320	-1.12	-1.043	-0.582	-1.094	-0.484
Urban[d]	-0.369	-0.454	-0.187	-0.262	-0.298	-0.369
Migration[e]	-0.033	-0.001	-0.632	-0.57	-0.197	-0.088
			Normalized (aggregate=100)			
Aggregate[b]	100.0	100	100	100	100	100
Rural[c]	48.1	71.2	56.0	41.2	68.8	51.4
Urban[d]	46.9	28.9	10.0	18.5	18.8	39.2
Migration[e]	5.0	-0.1	33.9	40.3	12.4	9.4

Notes:

[a] The decomposition relates to the terms of equation (2). Aggregate = rural + urban + migration.

[b] Mean annual value of dP, the year-on-year change in aggregate poverty incidence.

[c] Mean annual value of $\alpha^R dP^R$, the year-on-year population share-weighted change in rural poverty incidence.

[d] Mean annual value of $\alpha^U dP^U$, the year-on-year population share-weighted change in urban poverty incidence.

[e] Mean annual value of $(P^R - P^U)d\alpha^R$, the year-on-year migration-induced change in poverty incidence

Table 2. Annual Rates of Growth of Real GDP Per Person and its Components

	India	Taiwan	Thailand	Indonesia	Malaysia	Philippines
Years covered	1957 to 1992	1964 to 1995	1969 to 1999	1976 to 1999	1976 to 1995	1965 to 1997
Total	1.91	6.88	4.19	4.25	4.32	1.09
Agriculture	0.39	0.10	2.01	1.84	1.29	0.29
Industry	4.41	7.61	8.04	6.56	6.37	1.94
Services	4.26	7.5	5.33	5.17	4.96	1.64

Table 3. Results: Taiwan

	Change in total poverty		Change in rural poverty		Change in urban poverty	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	0.1256	1.31	-0.1421	-0.18	0.0498	0.22
Agriculture growth	-0.6115	-0.35	-0.4501	-0.41	-0.8349	-2.68
Industry growth	-0.4683	-3.25	-0.2835	-3.18	-0.0674	-2.65
Services growth	-0.1498	-0.52	-0.1270	-0.71	-0.0219	-0.43
Population growth	-2.0687	-3.64	-1.3602	-4.00	-0.3834	-3.13
R-squared	0.547		0.549		0.739	
Adjusted R-squared	0.456		0.459		0.686	
F-statistic						
DW	1.68		1.65		1.26	

Table 4. Results: Southeast Asia – Thailand, Indonesia, Malaysia and the Philippines

	Change in total poverty		Change in rural poverty		Change in urban poverty	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	1.589	4.226	2.006	5.860	0.150	0.996
Agriculture growth	-0.5430	-2.283	-0.729	-3.369	-0.174	-1.826*
Industry growth	0.0578	0.476	0.0064	0.057	-0.053	-1.078
Services growth	-1.186	-8.621	-1.0941	-8.376	-0.120	-2.167
Population growth	-0.071	-0.631	-0.036	-0.353	-0.0367	-0.815
Intercept dummy Thailand	1.050	3.627	0.885	2.408	0.232	1.997
Intercept dummy Indonesia	0.412	1.355	0.666	2.408	0.239	1.968
Intercept dummy Malaysia	0.6291	1.956	0.712	2.431	0.3376	2.618
R-squared		0.672		0.708		0.2554
Adjusted R-squared		0.652		0.691		0.2112
F-statistic		34.5		40.9		5.8

Table 5. Regression Results: India I - 1957 to 1992

	Change in total poverty		Change in rural poverty		Change in urban poverty	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	0.309	0.478	0.180	0.296	0.219	1.506
Agriculture growth	*-0.501*	*-2.507*	*-0.420*	-2.234	-0.096	-2.100
Industry growth	2.114	2.524	1.930	2.430	0.120	0.642
Services growth	-1.299	-2.130	-1.323	-2.321	-0.066	-0.475
Population growth	-1.061	-2.082	-0.842	-1.790	-0.251	-2.195
R-squared	0.766		0.717		0.556	
Adjusted R-squared	0.688		0.642		0.439	
F-statistic	9.83		9.62		4.75	
DW	2.248		2.141		2.244	

Table 6. Regression Results: India II - 1957 to 1997

	Change in total poverty		Change in rural poverty		Change in urban poverty	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-4.56	-0.49	-4.09	-0.49	0.44	-0.22
Agriculture growth	*-0.49*	*-2.2*	*-0.41*	*-1.98*	*-0.085*	*-1.76*
Industry growth	0.75	0.82	0.763	0.92	-0.041	-0.21
Services growth	-1.34	-2.21	-1.22	-2.2	-0.12	-0.89
Population growth	2.19	0.49	1.94	0.48	0.26	0.27
R-squared	0.59		0.56		0.38	
Adjusted R-squared	0.49		0.46		0.25	
F-statistic	6.5		5.8		2.85	
DW	2.21		2.3		1.9	

Figure 1. Poverty Incidence: India, 1957 to 1997

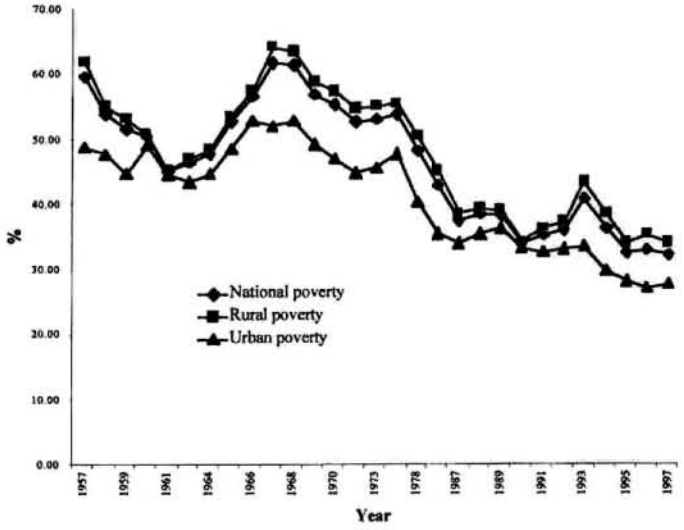


Figure 2. Poverty Incidence: Taiwan, 1964 to 1995

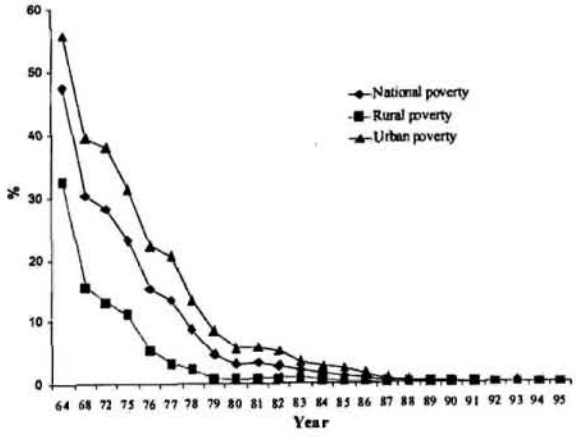
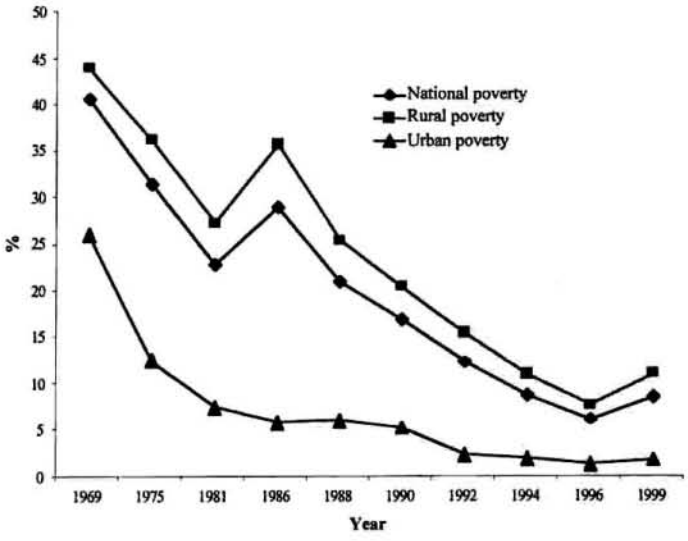


Figure 3. Poverty Incidence: Thailand, 1969 to 1999



poverty reduction) but only the coefficient for industry was significantly different from zero. The null hypothesis that the coefficients for each sector were the same was rejected by an F-test at the 90% confidence level.

For Southeast Asia (Table 4), the estimated coefficients for agriculture and services were negative and significantly different from zero at the 95 per cent confidence level. Growth of agriculture and services was thus strongly associated with reductions in poverty. The coefficient for industry was in positive, but small and not significantly different from zero. The null hypothesis that the three coefficients were the same was again rejected by an F-test at the 95 per cent level.

For India, the results will first be presented for the years 1957 to 1991, corresponding to the period covered in an important paper by Ravallion and Datt (1996). Again, the null hypothesis that the three coefficients were the same was again rejected by an F-test at the 95 per cent level. The results are similar to those derived earlier for India by Ravallion and Datt, despite differences in methodology.[5] Growth in agriculture and services each produce reductions in poverty and the coefficients are significantly different from zero at the 95 per cent confidence level. Growth of industry was associated with *increases* in poverty and this coefficient was also significantly different from zero at the 95 per cent confidence level. Ravallion and Datt also obtained a positive estimate for this coefficient (it was significant at the 90 per cent confidence level), but these authors do not offer an economic explanation for the result.

According to these results, growth of agriculture and services are consistently associated with poverty reduction. The differences arise with industrial growth. In

[5] In the Ravallion and Datt methodology the dependent variable is the proportional change in poverty incidence, rather than the absolute change, as in the present study. When poverty incidence is low, small absolute changes in poverty incidence produce large proportional changes, distorting the results. In addition, Ravallion and Datt seemingly suppress the intercept term in their regression, forcing the regression to pass through the origin. This imposes the unwarranted assumption that zero growth implies zero change in poverty.

Taiwan, growth of industry was strongly associated with poverty reduction. In India (1957 to 1991) it was associated with *rising* poverty. The results for Southeast Asia are exactly intermediate. Industry growth was neutral with respect to poverty incidence. An obvious explanation is available. The trade policy regimes under which the industrial growth occurred were radically different in these three case studies.

In Taiwan, growth of industry was not based on import-substitution policies. Industry received little protection and agriculture was the more highly protected sector. The result was a pattern of industrialization that was relatively labour-intensive, contained a substantial small enterprise component and was closely linked to rural areas. In India heavy protection of industry led to a capital intensive, large scale and urban based pattern of industrialization. Southeast Asian industrial policies were exactly intermediate between these two extremes. They were not as protectionist as India's, not as liberal as Taiwan's.

The Stolper-Samuelson theorem (Lloyd 2000) leads us to expect that a capital-intensive industrial strategy will reduce real wages by reducing the demand for labour and increase the return to capital. It is well understood that a strongly protectionist trade policy will reduce the rate of growth. The above results suggest that, in addition, it will promote a pattern of industrial growth that does not serve the objective of reducing poverty.

The Indian experience offers a possible test of this hypothesis. Since 1991 India has embarked on a program of trade liberalization that has seemingly changed its pattern of industrial growth (Srinivasan 2000; Jha 2003). If the trade-policy explanation of the results obtained in Tables 3 to 5 is correct, India's industrial growth since 1991 should have been more pro-poor. Table 6 shows the results obtained when the Indian data are updated to the latest year currently available, 1997. The estimated coefficients for

Figure 6. Poverty Incidence: The Philippines, 1976 to 1999

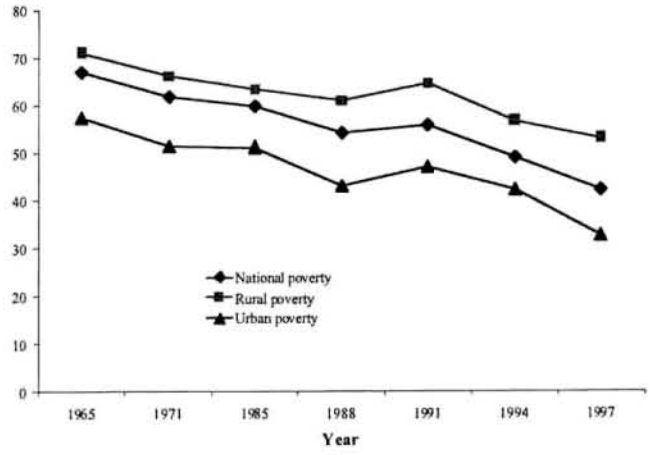
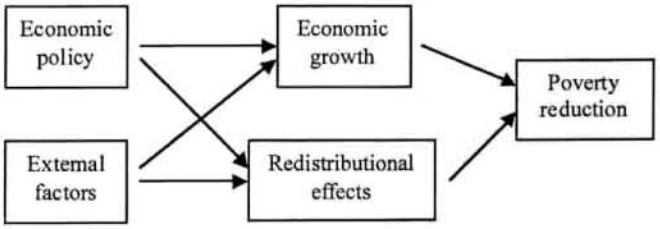


Figure 7. Conceptual framework: growth and poverty



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