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Patterns of Development, 1950 to 1983

Moshe Syrquin and
Hollis B. Chenery

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Moshe Syrquin is professor of economics at Bar Ilan University (Israel); Hollis B. Chenery is Thomas B. Cabot professor of economics at Harvard University and institute fellow at the Harvard Institute for International Development. Both are consultants to the World Bank.

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ABSTRACT

The main purpose of this paper is to provide more accurate measures of the dimensions of structural transformation during the process of development, by estimating long-run patterns of development for the period 1950-83. By including the turbulent decade after 1973 it tries to assess the stability of estimates of long run transformation and the robustness of inferences derived from data about the pre-1973 period. The relatively long time-series for a large number of countries allow a more detailed examination of the relation between cross-section and time-series estimates.

The typology of development patterns used in previous studies is elaborated and expanded.

The study focuses on processes of resource allocation, specifically on the structures of final demand, trade, production and employment. The samples consist of up to 108 economies over the period 1950-83.

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Contents

* The statistical appendix and the three annexes prepared by A. Kundu are available from the Socio-Economic Data Division of the International Economics Department.
a. Patterns in oil importing and oil exporting countries (A. Kundu).*
b. Energy consumption and patterns of development (A. Kundu).*
c. Patterns with ICP figures (A. Kundu).*

Intercountry comparisons are an important source for studying the association of changes in economic structure and the level of development. In a series of studies beginning the the 1950's, Simon Kuznets established a number of empirical generalizations about long-term changes in economic structure that are a concomitant and actually define modern economic growth (1966, 1971). Kuznets also showed that the association between the interrelated processes of change and the level of income found in the long-term experience of the industrialized countries, could also be observed in cross-county comparisons for a given period.

Previous comparative studies of structural change had focused on single processes such as the pattern of consumption (Houthakker, 1957) and the sectoral composition of employment (Clark, 1940). In the series of detailed and comprehensive studies published between 1956 and 1967, Kuznets presented the structural transformation as a whole rather than as a set of separate phenomena.

In Patterns of Development (Chenery and Syrquin 1975, henceforth cited as C-S) we chose a large set of the processes that characterize modern economic growth and extended the approach in an econometric study for over 100 countries for the period 1950-1970. The processes studied centered around those most likely included in a minimal definition of the structural transformation: accumulation of physical and human capital and shifts in the composition of demand, trade, output and factor use. Also included were some socio-economic processes, such as urbanization, demographic transition and

changes in income distribution, which appeared to be correlated with the level of development.

The results in C-S presented a view of the transformation as a transition from an economic structure representative at low income levels to one typical for high income countries. The transformation of the economic structure was further described in Chenery (1979), and elaborated in a recent comparative study of Industrialization and Growth (Chenery, Robinson and Syrquin, 1986). The patterns of industrial change in C-S summarize the relationships that exist along growth paths, where income is the measure of development. The patterns can be interpreted as reduced forms from a more general model. In Chenery and Syrquin (1986a,b) we presented a disaggregated simulation model of industrialization that goes back to some of the underlying relations determining industrial change; and also examined the behavior during the postwar period of about 40 countries that can be classified as semi-industrial. This group of countries showed an acceleration of growth and structural change since 1950. On the average, during the 3 decades 1950-1980, the transformation in semi-industrial countries resembled the one that took place in industrial countries over a period twice as long, when the latter were at a similar development stage.

The use of patterns for country analysis has evolved from simple static comparisons of actual structure to the predicted one, to analyses of long-run transformation in a comparative framework. Particularly useful for assessing the specific features of individual countries has been the typology of allocation patterns presented in Chenery and Taylor (1968) and in C-S and expanded in Chenery and Syrquin (1986b). In the latter study, the typology

was used as a frame for a detailed examination of the transformation in the postwar period in a sample of semi-industrial countries.

Chenery (1982) and Wood (1986) used the patterns approach to illustrate the distinguishing characteristics of industrialization in large countries. Examples of comparative studies of long-term growth and structural change in individual countries can be found in Syrquin (1986a and 1986c) on Israel, and Colombia;[1] Ofer (1987) on the USSR; and World Bank (1985) on China.

I. SCOPE OF THE STUDY

The present study relies on information for 108 economies during the period 1950-83 on aspects of economic structure related to the sectoral allocation of resources: demand, trade, production and factor use.

A. Objectives

The main purpose of this study is to provide more accurate measures of the dimensions of the transformation, by reestimating long run patterns of development for the period 1950-83. By including the turbulent decade after 1973 we try to assess the stability of estimates of long run transformation and the robustness of inferences derived from data about the pre-1973 period. The available information gives a sample larger by about 50 percent from the sample in C-S. The relatively long time series (over 30 years) for a large number of countries allows us to further explore the relation between cross-section and time-series estimates.

In section II.C we present a typology of development patterns that elaborates our earlier work in this area (Chenery and Taylor 1968, C-S, Chenery and Syrquin 1986b). Depending on the problem being analyzed and the objectives of the study, alternative typologies can be designed by combining structural features with policy aspects. In our presentation we emphasize policies related to the external sector and their links with size and resource availability. This choice reflects the importance of trade policies as an instrument to influence resource allocation in the period studied.

The processes analyzed are a subset of those in C-S, with some significant extensions. In C-S only two sectors producing commodities were distinguished: primary and industry. In the present study primary is now divided into agriculture and mining, and within industry, manufacturing and construction are shown separately.

Our recent comparative study (Chenery, Robinson and Syrquin 1986), shows the importance of disaggregating the manufacturing sector for analyzing industrialization and the principal alternative sequences of the process. Chenery (1960), Chenery and Taylor (1968) and Maizels (1963), estimated the relation of industrial structure with the level of development based on information that did not go beyond the early 1960's. In an unpublished report Prakash and Robinson (1979) extended the period to 1973. In the present study we make use of the Prakash - Robinson data base and extend the analysis to 1981.

For the structures of demand and production we estimate uniform patterns for shares in GDP in current and in constant prices. Differences in the time series between the two formulation are analyzed wherever we can establish systematic changes in relative prices during the period.

B. Issues in Comparative Analysis

Comparative analysis of structural transformation, while useful, has its own limitations. Some are addressed here and in other related work (Syrquin 1988), while others are inherent in the analysis and have to be recognized as qualifications.

Patterns of development relating changes in structure to the level of development provide a concise picture of average long run transformation but are not well suited to incorporate market behavior. Such a task requires a price endogenous model within a country. The two approaches are complementary. Intercountry comparative analysis in a general equilibrium framework can provide orders of magnitude for key relations and parameters used in country models. The price endogenous models can be used to check the sensitivity of the average stylized facts to variation in relative prices and other variables not explicitly considered in studies of long run transformation. (See Ranis 1984, and Chapter 11 in Chenery, Robinson and Syrquin, 1986).

Changes in structure and performance are interrelated. The patterns approach focuses primarily on the association of the level of development with those changes in economic structure necessary to sustain further growth. The patterns by themselves do not reveal the impact of structure on performance. Structural change is not sufficient for explaining growth, but neither is the pure supply side approach that ignores changes in structure.

Intercountry comparisons are of help in establishing stylized facts about the transformation, that give the expected changes in structure as a country develops. They are of little help in analyzing stagnation in countries with very low income. But even for such countries, the average

patterns of transformation are useful as indicators of feasible paths derived from the experience of other countries (World Bank, China Report 1985).

Patterns of development, based on intercountry comparisons, are average relations showing the expected transformation during the transition from a low income, agrarian economy to an industrial urban economy with substantially higher per capita income. The same overall pattern of transformation can accomodate significant differences in the timing and sequencing of particular aspects of change. The various paths may reflect differences in initial conditions (size, resources), in the historical environment (world markets, wars) and in economic policies in the relevant period. "The search for uniform features of development almost inevitably leads to a division of countries into more homogeneous groups" (Chenery, 1986 p. 18). Statistical constraints and the issues explored, limit the number of groups that is useful to distinguish in a typology. But such limits of convenience do not establish the "...notion that there are a limited number of different patterns of growth" (Papanek, 1977 p. 276).

A closely related issue has to do with the level of generality or aggregagation at which the analysis is conducted. Are the associations represented by patterns of development (for example, the shift from primary production to manufacturing) necessary conditions for sustained growth, or are they merely statistical correlations for a given sample and period? At a broad level "... the standard pattern of economic development is something like a historical likelihood or near-necessity. The modern world could have evolved somewhat differently, but since it did not, it would be extraordinarily difficult to change the standard pattern now" (Solow, 1977 p. 493).

Uniformities at a broad level of aggregation can hide wide variation in the behavior of individual components. This notion resembles the concept of substitutability in Gerschenkron (1962) but modified to recognize that its nature depends not only on relative backwardness but also on the factors mentioned above as responsible for variations in development patterns.

In a study on comparative long run economic growth in France and Britain, O'Brien and Keyder (1978, p. 196) conclude that " ... there is more than one way of transition from an agricultural to an industrial economy and from rural to urban society". Earlier in their book they complain that "Economic theory lends no support to assumptions ... that there is one definable and optimal path to higher per capita incomes and still less to the implicit notion that this path can be identified with British industrialization as it proceeded from 1780 to 1914". (p. 18, quoted in Crafts, 1984). O'Brien and Keyder do not seem to question the notion of a transition from "an agricultural to an industrial economy" but only the view that the path of transition is unique. This assumption of a unique and optimal path which they attack is nowhere implied in the analysis of the transformation based on intercountry comparisons. Recognizing the possibility of substitutability and of a typology of development patterns would prevent economic historians of identifying countries " ... as backward because their coal and iron and cotton production are relatively low" (p. 16).

C. Econometric Procedures and Data

To facilitate comparison with previous studies we followed generally the methodology in C-S. The variables studied are listed in table 1, and the economies in table 2. As in C-S we excluded most of the communist economies

Table 1: CHARACTERISTICS ANALYZED AND SAMPLE SIZES

Variable	Symbol	No. of Period	No. of Countries	Observations
Final Demand (Share of GDP)				
Current price shares		1950-83	107	3019
Constant price shares		1950-83	103	2531
Private consumption	C			
Government consumption	G			
Investment	I			
Export	E			
Imports	M			
Food consumption	FCN			
current		1953-82	54	1126
constant		1960-82	36	662
Merchandise Trade (Share of GDP)		1962-83	98	1829
Exports of merchandise	EMR			
Primary products	EP			
Fuels, Minerals and Metals	EFMM			
Other primary	EOP			
Manufactures	EM			
Imports of merchandise	MMR			
Primary products	MP			
Manufactures	MM			
Production (Share of GDP)				
Current price shares		1950-83	104	2360
Constant price shares		1950,55 60-83	92	1921
Agriculture	VA			
Mining	VN			
Manufacturing	VM			
Construction	VC			
Utilities	VU			
Services	VS			
Manufacturing (Share of GDP)		1953-54 58-81	70	1043
	ISIC code			
Food, beverages and tobacco	31			
Textiles, apparel and leather	32			
Wood and furniture	33			
Paper and printing	34			
Chemicals, petroleum and rubber	35			
Non-metalic minerals	36			
Basic metals	37			
Metal products and machinery	38			
Other	39			
Employment (Share of total)		1950-80	108	2710
Agriculture	LA			
Industry	LI			
Services	LS			
Relative Prices (1970=100)				
Demand		1950-83	107	2513
Consumption	PC			
Government	PG			
Investment	PI			
Exports	PE			
Imports	PM			
Production		1950,55 60-82	92	1764
Agriculture	PVA			
Mining	PVN			
Manufacturing	PVM			
Construction	PVC			
Utilities	PVU			
Services	PVS			

Table 2: ECONOMIES INCLUDED IN THE STUDY

Economy	Type	Population 1965 (mill)	GNP Per Capita 1980 (US$)	GNP Per Capita 1980 (ICP$)	Level of Income: Low Income (29)	Level of Income: Lower Middle Income (29)	Level of Income: Upper Middle Income (29)	Level of Income: Industrial (19)
Afghanistan	SP	11.115	223.8		x			
Algeria	SP	11.923	2,111.6				x	
Angola	SM	5.347	831.9			x		
Argentina	LP	22.283	1,982.7	3,795.6			x	x
Austria	SM	7.255	10,106.0	8,495.9				x
Bangladesh	LM	60.482	130.2		x			
Belgium	SM	9.448	12,005.5					x
Benin	SM	2.332	335.1		x	x		
Bolivia	SP	3.841	758.7	1,502.2				
Brazil	LP	84.292	2,001.0	3,243.4			x	
Burkina Faso	SP	4.595	218.2		x			
Burma	LP	24.250	172.8		x			
Burundi	SP	3.131	239.6		x			
Cameroon	SP	5.825	737.4	798.1		x		
Canada	LP	19.678	10,249.4	11,096.8				x
Central Afr. Rep.	SP	1.735	349.7		x			
Chad	SP	3.307	112.7		x			
Chile	SP	8.310	2,399.2	3,508.4			x	
China	LM	746.800	289.6		x			
Colombia	LP	18.488	1,282.0	2,756.9		x		
Congo, PR	SP	1.066	987.3		x			
Costa Rica	SP	1.490	2,048.8	3,032.5			x	
Denmark	SP	4.758	12,616.1	9,569.8				x
Dominican Republic	SP	3.719	1,158.5	1,950.3		x		
Ecuador	SP	5.134	1,476.2	2,606.3			x	
Egypt	LM	29.389	581.6			x		
El Salvador	SM	3.005	735.1	1,402.9		x		
Ethiopia	LP	22.550	132.4	273.3	x			
Finland	SM	4.564	10,257.6	8,465.0				x
France	LM	48.758	12,213.0	9,849.7				x
Germany	LM	58.619	13,331.4	10,224.7				x
Ghana	SP	7.767	374.0			x		
Greece	SM	8.572	4,301.6	5,175.6			x	
Guatemala	SP	4.615	1,077.3	2,306.9		x		
Guinea	SP	4.137	299.1		x			
Haiti	SP	3.950	274.2		x			
Honduras	SP	2.304	636.8	1,137.2		x		
Hong Kong	SM	3.598	5,467.7				x	
Hungary	SM	10.153	2,033.0	4,881.0			x	
India	LM	487.324	235.6	551.7	x			
Indonesia	LP	104.756	473.4	1,060.0		x		
Iran	LP	24.078	2,271.0				x	x
Iraq	SP	7.976	3,043.2				x	
Ireland	SM	2.876	5,093.9	5,576.8				x
Israel	SM	2.563	4,749.7	6,596.7			x	
Italy	LM	51.987	7,059.8	7,966.3				
Ivory Coast	SP	4.159	1,212.6	1,299.3		x		
Jamaica	SM	1.749	1,097.3			x		
Japan	LM	98.883	8,906.4	8,414.4			x	
Jordan	SM	1.962	1,137.3			x		
Kenya	SM	9.521	412.8	622.9		x		
Korea, Rep.	LM	28.709	1,606.6	2,541.4			x	
Lebanon	SM	2.151	1,841.7				x	
Liberia	SP	1.139	521.7				x	

Economy	Type	Population 1965 (mill)	GNP Per Capita 1980 (US$)	GNP Per Capita 1980 (ICP$)	Level of Income: Low Income (29)	Level of Income: Lower Middle Income (29)	Level of Income: Upper Middle Income (29)	Level of Income: Industrial (19)
Libya	SP	1.623	10,899.4			x		
Madagascar	SP	6.080	366.5	565.7	x			
Malawi	SP	3.919	197.6	402.1	x			
Malaysia	SP	9.531	1,653.3				x	
Mali	SP	4.558	199.4	335.1	x			
Mauritania	SP	1.085	433.1			x		
Mexico	LP	43.500	2,615.4	4,840.9			x	
Morocco	SM	13.323	948.2	1,302.5		x		
Mozambique	SP	7.263	322.7		x			
Nepal	SP	10.344	133,8		x			
Netherlands	SM	12.377	11,910.9	9,359.7				x
New Zealand	SP	2.628	7,288.0					x
Nicaragua	SP	1.613	784.5			x		
Niger	SP	3.510	326.6		x			
Nigeria	LP	58.490	991.7	896.3		x		
Norway	SM	3.723	13,572.2	10,882.4				x
Pakistan	LM	52.414	311.8	986.1	x			x
Panama	SM	1.269	1,861.7	3,301,0			x	
Papua New Guinea	SP	2.141	815.1			x		
Paraguay	SP	2.019	1,359.2	2,210.1			x	
Peru	SP	11.230	1,117.7	2,491.2		x		
Philippines	LP	31.771	730.6	1,725.8		x		
Portugal	SM	9.199	2,462.9	3,894.4			x	
Puerto Rico	SM	2.594	3,386.9				x	
Rwanda	SP	3.250	222.9		x			
Saudi Arabia	SP	4.793	12,640.3					
Senegal	SP	3.919	501.6	675.0		x		
Sierra Leone	SP	2.304	349.4		x			
Singapore	SM	1.887	4,509.3				x	
Somalia	SP	2.816	274.8		x			
South Africa	LM	19.467	2,666.4			x		
Spain	LM	32.056	5,615.9	6,326.3			x	
Sri Lanka	SP	11.133	271.2	1,189.6	x			
Sudan	SP	12.359	367.3		x			
Sweden	SM	7.734	14,738.4					x
Switzerland	SM	5.856	16,620.6					x
Syrian Arab Rep.	SP	5.325	1,512.3				x	
Taiwan (China)	SM	12.443	2,268.8				x	
Tanzania	SM	11.595	264.2	374.8	x			
Thailand	LP	31.241	706.9			x		
Togo	SP	1.704	430.4		x			
Tunisia	SM	4.630	1,369.4	1,994.9		x		
Turkey	LP	31.151	1,312.6				x	
Uganda	SP	8.432	235.3				x	
United Kingdom	LM	54.436	9,361.1	8,271.2	x			x
United States	LP	194.303	11,562.4	11,562.4				x
Uruguay	SP	2.693	3,450.2	4,141.6			x	
Venezuela	SP	9.169	3,828.0	5,233.1		x		
Yemen, AR	SP	4.659	441.7					
Yugoslavia	LM	19.434	3,045.0	3,863.4			x	
Zaire	LP	19.524	203.1		x			
Zambia	SP	3.643	619.4	699.0		x		
Zimbabwe	SP	4.268	762.3	933.0		x		

Notes: The type refers to the classification in part II.C and table 7: LP-large, primary oriented; LM-Large, manufacturing oriented; SP-small, primary oriented; SM-small, manufacturing oriented.

The groupings by level of income and according to the trade position in oil are from the 1982 World Development Report.

The ICP real income figures are preliminary estimates from phase IV of the International Comparisons Project.

and countries where the population in 1965 was less than one million.2/

For each variable x, expressed as a share of GDP (or of total labor force in the case of employment), equation (1) was estimated in two variants: with and without the capital inflow ratio (F).

$$x = \alpha + \beta_1 \ln y + \beta_2 (\ln y)^2 + \gamma_1 \ln N + \gamma_2 (\ln N)^2 + \Sigma \delta_i T_i + \varepsilon F \quad (1)$$

where x = dependent variable (see table 1),

y = per capita GNP in 1980 dollars,

N = population in millions,

F = imports minus exports of goods and nonfactor services as a share of GDP, and

T_i = dummy variables for time periods taking a non-zero value as follows:

$T_1 = 1$ if $t \geq 1960$,

$T_2 = 1$ if $t \geq 1967$,

$T_3 = 1$ if $t \geq 1973$, and

$T_4 = 1$ if $t \geq 1979$.

The time variables measure uniform shifts of the relations across countries, and are defined in a incremental way. For example, the coefficient to T_2 measures any shift after 1967 over and above the post-1960 one given by the coefficient of T_1.

The semilog formulation is a convenient one for the analysis of structural change because of its adding-up property. The fitted equations and derived predicted values from a common semilog formulation for the components

of an aggregate add up identically to the fitted equation and predicted value for the aggregate, provided all estimates refer to exactly the same sample.

Equation (1) was run for pooled samples combining the individual time series for all countries or for groups of countries according to the typologies described above. In these regressions most of the variance to be explained is in general still due to variation among countries, but to a lesser extent than in previous studies. This is so because of the length of the time-series in the present study and the substantial growth and transformation exhibited in the group of newly industrializing countries since the early 1950's.

The individual time-series are also analyzed directly in two ways. Average time-series relations are estimated (with and without F), by allowing each country to have its own intercept as in equation (2):

$$x = \alpha_i + \beta_1 \ln y + \beta_2 (\ln y)^2 + \Sigma \delta_i T_i + \varepsilon F \qquad (2)$$

where α_i = intercept for country i.

By allowing each country to have its own intercept we eliminate all the variation between countries and pool the within-countries variation only. The estimated parameters are weighted averages of the individual time-series estimates, with weights related to the variance of the explanatory variables. Since in time-series analysis any uniform change such as the growth of population is indistinguishable from a time trend, we omit the N terms from the equation.

Individual time-series relations within countries are also estimated in all cases where a minimal number of annual observations were available. In these regressions only lny appears as explanatory variable.

The issue of stability of development patterns is discussed in section III.A. A central question there is whether we can identify a structural break in the relations after 1973. At the aggregate level we address that question by comparing the average cross-country patterns before and after 1973. For individual time-series we apply, in a separate paper, the cusum test introduced by Brown, Durbin and Evans (1975) and the recent extension of the method to analyze panel data of Han and Park (1986).

D. Working Hypotheses

The structural transformation of an economy, comprises a set of interrelated processes of change. Shifts in the internal allocation of resources among sectors are the result of the interaction of changes in the composition of demand, and variations on the supply side. On the demand side the changes are derived from the pattern of income elasticities of demand, and on the supply side they are the effect of factor accumulation and productivity growth. The demand and supply effects are not totally independent from one another. Thus changes in demand between internal and external sources reflect changing comparative advantage; while aggregate productivity growth incorporates resource shifts from low productivity to higher productivity sectors.

Various models based on cross-country information, have studied the interaction of the various elements leading to change. Recent examples include the price endogenous model of Kelley and Williamson (1984) and our

model of industrialization (1980, 1986a, and Syrquin 1986b). This model and the original paper on "Patterns of Industrial Growth" (Chenery, 1960) provide the rationale for expecting systematic associations of economic structure with the level of development in cross-country comparisons.

Sources of Uniformity

The main sources of uniformity are the pattern of final and intermediate demand and the evolution of comparative advantage. In final demand the best established trends are the decline in the share of food in consumption and the rise in the share of resources allocated to investment. Industrialization usually increases the share of intermediates in total gross output while varying its composition from primary to manufacturing output. The rise in the ratio of capital (human and physical) to labor and the observed higher rate of productivity growth in the more modern sectors of the economy, tend to shift the comparative advantage from primary activities to industrial ones.3/

An additional source of uniformity is the international environment during the period under observation, which includes imitative (demonstration) effects on consumption and on development strategies.

Sources of Diversity

Of the factors that affect the transformation, the most variable is the extent of participation in the international economy. The level and composition of trade and hence the type of specialization are largely determined by the interplay of structure (size and resource availability) and policy. As argued above and shown in section II.C, differences in the type of

specialization affect more the timing of the transformation than its overall nature.

II. DIMENSIONS OF THE STRUCTURAL TRANSFORMATION

In this part we look at the transformation as a whole, and present the dimensions of change as reflected in intercountry comparisons of economic structure during the period 1950-83.

A. The Period 1950-83.

A brief description of key features of the international environment and of average growth performance during the period, might be useful as background for the results in the following sections.

The decade following the second World War was a period of reconstruction in Europe and of a significant drive to promote development in various parts of the World: South Europe, Latin America and in a large group of newly independent nations that emerged with the dismantling of Empires. This drive was influenced by the rivalry among political blocks after the War, and by a change in perceptions about the role of the state in fostering economic development.

The network of international trade suffered severe blows during the depression of the 1930's and the War. Memories of the breakdown of this network coupled with the new responsibilities adopted by many states for accelerating growth, resulted in development strategies that were largely inward orientated. This is the more significant since by the early 1960's, world trade was expanding at rates that had not been observed for decades.

The main participants in this expansion were the advanced countries and, since the mid 1960's an increasing group of semi-industrial countries that abandoned the inward strategy in favor of one that emphasizes a greater participation in the international economy.

The four fold increase in the price of oil in 1973 and the collapse of the Bretton Woods System, changed drastically the economic environment. The rise in the price of oil aggravated inflationary pressures and led to a recession in OECD countries, which was then magnified in less developed economies. The expansion of world trade, and the growth of output and productivity slowed down considerably. Recovery was halted abruptly by the second oil-shock in 1979. This time it was accompanied by interest rates in international markets that reached unprecedented levels. The foreign debt in various countries reached crisis proportions, and the recession became a serious depression in various regions, primarily in Latin America.

Average growth in total and per capita income during the three decades 1950-80, was significantly higher than in any comparable period in recent history. Growth rates were high in almost all regions of the world, except for the group of very low income countries in sub-Sahara Africa.

Average growth rates for the whole period studied, are shown in table 3 for the economies in our sample grouped according to the classification in the 1985 World Development Report. The figures are simple averages of least square estimates within countries for as many years as the data permitted. (See note to the table).

For the complete sample, income per capita grew on the average at 2.4 percent per year. At this rate after 30 years income per capita would

Table 3: AVERAGE ANNUAL RATES OF GROWTH DURING 1950-83: COUNTRIES GROUPED BY INCOME LEVEL

Group	Number of Countries	Annual Growth Rates (percent) Per Capita Income	GNP	Multiple of Initial Income Per Capita after 30 Years
All	108	2.4	4.6	2.04
Low income	29	0.8	3.0	1.27
Lower middle income	29	1.9	4.7	1.76
Upper middle income	29	3.6	6.0	2.89
Industrial	19	3.2	3.7	2.57

Notes: Libya and Saudi Arabia are included only in the total. Growth rates computed by least squares regressions for all observations available within a country. 60 countries had 30 or more annual observations, 41 countries had between 24 and 29 observations and 7 had less than 24 observations (see Table 7).

have doubled. The rate was not uniform among countries or groups. Seven of the 29 economies in the low income group had negative rates of growth. In the 22 with positive growth, the average rate equals 1.4 percent. Among LDC's there is, in table 3, a clear acceleration of growth as income goes up, reaching a rate of 3.6 in the upper middle income group. At this rate the initial level would increase by a factor of about 3 in 30 years. A sizable number of countries performed even better than this average rate, multiplying their starting income level by a factor of 4, or even 5. This is very significant for a study of patterns of development since it implies that, within the period of observation, a number of countries traversed a large segment of the transition range. We can therefore reexamine, with a more solid data base, the concept of a transition from one state to another that we advanced in C-S (p. 135), to replace the notion of a dichotomy between less developed and developed countries.

B. The Transformation as a Whole

In C-S the transition was represented by the income interval $100 - $1000 in 1964 US dollars, based on the observation that about 75 to 80 percent of the transformation in structure takes place within this range (p. 19). In this study we define the transition range in 1980 US dollars as the interval from $300 to $4000 per capita GNP. These revised figures account for inflation since 1964, and reflect the strong (but apparently little noticed) trends in the pattern of real exchange rates between the two dates. Real exchange rates in developing countries have tended to depreciate ralative to the average for industrial economies, and the lower the income level, the greater the depreciation. (Syrquin 1985, Wood 1987).

Table 4 shows the overall pattern of transformation, in the principal variables studies, derived by estimating equation (1) (omitting F), for a country of average size (N=20). The effects of variations in the capital inflow are discussed in annex C. The estimated regressions appear in table S1 in the Statistical Appendix. The predicted values for the selected income benchmarks refer to the period after 1973. That is, in calculating those levels, $T_1 = T_2 = T_3 = 1$ and $T_4 = 0$. Average values in the sample are also given for countries with per capita income in 1970 below $ 300 ("low income") and countries with per capita income in 1970 above $ 5000 ("high income") except for Libya and Saudi Arabia. The difference between these two average values is a measure of the magnitude of change during the transition. It appears in the column before last in table 4. Finally, to bring out the differences in timing, the last column indicates the level of income at which half of the total change has taken place, for variables where change is significant and monotonic.

Table 4 is similar to table 3 in C-S. The main difference is that in this work we only study variables related to what we label there "Resource Allocation Processes", but at a more disaggragated level.

The sets of resource allocation processes in table 4 represent the principal features of economic transformation identified as industrialzation. The overall picture in table 4 and in figures 1-4, is not much different from the one in C-S. Shifts in the relations primarily after 1973 are discussed in section III.A. In that section we also examine the accuracy of the estimates underlying table 4 as measured by the standard errors of estimate, (SEE).

Table 4: AVERAGE VARIATION IN ECONOMIC STRUCTURE WITH LEVEL OF DEVELOPMENT FOR POST 1973 PERIOD
(Population = 20 million)

	Mean[a] under $300	Income 300	per capita 500	(1980 US$) 1000	2000	4000	Mean[b] Over $5000	Total change	y at mid point
Final Demand									
Private Consumption	.79	.733	.702	.664	.631	.603	.60	-.19	600
Gov. Consumption	.12	.136	.135	.137	.144	.154	.14	.02	-
Investment	.14	.184	.208	.233	.250	.259	.26	.12	400
Exports	.16	.193	.207	.226	.245	.264	.23	.07	400
Imports	.21	.246	.252	.260	.270	.280	.23	.02	-
Food Consumption	.39	.387	.345	.291	.239	.189	.15	-.24	1200
Trade									
Exports:									
Total merchandise	.14	.152	.169	.188	.203	.212	.18	.04	400
Fuels, minerals, metals	.03	.048	.063	.073	.072	.061	.02	-.01	-
Other primary	.10	.091	.086	.079	.069	.057	.05	-.05	1250
Manufacturing	.01	.013	.020	.037	.061	.094	.11	.10	2000
Imports:									
Total merchandise	.16	.182	.193	.206	.217	.227	.19	.03	-
Primary	.05	.064	.067	.071	.075	.080	.07	.02	-
Manufacturing	.11	.118	.126	.135	.142	.147	.12	.01	-
Production									
Agriculture	.48	.394	.317	.228	.154	.097	.07	-.41	700
Mining	.01	.050	.066	.077	.075	.061	.01	-	-
Manufacturing	.10	.121	.148	.181	.210	.236	.28	.18	1200
Construction	.04	.044	.049	.055	.061	.067	.07	.03	1000
Utilities	.06	.067	.074	.081	.088	.093	.10	.04	900
Services	.31	.324	.346	.378	.412	.447	.47	.16	1300
Labor Force									
Agriculture	.81	.749	.651	.517	.381	.242	.13	-.68	1300
Industry	.07	.092	.132	.192	.256	.326	.40	.33	1600
Services	.12	.159	.217	.291	.363	.432	.47	.35	1000

[a] Approximately $180. Means values for 1960-72 of countries with y under $300 in 1970.

[b] Approximately $7300. Mean values for 1960-72 of countries with y over $5000 in 1970.

Resource Allocation Processes

The principal results in table 4, for the average economy, are first briefly discussed by process and then combined in table 5.

Demand: The transformation in final demand is one of the most uniform features of the process of development. On the average the share of private consumption in GDP declines with the level of income allowing a rising investment share and a lower import surplus. Food consumption declines by about 20 percentage points while nonfood consumption goes up. The shift from consumption to investment takes place early during the transition; the decline in food consumption is spread over a wider income range (see last column in table 4).

Trade: Only a small part of the variation in aggregate trade can be related to income. In the composition of exports we do find a systematic shift from primary products to manufactures, mostly in the upper levels of the transition. No such change takes place in imports, for which there is an increase in both components. Industrialization increases the demand not only for primary imports but also for imports of manufactures. Only in the case of large countries (see below section II.C) do we find a decline in manufactured imports clearly related to early import substitution in those countries.

The changes in final demand and trade reinforce each other and combine with complementary changes in intermediate uses and productivity growth to produce a more pronounced shift in the structures of production and labor use.

Production: The share of value added in agriculture declines sharply over the transition, while manufacturing and social overhead (construction plus utilities) double their share and the services sector rises its share by

Figure 1

STRUCTURE OF DOMESTIC DEMAND

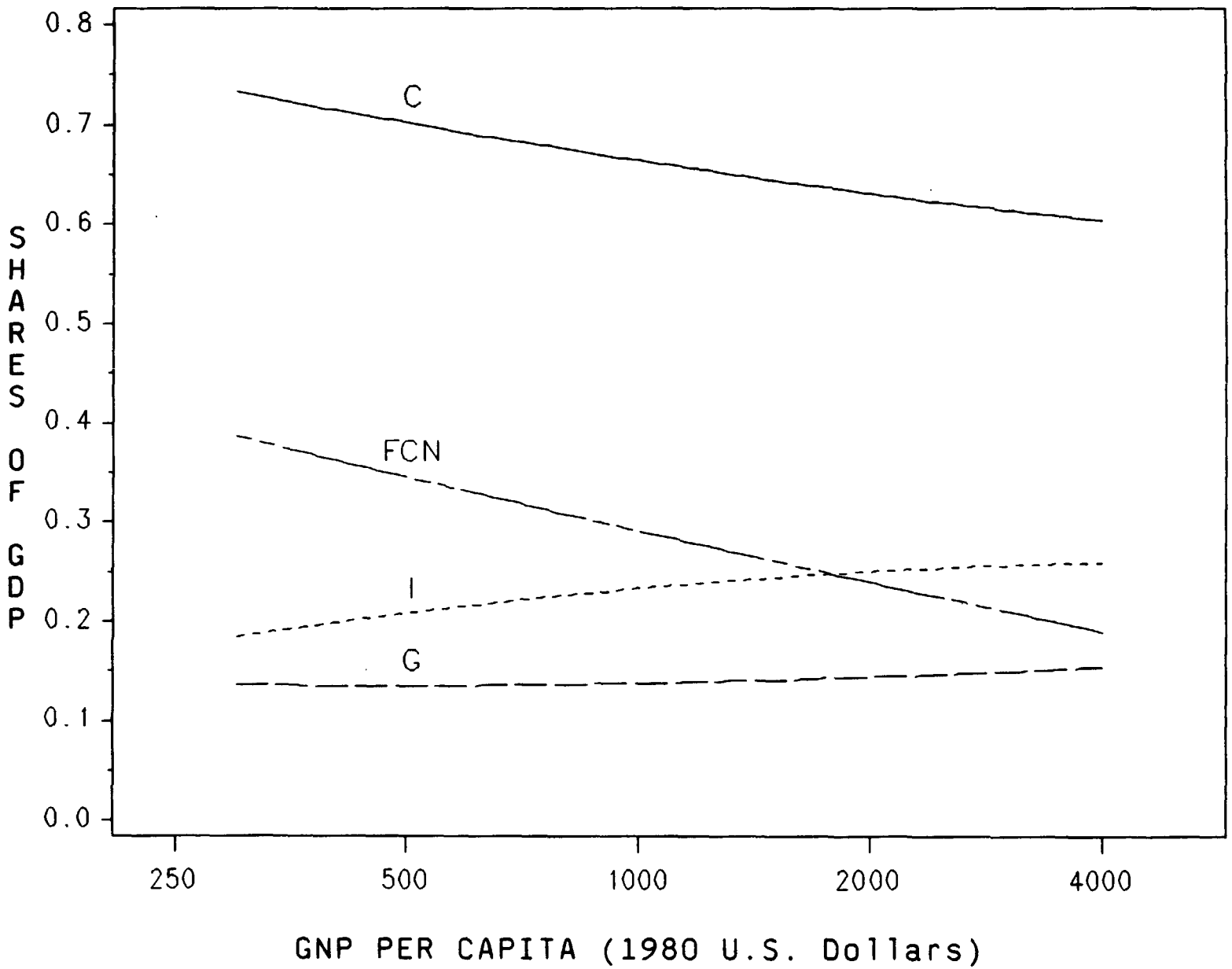


Figure 2a

STRUCTURE OF MERCHANDISE TRADE: EXPORTS

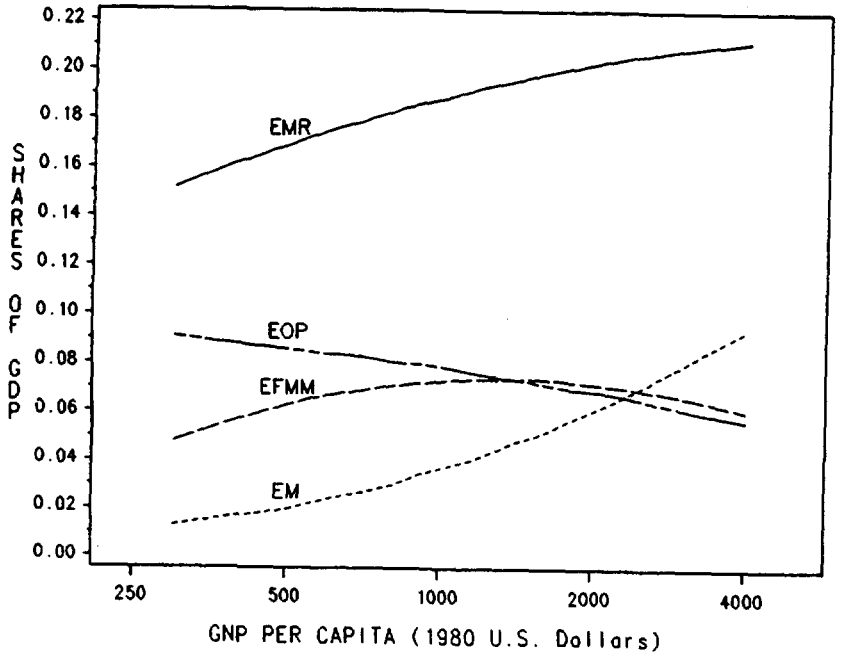


Figure 2b

STRUCTURE OF MERCHANDISE TRADE: IMPORTS

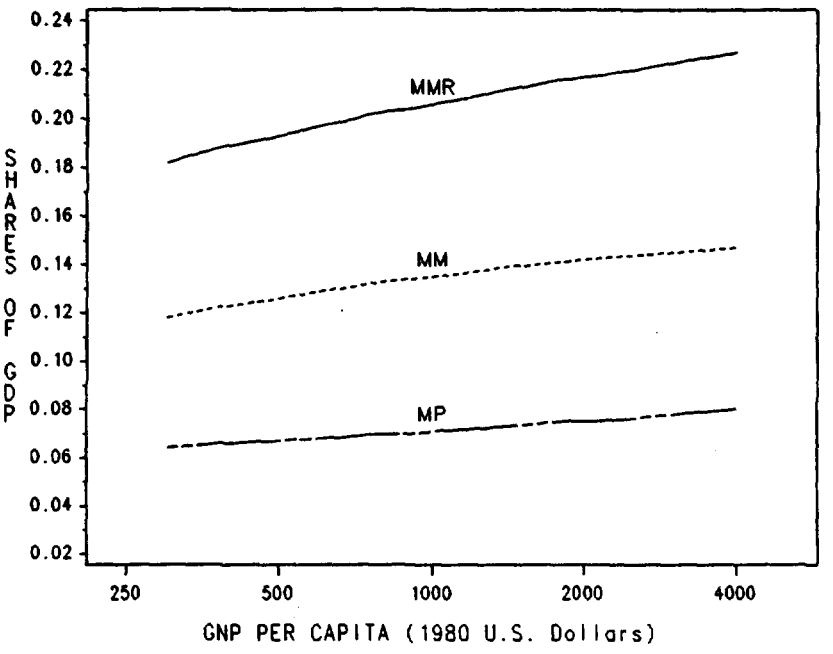


Figure 3
STRUCTURE OF PRODUCTION

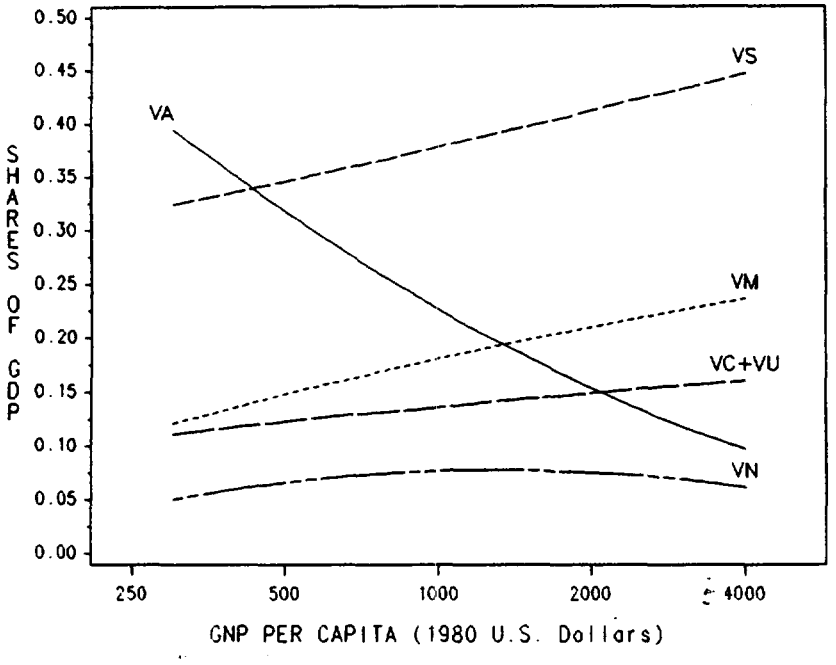
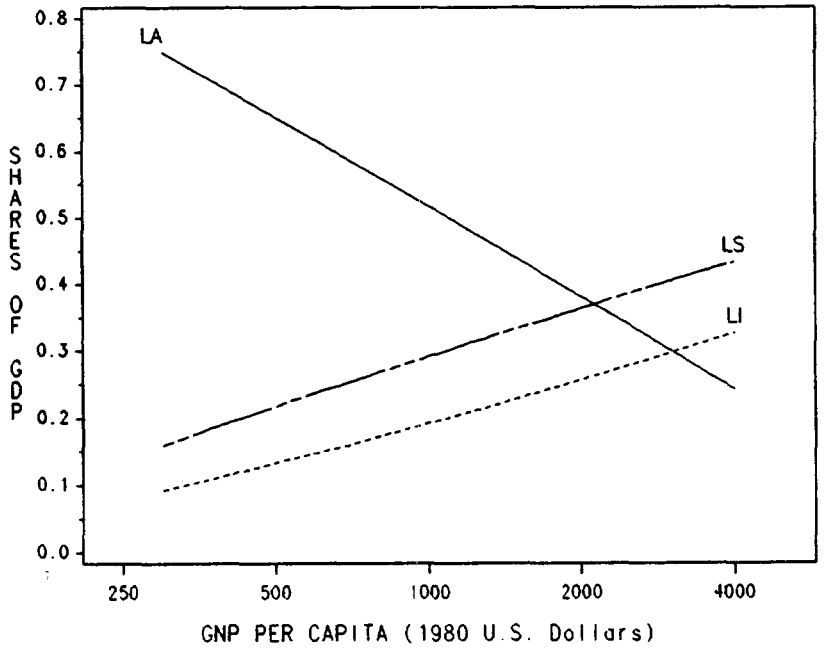


Figure 4
LABOR ALLOCATION



about 50 percent. The timing of the shift is an average of the early shift in demand and the later one in exports. The nature of the transformation in the production structure during the transition agrees in general with that predicted in C-S. The principal difference is the smaller rise in manufacturing and industry in this study, which probably reflects the fall in the manufacturing shares in output and employment that has taken place in virtually every single developed country since the late 1960's. The phenomenon has been labeled de-industrialization (see for example OECD 1979 and Blackaby 1978).

A useful benchmark was identified in C-S as the income level at which the rising industrial output share surpasses the declining primary share. In C-S at approximately y=300 (1964 US$) both industry and primary account for about 26 percent of total value added. This finding is almost identical in the present study, in which the two broad sectors equal about 25.5 percent of output at y = 1500 (1980 US$). For the more narrow classification of agriculture and manufacturing the crossover income level is 1400 (1980 US$) at which each represents 19 percent of total product.

The slower rise in manufacturing in table 4 (than in C-S) is accompanied by a faster increase in services. It has been argued (in Kravis, Heston and Summers 1983) that this rise in the output share of sevices is wholly accounted for by the systematic rise in the relative price of services with income across countries. They base this argument on the results of phase III of the international comparisons project (ICP). However, given that the ICP includes expenditure categories only and the limited sample studied so far, their results should be regarded as illustrative requiring further

study. We return to this issue in section III.B where we discuss the time-series results for the whole period.

Employment: The qualitative change in the sectoral composition of the labor force is similar to the one in value added, but there are also important differences in the magnitude of the shift and in its timing. The decline in the share of agriculture in employment is more pronounced than in production, but since it starts from a much higher level and takes place at a relatively higher income level, it leads to a decline in the relative productivity of labor in agriculture (share in value added divided by share in employment).[4] Only by the end of the transition (around $ 3000) does the trend reverse itself and the gap in average productivity begins to narrow.

Industrialization - An Integrated View

The sectoral correspondence of the structures of demand, trade and production in table 4 is only approximate. Strict comparability would require matching the classification schemes (ISIC, SITC), and an interindustry framework to allocate expenditure categories to industries and to account for intermediate goods. The framework of a multisectoral model, allows also the study of the interrelation among the sets of resource allocation processes. A model of industrialization as a system-wide phenomenon was presented in a study of the transformation of the Japanese economy (Chenery, Shishido, and Watanabe, 1962) and was subsequently revised and adapted to simulate the transformation over the complete transition range, on the basis of cross-country data (Chenery and Syrquin, 1980, 1986a). As suggested by those models, the estimates of the processes of change in table 4 can be related through the material balance equations:

$$X_i = W_i + D_i + T_i \qquad (3)$$

$$V_i = v_i X_i \qquad (4)$$

where the index i refers to a sector, X is gross output, W is intermediate demand, D is final demand, T is net trade (exports minus imports), V is value added, and v is the value-added ratio.

In this study, all the components are expressed as shares of GDP which is equal to $\Sigma V_i = V$. Combining (3) and (4) and dividing throughout by V:

$$V_i/V = v_i[W_i/V + D_i/V + T_i/V] \qquad (5)$$

Changes in the sectoral shares in value-added can be accounted for by changes in the composition of demand (intermediate and final), changes in the composition of trade, and changes in the value-added coefficient as in equation (6):

$$\Delta(V_i/V) = \bar{v}_i[\Delta(W_i/V) + \Delta(T_i/V)] + (V_i/V)\,\Delta v_i/v_i \qquad (6)$$

(a bar over a variable means that its value is set at the mean of the initial and terminal levels).

The elements in equation (6) are not all immediately available in table 4. For intermediate production (v and W) we rely on a recent

comparative study of interindustry relations that derived some systematic patterns of change from data on 83 input-output tables (Deutsch and Syrquin, 1986). We focus on commodities production only, and combine agriculture and mining into one sector called primary. We also assume that food consumption generates demands from the primary sector only, and that the manufacturing sector supplies one half of non-food consumption and investment (the other half represents construction and other nontradables). With these assumptions we now compute equation 6) for the whole transition range from $300 to $4000. The results are summarized in table 5.5/

Over the course of the transition there is a significant shift in value added from primary production to manufacturing and nontradables. The average patterns in table 5 show a very close correspondence between the directly estimated shift (the last row) and the one calculated by the right-hand-side of equation (6). Changes in domestic demand (Engel effects) account directly for less than one half of the change in structure, and changes in net trade for about ten percent on the average. The contribution of intermediates has two components. First there is a very significant increase in the demand for manufacturing products to be used as intermediates and a decline in the relative use of intermediate inputs from the primary sectors. These trends reflect the evolution from a comparatively simple to a more diversified, roundabout system with a higher degree of fabrication and specialization. The substitution of fabricated materials for natural ones is due to changes in technology and also to changes in relative prices. The second component refers to variations in the ratio of value-added to gross output in a sector. In agriculture this ratio tends to decline with the rise in income, or equivalently, the use of purchased intermediate inputs per unit

of output tends to increase. As shown in table 5, this factor accounts for about one fourth of the decline in the share of primary in total GDP. In an input-ouput model, the variation in intermediate use can be further attributed to changes in final demand, trade, and input-output coefficients. Such a decomposition can be found in the models cited above (for example in Chenery and Syrquin 1980).

Manufacturing - Disaggregated Results

During the process of industrialization the composition of the manufacturing sector changes considerably. At a more disaggregated level, country specific features and policy become more prominent in determining the pattern of specialization. Large countries can better exploit economies of scale within their domestic markets, and can more easily afford a strategy of import substitution on a wide front. Variation in resource endowments is expected to generate differences in production patterns within manufacturing, particularly in small economies. Nevertheless, various studies have shown that a high degree of uniformity still remains in the pattern of change within the industrial sector (at the two digit level of the old ISIC classification), both among countries and over long periods of time in the advanced countries.

Time series for developing countries were examined in Chenery and Taylor (1968) for the period 1950-63. To account for the expected differences in specialization due to size and resources, Chenery and Taylor divided the sample into three more homogeneous groups, and estimated average patterns of change within groups. The typology in the next section can be seen as an extension and refinement of this original effort. In an unpublished study Prakash and Robinson (1979) extended the analysis for the period 1953-73. In

Table 5: STRUCTURAL CHANGE OVER THE TRANSFORMATION

	Impact on the share of: Primary	Manufacturing
1. Changes in final demand		
$\Delta(D_i/V)$		
Food consumption	-.20	
One half of non-food C and investment		.08
2. Changes in intermediate demand		
$\Delta(W_i/V)$	-.06	.18
3. Changes in net trade		
$\Delta(T_i/V) = \Delta(E_i/V - M_i/V)$	-.05	.05
4. Changes in output	____	____
$\Delta(X_i/V) = (1) + (2) + (3)$	-.31	.31
5. Mean value-added ratio $\bar{v}_i$	.71	.35
6. Changes in the value-added ratio		
Δv_i	-.20	.03
$\Delta v_i/v_i$	-.27	.09
7. Implied changes in value-added share due to:		
$\bar{v}_i\ \Delta(X_i/V) = (5) \times (4)$	-.22	.11
$(\bar{V}_i/V)\ \Delta v_i/v$	-.08	.015
	-.30	.125
8. Value-added shares		
Predicted share at: y=300	.44	.12
y=4000	.16	.24
Changes in shares	-.28	.12

the present study we started with the data base from Prakash-Robinson, and added annual observations through 1981. The final data set used in this study refers to the period 1953-81, and although the coverage for the 1950's is very sparse, the series are long enough to study the evolution within developing countries and to assess the stability of the relations after 1973. The analysis of the time series and of the stability of the estimates is presented in part III. In this section we focus on long run industrial change in the average economy. In this study we follow the two-digit level of aggregation of the revised ISIC. At this level, nine separate branches are distinguished (see table 1). To assure compatibility between the aggregage share for manufacturing from the national accounts (VM) and the disaggregated figures (based on industrial censuses and surveys), we imposed the national accounts figure for the aggregate and adjusted proportionately the data of the subsectors for all observations.

Table 6 shows the standard variation in industrial structure with the level of development, in the same format as the aggregate results in table 4.

There have been various attempts in the literature to group industrial sectors into homogeneous categories differing in the demand for their products, their technology or their dynamism. Hoffmann (1958) stressed the systematic decline in the ratio of consumer to producer goods, while at the Economic Commission for Latin America (1964) the labels became more emotive: dynamic and vegetative branches. In table 6 and figure 5 we present two groupings which we have used in previous work. In Chenery and Syrquin (1986a), 14 manufacturing sectors are distinguished and the results are presented at a four sector level. In table 6 we further combine food products and consumer goods into light industry, and producer goods and machinery into

Table 6: AVERAGE VARIATION IN INDUSTRIAL STRUCTURE WITH LEVEL OF DEVELOPMENT FOR POST-1973 PERIOD
(Population = 20 million)

Sector	ISIC Code	Mean under $300	Income per capita (1980 US$) 300	500	1000	2000	4000	Mean Over $5000	Total change	y at mid point
Manufacturing	3	.119	.120	.151	.188	.219	.244	.269	.150	1200
Food, beverages and tobacco	31	.028	.042	.045	.047	.046	.042	.040	.012	-
Textiles and clothing	32	.034	.026	.030	.033	.034	.032	.029	-	-
Wood and products	33	.002	.004	.005	.006	.008	.010	.014	.012	2000
Paper and Printing	34	.005	.003	.004	.007	.011	.016	.025	.020	3000
Chemicals and rubber	35	.018	.024	.030	.036	.040	.042	.034	.016	400
Non-metalic minerals	36	.005	.005	.008	.011	.012	.013	.014	.009	700
Basic metals	37	.006	.005	.009	.013	.017	.019	.020	.014	1000
Metal products and machinery	38	.018	.010	.019	.032	.048	.066	.087	.069	2500
Other	39	.003	.001	.001	.003	.003	.004	.006	-	-
Light industry	31-34,39	.072	.076	.085	.096	.102	.104	.114	.042	900
Heavy industry	35-38	.047	.044	.066	.092	.117	.140	.155	.108	1500
Early	31,32,39	.066	.069	.076	.083	.083	.078	.074	-	-
Middle	33,35,36	.024	.033	.043	.053	.060	.065	.062	.038	500
Late	34,37,38	.029	.018	.032	.052	.076	.101	.132	.103	2500

heavy industry. The figures show that as income rises the composition of manufacturing shifts from light to heavy industry. The early increase in light industry is generally the result of domestic demand and the opportunities for import substitution which are exhausted at an early stage.

Static comparisons of relative labor productivity and capital intensity within manufacturing (Syrquin 1986b), suggest a higher use of capital in heavy industry, particularly in producer goods, accompanied by higher levels of labor productivity and wages. Part of this difference is due to a higher level of skills, especially in some branches of the machinery sector. Over time, the growth of labor productivity and of total factor productivity tends to be higher in heavy than in light industry. Economies of scale are more prevalent in heavy than in light industry and correspondingly, the weight of small scale firms in smaller.

Chenery and Taylor (1968) examined 11 branches of manufacturing and grouped them into three categories "according to the stage at which they make their main contribution to the rise of industry" (p. 409). Early industries are established at low income levels to satisfy the essential demands of the population. They are characterized by simple technologies and low income elasticities of demand. Their share in GDP remains static during the transition (within manufacturing their share goes down significantly), although there are some recent exceptions where the output of some branches in this group expanded rapidly for exports.

Middle industries typically double their share in GDP early in the transition but show little further increase. A large proportion of their output is used as intermediate inputs by other sectors. This source of demand expands fast in the lower income levels when the matrix of interindustry

relations becomes more dense. Income elasticities for the finished products from the group of middle industries are generally above unity.

The group of late industries accounts for virtually all of the increase in the manufacturing share in the latter stages of the transformation. This group includes investment goods, some intermediates, and durable consumer goods with high income elasticities of demand.

Some indication about the changes in intermediate demands for the products of the aggregate groups in table 6, can be obtained from unpublished calculations done for the study of Deutsch and Syrquin (1986). The change in the ratio of intermediate uses of manufactures to GDP over the range $300 to $4000, equals 18 percentage points. Of these, only 3 points originate in light industry while the other 15 points come from heavy industry. The classification in Deutsch and Syrquin allows only an approximate matching with the early-middle-late division. The approximate allocation shows no change in the ratio of sectoral intermediate demands to total GDP in the early group, an increase of 7 percentage points in the middle industries and an increase of 11 points in late industries.

The sources of structural change in industry are analyzed in some detail in Chenery, Robinson, and Syrquin (1986, part II). Alternative patterns of specialization appear below in section II.C.

C. Typology of Development Patterns

Average patterns of development are a useful starting point. They provide an initial reference point stressing the uniformities of the transformation. Various other factors influence the processes of change. Our hypothesis is that these factors affect primarily the timing and sequence of

Figure 6a

STRUCTURE OF VALUE ADDED IN MANUFACTURING (A)

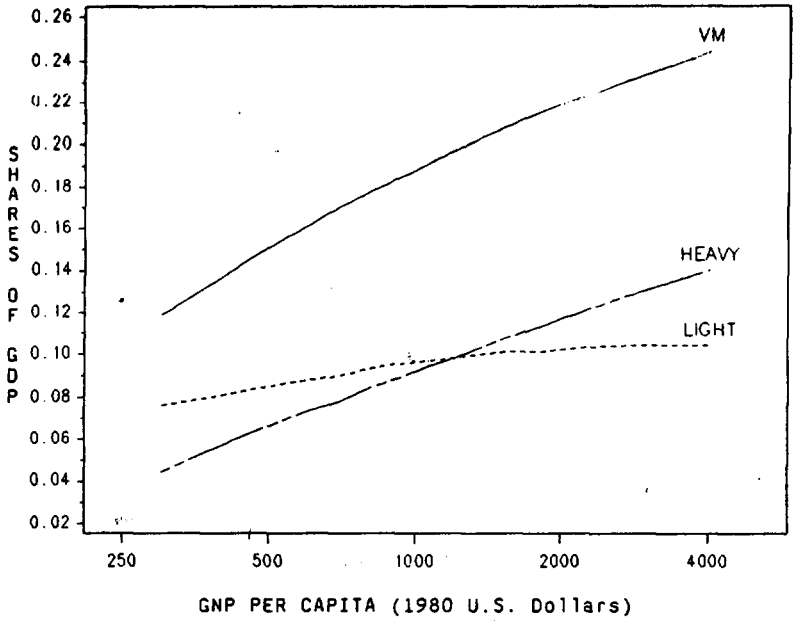
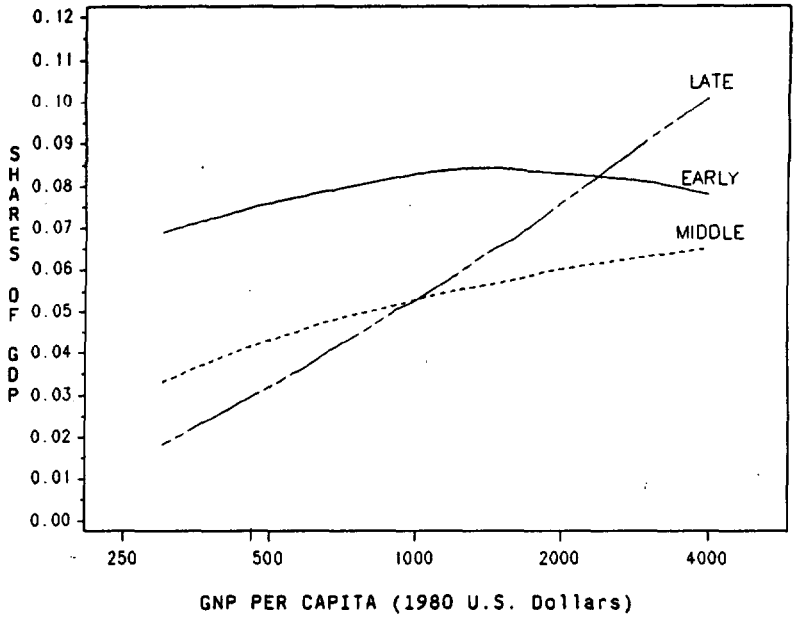


Figure 6b

STRUCTURE OF VALUE ADDED IN MANUFACTURING (B)



structural change and less its overall nature. In this section we focus on selected characteristics of economic structure and policy that have a systematic effect on resource allocation, and present a simple typology of development strategies. We then exploit the large samples to estimate separate regressions for each group.

The approach in this study extends our earlier typology of allocation patterns (Chenery and Syrquin, 1975 and 1986b. See also Chenery and Taylor, 1968 and Chenery, 1979). It is based on a statistical analysis of the level and orientation of exports, and incorporates structural characteristics and policy. The typology recognizes three dimensions:

a) Size: Economies are separated into small and large on the basis of their population size in 1965. Other measures of size and their relation to population are discussed in Perkins and Syrquin (1986), where the very large countries are singled out for further analysis (Chenery, 1979 chapter 3, and 1982, and Wood 1986, also focus on the distinguishing features of the very large countries).

b) Openness: We distinguish between an inward and an outward orientation according to the level of merchandise exports relative to the value predicted by the regressions. To account for the negative association between size and openness, separate regressions were run for large and small countries, and N was left as an explanatory variable in equation (1). To minimize the impact of potential breaks in the regressions after 1973 (see section III.A), within each group we further divided the sample by time - pre 1973 and post 1973 - and estimated separate regressions for each subperiod. The relative export level ($EL=E/\hat{E}$ where E here refers to merchandise exports) was calculated for 1965 and 1980 (table 7).

c) Trade Orientation: Direct measures of the availability of natural resources are hard to come by, and besides, the level and composition of exports reflect the combined effect of the abundance of resources and trade policy. To capture the combined effect of the two, we define a trade orientation index (TO) that measures the deviation of the actual trade bias (TB) from the one predicted for a country of similar income and size. The trade bias is defined as $TB = (E_p - E_m)/E$ where E here stands for merchandise exports ($=E_p+E_m$). It is a measure of the composition of commodity exports normalized by total merchandise exports. The TO index equals:

$$TO = TB - \hat{TB} = (E_p - E_m)/E - (\hat{E}_p - \hat{E}_m)/\hat{E}$$

The index considers the pattern of specialization as well as the level of total exports (for further discussion see the appendix to Chenery and Syrquin, 1986b). The TO index was calculated for 1965 and 1980 on the basis of separate regressions by size (small and large) and period (pre and post 1973).

On the basis of these three dimensions - size, the relative export level, and the trade orientation index - countries were assigned into one of the various types in table 7. In classifying countries the statistical measures were supplemented by dynamic considerations and an evaluation of their trade strategies. Thus, if a country experienced a significant shift in policy or in the two indicators between 1965 and 1980, we tended to classify it by its position in the terminal year or by the direction of the shift. More details about the classification appear in annex A.

In table 7 the countries are first divided by size into large (L) and small (S), then by trade orientation into primary (P) and manufacturing (M),

and finally by openness into inward (In), neutral (N), and outward (O). The inward and neutral classes appear together under the inward label. They are distinguished in the table but not in the regressions.

Performance by Type

Before contrasting the patterns of resource allocaltion in the various groups in the typology of table 7, we present a rough picture of comparative performance during the period 1950-83, based on unweighted averages of growth rates of total GDP (table 8). There is great variance within groups and factors other than those dividing the groups in the table, influence the rate of growth. Still, the differences are of interest though the above caveats should be remembered in any causal interpretation.

During the period 1950-83 large countries performed better than small ones, a manufacturing specialization outperformed a primary specialization, and an outward orientation exhibited higher growth than an inward orientation. The superiority of the outward orientation took place within all four types in the table (LP, LM, SP, and SM).

Table 7: A TYPOLOGY OF TRADE PATTERNS

A. Large

PRIMARY	n	g_y	EL		TO		F	
			65	80	65	80	65	80
Inward								
Argentina	26	1.2	46	32	33	29	-2.8	2.2
Brazil x	24	4.4	120	58	30	-6	-2.2	2.1
Burma	34	1.9	78	37*	19	18*	5.9	1.2*
Colombia x	34	2.3	53	72	11	23	-1.0	-0.5
Ethiopia	26	1.4	43	86	22	42	1.0	5.2
Mexico	34	3.2	50	22*	25	14*	1.0	2.7*
Philippines x	34	2.6	103	111	8	-27	-0.03	5.5
Thailand x	34	3.6	90	132	7	-11	1.3	5.4
Turkey	34	3.1	40	37	25	8	1.4	8.0
United States	34	1.9	55	70	106	46	-0.7	1.0
Outward								
Canada	34	2.7	85	143	17	47	0.2	-1.7
Indonesia	28	3.3	80	270	7	22	0.5	-8.3
Iran	26	5.7	129	210*	35	89*	-6.4	-9.1*
Nigeria	31	2.2	207	171*	24	49*	2.1	-1.4*
Zaire	34	-0.1	375	157*	-1	26	-9.8	19.1*
MANUFACT.								
Inward								
Bangladesh	24	0.4	26*	62	-102*	-108	7.3*	14.7
China	25	4.6	---	---	---	---	---	---
France x	34	3.7	88	97	-3	13	-0.9	1.7
India	34	1.5	62	120	-115	-118	2.2	3.9
Pakistan	24	2.8	70	82	-54	-69	8.3	11.5
Spain	33	4.2	40	57	4	-29	3.4	2.6
Outward								
Egypt	34	3.1	105	138	-25	22	3.8	15.4
Germany	34	4.0	127	140	-18	-5	-0.3	0.4
Italy	34	4.0	119	121	-38	-41	-2.6	2.9
Japan	34	6.4	131	84	-25	-42	-1.4	0.9
Korea	34	4.9	39	157	-96	-112	7.4	7.6
S.Africa	34	2.3	135	186	-18	-71	0.3	-8.2
United Kingdom	34	2.0	121	130	-20	-3	0.7	-2.5
Yugoslavia	26	4.7	94	75	-74	-57	-0.3	4.0

Table 7: A TYPOLOGY OF TRADE PATTERNS (Cont'd)

b. Small

PRIMARY	n	g_y	EL		TO		F	
			65	80	65	80	65	80
Inward								
Afghanistan	23	0.2	---	---	---	---	---	---
Australia	34	2.3	49	44	49	27	2.4	1.9
Bolivia	25	1.1	85	88*	26	43*	5.0	5.6*
Burundi	24	2.5	76	53*	- 4	8*	2.2	10.9*
Central Africa Rep. x	24	0.2	78	70	-89	-25	10.6	16.5
Chad x	23	-2.8	103	115*	4	-12*	7.5	19.8*
Chile	26	0.8	57	69	46	40	-1.1	4.2
Costa Rica x	24	2.5	59	56	6	-11	10.0	10.3
Denmark x	34	2.9	86	72	16	- 3	1.5	1.1
Dominican R.	34	2.6	56	61	31	12	2.3	9.7
Ghana x	34	-0.8	97	121*	14	1*	9.6	-0.9*
Guatemala x	34	2.0	77	88	10	5	2.8	2.9
Haiti	25	0.5	74*	---	-66*	---	8.2*	---
Madagascar x	26	-0.7	72	105	8	- 4	6.4	16.9
Mali x	34	0.9	98	114*	- 5	-23*	11.2	22.7*
Mozambique	31	-0.3	---	---	---	---	----	----
Nepal	26	0.3	107*	79	-75*	-60	4.5*	7.2
New Zealand	34	1.6	66	61	69	45	2.2	1.2
Nicaragua	34	1.2	80	67	24	17	3.1	18.9
Paraguay	34	2.3	43	35*	16	27*	0.8	5.5*
Peru	34	1.6	62	84	28	-15	1.2	-4.0
Rwanda	26	0.9	97	76*	2	6*	4.8	11.4*
Senegal x	24	-0.3	100	95	27	8	4.0	17.2
Somalia	24	-0.6	70	36	- 8	21	3.5	21.1
Sudan	30	0.6	81	48	- 2	- 5	0.7	10.9
Syria	26	3.3	54	67*	20	43*	0.04	12.5*
Uruguay	34	1.0	53	28	47	- 4	-7.0	6.2
Yemen	14	4.6	12*	3	---	---	28.8*	64.3
Outward								
Algeria	34	2.3	90	118	24	31	3.0	-1.9
Camaroon	26	2.0	124	141	17	29	0.5	-4.6
Congo	24	2.8	64*	125	12*	25	17.1	0.1
Ecuador	34	3.4	77	95	34	54	3.0	0.2
Guinea	24	1.3	---	---	---	---	---	---
Honduras	34	0.9	109	143	21	20	-0.5	7.4
Iraq	29	4.3	155	208*	50	62*	-15.0	-13.4*
Ivory Coast	24	1.8	147	141*	32	31*	-1.4	-0.2*
Liberia	24	0.7	151	155	12	24	-10.2	0.05
Libya	24	3.4	146	160	72	95	-20.7	-35.2
Malawi	30	2.2	147	256	- 2	-21	12.1	14.3
Mauritania	24	1.8	114	98*	16	21*	-13.5	22.7*
Malaysia	29	4.0	211	217	17	2	-4.4	-2.6

Table 7: A TYPOLOGY OF TRADE PATTERNS (Cont'd)

b. Small

PRIMARY	n	g_y	EL		TO		F	
			65	80	65	80	65	80
Outward								
Niger	24	-1.5	53	148	18	20	6.5	8.7
Papua	24	1.9	57	109*	14	33*	19.9	6.2*
Saudi Arabia	21	6.6	224	199	76	105	-33.9	-32.7
Sierra Leone	20	0.8	131	99	-101	-78	2.5	10.0
Sri Lanka	34	2.0	309	216	- 2	-37	-0.6	22.6
Togo	24	2.1	76	103	8	12	5.9	14.9
Uganda	34	-0.5	160	60*	8	0*	-1.2	2.1*
Venezuela	34	2.3	134	122	39	33	-10.5	-8.2
Zambia	34	2.0	243	153*	39	47*	-14.9	19.5*
Zimbabwe	24	1.4	---	---	---	---	----	----
MANUFACT.								
Inward								
Austria	34	4.3	72	72	-68	-61	0.6	1.9
Angola x	31	-1.3	---	---	---	---	---	---
Benin x	25	0.7	52	106*	8	-2*	8.6	22.7*
El Salvador x	34	1.1	112	137	2	-21	2.4	-0.9
Finland	34	3.7	70	82	-26	-35	1.7	0.8
Greece x	34	5.3	22	35	27	-16	11.3	6.8
Israel	34	4.3	41	82	-66	-80	13.5	12.4
Jamaica x	34	2.1	72	99	-22	-80	3.6	2.1
Jordan	14	6.5	50*	55	-21*	-18	56.7*	49.4
Morocco x	34	1.4	70	57	1	-42	-1.3	11.1
Norway x	34	3.2	79	87	- 8	44	0.9	-6.2
Panama x	34	3.6	---	---	---	---	---	---
Portugal	34	4.6	85	76	-84	-78	4.6	15.1
Sweden	34	2.7	73	73	-33	-45	0.9	1.9
Tunisia x	23	4.5	62	105	-1	-10	13.1	5.4
Tanzania x	26	1.9	186	80	-26	-31	-0.9	13.1
Upper Volta x	25	1.1	67	115	-4	-21	7.6	27.3
Outward								
Belgium	34	3.3	115	145	-67	-45	-0.2	3.7
Hong Kong	26	7.5	218	220	-113	-94	7.0	4.6
Hungary	24	5.9	154*	143	-86*	-75	7.4*	2.2
Ireland	34	2.8	96	125	1	-33	9.0	13.1
Kenya	34	2.1	148	108	-20	-30	-0.7	11.4
Lebanon	25	1.1	---	---	---	---	---	----
Netherlands	34	3.0	132	126	-34	-13	0.7	0.4
Puerto Rico	34	3.6	---	---	---	---	---	----
Singapore	24	7.1	314	378	-26	-36	12.1	9.3
Switzerland	34	2.3	86	87	-68	-63	0.8	3.5
Taiwan	34	5.6	---	---	---	---	---	----

n: number of annual observations on income per capita.
g_y: average annual growth rate of per capita GNP.
x: Neutral (see text).
*: 1975

Table 8 ANNUAL GROWTH RATE OF GDP 1950-83: SIMPLE AVERAGES (Percent)

Strategy	Size: Large — No. of Countries	Large — g_Y	Size: Small — No. of Countries	Small — g_Y		
Primary inward	10	4.94	27	3.58		
outward	5	5.12	23	5.01		All primary
	(LP)	5.00	(SP)	4.24	(P)	4.42
Manufact. inward	6	4.73	17	4.74		
outward	8	5.26	10	5.73		All manufact.
	(LM)	5.04	(SM)	5.11	(M)	5.09
	(L)	5.02	(S)	4.54		
All inward	4.28		ALL	4.67		
All outward	5.22					

Notes: Growth rates within countries are OLS estimates. The number of annual observations varies from 14 to 34 (see table 7).

Variation in Patterns of Resource Allocation

A simple way to assess the effects of size, specialization and openness on the patterns of structural change, is to compare the results of separate estimates of equation (1). For each of the three dimensions we compare the predicted values at the income levels representing the end points of the transition range ($ 300 and $ 4000) for various measures of structure. The effects of size and resources for example are not independent of each other. But as a first approximation we examine separately each of the three sources of diversity-size, specialization and openness. (Tests of homogeneity appear in annex B.)

Size: The importance of international trade is much lower in large than in small countries, and the difference between the two groups increases with the level of income (figure 6). An interesting difference relates to the share of manufactured imports. In large countries this share is not only lower but it declines during the initial stages of the transition, reflecting the early import substitution in large countries made possible by their larger domestic markets. The differences in trade patterns result in similar differences in the structures of production and employment. At low income levels, large countries are more industrialized than small ones. The contrast is particularly marked in heavy industry which is not economical in small economies at this income level. At higher income levels there is a high degree of convergence, implying a more pronounced transformation in smaller countries.

Trade Orientation: Ignoring the differences in size, the type of specialization has only a small average effect on the level of trade but (by

definition) a very significant one on its composition. A relative specialization in manufacturing is characterized by higher exports of manufactures and lower primary exports, absolutely and not only in relative terms. The impact on production and employment is similar to the one of size, but in this case the divergence between the two types is magnified during the transition. The pattern of specialization represents, in part, a strategy of development, unlike size which is a structural feature whose variation over time is insignificant relative to its variation across countries.

Openness: The criterion for classifying countries as inward or outward, was not the share of trade but the relative export level that measures departures in actual trade from the predicted one. In analyzing this dimension we also incorporated the pattern of specialization in a simple way. To the separate regressions within the inward and outward groups, we added an additive dummy variable taking the value of one for manufacturing orientation and zero for primary orientation. Within groups the predicted values for manufacturing and primary orientation differ by a constant (the coefficient of the dummy variable) at all income levels. The figures in table 9 show the ratio of predicted values of inward to outward for the two types of trade orientation. The last two columns give the coefficients of the dummy variables.

The principal differences due to openness and its interaction with the orientation of exports, as reported in table 9 are:

- In the more inward-oriented economies all categories of trade are significantly lower than in the outward group.

Figure 6

EXPORTS: S AND L

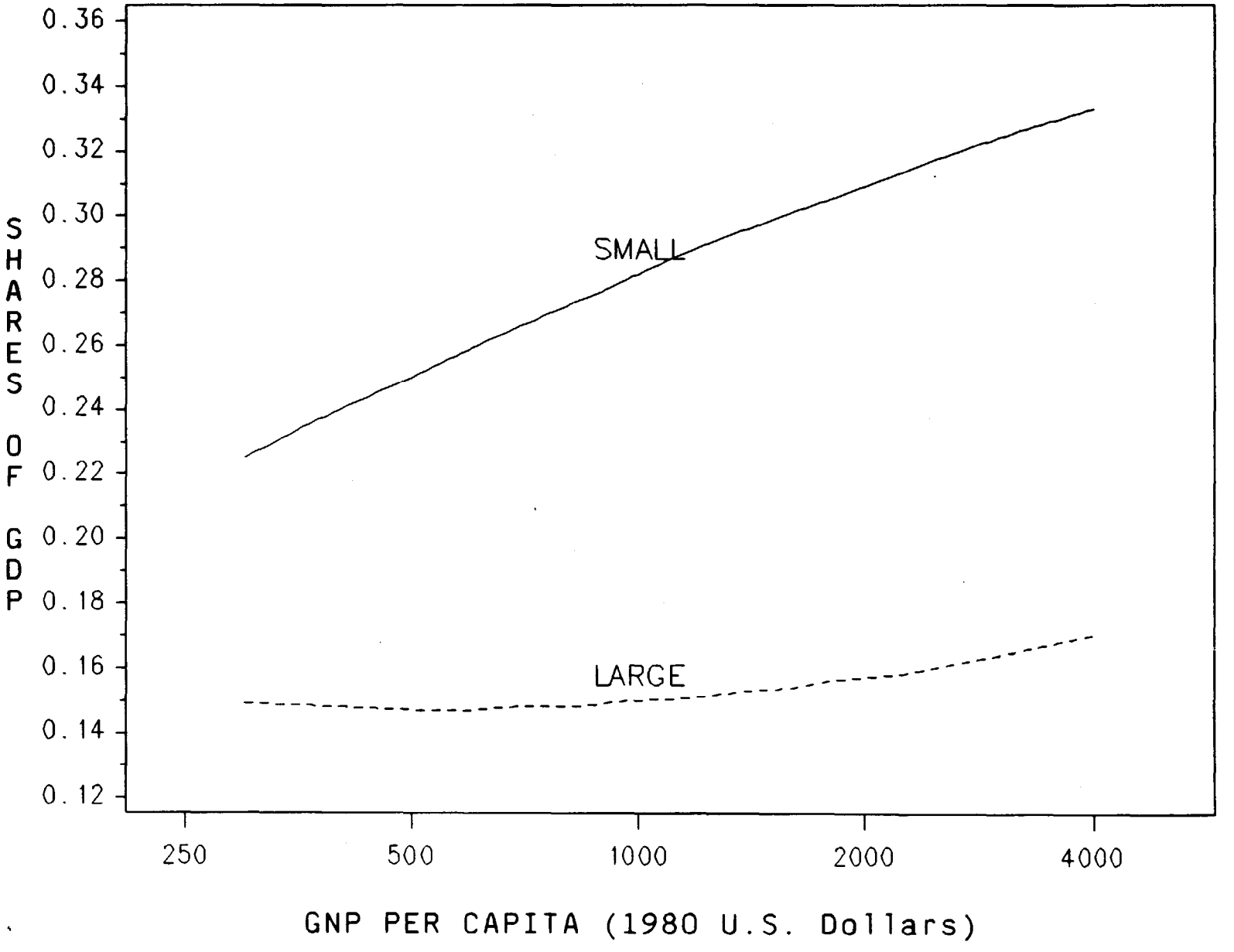


Table 9: EFFECTS OF SIZE, TRADE ORIENTATION AND OPENNESS ON PREDICTED VALUES OF STRUCTURE AT TWO INCOME LEVELS ($300 and $4000)

	Size: Large/Small		Orientation: Manuf/Primary		Openness: Inward/Outward (Primary)		Openness: Inward/Outward (Manuf)		Coefficient of dummy variable for manuf.(X100)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variable	300	4000	300	4000	300	4000	300	4000	Inw.	Outw.
EFMM	159	58	30	29	16	15	-	58	0.4	-13.6
EOP	49	34	93	64	63	93	46	64	-2.6	-1.0
EM	104	66	425	445	-	92	38	47	4.1	13.3
MP	77	65	134	218	73	89	66	116	3.5	5.9
MM	68	44	119	139	69	65	73	69	3.9	4.7
E	66	51	109	134	51	52	65	64	4.9	1.8
M-E	55	41	207	-	575	-	125	357	2.7	6.5
I	111	98	106	112	77	86	88	95	2.9	0.6
VA	87	111	98	108	105	94	113	129	-0.9	-3.6
VM	129	115	115	123	118	136	60	87	-0.6	9.3
VS	102	92	96	92	107	114	97	106	-1.7	1.7
LA	88	97	91	98	96	75	110	106	-2.7	-12.2
LI	138	103	143	124	114	107	72	90	3.0	8.6
LS	146	100	122	86	111	117	88	106	-0.3	3.6
Light ind.	127	89	104	116	173	149	92	95	-0.9	3.4
Heavy ind.	656	145	124	145	142	125	34	78	1.1	5.0

Notes: The figures are ratios of predicted values (x) times 100.

Size: $\hat{x}$ small = 100.

Orientation: $\hat{x}$ primary = 100.

Openness: $\hat{x}$ open = 100.

Predicted values calculated for a level of population of 6 million in small countries, 60 million in large countries, and 20 million in other divisions.

A blank indicates a negative or negligible value in one of the types.

- The share of manufacturing in output and employment in the more closed economies relative to the open ones is higher when trade shows a primary orientation (cols. 5-6) and lower when the specialization favors manufactures (cols. 7-8). The former case is representative of the import substitution strategy, primarily in the case of large countries (see below). When the absence of natural resources or policy consideration have led to a trade orientation toward manufactures, it is in the more open economies where we find a higher rate of industrialization.
- Within the inward and the outward groups an estimate of the average difference due to trade orientation is given by the coefficient of the dummy variable for manufacturing orientation, in the last two columns of table 9. The magnitude of the coefficients is distinctly higher in the outward group. In this group the level of exports is similar for the two types of specialization but the composition is very different. When a country's trade is manufacturing oriented, exports of manufactures (as a share of GDP) are 13 percentage points higher while primary exports are lower by a similar amount. In the structure of economic activity, this difference shows up in shares of manufacturing output and employment that are higher by about 9 percentage points.

Classification of Trade Patterns

The classification of countries by scale and trade orientation in table 7 was used as a basis for computing separate regressions of allocation patterns. Four groups were identified according to their size and trade orientation: large, primary oriented (LP); large, manufacturing oriented (LM); small, primary oriented (SP); and small, manufacturing oriented (SM). The terminology and approach first appeared in Chenery and Taylor (1968), and was revised in our 1975 study (C-S),

except for the division of the large countries into LP and LM which were previously consolidated into one group. In this study we show separate results for LP and LM, however, a note of caution is in order about the LM group. The composition of this group can lead to some peculiar results. Among its 14 countries it includes four very large and very poor (Bangladesh, China, India, and Pakistan) and four high income countries with very high shares of industry (France, Germany, Japan and the UK). In between we find a group with very rapid rates of industrialization during the period (Italy, Korea, Yugoslavia).

A comparison of the principal results appears in tables 10 and 11 and in figures 7-10. Table 10 compares the predicted levels for various indicators at one point in the middle of the transition range ($1000). Table 11 shows the magnitude of the transformation in structure for the four types.

Some of the results in table 10 mirror the ones in table 9. The main difference is that now we look at the combined effect of size and trade orientation.

Large countries export a much smaller share of output than small ones. Within large countries there are some interesting differences between LP and LM types, subject only to the above caveat about the composition of the LM group. The relative abundance of natural resources in the typical LP country, is reflected in its trade composition. Foreign exchange requirements are derived from primary exports, and there is little need for primary imports. Many countries in this group followed an import substitution strategy during most of the period since 1950. One result of this policy was a failure to develop manufactured exports which also shows up in the shortfall of light industry relative to the average pattern, and in the relatively low share of industrial employment.

Table 10: ALTERNATIVE PATTERNS OF SPECIALIZATION: COMPARISON AT y = $1000

Variable	Average Pattern (Share)[a]	Average Pattern Index	Index: Share of Type - Share of Average Pattern x 100 SP	SM	LP	LM
EFMM	7.3	100	125	18	78	19
EOP	7.9	100	147	106	63	29
EM	3.7	100	49	389	35	262
MP	7.1	100	97	177	52	152
MM	13.5	100	113	180	67	74
E	22.6	100	115	141	63	67
M-E	3.4	100	76	341	50	221
I	23.3	100	91	105	98	120
VA	22.8	100	102	105	113	93
VN	7.7	100	109	66	109	43
VM	18.1	100	85	95	97	116
VS	37.8	100	108	104	96	102
LA	51.7	100	112	85	102	89
LI	19.2	100	83	123	88	132
LS	29.1	100	90	111	104	98
Light ind.	9.6	100	104	95	89	123
Heavy ind.	9.2	100	60	76	95	137

a) Shares of GDP except for the employment variables which are shares of total labor force.

By contrast in the LM group, overall trade is still low but manufactured exports are substantially higher than in the average pattern, as is the share of light industry in GDP. The exploitation of economies of scale is reflected in the high shares of investment and heavy industry.

In small countries trade is more important but again its composition differs according to the pattern of specialization. In the SP economy high trade derives from primary exports that more than offset the shortfall in manufactured exports, while exactly the opposite is true of the typical SM economy. The high level of manufactured exports in the SM country is accompanied by an equally high share of manufactured imports - the exact opposite of the LP pattern. The high level of manufactured imports reflects input requirements, as well as final imports which are a concomitant of the higher degree of specialization and integration in the international economy of the resource-poor SM country.

Table 11 compares the magnitude of change during the transition in the four types. Manufactured exports increase everywhere but mostly in the manufacturing-oriented groups. The high level of specialization in small countries leads to a greater transformation in the structures of production and employment. Some of the early rise in industry in large countries, afforded by size and often prompted by policy, is not reflected in the table.

To facilitate a comparison with the results in Chenery and Taylor (1968), the dimension of the transformation within manufacturing is shown for the early-middle-late partition of industrial branches. Beyond the $300 mark there is little change in the share of early industries, except in SM countries where the subsequent rise is closely linked to the development of exports. Industrialization during the transition is mostly concentrated in the group of late industries, a group characterized by relatively high capital intensity and economies of scale.

Table 11: DIMENSIONS OF THE TRANSFORMATION BY TYPE
(Changes in Shares)

	Type			
	SP	SM	LP	LM
Merchandise exports				
Primary	2.6	-3.4	-7.3	-1.6
Manufacturing	2.2	15.6	3.7	6.4
Merchandise imports				
Primary	-1.1	5.3	-1.2	0.8
Manufacturing	1.2	6.7	-1.6	-1.4
Value added in				
Agriculture	-33.2	-30.6	-23.7	-27.6
Manufacturing	10.2	13.7	8.5	14.0
Labor force				
Agriculture	-54.1	-50.7	-45.7	-39.6
Industry	21.3	26.1	18.4	22.1
Manufacturing				
Early	1.5	5.2	-0.3	0.1
Middle	2.5	5.0	1.4	3.8
Late	5.5	9.6	7.6	9.8

Note: Changes in predicted values from y = $ 300 to y = $ 4000. N = 6 in small countries, and N = 60 in large ones.

In the four-way typology analyzed in this section the degree of openness has not been explicitly considered. Further splitting the types by this dimension would reduce the samples too much for statistical analysis. Instead, we make recourse once again to a dummy variable for estimating the average impact of an outward orientation within types. The coefficients of the dummies for the more open groups and their t ratios are reported in table 12.

In most of the cases the coefficients are highly significant statistically. Trade ratios in the more open groups are strikingly higher than in the more inward oriented ones. The increase in exports associated with greater openness, takes place in primary exports in SP and LP types, and in manufactured exports in SM and LM.

Greater openness is associated with lower trade deficits and higher investment shares, implying higher saving proportions. The only exception is the SM group where the effects are not significant.

In SP and LP countries that are relatively open, we find that the share of mining increases at the expense of manufacturing and services. In SM and LM, manufacturing is higher when the economy is outward oriented and agriculture lower. The higher shares of manufacturing reflect a higher share of light industry in SM and of heavy industry in LM.

A positive association between outward orientation and industrial employment is found only in the SM type economy.

Figure 7a

EXPORTS: SP AND SM

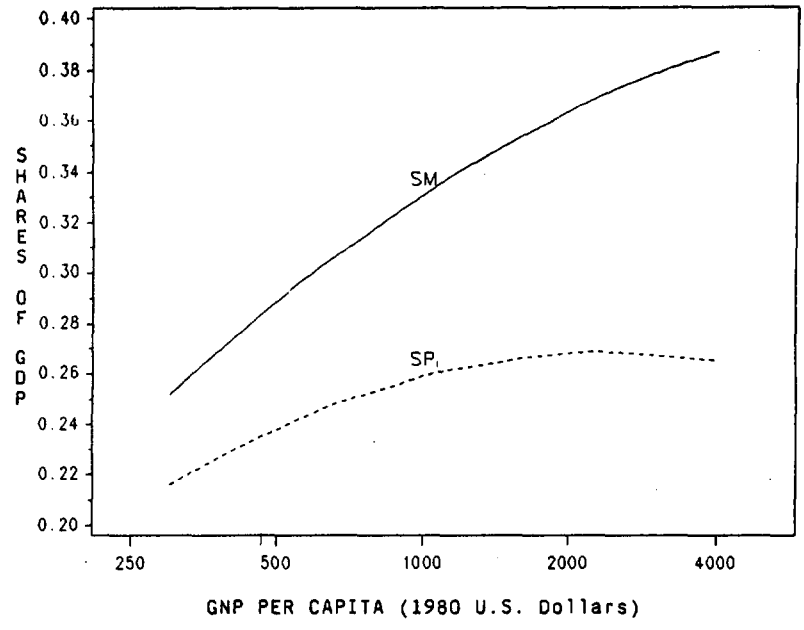


Figure 7b

EXPORTS: LP AND LM

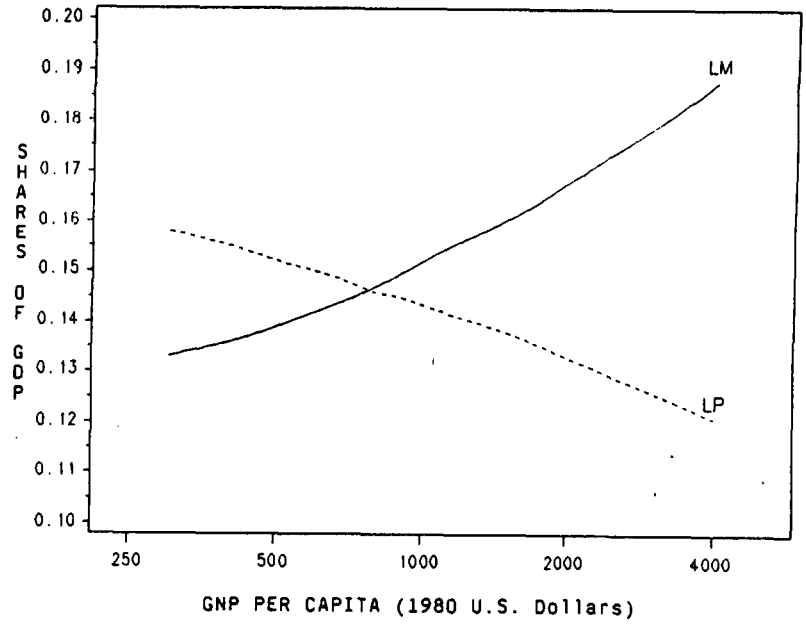


Figure 8a

STRUCTURE OF TRADE: SP

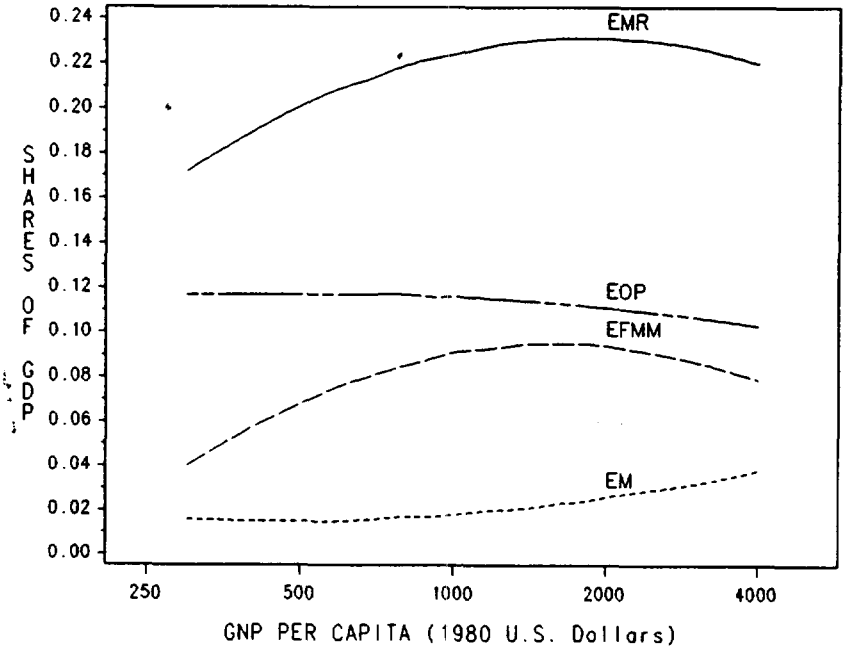


Figure 8b

STRUCTURE OF TRADE: SM

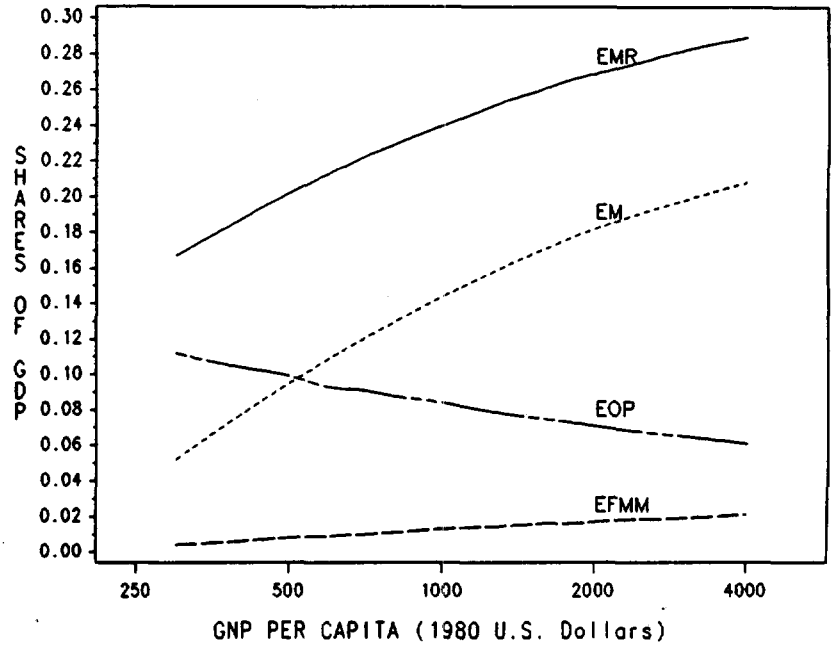


Figure 8c

STRUCTURE OF TRADE: LP

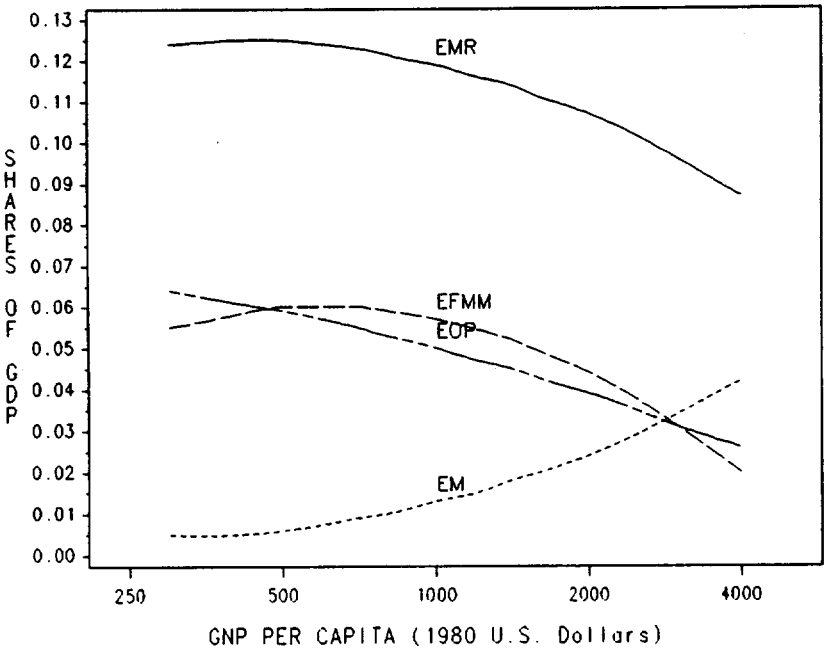


Figure 8d

STRUCTURE OF TRADE: LM

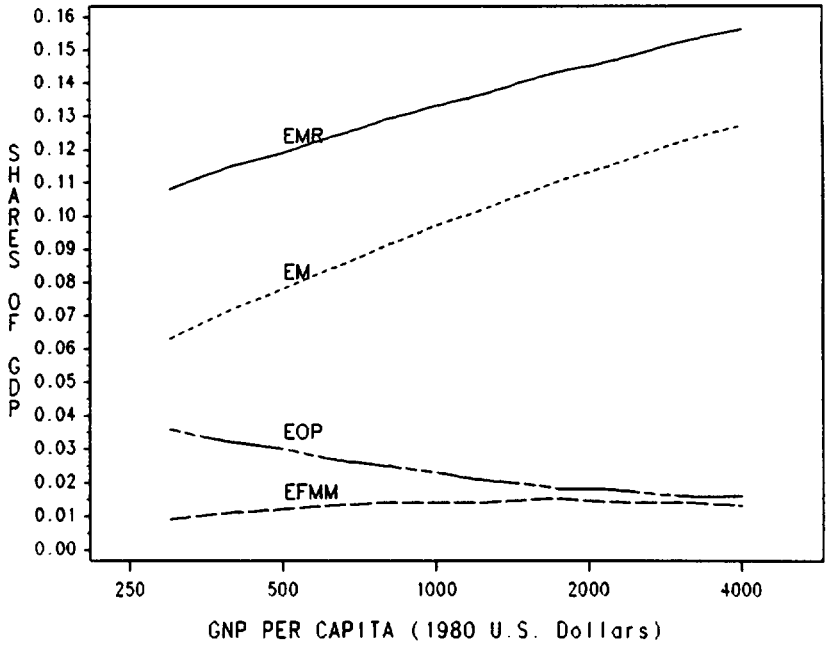


Figure 9a

STRUCTURE OF PRODUCTION: SP

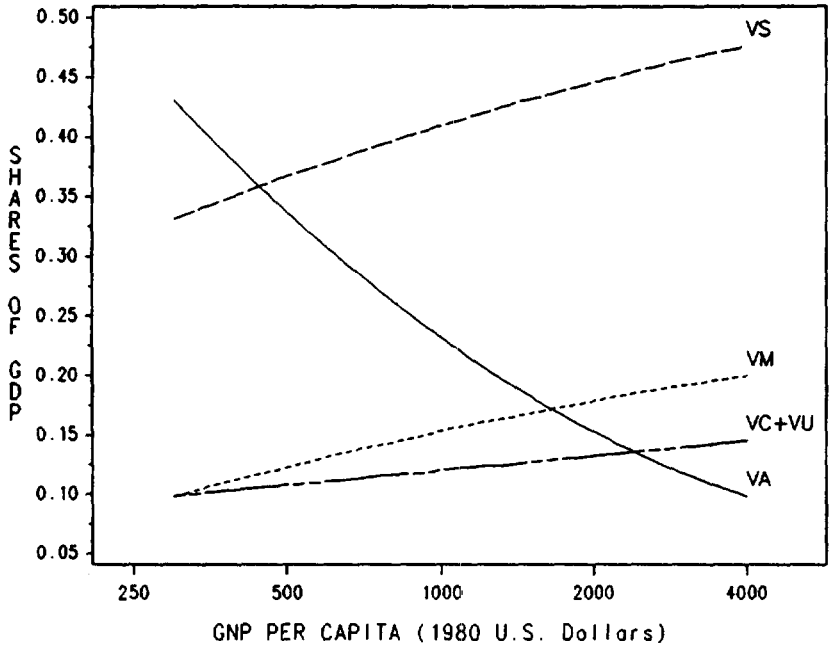


Figure 9b

STRUCTURE OF PRODUCTION: SM

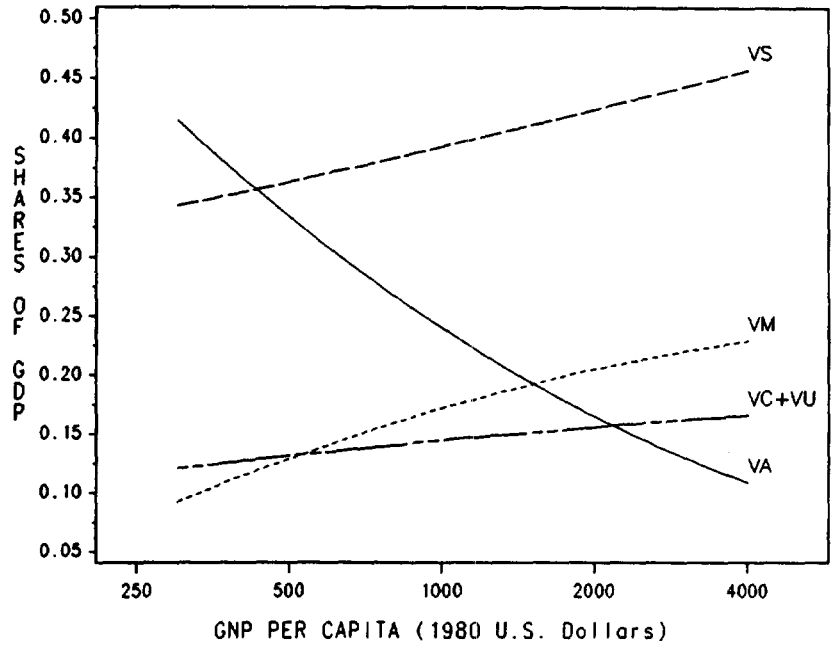


Figure 9c

STRUCTURE OF PRODUCTION: LP

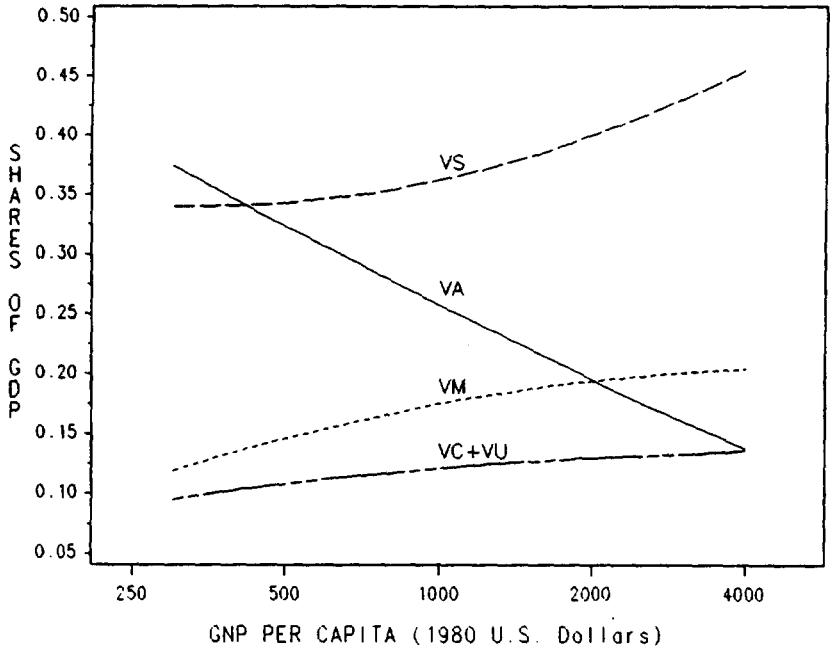


Figure 9d

STRUCTURE OF PRODUCTION: LM

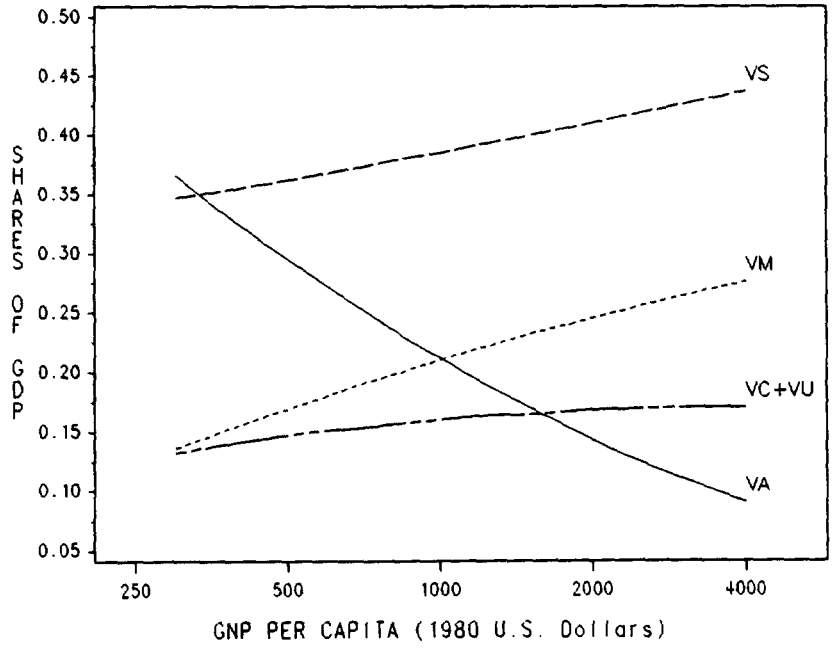


Figure 10a

STRUCTURE OF VALUE ADDED IN MANUF: SP

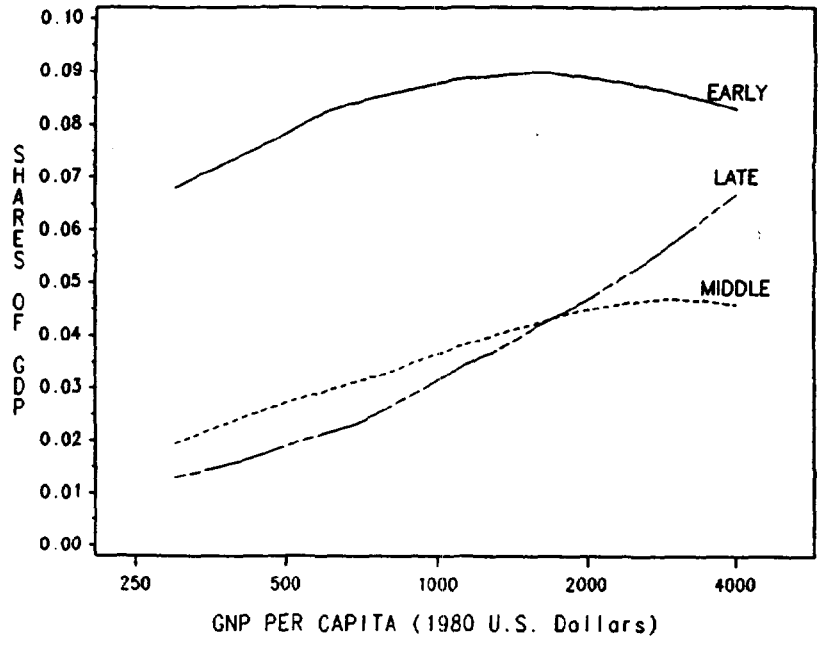


Figure 10b

STRUCTURE OF VALUE ADDED IN MANUF: SM

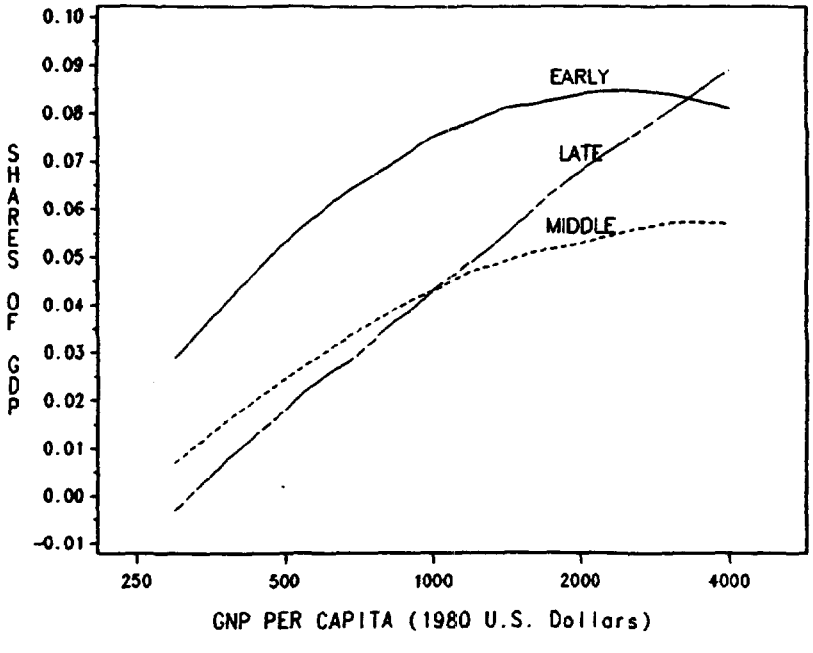


Figure 10d

STRUCTURE OF VALUE ADDED IN MANUF: LM

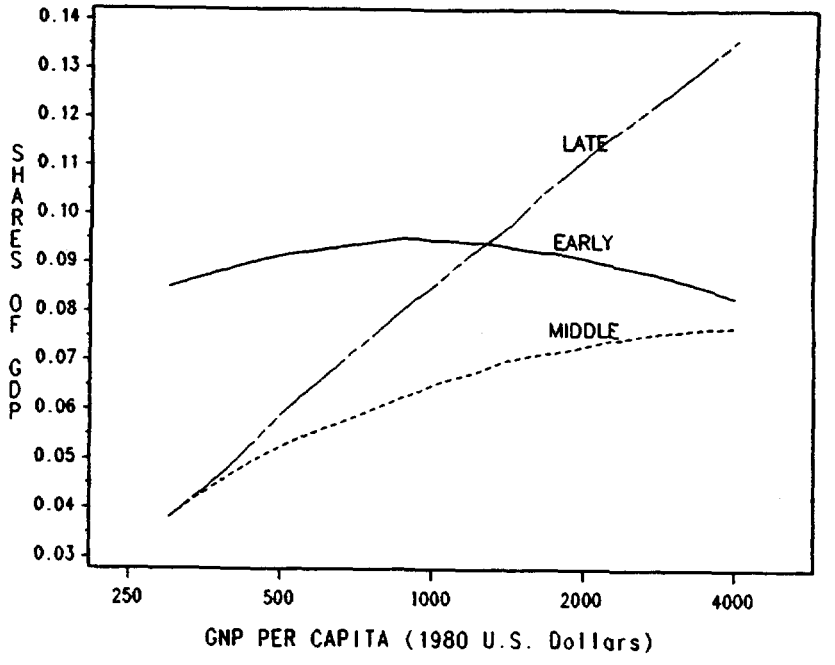


Figure 10c

STRUCTURE OF VALUE ADDED IN MANUF: LP

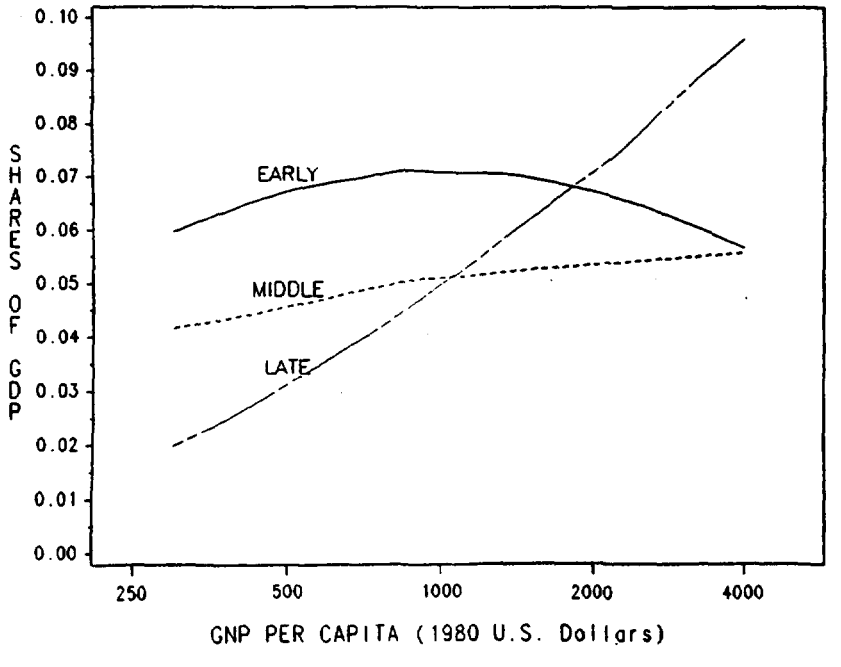


Table 12: EFFECT OF OUTWARD ORIENTATION BY TYPE

	Dummy variable for "open" group							
	Coefficient (X100)				t ratio			
	SP	SM	LP	LM	SP	SM	LP	LM
C	-11.4	2.8	-4.9	-6.2	24.0	5.3	6.9	8.6
G	2.0	-2.3	1.6	4.3	7.1	6.3	4.8	9.3
I	5.8	0.2	1.3	1.2	14.8	0.5	2.7	2.1
E	13.0	15.4	14.0	6.2	23.6	17.6	17.5	9.3
M	9.4	16.1	12.0	5.6	16.1	17.2	15.9	8.6
M-E	-3.6	0.7	-2.0	-0.6				
FCN	-7.7	0.3	0.9	-5.9	7.5	0.8	0.3	11.8
EP	12.7	3.1	15.2	1.4	19.9	5.8	16.5	3.3
EM	0.4	15.8	1.2	4.7	2.1	15.7	5.4	8.9
MP	1.6	6.0	1.7	1.9	6.0	13.6	5.8	5.1
MM	4.8	12.2	7.1	2.2	13.7	15.9	14.9	4.6
VA	-4.0	-5.3	3.7	-2.2	6.2	7.2	3.7	3.3
VN	7.8	0.1	11.2	1.6	13.5	0.4	18.8	3.5
VM	-2.4	4.2	-9.0	3.2	7.9	7.5	20.5	4.5
VC	0.9	-0.2	0.1	-0.2	6.5	1.1	0.4	0.9
VU	1.5	-1.4	-1.3	1.0	9.4	4.1	7.0	4.1
VS	-3.8	2.5	-4.7	-3.4	8.2	3.9	6.4	4.9
LA	3.8	-7.5	4.4	-5.1	5.8	8.6	4.2	6.0
LI	-1.9	5.8	0.1	0.8	7.0	10.5	0.3	1.4
LS	-1.9	1.7	-4.5	4.2	4.2	2.9	5.9	7.3
Light Ind.	-4.1	1.3	-3.4	0.4			*	
Heavy Ind.	0.1	0.7	-5.3	2.8				

* Regressions were run at the 9 sector level.

III. CHANGES OVER TIME

The analysis of the structural transformation in part II had a long run view, made possible by the wide variation in the level of development across countries. Our sample has an extensive coverage of economies over a relatively long period of time. In this part we take a closer look at changes over time in the uniform relations, and changes within countries. We first summarize the principal time trends in allocation patterns, and then compare time-series estimates within countries, to the estimates in part II which are predominantly cross-sectional.

A. Stability of Development Patterns

The stability of cross-country relations over time was already addressed in C-S. The unstable conditions in the international economy since the early 1970s have given greater weight to this issue. A variety of reasons could affect the temporal stability of intercountry patterns of development. For the present discussion they can be grouped under two headings: omitted variables and structural breaks.

Omitted Variables: Besides income and size, other factors influence the patterns of resource allocation. The impact of variables that are correlated with income over time is reflected in part, in the estimated income effects. Some long run processes of change proceed over time independently of variations in income. For example, changes in the level of technology, the international environment, or the strategies of development, may lead to shifts in the dependent variables. To the extent that those long run processes of change can be assumed to be universal and

to affect all countries alike, their effect would be captured by the time dummy variables in equation (1). In a more general model the time-shift variables would be replaced by the processes for which they stand as proxies.

Some of the omitted variables vary primarily among countries and are relatively invariant within a country over time. If these variables are correlated with income across countries, as in the case of the "exchange-rate-deviation-index"6/ or because of some historical reason, the cross-country patterns will differ from time-series estimates and this difference may end up as part of the time trend in the intercountry estimates. The interpretation of the shift in this case is quite different from the previous one.

Finally, we have the case of random or unanticipated shocks, such as the quadrupling of the price of oil in 1973. If the impact of the shocks is uniform for all countries, it will appear in the time-shift variable. If it is random, it may impair the accuracy of the estimates. The case of a differential impact across countries is considered in the sequel as a structural break.

Structural breaks: Estimates of cross-country relations may shift over time because of changes in the structure of a model (changes in structure in the econometric sense). This source of variation is not always different from the case of changes in omitted variables just mentioned. When the impact of the change in an omitted variable is different for different groups of countries, an additive time-shift variable will fail to represent the differential effect. If there is reason to believe that the effect of the change (in oil prices for example) varies systematically with income or some other characteristics, we could introduce interaction terms or split the sample and estimate uniform time-shifts within groups. As part of this project separate regressions were estimated for countries grouped by income level according to the classification in the 1985

World Development Report, and for a two way partition of developing countries into oil importing and oil exporting countries. A summary of results appears in annex D. An alternative approach to examine the interaction of time shifts with income, adopted in this section, is to estimate separate regressions for the time periods before and after 1973, and to compare predicted values at various income levels.

Cross-country patterns are not well suited to incorporate dynamic relations. Processes of adjustment that are distributed over time, may cause the static relations to shift, transforming part of what really is a long run income effect into a time trend.

Summing up the discussion: it is important to allow for temporal shifts in the estimation of cross-country relations, but the results should be evaluated with care since they are open to more than one interpretation.

Accuracy of the New Estimates

What effect did the events of the early 1970s have on the estimates of development patterns? We first address this question by comparing the goodness of fit of the estimates in C-S, which covered the period 1950-70, to the new ones which extend the period to 1983. Table 13 presents the standard error of estimate (SEE) of the regressions for all those variables that appear in both studies. The first two columns show the SEE's in the present study and in C-S. The figures are strikingly similar and suggest that if there is any difference, it favors the new study. To focus directly on the events around 1973 we estimated separate regressions for the pre 1973 and post 1973 periods, but to eliminate effects due to the composition of the sample we only included countries with information for all the years between 1960 and 1982 (1962-1979 in the case of merchandise trade). SEE's from regressions based on this compatible sample, for the whole

Table 13: GOODNESS OF FIT

	Standard Error of Estimate				
	ALL	C-S	ALL Compatible	Pre 1973	Post 1973
C	.087	.086	.077	.074	.080
G	.047	.043	.044	.038	.052
I	.065	.051	.067	.061	.073
E	.118	.119	.115	.111	.121
M	.121	.120	.116	.109	.125
n*	2954	1508/1432	1518	858	660
FCN	.051	.048	.041	.046	.029
n	1100	642	573	360	213
EP	.095	.091	.079	.077	.082
EM	.073	.064	.078	.074	.083
n	1782	413	1098	671	427
VA	.092)	.091	.082	.091	.070
VN	.077)		.066	.064	.069
VM	.058)	.060	.051	.049	.052
VC	.020)		.020	.021	.017
VU	.028	.026	.029	.032	.025
VS	.075	.084	.062	.062	.059
n	2311	1325	1518	858	660
LA	.118	.116	.114	.118	.107
LI	.061	.064	.064	.064	.063
LS	.084	.089	.081	.080	.082
n	2746	165	1098	671	427

*) n = number of observations.

period and for the subperiods appear in the last 3 columns in table 13. As expected, the accuracy after 1973 is poorer for variables related to trade, but only by a small margin. SEE's for the pattern of production are actually lower after 1973.

The results in table 13, and the resemblence of the overall transformation in part II to that based on earlier data, dispel the notion that the instability of the 1970s has invalidated previous estimates of development patterns. On the contrary, the overall picture of uniformity of the structural transformation appears to be quite robust.

Principal Time Trends

The estimated shifts will now be presented, first assuming them to be uniform for all countries, and then allowing for nonuniformities by contrasting pre-1973 and post-1973 regressions.

Uniform shifts: The time dummies in equation (1) are designed to capture uniform changes in the level of the regressions. As explained in part I the dummies measure incremental additive shifts. 1950-60 is the base period, T_1 gives the expected shift after 1960, T_2 the additional change after 1966 (over and above the one measured by T_1), T_3 and T_4 stand for the incremental shifts after 1973 and 1979 respectively. T_1 differentiates the 1950s from the rest of the period. Problems related to the quality of the information for this decade, might be reflected in the coefficient of T_1. The first oil shock and accompanying changes in the international economy suggested the year 1973 as a natural dividing point for T_3. Similarly, 1979 was selected for T_4 on account of the second oil shock and the onset of deep recessions in a large number of developing countries, primarily in Latin America.

Uniform time shifts were also estimated in C-S. The T_1 variable there compared 1950-54 to 1965-69. The coefficients of the time dummy variables are shown in table 14. (The t ratios appear in table S-1 in the Statistical appendix). T_1 of C-S is also shown for comparison.

The uniform time shifts up to the late 1970s, reinforce the income related shift from food consumption to investment and government consumption, and the increase in trade ratios. The increase in imports substantially exceeds the addition to exports resulting in higher proportions of capital inflow.

The time-related rise in trade shares after 1973 encompasses both primary and manufactured exports and imports.

If in the case of demand the results were similar to those in C-S, for the pattern of production there are some important differences. In the pre-1973 period we observe a very large shift from agriculture to all other sectors. This fall in the share of agricultural output comes on top of the effect of rising income, and can be explained by the nature of technological progress and the substitution of fabricated products for natural materials. The size of the effect - much larger than that in C-S - is probably due in part to data problems in the 1950s. After 1973, the share of manufacturing goes down reflecting the spread of the de-industrialization phenomenon in advanced economies. The exogenous shift after 1979 from tradables to nontradables combines the effects of the depression and worsening terms of trade in oil importing countries, with the changes in structure in oil exporting economies commonly identified as "Dutch-disease" effects.

Non-uniform shifts: To evaluate how uniform the time shifts are, and the stability of a unique relation for the whole period, the predicted values from the separate regressions run for the pre-1973 and post-1973 periods are compared in

Table 14: UNIFORM TIME TRENDS

Demand	Coefficient of Time Variables (percent) T1+T2	T3	T4	T1(C-S)
C	-3.0	-1.0	1.2	-2.1
G	2.8	1.2	1.0	2.2
I	2.2	2.6	-0.4	1.3
E	0.9	3.4	1.6	0.2
M	2.9	6.1	3.4	1.6
M-E	2.0	2.7	1.8	1.4
FCN	-2.7	0.2	-1.3	-2.5
Trade*				
EFMM	0.5	1.8	-0.3	
EOP	-0.6	0.5	0.0	
EM	0.7	1.1	1.8	
MP	-0.3	2.2	2.3	
MM	1.1	2.8	1.7	
Production				
VA	-7.1	0.1	-1.6	) -1.5
VN	2.2	1.4	0.3	)
VM	2.6	-0.7	-0.6	) -1.0
VC	1.3	0.1	0.2	)
VU	1.7	-0.4	0.5	0.6
VS	0.7	-0.6	1.3	1.9
Employment				
LA	-0.8	-0.9	-1.2	
LI	-1.3	-0.2	0.2	
LS	2.2	1.1	1.0	
Manufacturing				
Light Ind.	-1.0	-0.6	0.1	
Heavy Ind.	0.3	-0.4	0.2	

* Only T2 since the data start in 1962.

table 15, at three income levels: $300, $1000, and $4000. In general the regressions are not very different for both periods. In most cases the hypothesis of homogeneity cannot be rejected (see annex B). It is still of interest to locate the range of major discrepancies, as in the comparisons in table 15. Since the emphasis is on breaks around 1973, the coefficients of T_3 and T_4 are also shown in the table. These figures differ slightly from the ones in table 14 because they were estimated from compatible samples as explained above.

There are some cases where significant non-uniform shifts appear to be present. At low income levels ($300) food and total private consumption shift upward after 1973, in contrast to the drop at middle and higher income levels. The most significant differences are related to trade. The increase in manufactured and total exports after 1973 (holding income and size constant) is positively correlated with income, while the import surplus increases most at low income levels.

The shares of manufactured output and industrial employment are almost the same before and after 1973 at low and middle incomes, but fall significantly in the richer countries. The counterpart is a positive time shift in services employment in advanced countries.

B. Average Time-Series: 1950 - 1983

So far we have considered primarily the cross-country dimension of our data set, and made use of the variation over time to determine time trends in the cross-country relations. In this section we switch our attention to the time-series within countries but in a comparative framework.

Table 15: COMPARISON OF ESTIMATED PATTERNS FOR PERIODS BEFORE AND AFTER 1973, AND UNIFORM TIME SHIFTS
(Percent)

	$\hat{x}(73+) - \hat{x}(73-)$			Coefficient of:	
	300	1000	4000	T_3	T_4
C	0.1	-3.4	-2.7	-1.2	0.8
G	1.8	1.5	1.5	1.3	1.1
I	3.5	4.4	2.4	2.6	-0.4
E	2.1	5.5	6.4	3.6	1.8
M	7.7	8.0	7.6	6.4	3.4
M-E	5.6	2.5	1.2	2.8	1.6
FCN	2.3	-0.4	-1.1	-0.2	-1.0
EMER	2.7	3.8	4.0	3.2	1.6
EP	2.3	2.5	2.0	1.8	1.0
EM	0.3	1.2	2.1	1.3	0.6
MMER	4.5	5.0	4.8	4.6	2.2
MP	2.2	2.2	1.8	2.1	0.8
MM	2.4	2.9	3.1	2.5	1.4
VA	-0.5	-0.4	0.3	-0.1	-1.4
VN	0.8	1.8	1.8	1.1	1.0
VM	0.0	0.1	-1.3	-0.6	-1.2
VC	0.9	1.1	0.3	0.2	0.1
VU	0.2	0.3	-0.4	-0.2	0.3
VS	-1.2	-2.8	-0.7	-0.4	1.2
LA	-0.1	-1.7	-0.8	-0.5	-0.6
LI	0.7	0.1	-1.9	-0.7	-0.2
LS	-0.6	1.6	2.7	1.2	0.8
Light Ind.	0.1	-0.2	-0.8	-0.5	--
Heavy Ind.	-0.2	0.0	-0.3	-0.4	--

Cross-country patterns can be interpreted as long run adjustment paths, reflecting the accumulated development experience of various decades and even centuries characterized as modern economic growth. This was the way we presented the estimates of the structural transformation in part II. One reason behind the cross-sectional emphasis in previous studies, was the limited availability of comparable time-series information for a large number of countries. In C-S we compared time-series and cross-country estimates based on data for some 40 countries over about a 20-year period. Our present data set expands the coverage to about 100 countries over three decades.

Average time-series relations are derived in two ways. First we estimate simple time-series relations within each country and second, we estimate average time-series patterns by pooling the time series and introducing country dummy variables.

Individual Time-Series

Within each country and for each real variable x, we estimate equation (7)

$$x = \alpha + \beta \ln y \qquad (7)$$

In the present study we have information on shares of demand and output in GDP, in both current and constant prices. Their ratio is a measure of the price of an aggregate relative to the GDP deflator. We set all relative prices equal to 100 in 1970 and estimate for each relative price p, equation (8).

$$\ln p = a + bt \qquad (8)$$

(t = time)

The coefficient b is an estimate of the annual rate of change in the relative price.

Table 16 summarizes the results. The first two columns give the mean and standard deviation of the individual estimtes of $\tilde{n}$ and b. The number of estimates range from a minimum of 42 (countries) for the employment variables, to a maximum of 106 for the components of demand. To get an indication of the distribution of the estimated parameters, the next four columns show the number of cases in each of four size intervals (two positive and two negative). Finally a second-stage regression was run for the estimated coefficients as dependent variables with the log of per capita income in 1980 as explanatory variable. The results appear in the last two columns.

The principal results are now briefly summarized.

1. There is considerable variation in time-series income slopes across countries. Regarding the sign of the estimates, in most cases one sign dominates although we can always find exceptions.

2. Looking at the simple unweighted means of the income slopes, we find that the nature of the implied transformation in economic structure is quite similar to the cross-country one in part II, but somewhat larger in magnitude. (The income effects in equation (7) may in some cases reflect exogenous time shifts).

3. On the average increases in income during the period were accompanied by a drop in the share of food consumption matched by an increase in investment. The shares of aggregate trade show a much stronger increase with income than in the cross-country patterns. Both primary and manufactured exports have average positive income slopes. In the case of primary the average is influenced by the very large increase in the share of exports of fuels.

Table 16: TIME-SERIES RELATIONS: MEANS AND DISTRIBUTION

	Time-series coefficient of ln y or t		Distribution of slope coefficients by size intervals					Relation of within-country slope with income	
	Mean	S.D.	<-0.1	-0.1 /0	0 /0.1	>0.1	Total	Coeff.	t ratio
Demand									
C	-.12	.17	62	25	13	6	106	0.44	0.3
FCN	-.11	.11	28	10	2	2	42	-1.11	0.8
G	.04	.11	10	17	54	25	106	0.21	0.3
I	.12	.16	8	12	33	54	106	-4.77	4.2
E	.09	.19	10	20	33	53	106	0.47	0.3
M	.13	.29	11	12	29	54	106	-3.64	1.7
Trade									
EP	.05	.19	11	26	32	27	96	-1.21	0.8
EM	.06	.10	2	19	50	25	96	3.27	4.7
MP	.04	.10	6	18	54	18	96	-0.74	0.9
MM	.10	.16	7	11	37	41	96	-0.03	0.02
Production									
VA	-.16	.21	63	33	3	4	103	4.82	3.1
VM	.02	.09	10	25	51	17	103	-2.90	4.5
VS	.06	.14	10	24	31	37	102	0.25	0.2
Employment									
LA	-.17	.15	76	17	5	4	102	-2.46	2.3
LI	.05	.09	4	19	55	24	102	-1.05	1.7
LS	.12	.11	3	7	36	56	102	3.51	4.6
Manufacturing									
Early	-.02	.05	2	34	14	1	51	-1.69	2.9
Middle	.01	.03	0	16	35	0	51	-0.94	2.8
Late	.02	.05	1	14	34	2	51	-1.61	2.9
Relative Prices									
Demand:									
PC	-.20	1.1	0	64	39	0	103	-.24	2.7
PG	.37	1.6	0	35	68	0	103	.15	1.2
PI	.32	1.9	0	37	65	1	103	.42	3.1
PE	.22	2.0	0	51	52	0	103	-.18	1.1
PM	.20	2.2	0	47	56	0	103	-.68	4.4
Output:									
PVA	-.25	2.0	1	42	42	0	85	-.84	5.6
PVN	.48	3.5	1	35	48	1	85	.07	0.2
PVM	-.78	2.0	0	56	29	0	85	-.40	2.4
PVC	.56	1.6	0	25	60	0	85	.25	1.8
PVU	-1.42	2.4	2	67	16	0	85	-.26	1.2
PVS	-.04	1.5	0	39	46	0	85	.32	2.5

4. The most robust finding is the almost universal negative effect of income on the shares of agriculture in output and employment. Of the 103 countries for which long enough time series were available, only in seven did the income coefficient for the share of agriculture in output came out positive. In three of them (Liberia, Nicaragua, and Zambia) it was not significantly different from zero. In another three (Niger, Senegal, and Somalia) the growth of per capita income was negative, hence the positive coefficient signifies that the share of agriculture diminished in spite of the fall in income. The seventh, Burma, is the only true exception to this generalized phenomenon.

5. The average income slope of the share of manufacturing in value added is barely positive. In over one-third of the countries it is negative. It is instructive to identify the main cases with negative income elasticities. Among the very low income countries we find some with negative growth (Niger, Somalia). The negative elasticity means that the share of manufacturing actually went up during the period. In oil exporting countries (Algeria, Congo, Egypt, Iraq, Iran, Libya, Saudi Arabia), the decline in industry is the result of the oil boom - Dutch disease. In a third group there was a fall in the manufacturing share, but from extremely high initial values (Hungary, Israel, Yugoslavia). Finally, in virtually every industrial country there was a shift from industry to services at some point during the period. For the period as a whole, negative elasticities were estimated in 13 of the 18 countries defined as industrial and with the required data. (For Switzerland the data were missing). For the 68 countries with positive coefficients, the average slope rises to a respectable value of .08.

6. Within manufacturing, the labels early-middle-late are supported by the results. The average of the slopes is negative for the group of early industries, small but positive for middle industries, and still larger for late industries.

7. Before discussing the trends in relative prices we turn to the last two columns in table 16, showing the coefficients of income per capita in regressions explaining the variation of the individual within-country income slopes.

The association of income slopes with the level of development suggests in general a slowdown of the pace of transformation at higher income levels. The impact of income on investment and on the structure of production decreases with the level of income. The de-industrialization phenomenon in advanced countries shows up in the negative and significant coefficients for the shares of manufacturing and its three subsectors in GDP, and for industrial employment. Income effects that become stronger in richer countries are found for manufactured exports and for employment in nontradables.

8. The bottom part of table 16 presents the results of estimating equation (8) for the structures of relative prices of demand and production. The predetermined variable is time and not income, and the dependent variable is the natural log of a relative price. The coefficient of time gives therefore the average annual rate of change in a relative price for the whole period. If there was a significant change in trend during the period, the coefficients in the table would fail to reveal it. In the table the coefficients are multiplied by 100. The distribution of coefficients shows that for most variables, increases in relative price were as frequent as decreases. The large standard deviations also point out to the lack of uniformity across countries in the variation in internal price structures.

9. The average trends in relative prices of demand show a drop in the price of consumption and an increase in all other prices (relative to the price of GDP). The rate of price increase of investment declines with income. Since in any given year investment goods tend to have a higher relative price in lower income countries, this result indicates that the gap might have widened during the

period. The change in import prices declines (in algebraic value) with income, to a much larger extent than the decline in the change of export prices. The combined effect implies that changes in terms of trade for the whole period were more favorable the higher the level of income.

10. For the structure of production, we first note the expected positive trend in the relative price of mining. The relative prices of other tradables (agriculture and manufacturing) on the average go down, and the change intensifies at higher income levels. The change in the relative prices of nontradables is positively correlated with income. The effect of changing relative prices on the estimates of development patterns is examined in the next section.

Average Time-Series

To analyze the time-series experience within countries and still take advantage of the degrees of freedom afforded by the large cross-country sample, the individual time series can be pooled in a covariance framework to obtain average time-series patterns. (See chapter 5 and the technical appendix in C-S). Specifically, we let each country have its own intercept by using country dummy variables (equation (2)). This amounts to considering only the within-country variation over time, letting the different intercepts represent the longer run variation among countries (due to endowments, history, etc.). The estimated income slopes are weighted averages of the within-country slopes, with weights related to the time variances of income in the different countries. In equation (2) we also include the quadratic income term and the set of time dummies. For the structures of demand and production we had information on current and constant price shares. Average time-series relations were estimated for both sets. At this point it may be useful to distinguish two sources of variation in relative prices in our sample. At a point in time, the internal structure of relative prices varies across countries. Since there are reasons to

expect an association of the price structures with the level of development, the estimates of cross country patterns incorporate both real and price effects. To the extent that the association is expected to continue to hold, the combined total income effects are of interest on their own. Conversion to an international uniform price structure is not yet available for a very large number of countries, although this deficiency is being steadily overcome (for expenditure categories) by the studies of the International Comparisons Project (ICP). (See Summers and Heston, 1984.) In the analysis of the time-series - by country or pooled with country dummy variables - the variation in internal price structures across countries, is eliminated.

Relative prices also vary within countries over time. This type of variation we were able to consider for demand and production. In the case of cross-country patterns, the effect of such price variation was minimal and was therefore not shown (some estimates of time trends did change). Average time-series estimates of equation (2) for current and constant price shares, appear in table 17 where they are compared with the cross-country patterns. The results are presented in the form of expected total change in structure over the income range $1000 to $2000.7/ This range corresponds roughly to the one traversed by the average middle-income country between the late 1950s and the late 1970s. The total change is decomposed in the table into the effect of income and the uniform time shift which, for the period considered, is represented by the sum of the coefficients of T_2 (t 1967) and T_3 (t 1973).

Demand: Comparing first the two current price sets we observe a high degree of similarity in the total change predicted from cross-country regressions and from the average time-series. The direct income effect implied by the short-run patterns is larger than the one suggested by the cross-section; the difference is largely compensated by the smaller time trends in the time series. The larger

Table 17: COMPARISON OF CROSS-COUNTRY AND TIME-SERIES PATTERNS

Variable	Cross-country regressions			Time-series regressions. Shares in: Current Prices			Constant Prices		
	Income effect	Time trend	Total change	Income effect	Time trend	Total change	Income effect	Time trend	Total change
C	-3.3	-2.7	-6.0	-7.8	-1.4	-9.2	-2.5	-2.6	-5.1
G	0.7	2.5	3.2	-1.6	3.2	1.6	-3.4	3.7	0.3
I	1.7	3.4	5.1	6.9	0.9	7.8	8.0	0.3	8.3
E	1.9	4.3	6.2	7.7	0.5	8.2	4.9	0.7	5.6
M	1.0	7.4	8.4	5.2	3.2	8.4	7.0	2.1	9.1
FCN	-5.2	-0.8	-6.0	-8.4	1.2	-7.2	-10.4	1.0	-9.4
EFMM	-0.1	2.3	2.2	4.4	0.4	4.8			
EOP	-1.0	-0.1	-1.1	-1.6	-0.2	-1.8			
EM	2.4	1.8	4.2	4.3	0.4	4.7			
MP	0.4	1.9	2.3	-0.7	-0.2	-0.9			
MM	0.7	3.9	4.6	5.7	0.8	6.5			
VA	-7.3	-1.5	-8.8	-5.2	-3.0	-8.2	-5.2	-3.4	-8.6
VN	-0.2	1.8	1.6	1.8	1.2	3.0	0.1	0.1	0.2
VM	2.9	-0.7	2.2	2.0	0.7	2.7	4.5	0.5	5.0
VC	0.6	0.2	0.8	1.4	-0.2	1.2	0.9	0.0	0.9
VU	0.7	-0.2	0.5	-0.2	0.3	0.1	0.7	1.3	2.0
VS	3.4	0.3	3.7	0.2	1.0	1.2	-1.0	1.5	0.5
LA	-13.6	-1.8	-15.4	-5.8	-4.8	-10.6			
LI	6.4	-0.7	5.7	2.9	1.0	3.9			
LS	7.2	2.5	9.7	2.9	3.8	6.7			
Light Ind.	0.6	-0.9	-0.3	-0.5	-0.1	-0.6			
Heavy Ind.	2.5	-0.2	2.3	3.5	0.0	3.5			

Notes: Income effect computed for the interval \$1,000 - \$2,000.
Time trend measured by the coefficients of T_2 and T_3.

income effects in the short-run patterns manifest themselves in the cross-country regressions as time shifts. The interpretation of such shifts as reflecting changes in exogenous processes such as technology, has to be broadened to admit also divergences between the short run transformation and the one implied by the long run accumulated experience in a variety of distinct economies. The differences between the two sets of time-series estimates in table 17 are the effect of changes in relative prices.8/ A measure of the average change in price structures was given in table 16. To facilitate the comparison of the two sets in table 17, we first present an alternative average measure, obtained by estimating equation (9) - a variant of equation (8) - for the pooled sample in a covariance framework. We let each country have its own intercept and add a time dummy for t 1973 (T_3):

$$\ln p = a_i + bt + \delta T_3 \qquad (9)$$

The estimated annual rate of change is given by b, while i stands for a one-time jump in the relative price. The estimates of b and i in table 18, are averages of sometimes quite disparate experiences, but they are of help in discussing the results in table 17, to which we now return.

The increase in government consumption in the time-series at current prices is predominantly a price effect. The trend in export prices during the period was negative but the events of 1973 drastically changed the picture. The income related increase in export shares is composed of a significant real increase and a price effect. Since imports went up faster in current prices, the implication for the capital inflow is very different in the two sets. At constant prices, the capital inflow is positively associated with income but when we allow for the effect of prices the average association becomes negati

Trade: The total change in trade of commodities is generally more pronounced in the average time-series than in the cross-country patterns. As in the case of demand the difference in income effects shows up in the cross-sectional time trends.

The period since 1950, and in particular after 1960, saw a remarkable increase in world trade. Major contributing factors to this expansion were the replacement of inward oriented policies by more balanced strategies emphasizing exports in many developing countries, and the tighter integration of the developed economies, following the reduction of trade barriers and the creation of the European Economic Community. Among the advanced countries the rapid increase of trade took the form of exchange of manufactures against manufacture based on an increased intra-industry specialization. The time-series estimates reflect adequately these trends.

Production: The main differences between the short-run and the long-run estimates at current prices, are the increase of the mining share and the absence of an income effect on services in the time series. In the constant price estimates mining, as expected, shows no significant increase, but the income effect for manufacturing is quite large, indicating a significant decrease in its relative price (see table 18).

Employment: Income effects and total change are lower in the time series than in the cross-country estimate. The transformation in the sectoral composition of employment in the last three decades, fell significantly short of the predicted one from the long run patterns. This last one is derived from the variation across countries reflecting the long run historical experience in the sample of countries. The relatively low labor absorption in the industrial sector has been shown to be related to the nature of technological progress and to distortions in

Table 18: AVERAGE VARIATION IN RELATIVE PRICES
(Percent)

Relative price of:	Annual rate of change (b)	t ratio	Shift after 1973 (δ)	t ratio	Number of: countries	observations
Demand					102	2513
C	-0.06	(1.6)	-1.6	(2.5)		
G	0.88	(14.3)	-6.8	(6.9)		
I	0.04	(0.6)	3.1	(2.8)		
E	-0.95	(9.8)	18.3	(12.0)		
M	-0.52	(5.4)	12.6	(8.3)		
Production					90	1764
VA	-0.63	(6.4)	4.9	(3.8)		
VN	0.59	(2.9)	5.4	(2.0)		
VM	-0.48	(4.7)	-3.8	(2.8)		
VC	0.92	(8.8)	-4.0	(2.9)		
VU	-0.63	(5.7)	-11.7	(8.1)		
VS	0.24	(3.2)	-3.9	(4.0)		

product and factor markets (see for example, Little, Scitovsky, and Scott, 1970, and Krueger, 1983).

IV CONCLUSIONS

This study set itself to accomplish some limited tasks described in section I.A. The decision to do a wide cross-country study of patterns of development at this time, was prompted by the substantial increase of information in developing economies, and by the events of the 1970s which suggested a potential structural break in comparison to the period on which our 1975 study was based. Together, the enlargement of the data base and the turbulence of the decade after 1973, lead to a significant increase in the variance of the variables analyzed and thus allow for potentially more accurate and meaningful estimates.

In this study we examined a reduced set of development patterns focusing on resource allocation, or on industrialization for short. The results confirmed the strong association of economic structure with the level of development. Instead of a sharp dichotomy between less developed and industrial countries, each group with its own distinctive structure, we find that the changes in structure during the process of development are better described by the concept of a transition from a low income agrarian economy, to an industrial urban economy with substantially higher income. The transition may not be smooth and it may follow a variety of alternative paths, but the overall process of structural transformation has enough common elements to justify its representation by a set of stylized facts.

Development patterns are not invariant over time. Technological changes and other exogenous factors influence the patterns of structural change,

especially at the micro level. Nevertheless, the main features of transformation, identified by Kuznets as the core of modern economic growth on the basis of long term experience in advanced countries, can clearly be identified in the shorter time-series of a large number of developing countries (see also Syrquin 1988). One limitation of the approach is worth emphasizing again. Development patterns represent the expected changes in structure as a country develops. They are of little help in analyzing stagnation in countries with very low income levels; although in such countries, the patterns may still be useful in charting possible routes of transformation.

In the early stages of modern economic growth, there was a distinct acceleration in the pace of growth. It was very significant in historical perspective, but it pales in comparison to the acceleration of growth in the post-war period in most regions and groups of countries. Since the association of structure and growth in this period resembles the historical pattern, the implication is that structural transformation has also been much more pronounced than in any previous period.

The results summarized in Table 5 give an integrated view of the transformation, and present a first approximation to the determination of the underlying sources. This task is further pursued in studies that incorporate more of the historical experience of individual countries, and model in more detail behavioral relations and the functioning of markets (Chenery, Robinson, and Syrquin 1986).

The typology of trade patterns, used in previous studies, was expanded in section II.C. In addition to size and trade orientation, the degree of openness of the economy was shown to have a significant impact on the patterns of structural change. The three criteria for classification appeared, on the average, to be associated with performance over the whole period. The results

suggest that better performance was associated with larger size, with a manufacturing orientation and with a higher degree of openness.

The typology is a simple way of dealing with important features that lead to divergences from a uniform path of transformation. It is also useful as a frame of reference for country analysis and for studying the experience of groups of countries.

The principal message from part III is that long-term patterns are quite robust. The instability of the 1970s affected some of the results and increased the variability of experiences. The latter enriched the data base and reinforced the view that there are significant common elements in the process of industrialization.

The argument of sympathetic critics (Diaz Alejandro 1976, Perkins 1981), that the search for uniform patterns of structural transformation has reached diminishing returns, is well taken. This suggests that other approaches have become more valuable but instead of seeing them as competitive it is more useful to stress the complementary relations. Examples of complementary analysis are the model-based comparisons in Chenery, Robinson and Syrquin (1986), and the general equilibrium model of urbanization and transformation in Kelley and Williamson (1984). Also, the search for uniform patterns may have to be broadened to features, essential in modern economic growth, even if only indirectly related to structural transformation. Examples are managerial issues (Mason, 1984), and more generally institutional change which, "in the historical realm...has [been] identified...as the single most important differentiator of development performance among groups of countries," (Adelman 1986).

NOTES

1 Since the publication of Patterns, various studies have adopted a similar or identical approach. Without implying that all cross-country comparisons were influenced by Patterns, some that refer to it explicitly include the UNIDO (1979, 1983) studies of industrial change, McCarthy, Taylor, and Talati (1987) on trade patterns and the studies of 19th century patterns of development of Adelman and Morris (1984) and Crafts (1984).

2 When comparable information was available we did include three communist economies: China, Hungary, and Yugoslavia. From some of the regressions we excluded the information on Libya, Saudi Arabia and Singapore. The first two because of the enormous gap between their economic structure and their level of income, and Singapore because of the extreme values of its trade ratios. Exports are a multiple of GDP.

3 A trade theorist - Bhagwati (1977) for example - would object at this point (if not earlier) and say that "a country's trade pattern and volume and its production pattern are ... the result of interaction between the country's own endowments and demands and the rest-of-the-world's endowments and demands" (p. 498). While this argument is strictly correct its apparent implication that trade and production patterns could be anything should be contrasted with their remarkable uniformity across countries and over time. Trade theory becomes more illuminating when it joins Solow in recognizing that "The modern world could have evolved somewhat differently, but since it did not, it would be extraordinarily difficult to change the standard pattern now." (1977, p. 493). Both Bhagwati's and Solow's remarks appeared as published comments on the same paper (Chenery, 1977).

4 The productivity measure in the text, is average labor productivity which can be directly computed from the sectoral shares in output and employment. For a detailed comparison of this measure to one based on marginal products that considers other inputs, see Syrquin (1984).

5 In Chenery and Syrquin (1986a) we present a similar decomposition based on simulations of the cross-country model of industrialization. The results differ little from those in table 5.

6 See Kravis, Heston, and Summers (1978).

7 The regression estimates are shown in the statistical appendix.

8 The estimates may also differ because the samples are not the same. The constant price information is more limited.

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ANNEX A

Notes on the Classification of Countries

The typology of trade patterns in table 7 is based on a methodology similar to the one in previous studies (Chenery and Taylor, 1968; Chenery and Syrquin, 1975, 1986b). The criteria for classification were amply discussed in the appendix to Chenery and Syrquin (1986b), but since that study confined itself to semi-industrial countries only, this annex presents some further observations on the approach and on specific countries.

As explained in the text, three dimensions were analyzed:

(a) Size: Economies were separated into small and large on the basis of their population size in 1965.

(b) Openness: Three levels of openness were distinguished on the basis of the relative export level ($EL = E/\hat{E}$), that compares actual to predicted shares of merchandise exports: inward, neutral and outward. The labels are descriptive only and do not necessarily describe the trade policy. The neutral classification is indicated in table 7 but in the regression analysis it was lumped together with the inward group.

(c) Trade Orientation: The pattern of specialization was considered through the trade orientation index (TO). The index is a measure of the composition of commodity exports normalized by total merchandise exports:

$$TO = \frac{E_p - E_m}{E} - \frac{\hat{E}_p - \hat{E}_m}{\hat{E}} \qquad (A1)$$

The TO index differs from the one in C-S only in that exports there refer to total exports including services, whereas in (A1) the denominator is merchandise exports alone. In this case the index can be simplified to the

following:

$$TO = 2\left(\frac{E_p}{E} - \frac{\hat{E}_p}{\hat{E}}\right) = -2\left(\frac{E_m}{E} - \frac{\hat{E}_m}{\hat{E}}\right) \qquad (A2)$$

Economies were initially classified into three categories: primary, balanced, and manufacturing, as in C-S tables 11-13. The balanced group was subsequently divided among the other two.

The following observations refer mostly to the primary-manufacturing classification, as determined by the TO index and in part also by EL.

1. All countries, including large ones, were classified. In C-S the large groups were not split.

2. The EL and TO indices were computed for 1965, 1975, and 1980. If a country experienced a significant shift in policy or in the two indicators, we took that into account, although the values in 1980 were given less weight because the estimates after 1973 were less precise.

3. When the TO changed significantly between 1965 and 1980 we tried to determine the sources of the shift and the extent to which it could be expected to alter long term patterns of allocation. To illustrate: a shift in TO from positive (primary) to negative (manufacturing) could represent a decline in exports totally due to primary exports, or an increase in total exports originating in manufacturing. Only in the second case would we say that there was a shift toward industrial specialization.

4. In countries with very low income levels the discriminating power of the TO index becomes questionable. As it is derived from regression estimates, its variance at low income levels increases substantially. The main problem has to do with exports of manufactures in small countries. At very low income

levels, the predicted value of E_m is very small or nill. In such a case even a low E_m would produce a TO index indicating a manufacturing specialization. In such cases a country was classified as manufacturingoriented only if E_m accounted for a significant amount of merchandise exports with a lower bound of five percent. Other criteria were sometimes also considered, as in Chenery and Syrquin (1986b). For example the value of manufacturing output per capita.

5. A similar problem, but this time in the opposite direction, appeared at times at high income levels. It affected only a small number of countries as explained below.

6. A high level of services exports was often associated with a low EL value. Total exports might not be low but merchandise exports were, and their composition was also affected. The level of services exports were therefore considered in the classification of a few countries.

7. In some cases we checked the composition of manufactured exports, expecially in low income countries where our aggregate measure of E_m showed questionable high levels. Thus we found that in Sierra Leone where E_m reached 60 percent of merchandise exports, it was mostly due to diamonds.

8. In marginal cases the countries were usually classified as primary. That is, stronger justification was required to assign a country to the manufacturing oriented type.

9. In the few cases where series of trade data were not available the classification was based on trade data for one year or on other relevant World Bank data (World tables, World Development Reports, etc.). The classification in C-S was also consulted.

We now present some country-specific issues by size group.

Large Countries

United Kingdom. The TO index goes down because of oil exports, but E_m remained high. It equals 74 percent of E in 1980.

Five countries were initially classified as balanced. Four of them (Brazil, Colombia, Philippines and Thailand) are relatively resource rich and were in the past very primary-oriented. In spite of the rapid rise in E_m which led to a low TO by 1980, they were still classified as primary. The fifth one in this group (France) was listed as manufacturing because of its high ratio of E_m to E.

Egypt. Towards the end of the period it appears to shift in the direction of a primary specialization because of oil exports. The ratio of E_m to E diminishes but it is totally offset by an increase in services exports.

Indonesia. It was classified in the import substitution group in C-S. Because of the great expansion of oil exports it was now assigned to the primary group.

South Africa. Balanced in C-S, and primary in Chenery and Syrquin (1986b). However trade data indicate that the E_m ratio to E went up from 33 to 78 percent, and mostly in the form of products other than metals. It was assigned to the manufacturing group as suggested by the TO index.

Small Countries

A group of seven countries with negative TO were nevertheless assigned to the primary group. They are all low income countries: Central African Republic, Haiti, Mali, Nepal, Malawi, Sierra Leone, and Sri Lanka. In Nepal merchandise exports reached only about 6 percent of GDP, and therefore the high proportion of E_m in the total is not by itself enough to indicate an

industrial specialization. In Malawi E_m went up significantly but E_p increased even more.

Peru. A similar case to Brazil and Colombia. The increase in E_m takes place in a predominantly inward environment with strong primary roots. The negative TO index is more an indication of an anti primary export bias than of a manufacturing orientation.

Three marginal cases were exceptionally classified as SM. All were so classified in C-S:

Benin. Between 1965 and 1980 merchandise exports double and manufactured exports more than double.

Tunisia. Manufactured and total exports go up significantly, and in addition, both services exports and foreign capital inflows are relatively high. These usually indicate a manufacturing orientation.

Norway. The composition of merchandise exports shifted towards primary because of oil. Because of its high income level and since E_m is still quite high and services exports exceed 20 percent of GDP it was left in the SM type. The TO index in 1980 is very high (primary) but not before that.

Eight small economies were classified differently than in C-S. In five cases countries classified in 1965 as SM became now SP. These include low income countries (Afghanistan, Camaroon, and Senegal), Peru discussed above and Denmark. Unlike Norway, in the case of Denmark the relative high importance of primary exports is not a recent phenomenon.

The three economies that moved from SP to SM are:

Jamaica. A very negative TO index reflecting a high and increasing share of E_m. Additional checks indicate that manufactured exports are not only those related to bauxite and aluminium.

Morocco. A clear shift toward low trade shares, high foreign capital inflow and a substantial rise in the share of E_m. These are typical characteristics of an SM economy.

Tanzania. This is a borderline case. Trade goes down and capital inflow up. Manufactured exports account for about 15 percent of merchandise exports.

ANNEX B

Tests of Homogeneity

In the analysis in the text various subdivisions were considered. This annex presents homogeneity tests for seven binary divisions. In each case the null hypothesis that the two vectors of regression coefficient are not significantly different from each other, was tested by computing the F ratio (using Johnston's 1972 notation):

$$F = \frac{Q_2/k}{Q_1/(m+n-2k)}$$

with (k, m+n-2k) degrees of freedom,

where Q_1 = total of the two sums of squared residuals within groups;

Q_2 = difference between the sum of squared residuals from the pooled regressio and Q_1; and m, n, and k stand respectively for the number of observations in the two groups and for the number of coefficients estimated in each regression. The assumption of homogeneity can be rejected if F exceeds a preassigned critical level. The critical value for a 5 percent confidence level with (9,X) degrees of freedom equals 1.96. Table B1 gives the number of observations and F ratios for the various binary splits. Some observations on the procedure and the results follow.

1. The division by size and trade orientation gives the four trade patterns in section II.C: SP, SM, LP, and LM. Two sequences for spliting the sample are examined in table B1. In the first we start dividing by size (small-large) and then by trade orientation. In the second sequence, the

trade orientation is considered first (primary-manufacturing) and then the two groups are further subdivided by size.

2. The homogeneity tests reject uniformly the null hypothesis in the cases of size and trade orientation. This implies that the typology is statistically significant, but it hardly comes as a surprise. With large enough samples almost any sample division would prove statistically significant.

3. Comparing the two sequences we find that, in general, the P-M division leads to sharper results than the size split, but size still remains significant even within the P and M groups. The P-M split reduces the residual variation, particularly for trade, for manufacturing and its components, and for the employment structure. In the case of the agricultural share in value-added, the size distinction appears to be more significant.

4. In previous studies the large country group was not subdivided. The LP-LM distinction contributes to the explanatory power of the regressions, especially in the cases of trade and labor allocation.

5. The division of the sample by time is examined in the last part of the table. To eliminate effects due to the composition of the sample, we only considered economies with information for all the years between 1960 and 1982 (1962-1979 in the case of merchandise trade). The samples are therefore reduced, and the combined number of observations are smaller than the size of the full sample in table B1. The results show that, in general, there is no statistical gain in subdividing the sample into two time periods. However, there is an important qualification: the pooled regression included, besides the variables used in the subperiods, a set of time dummy variables. The conclusion is, therefore, not that there is no difference between the two specific regressions, but that uniform, additive time-shift variables account for most of the displacement over time.

Table B1: TEST OF HOMOGENEITY

Variable	No. of Observations											F Ratios when split by: Size	+Trade Orientation:		Trade Orient.		+Size	
	All	Large	Small	Primary	Manuf.	LP	LM	SP	SM	Pre 73	Post 73	S/L	LP/LM	SP/SM	P/M	SP/LP	SM/LM	Time
C												22.5	11.6	10.1	8.0	18.2	22.5	5.0
G	2954	871	2083	1739	1215	452	419	1287	796	858	660	13.6	10.9	4.9	10.1	10.1	6.1	1.6
I												17.3	18.4	7.2	10.0	16.4	9.5	4.6
E												16.8	7.1	19.6	23.9	11.3	8.8	1.3
M												10.7	9.1	37.8	45.2	8.4	6.9	0
FCN	1100	370	730	380	720	127	243	253	477	360	213	14.2	23.7	12.1	13.6	7.2	28.7	0.2
EP												17.9	11.3	21.5	24.1	15.6	12.0	0.1
EM	1782	541	1241	1096	686	286	255	810	431	671	427	5.5	49.9	57.5	74.0	9.1	6.4	0.1
MP												4.4	38.4	45.5	63.2	2.9	8.2	0
MM												13.6	3.3	27.5	30.1	12.1	6.7	0
VA												26.3	6.2	5.9	5.7	20.9	9.1	0
VN	2311	718	1593	1389	922	379	339	1010	583	858	660	5.8	5.7	14.8	13.3	7.7	5.4	0.3
VM												10.0	17.4	21.2	30.9	6.7	9.7	1.1
VC												6.3	12.3	11.3	15.2	9.3	1.6	8.1
VU												17.8	28.7	13.7	22.8	17.7	7.1	1.7
VS												21.3	14.5	27.3	24.1	16.2	25.1	8.1
Manuf:																		
Early												6.2	4.4	8.5	5.1	2.4	17.4	n.a.
Mid.	1025	408	617	510	515	191	217	319	298	---	---	10.0	14.3	16.9	19.1	6.0	16.4	n.a.
Late												6.7	16.3	12.7	24.5	4.3	6.1	n.a.
LA												19.1	16.6	47.1	49.4	16.7	16.7	0.7
LI	2746	784	1962	1637	1103	406	378	1231	725	671	427	3.9	45.4	47.3	63.2	16.6	6.4	3.6
LS												23.4	29.1	69.1	74.7	15.2	32.3	1.0

ANNEX C

The Impact of Variations in the Capital Inflow

Equation (1) in the text was estimated with and without the capital inflow ratio (F) measured by the difference between imports and exports as a share of GDP. The impact of aid and other capital flows on accumulation and other patterns of development, was a popular topic 15 years ago, and accordingly, it was discussed at various places in C-S. In this annex we present the estimated coefficients of the capital inflow ratio accompanied by some brief remarks. The estimates in table C1 refer to the full samples in table 1 in the text, and to the four groups of countries stratified by size and trade orientation. For the full sample results are also given from the average time-series, obtained by pooling all the time-series and adding a set of country dummy variables, one for each country. When available, the comparable estimates in C-S are also shown.

In general the results are very similar to those in C-S. In the cross-section (or long run patterns), an increase of one unit of F is about equally divided between higher imports and lower exports. Investment goes up by .31 and correspondingly, saving decline by .69 (=1 -.31). The rise in investment is higher than the one reported in C-S, and therefore the fall in the saving ratio is smaller.

In the time-series (or short run patterns) the coefficient of investment is even larger (.44), and virtually identical to the coefficient in C-S. As argued there, the short-run patters eliminate the between-countries variation, and are therefore a better guide to study the expected adjustment in saving and investment when F varies.

The results for merchandise trade show that, for the average economy, the decline in exports is concentrated in primary exports, while manufactured exports are uncorrelated with F. In the alternative patterns there is an interesting difference between the primary and manufacturing oriented groups. The substitutability between primary exports and F appears clearly in SP and LP economies. In SM and LM countries it is least pronounced, but now a significant negative relation with F emerges for manufactured exports. The direction of causality is not clear. The negative coefficient may simply reflect the fact that once a resource-poor economy manages to develop manufactured exports, it can dispense with otherwise essential reliance on F.

The negative coefficient of F in the regression for primary production (agriculture + mining) in C-S, is now seen to be wholly due to the mining component, and most of the positive effect on industry (manufacturing + construction) seems to originate with construction.

On the average, an additional unit of F is associated with a shift of about .4 from tradables to nontradables. The shift is somewhat lower in the short run patterns.

Table C1 COEFFICIENT OF THE FOREIGN CAPITAL INFLOW

	ALL COUNTRIES							
	Cross-section		Time-series					
Demand	This study	C-S	This study	C-S[a/]	SP	SM	LP	LM
C	.53	.72	.45	.55	.52	.44	.81	.61
G	.16	.15	.11		.14	.23	-.01*	.19
I	.31	.13	.44	.45	.34	.33	.20	.20
E	-.45	-.47	-.47	-.57	-.55	-.34	-.98	-.59
M	.55	.53	.53	.43	.45	.66	.02*	.41
(S)	-.69	-.87	-.56	-.56	-.66	-.67	-.80	-.80
Trade								
EP	-.63	-.98	-.42	---	-.69	-.21	-1.00	-.18
EM	.03*	.06	-.03	---	.03	-.30	.02*	-.42
MP	.18	---	.09	---	.10	.15	.08	.40
MM	.21	---	.34	---	.19	.18	.03*	.13
Production								
VA	-.06	-.59	.03*	-.10	-.01*	-.33	.20*	.24
VN	-.36		-.33		-.42	-.14	-.77	-.27
VM	.05	.21	.01*	.14	.01*	.10	.24	-.03*
VC	.09		.08		.09	.08	.00*	.10
VU	.04	.02	.03	-.01*	.01	.10	.07	-.24
VS	.25	.36	.19	-.03*	.32	.18	.26	.20

* t ratio less than 2.

a/ Estimates from the reduced, compatible sample.

Table 51

REGRESSION FOR FULL SAMPLE: 1950-1983

Variable	Const.	ln y	(ln y)2	ln N	(ln N)2	T1	T2	T3	T4	R2	No. of Obs
=DEMAND=											
C	1.34	-0.125	0.005	-0.013	0.001	-0.013	-0.017	0.010	-0.012	0.368	2954
	(26.22)	(8.71)	(5.36)	(-3.21)	(0.89)	(-2.69)	(-3.48)	(-2.01)	(2.26)		
G	0.273	-0.052	0.004	-0.003	-0.001	0.015	0.013	0.012	0.010	0.196	2954
	(9.93)	(-6.75)	(7.84)	(-1.51	(-2.29)	(5.79)	(5.08)	(4.33)	(3.47)		
I	-0.389	0.143	-0.008	-0.020	0.004	0.014	0.008	0.026	-0.004	0.283	2954
	(-10.2)	(13.35)	(-10.9)	(-6.40)	(7.41)	(3.76)	(2.16)	(6.94)	(-0.89)		
E	0.130	0.027	0.000	-0.44	0.000	0.000	0.009	0.034	0.016	0.254	2954
	(1.86)	(1.37)	(0.05)	(7.86)	(-0.39)	(-0.03)	(1.30)	(5.07)	(2.12)		
M	0.361	-0.008	0.001	-0.080	0.003	0.016	0.013	0.061	0.034	0.343	2954
	5.08	(-0.38)	(1.08)	(-14.0)	(3.37)	(2.35)	(1.89)	(8.87)	(4.57)		
FCN	0.942	-0.109	0.002	0.008	-0.001	-0.017	-0.010	0.002	-0.013	0.774	1100
	(13.8)	(-6.01)	(2.0)	(1.9)	(-1.3)	(-3.7)	(2.2)	(0.4)	(-2.2)		
=TRADE=											
EMER	-0.124	0.091	-0.005	-0.044	0.001		0.005	0.033	0.014	0.212	1782
	(-1.54)	(4.04)	(-3.13)	(-6.01)	(.095)		(0.74)	(5.05)	(1.81)		
	(4.80)	(-5.88)	(8.25)	(-2.85)	(0.74)		(1.47)	(2.40)	(3.22)		
EP	-0.386	0.180	-0.013	-0.030	0.001		-0.002	0.022	-0.003	0.214	1782
	(-5.47)	(9.16)	(-9.96)	(-4.64)	(0.51)		(0.29)	(3.89)	(-0.43)		
MMER	0.068	0.048	-0.002	-0.052	0.002		0.008	0.050	0.040	0.318	1782
	0.92)	(2.35)	(-1.57)	-7.71)	(0.86)		(1.26)	(-8.31)	(5.44)		
MP	0.019	0.044	-0.002	-0.042	0.001		0.011	0.028	0.017	0.343	1782
	(0.38)	(3.20)	(-2.48)	(-9.35)	(1.63)		(2.56)	(7.02)	(3.38)		
MM	0.049	0.004	0.000	-0.010	0.000		-0.003	0.022	0.023	0.205	1782
	(1.53)	(0.46)	(0.22)	(-3.32)	(-0.55)		(-1.05)	(8.31)	(7.33)		
=PRODUCTION=											
VA	1.927	-0.354	0.017	0.009	-0.003	-0.055	-0.016	0.001	-0.016	0.712	2311
	(31.99)	(-21.21)	(14.57)	(1.81)	(-3.54)	(-5.96)	(-2.98)	(0.26)	(-2.69)		
VN	-0.625	0.189	-0.013	-0.005	0.005	0.001	0.018	0.004	0.014	0.003	2311
	(-12.5)	(13.58	(-13.5	(-1.23)	(0.98)	(2.40)	(0.85)	(3.18)	(0.65)		
VN	-0.405	0.103	-0.004	0.014	0.002	0.026	0.000	-0.007	-0.006	0.551	2311
	(-10.8)	(9.81)	(-5.67)	94.68)	(3.55)	(4.471	(.05)	(-2.09	(-1.71)		
VC	-0.028	0.012	0.000	-0.002	0.000	0.012	0.001	0.001	0.002	0.250	2311
	-2.13)	(3.30)	(-0.96	(-1.74)	(1.35)	(6.11)	(0.86)	(1.20)	(1.34)		
VU	-0.076	0.031	-0.001	0.003	0.000	0.015	0.002	-0.004	0.005	0.180	2311
	-4.11)	(5.94)	(-4.11)	(1.80)	(-1.90)	(5.27)	(1.32)	(-2.28)	(2.46)		
VS	0.209	0.020	0.002	-0.019	0.001	-0.016	0.009	-0.006	0.013	0.407	2311
	(4.25)	(1.49)	(2.03)	(-4.77)	(0.98)	(-2.20)	(2.03)	(-1.41)	(2.67)		

Table 51 (Cont.)

EMPLOYMENT											
LA	1.757	-0.165	-0.002	0.030	-0.007	0.001	-0.009	-0.009	-0.012	0.817	2746
	(24.1)	(-8.1)	(-1.5)	(4.9)	-6.8	(0.1)	(-1.4)	(-1.4)	(-.3)		
LI	-0.176	0.016	0.005	0.006	0.000	-0.008	-0.005	-0.002	0.002	0.788	2746
	(-4.7)	(1.5)	(7.2)	(2.0)	(0.1)	(-2.4)	(-1.4)	(-0.6)	(0.4)		
LS	-0.581	0.150	-0.003	-0.036	0.007	0.008	0.014	0.011	0.010	0.716	2746
	-11.21	(10.3)	(-3.1)	(-8.4)	(9.5)	(1.6)	(3.0)	(2.4)	(1.5)		
MANUFACTURING											
31	-0.083	0.043	-0.003	-0.011	0.001	0.001	0.002	-0.001	0.001	0.210	1025
	(-3.5)	(7.0)	(-7.5)	(-6.1)	(3.3)	(0.6)	(1.1)	-0.7)	(0.5)		
32	-0.122	0.040	-0.003	0.007	-0.001	-0.005	-0.001	-0.001	0.000	0.098	1025
	(-6.6)	(8.1)	(-8.2)	(4.9)	(-3.3)	(-2.2)	(-0.7)	(-0.9)	(0.2)		
33	-0.001	0.001	0.000	0.000	0.000	-0.001	-0.001	-0.001	0.000	0.318	1025
	(-0.1)	(0.4)	(1.2)	(0.8)	(-2.1)	(-1.1)	(-3.6)	(-2.8)	(-.2)		
34	0.026	-0.008	0.001	-0.001	0.000	-0.002	-0.002	-0.002	0.000	0.547	1025
	(.32)	(-3.7)	(6.4)	(-1.5)	(1.3)	(-2.3)	(-4.2)	(-3.0)	-0.3)		
35	-0.153	0.037	-0.002	0.14	-0.001	0.002	0.004	0.002	0.003	0.358	1025
	(-9.9)	(9.1)	(-7.9)	(11.1)	(-6.6)	(1.0)	(3.7)	(2.1)	(1.6)		
36	-0.062	0.017	-0.001	0.003	0.000	0.001	0.000	-0.002	0.001	0.358	1025
	-12.8)	(12.8)	(-11.3)	(7.4)	(-5.5)	(1.0)	(0.2)	(-4.7)	(1.5)		
37	-0.088	0.019	-0.001	0.006	0.000	0.000	0.000	-0.001	-0.002	0.329	1025
	(-7.3	(6.0)	(-4.6)	(6.6)	(-2.7)	(0.1)	(0.6)	(-1.0)	(-1.2)		
38	-0.033	-0.012	0.002	0.015	-0.001	-0.002	-0.002	-0.003	0.000	0.749	1025
	(-1.5)	(-1.9)	(6.0)	(8.5)	(-2.7)	(-0.8)	(-1.5)	(-2.0)	(0.2)		
39	-0.017	0.005	0.000	0.000	0.000	0.000	0.001	-0.001	0.000	0.148	1025
	(-4.0)	(4.2)	(-3.3)	(-1.0	(2.4)	(-0.2)	(-3.3	(-1.9)	-0.6		

Table 52. REGRESSION FOR YEARS BEFORE 1973

Variable	Constant	ln y	(ln y)2	ln N	(ln N)2	R2	Nos of Obs
=DEMAND=							
C	1.004	-0.03	-0.001	-0.015	0.002	0.409	858
	(11.7)	(-1.3)	(-0.7)	-2.4	(1.6)		
G	0.410	-0.087	0.007	-0.005	0.000	0.127	858
	(9.4)	(-7.0)	(7.7)	(-1.6)	(-0.4)		
I	-0.129	0.074	-0.003	-0.028	0.005	0.279	858
	(-1.8)	(3.7)	(-2.2)	(-5.3)	(5.2)		
E	0.267	-0.012	0.003	-0.032	-0.003	0.273	858
	(2.1)	(-0.3	(1.0)	(-3.3)	(-1.7)		
M	0.552	0.057	0.005	-0.081	0.004	0.354	858
	(4.4)	(-1.6)	(2.0)	(-8.5)	(2.2)		
FCN	0.956	-0.115	0.002	0.017	-0.002	0.821	360
	(8.6)	(-3.8)	(1.2)	(2.3)	(2.0)		
=TRADE=							
EMER	0.254	-0.00	0.002	-0.063	0.003	0.287	671
	(1.9)	(-0.2)	(0.7)	(-6.4)	(2.0)		
EM	0.216	-0.073	0.007	-0.011	0.000	0.267	671
	(2.1)	(-2.5)	(3.7)	(-1.4)	(0.2)		
EP	0.039	0.066	-0.006	-0.052	0.003	0.341	671
	(0.4)	(2.2)	(-2.8)	(-6.5)	(2.2)		
MMER	0.301	-0.019	0.002	-0.049	0.000	0.309	671
	(2.3)	(-0.5)	(1.0)	(-5.0)	(0.2)		
MP	0.170	0.003	0.001	-0.048	0.002	0.421	671
	(2.1)	(0.1)	(0.4)	(-8.0)	(2.0)		
MM	0.131	-0.022	0.002	-0.001	-0.002	0.112	671
	(2.2)	-(1.3)	(1.7)	(-0.2)	(-2.1)		
=PRODUCTION=							
VA	1.880-	-0.34	0.016	-0.026	0.003	0.715	858
	(17.9)	(11.6)	(7.8)	(-3.3)	(2.1)		
VN	-0.346	0.116	-0.008	-0.012	0.001	0.062	858
	(-4.7)	(5.5)	(-5.5)	(-2.1)	(1.3)		
VN	-0.473	0.121	-0.005	0.034	-0.002	0.662	858
	(-8.3)	(7.5)	(-4.5)	(7.9)	(-2.9)		
VC	0.083	-0.017	0.002	-0.006	0.001	0.262	858
	(3.4)	(-2.3)	(3.8)	(-3.5)	(2.5)		
VU	0.073	-0.009	0.001	0.008	-0.002	0.146	858
	(2.0)	(-0.9)	(1.9)	(2.7)	-3.3)		
VS	-0.217	0.136	-0.006	0.003	-0.001	0.439	858
	(-2.9)	(6.5)	(-4.4)	(0.5)	(-1.2)		
=EMPLOYMENT=							
LA	1.754	-0.152	-0.003	-0.030	-0.002	0.817	671
	(10.6)	(-3.3)	(-0.8)	(-2.4)	0.7)		
LI	-0.046	-0.025	0.008	0.015	-0.001	0.784	671
	(0.5)	(-1.0)	(4.8)	(2.1)	(-1.1)		
LS	-0.709	0.178	-0.005	0.016	0.000	0.719	671
	(-6.3)	(5.7)	(-2.6)	(1.9)	(-0.2)		

Table 53

REGRESSION FOR YEARS AFTER 1973

Variable	Constant	ln y	(ln y)2	ln N	(ln N)2	R2	No of Obs
=DEMAND=							
C	1.690	-0.230	0.012	-0.008	0.001	0.451	660
	(16.9)	(-8.3)	(6.6)	(-0.9)	(0.3)		
G	0.503	-0.097	0.007	-0.021	0.001	0.187	660
	(7.8)	(-5.4)	(6.1)	(-3.7)	(0.9)		
I	-0.483	0.189	-0.012	-0.022	0.004	0.165	660
	(-5.3)	(7.5)	(-6.8)	(-2.7)	(2.7)		
E	0.121	0.106	-0.005	-0.049	0.000	0.311	660
	-0.8)	(2.6)	(-1.7)	(-3.7)	(-0.1)		
M	0.588	-0.031	0.003	-0.100	0.005	0.363	660
	(3.8)	(-0.71)	(1.0)	(-7.3)	(2.2)		
FCN	1.326	-0.223	0.009	0.046	-0.007	0.926	213
	(13.7)	(-8.7)	(5.6)	(7.4)	(-7.3)		
=TRADE=							
EMER	0.149	0.035	-0.001	-0.073	0.004	0.293	427
	(0.8)	(0.7)	(-0.3	(-4.9)	(1.7)		
EM	0.164	-0.056	0.007	-0.020	0.00	0.323	427
	(1.1)	(-1.4)	(2.5)	(-1.6)	(0.7)		
EP	-0.015	0.091	-0.008	-0.053	0.003	0.351	427
	(-0.1)	(2.4)	(-3.01	(-4.5)	(1.4)		
MMER	0.255	0.017	0.000	-0.063	0.002	0.335	427
	(1.5)	(0.4)	(0.1)	(-5.4)	(0.7)		
MP	.152	0.021	-0.001	-0.058	-0.001	0.109	427
	(1.4)	(0.7)	(-0.3)	(-6.1)	(1.7)		
MM	0.103	-0.004	0.001	-0.005	-0.001	0.109	427
	(1.40	(-0.20	(.04)	-0.8)	(1.0)		
=PRODUCTION=							
VA	1.866	-0.364	0.018	0.011	-0.003	0.793	660
	9.13)	(-15.10	(10.9)	(.4)	-2.1)		
VN	-0.522	0.172	-0.012	-0.024	0.003	0.103	660
	(-6.1)	(7.2)	(-7.3)	(-3.1)	(2.8)		
VM	-0.632	0.169	-0.009	0.040	-0.003	0.572	660
	(-9.6)	(9.3)	(-7.2)	(7.0)	(-3.6)		
VC	-0.055	0.023	-0.001	0.003	0.000	0.255	660
	(-2.6)	(3.9)	(-2.6)	(1.6)	(-1.2)		
VU	0.000	0.015	-0.001	0.004	-0.001	0.137	660
	(0.1)	(1.8)	(-0.9	(1.3)	(-1.7)		
VS	0.342	-0.016	0.004	-0.034	0.004	0.555	660
	(4.6)	(-0.8)	(3.2)	(-5.2)	(3.6)		
=EMPLOYMENT=							
LA	2.117	-0.261	0.005	-0.024	0.001	0.847	427
	(11.5)	(-5.2)	(1.5)	(-1.5)	(0.3)		
LI	-0.139	0.012	0.005	0.015	-0.001	0.759	427
	(-1.3)	(0.4)	(2.4)	(1.6)	(-0.9)		
LS	-0.978	0.250	-0.010	0.009	0.001	0.752	427
	(-7.0)	(6.6)	(-3.8)	(0.8)	(0.3)		

Table 54

AVERAGE TIME - SERIES

	ℓ_y	$(\ell_y)2$	T1	T2	T3	T4	No of Obs
=DEMAND=							
(Current Price Shares)							
C	-0.232	0.008	-0.001	-0.009	-0.004	0.015	3018
	-9.9)	(5.4)	(0.2)	(-3.4)	-1.5)	(5.1)	3018
G	-0.103	0.006	0.021	0.017	0.014	0.012	3018
	(-8.0)	(6.7)	(12.1)	(10.9)	9.1)	(7.1)	3018
I	0.467	-0.025	-0.003	-0.006	0.015	-0.007	3018
	(21.7)	(-18.2)	(-1.01	(-2.3)	(5.5)	-2.6)	3018
E	(-0.017)	0.009	-0.030	-0.015	0.020	+0.010	3018
	(-0.6)	(4.6)	(-7.7)	-4.1)	(0.045	0.027	3018
M	0.115	-0.003	-0.013	-0.013	0.45	0.027	3018
	(3.8)	(-1.4)	(-3.2)	(-3.5)	(12.0)	(7.5)	
(Constant Price Shares)							
C	-0.204	0.012	-0.017	-0.019	-0.007	0.005	2530
	(-6.9)	(5.9)	(-3.8)	(-6.3)	(-2.2)	(1.6)	
G	-0.087	0.003	0.015	0.015	0.023	0.012	2530
	(-3.9)	(1.7)	(4.4)	(6.4)	(9.9)	(5.1)	
I	0.302	-0.013	-0.019	0.006	0.009	-0.011	2530
	(9.0)	(-5.9)	(-3.71)	(-1.8)	(2.7)	(-3.1)	
E	-0.269	0.023	0.000	0.010	-0.002	0.009	2530
	(-8.2)	(10.9)	(0.0)	(2.8)	(-0.7)	(2.7)	
M	-0.257	0.025	-0.021	-0.001	0.023	0.016	2530
	-5.8)	(8.5)	(-3.2)	(-0.3)	(5.0)	(3.3)	
FCN	-0.098	-0.002	-0.004	0.002	0.011	-0.002	1125
	(-4.9)	(-1.3)	(-1.6)	(0.7)	(5.0)	(-.7)	
=TRADE=							
EMER	-0.025	0.009		-0.013	0.019	0.008	1828
	(-.6)	(3.2)		(-3.6)	(5.7)	(2.1)	
EDP	-0.013	-0.001		-0.006	0.004	-0.007	1828
	(-0.6)	(-0.5)		(-3.1)	(2.4)	(3.6)	
EFMM	0.102	-0.003		-0.006	0.010	0.003	1828
	(3.1)	-(1.2)		(-2.1)	(3.7)	(1.0)	
EM	-0.114	0.012		-0.001	0.005	0.012	1828
	(-4.9)	(8.0)		-0.5)	(2.9)	(5.7)	
MMER	0.175	-0.007		-0.009	0.035	0.026	1828
	(4.2)	(-2.7)		(-2.6)	(11.0)	(7.2)	

Table 54 (Cont.)

MP	0.075	-0.006		-0.004	0.022	0.022	1828
	(3.7)	(-4.5)		(-2.5)	(14.1)	(12.2)	
MM	0.100	-0.001		-0.005	0.013	0.004	1828
	(3.3)	(-0.6)		(-1.9)	(5.5)	1.6)	
=PRODUCTION=							
(Current Price Shares)							
VA	-0.327	0.017	-0.045	-0.023	-0.007	-0.01	2354
	-12.7)	(10.2)	(-9.6)	(-9.9)	-2.8)	(-5.2)	
VN	0.043	-0.002	0.007	0.001	0.011	0.003	2354
	(1.9)	(-0.9)	(1.4)	(0.5)	(4.3)	(1.2)	
VM	0.250	-0.015	0.019	0.000	-0.001	-0.005	2354
	(17.1)	(-15.7)	(7.0)	(5.4)	(-0.5)	(-3.4)	
VC	0.043	-0.002	+0.010	-0.032	0.000	0.001	2354
	(5.0)	(-2.7)	(6.3)	(-1.8)	(-.3)	(1.5)	
VU	0.058	-0.004	0.010	0.004	0.001	0.005	2354
	(7.3)	(-7.9)	(6.8)	(5.0)	-1.7)	(5.6)	
VS	-0.071	0.005	0.000	0.012	-0.002	0.010	2354
	(-3.0)	(3.3)	(0.1)	(5.0)	(-0.7)	(4.2)	
(Constant Price Shares)							
VA	-0.447	0.026	-0.009	-0.018	-0.016	-0.008	1920
	(-23.9)	(20.7)	(-1.4)	(-9.8)	(9.5)	(-4.8)	
VN	0.033	-0.002	-0.005	0.003	-0.002	-0.003	1920
	(1.9)	(-1.9)	(-0.8)	(1.9)	(-1.3)	-2.0)	
VM	0.132	-0.005	0.008	0.005	0.001	-0.002	1920
	(8.6)	(-4.6)	(1.5)	(3.1)	(0.6)	(-1.4)	
VC	0.104	-0.006	-0.006	-0.001	0.001	-0.001	1920
	(10.2)	(-9.3)	(-1.7)	(-0.9)	(0.7)	(0.7)	
VU	0.028	-0.001	0.004	0.005	0.007	0.007	1920
	(2.7)	(-1.8)	(1.2)	(5.2)	(7.9)	(7.6)	
VS	0.148	-0.011	0.008	0.006	0.009	0.007	1920
	(6.7)	(-7.6)	(1.0)	(2.6)	(4.6)	(3.3)	
=EMPLOYMENT=							
LA	-3.433	-0.336	-3.462	-2.540	-2.274	-1.626	2709
	(-2.0)	(-3.0)	(-17.0)	(-13.6)	(12.2)	(-6.4)	
LI	18.927	-1.018	0.652	0.398	0.642	0.630	2709
	(17.8)	(-14.9)	(5.2)	(3.4)	(5.6)	(4.0)	
LS	-15.492	1.354	2.810	2.142	1.632	0.996	2709
	(-10.8)	(14.6)	(16.5)	13.7)	(10.5)	(4.7)	

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