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Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
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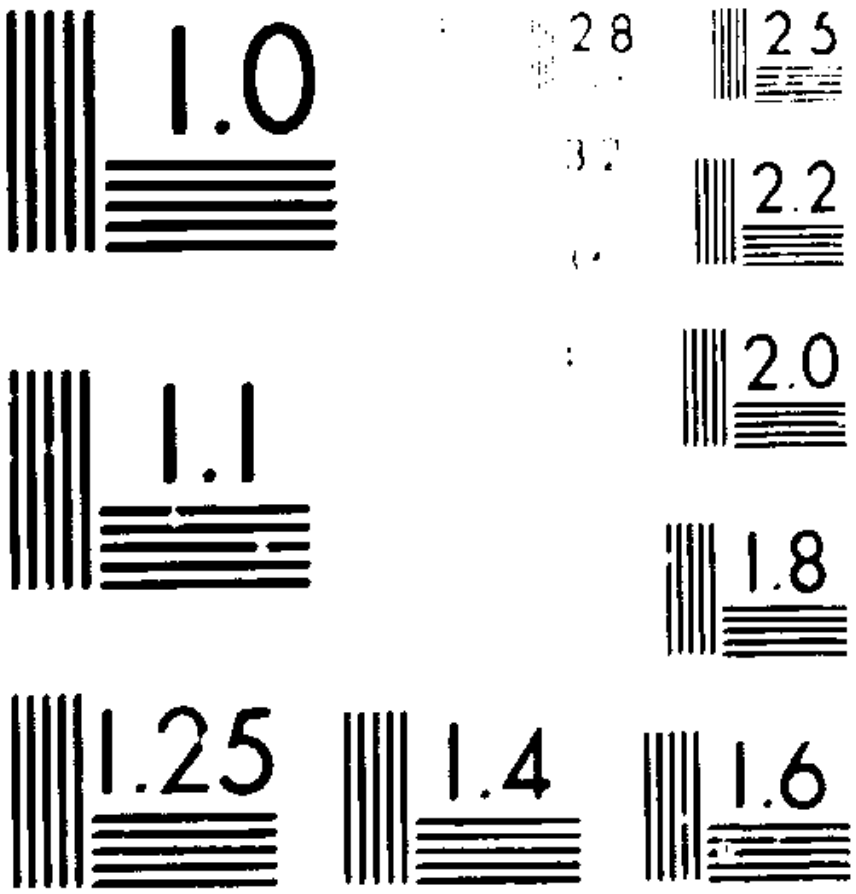
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INDUSTRIAL DEVELOPMENT STRATEGIES AND POLICIES AND SOCIO-ECONOMIC DEVELOPMENT IN THE DEVELOPING COUNTRIES*

prepared by the
Global and Conceptual Studies Branch
Division for Industrial Studies

Social Aspects of Industrialization

Working Papers

463

Garry Brennand

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INDUSTRIAL DEVELOPMENT STRATEGIES AND POLICIES AND SOCIO-ECONOMIC DEVELOPMENT IN THE DEVELOPING COUNTRIES

Table of Contents

FOREWORD

As a reflection of deliberations at the Third General Conference of UNIDO in New Delhi in 1980, a recurring theme at recent sessions of UNIDO's Industrial Development Board has been the need to give proper attention to the examination of the social aspects of the industrial development process. Specifically, it has been stressed that successful industrialization requires a concomitant programme of socio-economic development and progressive socio-economic change. On the one hand, it is recognized that the economic growth resulting from industrialization can promote social progress by creating the means to meet socio-economic needs, including education, nutrition, health, housing and communications. On the other hand, socio-economic development can serve as an input into the industrialization process, and therefore can be a mechanism for fostering industrial development.

While continuing to examine the social aspects of industrialization as an integral part of a number of UNIDO research projects, a specific research programme in the area was instituted in 1982 which in its present phase has adopted the concept of socio-economic indicators as a means for providing a composite picture of the process of socio-economic development. The process is currently being investigated at the global level for 149 countries in both cross-section and time-series analyses. These global analyses are also being complemented with a number of case studies - for the least developed countries of Africa, for a group of NICs in Asia and Latin America*, and for the countries of the EEC and the European CMEA.

This study examines the impact of industrialization upon 13 indicators of socio-economic development in developing countries. Initially, countries are placed into four groups, in order to establish economic and demographic homogeneity. An introductory analysis which assesses whether the two types of development are becoming more closely or more distantly related over time is followed by a system of lagged rank correlations, designed to determine the extent to which economic growth leads inevitably to progress in socio-economic

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* UNIDO/IS.356

development (as measured by socio-economic indicators). A similar analysis considers which indicators of socio-economic welfare most directly encourage economic progress, and policy implications are drawn on the basis of these and the previous conclusions.

This study was prepared jointly by Mr. Garry Brennand, a junior consultant working for the Secretariat, and the UNIDO Secretariat.

INTRODUCTION

In programming and planning its industrial development, policy makers in a developing country must combine a number of separate elements into a coherent and consistent whole, the precise shape of which is determined by, among other factors, the nature of the resource endowment of the country, the size of its domestic market, the degree of ideological commitment to a specific system, the level of development of the economy and society, and the specific culture, traditions and objectives of the society. Since, however, the ultimate objective of industrial development is development in the much wider socio-economic sense, the attainments of a country in industrial development must then be compared with the attainments achieved in the socio-economic sphere and the evaluation of strategies and policies of industrial development must then be made not only in terms of the degree of success in generating industrial development per se, but also in terms of its contribution to fostering socio-economic development. This paper will focus on this second measure of the success of policies and strategies of industrial development.

Previous considerations of the question of what is the nature of the relationship between the industrial development being carried out as part of the attempts of developing countries to accelerate their economic development and the process of socio-economic development have not produced definitive answers. This paper also does not presume to do so, but - using socio-economic indicators - will attempt to make general statements about the effects of industrialization and economic development on socio-economic development (and vice versa) in developing countries that will hopefully be of relevance to the process of formulating, implementing, and managing strategies and policies for industrial development.

THE NATURE OF THE INTERRELATIONSHIP BETWEEN ECONOMIC AND SOCIO-ECONOMIC DEVELOPMENT

The question of causality between the social and economic variables is at the heart of the problem of development: is it sufficient to encourage industrialization within a developing country in the belief that this will lead to inevitable social improvements? What is the effect - perhaps just as strong - of social variables upon economic and industrial development? For example, it is quite likely that a well-educated populace would be more able

to take advantage of its natural resources than one less well-educated, which would lead us to expect school enrollment ratios to have an effect upon economic activity, at the same time that industrialization created the necessary preconditions to allow further development of the educational sector.

This paper sets out to explore, for different groupings of developing countries, some evidence on the nature of the intertemporal interrelationship between economic and socio-economic development. It is widely agreed that industrialization by itself is not adequate to generate development as understood in its broad sense, and it is also generally believed that development, broadly conceived, is by its very nature a synergistic process that evolves through the long-term interaction of a wide range of factors, including predominantly economic and social influences. Hopefully this paper will provide some limited evidence on this question.

In case it is not obvious, let one point out before proceeding that the reason it is necessary to examine this interaction is because there is nothing automatic in the process whereby industrialization and economic development generate socio-economic development. This is particularly true since the countries of the developing world are at very different levels of development and enjoy varying potential for adopting different development policies and strategies. Therefore the ensuing analysis will consider four different categories of developing countries: the newly industrializing countries, large developing countries, small developing countries with ample resources, and small developing countries with modest resources.

If one examines the countries of the North, there are few where the process of economic development has not been accompanied by the attainment of complete or almost complete literacy. Similarly, life expectancy in market economies of the North is rarely below 72 years. 1/

When one turns to the developing countries, however, the economic and industrial strategies that have been pursued have not always been such that socio-economic development necessarily progressed in parallel with the

1/ The major exceptions are Turkey and South Africa at 62 and 61 years, respectively (1980).

economic and industrial development. For example, a country such as Sri Lanka would be ranked alongside Haiti with its GNP per capita of $270, yet has a life expectancy, infant mortality rate, and literacy rate that are all better than, for example, Mexico, with a GNP per capita of $2,090. 2/

Since the objective of industrialization is development in a wide socio-economic sense, it is therefore necessary that a fuller investigation be made of the degree of socio-economic development in developing countries with different actual or potential industrial development strategies and policies. This paper seeks to examine the extent to which strategies of industrial and economic development in certain broad groups of developing countries (and at a correspondingly relative high level of aggregation) have lead to progress in the realm of socio-economic development. The approach is thus to test the strength of causality that runs from economic activity to socio-economic development, and thus the extent to which the industrial strategies of developing countries have generated socio-economic welfare.

Since the countries of the developing world are at very different levels of development and have widely varying backgrounds, we cannot expect to conduct a meaningful investigation of the effects of economic development upon socio-economic welfare unless some form of disaggregation is undertaken. There is, however, no clear criterion by which such a disaggregation should take place. An approach which is often adopted is to consider separate regions of the world; this has the drawback, however, that it involves substantial heterogeneity of development levels and population size. The groups of countries that are used in this analysis have been chosen in an attempt to overcome both of these forms of heterogeneity.

THE COUNTRY GROUPINGS

The first group of countries to be examined are the newly industrializing countries (NICs), a group which has carried out extensive programmes of industrialization which are progressively leading them to evolve patterns,

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2/ Data for 1980 (except literacy, 1977).

attitudes, and forms of economic behaviour convergent with those of the countries of the North. These countries are also of key importance to the industrialization aspirations of the South, since at present they represent the major source of capital goods and technology within the South.

These countries - see Appendix A - were selected from among developing countries on the criterion of the share of manufactures in total exports. Pakistan and India are included on this criterion, even though organizations such as the World Bank 3/ still rank these countries as low-income countries by virtue of their low GNP per capita.

The choice of countries by this economic criterion, however, generates other types of heterogeneity; for example, the group includes both the small, densely populated country of Singapore and territory of Hong Kong, and also the large, appreciably less densely populated countries of Argentina and Brazil. This may give particular cause for concern because of the disparate potential that exists within the group for developing domestic market-oriented industrialization strategies.

Three other classifications of groups of developing countries according to population size and resource endowment are therefore also presented. Following the classification of the UN Handbook of Industrial Statistics,4/ the second group consists of large developing countries.5/ The remaining countries are further subdivided according to natural resource endowment (and therefore the potential for pursuing resource-based industrialization strategies): small developing countries with ample resources and small developing countries with modest resources. 6/

3/ World Bank, World Development Report 1982. (Washington, D.C.: IBRD, 1982).

4/ United Nations, Handbook of Industrial Statistics. (New York: 1982), 45-47.

5/ With a 1970 mid-year population of 20 million or over. See Appendix A.

6/ Using data on per capita value-added in the primary sector. See Appendix A.

In making the groupings more homogeneous from the demographic and resource endowment viewpoints, some economic disparities have been introduced: for example, large developing countries includes both Argentina (1980 GNP per capita of $2,390) and Bangladesh ($130).7/ However, for each of these groups, there are few such extremes. Figure 1 shows the growth of GNP per capita from 1960 to 1980 for the median of each of these groups (to avoid the distorting effect of these extremes that would be reflected using means). Clearly, there are two sets of economic performances, which have become more and more distinct over the past two decades. In the higher performance bracket are the NICs and the small developing countries with ample resources, whilst the poorer performance countries are the large developing and small developing countries with modest resources. This division is also reflected in the levels of MVA per capita, as shown in Figure 2.

Figures 3 and 4 illustrate the same phenomenon in the socio-economic sphere. Figure 3 shows the median of both the NICs and the small developing countries with ample resources for the socio-economic (result) indicators - life expectancy, infant mortality, and literacy - to be in a separate, higher class than the median for the other two groups (particularly for life expectancy, usually considered the best single indicator of health). Similarly, Figure 4 suggests such a division, particularly in health care and for the secondary school enrollment ratio, among socio-economic (input) indicators.

The groupings therefore can be seen to satisfy explicitly demographic and resource endowment homogeneity, yet are also seen to be reasonably homogeneous in their development levels. This will be important for the attempt to form some conclusions about the implications of industrial strategies for different kinds of countries.

Any uneasiness that remains concerning the extreme cases that exist within each group (such as the example cited above) can be further dispelled by the method of analysis adopted in this paper, namely the Spearman coefficient of rank correlation. Other techniques (such as least squares regression) emphasize the extreme values since the analysis is cardinal in nature; the purely ordinal approach of rank correlation reduces the heterogeneity problem in extreme cases in that a country whose performance is far better than most

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7/ World Bank, op. cit.

FIGURE 1

Median GNP per capita, 1960–1980

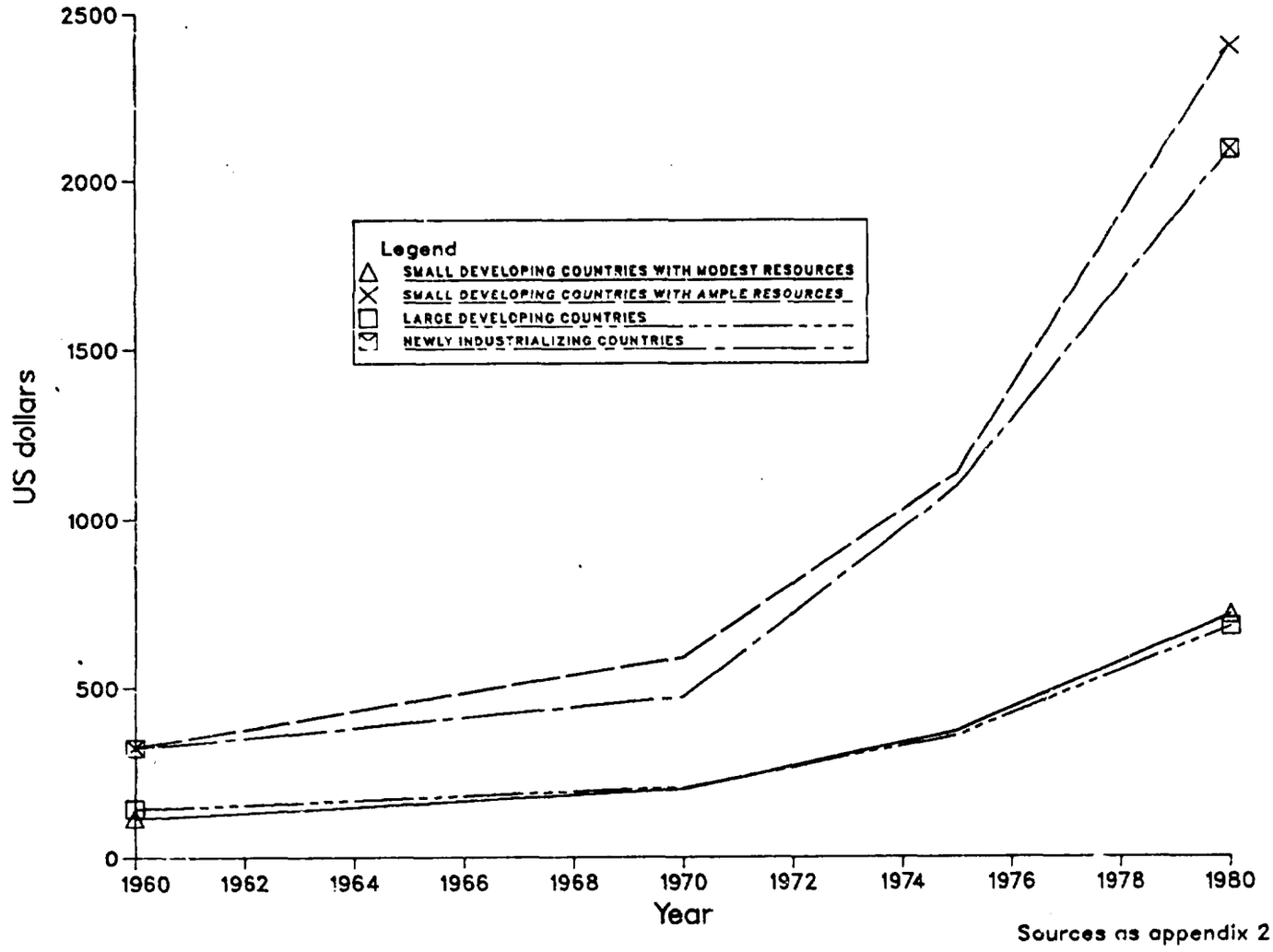

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FIGURE 2

Median MVA per capita, 1960–1980

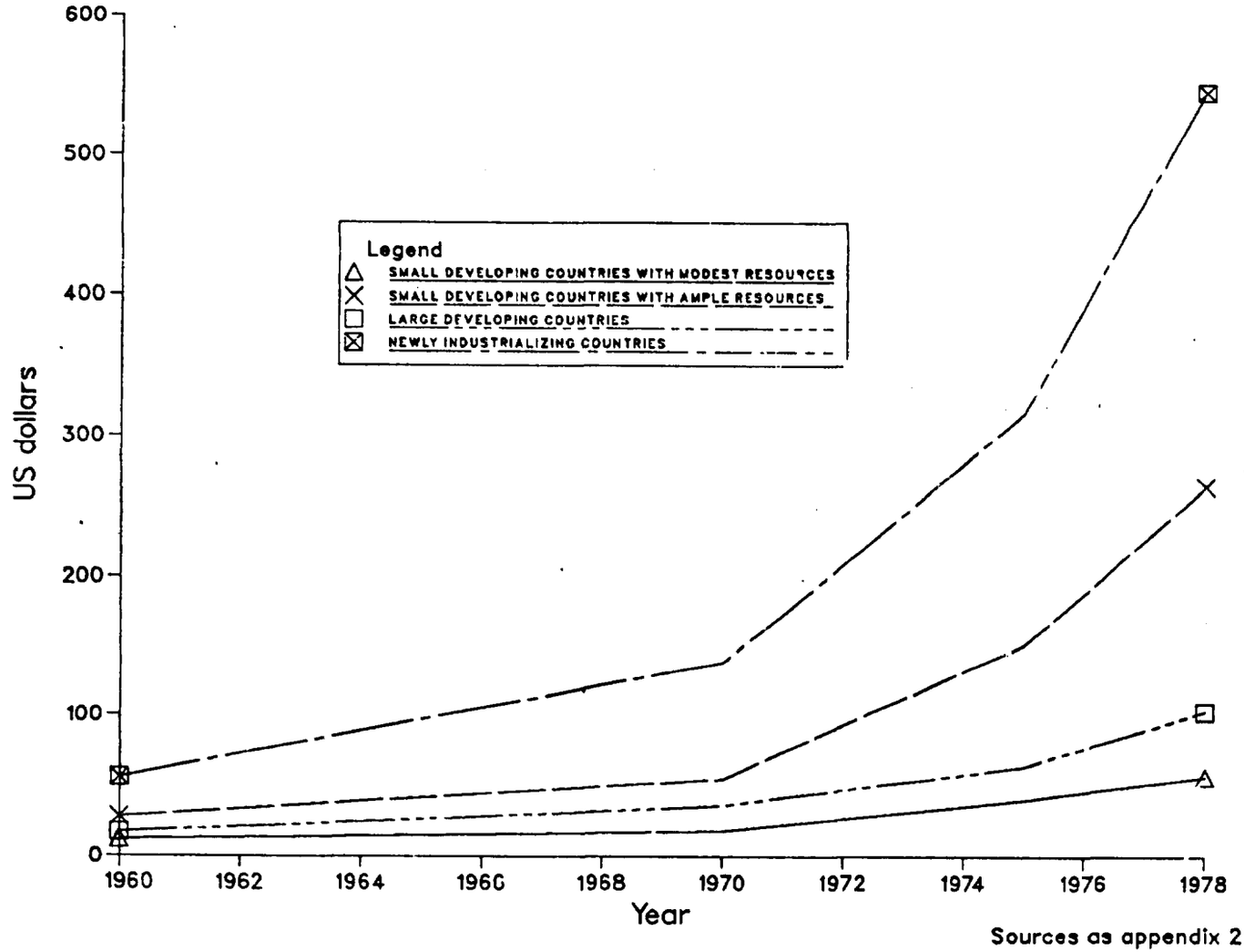

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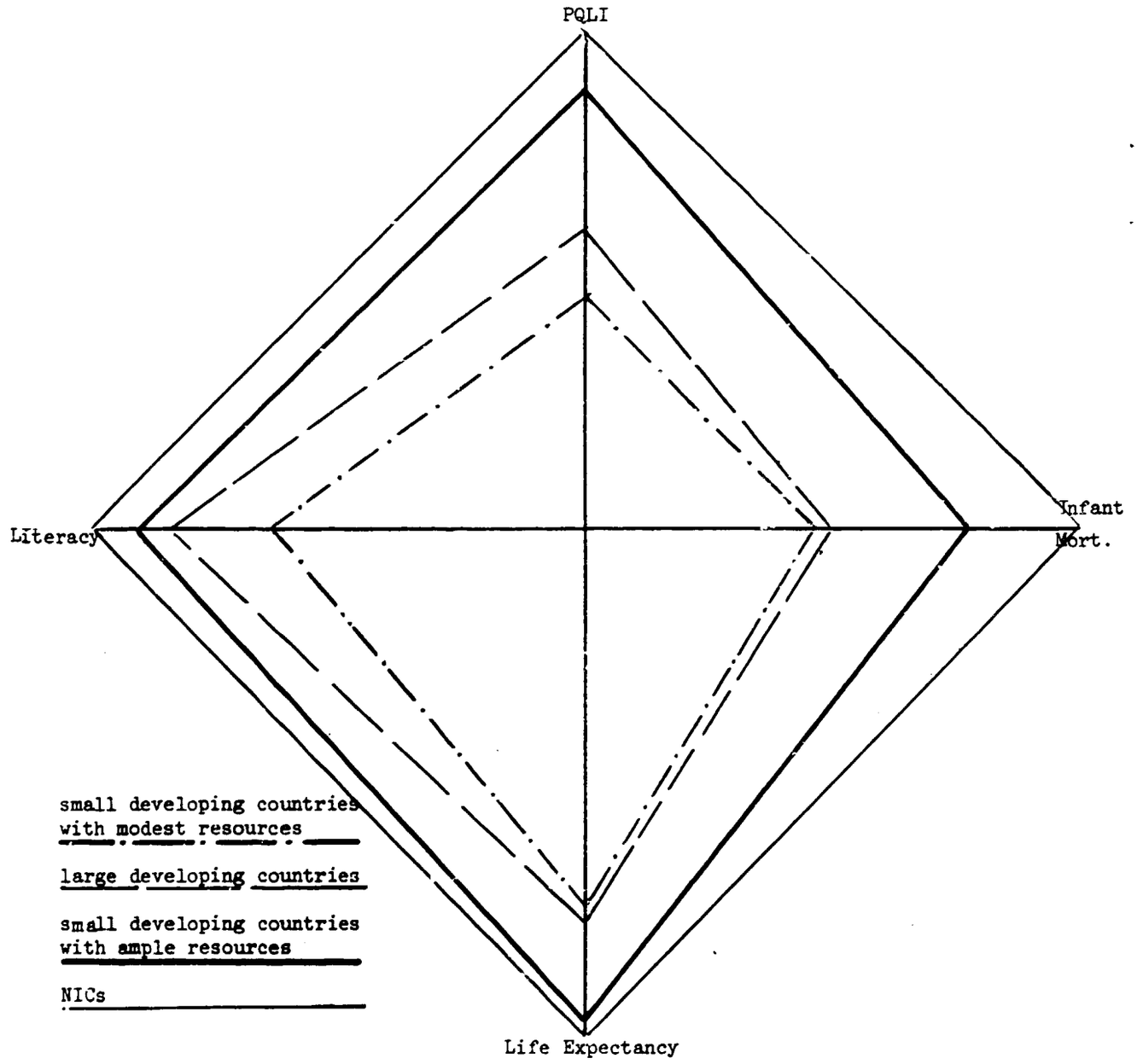
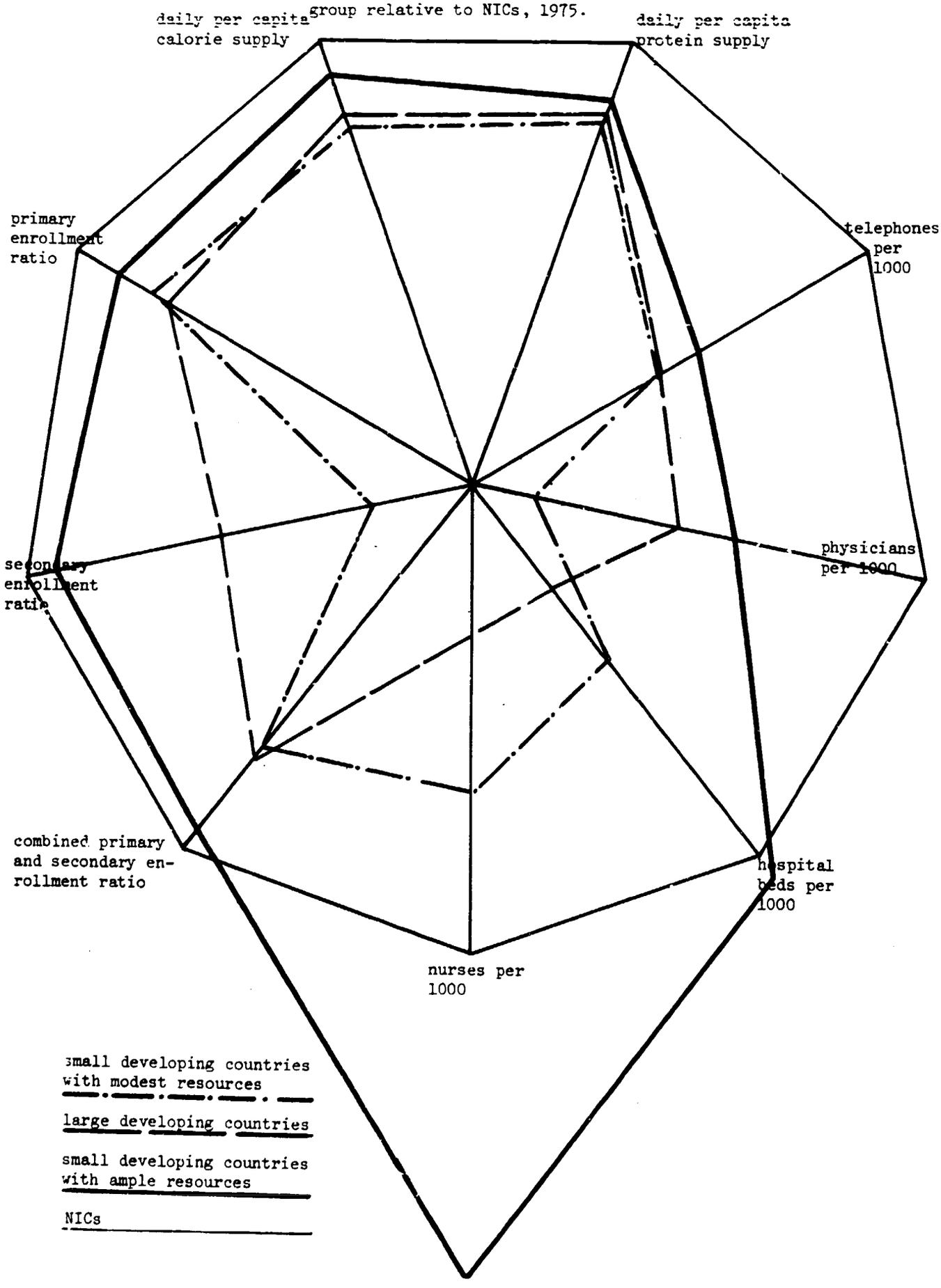
FIGURE 3. Median socio-economic (result) indicators for each group relative to NICs, 1975.



Note: The PQLI, explained in detail below, is an arithmetic average of the literacy rate and indices of life expectancy and infant mortality.

FIGURE 4. Median socio-economic (input) indicators for each group relative to NICs, 1975.



others in that group (e.g., Singapore's GNP per capita in 1980 was $4,430, contrasting with $200 in Burundi) can do no better than be ranked in first position.

There is clearly no objective criterion for grouping countries to establish homogeneous classifications. However, the four groupings used here address the problem directly, have an implicit homogeneity in other factors, and are used in a method of analysis which de-emphasizes the problem of homegeneity.

METHODOLOGY

As mentioned above, the technique adopted is the Spearman coefficient of rank correlation. This is a statistical method designed to measure the degree of association between two variables by considering the similarity of the ranking (of countries in this case) between the two variables, avoiding the explicit choice of dependant and independant variables.

The problem remains of how to establish the direction and strength of causality - a question that is at the heart of the development problem and a great deal of empirical economics. The method used in this paper is probably the commonest and simplest, involving a system of lagged correlations. More specifically, data for each socio-economic indicator are taken for the year 1975, and rank correlation coefficients are calculated between the indicator and GNP per capita and manufacturing value-added (MVA) per capita individually for the years 1970 to 1980 (i.e., 11 correlation coefficients for each economic-socio-economic combination). This will hopefully make it possible to see whether levels of socio-economic welfare have been more closely related to the economic performance of the past than that of the present: this would be indicated by coefficients between socio-economic indicators for 1975 and the economic indicators which fell as the year of economic data used progressed from 1970 to 1975). If this is clearly the case, the conclusion drawn here is that economic development has led to improvements in that particular indicator of socio-economic development.

While focusing on an examination of the hypothesis that economic development gives rise to socio-economic progress, the analogue hypothesis of

whether there are strong feedback effects from socio-economic indicators to economic activity can also be tested by the results of this analysis. For example, as mentioned above, a well-educated populace would be expected to take fuller advantage of natural resources than a less well-educated one, an argument which could be extended to nutrition, health care, etc. The test for this direction of causality is symmetrical to the first: it depends upon 1975 socio-economic indicator values being more closely associated with future values of the economic indicators than with the present. It should be noted that such a feedback effect does not preclude the possibility of economic activity having a direct effect upon socio-economic well-being, according to this analysis. If causality were to run both ways, the coefficient of rank correlation would be at or near its lowest with 1975 economic data, whilst it would rise with future (1976-1980) or past (1970-1974) data. Finally, a contemporaneous development of economic and socio-economic variables would be indicated by the closest relationships occuring between the economic data for 1975 and the socio-economic indicator, with falling coefficient values for future or past economic data.

In the process of investigating the direction of causality, it is likely that the rise and fall of coefficients will not always be clearly observable, and the conclusions concerning causation may appear to be somewhat subjective. It is important, then, to separate from the more ambiguous results those cases that give a clear indication of the nature of the relationship. For this purpose, a double criterion - of consistent results from using MVA and GNP data and a 1% significant level for rank correlation coefficients - must be satisfied in order to place that relationship at a more confident level of significance (the schematic figures below illustrate these relationships of stronger evidence with a heavier arrow). This instills a much higher level of confidence to a few results, and shows clearly the advantage of using both GNP per capita and MVA per capita in the analysis.

A final methodological note should be made: all data are in current US dollars, which may lead one to suspect that the analysis is obscured by inflation. However, the data for each coefficient are cross-sectional in nature, meaning that the usual problem of real versus nominal growth rates does not appear. The fact that the rank correlation between 1980 GNP per capita in real and money terms ranges from 0.914 for small developing countries with modest resources to 0.982 for large developing countries suggests that the analysis, conducted in money terms, is equivalent to what would have resulted from a study using real data.

SOCIO-ECONOMIC INDICATORS

In an attempt to obtain a reasonably broad picture of the socio-economic development process in relation to economic activity, a total of thirteen indicators of socio-economic well-being are used in the causality analysis. These include nine input indicators: daily protein supply per capita, daily calorie supply per capita, primary school enrollment ratios, telephones per capita, physicians per capita, nurses per capita and hospital beds per capita; three result indicators: infant mortality, life expectancy, literacy; and the synthetic Physical Quality of Life Index (PQLI).

The PQLI combines the three result indicators - infant mortality, life expectancy at age one and literacy - into one index monitoring the long-term result of the process of socio-economic development.8/ Though the first two variables seem to be representing the same dimension, the authors of the index argue that they represent distinct factors which imply that changes in life expectancy after age one are not related to changes in the infant mortality rate. 9/ The literacy rate is also included because it represents a wide range of factors that could affect the future development of the country and the extent to which the poor can achieve economic success.10/ The PQLI is also a simple index to compile data on and to compute, as these three pieces of data are published regularly for many countries.

8/ The PQLI indexes these variables between 0 and 100. The life expectancy levels for the world range between 38 and 77, and so these values are used as the 0 to 100 values on the index. Similarly, the range of infant mortality is established as being between 229 and 7 per 1000 and these values are taken as the endpoints of a 0 to 100 scale. Literacy rates are already indexed between 0 and 100, so the index is calculated as follows:

$$\text{PQLI} = \frac{\text{Index of life exp. at age one} + \text{Literacy rate of population over 15} + \text{Index of infant mortality per 1000 live births}}{3}$$

See Morris D. Morris, Measuring the Condition of the World's Poor. (London: Pergamon, 1979).

9/ The question of multicollinearity between life expectancy and infant mortality is discussed in David A. Larson and Walter T. Wilford's "The Physical Quality of Life Index: A Useful Social Indicator?" World Development 7/6 (1979), 581-584.

10/ The possibility of multicollinearity between the literacy rate and infant mortality was not discussed by the authors of PQLI, but recent work has strongly suggested its presence. See G. Dellaportes, "International Data: Their Use in Showing Relationships between Socio-economic and Demographic Variables", World Health Statistics Quarterly 34/2 (1981), 110-216.

Before looking at the nature of the causality for the four groups, a consideration will be given to the relationship between socio-economic result indicators and economic data for the same period, for each of four years: 1960, 1970, 1975, and 1978. This will show if there is any trend towards or away from a closer integration of the different sides of the development process. The results from this will be used later in the context of the results of the causality analysis, in an attempt to assess future prospects for each group, and to gain a clearer insight into the implications of future industrial policy.

THE CHANGING RELATIONSHIP BETWEEN ECONOMIC AND SOCIO-ECONOMIC VARIABLES

The initial rank correlations investigate the nature of the link between economic growth and improvements in socio-economic well-being (the latter measured by result indicators) over the past two decades for these groups. (See Appendices 2-5.) Inevitably, there exist minor conflicts in the evidence for the pattern for each group. However, a distinct trend emerges from the tables: the more developed groups (i.e., the NICs and small developing countries with ample resources) are witnessing a socio-economic development which is becoming less associated (on the given measures used here) with economic activity. This is reflected in the fact that development patterns become less clear at higher levels as improvements in welfare become more qualitative than quantitative. Similarly, the two poorer groups (i.e., large developing countries and small developing countries with modest resources) are experiencing a progressively closer relationship between the two types of development, a result that is associated with the fact that at very low levels of development, improvements in socio-economic development are often ad hoc in nature and not necessarily closely related to improvements in economic or industrial development.

Considering the indicators separately, it appears that the literacy rate has the most ambiguous relationship over time with GNP and MVA per capita. For the NICs, however, there was a substantial weakening in the relationship between 1960 and 1975, whilst a similar pattern was observed for large developing countries from 1960 to 1970. However, 1970-1978 saw a strengthening of the relationship for this same group, which, together with the ambiguity of the remaining results, makes any conclusion concerning this changing relationship over time tentative.

FIGURE 5

Coefficients of Rank Correlation between GNP per capita and Infant Mortality, 1960–1978

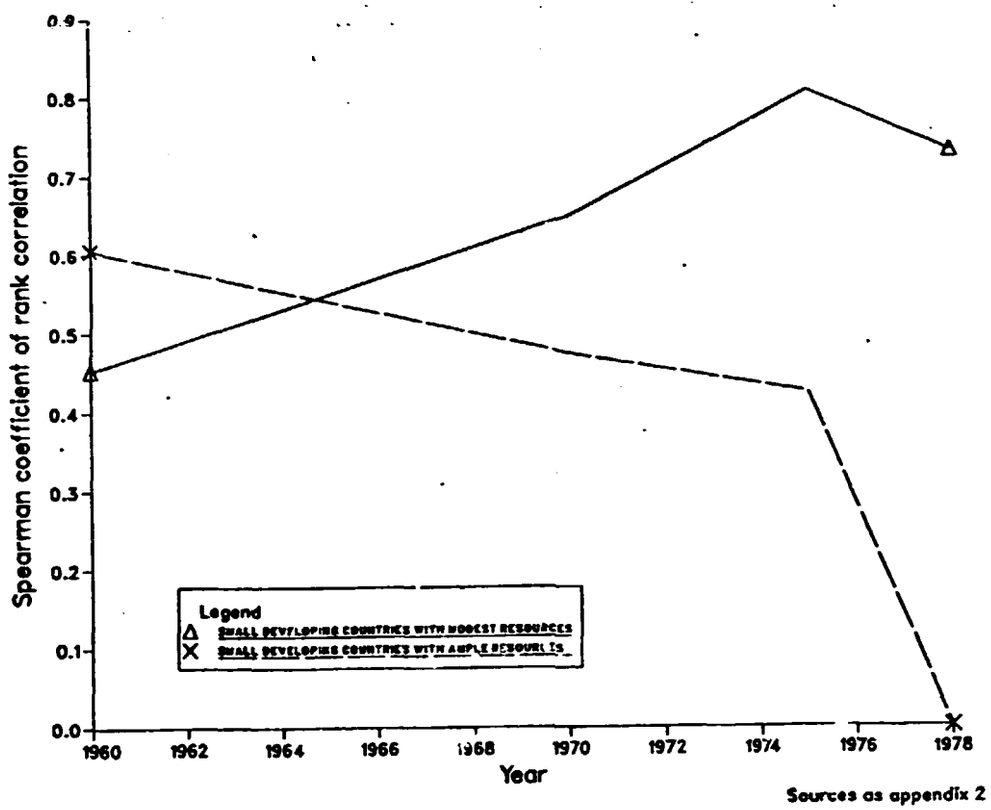


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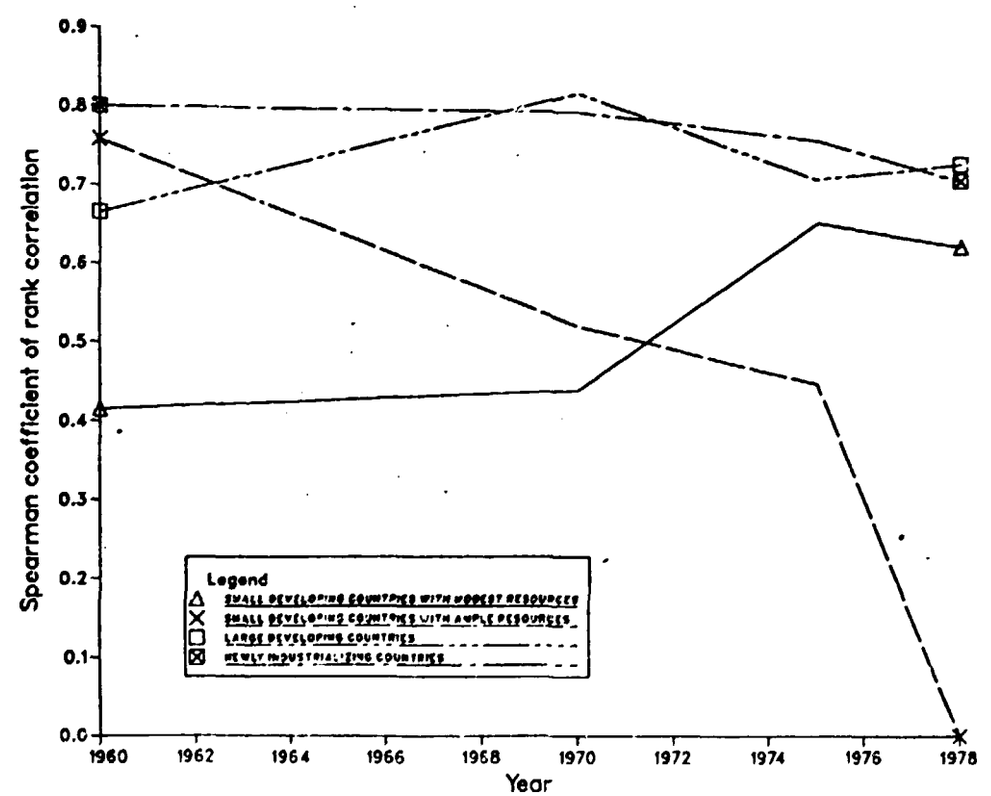
FIGURE 6

Coefficients of Rank Correlation between GNP per capita and Life Expectancy, 1960–1978



Sources as appendix 2

Life expectancy, on the other hand, gives the clearest indication of the changing relationships, with the distinction between the two groups as described above being particularly evident. Infant mortality figures show similar trends, with a particular emphasis upon the two groups of small countries: the small developing countries with ample resources are seen very clearly to have a substantially weakening relationship between infant mortality figures and economic activity, whilst small developing countries with modest resources have a relationship between these two types of development, which is becoming stronger over time. These cases, along with the trends in life expectancy, are shown in Figures 5 and 6 (where the economic indicator used is GNP per capita).

The importance of these results will be seen following the causality analysis below. If, as it seems, the two less developed groups are experiencing a closer and closer relationship between economic and socio-economic development, any evidence for economic activity causing improvements in socio-economic well-being will receive further vindication. The future for the ample resource group is less certain, given the dramatic fall in the rank correlation coefficients as seen in Figures 5 and 6. This suggests that this group would experience less direct socio-economic improvements in the future as a result of economic growth. The NICs and large developing countries seem to be in the midst of a respective weakening and strengthening of the relationship, especially for life expectancy, but the change is not so dramatic as for the ample resource countries.

THE RESULTS OF THE ANALYSIS OF CAUSALITY

This section considers first, the results for each individual group and later attempts to tie together common strands of evidence on the basis of these results, the earlier discussion of homogeneity, and the previous section on the trends in the strength of relationship between economic and socio-economic development. (The rank correlation coefficients for this enquiry into causality are presented in Appendices 6-13.)

Newly Industrializing Countries

The evidence for this group suggests that economic growth tends to lead to direct improvements in the inputs to the socio-economic development process, but only to indirect improvements in the final result indicators. Indeed, the strongest evidence is that these result indicators have feedback effects upon the level of economic activity - with this feedback being emphasized for infant mortality and life expectancy - and, consequently, for the PQLI. (See Figure 7.)

There are a number of possible explanations for this apparently asymmetric result. First, there may be substantial time lags between the changes of input levels (resulting from deviations in the level of economic activity) and the consequential change in the result indicators. A more likely explanation, however, is that result indicators levels are now quite reasonable 11/ - certainly relative to the countries in the South - and that further improvements are becoming increasingly difficult to attain.

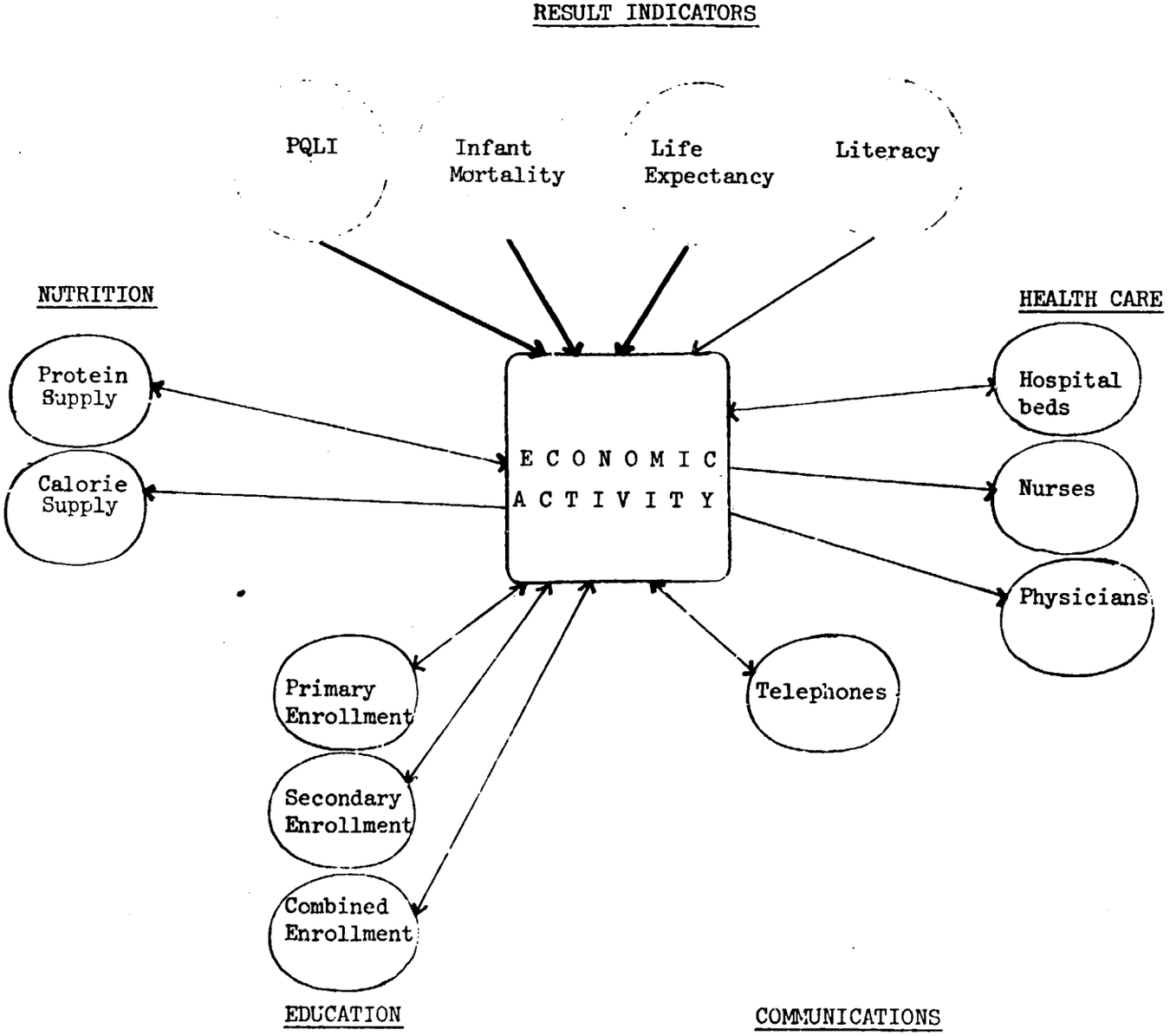
How do these feedback effects relate to the strategies for promoting industrialization in these countries? As mentioned above, there is a time lag present in the process of rising input levels improving output levels, but the question is one of the length of the lag and the nature of the exact relationship between combined inputs and the result indicators, rather than uncertainty concerning mutually reinforcing improvements. In other words, the improvement in the inputs to socio-economic development which appear to follow from the economic growth of these countries will not only be beneficial for the nutritional, educational etc. levels of the country, but also, once they have contributed to improvements in the result indicators (such as life expectancy), will lead to positive feedback effects on the economy.

Although the timing of such a cycle cannot be established by this type of analysis, it appears to be a medium-term phenomenon. There are, however, more immediate feedbacks to the economic system. Improvements in either secondary or primary education enrollment ratios, daily per capita protein supply, telephones per capita, or hospital beds per capita all appear to generate economic improvements. Thus, direct government spending on any of these categories would appear to be justifiable on economic grounds alone.

11/ Median values of 65 years for life expectancy, and 59 deaths per 1000 for infant mortality.

FIGURE 7.

CAUSALITY IN ECONOMIC AND SOCIO-ECONOMIC DEVELOPMENT:
NEWLY INDUSTRIALIZING COUNTRIES



Key:

pre on of causation

p on of causation (stronger evidence)

ev tion runs both ways

For this group then, industrialization and economic development seem to have given rise to socio-economic improvements through direct increases in input levels, and this impact was strengthened by strong feedback effects. It should, however, be stressed that the small sample group (of ten) rather limits the significance of the results, since there are not large movements within the rankings of GNP and MVA per capita over the 1970-1980 period.

Large Developing Countries

In contrast to the previous group, on the basis of an analysis of this group, it is not possible to draw broad conclusions concerning inputs or outputs as a whole. For example, the evidence that literacy rates have strong feedback effects upon the economy is clear, while for the two health result indicators the dominating influence is that of economic development on socio-economic progress. This is reflected in the two-way causality discovered for the PQLI, with the strongest evidence for socio-economic leading to economic improvement. (See Figure 8.)

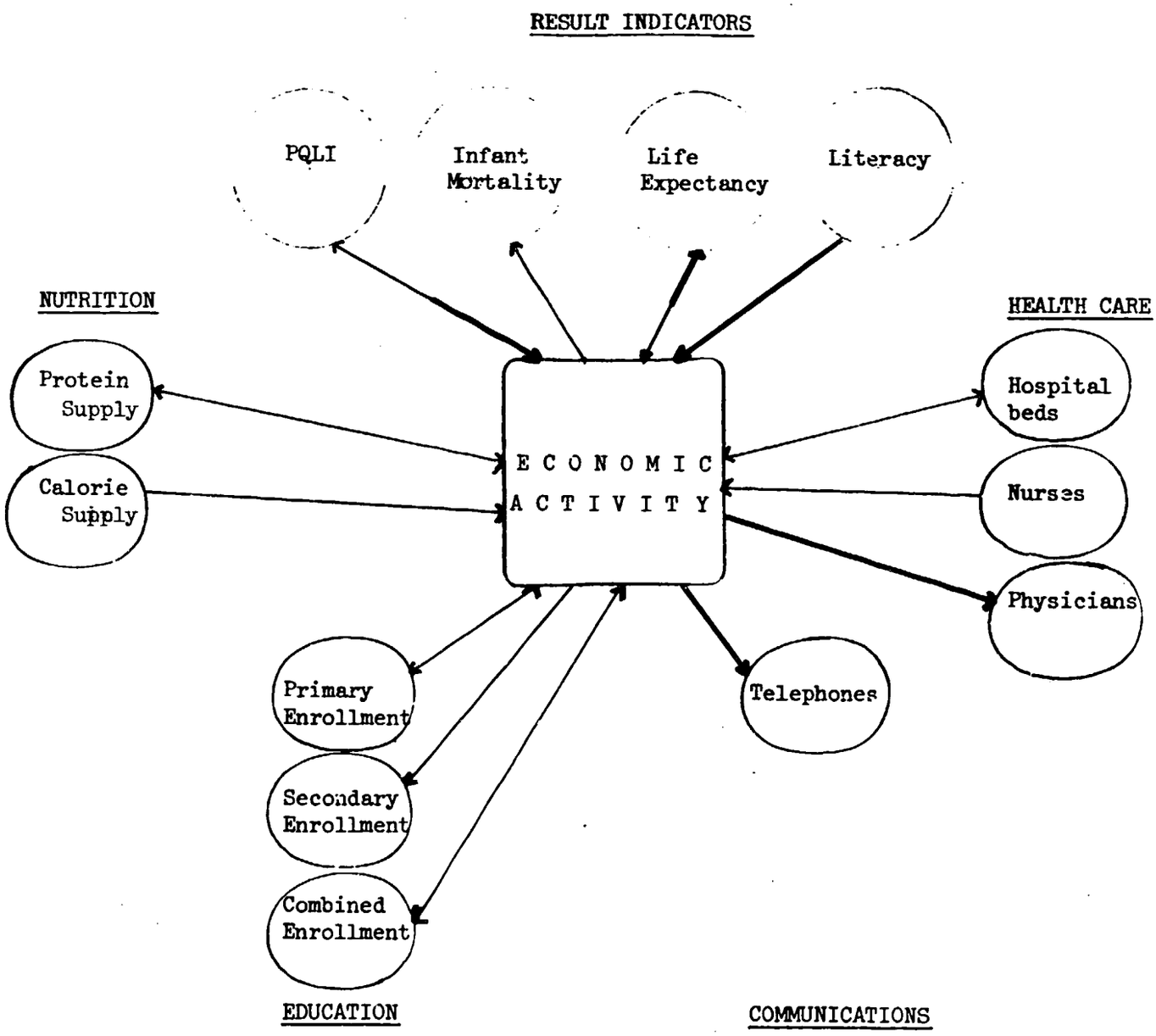
The clearest case where industrial strategies and economic development appear directly to promote improvements in the levels of socio-economic development is in the levels of physicians per capita and telephones per capita. In contrast, it appears that the level of nurses per capita has effects upon economic performance but economic improvements do not seem to lead inevitably to higher nursing levels. In a large developing country, this can often be disturbing since there will be large rural areas where access to medical attention is extremely difficult. Nursing supervision is often considered to be the most cost-effective way of improving health care at very low levels of development, there being a greater need to improve general awareness of medication and hygiene than for more intensive medical supervision or hospitalization. This lack of a concomitant rise in nursing levels following economic growth is further reflected in the result (in Appendix 14) that this is the only group for which the median value of the number of nursing personnel is below that of physicians (per capita figures).

In the educational dimension, there is evidence that changes in economic activity have eventual effects upon the levels of both primary and secondary

FIGURE 8.

CAUSALITY IN ECONOMIC AND SOCIO-ECONOMIC DEVELOPMENT:

LARGE DEVELOPING COUNTRIES



Key:

predominant direction of causation

predominant direction of causation (stronger evidence)

evidence that causation runs both ways

evidence that causation runs both ways (with stronger evidence for one direction)

enrollment, with the feedback into economic activity occurring with primary rather than secondary school enrollment. This implies that, in countries at this level of development, basic education is the most effective way to take greater advantage of the natural resources available.

Finally, the nutritional indicators suggest an important area of possible government intervention. Although protein supply appears to rise with economic development (and, indeed, to feed back into the economic system), the calorie supply does not follow in such a way. Instead, rises in calorie consumption appear to lead to improved economic performance, a result which is unsurprising, given the relatively low nutritional levels of many of the countries of this group. It would thus seem a matter of great importance, from both the immediate socio-economic viewpoint and the perspective of eventual economic performance, to concentrate upon policies which improve the levels of calorie supply per capita.

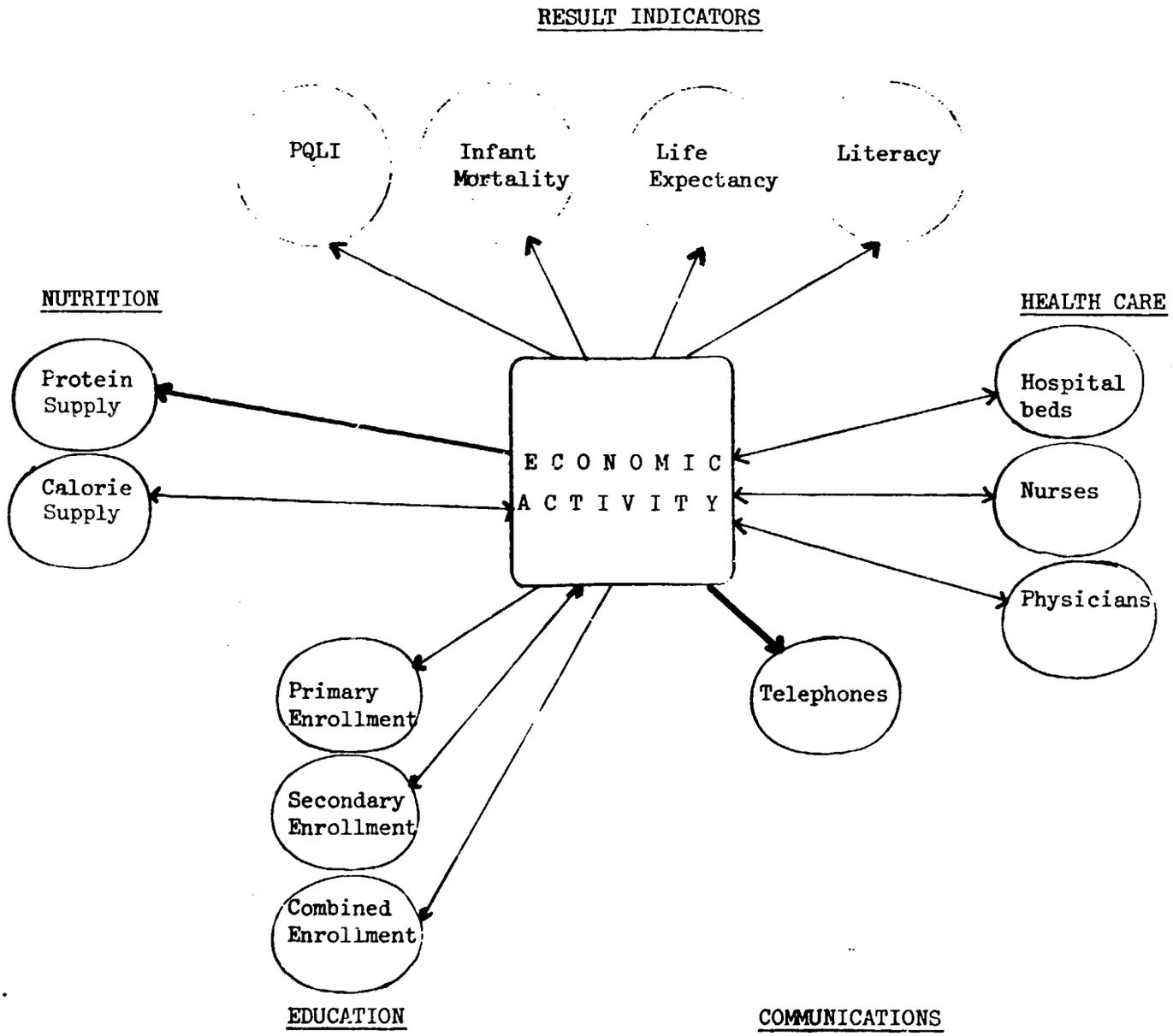
Small Developing Countries with Ample Resources

For this group, it is clear that economic growth leads to improvements in all areas of socio-economic development for both inputs and outputs, with a clear indicator of a one-way direction of causality between economic activity and the result indicators. This is nowhere more pronounced than in the case of health care, where the presence of resource wealth has generated the ability of policy makers to buy short-term health care - nurses and hospitals - and attain levels of socio-economic development even above that of the NICs. (See Appendix 14.) This result can support the conclusion that the impact of the development process can be very broad in nature for countries well endowed with resources who choose to pursue a strategy emphasizing industrial growth. (See Figure 9)

There are two very clear results. First, the development of the economy improves the communication network (as measured here by telephones per capita). This is perhaps unsurprising, given the high performance levels attained by this group in the more basic socio-economic areas of need, particularly in health care. Secondly, levels of protein supply per capita are influenced by the level of economic activity. Thus, although protein consumption is not at a satisfactory level (the median of the group stands at

FIGURE 9.

CAUSALITY IN ECONOMIC AND SOCIO-ECONOMIC DEVELOPMENT:
SMALL DEVELOPING COUNTRIES WITH AMPLE RESOURCES



Key:

——→ predominant direction of causation.

⟹ predominant direction of causation (stronger evidence)

⟷ evidence that causation runs both ways

61.4 grams per capita per day, compared with the FAO requirement level of about 80 grams), the implication is that further industrial development should bring with it improvements in this indicator.

As mentioned above, there is evidence that improvements in all other indicators will follow a rise in economic performance. However, there are also some interesting feedback patterns. First, all kinds of health care seems to generate benefits for the economy. A similar result holds for calorie supply. Although, as discussed above, economic variables appear to generate changes in these latter socio-economic indicators, it would be consistent with a government's industrial strategy to simultaneously encourage the development of these variables (i.e., calorie consumption, and the provision of hospital beds, nurses and physicians).

The only education indicator which helps to improve economic performance is secondary enrollment ratios, perhaps a result of the fact that primary enrollment ratios are already very high (median of 92.5 per cent, compared to the secondary median of 44.5 per cent), thus making primary education difficult to improve upon. It is also likely that the development levels of the countries of this group are reaching the point where more than basic education is required to manage the industrialization process.

Small Developing Countries with Modest Resources

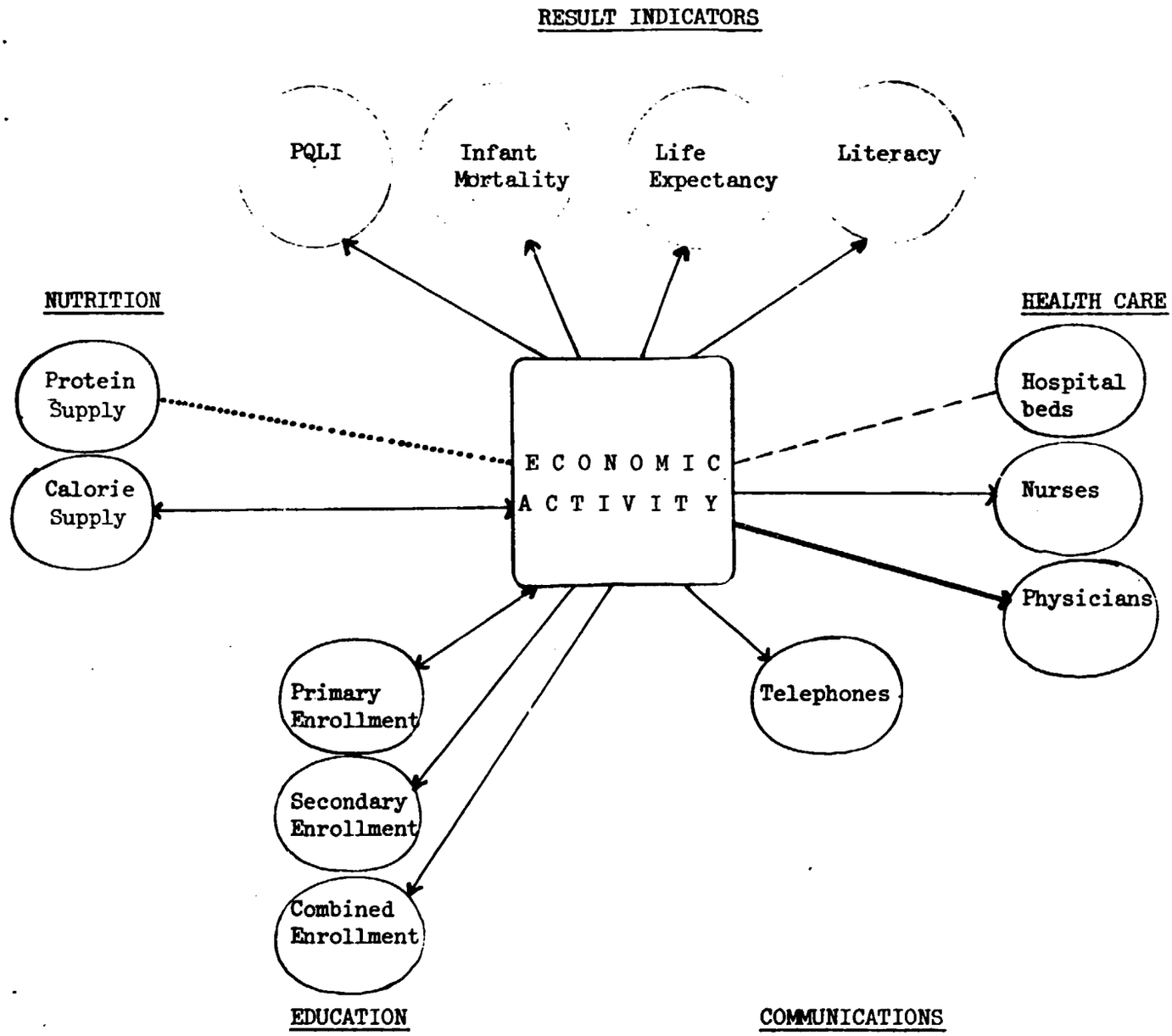
This grouping includes many of the poorest nations of the world, and is thus of crucial significance in order to gain a complete perspective of the nature of global development. With, for example, median values of 50 years life expectancy and 48 per cent literacy, it is clearly important to assess the implications of future industrial strategies for levels of socio-economic development.

Figure 10 confirms that economic progress generates eventual improvements in all of the result indicators - an encouraging outcome, given the present poor state of development. There appear, however, to be no feedback effects from these result indicators, possibly due to development levels still being altogether too low to generate concomitant rises in economic performance levels.

FIGURE 10.

CAUSALITY IN ECONOMIC AND SOCIO-ECONOMIC DEVELOPMENT:

SMALL DEVELOPING COUNTRIES WITH MODEST RESOURCES



Key:

predominant direction of causation

predominant direction of causation (stronger evidence)

evidence that causation runs both ways

contemporaneous development

little discernible relationship

The relationship between input levels and economic activity is less clear. Economic development can be seen to lead to improvements in the level of physicians per capita, again an encouraging result in that health care in most of these countries is currently rather poor (a median value of 0.09 physicians per 1000, or less than 1 per 10,000 population, compared to a median of over 6 per 10,000 in the NICs). There are also signs that nursing levels are affected by economic activity, and a contemporaneous development of the number of hospital beds with general economic performance suggests that the health care dimension will improve concurrently with future economic growth resulting from industrial policy.

Evidence for both the communications and education dimensions points to a similar conclusion - i.e., that economic growth will generate eventual improvements in these areas. Note, however, that there is an indication of a feedback effect occuring between primary school enrollment ratios and economic activity. This is probably due to the education of the population being presently quite poor, so that it is improvements in basic education that will, at this stage of development, lead to a greater ability to utilise the resources of the country in order to develop the economy.

Finally, the nutrition indicators provide a clear focus of attention for governments concerned with the socio-economic development of their countries. Firstly, the calorie supply levels, although rising with economic growth, also have feedback effects upon economic performances, presumably due to rising productivity. The protein indicator, however, is unrelated to economic performance levels. Given that the median daily per capita protein supply is only 57.7 grams (compared to the FAO requirement level of 80 grams), this is a cause for great concern.

The socio-economic development of these countries thus tends to follow quite broadly the progress of the economy, with the important exception of protein supply. Since calorie supply feeds back to the economic performance levels, direct government and international action is clearly required and desired in the nutritional dimension. Encouraging basic education would appear to be the next most important task, in the effort to attain a healthy pattern in both economic and socio-economic development.

CONCLUSIONS

In summarizing, it is necessary to consider in which ways the preceeding results are common to each other, as this will help to establish a greater confidence in the policy implications that follow from the results. This involves, first, looking at directions of causality that are consistent in each of the four groups. Any such finding is clearly a strong result, since it will suggest that the pattern of development is quite general for all developing countries. A second level involves considering which results are common between each of the two groups, as divided by the criterion of their present development levels (i.e., the higher development level being the NICs and the small developing countries with ample resources, and the lower level the large developing countries and the small developing countries with modest resources).

It appears that, for developing countries generally, economic development tends to generate improvements in both education (at the primary and secondary level) and communications (as represented here by the number of telephones per capita). Beyond these indicators, however, there is no consensus of the results, and, interestingly, no socio-economic indicator which feeds back into economic activity for all four groups.

The extent of the commonality in causality is far greater when the groups are divided into 'higher' and 'lower' development levels. (This, in itself, is indicative of the variety of experience in the pattern of development that occurs as a country moves from lower to higher levels.) Consider, first of all, the two higher performance groups of countries. A common result is that economic progress brings with it improvements in the level of all input indicators. This is clearly a very strong result, and one that is evidently encouraging for the economic policymakers in these countries.

This time there is also a common result concerning feedback effects: both groupings suggest that levels of hospital beds per capita and secondary school enrollment ratios have important beneficial effects upon the level of economic activity. This result for secondary education is a reflection (as described above) of the need within these countries to educate the workforce to a level where managerial and technical ability is enhanced, rather than, for example, simply attaining basic literacy.

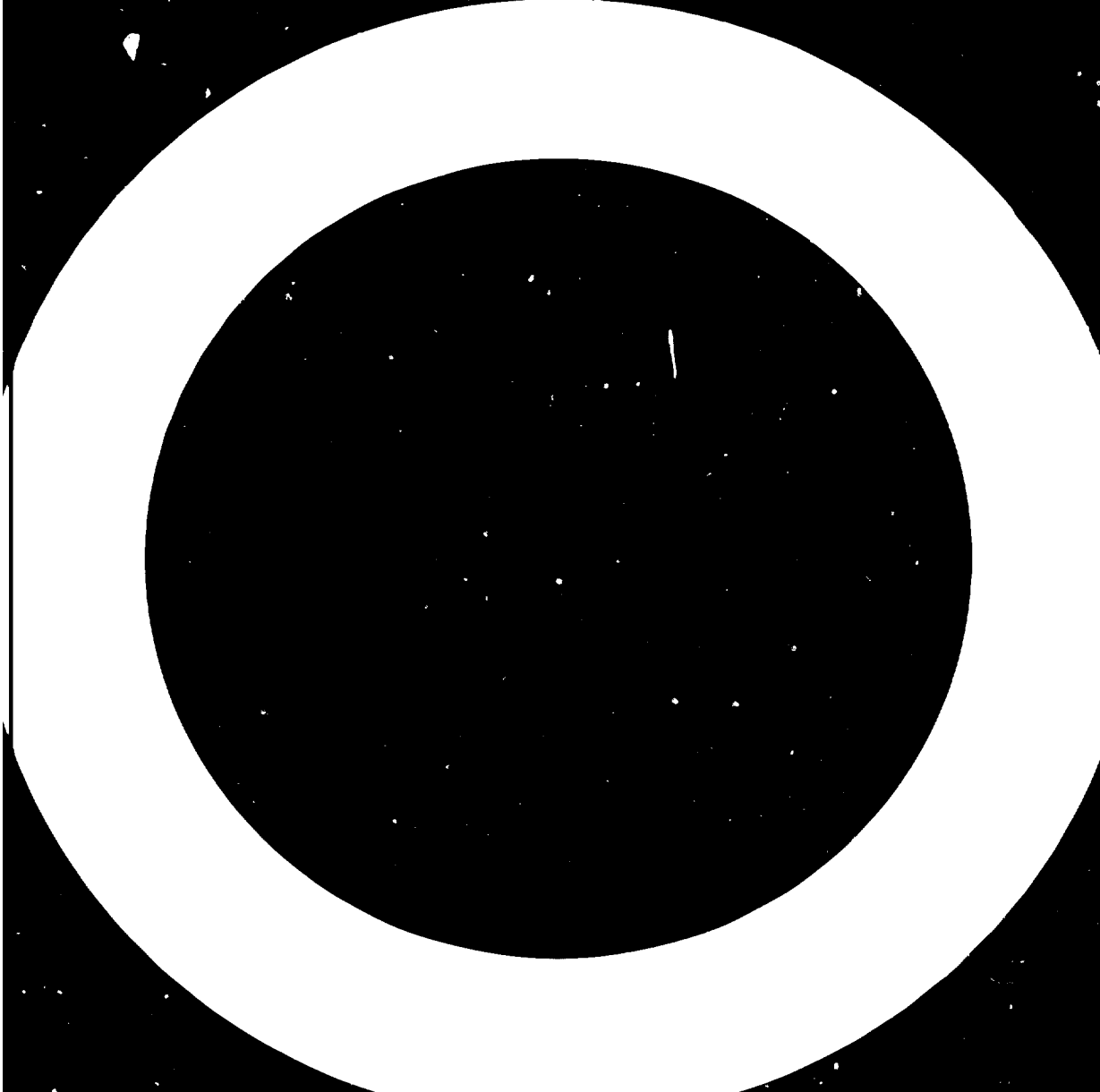
Although the result is encouraging to industrial strategists who are also concerned with broader socio-economic development, it should be remembered from the earlier analysis that the relationship between economic activity and the result indicators has been seen to be falling over time. Thus, this encouraging picture must be tempered by the possibility of future development being less broad in nature.

The development of the economy in the poorer groups improves the indicators in the education and communications dimensions. There is also very strong evidence that the number of physicians per capita will rise as a result. Particularly interesting, however, are the feedback effects that are common to both groupings. In the education dimension, higher primary enrollment ratios improve economic well-being. indicating that the levels of education in these countries are still so low that the best way to take immediate advantage of natural resources is to provide a basic education in order to attain, for example, higher levels of numeracy and literacy. The second common feedback effect concerns the levels of per capita calorie supply. This is unsurprising, given the often very low levels of nutritional intake that occur in the poorer countries of the world, so that higher calorie levels inevitably raise productivity.

However, attention must be focused upon the lack of consistency for three key input indicators: the number of nurses per capita, protein and (once more) calorie supply. For each of these indicators there exists one of the poorer groups that suggests no inevitable improvement following economic growth. Given that levels of all three are extremely poor (and, of course, the feedback effects that have been observed to occur with calorie intake levels), it is clearly important for governments of the poorer nations to pursue policies that attempt directly to improve these input levels.

Having said this, there are two hopeful signs: first, there is the common result that economic growth leads to improved health result indicators (i.e., infant mortality and life expectancy); and, secondly, the fact noted above that the relationship between economic and socio-economic growth is becoming closer over time. Although this is encouraging, it is unclear how long it will take before development in the three indicators mentioned above will begin to follow the economic improvements that are hoped for by industrial strategists.

Since the nutrition and health care of poorer developing nations is of such vital importance to their levels of socio-economic well-being, and since these indicators are typically at such low levels at the present, it is crucial that the industrial development policies and strategies that are pursued by the countries at the lowest development levels should have accompanying them an attempt to improve directly these key areas of socio-economic development.



APPENDIX 1

GROUP 1: NICs*	GROUP 2: large developing countries*	GROUP 3: small developing countries with ample resources
Argentina	Argentina	Algeria
Brazil	Bangladesh	Angola
Hong Kong	Brazil	Chile
India	Burma	Costa Rica
Korea, Rep. of	Colombia	Cyprus
Malaysia	Egypt	Gabon
Mexico	Ethiopia	Ghana
Pakistan	India	Guyana
Singapore	Indonesia	Iraq
Yugoslavia	Iran	Jamaica
	Korea, Rep. of	Kuwait
	Mexico	Liberia
	Nigeria	Libyan Arab Jamahiriya
	Pakistan	Malaysia
	Philippines	Panama
	Thailand	Saudi Arabia
	Yugoslavia	Trinidad and Tobago
		Uruguay
		Venezuela
		Zambia

GROUP 4: small developing countries with modest resources*

Bolivia	Ivory Coast	Senegal
Botswana	Jordan	Sierra Leone
Burundi	Kenya	Singapore
Cent. African Rep.	Lesotho	Somalia
Chad	Mali	Sri Lanka
Congo	Mauritius	Sudan
Dominican Rep.	Morocco	Syrian Arab Rep.
Ecuador	Nicaragua	Togo
El Salvador	Niger	Tunisia
Gambia	Paraguay	Uganda
Honduras	Peru	United Rep. of Tanzania
Hong Kong	Rwanda	

* Where the designation country appears in the heading it covers countries, territories or cities.

APPENDIX 2. Coefficients of rank correlation between economic and socio-economic indicators, 1960-78: NICs.

	1960		1970		1975		1978	
	GNP	MVA	GNP	MVA	GNP	MVA	GNP	MVA
Literacy Rates	.755	.855	.618*	.709*	-	-	.644*	.636*
Life Expectancy	.800	.795	.791	.864	.755	.782	.705*	.741
Infant Mortality	.564*	-	-	-	.773	.755	.691*	.705*

Notes: Significant at 1% level except:
* Significant at 5% level
\- Not significant at 5% level
GNP = GNP per capita
MVA = manufacturing value-added per capita

Sources: 1960-75: ILO Data Bank (1981), UNIDO Data Bank (1983)
1978: World Development Report 1980 (Washington, D.C., IBRD, 1980)

APPENDIX 3

Coefficients of rank correlation between economic and socio-economic indicators, 1960-1978: small developing countries with modest resources.[a/]

	1960		1970		1975		1980	
	GNP	MVA	GNP	MVA	GNP	MVA	GNP	MVA
Literacy Rates	0.594*	0.758	0.575*	0.578*	0.621*	0.676	0.577*	0.650
Life Expectancy	-	0.640*	-	0.463*	0.650	0.686	0.621*	0.544*
Infant Mortality	-	0.671	0.647	0.582*	0.806	0.805	0.730	0.660

Note: a/ Data limitations reduced the number of countries to 14 for this analysis.

Other Notes and Sources as Appendix 2.

APPENDIX 4.

Coefficients of rank correlation between economic and socio-economic indicators, 1960-1978: large developing countries.

	1960		1970		1975		1978	
	GNP	MVA	GNP	MVA	GNP	MVA	GNP	MVA
Literacy Rates	0.582*	0.699	0.474*	0.563*	0.596*	0.638	0.649	0.711
Life Expectancy	0.665	0.806	0.815	0.924	0.706	0.884	0.726	0.857
Infant Mortality	0.685	0.780	0.598*	0.721	0.529*	0.696	0.625	0.721

Notes and Sources as Appendix 2.

APPENDIX 5.

Coefficients of rank correlation between economic and socio-economic indicators, 1960-1978: small developing countries with ample resources.[a/]

	1960		1970		1975		1978	
	GNP	MVA	GNP	MVA	GNP	MVA	GNP	MVA
Life Expectancy	0.758	0.758	0.519*	0.725	0.446*	0.630	-	0.550
Infant Mortality	0.605	0.660	0.474*	0.666	0.424*	0.630	-	0.392*

Note: a/ Data limitations preclude the use of literacy rates in this analysis.

Other Notes and Sources as Appendix 2.

APPENDIX 6. Coefficients of Rank Correlation between GNP per capita

	1970	1971	1972	1973	1974
Daily per capita calorie supply	0.719 *	0.673 *	0.609*	0.691*	0.709*
Daily per capita protein supply	0.855	0.806	0.745	0.794	0.818
Hospital beds per 1000	0.773	0.709*	0.664*	0.745	0.736
Physicians per 1000 population	0.864	0.864	0.797	0.827	0.839
Nurses per 1000 population	0.709*	0.709*	0.697*	0.745*	0.733*
Primary school enrollment rate	0.777	0.814	0.850	0.795	0.786
Secondary school enrollment rate	0.632 *	0.586 *	-	0.627*	0.614*
Combined primary and secondary enrollment	0.755	0.727*	0.664*	0.727*	0.718*
Telephones per 1000 population	0.932	0.923	0.95	0.941	0.941
Physical quality of life index	0.714*	0.700*	0.723*	0.723*	0.714*
Adult literacy	0.577*	0.559*	-	-	-
Infant mortality	0.668*	0.641*	0.723*	0.714*	0.714*
Life expectancy	0.736	0.705*	0.718*	0.727*	0.736

Notes and Sources as Appendix 2.

1970 to 1980 and SEIs for 1975, NICs.

1975	1976	1977	1978	1979	1980
0.645*	0.618*	0.627*	0.636*	0.636*	0.709*
0.794	0.770	0.770	0.818	0.818	0.728
0.727*	0.773	0.782*	0.745	0.745	0.718*
0.864	0.797	0.797	0.821	0.821	0.803
0.697*	0.709*	0.709*	0.697*	0.697*	0.721*
0.714*	0.741	0.741	0.768	0.768	0.800
0.586*	0.586*	0.586*	0.614*	0.614*	0.586*
0.673*	0.655*	0.655*	0.700*	0.700*	0.673*
0.959	0.932	0.932	0.950	0.950	0.950
0.736*	0.709*	0.755	0.786	0.786	0.818
-	-	-	0.541*	0.541*	-
0.750	0.750	0.786	0.814	0.814	0.859
0.745	0.736	0.782	0.791	0.791	0.841

APPENDIX 7. Coefficients of Rank Correlation between MVA per capi indicators for 1975, NICs.

	1970	1971	1972	1973	1974
Daily per capita calorie supply	0.745*	0.806	0.818	0.758	0.758
Daily per capita protein supply	0.903	0.891	0.891	0.818	0.818
Hospital beds per 1000	0.745*	0.709*	0.721*	0.818	0.818
Physicians per 1000 population	0.900	0.918	0.888	0.803	0.803
Nurses per 1000 population	0.636*	0.697*	0.661*	0.636*	0.636*
Primary school enrollment rate	0.779*	0.746*	0.746*	0.638*	0.638*
Secondary school enrollment rate	-	-	-	-	-
Combined primary and secondary enrollment	0.783	0.767*	0.767*	0.667*	0.667*
Telephones per 1000 population	0.913	0.913	0.913	0.846	0.846
Physical quality of life index	0.833	0.803	0.852	0.803	0.803
Adult literacy	0.712*	0.664*	0.682*	0.609*	0.609*
Infant mortality	0.745*	0.758	0.794	0.733*	0.733*
Life expectancy	0.800	0.794	0.824	0.788	0.788

Notes and sources as Appendix 2.

ta 1970-80 and socio-economic

1975	1976	1977	1978	1979	1980
0.770	0.709*	0.636*	0.673*	0.758	0.824
0.879	0.891	0.879	0.855	0.891	0.891
0.770	0.806	0.794	0.697*	0.758	0.721*
0.839	0.821	0.779	0.712*	0.779	0.888
0.612*	-	-	-	0.600*	0.661*
0.663*	0.696*	0.754*	0.704*	0.621*	0.746*
-	-	-	-	0.633*	-
0.733*	0.750*	0.717*	0.706*	0.783*	0.767*
0.879	0.896	0.929	0.913	0.863	0.913
0.839	0.870	0.900	0.882	0.852	0.852
0.682*	0.730*	0.706*	0.633*	0.724*	0.682*
0.767	0.758	0.794	0.879	0.794	0.794
0.806	0.836	0.867	0.855	0.824	0.824

APPENDIX 8. Coefficients of Rank Correlation between GNP per capita 1970-1980 and socio-economic indicators for 1975, large developing countries.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Daily per capita calorie supply	0.735	0.720	0.708	0.727	0.688	0.735	0.732	0.756	0.776	0.726	0.738
Daily per capita protein supply	0.594*	0.616	0.573*	0.515*	-	0.503*	0.568*	0.538*	0.546*	0.484*	0.501*
Hospital beds per 1000	0.747	0.757	0.737	0.721	0.671	0.715	0.721	0.771	0.765	0.716	0.710
Physicians per 1000 population	0.853	0.817	0.810	0.785	0.729	0.771	0.738	0.779	0.768	0.738	0.700
Nurses per 1000 population	0.888	0.891	0.885	0.900	0.876	0.901	0.889	0.913	0.917	0.899	0.899
Primary school enrollment rate	0.479*	0.450*	0.425*	0.435*	0.439*	-	-	-	-	0.454*	0.483*
Secondary school enrollment rate	0.534*	0.466*	0.475*	0.515*	0.556*	0.540*	0.489*	0.510*	0.487*	0.518*	0.510*
Combined primary and secondary enrollment	0.701	0.686	0.682	0.676	0.730	0.711	0.683	0.720	0.701	0.735	0.739
Telephones per 1000 population	0.887	0.720	0.890	0.855	0.799	0.840	0.819	0.835	0.831	0.784	0.793
Physical quality of life index	0.629	0.633	0.627	0.580*	0.621	0.621	0.601	0.650	0.641	0.656	0.679
Adult literacy	0.542*	0.563*	0.554*	0.534*	0.617	0.596*	0.593*	0.632	0.629	0.673	0.677
Infant mortality	0.612	0.577*	0.576*	0.529*	0.518*	0.529*	0.497*	0.529*	0.524*	0.541*	0.574*
Life expectancy	0.766	0.749	0.742	0.713	0.691	0.706	0.676	0.716	0.716	0.699	0.724

Notes and sources as Appendix 2.

APPENDIX 9. Coefficients of Rank Correlation between MVA per capi for 1975, large developing countries

	1970	1971	1972	1973	1974
Daily per capita calorie supply	0.772	0.776	0.729	0.724	0.724
Daily per capita protein supply	0.543*	0.560*	0.484*	0.493*	0.446*
Hospital beds per 1000	0.795	0.794	0.771	0.745	0.734
Physicians per 1000 population	0.938	0.924	0.900	0.894	0.885
Nurses per 1000 population	0.903	0.907	0.896	0.888	0.890
Primary school enrollment rate	0.605	0.590*	0.570*	0.545*	0.565*
Secondary school enrollment rate	0.582*	0.588*	0.588*	0.593*	0.596*
Combined primary and secondary enrollment	0.796	0.796	0.810	0.799	0.811
Telephones per 1000 population	0.943	0.937	0.946	0.934	0.915
Physical quality of life index	0.763	0.747	0.750	0.738	0.750
Adult literacy	0.610	0.596*	0.617	0.608	0.638
Infant mortality	0.728	0.706	0.706	0.715	0.732
Life expectancy	0.887	0.872	0.868	0.863	0.871

Notes and Sources as Appendix 2.

ta 1970-80 and socio-economic indicators

1975	1976	1977	1978	1979	1980
0.726	0.753	0.769	0.765	0.730	0.746
0.506*	0.528*	0.523*	0.526*	0.531*	0.530*
0.760	0.790	0.793	0.772	0.753	0.736
0.863	0.856	0.874	0.855	0.840	0.838
0.898	0.905	0.907	0.918	0.916	0.920
0.530*	0.530*	0.549*	0.578*	0.575*	0.585*
0.565*	0.550*	0.560*	0.552*	0.536*	0.548*
0.790	0.795	0.807	0.815	0.797	0.807
0.921	0.912	0.910	0.906	0.894	0.897
0.731	0.747	0.763	0.792	0.768	0.778
0.638	0.661	0.667	0.724	0.718	0.724
0.696	0.676	0.694	0.729	0.717	0.719
0.844	0.834	0.850	0.866	0.847	0.850

APPENDIX 10. Coefficients of Rank Correlation between GNP per capita 1970-80 and socio-economic indicators for 1975, small developing countries with ample resources.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Daily per capita calorie supply	0.761	0.800	0.768	0.730	0.585	0.518*	0.491*	0.507*	0.466*	0.476*	0.472*
Daily per capita protein supply	0.887	0.862	0.846	0.793	0.704	0.654	0.623	0.620	0.595	0.623	0.615
Hospital beds per 1000 0.585	0.585	0.580	0.526*	0.523*	0.446*	0.445*	0.406*	0.413*	0.400*	0.390*	0.393*
Physicians per 1000 population	0.881	0.852	0.822	0.765	0.706	0.675	0.664	0.671	0.689	0.677	0.679
Nurses per 1000 population	0.693	0.678	0.712	0.672	0.541	0.474*	0.507*	0.569	0.517*	0.492*	0.488*
Primary school enrollment rate	0.573	0.559	0.572	0.522*	0.474*	0.471*	-	-	-	-	-
Secondary school enrollment rate	0.672	0.698	0.654	0.577	0.485*	0.502*	0.488*	0.485*	0.446*	0.431*	0.442*
Combined primary and secondary enrollment	0.664	0.638	0.637	0.604	0.555	0.538	0.485*	0.469*	0.446*	0.447*	0.443*
Telephones per 1000 population	0.788	0.792	0.760	0.669	0.580	0.574	0.546	0.553	0.540	0.527*	0.529*
Physical quality of life index	0.509*	0.612	0.400*	0.450*	-	0.418*	-	0.437*	-	-	0.524
Adult literacy	0.653	0.652	0.623	0.512*	-	-	-	-	-	-	-
Infant mortality	0.606	0.605	0.609	0.478*	0.390*	0.446*	0.439*	0.453*	0.389*	-	-
Life expectancy	0.676	0.673	0.637	0.522	0.403*	0.424*	0.411*	0.422*	0.398*	-	-

Notes and Sources as Appendix 2.

APPENDIX 11. Coefficients of Rank Correlation between MVA per c
small developing countries with ample resources.

	1970	1971	1972	1973	1974
Daily per capita calorie supply	0.584*	0.589	0.638	0.651	0.587
Daily per capita protein supply	0.665	0.691	0.727	0.719	0.679
Hospital beds per 1000	0.392*	0.435*	0.476*	0.475*	0.416*
Physicians per 1000 population	0.718	0.722	0.745	0.753	0.738
Nurses per 1000 population	0.428*	0.434*	0.544	0.577	0.501*
Primary school enrollment rate	0.437*	0.449*	0.454*	0.488*	0.442*
Secondary school enrollment rate	0.568	0.584	0.572	0.553	0.564
Combined primary and secondary enrollment	0.509*	0.520*	0.543	0.571	0.504*
Telephones per 1000 population	0.867	0.857	0.852	0.840	0.825
Physical quality of life index	0.787	0.776	0.727	0.731	0.661
Adult literacy	0.833	0.824	0.763	0.784	0.700
Infant mortality	0.760	0.736	0.718	0.703	0.651
Life expectancy	0.759	0.753	0.724	0.718	0.680

Notes and Sources as Appendix 2.

apita 1970-80 and socio-economic indicators for 1975,

1975	1976	1977	1978	1979	1980
0.528*	0.536*	0.559	0.627	0.613	0.613
0.633	0.640	0.630	0.671	0.695	0.695
0.492*	0.438*	0.488*	0.502*	0.499*	0.522*
0.709	0.699	0.688	0.774	0.783	0.769
0.500*	0.491*	0.527*	0.547	0.507*	0.510*
0.494*	0.423*	0.420*	-	-	-
0.542	0.511*	0.541	0.602	0.576	0.574
0.552	0.495*	0.500*	0.476*	0.463*	0.460*
0.765	0.721	0.691	0.748	0.771	0.776
0.618	0.561	0.538	0.596	0.596	0.605
0.621	0.563	0.518*	0.581	0.604	0.614
0.630	0.568	0.553	0.579	0.555	0.563
0.630	0.574	0.560	0.635	0.629	0.635

APPENDIX 12. Coefficients of Rank Correlation between GNP per capita 1970-80 and socio-economic indicators for 1975, small developing countries with modest resources.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Daily per capita calorie supply	0.512	0.541	0.592	0.589	0.577	0.581	0.568	0.531	0.537	0.476	0.437
Daily per capita protein supply	-	-	-	-	-	-	-	-	0.326*	-	0.319*
Hospital beds per 1000	0.513	0.529	0.562	0.622	0.602	0.588	0.511	0.522	0.467	0.490	0.458
Physicians per 1000 population	0.903	0.899	0.871	0.862	0.888	0.871	0.892	0.855	0.785	0.742	0.748
Nurses per 1000 population	0.631	0.663	0.689	0.718	0.651	0.638	0.603	0.557	0.531	0.498	0.453
Primary school enrollment rate	0.642	0.654	0.678	0.678	0.686	0.700	0.670	0.686	0.650	0.641	0.644
Secondary school enrollment rate	0.812	0.803	0.813	0.794	0.827	0.827	0.822	0.808	0.703	0.682	0.669
Combined primary and secondary enrollment	0.687	0.682	0.687	0.676	0.709	0.717	0.711	0.728	0.652	0.630	0.638
Telephones per 1000 population	0.887	0.890	0.900	0.900	0.934	0.925	0.912	0.892	0.867	0.814	0.792
Physical quality of life index	0.768	0.764	0.736	0.713	0.764	0.737	0.744	0.745	0.674	0.647	0.656
Adult Literacy	0.651	0.636	0.616	0.581	0.640	0.621	0.627	0.631	0.559	0.537	0.545
Infant mortality	0.673	0.668	0.633	0.619	0.683	0.650	0.656	0.659	0.605	0.572	0.565
Life expectancy	0.812	0.817	0.796	0.792	0.827	0.806	0.803	0.806	0.740	0.717	0.713

Notes and Sources as Appendix 2.

APPENDIX 13. Coefficients of Rank Correlation between MVA per capita 1970-80 and socio-economic indicators for 1975, small developing countries with modest resources.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Daily per capita calorie supply	0.543	0.568	0.587	0.601	0.580	0.555	0.588	0.561	0.599	0.613	0.622
Daily per capita protein supply	-	-	-	-	-	-	-	-	-	-	0.296*
Hospital beds per 1000	0.444	0.432*	0.471	0.480	0.529	0.552	0.558	0.548	0.499	0.495	0.482
Physicians per 1000 population	0.891	0.891	0.882	0.885	0.889	0.870	0.871	0.886	0.855	0.841	0.863
Nurses per 1000 population	0.604	0.592	0.652	0.640	0.627	0.623	0.630	0.596	0.591	0.574	0.582
Primary school enrollment rate	0.594	0.596	0.610	0.606	0.621	0.603	0.616	0.614	0.621	0.625	0.616
Secondary school enrollment rate	0.778	0.767	0.775	0.771	0.761	0.741	0.747	0.728	0.681	0.682	0.665
Combined primary and secondary enrollment	0.645	0.642	0.645	0.633	0.628	0.615	0.636	0.632	0.623	0.614	0.599
Telephones per 1000 population	0.862	0.857	0.873	0.901	0.904	0.897	0.899	0.881	0.882	0.870	0.853
Physical quality of life index	0.764	0.770	0.762	0.768	0.778	0.771	0.782	0.792	0.745	0.741	0.736
Adult literacy	0.677	0.692	0.680	0.668	0.683	0.676	0.686	0.699	0.654	0.653	0.652
Infant mortality	0.659	0.655	0.651	0.664	0.672	0.686	0.696	0.694	0.634	0.628	0.608
Life expectancy	0.789	0.797	0.785	0.814	0.819	0.805	0.811	0.811	0.768	0.767	0.759

Notes and Sources as Appendix 2.

APPENDIX 14. Median values of socio-economic indicators, 1975

	small developing countries with ample resources	small developing countries with modest resources	large developing countries	newly-industrializing countries
Daily per capita calorie supply	2460	2141	2198	2655
Daily per capita protein supply	61.4	57.7	58.0	70
Hospital beds per 1000	3.75	1.69	1.0	3.6
Physicians per 1000 population	0.37	0.09	0.29	0.63
Nurses per 1000 population	1.20	0.44	0.22	0.66
Primary school enrollment rate	92.5	83	78.5	102.5
Secondary school enrollment rate	44.5	16	26.5	47.5
Combined school enrollment rate	74.5	58	60.0	78
Telephones per 1000 population	2.6	0.9	0.9	4.5
Physical quality of life index	70.8	37.1	48.1	81.0
Adult literacy	69	48	64.5	76
Infant mortality	76	125	118.5	59
Life expectancy	64	50	51.5	65

Notes and Sources as Appendix 2.