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THE INCOME GROWTH AND THE RATE OF SAVING IN JAPAN: A BRIEF SURVEY OF RECENT ESTIMATES BY HITOTSUBASHI-GROUP[1]

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1. *How High?*

At the outset I would like to call the reader's attention to Mr. Colin Clark's figures on the subject. In his work, *The Conditions of Economic Progress*, 2nd ed., 1951, he pointed out the very high rates of income growth in Japan, based upon the following estimate.

Table I. Mr. Colin Clark's Estimate of Real National Income and its Rate of Growth in Japan

Period			Real income (*in million I. U.*)			Rate of growth per year
1887	to	1897	1.45	to	1.69	1.54
1897	to	1908	1.69	to	2.53	3.74
1908	to	1914–22	2.53	to	4.03	4.77
1914–22	to	1918–27	4.03	to	6.09	9.60
1918–27	to	1923–32	6.09	to	8.14	5.97
1923–32	to	1928–37	8.14	to	10.63	5.48
1928–37	to	1933–42	10.63	to	13.84	5.42

Table rearranged by Mataji Umemra from the figures given in Colin Clark, *op. cit.*, p. 136.

[1] This article is a revision of a paper presented to the International Association for Research in Income and Wealth, at the Meeting in Castelgandolfo near Rome, on 1–6 September 1953. I am indebted to Professor Shigeto Tsuru and other members of the Institute of Economic Research of the Hitotsubashi University for arranging my original paper. As an appendix, "Comment on Mr. Harry Oshima's Discussion" has been added.

The rate of growth per year, according to the above table, is within the range between 3.7% and 9.6% except the low rate in the first period. The average rate of the whole period may be more than 5%, and since 1914 nearly 7%. It is clear that such a rate is very high compared with the rates in countries in Europe and America. Mr. Colin Clark indicates also the high proportion of savings to national income in Japan, as shown in the following table.

Table II. Mr. Colin Clark's Estimate of Saving in Japan

Period	Savings (1) (*million I. U.*)	Income (2) (*million I. U.*)	Proportion $\frac{(1)}{(2)}$
1913–19	1.8	3.3	54.5
1919–24	2.8	5.7	42.1
1924–30	3.0	8.0	37.5
1938	3.86	14.5	26.6
1939	4.21	14.8	28.5
1913–39	3.1	9.2	33.7

Table rearranged by Masakichi Ito from the data given in Colin Clark, *op. cit.*, p. 506.

The rapid economic progress in Japan since the Meiji era is generally convincing, and is correct. But the estimate of the rate of progress is a subject for consideration, and the figures given by Mr. Colin Clark also should be reexamined closely.

The statistical data used by Mr. Colin Clark in his work are very limited, partly because of language restrictions and partly to the lack of good data available at that time. The purpose of the present paper is to give a brief survey of recent estimates attempted by the Hitotsubashi-group regarding the economic growth and savings in Japan.

2. *List of Recent Main Works*

Here I will not attempt to describe the history of Japanese income statistics. It may be enough to indicate some recent main works, beginning with the present writer's own book:

(1) Yuzo Yamada, *Nihon Kokumin Shotoku Suikei Shiryo* (*The Data Book of National Income Estimates in Japan*), Tokyo 1951.

The author (the present writer himself) tried to compile various past estimates and to give his own estimates. Cf. his article in English: Japanese National Income, in the "*Oriental Economist*", Vol. 18, No. 441–3, June 1951.

Some revisions of Yamada's estimates have been attempted in the following articles. They are all written in English.

(2) Shigeto Tsuru, Kazushi Ohkawa, Chotaro Takahashi and Isamu Yamada, Long Term Changes in the National Product of Japan since 1875.

This was an attempt to revise the estimate given in (1) regarding national product, and was presented as a preliminary paper to the Second Meeting of International Association for Research in Income and Wealth, 1951.

(3) Shigeto Tsuru and Kazushi Ohkawa, Long Term Changes in the National Product of Japan since 1878, in "*Income and Wealth, Series III,*" edited by Milton Gilbert, 1953.

This is a revised version of the preliminary paper above mentioned, taking into consideration the valuable suggestions from Mr. Harry Oshima of the Statistical Office of United Nations. Mr. Oshima subsequently contributed a critical article on Japanese national income estimates for "*Keizai Kenkyu*" (*Economic Review*) of the Institute of Economic Research of the Hitotsubashi University, Vol. 4, No. 3.[2]

(4) Kazushi Ohkawa, A Note on "Long Term Changes in the National Product of Japan", in the "*Annals of the Hitotsubashi Academy*", April 1953.

A further revision of the statistical side of the above article.

Furthermore, some articles concerning the subject matter are found in the "*Keizai Kenkyu*" (*Economic Review*) of the Hitotsubashi University. They are written in Japanese, with some English notes.

(5) Shigeto Tsuru, Chotaro Takahashi and Kazushi Ohkawa, "Analysis of the National Income Estimates of Japan," *ibid.*, Vol. 2. No. 4, October 1951.

(6) Kazushi Ohkawa and Associates, "The Rate of Growth in Japan's Economy," *ibid.*, Vol. 3, No. 1, January 1952.

(7) Chotaro Takahashi and Miyohei Shinohara, "Capital Formation in Japan", *ibid.*, Vol 4, No. 1, January 1953.

Occasion is taken to mention that the Institute of Economic Research of the Hitotsubashi University is now engaged on the compilation of historical statistical data concerning the national income, but the results will not be finally available for a few years.

3. *My Estimate of National Income in Three Aspects*

The present writer's own estimates of national income from 1875 to 1942 have been made in three different ways, viz. (a) national income produced or national product, utilizing mainly production statistics, (b) national income distributed, as the sum total of individual incomes, and (c)

[2] For Mr. Harry Oshima's article, see Appendix II of this Article.

national income expended or national expenditure, including various kinds of disbursements. Since Tsuru and Ohkawa reviewed my method of preparing estimates in their article published in "*Income and Wealth, Series III*", I need not repeat it here,[3] but will indicate only the results of the estimation concerning three aspects of national income. The following table gives the quinquennial averages of national income in three series for 1875–1942, with the percentage of differences as shown in formula.

Table III. My Estimates of National Income
(*in current million yen*)

Period	National product (a)	National income distributed (b)	National expenditure (c)	Differences $\frac{(a)-(b)}{(a)}$	Differences $\frac{(a)-(c)}{(a)}$
1875–77	527	—	—		
1878–82	726	—	—		
1883–87	828	—	—		
1888–92	1,165	968	—	+17	—
1893–97	1,666	1,095	1,157	+37	+31
1898–02	2,419	1,851	1,648	+23	+32
1903–07	2,801	2,787	2,756	+ 1	+ 2
1908–12	3,688	3,503	3,405	+ 5	+ 8
1913–17	4,964	4,507	4,815	+ 9	+ 3
1918–22	11,882	12,031	10,846	− 1	+ 9
1923–27	13,804	12,754	12,428	+ 8	+10
1928–32	12,184	11,911	13,035	+ 2	− 7
1933–37	15,509	15,376	16,278	+ 1	− 5
1938–42	32,052	34,207	36,824	− 7	−15

Y. Yamada, *op. cit.*, Table 19, 20 and 21. Figures partly revised here.

As may be seen in the table, there exist great differences among these three series, although they are so defined that they should be equal to each other.[4] It should be noted, however, that discrepancies in the three series can not be avoided, in so far as they are based on quite different data. Moreover, for the earlier years the figures are very rough, and in the later years also the calculation as to depreciation, indirect tax and so on are not always accurate, owing to the lack of available data.

[3] It should be noted, however, that Tsuru and Ohkawa confined their observations to the national product only, although my estimates cover three aspects of national income.

[4] Theoretically speaking, three aspects of national income are expressed after the Keynes's Symbols:

$$A - U = F + P = C + S$$

A (gross value of product), U (producer's good consumed), F (factor's cost), P (profit), C (consumption) and S (saving). Each item may be divided into several sectors and activities in a complicated way.

Nevertheless, the very fact of disparities among the three kinds of national income as above estimated suggests the direction of improvement, which may be expected in two ways; first, to seek for better or still undiscovered data, and secondly, to reexamine some of the bold assumptions employed in filling the gaps of existing data. Ohkawa has made a further step to revise my figures, as far as the national product is concerned. Now I shall turn to Ohkawa's estimate.

4. *Ohkawa's Estimate of National Product*

Ohkawa's revised estimate is designated as (O) in the following table, compared with my two kinds of estimates, (Ya) and (Yb), each series in the quinquennial averages.

Table IV. Ohkawa's Estimate, compared with Yamada's
(*in million yen*)

	Ohkawa National product (O)	Yamada National product (Ya)	Differences $\frac{(O)-(Ya)}{(O)}$	Yamada National income distributed (Yb)	Differences $\frac{(O)-(Yb)}{(O)}$
1878–82	659	726	−10		
1883–87	600	828	−38		
1888–92	797	1,165	−46	968	−21
1893–97	1,191	1,666	−40	1,095	+ 8
1898–02	1,922	2,419	−26	1,851	+ 4
1903–07	2,482	2,801	−13	2,787	−12
1908–12	3,309	3,688	−11	3,503	− 6
1913–17	4,518	4,964	−10	4,507	0
1918–22	11,186	11,882	− 6	12,031	− 8
1923–27	12,598	13,804	−10	12,754	− 1
1928–32	11,840	12,184	− 3	11,911	− 1
1933–37	15,698	15,509	+ 1	15,376	− 2
1938–42	32,352	32,052	+ 1	34,207	− 6

Ohkawa's estimate is found in his recent article in the "*Annals of Hitotsubashi Academy*", April 1953. It is somewhat different from the estimate given in his (and Tsuru's) article in "*Income and Wealth, Series III,*" 1953. As for Yamada's estimates, see the Table III.

As will be seen in the table, the difference is generally larger between (O) series and (Ya) series than between (O) and (Yb). It should be noted, however, that Ohkawa attempted to revise my figures regarding national income produced, and that therefore the lower degree of difference between (O) and (Yb) is rather accidental.

In order to clarify the causes of difference between (O) and (Ya), I will show the figures divided into three sectors, viz. primary, secondary and tertiary sectors, after the manner of Mr. Colin Clark.

Table V. (A) National Income divided into Three Sectors
(*in million yen*)

Period	Ohkawa			Yamada		
	Primary O_1	Secondary O_2	Tertiary O_3	Primary Y_1	Secondary Y_2	Tertiary Y_3
1878–82	426	70	163	276	128	322
1883–87	327	87	183	267	149	412
1888–92	432	129	235	415	221	529
1893–97	612	223	357	571	355	740
1898–02	932	421	569	827	572	1020
1903–07	1141	514	827	1112	659	1031
1908–12	1403	713	1193	1377	933	1379
1913–17	1636	1218	1664	1628	1548	1789
1918–22	3826	2890	4470	3832	3383	4667
1923–27	3503	3124	5971	3223	3790	6791
1928–32	2580	3282	5978	2423	3743	6019
1933–37	3084	5091	7523	2837	5149	7523
1938–42	5547	13241	13564	5337	13163	13564

(B) Differences

Period	$\frac{(O_1)-(Y_1)}{O}$	$\frac{(O_2)-(Y_2)}{O}$	$\frac{(O_3)-(Y_3)}{O}$
1878–82	+22.8	− 8.8	−24.1
1883–87	+10.1	−10.4	−38.4
1888–92	+ 2.1	−11.6	−36.9
1893–97	+ 3.4	−11.1	−32.1
1898–02	+ 5.5	− 7.9	−23.5
1903–07	+ 1.2	− 5.8	− 8.2
1908–12	+ 0.8	− 6.6	− 5.6
1913–17	+ 0.1	− 7.3	− 2.8
1918–22	− 0.1	− 4.4	− 1.8
1923–27	− 2.2	− 5.3	− 6.5
1928–32	+ 1.3	− 3.9	− 0.3
1933–37	+ 1.6	− 0.4	− 0.0
1938–42	+ 0.6	− 0.2	− 0.0

The detailed notes to this table are omitted, as Ohkawa has explained them in his article recently published. Here I would like to draw attention to the results of the differences between Ohkawa's series (O) and Yamada's series (Y), which are summerized as follows: first, the differences are larger for the earlier periods than for the later periods; secondly, they are larger for the tertiary sector than for the secondary and also larger for the latter than for the primary; and thirdly, differences have plus (positive) signs almost all the way through in the primary sector and minus (negative) signs in the other sectors. Thus Ohkawa's estimate, if more correct than mine, brings out the undue weight given to the tertiary sector in my estimate, the point which Mr. Oshima suggested on another occasion. Anyhow, we must accept for the present Ohkawa's estimate, so far as the national product is concerned.

5. *Comparison of Mr. Colin Clark's Estimate with Ours*

Now in turning to a comparison of Mr. Colin Clark's estimate with ours, I shall take, this time, his figures computed in current yen, besides those in I. U. as quoted in the beginning of the present paper. His figures, it will be noted, are divided into three parts; first, for 1883–1912, basing chiefly on products statistics; second, for 1913–32, originating in Prof. Hijikata's estimate of national income in the aspect of distributive shares, such as wages, profit, etc.; and last, for 1933–42, originating in estimates by the Japanese Economic Federation, a mixture of both aspects of production and distribution. The first and the last parts should be compared with Ohkawa's estimate (O) and the second part with my estimate (Yb). The following table compares those estimates in the quinquennial averages.

Table VI. Comparison of Mr. Colin Clark's Estimate with Ours
(in million yen)

Period	Colin Clark	Ohkawa	$\frac{(O)-(C)}{(O)}$	Yamada (Yb)	$\frac{(Yb)-(C)}{(Yb)}$
1883–92 (1887)	580	698	+17	—	—
1893–02 (1897)	1,060	1,556	+32	1,473	+28
1903–12 (1908)	2,210	2,936	+25	3,145	+30
1913–17 (14–17)	3,380	4,518	+25	4,507	+25
1918–22	9,680	11,186	+23	12,031	+20
1923–27	13,390	12,598	− 6	12,754	− 5
1928–32	12,050	11,840	− 2	11,911	− 1
1933–37	16,690	15,698	− 6	15,376	− 8
1938–42	34,090	32,352	− 5	33,698	− 1

Bracketed figures in the first column indicate the years of Colin Clark's estimate. Cf. Colin Clark, *op. cit.*, p. 136. As for (O) and (Yb), see the Table IV.

In this table we find that our figures are larger for the earlier periods and smaller for the later periods than Mr. Colin Clark's, a fact that will result in a rate of income growth less than Mr. Colin Clark has computed.[5]

6. *Rate of Income Growth*

Here is the rate of income growth given by Ohkawa on the basis of his estimate of national income above mentioned. To compute the rate of growth, the nominal value of national income must be deflated. Ohkawa compiled a new deflater, rearranging carefully several old wholesale price indices. I shall show his way of computing the rate of income growth in the following table.

Table VII. (A) Nominal and Real Income with Rate of Growth computed by Ohkawa
(*in million yen*)

Period	Nominal national income	Deflater 1928-32 average=100	Real national income	Rate of Growth
1878–82	659	46.3	1,407	—
1883–87	600	33.8	1,784	4.8
1888–92	797	37.1	2,140	3.7
1893–97	1,191	41.7	2,845	5.8
1898–02	1,922	53.1	3,618	4.9
1903–07	2,482	63.5	3,886	1.2
1908–12	3,309	68.5	4,813	4.4
1913–17	4,518	81.2	5,554	2.9
1918–22	11,186	150.4	7,087	4.9
1923–27	12,598	139.6	9,081	5.1
1928–32	11,840	100.0	12,089	5.3
1933–37	15,698	107.4	14,564	4.2
1938–42	32,052	184.6	17,609	3.9

(B) Rate of Growth in Overlapping Decades

Period (overlapping decades)	Rate of growth per year
1878–87 to 1883–92	4.2
1883–92 to 1888–97	4.9
1888–97 to 1893–02	5.4
1893–02 to 1898–07	3.0

[5] Mr. Colin Clark rejected Gini's figure of 1913 at 48.000 million yen (*op. cit.*, p. 139). I have not read Gini's article, but our estimation for that year may be between Gini's and Clark's.

1898–07 to 1903–12	3.0
1903–12 to 1908–17	3.5
1908–17 to 1913–22	4.1
1913–22 to 1918–27	5.1
1918–27 to 1923–32	5.5
1923–32 to 1928–37	4.7
1928–37 to 1933–42	3.8

The rate of growth was calculated incorrectly in Ohkawa's article in the "*Annals*". It has been amended here by himself.

The rate of income growth as shown in this table is not generally so high as Mr. Colin Clark concluded. The average rate for the whole period is 3.6%.

As for the deflater, we know the wholesale price index is not adequate, but we have no other indices available for the length of period we wish to deal with. The deflater compiled newly by Ohkawa is somewhat different from that used hitherto. He compiles further a sub-group index for agricultural commodities and another for non-agricultural commodities, with which he calculated real income and rate of growth in each sector of industries, but here I shall only show the result computed by him.

Table VIII. Rates of Growth for Each of Three Sectors, computed by Ohkawa

Period	Primary	Secondary	Tertiary
1878–87 to 1883–92	1.1	9.1	5.6
1883–92 to 1888–97	1.4	7.0	4.7
1888–97 to 1893–02	3.4	7.7	5.3
1893–02 to 1898–07	2.0	3.8	3.3
1898–07 to 1903–12	1.2	2.9	5.1
1903–12 to 1908–17	1.7	6.0	4.5
1908–17 to 1913–22	2.6	5.6	5.3
1913–22 to 1918–27	1.5	4.7	7.9
1918–27 to 1923–32	−0.8	6.7	7.9
1923–32 to 1928–37	0.8	7.6	4.7
1928–37 to 1933–42	1.8	8.0	1.8

Apart from some irregularities, this table shows a low rate for the primary sector and a high rate for the other sectors. The rate for the secondary sector is, on the average, a little more than that for the tertiary sector.

7. *My Estimate of Savings*

Along with the statistics for estimating the income growth, we are trying to improve the estimates of savings. It goes without saying that the proportion of savings to total income is an important factor in understanding the degree of income growth. But, here also, we face the deficiency of statistical data for the earlier years.

First I shall present my own estimate, given in the above mentioned book, which is based chiefly on the statistics of finance. We have statistical data regarding various deposits and securities since 1893. Government inverstment data are available only for the later years. I arranged these data when I estimated national expenditures. I shall show here the figures of national expenditures classified into several items and the proportion of savings to the total sum.

Table IX. My Estimate of National Expenditures and the Proportion of Savings
(A) Private Expenditures classified into Consumption, Savings and Tax (*in million yen*)

Period	Consumption	Savings (1)	Tax	Total (2)	(1)/(2)
1893–97	964	103	90	1,157	8.9
1898–02	1,400	100	148	1,648	6.1
1903–07	2,205	303	248	2,765	11.1
1908–12	2,783	288	334	3,405	8.5
1913–17	3,444	695	378	4,517	15,4
1918–22	7,050	2,268	931	10,249	32.1
1923–27	9,219	1,309	1,060	11,588	11.3
1928–32	9,469	1,206	1,002	11,677	9,9
1933–37	11,351	2,900	1,177	15,428	18.8
		(1,900)		(14,428)	(13.0)
1938–42	17,956	15,600	4,074	37,630	41.6
		(8,600)		(30,630)	(28.3)

(B) National Expenditure, including Government Account
(*in million yen*)

Period	Consumption		Savings				Total expenditure (4)	(3)/(4)
	Private	Government	Private	Government	Abroad	Subtotal (3)		
1913–17	3,444	336	695	64	276	1,035	4,815	21.5
1918–22	7,050	1,297	2,268	255	−24	2,499	10,846	23.0
1923–27	9,219	1,693	1,309	328	−121	1,516	12,428	12.2
1928–32	9,469	1,965	1,206	348	47	1,601	13,035	12.3
1933–37	11,351	2,845	2,900	573	−364	3,109	17,305	17.5
			(1,900)			(2,109)	(16,278)	(12.3)
1938–42	17,956	10,641	15,600	1,309	−1,788	15,121	43,723	34.5
			(8,600)			(8,121)	(36,824)	(22.3)

Cf. Yuzo Yamada, *op. cit.*, Table 21. But (B) has been somewhat corrected here. Government consumption excludes transfer income, and Government investment for 1913–27 is estimated to be 20% of expenditure, the same rate as for 1928–37.
The bracketed figures for 1933–37 and 1938–42 indicate savings reduced by the amounts of credit expansion originating in "indigested public bonds issue," 1000 and 7000 million yen respectively in round figures.

On account of the deficiency of data, the estimates are shown in two different ways, viz. (A) not including government account and investments abroad, and (B) including those items. The rate of saving for the years before 1908–12 was below 12% in (A) and that for the years since then was above 12%, but not over 23% in (B).[6] The estimate of private consumption before 1930 is made on rather a bold presumption, i. e., by utilizing the changes of income below the tax exemption limit to carry back the basic consumption of 1930 to the earlier years. As to private savings, they include the net increase of all kinds of deposits, with cash and cash-deposits and securities, but do not include construction. According to investigations published by the Economic Stabilization Board, the net increase of house construction amounts to 274 million yen per year for 1930–32, 368 million yen for 1933–37, 627 million yen for 1938–42. Thus, if we take these amounts into consideration, the proportion of savings in (B) table

[6] The remarkable high rate of saving (in non-blacked figures) for 1938–42 is due mainly to enforced saving or restricted consumption during the war, which began in 1937. The figures are computed here from the monetary expenditure side, not capital formation in the proper sense, and they contain the amounts of credit expansion originating in the so-called "indigested public bond issue" which amounted to 7000 million yen. Now, if we reduce those amounts from the total savings, on the assumption that the credit expansion at that time did not turn to the purchase of consumers' goods which were restricted by rationing and fixed prices, then the rate of savings for that period will be lower, as shown in the table. Furthermore, if we compute the savings in real terms, taking the price difference between producers' goods and consumers' goods into consideration, we may get a much lower rate. This note is in response to a question put to me by Mr. G. F. Shirras at the Castelgandolfo-Meeting.

should be increased by about 2%. The estimate of savings, however, in the above table is gross, including depreciation, so that the net saving will be smaller by 3 or 4 percent.

Anyhow, we may conclude that the proportion of net savings seems to be generally less than 20%, although the above estimates are insufficient on account of lack of necessary items. On the average the ratio may be between 16% and 17%, much less than Colin Clark's figures.

8. *Ito's and Shinohara's Estimates of Savings*

Recently Masakichi Ito attempted to estimate the savings from national wealth statistics. Mr. Colin Clark also seems to use the wealth statistics, when he estimates the savings of Japan in his work. But Ito carefully examined the data and obtained somewhat different results.[7]

We have the statistical data of national wealth for several scattered years: viz., for 1905, 1910, 1917 by the Bank of Japan, for 1913 and 1919 by Kokuseiin (State Investigation Board), and for 1924, 1930 and 1935 by the Cabinet Statistics Bureau. The data given by the Bank of Japan are too crude to be made use of. Ito rearranged the available data since 1913 and selected items relevant to capital formation—harbour equipments, trees, buildings, machines, live-stock and poultry, rails, vehicles, ships, water-works, power-plants, gas-works, equipments for communications, bridges, various kinds of products and imported goods. Ito pointed out that Mr. Colin Clark's figures seem to be the total sum of wealth excluding only the value of land.[8] Ito's estimate of capital amounts is as follows.

Table X. Ito's Estimate of Capital Amounts
(*in million yen*)

Period	Nominal amount	Deflater	Real amount
1913	16,515	73.1	22,523
1919	43,308	172.3	25,135
1924	60,665	150.8	40,229
1930	50,196	91.2	55,039
1935	62,640	102.5	61,112

[7] Ito's calculation is found in the "*Keizai Kenkyu*", Vol. 3, No. 1, January 1952, but here I am indebted to his unpublished article on this subject.

[8] At the Meeting in Castelgandolfo, Mr. Colin Clark told us that he computed the cost of house-building at American prices.

Table XI. Additional Capital and Its Proportion to National Income (*in million yen*)

Period	Additional capital	ditto. per year (1)	National income (2)	(1)/(2)
1914–19	2,542	424	6,028	7.0
1920–24	15,094	3,019	7,563	39.9
1925–30	14,810	2,468	10,414	23.7
1931–35	6,078	1,215	13,775	8.8
1914–35	38,519	1,751	9,344	18.7

The above two tables are quoted from Ito's unpublished article.

Ito formulized the relation between capital amount (K) and national income (Y) in the regression line:

$K=4.4904\,Y-1.752$, (K and Y are in billion yen.)

There are great disparities between the amount of capital given by Ito and the estimates of savings given by me. The latter figures deflated to real values are: 1,277 million yen for 1931–17, 1,662 for 1918–22, 1,091 for 1923–27, 1,601 for 1928–32, 1,845 for 1933–37 and 1,454 for 1938–42. But the 18.7% proportion of savings or additional capital to the total income on the average, is somewhat higher than my estimate, for Ito's estimate indicates "net" increase of capital.

However, as may be seen in the table, the proportion of savings shows great irregularities from year to year, which are perhaps due to the imperfect character of the original data. Ito points out that the capital amount in 1919 seems to be underestimated, and the amount in 1924 overestimated, the ratio of capital to income being calculated rather low (3.8) in 1919 and rather high (4.7) in 1924. The statistics of national wealth in Japan must be improved in the future. For the present, we might well call attention to the average figure of the proportion of savings 18.7% for 1914–35 given by Ito, which, although somewhat higher than my estimate, is far below the figures given by Mr. Colin Clark.

Another estimate of the so-called "capital formation by the flow-of-goods method" has been attempted recently by Miyohei Shinohara.[9] With great effort, he estimates the value of durable equipments and construction annually produced, the estimate of inventories being still absent. According to his results, the ratio of investment (gross, but excluding changes in inventories) to national income (net of depreciation) is on the average 16 or 17% for 1919–36. The disparities between the figures given by me and

[9] Miyohei Shinohara: Capital Formation in Japan, in the "*Keizai Kenkyu*", Vol. 4, No. 1, January 1953.

Shinohara are great from year to year, viz. 2,195 million yen by Shinohara and 2,499 by me for 1919–22, 2,123 and 1,516 for 1923–27, 2,019 and 1,516 for 1928–32 and 3,036 and 1,982 for 1933–37. The main reason for this, apart from the difficulty of valuation, may be found in the difference between goods-flow and money-flow. But 16 or 17% level given by Shinohara, excluding inventories, may be not so inconsistent with my estimate, which does not include house construction.

9. *Some Concluding Remarks*

It must be admitted that our estimates herein are very imperfect. As for income growth as well as savings, the various estimates stand side by side, and there are great discrepancies among them. I am aware that it is necessary to achieve a greater degree of consistency among our estimates, but for the present I must be content with the results above stated. Here I would like to make some concluding remarks:

(1) The rate of income growth in Japan was on the average 4% and the rate of savings was in the neighbourhood of 16% for 1913–38. Both rates are indeed high, but not so high as Mr. Colin Clark believed.

(2) The rates of income growth are found to fluctuate in a direction opposite to the changes of the rate of savings, which, in turn, fluctuate in parallel with the changes of price index.

Period	Rate of income growth	Rate of savings	Price index
1913–17	2.9	21.5	81.2
1918–22	4.9	23.0	150.4
1923–27	5.1	12.2	139.6
1928–32	5.3	12.3	100.0
1933–37	4.2	12.3	107.4
1938–42	3.9	22.3	184.6

If we can ascertain that the prices of producers' goods rise or fall to a greater degree than those of consumers' goods, we may be able to establish that the rate of savings revised by such prices data will move in a narrower range, around, say, 16%.

(3) The economic growth in Japan, so far as the period we have treated is concerned, proceeded steadily, seemingly not much affected by industrial fluctuations. The fall of prices did not decrease, but rather increased the real output. A steep expansion of industrialization and foreign trade was taking place, and the change of structure was more dominant than the price fluctuation. The proportion of income of the secondary sector to the total income rose from 25% in the first period to 40% in the last period. The

ratio of exports or imports to the national income was between 20 and 15%.

(4) If we adopt Harrod's formula $GC=s$, and assume that s=16 and $G=4$, then we may say $C=4$. According to Ito's estimate, the relation between capital amount (K) and national income (Y) is expressed in the regression line: $K=4.4904Y-1.752$, (K and Y are in billion yen). It follows that $\frac{K}{Y}$ is between 4.1 and 4.4 for the period treated here by us, and $\frac{\Delta K}{\Delta Y}$ is just 4. Although Harrod's "C" is, strictly speaking, not $\frac{\Delta K}{\Delta Y}$, our conclusion $C=4$ may be yet approximately admitted. But it should be noted that such round figures for the formula $GC=s$ may be taken as the start, not the goal, of economic observations and that further investigations may be required as to, for example, the allocation of capital or natural resources among various sectors of industries.

(5) Such rates as 4% in economic growth and 16% in the proportion of savings may be not unreasonable in an advancing economy. The high rate of income growth in Japan depended chiefly upon her rapid industrialization during the period. I will not here embark upon a more detail explanation of the background, but, in passing I must say that it may be difficult, if not impossible, for Japan to continue at such a high rate in future under the completely changed conditions of international relations. It may be added that in spite of the high proportion of savings the income growth is severely restricted by a tremendous lack of natural resources, and to find the most efficient way of utilizing the meagre resources that are available is of the utmost importance. Furthermore, Japan has suffered formidable destruction of her wealth due to frequent natural and other calamities, and capital accumulation is not always steadily proceeding. The destruction of wealth by the last war was so great that it will take many years, even under the condition of fairly high savings, to recover to the former position.

Appendix. I. *After the War*

Since the war, we have a rather reliable estimate of national income in Japan, published by the Economic Stabilization Board (now the Economic Counsel Board), as far as national income distributed is concerned, the figures for which we shall give. The rate of income growth after the war has been very great as may be expected.

Table XI. National Income and its Rate of Growth after the War, estimated by Economic Counsel Board
(*in billion yen*)

Period (fiscal year)	Nominal national income	Deflater	Real national income	Rate of growth
1934–36	14.5	1	14.5	
1946	386.7	43	9.0	
1947	1,041.2	115	9.1	1.1
1948	2,123.6	192	11.1	21.9
1949	2,844.8	229	12.6	13.5
1950	3,683.7	237	15.5	23.0
1951	4,849.5	288	16.8	8.4

Cf. Economic Counsel Board, *National Income after the War*, (in Japanese), 1953, p. 87. The deflater used here is a weighted average index of consumers' prices, rural and urban, and the prices of producers' goods.

The estimate of capital formation by Economic Counsel Board is based for the most part on financial and banking statistics. The capital formation in the following table (A) does not include government investments nor investments abroad, which we show separately in (B).

(A) *Table XII.* Capital Formation and its Proportion to National Income (*in billion yen*)

Period (fiscal year)	Capital formation	ditto. net (1)	National income (2)	(1)/(2)
1934–36	3.7	2.7	14.5	18.6
1946	70.2	57.1	386.7	14.6
1947	204.6	163.6	1,041.2	15.7
1948	405.4	333.2	2,123.6	15.7
1949	391.1	281.2	2,884.4	9.7
1950	686.8	537.8	3,683.7	14.6
1951	1,113.1	876.9	4,849.4	18.1

(B)

Period (fiscal year)	Consumption	Capital formation	Investment abroad	Govern't exp.	Total gross exp.
1934–36	11.2	3.7	0.2	3.2	18.3
1946	333.1	70.2	−14.4	84.1	473.0
1947	915.5	204.6	−67.7	248.1	1,299.5
1948	1,755.8	405.4	−98.2	537.7	2,600.7
1949	2,285.1	391.1	−114.1	688.2	3,250.3
1950	2,563.1	686.8	116.6	699.4	4,065.9
1951	3,178.1	1,113.1	97.0	936.9	5,324.8

Economic Counsel Board, *The National Income after the War* (in Japanese), p. 42, 50.

In the above table, the government expenditure is not divided into consumption and investment. Only for 1950 and 1951, we have the following figures of all investments, inclusive of government investments.

Table XIII. Capital Formation, including Government Investment *(in billion yen)*

Period (calender year)	Private capital formation		Investments abroad	Govern't investments	Total (1)	National gross exp. (2)	(1)/(2)
	House & equipment	Inventories					
1950	265	133	58	216	672	3580	18.7
1951	496	374	61	243	1174	4780	24.6
〃	(333)	(266)	(−16)	(188)	(671)	(3839)	(17.5)

Cf. Economic Stabilization Board, *The Annual Report of National Economy*, (in Japanese) 1952, supplementary tables. The figures in brackets are deflated by the specific price indices for the respective items of national income, on the basis of 1950.

Appendix II. *Comment on Mr. Harry Oshima's Discussion on Yamada's Estimates.*

In his article "Survey of Various Long-term Estimates of Japanese National Income,"[10] Mr. Harry Oshima devotes a great part for a valuable discussion on the methods of estimating in my book——"*Nihon Kokumin Shotoku Suikei Shiryo*". I am most grateful for his many useful suggestions, which without doubt will promote the further improvement of my own incomplete work. Here I would like to summarize the points at issue and comment briefly on them.

[10] Harry Oshima's article, in the "*Keizai Kenkyu*", Vol. 4, No. 3, July 1953.

The discussion is confined to the national product estimates for earlier period. For the numbering and itemizing, I am fully responsible. My comments are in brackets.

1) Leakage of minor items in production statistics.
   1.1) For agriculture some adjustment is made, but is incomplete. (Ohkawa has improved upon it recently.)
   1.2) For fishery, mining and manufacturing, no adjustment is made. (Tsuru and Ohkawa calculated the proportion of mining products to manufactured products in the later period, and applied this proportion to the earlier period. For the deficiencies in factory production statistics, I myself intended to adjust the figures by raising the amount of home industry. But, I admit that this method is very incomplete.)
   1.3) Discrepancies between the production statistics and the export statistics are not taken into consideration. (I was aware of this, but could not check both figures with each other).
2) The neglect of self-consumption in peasant housholds, such as food, fish, wood, hunting, weaving, etc. (This involves the examination of farm housholds statistics for the earlier period, which are not yet available to us. A search for better historical data is necessary).
3) The incomplete estimation of the ratio between the gross value of products and the net value of income.
   3.1) The ratio for agriculture is undervalued. (This point has been also somewhat improved by Ohkawa).
   3.2) The ratio for factories is overvalued. (I took it as computed in a position between home industry and factory. Of course it is very approximate, although a change in scale should be considered. I would like to examine the historical data of the textile industry on this point).
4) The incompleteness of labour force data used for the estimation of home industry as well as tertiary sector. (The original data should be carefully reexamined).
5) The inadequacy of using the Tokyo price index as deflater. (Ohkawa calculated the agricultural price index for a long period in his recent article).

As a whole, I do not find any objection to Mr. Oshima's critique. But, on this occasion, I would like to repeat what I intended to convey in my book. It seems to me that there are two stages of collecting scattered data, the first being the sifting of available data in various aspects, and that is the main purpose of my book. The second stage involves the checking of data with each other, and Mr. Oshima's suggestions may belong to this stage. He says:—"The possibility of obtaining reliable measures of economic growth for the Meiji period lies in developing adequate occupational distribution data. If approximately reliable totals and major breakdowns can be

had, these can be used as controlling totals, instead of production data which do not seem to cover output comprehensively." He may be right as far as the second stage is concerned. But my main intention is to collect and compile data on production, distribution and expenditure, respectively,——the three aspects of national income. Furthermore, my intention is not merely to know the aggregate total sum of national income, but rather its constitution or circulation. If our object were to be the estimation of national income as a whole, it might be measured from any one of these three aspects or a mixture of them, whichever is confirmable without much difficulty. But if we wish to grasp the constitution or circulation of national income, all these aspects must be ascertained separately and their interrelationship clarified. However, it is not necessary to say that this intention of work does not permit the incompleteness of each series, and I must proceed to my next step by means of the valuable suggestions given by Mr. Oshima.