Building 2-sector schemes from the input-output table: Computation of Japan's economy 1960–1985

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Abstract

This paper develops a procedure to construct 2-sector schemes from the input-output tables. On the basis of domestic demand, each industry is split into the capital sector and the consumption sector, while augmented inputs *i.e.* sums of amortisation of fixed capital and intermediate inputs, are regarded as capital inputs. This approach is applied to the Japanese economy 1960–1985. Technical parameters, distribution factors and growth factors of both sectors are computed. Our observation reveals some characteristic features of the Japanese economy in the period, such as the increasing weight of wages and hence of consumption goods sector, as well as larger capital-intensity of the capital-goods sector.

1 Introduction

The macro economic model with 2-sectors—the one producing capital goods and the other producing consumption goods—has been taken up in literature of economic theory, because it is the one to reveal the most fundamental economic structure of society, such as capital-labour ratios, wage-profit ratios, profit rates of basic sectors and the sector ratio, despite its simple format.

There is no immediate data which represent the 2-sector scheme. Hence, the 2-sector scheme must be estimated on the basis of adequate sources. We shall carry out this on the basis of input-output tables.

The objective of this short paper is twofold. That is, at the outset, we discuss theoretical aspects to construct 2-sector scheme from the input-output table, and then apply the formulae to Japan's economy 1960 to 1985.

The plan of this paper is as follows. Section 2 will be devoted to establishing formulae, which are necessary to construct 2-sector schemes.

Section 3 will discuss the application of our theoretical basis to the input-output tables of the Japanese economy. We shall see various important figures concerning the above-mentioned macroscopic economic structure of the Japanese economy.

2 Framework of the analysis

2.1 A basic idea

Let us establish an overall procedure from the input-output system to the 2-sector scheme.

Suppose that the economy has n industries. The economy is assumed to be of the Leontief-type, *i.e.* it has no joint-production process. At the outset, we shall disregard international trade.

Let us employ the following symbols[1]:

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[1] When x stands for a vector, its i-th component is denoted by x_i.

x_{ij} : current input of good i in industry j,
x : the output vector,
C : the consumption vector,
Δk : the vector of investment of current inputs,
w : the wage vector,
s : the profit vector.
A : the current input coefficient matrix,

where $A = \left(\frac{x_{ij}}{x_j}\right)$.

Suppose that all entries in the input-output system are measured in terms of the so-called dollar's worth unit, and the vertical sum of the input-output system will be evaluated. The input-output table can be given, for instance, by the following conventional form:

Table 1: A closed input-output table

	1 $\cdots$ n	Consumption	Investment	Total
1	x_{11} $\cdots$ x_{1n}	C_1	Δk_1	x_1
$\vdots$	$\vdots$ $\ddots$ $\vdots$	$\vdots$	$\vdots$	$\vdots$
n	x_{n1} $\cdots$ x_{nn}	C_n	Δk_n	x_n
Wages	w_1 $\cdots$ w_n			
Profits	s_1 $\cdots$ s_n			
Total	x_1 $\cdots$ x_n			

and the fundamental system of equations of the input-output system will be given by

$$x = Ax + C + \Delta k. \tag{2.1}$$

Now, products of each industry are employed either as capital goods or consumption goods, so that it is impossible to classify goods into the two categories only from the angle of the industry that produces them. Part of each industry is the capital goods sector, while the remaining part the consumption goods sector. The former enters into the capital goods sector, while the latter into the consumption goods sector. The problem here is how to divide each industry into two parts.

Each industry can be divided into two sub-industries—the one producing capital goods, the other consumption goods—which have the same input-output technique. We may then construct $2n$-industry economy, the first n industries of which produce capital goods, and the last n industries produce consumption goods, and the i-th and the $n+i$-th industry have the same input-output technique.

Let us write:

x^K : output of capital goods industries,
x^C : output of consumption goods industries,
λ_i : ratio of capital goods production of industry i,

and the fundamental system of equations of the economy will be described by

$$\begin{pmatrix} x^K \\ x^C \end{pmatrix} = \begin{pmatrix} A & A \\ O & O \end{pmatrix} \begin{pmatrix} x^K \\ x^C \end{pmatrix} + \begin{pmatrix} \Delta k \\ C \end{pmatrix}. \tag{2.2}$$

It may be appropriate to call this approach the *demand-basis enlargement* of the input-output system.

It is easily seen that x^K and x^C should satisfy

$$x^K = Ax^K + Ax^C + \Delta k,$$
$$x^C = C.$$

Evidently,

$$x^K = (I-A)^{-1}(AC + \Delta K),$$
$$x^C = C.$$

The above shows that the original input-output system (2.1) can be solved as

$$x = (I-A)^{-1}(\Delta k + C)$$
$$= (I-A)^{-1}(\Delta k + AC) + C$$

so that x can be divided into two components:

$$x = x^K + x^C.$$

The first part can be called the *investment-induced* output and the second part the *consumption-induced* output.

Let us define the ratio λ_i by

(2.3) $$\lambda_i = \frac{x_i^K}{x_i^K + x_i^C},$$

and this represents the ratio of good i demanded as capital goods.

From this, it is seen that from one unit of inputs of industry i, λ_i enters into the output of the capital goods sector, while $1 - \lambda_i$ enters into that of the consumption goods sector.

By extending this, all inputs of each industry can be divided into two parts in proportion to the division of the total output of the industry into the investment-induced output and the output that goes into consumption.

Taking the above into account, the fundamental equation of the 2-sector scheme will be established by aggregating the enlarged $2n$-industry system into the 2-sector system—sector I produces capital goods, whilst sector II supplies consumption goods.

Let us write:

Y_i : the total production of sector i,
k_i : the amount of current capital of sector i,
W_i : wages of sector i,
Π_i : profits of sector i,
$\mathcal{K}$: total investment,
$\mathcal{C}$: total consumption,

where

$$\mathcal{K} = \sum_{i=1}^{n} \Delta k_i, \quad \mathcal{C} = \sum_{i=1}^{n} C_i.$$

We shall employ suffices I and II to indicate sectors.

By evaluating the afore-said λ_i for each industry, we can compute the amount of current capital, wages and profits in two sectors by the following:

$$k_I = \sum_{i=1}^{n}\sum_{j=1}^{n} \lambda_j a_{ij} x_j, \quad (2.4)$$

$$k_{II} = \sum_{i=1}^{n}\sum_{j=1}^{n} (1-\lambda_j) a_{ij} x_j, \quad (2.5)$$

$$W_I = \sum_{i=1}^{n} \lambda_i w_i, \quad (2.6)$$

$$W_{II} = \sum_{i=1}^{n} (1-\lambda_i) w_i, \quad (2.7)$$

$$\Pi_I = \sum_{i=1}^{n} \lambda_i s_i, \quad (2.8)$$

$$\Pi_{II} = \sum_{i=1}^{n} (1-\lambda_i) s_i. \quad (2.9)$$

As for the total production, we have

$$Y_I = \sum_{i=1}^{n} \lambda_i x_i, \quad (2.10)$$

$$Y_{II} = \sum_{i=1}^{n} (1-\lambda_i) x_i. \quad (2.11)$$

The target 2-sector scheme will then be given by Table 2.[2]

Table 2: A closed 2-sector scheme

	I	II	Finals	Total
I	k_I	k_{II}	$\mathcal{K}$	Y_I
II			$\mathcal{C}$	Y_{II}
Wages	W_I	W_{II}		
Profits	Π_I	Π_{II}		
Total	Y_I	Y_{II}		

Thus, it is seen that the ratio λ_i is the key-magnitude in constructing the 2-sector model from the input-output table. Since this is determined on the basis of demand, the above can be called the *demand-basis* approach.

2.2 A formal remark

Looking at the above computation from a formal angle, we see that our problem is to find a set of numbers λ_is such that

$$\sum_{j=1}^{n} \lambda_j x_j = \sum_{i=1}^{n}\sum_{j=1}^{n} x_{ij} + \sum_{j=1}^{n} \Delta k_j, \quad (2.12)$$

$$\sum_{j=1}^{n} (1-\lambda_j) x_j = \sum_{j=1}^{n} C_j. \quad (2.13)$$

[2]Finals in Table 2 indicate the main net product of the sector: as for sector I, it is investment, while as for sector II it is consumption.

It is easily seen that (2.12) and (2.13) are not independent: only one of them makes sense, so that there is only one independent equation to determine more than 2 unknowns. Hence, there is not a unique pair of numbers λ_is.

The ratio given by (2.3) is trivial but most important, as seen from (2.13).

In fact, we have

$$\lambda_i = 1 - \frac{C_i}{x_i}, \tag{2.14}$$

so that this ratio of each industry does not depend on other industries explicitly.

It is obvious that λ_is satisfies (2.13), for instance. Conversely, λ_is which are independent of other λ_js ($j \neq i$) satisfying (2.13) is expressed by (2.14).

2.3 Replacement of fixed capital

If we take fixed capital into account, immediate problems to be considered are two: first, k_is are reformulated; secondly, investment of fixed capital is counted for. Current inputs which include replacement of fixed capital will be called the *augmented input.*

Inputs of fixed capital should be a part of physical inputs for production, the problem of replacement and amortisation soon appears, as was discussed elsewhere.[3]

Suppose that the matrix data of replacement and amortization of fixed capital are available. Let us write:

- r_{ij} : replacement of fixed capital i in industry j,
- d_{ij} : amortisation of fixed capital i in industry j,
- ΔF : the vector of net investment of fixed capital,
- ΔK : the vector of total net investment.

If the economy is in equilibrium, then

$$r_{ij} = d_{ij},$$

so that we assume this in what follows.[4]

Let us introduce

- $k_i^\dagger$: the amount of used-up and/or replaced capital of sector i,
- D_i : the amortization of sector i,
- $\mathcal{K}^\dagger$: net investment of fixed capital,

Then, we can compute as follows.

As for the amortisation of fixed capital,

$$D_I = \sum_{i=1}^{n}\sum_{j=1}^{n} \lambda_j r_{ij}, \tag{2.15}$$

$$D_{II} = \sum_{i=1}^{n}\sum_{j=1}^{n} (1-\lambda_j) r_{ij}. \tag{2.16}$$

Since one has

$$k_i^\dagger = k_i + D_i, \; i = I, II,$$

[3] As for the Leontief economy with fixed capital, refer to Fujimori[1982].

[4] Rigorously speaking, depreciation of fixed capital may differ from its replacement, even if the economy is in the balanced growth, because parts of outputs are consumed for non-productive purposes. We may, however, disregard this difference.

from the angle of input one has

$$Y_I = k_I^\dagger + W_I + \Pi_I, \tag{2.17}$$

$$Y_{II} = k_{II}^\dagger + W_{II} + \Pi_{II}. \tag{2.18}$$

Total investment of the input-output system consists of the two parts as

$$\Delta K = \Delta F + \Delta k,$$

so that from the angle of allocation of products, one can write

$$Y_I = k_I^\dagger + k_{II}^\dagger + \mathcal{K} + \mathcal{K}^\dagger, \tag{2.19}$$

$$Y_{II} = \mathcal{C}. \tag{2.20}$$

where

$$\mathcal{K}^\dagger = \sum_{i=1}^{n} \Delta F_i.$$

Thus, we obtain the fundamental 2-sector macro system in the absence of international trade.

Nevertheless, fixed capital does not affect the ratio λ_is, since they are determined solely by consumption as seen from (2.14).

2.4 International trade

If international trade is taken into account, the total output does not generally equal to the total domestic demand, so that computation of λ_is should be modified.

We compute the division of outputs into two parts according to domestic demand of investment and consumption. Hence, the part of demand which is assigned to export, for instance, is disregarded.

Let us write:

- $A^\dagger$: the augmented input coefficient matrix,
- E : the export vector,
- M : the import vector,
- H : the domestic demand vector,

where $A^\dagger = \left(\dfrac{x_{ij} + r_{ij}}{x_j}\right)$, and the fundamental input-output system is given by

$$x = A^\dagger x + C + \Delta K + E - M.$$

In the system with internatinal trade, we have to recall that the key ratio λ_i of each industry is defined by the demand of inputs and investment to the total domestic demand, so that we have to modify as

$$\lambda_i = 1 - \frac{C_i}{H_i} \tag{2.21}$$

where

$$H_i = \sum_{j=1}^{n} x_{ij} + \Delta K_i + C_i.$$

Suppose that we have a matrix data of imported goods, the sa-called table of imports. Then, we can compute the amount of imported goods allocated as capital or consumption goods in the same manner as we compute consumption and capital inputs in the closed input-output table. That is, let '~' indicates that the variable concerned is an entry in the table of imports.[5] Then,

$$M_I = \sum_{i=1}^{n}\Big(\sum_{j=1}^{n}\tilde{x}_{ij} + \Delta\tilde{K}_i\Big), \tag{2.22}$$

$$M_{II} = \sum_{i=1}^{n}\tilde{C}_i. \tag{2.23}$$

Again from the formal angle, our problem is to find a set of numbers λ_i, E_I and E_{II}, such that

$$\sum_{j=1}^{n}\lambda_j x_j = \sum_{i=1}^{n}\Big(\sum_{j=1}^{n}x_{ij} + \Delta K_i\Big) + E_I - M_I, \tag{2.24}$$

$$\sum_{j=1}^{n}(1-\lambda_j)x_j = \sum_{j=1}^{n}C_j + E_{II} - M_{II}. \tag{2.25}$$

Since one of the above two is independent, those ratios and magnitudes are not determined uniquely. Nevertheless, since we specify the manner to compute λ_is and the amount of imports, exports are determined as the difference of total balances.

Total output subtracted by all the row elements is regarded as the export of the sector concerned. That is, exports are evaluated to adjust the total row sum. Since exports are not demanded at home, there is no knowing how to separate them by the demand-side.[6]

$$E_I = Y_I - k_I^{\dagger} - k_{II}^{\dagger} - \mathcal{K} - \mathcal{K}^{\dagger} - M_I, \tag{2.26}$$

$$E_{II} = Y_{II} - \mathcal{C} - M_{II}. \tag{2.27}$$

Thus, we obtain all the necessary data for the 2-sector scheme of the economy.

The horizontal balance of the table is given by:

$$Y_I = k_I^{\dagger} + k_{II}^{\dagger} + \mathcal{K} + \mathcal{K}^{\dagger} + E_I - M_I, \tag{2.28}$$

$$Y_{II} = \mathcal{C} + E_{II} - M_{II}. \tag{2.29}$$

Table 3 is the goal of our computaion.

Table 3: An open 2-sector scheme

	I	II	Finals	Exports	Imports	Total
I	$k_I^{\dagger}$	$k_{II}^{\dagger}$	$\mathcal{K}+\mathcal{K}^{\dagger}$	E_I	$-M_I$	Y_I
II			$\mathcal{C}$	E_{II}	$-M_{II}$	Y_{II}
Wages	W_I	W_{II}				
Profits	Π_I	Π_{II}				
Total	Y_I	Y_{II}				

3 Computation and its results

3.1 Data base

In the previous section, the fundamental formulae are established. Our next task is to apply them to the actual input-output tables of Japan's economy.

[5] $\tilde{C}_j$ stands for, say, the amount of imports of good j allocated for consumption.

[6] The 'final product' of our computation is thus the estimate of exports.

We apply our discussion to the input-output tables of Japan's economy of 1960, 1965, 1970, 1975, 1980 and 1985. The input-output tables employed for the present computation is the simplest tables, such as 10 × 10 for 1960 and 1965, 13 × 13 for 1970, 1975, 1980 and 1985. In the input-output tables of those years, most data concerning variables employed in the previous section are obtained from the given table.

The points which must be taken into consideration are twofold. The first point is that the input-output table is compiled in terms of the market price after tax. The second is that some matrix data are not available for the above mentioned data base.

With regards to these two points, we make some additional explanations in the following. Supplementary considerations will be reduced to the modification of data of the so-called 2nd and the 3rd quarters of the input-output tables.

3.2 Distribution, consumption and investment

Major columns of the final demand in the input-output table, which are vector data, are household consumption, ex-household consumption, gross investment of fixed capital, net increments of inventory and governmental consumption. Except exports, the investment of fixed capital and inventories are regarded as investment, while all the other items as consumption. Import-tax is added to imports.

Meanwhile, the 3rd quarter of the input-output table includes the crude value-added items, *i.e.* amortisation, wages, ex-household consumption, surplus, indirect taxes and subsidiaries. Those are all vector data.

Among entries in the 3rd quater of the table, wages alone are counted as income of the working class, while ex-household consumption and surplus constitute profit.

The sources of secondary income, *i.e.* indirect taxes and subsidiaries are added to wages and profits proportinately to modify wages and profit in such a way that their sum is equal to the total net national income. Modified wages and profits are called *augmented wages* and *augmented profit* respectively.

Since only vector data of amortisation and gross investment of fixed capital are available, we apply λ_is to each componet of the amortization vector and compute the amount of replacement of both sectors.

By subtracting thus obtained replacement from gross investment, we compute net investment of fixed capital.

Meanwhile, net increment of inventories can be regarded as investment of currents inputs, so that it is included in net investment.

3.3 Imports

We do not refer to the table of imports, but, instead, we assume that imported goods are allocated to each demand factor in proportion to its weight in the total demand.

Since the amount of imports spent for final consumption alone is counted as imports of sector II, which we approximated by the following:

$$M_{II} = \sum_{i=1}^{n} \frac{C_i}{H_i} M_i, \tag{3.1}$$

where all the remaining is counted for as imports of sector I.

Thus, the correspondence between the theoretical model and the actual input-output table is established.

3.4 Results

The following shows the result of our computation. Table 4 shows the magnitude of λ_is of industries.[7]

Table 5 shows the 2-sector scheme of the period, based on (2.17)–(2.18) and (2.28)–(2.29).

Meanwhile Table 6 shows some important ratios immediately derived from Table 5. That is to say, we compute capital-wage ratio $\kappa_i = \frac{k_i^\dagger}{W_i}$, profit-wage ratios $\mu_i = \frac{s_i}{W_i}$, profit-rates $\pi_i = \frac{s_i}{k_i^\dagger + W_i}$, (where $i = I, II$), the sector ratio $\zeta = \frac{Y_I}{Y_{II}}$, the accumulation-capital ratio $\delta = \frac{\mathcal{K} + \mathcal{K}^\dagger}{k_I^\dagger + k_{II}^\dagger}$, and the accumulation-profit ratio $\sigma = \frac{\mathcal{K} + \mathcal{K}^\dagger}{s_I + s_{II}}$. Table 7 shows yearly average expansion rates of the past 5 years of two sectors.

Table 4: Capital production ratios

	1960	1965	1970	1975	1980	1985
1	0.8393	0.7957	0.7932	0.7992	0.7867	0.8114
2	0.9820	0.9884	0.9987	0.9997	0.9997	0.9998
3	0.7626	0.7443	0.8127	0.7970	0.8235	0.8009
4	0.9980	0.9976	0.9973	1.0000	1.0000	1.0000
5	0.7086	0.6907	0.6763	0.6859	0.7169	0.6734
6	0.4460	0.4089	0.4645	0.4669	0.4620	
7						0.4667
8						0.7485
9						0.2283
10			0.9796	1.0000	1.0000	
11	0.6532	0.6841	0.6152	0.6657	0.6223	
12						0.7376
13						0.6530
14	0.0000	0.0000	0.0000	0.0000	0.0184	0.0200
15	0.1597	0.1670	0.1832	0.1992	0.2440	0.2736
16			0.9716	1.0000	1.0000	
17			0.9983	1.0000	0.9484	
18	1.0105	0.9683	0.9366	0.9727	1.0000	1.0000

4 Concluding remarks

4.1 Two types of observations

In the previous section, 2-sector schemes of the Japanese economy from 1960 to 1985 are compiled. Looking at these tables, we can easily derive the following two types of obsevations.

The first group of findings concerns the cross-section property of the 2-sector economy.

(1) $\zeta > 1$ fluctuates around the level of 2.0.

[7] Industry codes,1–18,in the table are as follows: 1, Agriculture, Forestry & Fishing; 2 Mining; 3 Manufuturing; 4 Construction; 5 E.Energy, Gas & Water; 6 Commerce, Finance, Insurance & Real estate; 7 Commerce; 8 Finance & Insurance; 9 Real Estate; 10 Real Estate Rental; 11 Transportation & Communication; 12 Transportation; 13 Communication & Broadcasting; 14 Public Services; 15 Other Services; 16 Business Supplies; 17 Packing; 18 Unclassified.

Table 5: 2-sector schemes

1960	Sector I	Sector II	Finals	Exports	Imports	Total
I	167825	56648	36644	12774	−14858	259032
	(11008)	(6923)				
II			109903	4410	−2703	111611
Wages	37708	27973				
Profits	53499	26989				
Total	259032	111611				370643
1965						
I	290859	112711	62257	24799	−26602	464024
	(25723)	(15350)				
II			232478	9516	−5704	236290
Wages	84015	64358				
Profits	89150	59221				
Total	464024	236290				700314
1970						
I	718769	231747	190860	65437	−69114	1137699
	(63707)	(31607)				
II			470585	20018	−13122	477481
Wages	200290	136786				
Profits	218640	108948				
Total	1137699	477481				1615180
1975						
I	1434790	532516	292030	154858	−178716	2235478
	(127101)	(66558)				
II			1068663	45914	−27741	1086836
Wages	477930	375122				
Profits	322759	179197				
Total	2235478	1086836				3322314
1980						
I	2456211	909333	462058	269431	−333461	3763572
	(200272)	(116137)				
II			1761092	75509	−49758	1786843
Wages	791718	594279				
Profits	515644	283231				
Total	3763572	1786843				5550415
1985						
I	2743347	1174818	444514	367082	−318063	4411698
	(247238)	(187545)				
II			2323499	108361	−58119	2373741
Wages	1069492	773670				
Profits	598859	425253				
Total	4411698	2373741				6785439

Unit is 100 million yen, nominal producer's price of each year.

Figures in () in the first and the second columns indicate the amortisation.

Table 6: Structural parameters

	κ_I	κ_{II}	μ_I	μ_{II}	π_I	π_{II}	ζ	δ	σ
1960	4.451	2.025	1.419	0.965	0.260	0.319	2.321	0.163	0.455
1965	3.462	1.751	1.061	0.920	0.238	0.334	1.964	0.154	0.420
1970	3.589	1.694	1.092	0.796	0.238	0.296	2.383	0.201	0.583
1975	3.002	1.420	0.675	0.478	0.169	0.197	2.057	0.148	0.582
1980	3.102	1.530	0.651	0.477	0.159	0.188	2.106	0.137	0.578
1985	2.565	1.519	0.560	0.550	0.157	0.218	1.859	0.113	0.434

Table 7: The rate of expansion

	1960	**1965**	**1970**	**1975**	**1980**	**1985**	**Average**
Sector I	-	1.124	1.196	1.145	1.110	1.032	1.120
Sector II	-	1.162	1.151	1.179	1.105	1.058	1.130

(2) The weight of depreciation of fixed capital in sector II is comparatively greater than the counterpart of sector I.

(3) $\kappa_I > \kappa_{II}$; $\pi_I < \pi_{II}$; $\mu_I > \mu_{II}$.

(4) E_I is comparatively smaller than E_{II} all through the period concerned except 1970.

The second group of findings is related to the time-series property of the economy.

(1) The capital-wage ratios are generally looking down in the period.

(2) ζ, which looks to fluctuate around a level of 2.0, tends to decline.

(3) The weight of fixed capital is increasing.

(4) The profit-rates of both sectors are looking down.

(5) The profit-wage rate has a tendency of declination.

(6) δ reached its apex in 1970, but it tends to to fall since then. Meanwhile, σ was in the plateau state from 1970 to 1980.

(7) Two sectors are not necessarily expanding at the same rate for each 5-year period, but the overall average of 25 years indicates somehow very close magnitudes.

4.2 Interpretations

From the above observations, we can derive some important conclusions and conjectures.

(1) The fact that sector I is more capital-intensive shows that the Japanese economy does not possess stable dynamic equilibrium by nature. That is, if we assume the accelaration principle of accumulation of capital, the economy with the above computed structural parameters will not converge to a stable situation.[8] [9]

[8]The same fact was pointed out by Tsukui-Murakami[1979] in the 7 x 7 Leontief system of the Japanese economy 1965.

[9]This also tells that the wage-profit curve is concave toward the point of origin, and never extends beyond Sraffa's standard wage-profit curve, if the wages are assumed to be paid ex-post.

(2) Unequal profit rates and unequal profit-wage rates imply that the economy has never been in equilibrium for the past 25 years: the growth path of the Japanese economy is characterised rather by its uneven development.

(3) The weight of wages is steadily increasing, and this seems to lead to a declining tendency of the sector ratio.

(4) The profit-wage ratios are sharply declining in the both sectors. This is one of the greatest reason for the decreasing profit-capital ratio.

In summary, the basic underlying tendency of the period concerned seems to be the increasing weight of sector II and wages.

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