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Comparative Analysis of Dualistic Growth*

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This paper identifies the sources of growth from identity-based decomposition in which overall growth of a dualistic economy is the sum of the growth in the two sectors. The contribution of the various enlargement and enrichment effects in each economic sector to total economic growth is measured and compared for a sample of forty countries over a period of twenty years. A sector's enlargement is found to be the major contributor to growth in less developed economies, while a sector's enrichment is the major contributor for the more developed economies.

I. Introduction

The characteristics and role of industrialization in economic growth and development have been a controversial subject, generating many hypotheses. Among the best known generalization is the proposition that as per capita income increases, the share of manufacturing in total production and employment rises while the share of agriculture declines. According to Kuznets (1966), the shift of resources from agriculture to industry is, indeed, the main feature of modern economic growth. Chenery and Syrquin (1975, 1980) extended Kuznets' research to cover the patterns of development for developing countries in the postwar period.

Lewis (1954), Fei and Ranis (1964), and Jorgenson (1961) showed that less developed countries exhibit dualistic economic growth. The central underlying assumption is that the economy could be divided into two main sectors: (1) a modern industrial sector and (2) a traditional

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agricultural sector. Kuznets (1964) conjectured that countries with high rates of economic growth experience a more rapid decline in the proportional contribution of agriculture.

Studies of growth, whether aggregate or sectoral disaggregation, focus on identifying determinants by one of two approaches. The first approach is to construct a model incorporating institutional, behavioral, and technological relations along with assumptions about the function of markets.[1] The second approach explains the sources of growth from identity-based decomposition in which overall growth of a dualistic economy is the sum of the growth in the two sectors.[2] Fields (1980) proposed a scheme whereby each sector's growth can be divided into two components: enlargement, which is due to expansion of the labor force in the aggregate; and enrichment, which is increased productivity translated into higher income for workers. Therefore,for a dualistic economy to grow, (Hall, 1983, p. 268) at least one of the following events must occur:

(1) the labor force in the modern sector grows more rapidly with no change in relative wages;
(2) labor productivity (the inverse of labor-output ratio) in the modern sector increases resulting in higher income flowing only to a fixed number of persons, and;
(3) labor productivity in the traditional sector increases resulting in benefits in equal proportions to all in the sector.

Following Fields' theoretical framework (1980, pp. 40-47) and using data from a selected group of countries, this paper examines how developing countries experience some or all of the above changes as their economies grow. This research specifically:

(a) quantifies, on a country-specific basis, the contribution of the various enlargement and enrichment effects to total economic growth;
(b) examines how these various components differ in fast- and slow-growing economies;
(c) checks the claim that countries with high rates of economic growth experience a rapid decline in the proportional contribution of the traditional sector, in a sense testing Kuznets (1964) conjecture, and;
(d) tests the hypothesis that a sector's enlargement is the major contributor to growth in less developed economies, while a sector's

[1] See Dervis, de Melo, and Robinson (1982) for a detailed discussion of such models.
[2] See for example, Syrquin (1986), and Fields (1980).

enrichment is the major contributor for the more developed economies.

The groups of countries selected for this study are classified by the World Bank as low-income, lower- and upper-middle-income, and industrial market economies. The inclusion of industrial market economies allows comparison. The data used were obtained from the World Bank (1982-89), for the period 1960 through 1980. The choice of the period was mainly due to lack of comparable information. Furthermore, several countries in each group had to be omitted for the same reason.

II. The Model

The growth accounting approach for assessing dualistic development in this paper, as mentioned earlier, follows the work of Fields (1980), and is unique in that it delves into questions of economic growth in a simple yet somewhat detailed manner. Growth is disaggregated into various components, making it possible for use as a tool to implement policies of employment creation and alleviation of poverty. Thus, the optimism and aspiration associated with economic growth can be judged by looking at the ingredients which constitute such growth. No such approach, to the knowledge of the authors, has been attempted. Two related schemes are pursued which disaggregate the incremental change in gross domestic product and its per capita equivalent between 1960 and 1980.

Define:

G = Gross domestic product (GDP) for a particular country,
G_i = Gross domestic product by industrial origin, $i = 1,\ldots,k$,
L = Total active labor force,
L_i = Labor force by industrial origin,
R_i = Output per worker in national currency associated with sector i.

From the above definitions, we get

$$(1) \qquad G = \sum_{i=1}^{k} G_i = \sum_{i=1}^{k} R_i L_i$$

We derive the first scheme as follows: Let $\Delta G = G^2 - G^1$, be the change in GDP in national currency between two periods, 1 representing the base year, and 2 representing the terminal year. From equation (1),

$$(2) \qquad \Delta G = \sum_{i=1}^{k} R_i^2 L_i^2 - \sum_{i=1}^{k} R_i^1 L_i^1 = \sum_{i=1}^{k} (R_i^2 L_i^2 - R_i^1 L_i^1)$$

$$= \sum_{i=1}^{k} [R_i^1 (L_i^2 - L_i^1) + (R_i^2 - R_i^1) L_i^1 + (R_i^2 - R_i^1)(L_i^2 - L_i^1)].$$

Equation (2) is an identity. It decomposes ΔG into the sum of three components: enlargement, enrichment, and interaction. When a sector experiences an increase in the percentage of its labor force, its contribution to ΔG is called enlargement, given by the first term. When a sector experiences an increases in output per workers, translated into improvement in income, its contribution to ΔG is called enrichment, given by the second term. The third term is the interaction, which is an additional effect due to the combined influence of both enlargement and enrichment. Since the major focus of this paper is on dual economies, $k = 2$ in equation (2), the analysis concentrates on two sectors, the traditional agricultural sector, and the modern industrial sector.

For the second scheme, we start with equation (1), which yields

$$Y = \frac{G}{L} = \frac{1}{L} \sum_{i=1}^{k} R_i L_i = \sum_{i=1}^{k} R_i \frac{L_i}{L} = \sum_{i=1}^{k} R_i F_i$$

where Y is the output per worker in the active labor force, and f_i is the percentage of the labor force in sector i. Let

$$\Delta Y = Y^2 - Y^1 = \sum_{i=1}^{k} R_i^2 f_i^2 - \sum_{i=1}^{k} R_i^1 f_i^1 = \sum_{i=1}^{k} (R_i^2 f_i^2 - R_i^1 f_i^1),$$

be the change in Y between two periods, 1 representing the base year, and 2 representing the terminal year.

For a two-sector model, a modern sector (m) and a traditional sector (t),

$$(3) \qquad \Delta Y = (R_m^2 f_m^2 + R_t^2 f_t^2) - (R_m^1 f_m^1 + R_t^1 f_t^1).$$

By taking the first difference of Equation (3), Fields (1980, p. 42) has shown that

$$(4) \qquad \Delta Y = (f_m^2 - f_m^1)(R_m^1 - R_t^1) + (R_m^2 - R_m^1) f_m^1 + (R_m^2 - R_m^1)(f_m^2 - f_m^1) + (R_t^2 - R_t^1) f_t^1$$

The four components of equation (4) are: modern sector enlargement effect, modern sector enrichment effect, interaction between enlargement and enrichment of the modern sector, and traditional sector enrichment effect. Negative values are possible for any of the factors, depending on whether a sector shrinks in employment, or whether output per worker declines.

III. Comparisons Among Nations

The results of computations are shown in Tables 1 and 2. Table 1 shows the disaggregation of GDP changes for 40 countries between 1960 and 1980. The first three columns give the percentage of enlargement, enrichment, and interaction in GDP for the traditional agricultural sector relative to overall GDP. Columns 4-6 give the same information for the modern industrial sector. The values are normalized percentages.

As an example, consider the percent increments in India's GDP between 1960 and 1980. The traditional sector has enlargement, enrichment, and interaction values of 29 percent, −2 percent and −1 percent, respectively. The modern sector values are 40 percent, 18 percent,and 16 percent respectively. For the agricultural sector, all low- and lower-middle-income countries, with the exception of Chile, show positive enlargement effect. All countries of the upper-middle-income group experienced a contraction in the traditional sector, with the exception of Mexico and Panama which had an increase of one percent. For Korea, the value is zero. Table 1 also shows that all developed market economies experienced a shrinking agricultural sector. Therefore, in general, an inverse relationship exists between the level of per capita income and the proportion of the population in agriculture. This supports Kuznets' proposition and is consistent with the existing empirical literature (Chenery, Robinson and Syrquin, 1986). With respect to enrichment in the traditional agricultural sector, there are three countries which experienced a deterioration in agricultural output per worker: India in Group (1), Nigeria in Group (2), and Venezuela in Group (3). In general, there is a direct relationship between the level of income and the enrichment factor.

All countries show a positive enlargement effect in the nonagricultural sector. Each low-income country, except Burma, and each middle-income country, except El Salvador, benefitted from the enrichment factor in the modern sector. Burma and El Salvador experienced a decline in enrichment in the nonagricultural sector. For Jamaica, there was no change. These three countries possess the highest modern-sector enlargement effect in their respective groups. Generally, there was a higher enlargement effect in the modern sector for lower-middle-income economies relative to other groups. For this group of countries, the enrichment factor was quite modest and on the average accounted for no more than 11 percent of total output growth. Cross-country patterns, shown in Table 1, indicate that higher enrichment values in the modern sector and rising per capita income are closely related.

Table 2 shows the disaggregation of GDP growth per active worker in

Table 1

COMPONENTS OF GDP GROWTH IN TWO SECTORS BY SELECTED COUNTRIES

	Agriculture			Nonagriculture		
	Enlargement	Enrichment	Interaction	Enlargement	Enrichment	Interaction
Low Income	0.15	0.10	0.02	0.43	0.16	0.14
India	0.29	−0.02	−0.01	0.40	0.18	0.16
Sri Lanka	0.14	0.03	0.02	0.41	0.23	0.17
Burma	0.04	0.34	0.04	0.63	−0.02	−0.02
Pakistan	0.13	0.06	0.04	0.29	0.24	0.25
Lower Middle Income	0.06	0.07	0.02	0.60	0.11	0.14
Bolivia	0.03	0.08	0.01	0.65	0.10	0.12
Indonesia	0.04	0.14	0.03	0.35	0.16	0.27
Morocco	0.03	0.05	0.01	0.69	0.09	0.12
Philippines	0.08	0.09	0.05	0.41	0.16	0.20
Egypt	0.06	0.05	0.02	0.30	0.26	0.31
Honduras	0.14	0.07	0.04	0.60	0.06	0.08
Dominican Republic	0.04	0.05	0.01	0.66	0.08	0.16
Nigeria	0.16	−0.08	−0.04	0.18	0.45	0.33
Thailand	0.07	0.09	0.05	0.40	0.12	0.28
El Salvador	0.05	0.14	0.03	0.82	−0.02	−0.03
Jamaica	0.01	0.03	0.00	0.96	0.00	0.00
Peru	0.05	0.01	0.00	0.81	0.06	0.07
Turkey	0.05	0.09	0.02	0.67	0.06	0.12
Guatemala	0.10	0.07	0.05	0.54	0.09	0.14
Costa Rica	0.04	0.08	0.03	0.71	0.05	0.10
Colombia	0.05	0.12	0.04	0.56	0.08	0.14
Chile	−0.01	0.07	−0.01	0.85	0.05	0.05
Upper Middle Income	0.02	0.10	−0.02	0.10	0.29	0.25
Uruguay	−0.03	0.16	−0.02	0.32	0.48	0.10
Portugal	−0.04	0.09	−0.03	0.18	0.55	0.25
Yugoslavia	−0.04	0.18	−0.06	0.49	0.18	0.25
Mexico	0.01	0.04	0.01	0.46	0.18	0.29
Panama	0.01	0.06	0.01	0.47	0.18	0.28
Argentina	−0.02	0.10	−0.01	0.39	0.38	0.17
Korea, Rep.	0.00	0.09	0.00	0.31	0.18	0.42
Venezuela	−0.01	−0.04	0.00	0.74	0.11	0.19
Greece	−0.04	0.23	−0.08	0.27	0.35	0.27
Industrial Market	−0.04	0.13	−0.07	0.23	0.58	0.17
Italy	−0.05	0.20	−0.11	0.26	0.50	0.20

Table 1 (Continued)

	Agriculture			Nonagriculture		
	Enlargement	Enrichment	Interaction	Enlargement	Enrichment	Interaction
Belgium	−0.03	0.08	−0.05	0.10	0.79	0.11
United Kingdom	−0.01	0.05	−0.01	0.10	0.82	0.05
Austria	−0.05	0.19	−0.12	0.16	0.65	0.16
Finland	−0.10	0.30	−0.18	0.40	0.36	0.22
West Germany	−0.02	0.08	−0.04	0.16	0.71	0.13
Denmark	−0.05	0.15	−0.08	0.28	0.55	0.16
Japan	−0.02	0.07	−0.04	0.19	0.46	0.34
Norway	−0.04	0.12	−0.07	0.21	0.59	0.13
United States	−0.01	0.03	−0.01	0.43	0.39	0.17

Source: Based on *World Development Reports, 1982-89,* and, *World Tables, 1988-89.*

the labor force. For India, the values 0.18; 0.77; 0.12; and −0.06 indicate that between 1960 and 1980, 18 percent of the incremental change in per capita GDP is explained by an increase in the proportion of the labor force in the modern sector and a positive differential in the rate of output between the two sectors. Similarly, 77 percent of the increment is explained by the increase in the output per worker in the modern sector. The combined effect of these two factors is 12 percent. Finally, there is a 6 percent decline in the proportion of the contribution of the traditional sector.

The results of Table 2 were consistent with those in Table 1. Generally, there was a higher enlargement effect in the modern sector for lower-middle-income economies relative to other groups. On the other hand, there were noticeable differences in the enrichment effect between the lower-middle-income group and the other economies.

The results in Tables 1 and 2 were based on comparisons made between GDP of 1960 and that of 1980. Perhaps the use of averages of various years at the two ends of the time period are more desirable because an average carries with it an element of trend. For instance, instead of calculations based on data for 1960, it is preferable to use an average of GDP for five years, for example 1960 to 1965. Similarly at the other end, it is preferable to use the average of GDP of the last five years. The use of averages can pose problems, however. The difficulty of gathering comparable data for a large number of countries for a large number of consecutive years is a matter of no small concern. In fact, as stated earlier in this paper, many countries were eliminated from the present study

Table 2

COMPONENTS OF PER CAPITA GDP GROWTH
IN TWO SECTORS BY SELECTED COUNTRIES

	Nonagriculture			Agriculture
	Enlargement	Enrichment	Interaction	Enrichment
Low Income	0.19	0.54	0.06	0.21
India	0.18	0.77	0.12	−0.06
Sri Lanka	0.08	0.76	0.05	0.11
Burma	0.45	−0.05	−0.02	0.61
Pakistan	0.06	0.67	0.10	0.16
Lower Middle Income	0.41	0.31	0.11	0.17
Bolivia	0.46	0.27	0.10	0.16
Indonesia	0.20	0.33	0.24	0.23
Morocco	0.52	0.26	0.11	0.11
Philippines	0.17	0.48	0.11	0.24
Egypt	0.09	0.63	0.18	0.10
Honduras	0.41	0.25	0.08	0.26
Dominican Republic	0.49	0.25	0.16	0.10
Nigeria	0.03	1.04	0.11	−0.17
Thailand	0.30	0.29	0.24	0.18
El Salvador	0.71	−0.06	−0.03	0.38
Jamaica	0.89	0.00	0.00	0.11
Peru	0.63	0.27	0.07	0.03
Turkey	0.57	0.14	0.13	0.16
Guatemala	0.31	0.35	0.11	0.23
Costa Rica	0.45	0.22	0.09	0.24
Columbia	0.24	0.33	0.12	0.31
Chile	0.55	0.23	0.04	0.18
Upper Middle Income	0.18	0.54	0.19	0.09
Uruguay	0.07	0.71	0.04	0.18
Portugal	0.08	0.65	0.21	0.06
Yugoslavia	0.36	0.27	0.23	0.14
Mexico	0.26	0.48	0.19	0.08
Panama	0.25	0.48	0.18	0.09
Argentina	0.03	0.77	0.07	0.13
Korea, Rep.	0.15	0.40	0.35	0.11
Venezuela	0.27	0.65	0.19	0.11
Greece	0.18	0.43	0.24	0.15
Industrial Market	0.08	0.75	0.11	0.07
Italy	0.15	0.59	0.16	0.09

Table 2 (Continued)

	Nonagriculture			Agriculture
	Enlarge-ment	Enrich-ment	Inter-action	Enrich-ment
Belgium	0.01	0.90	0.05	0.04
United Kingdom	0.01	0.94	0.01	0.04
Austria	0.09	0.70	0.14	0.08
Finland	0.18	0.49	0.18	0.14
West Germany	0.06	0.82	0.08	0.04
Denmark	0.10	0.72	0.10	0.08
Japan	0.08	0.66	0.22	0.04
Norway	0.07	0.75	0.11	0.06
United States	0.03	0.91	0.03	0.04

Source: Based on *World Development Reports, 1982-89,* and, *World Tables, 1988-89.*

because of data constraints. In addition, the way the data were utilized in the model makes averaes less desirable. Remembering that the two models incorporate the data in normalized form such that each row in Tables 1 and 2 sums to one, it is unlikely that averaging produces any significant different results than using a single yera's data.

The impressions obtained from both tables can be checked by calculating the averages and dispersions of the various factors. To discover the pattern of the relationship between the enlargement and enrichment factors of each sector and the levels of country income, cross-section analysis of international similarities and differences was conducted. The comparisons were based on the results of Tables 1 and 2, using one-way analysis of variance, testing means among groups of nations.

There were six tests for the variables in Table 1, and four tests for variables in Table 2. If the F test rejected the hypothesis of equality of means among the groups of nations, the means were compared by the multiple comparison procedure of Newman and Keuls (Klockars and Sax, 1986). For ease of presentation, the nations were categorized as low-income (1), lower-middle-income (2), upper-middle-income (3), and, industrial market (4).

For Table 1, statistical significance was detected for all factors, with the exception of the enrichment effect in the traditional sector and the interaction effect in the modern sector. The F values of the test were all greater than 2.86 for 5 percent significance level. The Newman-Keuls

multiple comparisons identified the following subets for Table 1 in increasing order: [(4,3), (2), (1)] for traditional sector enlargement; [(2,3,1,4)] for traditional sector enrichment; and [(4),(3),(2,1)] for traditional sector interaction; [(4,3,1), (2)] for modern sector enlargement; [(2,1),(3),(4)] for modern sector enrichment; and [(1,2,4,3)] for modern sector interaction.

Similarly, for Table 2 statistical significance was detected at the 5 percent level for all factors, except the traditional sector enrichment effect. The Newman-Keuls multiple comparisons identified the subgrouping in increasing order of magnitudes as; [(4,3,1), (2)] for modern sector enlargment; [(2,1),(3),(4)] for modern sector enrichment; [(1,4,2) (3)] for interaction between enlargement and enrichment; and, [(4,3,2,1)] for traditional sector enrichment effect.

The enlargement effect in the traditional sector was more pronounced in the low-income economies than in other groups of economies. The enlargement effect in the modern sector was more pronounced in the lower-middle-income economies than in other groups, suggesting a labor shift from the agricultural to the nonagricultural sector. In the traditional sector, no statistical significance was detected in the average growth among all economies in their enrichment effect. This could be due to small incremental changes in output per work in low-income economies while the size of the labor force remained large. The revese could be true for higher income economies. On balance, there was an offsetting influence resulting in statistically insignificant differences among the averages. On the other hand, enrichment in the modern sector favored the higher income economies as a consequence of the state of technology and capital accumulation accessible to these economies, as well as government policies and the elimination of factor price distortions.

The results show that in developing economies, a sector's enlargement rather than enrichment has been the major source of growth. The results, although not conclusive, suggest the paradoxical situation of poor countries, which need enrichment the most, but find it most difficult to achieve. This very well could be due to the difficulties of implementation of developmental policies, as Gyimah-Brempong (1990) has shown in his study of Tropical African countries. Enrichment is thus not a simple goal, and the less developed a country is, the more difficult it is to achieve. There is, thus, a vicious circle which stands a better chance of being broken with resource augmentation. The inward looking policies adopted by some of the developing nations (for example, India) have affected the enrichment of each sector and consequently the overall growth rate for that country.

IV. Summary and Conclusions

Two models based on welfare economics were employed to examine growth rates of the two main sectors in dualistic economies — a modern industrial sector and a traditional agricultural sector. The models have the advantage of breaking down the growth rate of each sector into enlargement and enrichment components. This aspect is crucial when discussing growth rates of the sectors because it is impossible to pin-point the sources of such growth. That is, it is not enough to speak about the desirability of growth of the modern industrial sector by qualitative judgments alone. Instead, one looks at such growth to see whether it is merely an outcome of expansion to include more people or whether it is an outcome of the increase in income of those who were originally included in the sector. These models answer such questions, and thus can be used to implement policies of economic growth and can be applied to alleviate absolute poverty, as can be seen from equation (4). Economic growth can be of benefit to the poor by either drawing more of them into the modern sector (enlargement effect) or by raising the income of those remaining in the traditional sector (enrichment effect). The sum of the two effects constitute the total income gain of the poor.

This paper presented a profile of economic growth among selected countries at different stages of development. Findings indicate that general systematic relationships exist between the level of development as categorized by income and the magnitude of enlargement and enrichment factors. These results were evident from the one-way analysis of variance for testing the hypothesis of equality of means. Thus, levels of development may be classified according to the magnitude of the different factors. In this respect, it may be inferred that a sector's enlargement is the major contributor to growth in less developed economies, while a sector's enrichment is the major contributor for more developed economies.

Therefore, it is crucial to recognize the potential benefits of reallocation. The reallocation of resources from sectors of lower productivity to sectors of higher productivity can make an important contribution to overall growth. This paper supports the emphasis in the literature on a structural transformation from agriculture to manufacturing (Johnson, 1970; Johnson and Kilby, 1975) and towards a multisectoral, heterogeneous, modern economy (Chenery, Robinson and Syrquin, 1986).

The major policy priority in LDCs is to eliminate disequilibrium in their factor markets and factor price distortions, particularly because of rapid change in the structure of production. The government regulation

of loans and enterprises which perpetuate low productivity in developing countries should be replaced by sound government economic policies to inspire their citizens. These are important in both a strategy of poverty alleviation and accelerated economic growth.

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