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PRODUCTIVITY AND WAGES IN MANUFACTURING INDUSTRY IN POST-WAR JAPAN

By Kōichi Satō*

I. The expansion of exports in Japan

Last year, 1956, "Japanese enjoyed a big economic prosperity popularly described as a boom unprecendented since Emperor Jimmu—the first ruler of Japan."[1] The national income grew up by 13.9 per cent and the industrial production by 23.4 per cent above the previous year. And "in comparison with the estimated rate of growth in the Five-Year Program, national income and consumption more than doubled, industrial production and export tripled, imports increased more than five times and investments expanded more than eight times in their tempo of expansion."[2]

How could our country show such remarkable tempo of expansion? Out of many causes, we can point out two as main causes, the one is the continuing investment boom over the world and the other is the domestic investment boom maintained during this period. Thanks to both external and internal investment booms, Japanese foreign trade expanded and this expansion made the balance between the international payments and reciepts. (See Table 1.) As we can see from Table 1,

Table 1. Balance of Foreign Exchange Payments, 1956
(unit: $ 1.000.000)

Year	Merchandise Export	Merchandise Import	Military Consumption	Ordinary Invisible Receipts	Ordinary Invisible Payments	Nominal Overall Balance	Substantial Overall Balance
1954	1,532	1,962	596	181	248	100	△20
1955	1,954	1,848	557	156	326	494	354
1956	2,402	2,470	595	228	462	293	137
1956-1955	448	622	38	72	136	−201	−217

Source: *Foreign Exchange Statistics*, Ministry of Finance.
△ represents excess of payments over receipts.

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1) *Economic Survey of Japan*, 1956, Economic Planning Agency, Japanese Government, Tokyo, 1957, p. 1.

2) *op. cit.*, p. 2.

the deterioration of balance of payments in 1956 is not due to the stagnation of exports but to the marked imports which were caused by the domestic investment boom and exceeded the increase of exports. Although the exports in 1956 show the 2,402 million dollars in amount and the rate of increase over the level of previous year is 23 per cent, the imports increased by 34 per cent. The increase of exports is due to the expansion of over-seas demand brought about by the world-wide prosperity, but, as "*Economic Survey of Japan*, 1956" points out, it is likely that there are two other causes which are not external but interior. The one is the fact that the increase in the productivity (quantity) exceeded the money wage gain and the other is the fact that the rapid increase in the domestic production capacity of many industries outpaced the increase in the domestic demand. As for the former, we must notice that, though in the most countries of the world the increase in money wages outpaced the gain in productivity, our country (and Italy) followed a reverse course. (See Table 2.) Thus, "*Economic Survey of Japan*" states that "the build up of the export competitive capacity may be due to the reduced unit account of row materials required in production and improved quality of products, but the marked increase in productivity reduced the wage expenses per unit product and thus boosted the export competitive strength (in the case of Japan)."[1]

Table 2. Changes in Labor Productivity and Wage Payments (1956)

	Industrial Production / Employment (A)	Wages (B)	B/A
Japan	167	165	99
U.S.A.	112	124	111
U.K.	109	138	127
Germany	126	136	108
France	136	145	107
Italy	134	123	92

Source: United Nations Statics.

II. Productivity and Wages in manufacturing industry during these five years

The fact that the productivity increase exceeded the rise of wages, however, is not particular to the last year[2]. The relation between the changes of productivity and real wages is shown in Table 3, also in Fig. 1. The indices of real wages exceeded those of productivity until 1952, and

1) *Economic Survey of Japan*, 1956, *op. cit.*, p. 52.
1957.

2) Our analysis is restricted within the manufacturing industry only.

Table 3. Productivity and Wage Indices in Manufacturing Industry based on Pre-War level (1934-36)

	Production	Employment	Productivity	Real Wages	Wages	Consumer Prices	Wholesale Prices
1947	35.1	137.8	28.4	30.2	32.9	109.1	48.2
48	52.5	139.3	42.0	48.6	91.9	189.0	127.9
49	68.9	140.7	54.6	66.3	157.1	236.9	208.8
50	82.0	133.9	68.3	85.4	187.9	219.9	246.8
51	115.1	144.0	88.9	92.1	235.2	255.5	342.5
52	128.2	148.5	96.2	102.3	272.2	266.2	359.2
53	159.7	155.4	114.5	107.3	307.0	286.2	351.6
54	173.8	162.9	118.9	108.0	325.8	301.8	349.2
55	189.4	160.7	131.3	114.5	340.4	297.4	343.0
56	232.8	167.4	155.0	125.5	376.7	300.2	357.9

Source: Production, Employment, Wages; *Survey* by Economic Planning Agency.
Productivity, Real Wage; *Monthly Labor Statistics & Research Bulletin* by Ministry of Labor.
Consumer Price; *Survey* by Statistics Bureau.
Wholesale Price; *Bulletin for Economic Statistics* by the Bank of Japan.

since 1953 this tendency turned reversed. The same relations are seen in the changes of wage and consumer's price. What does this fact mean? Firstly, it means that during the period of post-war reconstruction workers required "the living wages" to secure the minimum standard of living and managers were obliged to pay "the living wages" regardless of any financial conditions of business enterprise. Consequently during this period the real wage didn't rise and inflation only grew up rapidly, because the rises of wages were not accompanied by the gain in productivity. Secondly it also means that even if there are succeeding rises in wages since the end of War, this has no relation to the increase in the productivity. For example, in 1947, the real wage index is 30.2 and the productivity index is 28.4, but in 1948 the productivity index, 42.0, is above the real wage index of 1947. This phenomenon which the real wage index of the previous year is exceeded by the

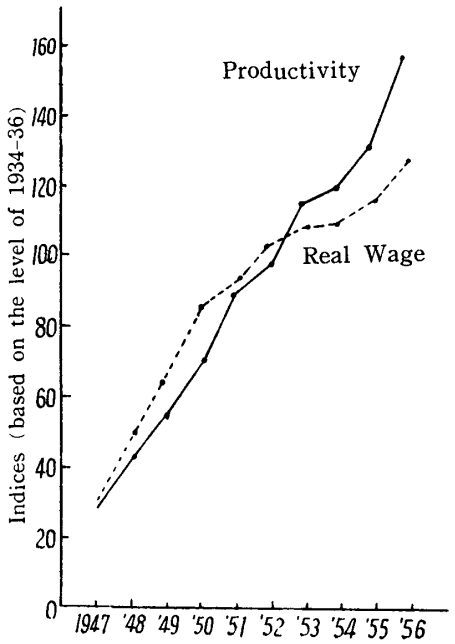

Fig. 1. Movements of Productivity and Real Wage.

Table 4. Indices of Production, Productivity, and Wages, etc. based on the level of 1951

		1951	1952	1953	1954	1955	1956
Production	Index	100.0	111.4	138.7	151.0	164.5	202.0
	Rate of rising		11.4	24.5	8.9	8.9	22.8
Wages	Index	100.0	117.7	133.5	142.1	149.2	165.4
	Rate of rising		17.7	13.4	6.4	5.0	10.9
Productivity in Quantity	Index	100.0	108.2	128.7	133.6	147.5	173.0
	Rate of rising		8.2	18.9	3.8	10.4	17.2
Added Value Rroductivity	Index	100.0	107.9	127.4	129.1	140.1	173.8
	Rate of rising		7.9	18.1	1.3	8.5	24.1
Wholesale Price (except farm products used in food)	Index	100.0	99.7	99.0	96.6	95.0	100.5
	Rate of rising		−0.3	−0.7	−2.4	−1.7	5.8
Real Wage	Index	100.0	112.1	119.3	119.3	126.7	139.7
	Rate of rising		12.1	6.4	0.0	6.2	10.3
Labor Cost Rate	Index	100.0	109.1	104.8	110.1	106.5	95.1

Source : *Monthly Labor Statistics & Reasearch Bulletin* by Ministry of Labor.

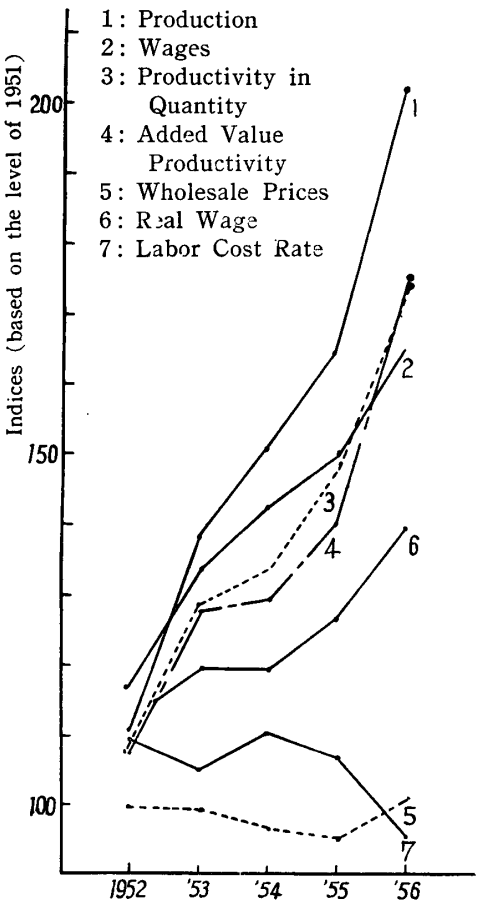

Fig. 2. Movements of Productivity, and Wages etc.

productivity index of the next year continues till 1952, when the relation between the changes of productivity and real wage turned reversed. This fact shows that the productivity rose with one year time-lag in parallel with the rises of real wage, and "the living wages" paid to workers were, so to say, advanced wages for the managers. In 1953, this relation returned to the normal condition. Accordingly, we are to observe the relation between the changes of productivity and wages in '52～'56 except the reconstruction periods immediately after the end of War and the fluctuating periods of Korean War in Table 4 and Fig. 2 which show the indicies of production, productivity both in quantity and in added value, wages, labor cost rate etc, based on the level of 1951. Besides, when we pay attention to the figures of the rate of rising in each index (Fig. 3), we can see, at first, that during the period of the large expansion of production, the rates of increase in productivity both in quantity and added value exceed

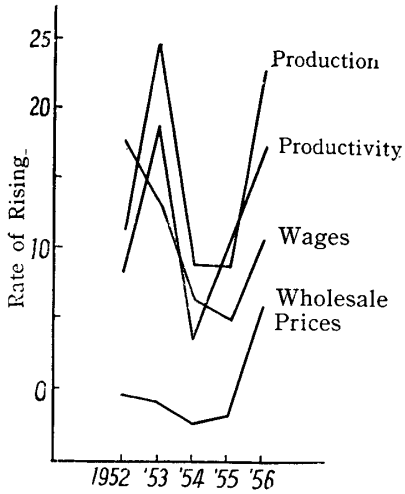

Fig. 3. The Rates of Rising of Productivity etc.

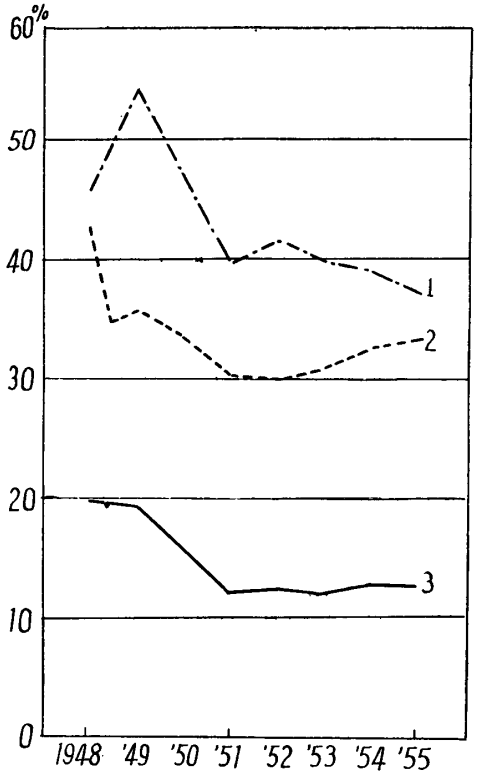

Fig. 4. Changes of Labor Cost Rate etc.

1. Distribution Rate
2. Added Value Rate
3. Labor Cost Rate

that of wages and during the period of small expansion of production, the rate of increase in wages inversely exceeds the productivity. So we shall be able to interpret this fact by saying that the wage has been increased at certain rate of upward trend. Next, when we look at the changes of the wholesale prices and labor cost rate (Table 4), we can see these indices show little fluctuations in comparison with the changes of productivity and wages. The changes of labor cost rate are less fluctuating in contrast with the changes in the time immediately after the end of War. (See Fig. 4.) The same phenomena are also seen in the rate of added value and in the rate of distribution. Then, as a whole, these phenomena suggest that in manufacturing industry the expansion of production is likely to regulate the rise of prices and to stabilize prices and, at the same time, the increase of productivity don't change the relation of distribution (that is, the labor cost rate don't change) but has been able to raise the wages[1].

1) As to the relation between the levels of prices and wage rates under the impetus of increasing productivity, Prof. Dunlop states as follows: "(1) constant prices and rising wages, (2) falling prices and constant wages, and (3) rising prices with wages rising at an even faster pace. The actual movements of wage and price levels would appear more closely to approximate case (1) than either of the other two cases." In our country, we can say that the movements of wage and price levels in the long term are similar to the case (3), but in recent five years those movements are nearly the case (1). J. T. Dunlop, "Productivity and the Wage Structure" in *Income, Employment and Public Policy*, Essays in Honor of A. H. Hansen, 1948, p. 341.

III. Productivity and Wages in relation to enterprise scales and industrial sectors

In section I and II where we saw the relation between the change of

Table 5. Productivity and Wages in Enterprise Scale (unit=1,000 yen)

Enterprise Scale classified by Number of Employee		Quantitative Productivity				Added Value Productivity				Wage per capita			
		1952	1953	1954	1955	1952	1953	1954	1955	1952	1953	1954	1955
Weighted average		1,072	1,223	1,278	1,322	302	363	401	423	129	143	157	160
I	4~9	476	559	581	600	138	161	184	197	64	75	85	87
II	10~19	620	717	763	768	168	191	224	236	83	93	104	107
III	20~29	709	818	879	892	190	217	254	265	93	105	117	117
IV	30~40	826	948	1,008	1,010	221	252	293	303	102	113	125	127
V	50~99	984	1,128	1,204	1,216	269	298	352	366	112	126	140	141
VI	100~199	1,205	1,379	1,493	1,498	325	374	445	450	131	142	159	158
VII	200~299	1,511	1,574	1,717	1,793	430	441	516	532	155	157	173	176
VIII	300~499		1,767	1,989	2,063		511	600	594		175	198	199
IX	500~999	1,629	1,868	1,892	1,997	477	606	602	684	182	198	219	217
X	over 1000	1,607	1,767	1,836	1,980	463	598	651	714	210	227	253	270

Source: *Industrial Statistics* by Ministry of International Trade and Industry.

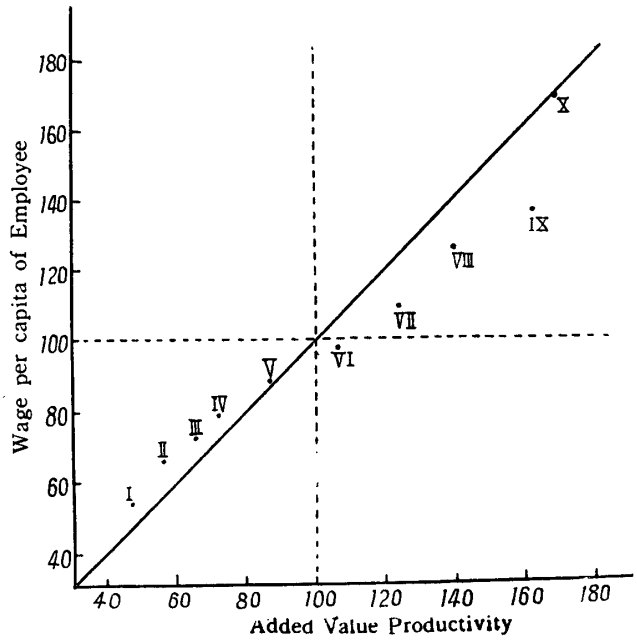

Fig. 5. Correlation between Productivity and Wages in enterprise scale classified by numbers of employee in 1955.
Index of Added Value Productivity; 423,000 yen=100
Index of Wage per capita of Employee; 160,000 yen=100

productivity and that of the wages, we argued them in terms of average concerning whole manufacturing industry. Then we'll examine the relations between the changes of productivity and wages both according to the scales of business enterprises classified by numbers of employee, and according to the divided sectors of manufacturing industry.

1. The relation in enterprise scales classified by numbers in manufacture industry.

The indices of productivity in quantity and in added value, and wage per

capita of workers in each scale of enterprise are showen in Table 5[1]. Looking at the Table, we can easily find that the more the numbers of employee are, the larger the indices of productivity and wages are. And in both of productivity and wage indices, the rate of the maximum index to the minimum in every year is within a little more than three and a little less than four times. If we pay attention to the correlation between the changes in added value productivity and the increases in wage per capita of workers[2], we can get such relation as shown in Fig. 5 and we can find the same relation in every year. What we can say to see the relation is as follows: the workers of the smaller enterprises of which the numbers of employee are 4–99 in Table 5 I–V are paid relatively high wages in comparison with their relatively lower productivity, and the workers of the larger enterprises than the medium size VI–IX are conversely paid the lower wages, and in the largest enterprises of more than 1,000 members of employee, X, the workers are paid nearly in parallel with the productivity. Judging from these observations we may say that the employees in the smaller enterprises have comparatively more advantage than those in larger enterprises. But it is a hasty conclusion. If we examine the wage differences in enterprises classified by numbers of employee, we can find that the wages of smaller enterprise (especially, 10–29 members) are nearly half of the largest (over 1000 members) and the lowest wage of the smaller enterprise happens to be about one-third of that of the largest enterprise when viewed from classification of industrial sectors. (See Table 6.)

Lastly, let's see the results got by calcurating the ratios of changes both in productivity of added value and in wage per capita of employee in 1955 at the level of 1952. We get Table 7 where the scales of enterprises are classified by the number of employee. From Table 7 we can see that in these few years the rate of rises of wage are generally less than that of productivity, but in the smaller enterprise the increased rate of wage to that of productivity is larger than that of enterprises in medium scale. Therefore, we can classify two groups, the one is a better group, that is, the small scale and the other is a worse group, that is, the medium scale. And the group of the largest enterprises only makes an exception. (See Fig. 6.) The rate of

1) In this section the data are limited by 1955.

2) We took the added value productivity instead of the quantitative productivity because the coefficient of correlation between the former and wages is larger than that between the latter and wages.

Table 6. Wage Difference Indices in each Enterprise Scale of Manufacturing Industry (over 1000=100)

Numbers of Employee	over 1000	500~999	100~499	30~99	10~29
Manufacturing Industries	100(17,435 yen)	85	72	62	54
Food	100(15,159 yen)	85	70	65	57
Spinning & weaving	100(10,640 yen)	87	81	73	65
Clothings	100(12,230 yen)	63	60	56	54
Wood & wood products	100(13,662 yen)	95	82	72	70
Furnitures & fixtures	100(15,320 yen)	—	75	74	65
Paper & similar products	100(23,199 yen)	73	58	43	36
Printing & publication	100(20,240 yen)	93	73	65	54
Chemical	100(16,818 yen)	93	89	74	65
Petroleum & coal products	100(21,019 yen)	86	75	57	46
Rubber products	100(13,531 yen)	82	82	79	77
Hide, skin & products thereof	100(20,156 yen)	57	65	57	50
Glass, stone & clay products	100(21,934 yen)	74	56	50	41
Primary metals	100(21,080 yen)	95	83	73	61
Metal products	100(18,622 yen)	91	83	66	58
Machines	100(18,278 yen)	97	85	74	65
Electric machines	100(18,165 yen)	92	68	64	60
Transports equipments	100(22,048 yen)	82	71	60	55
Precision tools & instruments	100(19,018 yen)	94	67	60	56
Other manufacturing industries	100(14,787 yen)	72	70	60	58

Source: *Report of Research on the Actual Wages* by Ministry of Labor, 1955.

Table 7. Change ratio in Added Value Productivity and Wage of a year per capita. (classification in enterprise scale)

	Added Value Productivity '55/'52	Wage of a year per capita '55/'52
Total	1.4	1.24
I 4~9	1.5	1.36
II 10~19	1.4	1.29
III 20~29	1.22	1.26
IV 30~49	1.37	1.25
V 50~99	1.36	1.26
VI 100~199	1.38	1.21
VII 200~499	1.31	1.21
VIII 500~999	1.43	1.19
IX over 1000	1.56	1.29

Source: *Industrial Statistics* by Ministry of International Trade and Industry.

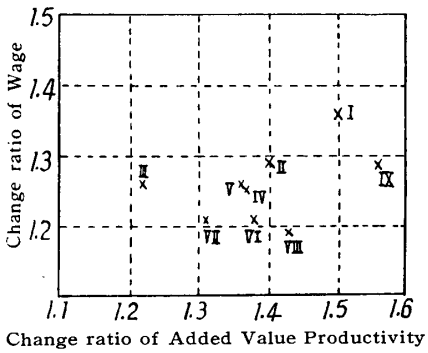

Fig. 6. Change ratio in Productivity and Wage of a year per capita.

rises of wages to that of productivity in the largest sector, however, is slower than that in the smaller.

Thus, it is said that the rate of rises in productivity overpaced that of wages and this fact made a cause in increase in exports. But, as aforementioned, the differences in the levels of wages among each scale of enterprises classified by the numbers of employee are very large (Table 6) and especially in medium scale of enterprises the wage indices per capita of employee is comparatively lower than those of productivity in added value (Table 5 and Fig. 5.) and generally the rate of rising of wage got slow-down in comparison with the increasing rate of productivity (Table 7). As to the rate of rising of wage only, we could see that the small scales of all were faster than the others. The most part of workers of our manufacturing industry belongs to both the small scale (over one half of all) and the medium scale (30 per cent of all). Besides this fact in quantity of workers, the medium and small scales of enterprise—especially medium—play an important role from the structural reasons as follows.

(i) In the export trade, the products of medium and small enterprises earn a high rate of foreign exchange. The ratio of medium and small industry products in total exports is estimated at 50 per cent.

(ii) The medium and small enterprises are superior to the large enterprises in capital productivity and the rate of capital rotation.

(iii) The capacity to absort employees per unit investment in medium and small enterprises is much higher than in large enterprises.

(iv) In our country, the degree of dependence on subcontracts in major manufacturing industries is high. So, how can large enterprises advance their modernization in machine and equipment depends on the development of the subcontract industry.

Then the movement of these smaller industries must be paid more attention.

2. The relation in each industrial sectors of manufacturing industry.

Concerning each sector of manufacturing industry, we can get the indices of added value productivity and wages per capita of workers in recent years. (See Table 8.) Every year in each industrial sector, the movements of indices of productivity and wages fluctuate in the same directions closely relating to each other. (See Fig. 7 where 1955 was taken as an example.) We must notice that every year the differences of productivity indices are larger than those of wage indices. This fact suggests that the changes of wage are not so elastic as those of productivity, even though the tendencies of movements in indices of productivity and wages are in the same direction.

Table 8. Difference Indices of Productivity and Wage in each Industrial Sector of Manufacturing Industry.

	Added Value Productivity					Wage per capita				
	1951	1952	1953	1954	1955	1951	1952	1953	1954	1955
Manufacturing Industries	(279) 100	(303) 100	(363) 100	(401) 100	(423) 100	(109) 100	(126) 100	(143) 100	(157) 100	(160) 100
1. Food	85	105	98	105	104	73	74	73	74	74
2. Spinning & weaving	84	71	69	66	70	70	70	66	67	67
3. Clothings	56	53	50	50	48	56	57	56	55	53
4. Wood & wood products	46	55	55	57	55	59	65	66	67	69
5. Furnitures & fixtures	47	56	51	53	52	68	75	73	72	73
6. Paper & similar products	205	161	152	131	133	130	137	126	119	121
7. Printing & publication	114	127	117	123	124	115	114	117	115	121
8. Chemical	191	159	175	182	195	140	140	130	139	144
9 Petroleum & coal products	282	255	273	216	269	133	137	137	141	149
10. Rubber products	94	117	111	135	125	117	103	100	100	99
11. Hide, skin & products thereof	87	87	73	79	78	98	94	91	86	88
12. Glass, stone & clay products	92	103	107	111	104	97	101	97	99	98
13. Primary metals	156	131	147	139	151	169	141	159	161	161
14. Metal products	82	82	80	80	79	96	94	97	95	93
15. Machines	82	94	85	90	86	116	117	114	116	113
16. Electric machines	112	125	123	126	115	119	125	122	121	118
17. Transports equipments	79	111	115	170	91	140	148	150	149	147
18. Precision tools & instruments	68	79	74	81	80	103	109	108	109	111
19. Other manufacturing industries	50	63	59	60	62	65	66	69	69	67

Source: *Industrial Statistics* by Ministry of International Trade and Industry.

IV. Some problems unsettled

We have examined the interrelation between the changes of productivity and wages in the above sections. As Prof. Dunlop points out[1], there are many factors to act against a perfect correlation with which the changes of wage rate and increases in productivity are uniquely related among different firms and industries. We can pick up three factors out of many factors. 1. The differences in the method of wage payment. 2. The degree and character of competition in the product market. 3. The differences in bargaining power of labor organization. In our country, the third factor of them is generally thought as the largest factor of disturbance, because of the rapid development of labor

1) J. T. Dunlop, *op. cit.*, p. 345.

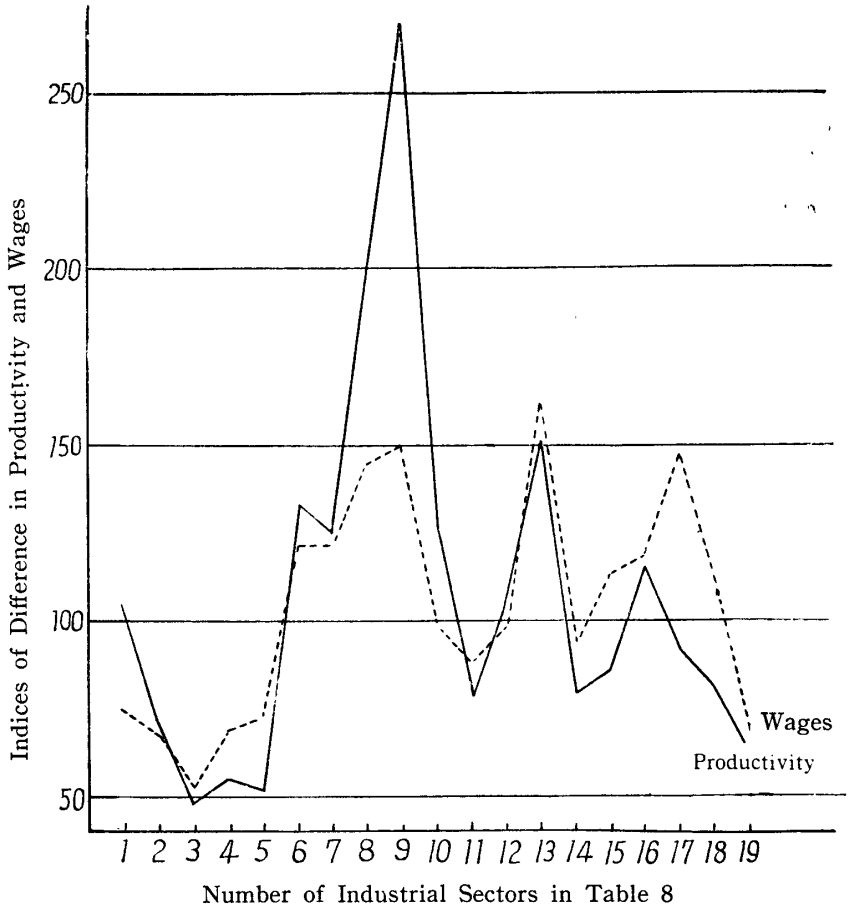

Fig. 7. Differences of Productivity and Wages in Industrial Sectors.

organization in the post-war period. Surely we can see that this factor has strongly influenced on the increases of production in the period immediately after the end of War, but we can not find the particular interrelation between the increase of productivity and the numbers of labor disputes. What we can regard as the disturbance factor is rather the second out of three. Hence we have the problems left to investigate the market conditions of each industrial sector in our country,—how is our markets monopolistic or competitive and what is the relation between this market conditions and the changes of productivity and wages.