6

NOTES ON INCOME GROWTH AND THE RATE OF SAVING IN JAPAN

A Brief Survey of Recent Estimates made by Research Workers at Hitotsubashi University[1]

by Yuzo Yamada

I. HOW HIGH

AT the outset I should like to call the reader's attention to Mr. Colin Clark's figures on the subject. In the second edition of *The Conditions of Economic Progress* he pointed out the very high rates of income growth in Japan, as shown by the following estimates:

TABLE I

Mr. Colin Clark's Estimate of Real National Income and its Rate of Growth in Japan[2]

Period	Real Income (in million I.U.)	Percentage 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

The rate of growth per year, according to the above table, ranges between 3.7 per cent and 9.6 per cent, except for the low rate in the first period. The average rate of the whole period is more than 5 per cent, and after 1914 it approached 7 per cent. It is clear that such a rate is very high compared with the corresponding rates for countries in Europe and America. Mr. Colin Clark also drew attention to the high proportion of

[1] I am indebted to Professor Shigeto Tsuru and other members of the Institute of Economic Research of the Hitotsubashi University for assistance with the original draft of this paper. See Appendix II below, pp. 241–242, for a reply to Mr. Harry Oshima's comments on the original draft.

[2] Colin Clark, *The Conditions of Economic Progress*, Second Edition, London, 1951, p. 136. The figures in this table have been derived from Mr. Clark's original estimates by Mataju Umemura.

savings to national income in Japan, as shown in the following table:

TABLE II

Mr. Colin Clark's Estimate of Saving in Japan[1]

Period	Savings (1) (million I.U.)	Income (2) (million I.U.)	Proportion (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

The statistical data used by Mr. Colin Clark in reaching these estimates were very limited, partly because of language restrictions and partly owing to the lack of good data available at that time. The purpose of this paper is to give a brief survey of recent attempts by a group of research workers at Hitotsubashi University to estimate rates of economic growth and saving in Japan.

II. LIST OF RECENT MAIN WORKS

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

(1) Yuzo Yamada, *Nihon Kokumin Shotoku Suikei Shiryo (Data Book of National Income Estimates in Japan)*, Tokyo, 1951. In this I have tried to compile various past estimates and to give my own estimates. See also my article in English: 'Japanese National Income', in the *Oriental Economist*, Vol. XVIII, No. 441–3, June 1951.

Some revisions of these 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 the first attempt

[1] Table derived by Masakichi Ito from the data given in Colin Clark, *op. cit.*, p. 506.

to revise my estimates of national product and was presented in a preliminary form to the Second Meeting of the 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 mentioned above, which takes into consideration valuable suggestions made by Mr. Harry Oshima of the Statistical Office of the 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 Hitotsubashi University, Vol. 4, No. 3)[1].

(4) Kazushi Ohkawa, 'A Note on Long-Term Changes in the National Product of Japan', in the *Annals of Hitotsubashi University*, April 1953. A further revision of the estimates in the paper under (3).

Further articles on the subject are available in the *Keizai Kenkyu* (*Economic Review*) of Hitotsubashi University. These are written in Japanese, with brief English summaries:

(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.

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 available for some years.

III. MY ESTIMATES OF NATIONAL INCOME

My own estimates of national income from 1875 to 1942 were made in three different ways, viz. (*a*) national income produced or national product estimates dependent mainly on

---

[1] For a comment on Mr. Harry Oshima's article, see Appendix II to this paper.

production statistics, (b) national income distributed, i.e. the sum total of individual incomes, and (c) national income expended or national expenditure arrived at by summing 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,[1] but will indicate only the results of the estimate for three aspects of national income. The following table gives the quinquennial averages of national income in three series for 1875–1942, with percentage differences as shown.

TABLE III

Camada's Estimates of National Income[2]

(in millions of current yen)

Period	National Product (a)	National Income Distrubuted (b)	National Expenditure (c)	Differences (a)−(b) (a)	(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
1898–1902 .	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

The table reveals sizeable differences among these three series, although they are so defined that they should equal each other.[3] It should be noted, however, that discrepancies in the three series cannot be avoided, in so far as they are based on

[1] It should be noted, however, that Tsuru and Ohkawa confined their observations to the national product only, whereas my estimates cover the three approaches to national income.

[2] Y. Yamada, *op. cit.*, Tables 19, 20 and 31. Figures given here are partly revised.

[3] Theoretically speaking, the three aspects of national income can be expressed thus in the Keynsian symbols:

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

where A = gross value of product, U = producers' goods consumed, F = factor's cost, P = profit, C = consumption, and S = saving.

Q

quite different data. Moreover, for the earlier years the figures
are very rough, and even in the later years the estimates of
depreciation, indirect taxes and so on are not always accurate
owing to lack of data. Nevertheless, the disparities among the
three sets of national income totals as estimated above suggest
the direction of improvement. This may be sought in two ways:
first by looking for new or better data and secondly by re-
considering some of the bold assumptions adopted in filling the
gaps in existing data. Ohkawa has made a further effort to
revise my figures for national product and this is described in
the next section.

IV. OHKAWA'S ESTIMATE OF NATIONAL PRODUCT

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

TABLE IV

Comparison of Estimates by Ohkawa and Yamada[1]

(in millions of current yen)

Period	Ohkawa National Product (O)	Yamada National Product (Ya)	Difference (O)−(Ya) (O)	Yamada National Income Distributed (Yb)	Difference (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
1898–1902	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	32,064	+1	34,207	−6

As will be seen in the table, the difference is generally larger
between (O) series and (Ya) series than between (O) and (Yb).

[1] Ohkawa's estimate is found in his recent article in the *Annals of Hitotsubashi
University, April 1953.* It is somewhat different from the estimate given in his
(and Tsuru's) article in *Income and Wealth Series III*, 1953. For Yamada's
estimates, see Table III above.

It should be noted, however, that Ohkawa's estimates were designed to revise my figures for national income produced, and that the narrower differences between (O) and (Yb) are therefore due to chance factors.

In order to clarify the sources of differences 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 millions of current 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
1898–1902.	932	421	569	827	572	1,020
1903–07 .	1,141	514	827	1,112	659	1,031
1908–12 .	1,403	713	1,193	1,377	933	1,379
1913–17 .	1,636	1,218	1,664	1,628	1,548	1,789
1918–22 .	3,826	2,890	4,470	3,832	3,383	4,667
1923–27 .	3,503	3,124	5,971	3,223	3,790	6,791
1928–32 .	2,580	3,282	5,978	2,423	3,743	6,019
1933–37 .	3,084	5,091	7,523	2,837	5,149	7,523
1937–42 .	5,547	13,241	13,564	5,337	13,163	13,564

(B) *Differences in the Estimates*

.Period	$\dfrac{(O_1)-(Y_1)}{(O)}$	$\dfrac{(O_2)-(Y_2)}{(O)}$	$\dfrac{(O_3)-(Y_3)}{(O)}$
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
1898–1902 . .	+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 provided them in his article published in April 1953.[1] Here I would like to draw attention to the results of the comparison between Ohkawa's series (O) and Yamada's series (Y), which can be summarized as follows: first, the differences are larger for the earlier than for the later periods; secondly, they are larger for the tertiary sector than for the secondary and also larger for the tertiary than for the primary; 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, a point which Mr. Oshima himself brought out on another occasion. Anyhow, we must accept for the present Ohkawa's estimate so far as the national product is concerned.

V. COMPARISON OF MR. COLIN CLARK'S ESTIMATE WITH OURS

Now in turning to a comparison of these estimates with those by Mr. Colin Clark I shall take this time his figures computed in current yen rather than those in International Units quoted in the beginning of the present paper. His figures, it will be noted, are divided into three groups; first those for 1883–1912, based chiefly on products statistics; second, those for 1913–32, originating in Professor Hijikata's estimate of national income by distributive shares, such as wages, profits, etc.;[2] and last, those for 1933–42, originating in estimates by the Japanese Economic Federation,[3] which are a mixture of both production and distribution approaches. The first and the last parts should be compared with Ohkawa's estimate (O) and the second part with my estimate (Yb). Table VI compares those estimates, in quinquennial averages.

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 feature that will result in an estimated rate of income growth lower than the one Mr. Colin Clark has computed.[4]

[1] Op. cit. in Section 2 above.
[2] Mitsubishi Economic Research Bureau, Monthly Circular, March 1934.
[3] East Asia Economic Intelligence Series No. 1, October, 1939.
[4] Mr. Colin Clark rejected Gini's figure of 48,000 million yen for 1913 (op. cit., p. 139). I have not read Gini's article but our estimates for that year may be between Gini's and Clark's.

TABLE VI

Comparisons with Mr. Colin Clark's Estimates[1]

(in million yen)

Period	Colin Clark	Ohkawa	$\dfrac{(O)-(C)}{(O)}$	Yamada (Yb)	$\dfrac{(Yb)-(C)}{(Yb)}$
1883–92 (1887) .	580	698	+17	—	—
1893–1902 (1897)	1,060	1,556	+32	1,473	+28
1903–12 (1908) .	2,210	2,936	+25	3,145	+30
1913–17 (1914–17)	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

VI. RATE OF INCOME GROWTH

To compute the rate of growth by deflating the nominal value of national income Ohkawa compiled a new deflator, rearranging carefully several old wholesale price indices. The stages in his estimates of the rate of income growth are shown in the following table.

TABLE VII

*(A) Nominal and Real Income with Rate of Growth
Computed by Ohkawa*[2]

(in millions of current yen)

Period	Nominal National Income	Deflator (1928–32 Average = 100)	Real National Income	Percentage Rate of Growth per Year
1878–82 . .	659	46.3	1,407	—
1883–87 . .	600	33.8	1,784	4.9
1888–92 . .	797	37.1	2,140	3.7
1893–97 . .	1,191	41.7	2,845	5.8
1898–1902 . .	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

[1] Bracketed figures in the first column indicate the years of Colin Clark's estimate, Cf. Colin Clark, *op. cit.*, p. 136. For (O) and (Yb) see Table IV.
[2] The rate of growth was calculated incorrectly in Ohkawa's article in the *Annals*. It has been amended here by himself.

(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 1893–1902	5.4
1893–1902 to 1898–1907	3.0
1898–1907 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 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 per cent. As for the deflator, 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 deflator compiled recently by Ohkawa is somewhat different from previous deflators. He compiles 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 industrial sector, but here I shall only show the result computed by him.

TABLE VIII

*Rates of Growth for Each of Three Sectors,
Computed by Ohkawa*

Percentage Rate per Year

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 1893–1902	3.4	7.7	5.3
1893–1902 to 1898–1907	2.0	3.8	3.3
1898–1907 to 1903–1912	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 higher than that for the tertiary sector.

VII. MY ESTIMATE OF SAVINGS

We are also 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 income growth. But here, also, we face the deficiency of statistical data for the earlier years.

First I shall present my own estimate, based chiefly on statistics of finance.

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

TABLE IX

My Estimates of Expenditures and Savings[1]

(A) *Private Expenditures classified into Consumption, Savings and Tax*

(in million yen)

Period	Consumption	Savings (1)	Tax	Total (2)	$\frac{(1)}{(2)}$
1893–97 .	964	103	90	1,157	8.9
1898–1902 .	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 (1,900)	1,177	15,428 (14,428)	18.8 (13.0)
1938–42 .	17,956	15,600 (8,600)	4,074	37,630 (30,630)	41.6 (28.3)

[1] Yuzo Yamada, *op. cit.*, Table 21. But (*B*) has been somewhat amended here. Government consumption excludes transfer income, and Government investment for 1913–27 is estimated to be 20 per cent 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 'undigested public bond issue', i.e. 1,000 and 7,000 million yen respectively in round figures.

(*B*) *National Expenditure, including Government Account*

(in million yen)

| Period | Consumption | | Savings | | | | Total Expenditure (4) | $\frac{(3)}{(4)}$ |
	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 (1,900)	573	−364	3,109 (2,109)	17,305 (16,278)	17.5 (12.3)
1938–42	17,956	10,641	15,600 (8,600)	1,309	−1,788	15,121 (8,121)	43,723 (36,824)	34.5 (22.3)

12 per cent in (*A*) and that for the years since then was above 12 per cent, but not over 23 per cent in (*B*).[1] The estimate of private consumption before 1930 is made on rather a bold assumption, 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. Private savings include the net increase in all kinds of deposits, including 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 Table IXB should be increased by about 2 per cent of income. The estimate of savings, however, in the above table is gross, including depreciation, so that net saving should be smaller by 3 or 4 per cent of income. Anyhow, we may conclude that the proportion of net

[1] The remarkably high rate of saving (unbracketed figures) for 1938–42 is due mainly to forced saving or restricted consumption during the war, which began in 1937. The figures are computed here from the monetary expenditure side, so that they do not represent capital formation in the proper sense, and they contain the amounts of credit expansion originating in the so-called 'undigested public bond issue', which amounted to 7,000 million yen. Now, if we deduct these amounts from total savings, on the assumption that the credit expansion at that time did not flow into the purchase of consumer's goods which were restricted by rationing and fixed prices, the rate of saving for that period will be lower, as shown in the table (bracketed figures). Furthermore, if we compute the savings in real terms, taking the price difference between producer's goods and consumers' goods into consideration, we may get a much lower rate.

savings seems to be generally less than 20 per cent, although the above estimates are inadequate on account of lack of essential data. On the average the ratio may be between 16 per cent and 17 per cent, much less than Colin Clark's figures.

Recently Masakichi Ito attempted to estimate savings from national wealth statistics. Mr. Colin Clark also seems to have used wealth statistics in his estimates of savings for Japan. But Ito examined the data in great detail and obtained somewhat different results.[1]

We have estimates of national wealth for several scattered years: for 1905, 1910 and 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 estimates given by the Bank of Japan are too crude to be useful. Ito rearranged the available data since 1913 and selected items relevant to capital formation – harbour equipment, trees, buildings, machines, livestock and poultry, rails, vehicles, ships, waterworks, power-plants, gasworks, equipment 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. Ito's estimates of the value of capital are as follows:

TABLE X

Ito's Estimates of the Value of Capital[2]

(in million yen)

Period	In Current Value	Deflator	In Constant Values
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

[1] Ito's calculation is found in the *Keizai Kenkyu*, Vol. 3, No. 1, January 1952, but here I am using his unpublished article on this subject.
[2] Quoted from Ito's unpublished article.

TABLE XI

Additional Capital and its Proportion to National Income[1]

(in million yen)

Period			Additional Capital	Deflator, per Year (1)	National Income (2)	$\frac{(1)}{(2)}$
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

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

$$K = 4.490Y - 1.752 \ (K \text{ and } Y \text{ are in billion yen}).$$

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 1913–17, 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 per cent proportion of savings or additional capital to the total income on the average is somewhat higher than my estimate, for Ito's estimate reflects '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 value of capital in 1919 seems to have been under estimated, and that for 1924 over estimated, the ratio of capital to income being 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 Ito's average figure of 18.7 per cent for the proportion of savings in 1914–35 which, although somewhat higher than my estimate, is far below the figures given by Mr. Colin Clark.

Another estimate of 'capital formation by the flow-of-goods method' has been attempted recently by Miyohei Shinohara.[2]

[1] Quoted from Ito's unpublished article.
[2] Miyohei Shinohara, 'Capital Formation in Japan', in the *Keizai Kenkyu*, Vol. 4, No. 1, January 1953.

With great effort, he estimates the value of durable equipment and construction annually produced (no estimate of inventories is available). According to his results, the ratio of investment (gross, but excluding changes in inventories) to national income (net of depreciation) averages 16 to 17 per cent for 1919–36. The disparities between my figures and those of Shinohara are great from year to year – 2,195 million yen estimated 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 may be found in the difference between goods flow and money flow, apart from the difficulty of valuation. But the 16 per cent or 17 per cent level calculated by Shinohara, excluding inventories, is not so inconsistent with my estimate, which does not include house construction.

IX. SOME CONCLUDING REMARKS

It must be admitted that our estimates here are quite crude. For both income growth and savings, the various estimates yield markedly discrepant results. 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 stated above. Here I would like to give some concluding remarks:

(1) The rate of income growth in Japan averaged about 4 per cent per year and the rate of savings was in the neighbourhood of 16 per cent for 1913–38. Both rates are high, but not so high as Mr. Colin Clark's figures suggest.

(2) The rates of income growth fluctuate inversely to changes in the rate of savings, which, in turn, fluctuate in sympathy with changes in the 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 prices of producers' goods rise or fall to a greater degree than those of consumers' goods, we may find that the rate of

savings for estimates adjusted for price changes will fluctuate within a narrower range, around, say, 16 per cent.

(3) The rate of economic growth in Japan, so far as the period we have treated is concerned, was apparently not greatly affected by industrial fluctuations. The fall of prices did not decrease, but rather increased real output. A steep expansion of industrialization and foreign trade was taking place, and the change in structure was more dominant than price fluctuations. The proportion of income of the secondary sector to the total income rose from 25 per cent in the first period to 40 per cent in the last period. The ratio of exports or imports to the national income was between 20 and 15 per cent.

(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 equation:

$$K=4.4904Y-1.752 \ (K \text{ and } Y \text{ are in billion yen})$$

It follows that $\dfrac{K}{Y}$ is between 4.1 and 4.4 for the period treated here by us and $\dfrac{\Delta K}{\Delta Y}$ is just 4. Although Harrod's 'C' is, strictly speaking, not $\dfrac{\Delta K}{\Delta Y}$ our conclusion $C=4$ may be thus approximately admitted. But it should be noted that such round figures for the formula $GC=s$ provide a starting point rather than a goal of economic observations and that further study is required of, among other things, the allocation of capital or natural resources among various sectors of industries.

(5) Such rates as 4 per cent per year in growth of real income and 16 per cent for the proportion of savings may not be 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 detailed 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.

APPENDIX I

Since the war, we have a reliable estimate of national income in Japan, published by the Economic Stabilization Board (now the Economic Counsel Board). The rate of income growth since the war has been very great, as might be expected.

TABLE XII
National Income and its Rate of Growth after the War, estimated by Economic Counsel Board[1]

(in billion yen)

Period (fiscal year)	Nominal National Income	Deflator	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

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

TABLE XIII[2]
(A) Capital Formation and its Proportion to National Income

(in billion yen)

Period (fiscal year)	Capital Formation	Capital Formation, Net (1)	National Income (2)	$\frac{(1)}{(2)}$
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

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

[1] Economic Counsel Board, *The National Income after the War* (in Japanese), pp. 42, 50.

239

(B)

Period (fiscal year)	Con- sumption	Capital Formation	Investment Abroad	Govern- ment Expendi- ture	Total Gross Expendi- ture
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	936.6	5,324.8

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

TABLE XIV

Capital Formation, including Government Investments[1]

(in billion yen)

Period (calendar year)	Private Capital Formation		Invest- ments Abroad	Govern- ment Invest- ments	Total (1)	National Gross Expen- diture (2)	$\frac{(1)}{(2)}$
	House and Equip- ment	Inven- tories					
1950	265	133	58	216	672	3,580	18.7
1951	496	374	61	243	1,174	4,780	24.6
1951	(333)	(266)	(−16)	(188)	(671)	(3,839)	(17.5)

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

APPENDIX II

In his article 'Survey of Various Long Term Estimates of Japanese National Income',[1] Mr. Harry Oshima presents a valuable discussion of the methods of estimating in my book – *Nihon Kokumin Shotoku Suikei Shiryp*.[2] I am most grateful for his many useful suggestions. Here I would like to summarize the points at issue and comment briefly on them. The discussion is confined to the national product estimates for the earlier period. The points are given in italics and are followed by my comments. The numbering is my own.

(1) *Leakage of minor items in production statistics.*

　(1.1) *For agriculture some adjustment is made, but it 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 compensate by raising the estimates for home industry. But I admit that this method is inadequate.

　(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 the two sets of figures.

(2) *The neglect of consumption of home-produced goods in peasant households, such as food, fish, wood, hunting, weaving, etc.* This involves the examination of farm household 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 and net value product.*

　(3.1) *The ratio for agriculture is undervalued.* This point has been somewhat improved by Ohkawa.

　(3.2) *The ratio for factories is overvalued.* I took it at a level intermediate between home industry and factory. Of course it is very approximate, and a change in scale could be considered. I would like to examine the historical data of the textile industry on this point.

[1] *Keizai Kenkyu*, Vol. 4, No. 3, July 1953.
[2] *Op. cit.* in Section 3 of this paper.

(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 re-examined.

(5) *The inadequacy of using the Tokyo price index as deflator.* Ohkawa calculated an agricultural price index for a long period in his recent article.

On the whole, I do not disagree with Mr. Oshima's critique. But, on this occasion, I should 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 was the main purpose of my book. The second stage involved 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 break downs can be had, these can be used as controlling totals, instead of production data that do not seem to cover output comprehensively.' He may be right as far as the second stage is concerned. But my main intention was to collect and compile data on production, distribution and expenditure, respectively. Furthermore, my intention was not merely to know the aggregate total sum of national income, but rather its composition. If our object were the estimation of national income as a whole, it might be measured by any one of the three approaches or by a mixture of them, whichever can be checked without much difficulty. But if we wish to learn the composition of national income, the several aspects must be ascertained separately and their inter-relationship clarified. Needless to say, this intention does not obviate the need for completeness and reliability of each series, and I must proceed forward with the help of the valuable suggestions given by Mr. Oshima.