

# ON THE INDUSTRIAL DISTRIBUTION OF NATIONAL PRODUCT AND LABOR FORCE DURING ECONOMIC GROWTH\*

Kazushi Ohkawa and Henry Rosovsky

The recent writings of Simon Kuznets have produced considerable data and analysis about the sectoral changes in national product and labor force during economic growth<sup>1</sup>). Most of his results are completely acceptable and very enlightening. In re-examining some of the basic propositions, however, we are inclined to suggest certain modifications in Kuznets' conclusions, especially as they relate to the agricultural sector. We will proceed in the following order: (1) a brief statement of Kuznets' findings and the questions they raise; (2) an exposition of our own findings; (3) suggested conclusions.

## I

Kuznets divided the economy of each country into three sectors: agriculture (A), manufacturing (M), and services (S), and then subjected these sectors to cross-section and historical analysis<sup>2</sup>). Using the cross-section method, Kuznets found, first of all, that the relative product per worker in the A sector rises from values well below 1.0 in terms of a country-

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1) The most detailed results are contained in Simon Kuznets, "Quantitative Aspects of the Economic Growth of Nations, II: Industrial Distribution of National Product and Labor Force", *Economic Development and Cultural Change*, Supplement to Vol. V, No. 4 (July, 1957). See also by the same author, *Six Lectures On Economic Growth*, (Glencoe, Illinois: The Free Press, 1959), Lecture III: Findings on Industrial Structure of Labor Force and National Product.

2) A: agriculture, fisheries and forestry. M: mining, manufacturing, and construction. S: others. The S sector includes transportation and communication which probably should have been classified under M. In this paper, however, we did not attempt this re-classification.

wide average, and that the product per worker of the M+S sectors falls from an initial level well above 1.0, as per capita income increases. But this conclusion is restricted to countries at the top of the per capita income scale: classes I through III<sup>3</sup>).

It does not apply to countries of class VII through class IV. Secondly, the data about the various countries seemed to show that product per worker in the M Sector rises relative to country-wide averages as per capita income increases if we deal with the labor force including unpaid family labor. Finally, product per worker in the S sector clearly declines as per capita income increases, again relative to a country-wide average, and this is taken to indicate that the disparity between the M and S sectors declines with development.

Next, Kuznets turned to the available time-series in order to substantiate the cross-section findings. He was forced to limit himself to fifteen countries for which long-term changes in relative levels of sectoral product per worker could be derived. Further, the data were largely restricted to the twentieth century and unpaid family labor had to be included in the labor force. The findings become somewhat more complicated at this point, and for the sake of clarity they will be presented *ad seriatim*.

1. In six countries (Denmark, Germany, Holland, Sweden, U. K. and U. S.) product per worker in the A sector rises relative to the country-wide average. In two more countries (Norway and the Union of South Africa) it rises relative to the product per worker in the M+S sector, though it falls relative to the

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3) There are seven classes of per capita income in terms of U. S. dollars. Taking the lowest as 100, they are: I-1,700; II-1,000; III-650; IV-400; V-270; VI-200; VII-100.

country-wide average. In the six remaining countries (Japan has to be excluded as a doubtful case) the long-term trend in the relative product per worker in the A sector is downward. If we exclude Australia and New Zealand, generally accepted as most untypical countries in which the initial relative levels of per worker product in the A sector were quite high, Kuznets' long-term series show eight rises and four declines of relative per worker product in the A sector. Of the declines, two (Italy and Hungary) occur in countries which, on the basis of per capita income, belong in class IV, and cross-section analysis leads to no specific expectations about the productivity movement. There remain only two countries (France and Canada) which show declines. Kuznets is therefore inclined to argue that in this case the results of the historical analysis support the findings derived from cross-section data: the trend of the relative per worker product in the A sector rises.

2. Generally, the relative product per worker in the M sector rises over time. This is true in eleven out of fourteen countries and often the increases are substantial. Declines take place in only three countries (Japan, Union of South Africa, and New Zealand) in which the initial product per worker in the M sector was quite high. The relative rise in per worker product of the M versus S sector is even more general, it being the case in twelve out of fourteen countries (except in New Zealand and the Union of South Africa). Once again, the results are consistent with the cross-section analysis.

3. Product per worker in the S sector declines in eleven out of fourteen countries relative to the country-wide average (the exception being Hungary, Australia, and New Zealand). Keeping in mind that these are somewhat unusual countries, the generality of the downtrend is impressive.

4. Kuznets also computed a measure of sectoral inequality for product per worker and found that with the growth of product per capita the weighted inequality of sectoral per worker products diminished (except in the case of France, Hungary, and one of the estimates for Japan).

We may now summarize Kuznets' findings in the

following manner. First, there is, in general, a reconciliation between historical and cross-section observations. Second, there is a trend of diminishing intersectoral inequality in product per worker during economic growth. Third, in the course of economic change, the fall of relative product per worker in the S sector is impressive, and the rise of product per worker in the A sector is greater than in the M+S sector.

Among the several important implications brought out by these findings, we wish to pay particular attention to the changes in the relative disparity in product per worker between the agricultural and the non-agricultural sectors. According to Kuznets, the relative disparity tends to be wider in the low income countries<sup>4</sup>.

This means that the underdeveloped countries are further behind the developed countries in product per worker in agriculture than in the non-agricultural sectors.

Our examination of the data underlying the above conclusions suggested several possible modifications. Kuznets' long-term analysis makes comparisons by selecting only two periods or years, often rather far apart. This may create some problems because the relative product per worker in the A sector is subject to significant fluctuations. In the time-series, developments in the A sector in relation to the other sectors do not appear to us to follow as clear a pattern as those for M and S. We also have some doubts about the interpretation of the cross-sections, especially in relation to the changes in relative product per worker in A and M, and these, in turn, make more difficult the reconciliation with the historical observations. Finally, we would be inclined to suggest a modification of Kuznets' proposition concerning the relative disparity of product per worker in agriculture.

## II

There are two ways of measuring the relative change of per worker product in a sector of the eco-

4) See *Six Lectures*, p. 54 and for a more detailed treatment, "Quantitative Aspects...", *Economic Development and Cultural Change*, V, 4, p. 37.



nomy: relative to a country-wide average, or alternatively, to the other sector(s). Kuznets used both techniques. Comparing one sector to other sectors creates no special problems. As Kuznets pointed out, however, comparison to a country-wide average involves two different factors: the changes in relative product per worker in a sector are due partly to changes in the absolute level of per worker product, and partly to changes in the country-wide averages associated merely with the shifts in weights of the different sectors. The two kinds of measurements should be clearly distinguished.

In making the direct comparisons between sectors we will use the ratios A/M and A/S rather than A/M+S, the latter being frequently used by Kuznets. The movements of M and S are distinctly different, and therefore A/M and A/S are deserving of independent analysis. Let us look at Table 1 where the relative product per worker in major sectors is supplied for eleven countries, using long-run time-series, with respect to both country-wide averages and direct intersectoral comparisons.

We selected four periods centering around 1875—85, 1905—15, 1925—35, and 1950—55, in order to observe the change in relative product per worker between these years<sup>5)</sup>. To begin with, let us concentrate on the movements of A, M, and S, the relative product per worker in each major sector with reference to the country-wide average. We note that the movement of A in most countries seems to change after the period 1925—35, suggesting that the Great Depression was of some consequence. The final (postwar) period may also show the effects of agricultural support policies and changes in the employment situation, and therefore it is desirable to treat the pre and postwar periods separately. In the pre-war years, the values of A show a downward or almost level trend. The only clear exception is the U. S. for which the figure in 1910 is clearly higher than the previous one. In the U. K., France and Germany, the

5) Due to space limitations we use these periods to describe our results. In actual fact we plotted the ratios for all countries using all of the data supplied by Kuznets.

figures show a very slight rise from the first to the second period, but we interpret this as a level trend. The picture changes radically in the postwar era: in most countries the value of A definitely rises. Here the only exceptions are Italy and Germany and the declines in A are extremely slight. Our conclusion is that the relative product per worker in the A sector generally tends to have a downward or level

**Table 1**  
RELATIVE PRODUCT PER WORKER BY  
MAJOR SECTORS, LONG-TERM SERIES

Labor Force	Dates National Product	A	M	S	M+S	A/M	A/S	A/M +S
<b>FRANCE</b>								
1876	1872, 1882	0.80	1.17	1.30	1.23	0.68	0.62	0.65
1906	1898, 1908—10	0.84	1.09	1.17	1.12	0.77	0.72	0.75
1926	1924—28	0.52	1.20	1.46	1.30	0.43	0.36	0.40
1950	1949	0.68	1.39	0.94	1.17	0.49	0.72	0.58
<b>GERMANY</b>								
1882	1880—89	0.52	0.68	2.42	1.35	0.76	0.21	0.39
1907	1905—14	0.53	0.97	1.65	1.24	0.55	0.32	0.43
1933	1930—38	0.48	1.08	1.38	1.21	0.44	0.35	0.40
1950	1949—51	0.47	1.06	1.31	1.16	0.44	0.36	0.41
<b>SWEDEN</b>								
1880	1879—81	0.59	1.08	2.80	1.87	0.55	0.21	0.32
1910	1909—11	0.53	1.11	1.99	1.44	0.48	0.27	0.37
1930	1929—31	0.39	1.16	1.74	1.40	0.34	0.25	0.28
1950	1949—51	0.64	1.09	0.95	1.09	0.58	0.67	0.59
<b>UNITED KINGDOM</b>								
1891	1895	0.64	0.69	1.71	1.06	0.93	0.37	0.60
1911	1911	0.68	0.91	1.17	1.04	0.75	0.58	0.65
1930	1930	0.69	1.07	0.98	1.02	0.64	0.70	0.68
1951	1948—54	1.08	0.98	1.02	1.00	1.10	1.06	1.08
<b>ITALY</b>								
1881	1876—85	0.92	0.73	1.77	1.10	1.26	0.52	0.84
1911	1906—15	0.76	0.94	1.87	1.30	0.81	0.41	0.58
1931	1926—35	0.65	0.97	1.77	1.31	0.67	0.37	0.50
1954	1950—54	0.64	1.28	1.22	1.25	0.50	0.52	0.51
<b>JAPAN</b>								
1877, 1882	1878—82	0.78	1.66	2.25	2.03	0.47	0.35	0.38
1907, 1912	1908—12	0.67	1.23	1.88	1.57	0.43	0.38	0.43
1930	1928—32	0.44	1.33	1.71	1.55	0.33	0.26	0.28
1955	1955	0.53	1.34	1.35	1.34	0.40	0.39	0.40
<b>CANADA</b>								
1881	1880	0.84	0.81	1.70	1.16	1.04	0.49	0.72
1911	1910	0.74	1.03	1.26	1.15	0.72	0.59	0.64
1931	1930	0.42	1.76	1.08	1.26	0.24	0.39	0.33
1950—53	1950—53	0.67	1.14	1.05	1.09	0.59	0.64	0.61
<b>UNITED STATES</b>								
1870	1867, 1879	0.41	0.85	2.29	1.58	0.48	0.18	0.26
1910	1904—13	0.55	0.84	1.49	1.20	0.65	0.37	0.46
1930	1924—33	0.40	0.83	1.38	1.16	0.48	0.29	0.34
1950	1947—54	0.59	1.09	1.04	1.06	0.54	0.57	0.56
<b>AUSTRALIA</b>								
1891	1891	1.39	0.76	0.90	0.86	1.83	1.54	0.84
1911	1911	1.00	0.97	1.01	1.00	1.03	0.99	1.00
1933	1933	0.87	0.89	1.10	1.04	0.98	0.79	0.84
<b>NETHERLANDS</b>								
1909	1913	0.59	0.76	1.57	1.17	0.75	0.36	0.49
1930	1929—31	0.46	0.83	1.44	1.14	0.55	0.32	0.40
1947	1947—54	0.66	1.23	0.98	1.08	0.54	0.67	0.61
<b>NORWAY</b>								
1910	1910	0.50	0.99	1.85	1.44	0.51	0.27	0.35
1930	1930	0.40	1.08	1.66	1.41	0.37	0.24	0.28
1950	1950	0.47	1.06	1.36	1.21	0.44	0.27	0.39

Source: Computed from data presented in Kuznets, "Quantitative Aspects...", *Economic Development and Cultural Change*, V, 4, Appendix. We omitted the Union of South Africa, New Zealand, Hungary and Denmark, because the series for these countries seemed too short. The postwar figures for Japan were supplied by the Economic Planning Agency. The years 1875—85 were taken as the initial period because data were available for most countries at that time.

vel trend until the period 1925—35. In the postwar period we find an upward tendency. In comparing the initial and the postwar period, we still find a general fall in A, with only three exceptions: the U. K., Sweden, and the U. S. (The series for the Netherlands are too short.) This suggests that even with the wide-spread postwar rise, product per worker in the A sector relative to the country-wide average is still lower than it was around 1875—85 for most countries.

The downward trend of S is clear from the initial through the postwar period. Only two countries, France and Australia, exhibit somewhat contradictory results, but on the whole there can be no doubt hereabout the generality and importance of Kuznets' findings.

It is a bit more difficult to accept Kuznets' suggestion about the upward trend of M. There are only two countries for which we can see a clear upward trend throughout the four periods: Italy and the Netherlands. The upward trend in Sweden, Canada, the U. K. and Norway has a break in the pastwar period. In some other countries we cannot identify a definite trend. It seems to us that the movements of the relative product per worker in the M Sector are most complicated. The upward movements appear to out-number the other cases, but if an upward trend exists at all, it must be treated very carefully.

With what we already know, it is possible to anticipate, to some extent, the movements of A/M, A/S, and A/M+S. We start with A/M, the relative product per worker in the A sector compared to the M sector. We know that the movement of A is comparatively unambiguous while the value of M changes in a rather vague fashion, and it is to be expected that the ratio will more or less reflect the movements of A. In fact, in Table 1 we can see a downward trend in the ratio for most countries before World War II, with France and the U. S. as the only two exceptions. During the postwar period, the same table reveals an overall upward trend and Italy and the Netherlands are cast as the only exceptions. In the direct comparison between the initial and the final period we find a fall of A/M in most countries, excepting the U. K., Sweden and the U. S.

Turning to A/S, we already know that the trend of S is clearly downward, and that of A somewhat less clearly downward for the prewar periods. Accordingly, we expect both a rise and fall in A/S depending on the degree of decline in these two sectors. For the prewar years, the actual movements of A/S are rather involved. In four countries—Italy, Netherlands, Norway and Australia—A/S moves down. In two countries—Germany and the U. S.—it moves up, while in the remaining countries the ratio moves first up and then down, i. e. without a clear trend. In the postwar period, however, A/S definitely has an upward trend, without exceptions. We would maintain, keeping in mind our more detailed historical investigations, that no simple generalizations are possible. A direct comparison between the initial and final periods, however, shows a definite rise of this ratio in almost all countries under consideration. This is contrary to the case of A/M.

In order to make a more direct comparison with Kuznets' findings we also computed ratios of the type A/M+S. In this case, too, it seems most difficult to make a generalization for the pre-war period, although in the postwar years an upward trend is obviously present. Making a direct comparison between the initial and terminal periods in order to ascertain the long-term movement, it can be said that the ratio rises except in France, Italy and Canada. In our previous discussion we observed that A/M tends to fall slightly while A/S rises strongly. Naturally, this will result in a rising trend for A/M+S.

Let us now turn to the cross-section analysis and Table 2 where we present a re-arrangement of Kuznets' data. He gives us relative product per worker to country-wide averages by using the arithmetic means of shares of major sectors in national product and labor force, grouped by countries in various per capita income levels<sup>6</sup>). In Table 2, only A/M and A/S are our own calculations.

If we deal with the labor force including unpaid family labor, the relative level of product per wor-

6) Kuznets computed two kinds of figures. We used the ones derived from the sample of identical countries. *Ibid.*, p. 33 ff.



ker in the A sector shows an interesting movement as per capita income varies. Except at the highest economic level represented by class I, the values of A are all slightly under .70, and excepting class IV, all .60 or higher. If we exclude class IV as an exception for the time being, the changes in the value of A are slight through a wide range of per capita income. When we deal with the labor force excluding unpaid family labor, something like a "U" shaped movement suggests itself. Referring back to our discussion of A in the historical series, we recognized a slight downward movement, with the exception of upward movements in a few high per capita income coun-

**Table 2**

ARITHMETIC MEANS OF MAJOR SECTOR RELATIVES OF PRODUCT PER WORKER FOR RECENT YEARS

A. Including Unpaid Family Labor						
	A	M	S	A/M	A/S	A/M+S
I	0.86	1.03	1.04	0.87	0.86	0.86
II	0.60	1.26	1.12	0.49	0.55	0.52
III	0.69	1.01	1.23	0.71	0.59	0.61
IV	0.48	1.64	2.37	0.43	0.32	0.27
V	0.61	1.31	1.57	0.54	0.37	0.42
VI	0.69	1.23	2.10	0.39	0.28	0.45
VII	0.67	4.17	2.79	0.34	0.25	0.31
B. Excluding Unpaid Family Labor						
	A	M	S	A/M	A/S	A/M+S
I	0.95	1.02	1.02	0.96	0.94	0.95
II	0.81	1.11	0.98	0.77	0.88	0.81
III	0.70	0.95	1.19	0.79	0.67	0.70
IV	0.45	1.24	1.54	0.62	0.47	0.45
V	0.61	1.18	1.39	0.81	0.55	0.61
VI	0.65	0.97	1.60	0.82	0.60	0.65
VII	0.89	1.18	1.52	0.94	0.73	0.89

Source: Kuznets, "Quantitative Aspects...", *Economic Development and Cultural Change*, V, 4, pp. 36, 41.

tries. Therefore, from class I to class III the historical and cross-section data are more or less consistent. But we can find no clear relation between the historical series and classes IV to VII<sup>7)</sup>.

7) Kuznets' reading of the same figures differs from ours. He says: ".....if we deal with labor force including unpaid family labor, the relative level of product per worker in the A sector declines markedly, as total product per capita drops .....A similar movement characterizes the relatives of product per worker in the A sector when we deal with the labor force excluding unpaid family labor." *Ibid.*, pp. 36—38. Since Kuznets finds a general upward trend for A in the time-series he finds the two approaches consistent.

The movements of M appear to have no association with differences in per capita income when we exclude family labor. When family labor is included, there are still very wide variations and we can see no definite trends. (The value of class VII must be considered exceptional.) Our skepticism about the historical results is reinforced by the cross-sections<sup>8)</sup>.

The relative product per worker in the S sector has a negative association with differences in per capita income whether unpaid family labor is included or excluded. Throughout the entire range of income classes again—excluding class IV—the trend is evident. With very few exceptions the same movement was spotted in the historical series and the results of both series can be called consistent. In this instance we fully support Kuznets' observations.

Let us next look at the ratios A/M and A/S. If we include unpaid family labor, the movement of A/M is peculiar: in the lowest class it is .34, and in the highest .87, but there exists no straight progression from class VII to I. The movements of A/S show a similar tendency, when unpaid family labor is excluded. What happens to A/M and A/S deserves special attention because it illustrates the difficulties of assuming a straight trend through the full range of per capita income classes.

To unravel this complicated question, it is well to refer again to Table 2, particularly column A/M+S with which Kuznets worked. He observed: "Here the decline continues, on the whole, through the full range of economic level classes when we deal with labor force including unpaid family labor, but it stops at class IV, when we exclude unpaid family labor. I have no ready explanation of this latter movement<sup>9)</sup>. The ratio A/M+S, of course, is a com-

8) We disagree with Kuznets about what happens to M when family labor is included. In this case, he says: ".....product per worker in the M sector, relative to country-wide.....definitely rises as per capita income declines." *Ibid.*, p. 40. Later on, in what must be a misprint, he says: ".....product per worker in the M sector.....should show an upward trend....." during economic growth. *Ibid.*, p. 46.

9) *Ibid.*, p. 39.

bination of A/M and A/S and even when family labor is included, the latter do not decline over the full range of economic classes. Class IV represents a low point between higher values at both ends of the scale. In our reading of the historical data, we recognized that it is impossible to speak of a single upward or downward trend for A/M+S during the full course of economic development. But here again, the cross-sections are consistent with history when we consider the countries with higher per capita income.

What we fail to see either in the historical or cross-section data is the alleged declining trend of inequality of per worker product in the A sector. This is especially difficult to see in the initial stages of economic growth or for the lower ranges of economic levels. In fact, we believe that there may even exist an *increasing* trend of inequality of per worker product in the A sector; this is strongly indicated by the "U" shape of the cross-section data excluding unpaid family labor. This series, however, cannot be historically verified.

In order to check the stability of the cross-sections,

**Table 3**  
ARITHMETIC MEANS OF MAJOR SECTOR  
RELATIVES OF PRODUCT PER WORKER  
FOR MORE RECENT YEARS

A. Including Unpaid Family Labor						
Number of Countries	A	M	S	A/M	A/S	
I	5 0.61	1.08	1.06	0.57	0.59	
II	6 0.58	1.22	1.19	0.51	0.51	
III	6 0.60	1.10	1.26	0.56	0.49	
IV	6 0.66	1.25	1.44	0.48	0.40	
V	5 0.53	1.71	1.77	0.32	0.32	
VI	6 0.63	1.59	1.98	0.51	0.36	
VII	6 0.63	3.35	2.44	0.40	0.33	
B. Excluding Unpaid Family Labor						
	A	M	S	A/M	A/S	
I	5 0.71 (0.61)	1.06 (1.08)	1.05 (1.06)	0.68 (0.57)	0.68 (0.59)	
II	5 0.73 (0.52)	1.06 (1.26)	1.15 (1.19)	0.69 (0.48)	0.65 (0.50)	
III	5 0.74 (0.61)	1.04 (1.13)	1.06 (1.24)	0.73 (0.57)	0.69 (0.51)	
IV-V	5 0.77 (0.57)	1.18 (1.18)	1.26 (1.26)	0.72 (0.38)	0.64 (0.38)	
IV-VII	4 0.80 (0.72)	1.05 (1.35)	1.67 (2.05)	0.83 (0.64)	0.52 (0.41)	

Source: United Nations, Statistical Office, *Yearbook of National Account Statistics*, 1958 and *Statistical Yearbook*, 1958; I. L. O., *Yearbook of Labor Statistics*, 1958. The dates for the national product figures pertain mainly to 1955-57. As many countries as possible were selected. The figures in parenthesis in B show the case of including unpaid family labor for the identical countries. Lower income classes were combined because of the smaller number of countries.

and in particular to verify the validity of the "U" shape when family labor is excluded, we tried to get somewhat more up to date figures than presented by Kuznets. His data generally pertain to the 1940's and early 1950's and form the basis for Table 2. In Table 3 we present data for the second half of the 1950's.

A number of points are confirmed by these data. First, the value of A is comparatively stable over the full range of economic levels irrespective of the inclusion or exclusion of family workers. Second, the value of M is also comparatively stable throughout, when family labor is excluded. When family labor is included, M appears to be larger at the lower income classes. Third, including or excluding family labor, the value of S has a clear upward movement as per capita income declines. One should notice, however, that at the lower economic levels the values of M and S are especially large, when family labor is included. At this point, the path of the ratios A/M and A/S are perfectly predictable: the former remains rather level while the latter increases as per capita income rises.

The above discussion tempts us to state two very tentative empirical propositions. (1) The rate of increase in A sector per worker product parallels that of the M sector. (2) Product per worker in the A sector increases relative to that of the S sector. Combining M and S gives the misleading appearance that the relative product per worker in the A sector tends to increase *vis a vis* the non-agricultural sectors during economic growth. Instead, one could say that there is an equalizing trend between physical and service productivities during economic growth. Obviously these propositions pay more attention to the series which exclude family labor. We believe that the peculiar nature of family work and its unreliable recording can only serve to obscure the underlying long-run economic relations.

### III

We will now attempt to draw these facts into a simple model. To do this, we will operate with three assumptions: (1) the constancy of A/M; (2) the fact that the relative product per worker in the M sector



in relation to the country-wide average tends to be close to unity during economic growth—i. e.  $M=1$ ; (3) to this we add one of the important Kuznets findings: the relative product of the S sector tends to be an unchanged proportion of national product through the full range of economic levels<sup>10</sup>). Perhaps these assumptions have been stated too boldly, but they do seem to be in general correspondence with the statistical facts.

Let the share of product in each major sector to the country-wide total be  $P$ , and that of labor force be  $L$ , and let the suffixes  $a$ ,  $m$ , and  $s$ , stand for the sectors  $A$ ,  $M$ , and  $S$ . The three assumptions may then be stated as follows:

- (1)  $\frac{P_a}{L_a} / \frac{P_m}{L_m} = A/M = \alpha$  ( $\alpha$ , a constant)
- (2)  $P_m = L_m$ , or  $P_a + P_s = L_a + L_s$
- (3)  $P_s = \beta$  ( $\beta$ , a constant).

We can now restate these equations as

- (1')  $L_a - P_a = \beta - L_s$
- (2')  $P_a/L_a = \alpha$ .

Considering  $P_a/L_a = \alpha$  and  $L_a - P_a = (1 - \alpha)L_a$ , we arrive at a final single equation:  $L_a = (\beta - L_s)/(1 - \alpha)$ . This equation implies a constant negative relation-

ship between  $L_a$  and  $L_s$  assuming the constancy of  $\alpha$  and  $\beta$ . It must be admitted that this constancy can only hold true in a very broad sense, and that the only intention of the equation is to illustrate the strongest tendencies at work in the redistribution of labor force and national product during economic growth.

Because of its unchanged share of national product, the dominant factor determining per worker product in the S sector is the number of people working in it. On the other hand, in the earlier stages of economic growth there is the possibility (or even likelihood) of over-supply or underemployment in the A sector. Thus, the A sector may be made to absorb the difference between the demand for labor in the other sector and the supply of labor to these sectors. The possibility of labor shifts from A to the other sectors is therefore crucial in determining the relative product per worker in A. Our equation implies that this shift of labor out of A—assuming of the relative share of product of S—is a necessary condition to keep per worker product in A in a constant ratio ( $\alpha$ ) to M.

10) *Ibid.*, pp. 8—9.