

A STATISTICAL EVALUATION OF THE RATE OF GROWTH OF NATIONAL INCOME IN POSTWAR JAPAN¹

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I. INTRODUCTION

AFTER the Second World War many countries showed growth rates which were much higher than those in the prewar period. These included, apart from the socialist countries, Japan, West Germany, Italy, France, Greece, Taiwan, etc. The mainspring of these high growth rates may be partly due to the rehabilitation effect; countries which experienced a deep trough in their production in the immediate postwar years would have naturally experienced a relatively rapid recovery. However, in the case of Japan, even after the prewar peak was surpassed in *per capita* real income, it has not experienced a period of retardation in the growth rate. Instead, what has ensued has been an upsurge in the fixed investment of private enterprise, the extent of which Japan never before experienced. According to official national income statistics, private fixed investment (excluding residential construction) increased from 777.4 billion yen to 4,050.4 billion yen for 1955-61, about a five-fold increase in only six years. Such an unprecedented increase in fixed investment brought about an annual real G.N.P. growth rate of about 10 per cent.

We have already dealt with the causes of the high rate of growth in Japan in other books and articles.² Although it is impossible to repeat it all here, we may list some of the important factors in the high rate of growth particularly in the postwar period as follows: (1) The rehabilitation effect mentioned already. (2) The extraordinary investment boom (particularly from 1955 on) in parallel with the rapid introduction of foreign technology. (3) The still abundant supply of labour in the dual economy, and the higher rate of growth of the labour force as well

¹ I benefited from discussions with Simon Kuznets, Colin Clark, Satoru Yoshiue, and Phyllis Deane in amending my paper submitted to the Eighth Conference of the International Association for Income and Wealth, 1963.

² M. Shinohara, *Growth and Cycles in the Japanese Economy*, Kinokuniya, Tokyo, 1962, and *Factors in Japan's Economic Growth*, Ministry of Foreign Affairs of Japan, 1962, written by the author and reviewed by the members of the Institute of Statistical Research, Tokyo.

as the much higher rate of its migration from the rural to the urban sector than in the prewar period. (4) The existence of the relatively undervalued exchange rate, which has promoted the export growth rate. (5) The highly reduced proportion of post-war military expenditures, which has shifted some resources to private investment. (6) The existence of a financial structure in which even the commercial banks have given a tremendous amount of long-term loans quite liberally, particularly to the big enterprises. The so-called 'over-loan' of the central bank, in combination with this financial structure, has given a strong impetus to optimistic investment behaviour by entrepreneurs. (7) The higher saving ratio (even of urban workers) as compared with other countries.

These, of course, do not exhaust all of the causes. However, in this article, we shall concentrate on a *statistical* re-examination of the growth rate computed from official national income statistics, i.e. our problem is to ascertain to what extent the extraordinary rate of growth was due to statistical upward biases. These biases will be broken down further into those in the estimates of the national income components and those in their deflators.

This kind of test is extremely difficult to make, for in order to examine the growth rate, we must be familiar with the detailed processes by which the national income estimates are derived as well as with the merits and the defects of the basic statistical materials from which the national income is estimated. However, even if such a re-examination were possible, it would require a very extensive study, so in this article we will restrict ourselves to a test of the *expenditure* side of the account only. In other words, we will re-examine, first, the estimates of private consumption expenditure, gross fixed capital formation, changes in inventories, the current purchases of goods and services by the Government, and exports and imports of goods and services. Second, we will pass on to a reconsideration of existing price deflators by which each of these components is reduced to real terms. We shall make no attempt here to probe the income side of the account.

Postwar national income statistics can be divided roughly into two time periods, 1946-50 and 1951-61, from the point of view of statistical reliability. National income estimates for the period before 1950 involve immense weaknesses, for the statistical

discrepancies between the expenditure and income sides of the national income statistics are quite considerable,¹ and some price deflators particularly with respect to fixed investment did not sufficiently reflect the existence of black market prices in the earlier postwar period. On the other hand, in the period after 1951, national income estimates can be assumed to be much more reliable, for the statistical discrepancies were reduced to a minimum, and price deflators became more dependable due to the stabilization of domestic prices. Therefore, the period we shall attempt to examine will be restricted to the period 1951-61. For this period, we have already two inter-industry tables for 1951 and 1955. Censuses or other large-scale surveys became available in various fields. The basic statistical materials, therefore, can be used with greater confidence.

The Economic Planning Agency is now going to reconstruct and re-estimate the national income of Japan. Therefore, my article purports to throw light merely on a *direction* in which the revision should be oriented, although my personal estimates included here are all *preliminary* and will need perforce an elaborate reconstruction in themselves.

II. PRIVATE CONSUMPTION EXPENDITURE

Before going into an examination of the national income growth rate, it is necessary for us to take up each component of the G.N.P. The first is private consumption expenditure. In this case as well as in other components there are two problems, i.e. the *level* and the *growth rate*. Even if the levels, say in 1951 and 1961, are underestimated by 10 per cent respectively, this would not affect the growth rate for 1951-61. However, we will be concerned here, above all, with the *level* of private consumption expenditure.

A glance at the estimates for consumption expenditure in the official national income statistics gives rise to the doubt that the proportion of clothing expenditures to total consumption is too low. The reason is as follows: In 1961 its ratio is 8.6 per cent, whereas it is 12.8 per cent for that year, according to the urban worker's family budget survey conducted by the Statistics Bureau of the Prime Minister's Office. Furthermore, it is listed

¹ M. Shinohara, 'Capital Formation in Post-War Japan - a Statistical Evaluation', submitted to the First Asian Conference of Income and Wealth, held in Hongkong in 1960.

as 11.3 per cent in the 1961 fiscal year, according to the Farm Household Economy Survey conducted by the Ministry of Agriculture and Forestry. In other words, the clothing expenditure ratio seems a bit underestimated in the national income statistics in the light of these sample surveys, even after some differences in the definition of consumption (e.g. inclusion or exclusion of imputed rent) are taken into consideration. Consequently, we must first consider why such a discrepancy arose.¹

Table I shows that, in the 1955 inter-industry table, clothing expenditure amounts to 776.4 billion yen. The difference between the two is very wide. I have attempted to estimate some parts of the consumption expenditure by the commodity flow method and also by the retail sales method, and the results which are shown in Table I are very close to that of the input-output table. The commodity flow method starts from the census of manufactures, adjusting the freight and mark-up as well as imports and exports, thus giving the final value of consumption at the point of final purchase. The retail sales method, in this case, uses the wholesalers' sales in the census of distribution as a base, adjusting the margins and freights up to the stage of retail sale, and deducting costs which do not reach the final domestic consumers (e.g. foreign trade, producers' buying, etc.). Theoretically, the retail sales method should start from the retailers' sales, but in Japan the statistical coverage of the retail sector is not good even in the census, and the census of distribution seems to cover only 70-80 per cent of that sector. This is why we have started from the wholesalers' stage.

TABLE I

Estimates of clothing expenditure in 1955

Unit: billion yen

(a) Input-output table	776.4
(b) Commodity flow method (M. Shinohara)	735.2
(c) Retail sales method (M. Shinohara)	759.6
(d) Official national income estimate	403.7

Note: The estimate (a), based on the input-output table, has been adjusted to purchaser's price, by making the necessary additions to the producer's price in the original table.

¹ This point was taken up in the Report of the Consumption-Investment Sub-Committee included in the 'Report of the Consultative Committee on the Revision of the National Economic Accounts', 1962. The author was a member of the drafting committee of the Sub-Committee.

Why does such a gap exist as seen in Table I? The present official estimate of clothing expenditure is an extrapolation of the 1947 benchmark estimate which is based on the retail valuation method (a kind of product approach). The extrapolation up to 1950 is based on an index which is derived from the product of the following three indexes: (1) the index of the volume of commodity supply, (2) the index of total population, (3) the consumer's price index. From 1950 on this is extrapolated on the basis of the family budget surveys. However, what invalidates the results is the fact that the 1947 benchmark year was a year of an acute shortage of commodities whose distribution was controlled and whose prices were affected by hyperinflation. Therefore, the commodities covered are expected to be extremely understated. This is the main reason why a tremendous gap exists between the input-output estimate and the official national income estimate. It is understandable that an estimate which was understated by about 50 per cent in 1947 would be still more understated in 1960, even if the index of extrapolation were fairly reasonable.

TABLE II

Estimates of expenditures on food in 1960

Unit: billion yen

(a) Input-output ¹	3,146.7
(b) Retail valuation method (A. Noda)	3,158.3
(c) Commodity flow and retail valuation methods (M. Shinohara)	3,252.8
(d) Official national income estimate	2,679.3
(e) Based on family budget surveys ²	2,680.7

Notes: ¹ The estimate derived from the input-output table has been raised from producer's price to purchaser's price

² The estimate based on family budget surveys includes not only the food expense in the surveys' list but also the *real* food expense in the item 'miscellaneous' (e.g. gifts of food).

A second main item in consumption expenditures is food. Table II compares the official national income estimate with other estimates for food expenditure. Again, in this table, we find that the estimate from the inter-industry table, my estimate and Noda's figure are all greater than the official national income figure. It is also to be noted that the estimates (a), (b), (c) are very similar to each other and the official national income

figure is almost equal, by chance, to an estimate based on the family budget surveys. On the one hand, the reason why (a), (b), (c) are similar is very clear, for the three employ almost the same statistical method and materials, and the similarity of the three can be a reasonable check on the correctness of the computation. On the other hand, the similarity of (d) and (e) is not a necessary coincidence, for the food expense estimate in the official national income is based on an extrapolation from the benchmark estimate of 1950 by the retail valuation method. However, first, the retail valuation estimate in 1950 was not at that time completely free of the postwar chaos in the distributive process. Second, the family budget survey method does not adequately include the food expenditures made outside the household, for this would be omitted from the housewife's book-keeping if it were spent by the head of the household. Since the level of the official estimate (d) is by chance equal to (e) as based on the family budget surveys, this comment is also applicable to the official national income estimate. Third, if computed from the food expense in the family budget survey for urban worker households, the caloric intake per person per day would be around 1,600 calories, according to Mr. Seiki Nakayama's computation, while the National Nutrition Survey conducted by the Ministry of Public Welfare suggests that the national average of caloric intake is around 2,000 calories. This indicates a considerable underestimation in the food expenditure estimates based on the family budget surveys. Fourth, it is a widely prevailing custom for companies to spend large amounts of money in entertaining guests, and for employees to partake in such entertainment. If these company entertainment expenditures amount to a considerable figure, the estimate based on the family budget surveys as well as the official national income estimate (since it is virtually the same amount) may be an underestimation. To some extent a company's entertainment expenses should be treated as an expenditure on intermediate products. But, if the national income is a barometer of economic welfare, such an expense cannot be neglected in the estimate of food expenditures.

There are many other problems in relation to other items, e.g. medical care, transportation and communication, rent, etc., but the items of food and clothing are most important. We have briefly explained the problems with respect to levels underlying the present national income estimate relating to these two items

of consumption expenditures. However, the 'level' problem is one thing and the 'growth rate' evaluation is another thing. As we have said already, if the levels of two years compared with each other are equally underestimated, it may not affect the rate of growth.

Taking into consideration our estimates of the understatement of food and clothing expenditures in the official national income statistics, and since my estimate by the commodity flow method still does not cover all items, we are going first to compose a series based on the private consumption expenditure estimates in the input-output tables (1951, 1955, and preliminary 1959).

Table III shows the process of our estimation. First, the private consumption expenditures as defined for the input-output tables are adjusted to the definition of the national income statistics (e.g. with the addition of imputed interest). Second, since they are in calendar year terms, they are converted to fiscal years by multiplying by the ratio of fiscal to calendar consumption for the official statistics. Third, the derived figures for private consumption in 1951, 1955, and preliminary 1959

TABLE III

Private consumption expenditure based on input-output tables

Unit: billion yen

A. Adjusted to the National Income Definition

Calendar year	Private consumption expenditure input-output table	Adjusted to the national income definition	Private consumption expenditure national income statistics	Converted to fiscal year ⁴
	(a)	(b)	(c)	(d)
1951	3,281.2 (51.0) ¹	3,193.5 (53.8) ¹	2,863.2 (57.1)	3,366.4 (55.5)
1955	6,435.5 (100.0) ²	5,934.1 (100.0) ²	5,011.1 (100.0)	6,061.3 (100.0)
1959	8,731.8 (135.9) ³	8,017.0 (135.9)	6,704.9 (133.8)	8,222.8 (135.7)

Sources: ¹ The Ministry of International Trade and Industry, *Inter-industry Analysis of the Japanese Economy* (in Japanese), Oriental Economist Co. Ltd., 1957, p. 535.

² Statistical Standard Bureau, '1955 Inter-industry Table and National Income Statistics', March 1963. (Mimeographed.)

³ The Ministry of International Trade and Industry, *Inter-industry Analysis of the Japanese Economy by the Input-Output Table* (in Japanese), Sobunsha, 1962, p. 415.

⁴ Converted by the ratio of fiscal to calendar year figures of consumption expenditure in the official national income statistics.

B. Inter- and extrapolation by the Official Consumption Series

Fiscal year	Private consumption expenditure (official)	Private consumption (input-output table)	Inter- and extrapolated	Aggregate consumers' price index	Private consumption expenditure in real terms
1951	3,018.2 (59.0)	3,336.4 (55.5)	3,366.4	85.3	3,946.5
1952	3,679.0 (71.9)	(69.3)	4,200.5	88.7	4,735.5
1953	4,351.5 (85.0)	(83.3)	5,049.1	95.7	5,276.0
1954	4,740.2 (92.6)	(91.7)	5,558.2	100.5	5,530.5
1955	5,118.5 (100.0)	6,061.3 (100.0)	6,061.3	100.0	6,061.3
1956	5,501.9 (107.5)	(107.8)	6,534.1	101.2	6,456.6
1957	5,980.1 (116.8)	(117.5)	7,122.0	103.6	6,874.5
1958	6,294.0 (123.0)	(124.0)	7,516.0	103.2	7,282.9
1959	6,877.0 (134.4)	8,222.8 (135.7)	8,222.8	105.1	7,823.8
1960	7,694.2 (150.3)	(151.9)	9,207.1	108.3	8,501.5
1961	8,920.1 (174.3)	(176.3)	10,686.1	115.2	9,276.1

are used as benchmarks, and other years are estimated by inter- or extrapolation. These are deflated by an aggregate consumer price index in which the urban and farm household consumer price indices are averaged with weights of 7 and 3 respectively.

These are our estimates of the consumption expenditure which raise its level to that of the input-output tables. An examination of the growth rate will be postponed to the latter part of this paper.

III. FIXED CAPITAL FORMATION

I submitted to the First Asian Conference of Income and Wealth held in Hongkong in 1960 a paper entitled 'Capital Formation in Postwar Japan - A Statistical Evaluation' which dealt with the fixed capital formation estimates. In that paper, I attempted to re-examine the official estimate in the light of my own estimate by the commodity flow method. Although there is no substantial difference for the calendar year 1951 between the input-output table figure and my figure based on the commodity flow method and the official figure, we found a significant difference between them for the calendar year 1955. We have included in Table IV another recent estimate by the Economic Research Institute of the Economic Planning Agency. This is often called the 'Akabane estimate' in Japan, after the main researcher. Of these, my estimate in 1955 is the highest, and my

preliminary interpretation of the large difference was as follows. 'If, in various firms, a part of capital purchases are charged to current account, as in U.S. firms (e.g. small equipment, replacement parts, and even certain major equipment for tax reasons), this part of tangible fixed assets will not show up in their capital accounting. . . . The estimate by the commodity flow method includes the above portion, but the estimate by the incremental assets method does not.' However, it is still not clear why such

TABLE IV
Fixed capital formation estimates
Unit: billion yen

Calendar year	Official estimate ¹	Input-output ¹ table	Akabane's estimate ¹	Shinohara's estimate ²
1951	1,006.3	964.5	1,050.6	1,079.5
1955	1,469.0	1,682.5	1,541.6	1,869.9

Sources: ¹ For the official estimate, input-output estimate, and Shinohara estimate, see sources already mentioned.

² The Akabane estimate was recently published in *Capital Stock and Economic Growth* (in Japanese), 1962, E.P.A., Economic Research Institute.

a difference existed only for 1955 and not for 1951. Moreover, in the 1955 input-output table, the fixed investment is estimated as 1,682.5 billion yen, which is higher than the official estimate by 14.5 per cent, but lower than my estimate by 10 per cent, even where the same commodity flow method was employed in the estimate. We cannot explain the difference, but we may doubt my 1955 estimate. On the other hand, Mr. T. Akabane's new estimate falls about half-way between the input-output and the official estimate. Essentially, the Akabane estimate employs the incremental assets method, but it seems to me that his new estimate has three merits. First, he consistently followed one method and one source of data in his estimates of the components of fixed investment. In the official estimate there has not always been such a continuity of method. Second, his fixed investment estimate in 1955 prices, adjusted by the excess of exports to imports of equipment, is very close to the index of the volume of investment goods shipments made by the Ministry of International Trade and Industry as shown in Table V.

TABLE V
A check on Akabane's estimate

Calendar year	Real fixed investment adjusted by the exports-imports difference (1955 = 100)	M.I.T.I.'s index of investment goods shipment (1955 = 100)
1951	77.5	74.9
1952	82.3	78.1
1953	94.8	92.5
1954	101.6	105.7
1955	100.0	100.0
1956	121.9	124.1
1957	148.0	162.3
1958	159.9	161.7
1959	187.1	185.2
1960	249.8	248.8

Source: E.P.A., Economic Research Institute, *Capital Stock and Economic Growth*, 1962, pp. 43-44.

Third, with respect to residential housing, Akabane raised the adjustment rate so as to correct the understatement in the basic building statistics, from 1.3 to 1.8. Therefore, as far as residential housing is concerned, the Akabane estimate may be more adequate in view of the prevailing opinion among experts that the building statistics are understated.

I believe that the levels of the official and the Akabane estimates may still be underestimated, but the main concern here lies in the trend, so we have decided to use the Akabane estimate as far as corporate fixed investment and residential housing are concerned. Concerning unincorporated firms' fixed investment and Government fixed investment, we adopt the official estimates without any revision. The final results thus revised are shown in Table VI. A comparison with the official estimate and analysis of the growth rate will be made in the latter part of this paper.

One problem remains with reference to the deflation of fixed investment. In the official national income statistics, the Bank of Japan producers' goods price index has been used, but it is quite inadequate for this purpose, for it includes a lot of producers' goods other than capital goods, such as textile yarn, chemical fertilizer, coking coal, and other raw materials. Hence for 1952-61 the producers' goods price index shows a 5.1 per cent increase, and the capital goods price index a 25.4 per cent increase. In Akabane's estimate, therefore, the national wealth deflator was used, instead of the producers' goods price index.

TABLE VI
Fixed investment percentages revised
 Unit: billion yen

Fiscal year	Personal residential housing (Akabane's) ¹	Corporate fixed investment (Akabane's)	Unincorporated firms' fixed investment (official)	Government fixed investment (official)	Total	Capital goods price index ²	Real fixed investment	Real private fixed investment
1951	110·8	584·8	133·0	353·1	1,181·7	100·3	1,178·2	715·7
1952	147·8	472·9	168·7	437·8	1,227·2	97·1	1,263·9	660·8
1953	194·0	637·7	183·7	632·6	1,648·0	103·1	1,598·4	796·7
1954	195·2	639·6	190·3	605·2	1,630·3	98·5	1,655·1	842·5
1955	217·6	646·9	172·9	587·3	1,624·7	100·0	1,624·7	819·8
1956	264·4	1,209·6	203·4	663·4	2,340·8	117·2	1,997·3	1,205·6
1957	308·2	1,525·5	244·9	814·2	2,892·8	118·0	2,451·5	1,500·3
1958	329·3	1,376·9	221·5	913·3	2,841·0	107·3	2,647·7	1,489·6
1959	386·5	1,781·5	268·5	1,076·9	3,513·4	110·9	3,168·1	1,848·5
1960	483·2	2,630·5	313·7	1,307·8	4,735·2	113·6	4,168·3	2,591·7
1961	633·8*	3,594·7*	331·9	1,740·1	6,300·5	123·1	5,118·2	3,189·8

Notes:

¹ In *Capital Stock and Economic Growth*, only the calendar year figures on personal residential housing are available, so we have converted them to a fiscal year basis by multiplying the official fiscal figures of personal residential housing by the ratio of Akabane's estimate to the official estimate in the calendar year.

² The capital goods price index is a special index in the Bank of Japan's wholesale price index (originally 1952 calendar year = 100), covering construction materials as well as investment goods in a narrower sense.

* Preliminary estimates by the writer.

As Table VII suggests, there is a fairly close correspondence between the capital goods price index and the national wealth deflator. In view of this, it seems much more satisfactory to use the capital goods price index (or the national wealth deflator) as a deflator of fixed investment. However, the wholesale price index of the Bank of Japan was completely revised in 1963, and all indexes have now been changed to 1960 = 100. In this new series, the term 'capital goods' is used in a narrower sense, and the term 'investment goods' is used in the same sense as 'capital goods' in the old index (including construction materials). In the 'investment goods price index' in the new series, the rate of increase is extremely small (1960 = 100, 1961 = 102.5, 1962 = 102.1). This may be partly due to the highly reduced weight in the new index of lumber, the price of which has recently increased most conspicuously.

TABLE VII
Various investment goods price deflators

Calendar year	Producers' goods price index	Capital goods price index ¹	Producers' goods price index, other than capital goods	National wealth deflator ²
1951	102.4	—	—	86.8
1952	105.2	98.7	113.3	94.4
1953	105.5	102.7	108.9	99.7
1954	101.8	101.8	101.5	99.8
1955	100.0	100.0	100.0	100.0
1956	108.8	114.1	102.2	113.8
1957	113.0	122.6	100.9	123.2
1958	102.8	109.8	94.1	109.2
1959	103.8	111.6	93.9	112.6
1960	104.8	113.8	93.4	113.8

Notes: ¹ Quoted from *Capital Stock and Economic Growth*, p. 49

² The 'national wealth deflator' is derived by dividing the current value of total real fixed investment (in 1955 prices). The latter is the total of real values of the fixed investments classified by type and structure of asset. In the 1955 National Wealth Survey, the purchase prices of various fixed assets which were bought in various points of time were made comparable by inflating them up to 1955 prices. The real values of national wealth components were thus derived.

Nevertheless, construction prices will reflect not only the rising prices of construction materials but also increasing wage costs in the construction industry. Since technical progress in this industry lags behind the general progress, it is very probable

that the increasing wage rate has raised the price of construction activity. As the capital goods price index has behaved for 1952-60 almost in the same way as the national wealth deflator in which changes in wage cost are adequately reflected, we assume that by using the Bank of Japan's old capital goods price index it would have continued to behave in the same way for 1960-61, too.

IV. INVENTORY INVESTMENT

With respect to inventory investment, the official statistics seem to involve a most striking weakness. First, they always neglect inventory valuation adjustment. Second, inventory investment in non-farm unincorporated enterprises is probably overestimated (three or four times larger than the correct value!), as I have explained in my earlier paper, 'Capital Formation in Post-War Japan - A Statistical Evaluation'. In other words, the inventories at the end of the period are almost all overvalued, and those at the beginning are systematically undervalued in the basic sampling survey, called the 'Unincorporated Commercial and Manufacturing Enterprise Survey'. (Recently it was renamed the 'Unincorporated Enterprise Survey' and included the service industry, too.) The official estimate was based upon this difference, thus always being overestimated. Theoretically, the inventories at the end of a period should be equal to those at the beginning of the next period. Nevertheless, there were systematically big differences between the two in the Survey. The reasons were partially explained in the previous paper. We attempted, first, to get averages of the end of each period and the beginning of the following period respectively, and then computed the differences between the two as more reliable changes in inventories. By this procedure, the number of samples may be considered to have been automatically doubled. We also got a distinctly lower level of inventory investment with a reasonable cyclical movement conforming to the actual business cycle (in the official national income estimate, the inventory changes in unincorporated enterprises lack such a cycle).

Table VIII shows the process by which inventory investment in non-farm unincorporated enterprises was estimated. It is preliminary in the sense that the official estimate was used as a stepping-stone. We intend to derive, first, the adjustment rate

TABLE VIII

Process of an estimate of inventory investment in non-farm unincorporated enterprises

Fiscal year	'the inventories at the end' minus 'the inventories at the beginning'	Manufacturing Shinohara's estimate	(b _m) (a _m)	Wholesale and retail trades 'the inventories at the end' minus 'the inventories at the beginning'	Shinohara's estimate	(b _c) (a _c)	Share of the numbers of individual manufacturing proprietors	Weighted averages of c _m and c _e	Non-farm unincorporated enterprise inventory changes (official)	e x f
	a _m yen	b _m yen	c _m %	a _c yen	b _c yen	c _e %	d %	e %	f billion yen	g billion yen
1951	—	—	—	—	—	—	32.3	—	81.4	+25.3
1952	+66,696	-135,762	—	+77,271	-147,611	—	25.8	—	122.6	+6.7
1953	+30,258	+4,211	+13.9	+79,395	+17,561	+22.1	26.7	+19.9	132.8	+26.4
1954	+35,303	+13,583	+38.5	+65,024	+12,460	+19.2	25.6	+14.1	113.8	+16.0
1955	+32,685	+5,212	+15.9	+65,577	+11,616	+17.7	26.8	+17.2	109.5	+18.8
1956	+35,717	+30,755	+86.1	+66,711	+39,708	+59.5	24.7	+66.1	101.3	+67.0
1957	+59,724	-43,692	-73.2	+52,976	-11,112	-21.0	24.3	-33.7	97.1	-32.7
1958	+41,207	+45,117	+109.5	+100,505	+42,212	+42.0	24.9	+58.8	101.9	+59.9
1959	+40,061	+51,381	+128.3	+65,257	-22,212	-35.2	22.4	-1.4	99.9	-1.4
1960	+89,124	-18,775	-21.1	+100,592	+38,016	+37.8	29.3	+20.5	169.7	+34.8
1961	+72,328	-9,438	-13.0	+133,523	+46,362	+34.7	31.2	+19.8	170.2	+33.7

Notes:

- (1) (a_m) and (a_c) come from the 'Unincorporated Commercial and Manufacturing Enterprise Survey', conducted by the Statistics Bureau of the Prime Minister's Office.
- (2) Shinohara's estimates (b_m) and (b_c) are as explained in the text.
- (3) (d) is the proportion of the individual manufacturing proprietors in the total number of individual proprietors in manufacturing and commerce, based upon the Labour Force Survey.
- (4) The figures are in terms of inventory changes per unit of enterprise.
- (5) For 1951 and 1952 the extrapolation in the final column of this table (g) was based on the inventory changes recorded for corporate enterprises with capital of less than 10 million yen.

which would eliminate the upward bias in the official estimate. This rate is estimated in Table VIII, by comparing the inventory difference between the end and beginning of each period with my own estimate with respect to the inventory investment (adjusted by inventory valuation). Multiplying the official estimate by this ratio, we obtain the inventory investment in non-farm unincorporated enterprises. However, for the years before 1952, we have decided to extrapolate it on the basis of the inventory changes in the lowest group (less than 10 million yen of capital) of corporate enterprises.

Corporate inventory investment is estimated, after inventory valuation adjustment, from the quarterly report of the Corporate Enterprise Survey, without introducing any adjustment as to the exclusion of firms with a capital of less than 2 million yen from the quarterly report, for it seems to be of a trivial amount.

The Government inventory changes do not include those of the local government corporations since they are included with Government fixed investment. However, it is impossible to break them down here, and we used the official estimate without modification. Inventory changes for individual farm proprietors are also quoted from the official national income statistics, for in view of the extreme weakness in the basic data no improvement can be expected from an attempt at revision.

Consequently, the main improvement in our series lies in the revision of the inventory investment of non-farm unincorporated enterprises.

V. GOVERNMENT CONSUMPTION OF GOODS AND SERVICES

As far as the *current value* series is concerned, we do not intend to introduce any modification in the official estimate of Government current purchases of goods and services. However the official series in *real terms* adopts the aggregate consumer price index as a deflator. This seems unsatisfactory, for the real value of Government consumption of 'services' would be the volume of Government services themselves, so the compensation of Government employees should be deflated by their salary index.¹ It is only the Government current purchases of goods that should be deflated by a commodity price index.

¹ I owe this point to a discussion with Shigeto Tsuru as well as to Milton Gilbert, *Comparative National Products and Price Levels*, 1958.

TABLE IX
Inventory investment estimate
Unit: billion yen

Fiscal year	Corporate inventory investment (Shinohara)	Inventory changes in individual farm proprietors (official)	Inventory investment in non-farm unincorporated business (Shinohara)	Government inventory changes (official)	Total (a+b+c+d)	Private inventory investment (a+b+c)	Wholesale price index	Real total inventory investment (e/g)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1951	+ 312.6	+85.1	+25.3	+ 58.6	+ 481.6	+ 423.0	103.2	+ 466.7
1952	+ 12.7	+39.9	+ 6.7	+ 36.2	+ 95.5	+ 59.3	101.2	+ 94.4
1953	+ 363.2	+35.1	+26.4	+ 10.2	+ 434.9	+ 424.7	103.5	+ 420.2
1954	+ 82.5	+37.8	+16.0	- 12.6	+ 123.7	+ 136.3	100.5	+ 123.1
1955	+ 128.5	+77.3	+18.8	+127.7	+ 352.3	+ 224.6	100.0	+ 352.3
1956	+ 593.0	- 6.2	+67.0	+ 28.3	+ 682.1	+ 653.8	106.2	+ 642.3
1957	+ 584.0	+51.7	-32.7	- 5.6	+ 603.0	+ 597.4	105.8	+ 569.9
1958	+ 13.9	+29.7	+59.9	+ 14.7	+ 118.2	+ 103.5	99.9	+ 118.3
1959	+ 551.6	+15.0	- 1.4	+ 38.4	+ 603.6	+ 565.2	102.2	+ 590.6
1960	+ 619.2	+20.7	+34.8	+ 32.3	+ 707.0	+ 674.7	102.0	+ 693.1
1961	+1,577.8	+31.9	+33.7	- 12.3	+1,631.1	+1,643.4	102.9	+1,585.0

Notes:

(1) (a) and (c) are figures obtained through inventory valuation adjustment.

(2) (b) and (d) are official estimates, and leave room for revision. The data for farm inventories in particular are not very reliable.

Consequently, our first problem is to divide the Government current purchases into 'goods' and 'services'. For current purchases of goods, we used the Bank of Japan wholesale price index of consumer goods. Although the official real series employs the aggregate consumer price index, it is not a satisfactory deflator of Government current goods purchases, for the

TABLE X

Real Government current purchases of goods and services

Fiscal year	Total current expenditures of central and local governments, excluding duplications (a)	Government current purchases of goods and services (b)	Compensation of Government employees (c)	$\frac{c}{a}$ (d)	$\frac{c}{b}$ (e)	Wholesale price index of consumer commodities (f)
	billion yen	billion yen	%	%	%	%
1951	1,139.0	552.8	264.0	23.2	47.8	96.6
1952	1,368.7	681.5	393.5	28.7	57.7	96.0
1953	1,622.9	767.8	477.7	29.4	62.2	101.2
1954	1,751.0	845.8	551.2	31.5	65.2	102.4
1955	1,717.8	889.1	584.8	34.0	65.8	100.0
1956	1,812.5	936.5	619.7	34.2	66.2	100.5
1957	2,001.9	1,013.6	674.1	33.7	66.5	101.0
1958	2,208.6	1,074.3	726.8	32.9	67.7	98.2
1959	2,439.5	1,177.1	790.7	32.4	67.2	100.6
1960	2,872.3	1,342.9	921.6	32.1	68.6	103.2
1961	3,580.8	1,589.9	1,081.4	30.2	68.0	104.6

Fiscal year	Real Government current purchases of goods (b-c)/f (g)	Salary per man per year in central Government (h)	Real Government current purchases of services c/h (i)	Real Government current purchases of goods and services (g + i) (j)
	billion yen	yen	billion yen	billion yen
1951	299.0	126,841 (46.8)	564.1	845.6
1952	300.0	178,431 (65.8)	598.0	892.5
1953	286.7	223,928 (82.6)	578.4	857.9
1954	287.7	267,700 (98.7)	558.5	841.8
1955	304.3	271,100 (100.0)	584.8	889.1
1956	315.2	286,556 (105.7)	586.3	900.3
1957	336.1	320,232 (118.1)	570.8	902.0
1958	353.9	337,250 (124.4)	584.2	926.2
1959	384.1	360,193 (132.9)	595.0	974.9
1960	408.2	408,076 (150.5)	612.4	1,015.2
1961	486.1	483,408 (178.3)	606.5	1,066.7

Sources: The Budget Bureau, The Ministry of Finance, *The Fiscal Statistics* (in Japanese), 1962. As this source was incomplete, I am indebted to the Research Section of the Secretariat, The Ministry of Finance for assistance in compiling the above series.

consumer price index covers services and the weight attached to food makes it inappropriate for deflating Government current goods purchases. We therefore used the wholesale price index for consumer goods as a second best.

For the earnings of Government employees, we used as a deflator the salary index of the central Government officials, because salaries in local government have moved in parallel with those of the central Government, with occasional lags in certain places.

VI. GROWTH RATE CONSIDERATIONS

The evidence on current payments and receipts by the rest of the world suggests no great differences from the official estimates. Our only change was to use the recent revision of the export and import price indexes by the Ministry of Finance to provide new deflators.

This process of reconstructing the G.N.P. components and their deflators enabled us to re-examine the national income growth rate in postwar Japan from the expenditure side. In this sense, the reconstruction in Table XI is only tentative. A complete revision is now going on in the Economic Planning Agency.

Our preliminary amendments are contained in Table XI, in which the G.N.P. components in current prices as well as in 1955 prices are shown. From this, we can compute the growth rate for a real G.N.P. and its components. We can also compare the official series with ours. To make a computation of growth rates, we have decided to fit a linear logarithmic equation ($\log X = a + bt$) to these data, and then compute their annual rates of growth. Table XII is a result of this computation.

There are several points to be noticed:

(1) *G.N.P. as a whole.* Our series differs from the official series in that it is higher, even if the difference in the G.N.P. growth rate for 1951-61 is comparatively small. However, the difference in the G.N.P. growth rates is as follows:

	Our estimate of growth %	Official estimate of growth %
1951-55	8.14	7.47
1955-61	9.86	10.63
1951-61	8.91	9.08

TABLE XI

Reconstructed G.N.P. Components

Unit: billion yen

A. G.N.P. in current values

Fiscal year	Private consumption expenditure	Fixed capital formation	Inventory investment	Government current expenditure on goods and services	Current payments by foreign countries	Current receipts by foreign countries	G.N.P.
1951	3,366.4	1,181.7	481.6	552.8	908.6	- 699.2	5,791.9
1952	4,200.5	1,227.2	95.5	681.5	830.1	- 750.6	6,284.2
1953	5,049.1	1,648.0	434.9	767.8	916.4	- 928.9	7,887.3
1954	5,558.2	1,630.3	123.7	845.8	960.8	- 830.6	8,288.2
1955	6,061.3	1,624.7	352.3	889.1	1,092.5	- 951.2	9,068.7
1956	6,534.2	2,340.8	682.1	936.5	1,272.3	-1,373.0	10,392.9
1957	7,122.0	2,892.8	603.0	1,013.6	1,385.5	-1,439.6	11,577.3
1958	7,516.0	2,841.0	118.2	1,074.3	1,354.5	-1,159.8	11,744.2
1959	8,222.8	3,513.4	603.6	1,177.1	1,614.8	-1,501.1	13,630.6
1960	9,207.1	4,735.2	707.0	1,342.9	1,822.0	-1,801.4	16,012.8
1961	10,686.1	6,300.5	1,631.1	1,589.9	1,903.5	-2,254.0	19,857.1

B. G.N.P. in 1955 prices

1951	3,946.5	1,178.2	466.7	863.1	721.7	- 558.0	6,618.2
1952	4,735.6	1,263.9	94.4	898.0	728.8	- 667.8	7,052.9
1953	5,276.0	1,598.4	420.4	865.1	845.4	- 920.6	8,084.5
1954	5,530.5	1,655.1	123.1	846.2	922.1	- 844.1	8,232.9
1955	6,061.3	1,624.7	352.3	889.1	1,092.5	- 951.2	9,068.7
1956	6,456.6	1,997.3	642.3	901.5	1,222.2	-1,288.0	9,931.9
1957	6,874.5	2,451.5	569.9	906.9	1,312.0	-1,323.2	10,791.6
1958	7,282.9	2,647.7	118.3	938.1	1,347.8	-1,277.3	11,057.5
1959	7,823.8	3,168.1	590.6	979.1	1,581.6	-1,679.1	12,464.1
1960	8,501.5	4,168.3	693.1	1,020.6	1,777.6	-2,030.9	14,130.2
1961	9,276.1	5,118.2	1,585.0	1,092.6	1,905.4	-2,541.1	16,436.2

TABLE XII

Growth rates of reconstructed G.N.P. and its components in 1955 prices

Fiscal year	G.N.P.	Private consumption expenditure	Fixed capital formation	Inventory investment (per cent)	Government current expenditure on goods and services	Current payments by foreign countries	Current receipts by foreign countries
1951-55	8.14	10.66	9.55	- 3.02	-0.01	11.23	13.89
1955-61	9.86	7.24	20.28	18.27	3.43	9.72	15.76
1951-61	8.91	8.03	15.15	15.14	2.09	10.76	14.60

TABLE XIII

Comparisons of G.N.P. estimates and implicit deflators

Fiscal year	Official estimate of G.N.P. (a)	Our estimate of G.N.P. (b)	$\frac{b}{a}$ (c)	Implicit G.N.P. deflator in official estimate (d)	Implicit G.N.P. deflator in our estimate (e)	(e-d) (f)
	billion yen	billion yen				
1951	5,444.2	5,791.2	1.064	(89.6)	87.5	-2.0
1952	6,118.0	6,284.2	1.027	(91.8)	89.1	-2.7
1953	7,084.8	7,887.3	1.113	98.1	97.6	-0.5
1954	7,465.7	8,288.2	1.110	100.0	100.7	+0.7
1955	8,235.5	9,068.7	1.101	100.0	100.0	0.0
1956	9,292.9	10,392.9	1.118	103.5	104.6	+1.1
1957	10,149.8	11,577.3	1.141	104.8	107.3	+2.5
1958	10,394.7	11,744.2	1.130	104.0	106.2	+2.2
1959	12,572.5	13,630.6	1.084	106.6	109.4	+2.8
1960	14,664.9	16,012.8	1.092	109.9	113.3	+3.4
1961	17,701.5	19,857.1	1.122	116.4	120.8	+4.4

Note: The bracketed deflator in column (d) is not an implicit deflator, but a weighted average of component price indexes with 1955 fixed weights.

In other words, there is a difference in their levels, but not a significant difference in the growth rate.

(2) *Private consumption expenditure.* Our estimate indicates a higher growth rate than does the official series. Consumption growth rates from the two sources compare as follows:

	Our estimate of growth %	Official estimate of growth %
1951-55	10.66	8.84
1955-61	7.24	7.11
1951-61	8.03	7.32

(3) *Real Government expenditure on goods and services.* This is greatly reduced by adopting a new deflator. The official real series suggests a growth rate of 6.07 per cent, which compares with 2.09 per cent in our series. The reason is obvious for we have defined the real value of compensation for Government employees as the volume of the services themselves.

(4) *Inventory investment.* Inventory investment of non-farm unincorporated enterprises is considerably reduced, but as a total figure, our estimate is lower in the earlier period, but not so much lower in the later period. In other words, the growth rate of inventory investment suggested by our series is higher than in the official series.

(5) *Fixed investment.* Here the different deflator probably caused a difference in growth rates. The lower rate of increase in the wholesale price index of 'producers' goods' as opposed to that of 'capital goods' would itself have brought about a higher growth rate in the official fixed investment series.

	Our estimate %	Official estimate %
1951-55	9.55	11.00
1955-61	20.28	23.45
1951-61	15.15	17.94

(6) *The G.N.P. estimates compared.* The official estimate of the G.N.P. and our own estimate are compared in Table XIII. On average, our estimate is about 10 per cent higher but the ratio of the two shows a cyclical fluctuation which is mainly due to the oscillations in our inventory investment series. For 1951-55,

this ratio rises from 1.064 to 1.101, while for 1955-61 it is almost constant (1.101-1.222). This may partly explain why the G.N.P. growth rate in our estimate is higher for 1951-5, but not for 1955-6. For the implicit G.N.P. deflator, our estimate indicates a steeper rise, and this explains why the real G.N.P. growth rate in our series is lower than in the official series, although the rate of increase in money G.N.P. is higher in ours.

(7) *Industrial production.* The growth rate of industrial production is 11.55 per cent for 1951-5, 15.41 per cent for 1955-61, and 13.91 per cent for 1951-61 (based on calendar year figures). It is not surprising to find such a very high industrial growth associated with a G.N.P. growth rate approaching 9 per cent.

VII. CONCLUSION

Our statistical evaluation of the postwar growth rate of the Japanese economy as reflected in national income statistics is not perfect in the sense that we have focused attention only on the expenditure side of the G.N.P. However, we can arrive at a few conclusions.

(1) There seems to be a consistent undervaluation of private consumption expenditure in the official estimate, but its upward revision has also raised the consumption growth rate to some extent.

(2) There is a tremendous overvaluation of inventory investment in non-farm unincorporated enterprises. Its statistical improvement has entailed a reduction of total inventory investment, particularly in the earlier period, revealing more fluctuations in inventory investment.

(3) The trend of the fixed investment deflator in the official estimate is relatively flat, owing to the inclusion of various raw material items in the composition of the producers' goods price index. However, restricting it to capital goods has raised its trend so that in real terms the investment series shows a lower rate of growth.

(4) The most drastic change has appeared in the series of real Government current expenditures for goods and services. By applying a salary index of Government officials as a deflator of compensations for Government officials, the growth rate of Government current expenditure undergoes a very noticeable reduction.

(5) On the whole, our G.N.P. implicit deflator shows a steeper rise than the official figure, and this more than cancels the higher money value of the G.N.P. in our estimate.

(6) In spite of the remarkable change in the composition of the nominal and the real G.N.P. in our estimate, the G.N.P. growth rate is still very high, approaching 9 per cent.

(7) Although these conclusions still leave some room for further examination, particularly on the income side, it is beyond doubt that the extremely high rate of growth in Japan in recent years was not a mere statistical illusion, judging by the evidence of the input-output tables and the very brisk activity in industrial production.

Of course, we cannot anticipate a continuation of this extraordinary rate of growth that we experienced in the 1955-61 period. First, in 1955, the proportion of private fixed investment in G.N.P. (9.5 per cent) was relatively low compared with the high growth potential for 1955-61, so we encountered an unprecedented investment boom, but the private fixed investment ratio in 1961 reached the high ratio of 22.9 per cent, which will not continue to rise, even if we assume a similar growth potential for G.N.P. in the coming period. Second, since around 1959, we have experienced an increasing labour shortage as well as the narrowing wage differential between the big and small enterprises. The consumer price index has tended to increase from 1959 very clearly. This is an indication that sooner or later the growth rate will be obliged to slow down. Third, the heavy industry ratio in manufacturing (in terms of value added) has amounted to 60 per cent in 1960 which is among the highest in the capitalist world, so the heavy industrialization would not be expected to proceed beyond this ratio. Fourth, although the wide gap in technology between Japan and the advanced countries has been the background of the investment boom from 1955 on, the rate of introduction of foreign technology would be slower as the gap narrows. However, though we may expect some retardation of our growth rate, Japan's economic growth potential still seems to be higher than that of western countries for some time to come, for some of the long-run factors of a high rate of growth will remain.