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A DECOMPOSITION ANALYSIS OF MANUFACTURING VALUE ADDED AND STRUCTURAL CHANGE BY INDUSTRY AND REGION, 1963–80

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I. INTRODUCTION

THE 1980s have ushered in a period of uncertainty, instability, and difficult adjustment for the world economy. Exchange rates of the major currencies have fluctuated to an unprecendented extent. The recession at the beginning of the decade brought about an absolute fall in GDP, and not just a decline in positive growth, in some OECD countries. Developing countries have been especially vulnerable to the multiple external shocks that occurred towards the end of the 1970s and the beginning of the 1980s—falling commodity prices and the consequent worsening of the terms of trade for exporters of primary products; a steep rise in the price of oil and its subsequent fall in 1985; the recession of 1980–82 in developed countries followed by sluggish growth; the sudden rise in nominal and real interest rates reversing the assumptions under which large debts have been contracted; and the volatility in the exchange rates of their major trading partners. These shocks were not the cause but the symptoms of fundamental disequilibrium in the world industrial economy, including global trade imbalances and the inadequacy of an international financial system that does not permit adjustment of imbalances without causing a growth recession; and disruption of the industrialization process in developing countries.

There seems to be growing evidence for the negative consequences of these external shocks for the manufacturing sectors of developing countries. For instance, there have been marked reductions in real manufacturing investment and output as a result of sharp cutbacks in imports of industrial intermediate goods and capital goods as part of adjustment measures to alleviate the worsening current account imbalances caused by these shocks. This may have dimmed the prospects for sustaining the momentum of rapid industrialization in developing countries which has been set in motion at the beginning of the 1960s and accelerated throughout the decade of the 1970s.

One of the major findings of this study is that during the decades of the 1960s and the 1970s, most traditional manufacturing industries in the South had been growing steadily despite the shrinking shares of these industries in world total

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manufacturing production, and, even more importantly, the South's gains had been based on internally generated economic forces. Now, the crucial question remains open as to how much of these gains made by the South has been eroded or whether the momentum of rapid industrialization in the South has been slowed or even reversed by the simultaneous impacts of multiple external shocks in the 1980s. Before attempting to answer this question, it may be necessary to have a solid grasp of structural transformation which had occurred over the period of 1960–80.

In recent years much attention has been focused on two interrelated development issues—the growing interdependence and structural change in the world economy. The increasing internationalization of trade, production, and finance combined with the intensified development efforts of developing countries has contributed to a significant structural change in many national economies and resulted in the continuously shifting international division of labor.

Structural change is broadly viewed here to include the whole range of interrelated changes in the structure of an economy in the development process. This includes a shift in such variables as the composition of demand, product mixes, sectoral composition of employment, as well as the external structure of trade and capital flow.

While economic growth remains as one of the most important development objectives, structural change that transforms a traditional agrarian economy into a modern industrial economy has been accorded equally high, if not greater, priority by many development planners and policymakers. It reflects a commonly held view that structural change may not necessarily lead to rapid economic growth in the short run but is a *desideratum* for developing the productive capacity to expand and sustain output, employment, and welfare of an economy in the long run.

Central to the study of structural change are, among other things, the patterns of sectoral change, namely the change in the sectoral composition of output and employment. For instance, it has been amply documented that the relative share of industry and particularly manufacturing in GDP increases with the rising per capita income. With this perspective in mind, we attempt to examine systematically the patterns of manufacturing value added (MVA) growth of twenty-eight manufacturing industries in various regions of both the North and the South in the period of 1963–80. The relatively narrow focus of this study on the manufacturing sector may be partly justified, given the pivotal role that industrialization plays in structural change and economic development and given a common perception that the development of manufacturing industries is the most critical element of industrialization.

Moreover, we attempt to decompose the sources of MVA changes into three elements attributable to: the global economic effect, the individual industry effect, and the regional effect. Our main objective is served by the identification of regional growth or decline in the MVA of an industry which is region-specific. Put slightly differently, the regional effect component would permit us to determine the magnitude of the contribution of endogenous growth factors such as a

region's capacity to expand its share of the world MVA growth, independently of the general fluctuations of the world economy. This has an important implication for a South-South industrial cooperation strategy, since the question of whether such a South-South scheme is viable and sustainable depends on the vulnerability of the South's economy to the rise and fall of the world economy.

Likewise, global and industrial components may enable us to gauge the increasing sensitivity of manufacturing activities in various regions, particularly in the North, to the global interdependence factor and the dynamics of shifting comparative advantage. In this context, there is mounting evidence that the traditional manufacturing industries in the North are rapidly losing their comparative advantage to the South and an empirical measurement of this shift in the international division of labor would be useful.

II. THE PATTERNS OF MVA GROWTH BY REGION IN 1963–80

The statistical data used for this study was from UNIDO data base. MVA data for the ISIC twenty-eight three-digit manufacturing industries in 1975 constant prices were examined for three subperiods of 1963–67 (period 1), 1967–73 (period 2), and 1973–80 (period 3). The division of the 1963–80 period into three subperiods was primarily dictated by a discernible trend in the average annual increase in MVA of both developed economies and developing countries within each subperiod identified.

It is obvious that the way country data is aggregated would have a significant bearing on statistical results of any empirical analysis. But there are no hard-and-fast rules for country grouping. Usually, country grouping can be done either by the criteria of geographic proximity or by some common country characteristics such as stages of development (proxy by per capita income), country size, natural resource endowments, trade orientation, and so on, or a combination of both approaches. This study adopted a hybrid method of country grouping based on both income criteria and geographic proximity. Namely, first, using the 1982 per capita income of U.S.$300 as a cutoff line, developing countries are divided into two groups—low-income developing countries and middle-income developing countries. Then, within each income group, countries are further grouped according to geographic proximity. As a result, six regional groups for developing countries emerged: for low-income country group, Indian Sub-Continent (LIS) and Africa (LAF); for middle-income country group, Asia (MAS), the Middle East and North Africa (MME), Africa (MAF), and Latin America (MLA). Likewise, among developed countries, Western Europe is divided into two groups, advanced Western Europe (WE1) and newly industrialized Western Europe (WE2), using the income criteria, and the rest of the grouping consists of North America (NA), Japan (JP), Eastern Europe (EE), and other developed countries (OD). A total of twelve regions (six developed, six developing) were covered in the study sample. Countries with a population of less than one million in 1980 were excluded from the sample. Also conspicuously missing in the sample is centrally planned Asia region, mainly

TABLE I

REGIONAL SHARE OF WORLD MVA FOR SELECTED YEAR

(%)

300 Total Manufacturing	1963	1967	1973	1980
Total value (U.S.$ million, 1975 prices)	802,310	1,022,987	1,505,288	1,897,032
Total developing	7.35	7.45	8.07	9.52
Total low income	1.40	1.32	1.06	1.04
LIS	1.30	1.20	0.90	1.00
LAF	0.10	0.10	0.10	0.08
Total middle income	5.95	6.13	7.01	8.47
MAS	0.70	0.70	0.90	1.40
MME	0.70	0.70	0.80	0.90
MAF	0.20	0.20	0.30	0.30
MLA	4.40	4.60	5.10	5.90
Total developed	92.65	92.55	91.93	90.48
NA	29.10	29.50	26.30	23.70
WE1	34.10	30.60	28.80	24.60
WE2	2.60	2.90	3.40	3.70
JP	6.50	7.80	9.60	9.30
EE	18.10	19.70	21.80	27.40
OD	2.20	2.10	2.00	1.80

Source: UNIDO data base.

China because of the unavailability of 1980 data. The composition of each region grouped from a sample of seventy-four countries is summarized in Appendix Table I.

Table I reveals an evolution in the pattern of MVA share by regions. First of all, the MVA share of the sample developing countries as a whole shows an unmistakable upward trend growing steadily from 7.35 per cent in 1963 to 9.52 in 1980, but at a far slower rate of growth than that required to attain the Lima target of 25 per cent.[1] Moreover, the aggregate figures disguise considerable variations among regions of both the South and the North. It is noteworthy that the MVA share of the low-income group, particularly that of low-income Africa (LAF) with a very small base to begin with, has been continuously sliding, while that of the middle-income group, notably the middle-income Asia (MAS) and

[1] The Lima target refers to the UNIDO's target to increase industrial production in the developing countries to at least 25 per cent of world industrial output by the year 2000. A trend least-squares fitted to the share data of the developing countries for the period of 1961–80 was

$$MVAS = 7.493 + 0.1488t, \qquad R^2 = 0.86,$$
$$(44.68) \quad (10.63)$$

where $MVAS$ is the South's share of world MVA and, numbers in parentheses are t-values. A trend projection up to the year 2000 based on the above equation gives only about 13.4 per cent, undershooting the 25 per cent target by a great margin. See [6].

middle-income Latin America (MLA), increased markedly during the period. Similarly, behind a general slow decline over time in the aggregate MVA share of total developed countries lies substantial regional differences. Eastern Europe (EE) and newly industrialized Western Europe (WE2) registered an appreciable gain in their respective MVA share, while the rest of the group showed a downward trend.

There is no commonly accepted method for measuring, testing, and comparing the extent of structural change that had occurred in various regions of the world during the period under consideration. The most serious problem encountered in developing such a measurement method is the nonexistence of an ideal norm against which actual performance could be compared. In the field of development economics, the notion of optimal structure of production of an economy is not only conceptually elusive and yet to be formulated, but also may vary over time and space as affected by a shift in the international division of labor and comparative advantage, thus making its empirical measurement extremely difficult.

In the absence of a theoretically sound measurement method, the study uses an ad hoc approach, making certain "heroic" assumptions. Namely, assuming that the industry share distributions of MVA in Japan and North America in 1980 reflect a desired, if not ideal, form of structure, we designated them as a benchmark against which changes in the industry share of all other regions are measured. Evaluation criteria used for this purpose are the inequality coefficients[2] (u) and the root-square mean error ($RSME$), i.e.,

$$u=[\sum_i(y_i^s-y_i^b)^2/\sum_i(y_i^b)^2]^{1/2},$$

$$RSME=[\sum_i(y_i^s-y_i^b)^2/N]^{1/2},$$

where

$y_i^b = i$th industry share of total MVA in the benchmark region,
$y_i^s = i$th industry share of total MVA in the sample region,
$N =$ the number of industries.

The $RSME$ and inequality coefficients of the share values of all regions for 1963 and 1980 are given in Table II. These figures in Table II provide an overall indication of how close the share distribution of a sample region in a given year came to the corresponding value of a benchmark region in 1980. It is obvious that the closer the share distribution of a sample region is to that of a benchmark region, the smaller the coefficient is, and zero if the two are identical in the extreme case.

Before discussing numerical results, it seems useful to describe briefly the structural characteristics of manufacturing industry in the benchmark regions of Japan and North America or the United States in this case because of its dominant position in this region.

Japan. Structural change in Japan has been dictated by the country's poor natural resource endowments and promoted by its resource-saving strategies and

[2] For a detailed explanation of the use of the inequality coefficient method, see [5].

TABLE II

A COMPARATIVE MEASURE OF STRUCTURAL CHANGE

	Inequality Coefficient				*RSME*			
	Bench Mark JP[a]		Bench Mark NA[b]		Bench Mark JP[a]		Bench Mark NA[b]	
	1963	1980	1963	1980	1963	1980	1963	1980
TDG	0.39565	0.209513	0.31397	0.150344	4.52799	3.29502	3.82487	2.64677
LIS	0.53803	0.259466	0.54326	0.233055	5.28025	3.66684	5.03126	3.29535
LAF	1.29656	0.687090	1.17516	0.592719	8.19687	5.96704	7.39983	5.25530
MAS	0.71236	0.327233	0.57738	0.266307	6.07578	4.11794	5.18686	3.52261
MME	0.78592	0.606578	0.69860	0.552690	6.38177	5.60654	5.70541	5.07474
MAF	0.39624	0.406063	0.30406	0.322946	4.53136	4.58721	3.76404	3.87916
MLA	0.33356	0.167025	0.25014	0.111746	4.15755	1.94200	3.41403	2.28186
TDD	0.09173	0.040442	0.04623	0.014572	2.18027	1.44767	1.46761	0.82400
NA	0.09160	0.052688	0.03371	0.000000	2.17876	1.65236	1.25319	0.00000
WE1	0.07518	0.048421	0.04067	0.014766	1.97383	1.58406	1.37666	0.82948
WE2	0.30700	0.178045	0.24356	0.124231	3.98860	3.03750	3.36787	2.40596
JP	0.14326	0.000000	0.11611	0.058596	2.72465	0.00000	2.32594	1.65236
EE	0.20162	0.086560	0.16899	0.074556	3.23232	2.11792	2.80611	1.86387
OD	0.15685	0.151793	0.09316	0.080164	2.85100	2.80464	2.08344	1.93270

Source: UNIDO data base.

[a] Industry share of total MVA in Japan, 1980 used as a benchmark.

[b] Industry share of total MVA in North America, 1980 used as a benchmark.

an industrial organization to accomodate them. The thrust of this structural change has been towards miniaturization, a product mix using less imported inputs, increasing the information content of products coupled with "just-in-time" inputs inventory management. All these factors contributed to greater efficiency in the manufacturing sector of Japan with electronics playing a dominant role.

High technology has been the most important driving force behind structural change of the manufacturing sector in Japan. Investment in high-technology inputs was often promoted to revitalize stagnant or declining industries such as the material industries. High-technology investment was also used to stimulate further rapidly growing industries such as the processing and assembly industries. For capital goods industries such as electrical and nonelectrical machinery and precision instruments, high technology is both an input and an output, thus strengthening both backward and forward inter-industry linkages and contributing to the rapid growth of their markets.

The United States. In the United States, as in Japan, high technology played a critical role in fostering growth and restructuring the manufacturing sector. High-technology products include, among other things, office and computing machines, copiers and related equipment, electronics, communications, electronic components, and medical instruments. The average annual growth rate in high-technology products was 14 per cent in 1977–84, or nearly five times the overall average. Particularly, office and computing machines registered a remarkable growth rate of 22 per cent a year in this period.

By contrast, other manufacturing industries have experienced a sluggish growth

or even stagnation in 1977–84. They include farm equipment, shipbuilding, primary metals, leather, and leather products. In general, space equipment was the fastest growing sector over 1977–84 period with a growth rate of 6.7 per cent per annum, followed by business equipment with 4.4 per cent and consumer goods with 2.4 per cent.

Structural change in the manufacturing sector required heavy investment both in Japan and in the United States. The average gross fixed capital formation in both countries exceeded 4.0 per cent per year in 1978–86 compared to the European rate of 1.0 per cent. Investment in Western Europe has been concentrated on rationalization and reduction of overmanning, while in Japan it has focused on capacity expansion and in the United States on the growing demand for private sector services.

Numerical results in Table II show among other things.

(1) Whether measured against Japan or North America as a benchmark region, both *u* coefficients and *RSME* for the low-income Africa (LAF) in both 1963 and 1980, are largest among twelve regions. It seems to suggest that LAF resembles least JP or NA in the structure of production among all sample groups, reflecting still the embryonic stages of industrialization in this region. It is worth noting, however, that both coefficients were considerably reduced between 1963 and 1980 in the same region. For instance, *u* coefficient fell to 0.6871 from 1.2965 and *RSME* to 5.967 from 8.1969 as measured against Japan as a benchmark region. This may imply that some positive structural change occurred between 1963 and 1980 in the region, although not enough. On the other hand, the coefficients for the middle-income Africa slightly increased between 1963 and 1980 and the gap between LAF and MAF was substantially reduced.

(2) It comes as no surprise that the coefficients for the Middle East and North Africa (MME) is one of the highest, only second to those of LAF, and worse yet, these coefficients changed little between 1963 and 1980. Many countries in the region are major oil exporters and tend to specialize in the production and exports of a few commodities and particularly crude oil. Despite their high per capita incomes, the structure of the economies in the region during the period of 1963–80 was basically dominated by the oil sector with a very narrow industrial base. However, all this may change drastically in the current decade, in view of recent massive investments in the physical and social infrastructure and energy-related downstream industries, particularly in the Gulf region. The 1980–90 statistics seem most likely to tell a different story of substantial structural transformation.

(3) Latin America (MLA) yielded the best indicators of structural change among all regions in the South. In fact, MLA's coefficients are strikingly close to those of newly industrialized Western Europe (WE2), perhaps signifying roughly the same degree of structural change which might have taken place in the two regions during the period under consideration. In this regard the middle-income Asia (MAS) which is mostly populated by NICs and near-NICs did not fare as well as LA, but a substantial decrease in the coefficients between 1963 and 1980 seems to point to the evidence that the region had undergone a significant structural change. Furthermore, the recent remarkable growth of production and exports in

the MAS region, albeit the unfavorable international economic environment, would seem most likely to present a quite different picture in the 1980s, portraying MAS as the most dynamic growth pole in the world. This would strike a sharp contrast to the worsening performance of MLA saddled with huge external debts.

(4) The results also show that developed Western Europe (WE1) was structurally much closer to JP and NA than WE2 and Eastern Europe (EE) vis-à-vis the two benchmark regions. Also the coefficients comparing two benchmark regions, Japan and North America, are markedly low, thus suggesting a remarkable similarity in the patterns of structural change between the two benchmark regions. Furthermore, the extent of structural change seems to be somewhat greater in Japan than in North America over the same period. For instance, Japan's *RSME* calculated from the formula using Japan as a benchmark shows the coefficient value of 2.7 in 1960, while a similar calculation for North America yields the value of only 1.3.

(5) Finally, on the whole, the results show a significant gap in structural balance between the North and the South both in 1963 and 1980, if the model of industrialization in Japan and North America is assumed to be patterned after. Of course, this particular assumption may be open to question.

III. A DECOMPOSITION ANALYSIS OF THE MVA CHANGES BY REGION AND INDUSTRY FOR THE PERIODS OF 1963–67, 1967–73, AND 1973–80

A. *Methodology*

The purpose of this section is to estimate the regional growth or decline in the MVA of an industry which is region-specific. The regional effect component is intended to provide a measure of the relative performance of the region in a particular industry, independent of the global economic conditions and the world-wide performance of the industry in question.

The analytical method used here is adapted partially from shift-share analysis which has been widely used as a forecasting technique for regional employment in the field of regional science.[3]

Let us define the following variables:

MVA_{ijt} = MVA of industry i in region j in period t,
$i = 1, 2, \ldots, n, \quad j = 1, 2, \ldots, m,$

r = percentage increase in total world MVA from period $t-1$ to period t,
r_i = percentage increase in world MVA of industry i from period $t-1$ to period t,

[3] The literature on shift-share analysis is quite extensive and there are numerous variants of the shift-share technique. For a critical review of the literature of shift-share as well as comprehensive bibliography on this subject, see [4]. Leamer and Stern [3] also developed independently a similar technique to analyze the relative performance of export growth in a particular country. For an empirical application of the constant market share analysis, see [1].

r_{ij} = percentage increase in MVA of industry i in region j from period $t-1$ to period t.

Now, for industry i in region j, we can derive the following mathematical identity.

$$\Delta MVA_{ijt} = MVA_{ijt} - MVA_{ij(t-1)}$$
$$= \underset{\text{(a)}}{rMVA_{ij(t-1)}} + \underset{\text{(b)}}{(r_i - r)MVA_{ij(t-1)}} + \underset{\text{(c)}}{(r_{ij} - r_i)MVA_{ij(t-1)}}.$$

The above equation decomposes the growth of MVA of industry i into three components attributable to:

(a) the global effect, r: the general rise in the total world MVA as a function of the world economic activity levels;

(b) the industry effect, $r_i - r$: the growth rate of MVA of industry i relative to the world average MVA growth. Thus, if the MVA of industry i is growing faster than the world average for all manufacturing industries, the term would be positive, and negative if the opposite holds; and

(c) the regional effect, $r_{ij} - r_i$: this term measures a differential growth rate of MVA in the same industry between a given region and the rest of the world.

Finally, we must consider some of the limitations associated with the application of the method presented above. First, the estimate is devoid of any causal relationships by nature of the identity relation. The technique is useful in disaggregating the past MVA growth into its different components but it fails to offer any explanations as to *why* a given component, for example, regional effect, is the dominant factor in explaining actual MVA changes in a given region. Nevertheless, the technique helps to identify the areas in which the explanations can be sought. Second, the technique is not stochastic in form and hence it is not valid for econometric projections: the procedure can be used only to analyze the ex post performance. Third, the conclusions drawn from a decomposition analysis are valid only for the particular time period chosen, the level of industry disaggregation used and the particular regional grouping adopted. An alternative set of these parameters may produce different results and perhaps variant conclusions.

B. *Empirical Results*

Table III summarizes the overall decomposition of MVA changes for the developing and developed countries groups into the three effects—global, industry, and regional—for three periods, 1963–67, 1967–73, and 1973–80.[4]

The presence of negative signs in the table seems confusing at first glance, but this can be readily clarified via an illustration. For instance, take the case of basic products in 1973–80 in Table III. For the developed countries, the actual MVA change of this industry was U.S.$55,996 million during the same period. If the MVA in basic products group were growing at the world average growth rate of total manufacturing for the period (25 per cent), the MVA change would have

[4] More detailed tables for the decomposition of MVA changes for twelve regions for the same periods are given in the unpublished appendices, and are available upon request.

TABLE III

A NORTH-SOUTH COMPARISON OF DECOMPOSITION OF MVA CHANGES, 1963–80

(%)

		1963–67				1967–73				1973–80			
		MVA[a]	*g*	*i*	*r*	MVA[a]	*g*	*i*	*r*	MVA[a]	*g*	*i*	*r*
Agro-food processing													
311	Developing	1,952	142.8	−39.1	−3.7	5,194	109.7	−46.1	35.3	5,938	72.3	−7.3	35.0
	Developed	16,880	137.2	−37.6	0.4	26,242	181.6	−74.6	−7.0	26,332	120.0	−12.1	−7.9
313	Developing	469	105.0	−12.3	7.3	1,310	81.3	−19.2	37.9	2,807	31.6	9.4	59.0
	Developed	3,857	114.3	−13.4	−0.9	6,664	140.7	−33.2	−7.4	6,902	95.5	28.5	−24.0
314	Developing	425	117.0	−55.7	38.7	668	157.6	−81.5	23.9	1,293	55.7	−5.5	49.8
	Developed	933	224.5	−106.9	−17.6	1,785	225.8	−116.8	−9.0	1,668	153.8	−15.2	−38.6
Total[b]													
	Developing	2,846	132.72	−37.16	4.44	7,172	108.97	−43.76	34.71	10,038	58.78	−2.40	43.62
	Developed	21,670	136.87	−36.27	−0.61	34,691	17 .02	−68.82	−7.18	34,902	116.77	−4.22	−12.55
Energy													
353	Developing	1,343	79.4	29.0	−8.4	3,378	72.8	23.1	4.1	3,694	57.8	−13.4	55.6
	Developed	4,009	71.1	26.0	2.8	8,786	77.2	24.4	−1.6	2,360	243.7	−56.6	−87.1
354	Developing	158	56.6	−33.1	76.5	333	68.4	−37.7	69.3	329	61.6	−23.3	61.7
	Developed	419	310.4	−181.5	−28.9	858	282.8	−155.9	−26.9	723	206.2	−78.1	−28.1
Total[b]													
	Developing	1,501	77.00	22.46	0.54	3,711	72.11	17.64	9.95	4,023	58.11	−14.21	56.10
	Developed	4,428	93.74	6.37	−0.20	9,644	95.44	8.36	−3.85	3,083	234.91	−61.44	−73.26

TABLE III (Continued) (%)

		1963–67				1967–73				1973–80			
		MVA[a]	*g*	*i*	*r*	MVA[a]	*g*	*i*	*r*	MVA[a]	*g*	*i*	*r*
Basic products													
341	Developing	485	82.4	−3.4	21.0	1,047	87.3	−7.5	20.2	1,167	63.5	−28.7	65.2
	Developed	6,423	105.9	−4.4	−1.6	13,216	111.2	−9.6	−1.6	5,280	208.7	−94.3	−14.4
351	Developing	668	52.6	44.0	3.4	2,363	38.8	24.2	36.9	2,472	43.3	7.5	49.2
	Developed	14,191	54.6	45.6	−0.2	31,549	63.3	39.5	−2.8	20,327	90.3	15.7	−6.0
352	Developing	1,435	55.2	16.1	28.7	3,011	67.5	7.6	24.8	5,234	34.7	17.3	47.9
	Developed	7,175	81.9	23.9	−5.7	14,222	94.6	10.7	−5.3	13,399	79.2	39.5	−18.7
361	Developing	96	122.6	−42.4	19.8	286	86.4	−4.1	17.7	357	56.3	9.1	34.6
	Developed	790	156.5	−54.1	−2.4	2,324	107.2	−5.1	−2.2	2,071	91.2	14.7	−6.0
362	Developing	199	61.8	6.2	32.0	618	49.3	6.4	44.4	795	39.5	18.9	41.6
	Developed	1,909	93.9	9.4	−3.3	4,211	94.3	12.2	−6.5	4,312	72.8	34.9	−7.7
369	Developing	609	84.7	0.9	14.5	1,731	67.7	3.8	28.5	2,862	36.6	−11.7	75.2
	Developed	6,972	100.2	1.0	−1.3	15,642	97.6	5.6	−3.2	5,942	200.7	−64.5	−36.2
371	Developing	811	92.4	−9.0	16.6	2,585	64.5	−7.6	43.2	4,374	34.7	−29.3	94.6
	Developed	12,692	111.9	−10.8	−1.1	25,620	118.4	−14.0	−4.4	−639	−3,495.2	2,947.9	647.3
372	Developing	435	65.5	17.5	16.9	808	85.9	5.9	8.3	935	60.5	−10.8	50.3
	Developed	4,826	80.1	21.4	−1.5	9,444	94.3	6.4	−0.7	5,304	132.6	−23.7	−8.9
Total[b]													
	Developing	4,738	70.37	10.22	19.32	12,449	63.85	5.36	30.78	18,196	39.97	−4.28	64.29
	Developed	54,978	88.23	13.44	−1.68	116,228	93.86	9.47	−3.33	55,996	154.13	−33.24	−20.90

TABLE III (Continued)

(%)

		1963–67				1967–73				1973–80			
		MVA[a]	g	i	r	MVA[a]	g	i	r	MVA[a]	g	i	r
Light industry													
321	Developing	1,115	203.6	−91.8	−11.8	3,761	117.5	−25.6	8.1	2,979	109.4	−65.2	55.7
	Developed	6,938	178.6	−80.5	1.9	18,878	12 .9	−28.3	−1.6	5,456	322.6	−192.1	−30.4
322	Developing	600	94.7	−40.0	45.3	620	20 .7	−55.7	−47.0	575	141.8	−55.7	13.9
	Developed	4,284	184.2	−77.8	−6.3	11,565	13 .4	−36.9	2.5	6,632	166.7	−65.5	−1.2
323	Developing	73	187.3	−137.3	50.1	117	22 .7	−146.3	16.6	305	55.9	−26.3	70.4
	Developed	356	413.4	−303.2	−10.3	957	281.2	−179.1	−2.0	661	250.3	−117.8	−32.5
324	Developing	184	131.4	−66.7	35.3	148	33 .6	−242.0	3.3	329	91.4	−34.5	43.1
	Developed	1,171	214.4	−108.8	−5.5	1,381	35 .5	−251.2	−0.4	1,664	174.2	−65.7	−8.5
331	Developing	250	170.4	−68.2	−2.3	747	11 .5	−27.9	14.3	1,032	61.3	−52.6	91.3
	Developed	2,988	166.3	−66.5	0.2	7,384	13 .4	−33.0	−1.4	58	12,176.7	−10,451.6	−1,625.1
332	Developing	228	99.8	−7.9	8.1	344	144.6	11.6	−56.2	671	51.8	−18.3	66.6
	Developed	3,475	109.2	−8.6	−0.5	8,988	9 .6	7.3	2.2	3,762	173.3	−61.4	−11.9
342	Developing	267	188.1	−35.9	−52.2	898	10 .9	−51.0	41.1	446	166.5	−41.2	−25.3
	Developed	7,251	121.2	−23.1	1.9	9,543	193.7	−89.8	−3.9	9,221	131.2	−32.5	1.2
355	Developing	313	92.6	−9.8	17.1	1,009	63.9	7.9	28.2	1,156	51.0	−16.1	65.0
	Developed	2,474	114.2	−12.0	−2.2	6,468	92.9	11.5	−4.4	2,516	189.6	−59.7	−29.9
356	Developing	251	63.2	101.4	−64.7	851	46.0	83.5	−29.5	702	59.5	32.0	8.6
	Developed	4,165	36.9	59.2	3.9	13,197	34.8	63.3	1.9	8,704	65.5	35.2	−0.7

TABLE III (Continued)

(%)

		1963–67				1967–73				1973–80			
		MVA[a]	*g*	*i*	*r*	MVA[a]	*g*	*i*	*r*	MVA[a]	*g*	*i*	*r*
381	Developing	1,079	61.9	4.3	33.7	2,110	78.4	5.2	16.4	2,784	50.1	−0.1	50.0
	Developed	14,689	95.8	6.7	−2.5	32,740	94.8	6.3	−1.1	23,049	106.2	−0.1	−6.0
Total[b]													
	Developing	4,360	125.89	−34.42	8.48	10,605	108.14	−14.75	6.60	10,979	78.97	−29.78	50.79
	Developed	47,785	126.08	−25.28	−0.78	111,101	113.23	−12.59	−0.64	61,723	152.03	−42.98	−9.02
Capital goods													
382	Developing	1,072	43.3	9.4	47.3	3,470	37.5	3.5	59.0	3,531	43.8	14.4	41.8
	Developed	24,226	83.9	18.2	−2.1	48,586	95.3	9.0	−4.2	46,969	77.6	25.6	−3.1
383	Developing	1,122	46.5	21.5	32.0	2,520	56.5	29.9	13.6	4,841	28.4	21.5	50.0
	Developed	19,004	69.6	32.2	−1.9	48,070	65.8	34.9	−0.7	47,866	59.8	45.3	−5.1
384	Developing	1,153	84.5	3.5	12.0	4,844	45.7	3.9	50.4	4,549	52.1	−2.9	50.8
	Developed	20,387	96.7	4.0	−0.7	44,681	97.1	8.3	−5.5	29,776	114.0	−6.3	−7.8
385	Developing	69	83.7	45.5	−29.2	232	56.7	20.4	22.9	311	40.8	67.1	−7.9
	Developed	7,319	64.6	35.1	0.3	15,662	73.8	26.6	−0.3	26,414	37.8	62.2	0.1
390	Developing	405	74.3	−1.2	26.9	221	319.8	−8.8	−211.0	876	48.8	26.7	24.5
	Developed	3,604	104.8	−1.8	−3.0	8,413	97.1	−2.7	5.5	9,681	66.0	36.2	−2.2
Total[b]													
	Developing	3,821	60.69	10.70	28.61	11,287	51.18	9.67	39.14	14,108	41.44	13.18	45.35
	Developed	74,540	82.87	18.58	−1.47	165,412	85.27	17.41	−2.67	160,706	71.80	32.21	−4.00

[a] In millions of 1975 U.S.$.

[b] Industry group totals and averages.

been U.S.$86,307 million, about 1.54 times the actual value. However, this value was partly offset by U.S.$18,613 million (−33 per cent) due to the sluggish performance in basic products relative to the world average, and by U.S.$11,703 million (−21 per cent) due to the negative regional effect. Thus, we arrive at the net MVA change of U.S.$55,996 million.

For analytical convenience, twenty-eight manufacturing industries were reclassified under five broad industrial groups; agro-food processing, energy, basic products, light industry, and capital goods. This was done mainly to articulate a broad sweep of structural change across industries and regions. However, this broad overview was often supplemented by a more detailed analysis of some significant developments at the individual industry level whenever appropriate.

The most striking outcome is the pervasive presence of positive regional effects in the South and the opposite of this situation in the North, consistently across industries and over time with few exceptions. Put slightly differently, MVA change was seen to be considerably more sensitive to the general global economic environment and the worldwide market conditions of individual industries in the North than in the South. This would seem to suggest that production and trade in the North has become increasingly internationalized, while the South has still abundant untapped potentials for increasing value added in many manufacturing activities at the regional levels.

Now we will turn to each broad industrial group.

1. *Agro-food processing*

The South secured an expanding share of total MVA change over time in this industry group as evidenced by the ratio of South-North MVA change being rapidly increased from 13 per cent in the first period (1963–67) to 21 per cent in the second period (1967–73) and almost 30 per cent in the final period (1973–80). Furthermore, regional growth factors as measured by regional effect coefficients played an increasingly important role in bringing about this change. For instance, only 4 per cent of the South's MVA change (U.S.$2,846 million) in agro-food processing was accounted for by the regional growth factor in the first period, but this proportion was markedly increased to 35 per cent in the second period and to 44 per cent in the last period. Meanwhiles, the North exhibited extreme sensitivity to the world economic condition and the general downward trend of the agro-food processing industry with little regional strength throughout the periods. The same patterns of change were more or less replicated at the individual industry levels, all pointing to a substantial gain in the regional strength as a significant factor explaining the industry's growth in the South, which sharply contrasted with the growing responsiveness of the North's industries to external factors.

2. *Energy*

The energy group, which is made up of only two industries, petroleum refining (353) and petroleum and coal products (354), was the only sector in which the South gained a greater share of total MVA change than the North. To be more precise, this has occurred only in petroleum refining which started out with the

South's MVA change amounting to less than half the North's in the first two periods, but the South's MVA growth surpassing the North's by one and a half times in 1973–80, primarily owing to the two oil price-hikes which occurred during the period. The regional coefficient for the South made a quantum jump from 4.1 per cent in 1967–73 to 55.6 per cent in 1973–80, while the North's regional coefficient dropped sharply from −1.6 per cent to −87.1 per cent, and the global effect drastically increased from 77.2 per cent to 244.0 per cent between the last two periods. This seems to underscore the growing fragility of the petroleum refining industry in the North. In a similar vein, region-specific factors explained more than 60 per cent of the MVA growth of petroleum and coal products in the South, while the same industry performance in the North was predominantly influenced by both the global and industry effects over the same periods.

3. *Basic products*

From the South's viewpoint, the basic products group as a whole registered the second best MVA growth performance, only behind the energy group. There was a remarkable increase in the South's MVA growth as per cent of the North's change starting from 8.6 per cent in 1963–67 to 10.7 per cent in 1967–73 and an abrupt increase to 32.5 per cent in 1973–80. The regional strength to sustain output in the South also dramatically improved in a similar fashion over time as the regional coefficient increased from 19 per cent in the first period to 31 per cent in the second period to 64 per cent in the last period. In sharp contrast, with its diminishing share of MVA change, the North's performance became progressively sensitive to the global effect, whose coefficient increased from 88 per cent in the first period to 154 per cent in the third period. At the individual industry level, the growth performance of iron and steel (371) casts a particularly interesting North-South contrast. The South's MVA change increased more than fivefold from U.S.$811 million to U.S.$4,374 million between the first period and the last period along with its markedly improved regional coefficient, while the North's MVA change initially doubled from U.S.$12,692 million to U.S.$25,620 million between the first two periods, only to experience a sudden decline in its MVA by U.S.$640 million between 1973 and 1980. Other notable industries in the South which were quantitatively significant in terms of output with exceptional performance compared with their counterparts in the North are industrial chemicals (351), other chemical products (352), and nonmetal products (369).

4. *Light industry*

In general, the light industry group in the South chalked up an impressive gain in its share of MVA growth vis-à-vis the North, although not as striking as the results achieved by the basic product group. The ratio of South-North MVA change remained almost constant around 9.5 per cent between the first two periods, but the ratio nearly doubled to 18 per cent in the third period. At the same time, the regional coefficient markedly increased from about 8 per cent in the first period to 50 per cent in the third period. This gain was equally matched by a substantial

decrease in the proportion of MVA change which was explained by the world economic conditions, a drop from 125 per cent to about 79 per cent. However, the relatively poor growth performance of the light industry group worldwide seems to have prevented this industry group in the South from growing faster, as explained by sizable negative values of the industry effect. What happened to the light industry group in the North is the opposite of the situation in the South. Namely, the predominant portion of MVA change in the light industry group in the North was accounted for by the global economic situation and the worldwide growth performance of the industry under consideration.

The most important industries within the light industry group in terms of MVA change include:

(1) The textile industry (321) in the South sustained its steady growth over the periods, countering its worldwide downward trend which affected adversely the growth performance of the industry in the North. The region-specific factors also became increasingly important in explaining the South's growth in the most recent period.

(2) The wood products industry (331) witnessed a dramatic reversal of the dominant position between the North and the South. The MVA growth in the North was over fifteen times that of the South in the initial period, U.S.$228 million in the South to U.S.$2,988 million in the North. But the South's figure jumped to U.S.$1,032 million while the North's value shrunk to a trifling U.S.$58 million in the last period. Meanwhile, the South's capacity to generate growth internally increased tremendously, while the North's performance became extremely dependent on the external factors.

(3) The South made a hefty gain in the rubber products industry (355) along with its considerably strengthened regional effects. The MVA change of the industry in the South was up sharply to U.S.$1,000 million from U.S.$313 million between the first two periods and stayed at the same plateau in the last period. However, the North's gain was also equally remarkable, almost tripling from U.S.$2,474 million to U.S.$6,468 million between the first two periods, but subsequently dropped to the previous level of almost U.S.$2,500 million. In the mean time, the global and industry effects became dominant factors in explaining the North's growth performance.

(4) In the metal products industry (381), both the North and the South enjoyed considerable MVA gains throughout the periods, although the ratio of South-North MVA growth slightly improved over time in favor of the South. Also the North's growth tends to be more sensitive to the external forces than the South.

5. *Capital goods*

The development of the capital goods industries is commonly seen as one of the most essential ingredients required to accelerate technological advances and achieve industrial maturity of the developing countries. Yet, the empirical evidences seem to suggest that the South's gains in this critical sector during the periods were least impressive as compared with progresses made in other sectors. The ratio of South-North MVA change increased steadily but slowly from about 5 per

cent in 1963–67 to 7 per cent in 1967–73 and to slightly less than 9 per cent in 1973–80. Unlike previous cases, there were no striking changes in all coefficients for global, industry, and regional effects in both the North and the South. It appears that the North clearly maintains a firm control over the production of capital goods and the South is yet to make any significant dent on the dominant position of the North in this important sector.

There are, however, considerable inter-industry variations within the capital goods sector in terms of the North-South performance. For instance, the South made a remarkable inroad towards the enlargement of its share of world MVA growth in the transport equipment industry (384) as the South's MVA change as per cent of the North's rapidly climbed from about 6 per cent in the initial period to 11 per cent in the second period and further up to 15 per cent in the third period. There was also a parallel growth in the South's capacity to generate MVA in this industry on its own strength, as shown by a notable increase in the regional coefficients from 12 per cent to around 50 per cent between the first and third periods. By sharp contrast, the South's MVA growth in the professional and scientific goods industry (385) was trifling small relative to that of the North throughout the periods, never exceeding 1.5 per cent of the North's growth. Meanwhile, the South's performance in machinery (382) and electrical machinery (383) comes between these two extremes. In the machinery industry the South's MVA growth as per cent of the North's increased somewhat from 4 per cent to 7 per cent initially and remained at the same level thereafter with the regional coefficient varying between 40 and 60 per cent. Likewise, in the electrical machinery industry, the ratio of South-North MVA change increased twofold from 5 per cent to 10 per cent between the last two periods along with a remarkable increase in the regional coefficient from 13 per cent to 50 per cent. On the whole, there were signs of budge-oning growth of the capital goods industry in the South but such growth was confined to a handful of countries in a few isolated regions in the South, namely Latin America, and South and Southeast Asia.

The importance of capital goods industry is underscored by empirical evidence that trade in capital goods has a much greater tendency to be two-way trade or intra-industry trade than is the case for labor-intensive goods.[5] In view of the embryonic stage of development of the capital goods industry in developing countries, it appears that a tremendous potential for intra-industry trade in investment goods among developing countries has so far not yet been exploited.

Even a cursory examination of the more detailed unpublished tables for the decomposition of MVA change by twelve regions would readily reveal substantial variations among the regions. But the limitation of space simply does not permit a full account of MVA changes for twenty-eight industries in the twelve regions covering the three periods.

C. *Regression Analysis*

As stated earlier, the decomposition analysis could not offer any explanations of the causal factors underlying the relative regional strength of a particular industry

[5] For an empirical analysis of intra-industry trade among developing countries, see [2].

in a particular region, as measured by the regional coefficient. Obviously, the region-specific ability to generate and sustain the MVA growth of an industry independently of external influences could be affected by a whole host of factors such as natural resource endowments, trade regimes, technological capacity and skill levels, market size, relative factor costs, physical and social infrastructure, and many other socioeconomic variables. These factors vary vastly from region to region. Therefore, given the diversity and heterogeneity of these regions, each region may have to be examined separately.

It is, however, beyond the scope of this study to carry out such a comprehensive study of causal factors for each region's strengths and weaknesses of the manufacturing sector and its component industries. Instead, we develop an ad hoc general hypothesis about what might explain inter-regional and inter-industry differences in the regional effect and statistically test its validity, using cross-section and time-series pooled data for each industry. It must be noted that the empirical results presented here only serve to determine the general empirical validity of a set of the variables which are postulated to have an explanatory power on the regional effect. The results do not apply to the special conditions of any specific region.

The following functional specification was used for this purpose:

$$X_{ij}=a+b_1\ln y+b_2(\ln y)^2+cN+d_1\ln(I/GNP)+d_2\ln(XP/GNP)+d_3\ln(XM/GNP),$$

where

X_{ij} = calculated regional effect of ith industry in jth region,
y = per capita income,
N = population,
I/GNP = ratio of investment to GNP,
XP/GNP = primary exports as per cent of GNP, and
XM/GNP = manufacturing exports as per cent of GNP and ln represents a natural-log transformation of the variable.

Per capita income was included as a proxy variable for the stages of development. It is based on the hypothesis that as a country or a region advances along the path of industrialization, so does its capacity to generate the growth of MVA internally up to a certain point. While industrialization broadens a regions' capacity to increase MVA, it tends to integrate progressively the region's economy into the world economy. At the same time, industrial performance becomes increasingly sensitive to external factors such as world economic conditions and the worldwide growth performance of a given industry rather than region-specific factors. Therefore, the importance of regional effect is expected to diminish, while global and industrial effects would become a dominant factor in explaining the MVA growth, once a region achieves industrial maturity. Furthermore, the patterns of this change may be approximated by a nonlinear form, i.e., a log-quadratic function in this case. Theoretically correct signs should be plus for the linear term and minus for the quadratic term, reflecting a diminishing rate of increase of the regional effect in proportion to increasing per capita incomes.

It is further postulated that a region's capacity to generate the MVA growth is positively related to market size (N), and a region's rate of resource mobilization, i.e., the share of capital formation in GNP (I/GNP), and negatively related to a region's relative endowments of natural resources which is measured by the two variables, the share of primary exports in GNP (XP/GNP) and the share of manufacturing exports in GNP (XM/GNP). It is well known that specialization in the production and exports of primary commodities tends to delay or even impede industrialization. It is equally obvious that manufacturing export-led growth would make an economy more open and sensitive to changing international economic conditions.

The goodness of fit for the estimated equations as measured by R^2 ranged from 0.09 to 0.81 but the majority of the equations (twenty-one out of twenty-nine equations) had a reasonably good fit with R^2 of over 0.5 (see Table IV). In fact, the results turned out to be better than expected, since cross-section data tend to yield poorer fits than time-series data. Furthermore, most of the sectoral equations have correct signs for their variables except for population (N).

Now, turning to the individual variables, the regression results generally support the conceptual hypothesis about the relationship between per capita incomes and the regional effect as described by a log-quadratic function. In other words, the regional effect is expected to increase in a decreasing rate as per capita incomes rise, and become negative, once per capita incomes reach a critical level. For this relationship to hold, the sign for the linear term must be plus and the quadratic term negative. Generally, this is the case. Out of twenty-nine sectoral equations estimated, only four have wrong signs. But only twelve estimated equations have statistically significant coefficients for both linear and quadratic terms at the 95 per cent confidence level.

It can be readily seen that the elasticity of regional effect with respect to income, i.e.,

$$e=(y/X)(\partial X/\partial y)=(1/X)(b_1+2b_2\ln y),$$

decreases as per capita incomes rise for $b_1>0$ and $b_2<0$. This means that the regional effect becomes progressively smaller, eventually diminishes to zero, and then become negative, as per capita incomes continuously rise. Also setting $e=0$ and solving for y will give the value of a threshold per capita income beyond which the elasticity becomes negative, ceteris paribus.

It seems reasonable to expect that the region's capacity to generate the MVA growth from internal sources is positively related to the extent of resource mobilization within the region which is roughly measured by the share of investment in GNP (I/GNP). The empirical results clearly confirm this expectation. Only five among twenty-nine coefficients have a wrong sign and more than half of them are statistically significant at the 95 per cent confidence level . More importantly, the results show that the elasticity of the investment share in GNP is considerably larger than that of the primary export share in GNP or the manufacturing export share in GNP in most cases. This implies that resource mobilization and expansion of productive capacity is likely to have a greater impact on the endogenous growth of a region than trade promotion guided by natural resource endowments.

TABLE IV

REGRESSION ANALYSIS OF REGIONAL EFFECT DETERMINANTS

ISIC		Constant	Regression Coefficients			ln (*I*/*GNP*)	ln (*XP*/*GNP*)	ln (*XM*/*GNP*)	R^2	*DW*	*n*
			ln*y*	$(\ln y)^2$	*N*						
311	Food products	−18,621.10*	5,914.36*	−477.50*	−0.56	825.09	−574.01*	−66.91	0.72	2.35	27
		(−3.362)	(2.94)	(−3.33)	(−0.54)	(1.04)	(−2.50)	(−0.35)			
313	Beverages	−6,255.10	2,118.62	−157.75	0.42	6.23	−218.93	−291.00*	0.41	2.00	27
		(−1.61)	(1.50)	(−1.56)	(0.57)	(0.01)	(−1.35)	(−2.14)			
314	Tobacco	−2,643.66*	732.25*	−61.50*	−0.03	209.08*	−32.77	44.77	0.81	2.31	27
		(−3.86)	(2.95)	(−3.46)	(−0.21)	(2.13)	(−1.15)	(1.88)			
321	Textiles	−4,517.67	1,135.11	−124.14	−1.83	1,569.09	−684.30*	−516.94*	0.48	2.01	27
		(−0.54)	(0.37)	(−0.57)	(−1.17)	(1.31)	(−1.97)	(−1.78)			
322	Wearing apparel	−4,683.63	1,097.92	−109.483	−1.40*	1,063.82*	−287.56*	−161.84	0.65	2.08	27
		(−1.21)	(0.78)	(−1.09)	(−1.93)	(1.92)	(−1.79)	(−1.20)			
323	Leather and products	−920.21	200.01	−20.54	−0.25	248.61*	−76.36*	−43.02	0.61	2.44	27
		(−1.11)	(0.66)	(−0.95)	(−1.60)	(2.09)	(−2.22)	(−1.49)			
324	Footwear	−2,937.71*	898.29*	−79.62*	−0.67*	347.40*	−164.05*	−5.10	0.75	2.32	27
		(−2.25)	(1.89)	(−2.35)	(−2.72)	(1.85)	(−3.02)	(−0.11)			
331	Wood products	−5,730.08*	1,983.68*	−149.69*	0.65	−189.06	−57.53	−12.51	0.32	2.26	27
		(−1.90)	(1.81)	(−1.91)	(1.14)	(−0.44)	(−0.46)	(−0.12)			
332	Furniture fixtures	−5,894.20*	2,215.66*	−158.52*	0.70	−622.14	73.27	−3.42	0.37	2.01	27
		(−2.20)	(2.28)	(−2.29)	(1.39)	(−1.62)	(0.66)	(−0.04)			

TABLE IV (Continued)

ISIC		Constant	Regression Coefficients			ln (*I*/*GNP*)	ln (*XP*/*GNP*)	ln (*XM*/*GNP*)	R^2	*DW*	*n*
			ln*y*	$(\ln y)^2$	*N*						
341	Paper and products	−5,787.22*	1,645.10*	−141.76*	−0.92*	754.18*	−347.22*	−61.19	0.79	2.57	27
		(−3.02)	(2.36)	(−2.85)	(−2.55)	(2.74)	(−4.36)	(−0.92)			
342	Printing and publishing	−1,588.45	631.64	−48.27	−0.22	−117.60	2.44	−35.20	0.09	2.09	27
		(−0.40)	(0.44)	(−0.47)	(−0.29)	(−0.21)	(0.02)	(−0.25)			
351	Industrial chemicals	−10,463.85	3,269.59	−291.39	−1.95	1,730.89	−148.39*	−696.06	0.47	2.47	27
		(−0.91)	(0.79)	(−0.98)	(−0.91)	(1.06)	(−2.42)	(−1.75)			
352	Other chemical products	−7,109.14	1,215.45	−131.40	−1.65	2,586.72*	−970.60*	−598.63*	0.52	2.22	27
		(−0.84)	(0.39)	(−0.60)	(−1.04)	(2.13)	(−2.76)	(−2.03)			
353	Petroleum refinery	−12,052.86*	3,398.61*	−272.31*	−0.22	729.78	−150.05	60.08	0.61	2.22	27
		(−2.85)	(2.22)	(−2.49)	(−0.27)	(1.21)	(−0.86)	(0.41)			
354	Petrol and coal products	−195.81	−112.72	1.93	−0.33	414.00*	−130.19*	−98.36*	0.54	1.94	27
		(−0.17)	(−0.27)	(0.06)	(−1.52)	(2.47)	(−2.68)	(−2.41)			
355	Rubber products	−4,458.21*	1,135.91*	−100.31*	−0.45	656.37*	−194.96*	−29.66	0.71	2.13	27
		(−2.39)	(1.68)	(−2.08)	(−1.28)	(2.46)	(−2.52)	(−0.46)			
356	Plastic products	2,862.65	−685.64	52.69	−0.10	−44.61	−176.01	−255.36	0.12	2.02	27
		(0.50)	(−0.33)	(0.36)	(−0.10)	(−0.06)	(−0.75)	(−1.29)			
361	Pottery china, etc.	−1,679.94	497.79	−42.55	−0.30	252.49	−156.18*	−124.88*	0.66	2.33	27
		(−1.42)	(1.16)	(−1.39)	(−1.34)	(1.49)	(−3.18)	(−3.03)			
362	Glass and products	−3,800.66*	1,125.18*	−87.28*	0.10	123.98	−32.72	−53.73	0.61	2.14	27
		(−2.75)	(2.24)	(−2.43)	(0.38)	(0.63)	(−0.57)	(−1.12)			

TABLE IV (Continued)

ISIC		Constant	Regression Coefficients			ln (*I*/*GNP*)	ln (*XP*/*GNP*)	ln (*XM*/*GNP*)	R^2	*DW*	*n*
			ln*y*	$(\ln y)^2$	*N*						
369	Nonmetals products	−11,939.49* (−2.80)	3,312.15* (2.14)	−277.56* (−2.51)	−0.82 (−1.03)	1,316.13* (2.15)	−522.80* (−2.95)	−183.07 (−1.23)	0.72	2.42	27
371	Iron and steel	−25,445.95* (−2.90)	6,414.41* (2.02)	−566.59* (−2.49)	−3.10 (−1.88)	4,126.04* (3.28)	−1,445.43* (−3.97)	−189.82 (−0.62)	0.78	2.41	27
372	Nonferrous metals	−6,693.38* (−1.96)	1,642.38 (1.32)	−148.45 (−1.68)	−0.96 (−1.49)	1,055.57* (2.16)	−267.90* (−1.89)	30.26 (0.25)	0.64	2.14	27
381	Metal products	−20,023.10* (−1.73)	4,789.86 (1.14)	−463.55 (−1.54)	−4.14* (−1.91)	4,364.84* (2.63)	−1,473.52* (−3.07)	−471.97 (−1.17)	0.71	2.27	27
382	Machinery	−12,541.51 (−0.68)	1,444.05 (0.22)	−246.80 (−0.52)	−5.78 (−1.67)	7,177.12* (2.72)	−2,684.49* (−3.52)	−1,676.00* (−2.62)	0.66	2.14	27
383	Electrical	−7,542.23 (−0.41)	−1,788.71 (−0.27)	−50.58 (−0.11)	−8.17* (−2.37)	9,134.35* (3.47)	−2,148.69* (−2.82)	−414.60 (−0.65)	0.65	2.04	27
384	Transport	−37,158.00* (−1.80)	8,123.58 (1.08)	−780.32 (−1.46)	−6.28 (−1.62)	7,745.12* (2.61)	−1,834.24* (−2.14)	−141.00 (−0.20)	0.67	2.01	27
385	Professional goods	−2,804.48 (−0.30)	−525.10 (−0.15)	−25.86 (−0.11)	−3.14 (−1.78)	3,104.88* (2.30)	−703.32* (−1.80)	−107.07 (−0.33)	0.47	2.09	27
390	Other industries	−8,385.90* (−2.57)	2,936.95* (2.48)	−220.96* (−2.62)	0.45 (0.74)	−387.63 (−0.83)	2.51 (0.02)	−69.90 (−0.62)	0.56	2.02	27
300	Total manufacturing	−134,541.00 (−1.49)	38,573.46 (0.87)	−2,798.28 (−1.19)	−25.10 (−1.48)	35,240.03* (2.71)	−12,203.67* (−3.25)	−3,981.29 (−1.26)	0.64	1.99	27

Note: Numbers in parentheses are *t*-values.
* Statistically significant at the 95 per cent confidence level.

As stated earlier, specialization in the production and exports of primary commodities tends to be negatively correlated with structural change and industrialization of a country or a region. Particularly, the commodity-exporting region may be exposed to the boom-and-bust cycle of dependence on the widely fluctuating world demands and unpredictably changing supply conditions. As a result, the economy's capacity to grow on its own endogenous economic forces may be greatly impaired. It seems that the empirical results support this theoretical expectation. A major bulk of the coefficients for the primary commodity export share are not only statistically significant (at the 95 per cent confidence level) but also have a correct sign (minus). The results further show that the regional coefficients tend to be more responsive to the primary export share than the manufacturing export share in most cases.

In a similar vein, the manufacturing export share is expected to be negatively related to the regional coefficient. This negative relationship seems to be consistently corroborated by the empirical results. Only three out of twenty-nine equations have a wrong sign for this variable. However, albeit their correct signs, only six coefficients are statistically significant. It must be concluded, therefore, that statistical relationships between the manufacturing export share and the regional coefficient seem far weaker than that between the primary export share and the dependent variable.

Lastly, the results obtained for the population variable would seem rather unexpected and inexplicable. Since population is used often as a proxy variable for market size, and market size is considered to be a crucial determinant of the region's capacity to expand its own internal market, the sign for the population coefficient should be positive. But almost all coefficients have a wrong sign. However, the results should not carry too much weight, given the fact that most coefficients are statistically insignificant and hence little confidence could be placed on these estimates.

IV. CONCLUDING REMARKS

Granted, our method for analyzing MVA data is rather crude and subject to many limitations. Moreover, to draw a sharply focused picture of the patterns of MVA changes among different regions would be difficult without an in-depth analysis of why MVA increased the way it actually did within the specific regional context, going beyond a mere statistical analysis of data. The principal findings nonetheless provide interesting and substantive insights.

Our analysis shows that if the patterns of MVA growth in different manufacturing industries are expected to provide reasonable clues to structural change in manufacturing, world manufacturing industry underwent marked structural transformation between 1963 and 1980. Changes in the industry share of the world MVA between 1963 and 1980 indicate that some of the fastest growing industries have been concentrated in capital goods, particularly electrical machinery, machinery, industrial chemicals, and professional goods. Meanwhile, the relative shares of most light industries (e.g., food products, textiles, wearing apparel) and

some resource-based industries (e.g., iron and steel, wood products) declined rapidly over the same period.

Although the North accounted for an overwhelming portion of the world MVA change between 1963 and 1980, the MVA of most traditional manufacturing industries in the South had been steadily on the rise despite the shrinking shares of most of these industries in the world total production, and even more importantly, the South's gains had been based on internally generated economic forces, as revealed by the significance of the regional effect calculated from the decomposition analysis. Of course, Africa, both the low-income and middle-income groups, is a major exception to this otherwise encouraging picture.

As a corollary of the South's expansion in light manufacturing and resource-based industries, the North's share in these smokestack industries declined dramatically and instead its growth has been gravitated to capital goods and other high-tech industries. In this regard, it is important to note that the South's gains in this critical capital goods industry during the period were least impressive as compared with advances made in other sectors. The North still maintains an undisputed control over the production and trade of capital goods and the South is yet to make any significant dent on the dominant position of the North in this important sector.

Moreover, the decomposition analysis suggests that across nearly all manufacturing industries, the North exhibited a remarkable sensitivity to general fluctuations of the global economy and the worldwide performance of individual industries. It revealed little regionalized viability to withstand external pressures.

The South is, of course, not a monolithic economic group. The reality is considerably more complex, for the pace and patterns of structural change within the South varied widely from region to region. For instance, statistical test results show that the structure of production in Africa changed little between 1963 and 1980, when compared with the 1980 structure of Japan or North America. Meanwhile, Latin America underwent the most rapid structural change among all regions in the South, closely followed by the middle-income Asia during the period, although there are some signs of a dramatic reversal of this positive trend in Latin America which has been troubled by the mammoth external debt in recent years. Also, the Middle East fared slightly better than Africa in terms of structural change despite the region's high per capita income. The result is not surprising, because the structure of the economies in the region during the period was dominated by the oil sector with a very narrow industrial base.

One of the major findings of this study is the extent to which an economy becomes increasingly sensitive to external factors as it progresses through the successive stages of development. The main results of the decomposition analysis seem to substantiate this hypothesis. Irrespective of the branch of manufacturing industry, industry performance tends to be generally affected more by region-specific factors than external factors at the initial stages and at the early second stages of industrialization. At the advanced stages of industrialization, most industrial activities become extremely responsive to the ebbs and flows of the world economy and the worldwide performance of a given industry. The reason

may be that as the economy passes through the successive stages of specialization, it will be also progressively drawn into the international division of labor and trade. Of course, the pace of integration into the world economy may vary considerably from industry to industry, but ultimately all reach the point where external economic environment becomes a more dominant factor than region-specific internal economic conditions in explaining the region's MVA growth. The regression results lend empirical support to the notion of increasing internationalization of production and trade at successively advanced stages of development. More specifically, the results show that the part of MVA growth attributable to internally generated economic forces as measured by the regional effect tends to increase initially in step with rising per capita incomes and then began to diminish continuously as per capita incomes rise beyond a certain critical level. As a result, our decomposition analysis portrays clearly the pervasive presence of positive regional effects in nearly all manufacturing industries of the South and the opposite of the situation in the North.

Some caveat is in order before concluding this study. Much has happened since 1980. Most notable among many turbulent events are prolonged worldwide stagnation, persisting unemployment, a collapse of commodity prices and worsening terms of trade against developing countries, a rising tide of protectionism, and most important of all, the acute problem of external indebtedness in developing countries and particularly in Latin America. All of these factors combined may alter some of the basic conclusions arrived at on the basis of the 1963–80 data. This seems likeliest in the case of Latin America. Nevertheless, most other findings still may hold.

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APPENDIX TABLE I

COUNTRY GROUPING

	1980 Population (Millions)	1980 per Capita (GNP)	1980 MVA per Capita[a]
I. Developing countries	1,861.6	726.2[b]	105.0[b]
A. Low-income developing countries	970.6	233.9[b]	25.1[b]
(1) Indian Sub-Continent (LIS)	858.6	234.7[b]	26.6[b]
Bangladesh	88.5	130	11
India	673.2	240	27
Pakistan	82.2	300	37
Sri Lanka	14.7	270	44
(2) Africa (LAF)	112	227.2[b]	13.7[b]
Ethiopia	31.1	140	12
Madagascar	8.7	350	27
Mozambique	12.1	230	19
Tanzania	18.7	280	14
Uganda	12.6	300	11
Zaire	28.3	220	10
B. Middle-income developing countries	891	1,262.3[b]	192.1[b]
(3) Asia (MAS)	297	739.2[b]	100.9[b]
Indonesia	146.6	430	30
Malaysia	13.9	1,620	222
Philippines	49.0	690	115
Singapore	2.4	4,430	967
Korea, Republic of	38.2	1,520	262
Thailand	47.0	670	96
(4) Middle East and North Africa (MME)	149	1,194.9[b]	114.4[b]
Algeria	18.9	1,870	96
Egypt	39.8	580	94
Iran	38.8	951	174
Iraq	13.1	3,020	99
Jordan	3.2	1,420	63
Morocco	20.2	900	91
Syria	9.0	1,340	59
Tunisia	6.4	1,310	137
(5) Africa (MAF)	135	859.6[b]	45.7[b]
Congo	1.6	900	27
Ivory Coast	8.3	1,150	109
Ghana	11.7	420	50
Kenya	15.9	420	35
Nigeria	84.7	1,010	32
Zambia	5.8	560	98
Zimbabwe	7.4	630	106

APPENDIX TABLE I (Continued)

		1980 Population (Millions)	1980 per Capita (GNP)	1980 MVA per Capita[a]
(6)	Latin America (MLA)	310	1,971.4[b]	380.4[b]
	Argentina	27.7	2,390	799
	Bolivia	5.6	570	72
	Brazil	118.7	2,050	428
	Chile	11.1	2,150	290
	Colombia	26.7	1,180	139
	Dominican Republic	5.4	1,160	179
	Ecuador	8.0	1,270	126
	Jamaica	2.2	1,040	199
	Mexico	69.8	2,090	349
	Peru	17.4	930	234
	Uruguay	2.9	2,810	395
	Venezuela	14.9	3,630	393
II.	Developed countries	1,202.4	7,683.3[b]	1,601.2[b]
(7)	North America (NA)	251.6	11,243.2[b]	1,871.6[b]
	USA	227.7	11,360	1,891
	Canada	23.9	10,130	1,689
(8)	Advanced Western Europe (WE1)	281	10,327.3[b]	1,922.8[b]
	Austria	7.5	10,230	1,985
	Belgium	9.8	12,180	1,978
	Denmark	5.1	12,950	1,988
	Finland	4.9	9,720	1,886
	France	53.5	11,730	2,139
	Germany, Federal Republic of	60.9	13,590	2,839
	Italy	56.9	6,480	1,448
	Netherlands	14.1	11,470	1,992
	Norway	4.1	12,650	1,526
	Sweden	8.3	13,520	2,492
	United Kingdom	55.9	7,920	1,105
(9)	Newly industrialized Western Europe (WE2)	127	3,222.5[b]	532.9[b]
	Greece	9.6	4,380	516
	Ireland	3.3	4,880	642
	Portugal	9.8	2,370	723
	Spain	37.4	5,440	851
	Turkey	44.9	1,470	186
	Yugoslavia	22.3	2,620	598
(10)	Japan (JP)	116.8	9,890	2,677
(11)	Eastern Europe (EE)	375	4,513.3[b]	1,295.3[b]
	Bulgaria	9.0	4,150	936
	Czechoslovakia	15.3	5,820	1,761
	German Democratic Republic	16.9	7,180	2,551
	Hungary	10.8	4,180	1,027

APPENDIX TABLE I (Continued)

	1980 Population (Millions)	1980 per Capita (GNP)	1980 MVA per Capita[a]
Poland	35.8	3,900	1,223
Rumania	22.2	2,340	1,174
USSR	265.5	4,550	1,228
(12) Other developed countries (OD)	51	4,916.3[b]	941.1[b]
Australia	14.5	9,820	2,146
Israel	3.9	4,500	834
New Zealand	3.3	7,090	910
South Africa	29.3	2,300	363

Sources: For population and per capita, World Bank, *World Development Report, 1982* (New York: Oxford University Press, 1982); for MVA, UNIDO data base.
Note: Covers selected countries with a population of more than a million in 1980.
[a] In millions of 1975 U.S.$.
[b] Indicates a weighted average.