

# Notes on an Alternative Method of Estimating the National Income and Expenditure of Japan, 1881

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## 1. Introduction<sup>1)</sup>

In the pioneer works of Professors Yamada and Ohkawa, national income totals for the early years of modern Japan are obtained as extrapolation of benchmarks around the 1920's. In this paper, we will attempt to establish an independent benchmark for an earlier year, specifically 1881. The following estimate is frankly a *trial* effort whose main purpose is to explore the feasibility of establishing an early benchmark.

The approach depends heavily on the labor force statistics from the *koseki-hyo* or the family registration records. Earnings data are culled from various government reports and the *Teikoku Tokei Nenkan*. In computing national expenditures, budget statistics and import data are used. Private consumption is obtained as a residual, as is commonly done in the national income tables of most underdeveloped countries today. The resulting estimates are thought to be crude but no cruder than those published by several underdeveloped countries in Asia and Latin America today.

## 2. National Income, 1881

Though the labor force data from the *koseki-hyo* for 1876 and 1883 and the wage statistics need to be studied more thoroughly than the writer has been able to do, preliminary analysis indicates that they are usable for national income purposes. The following distribution of occupied population is obtained from the *koseki-hyo*:

1) The paper is a condensation of one too lengthy to be presented in this magazine. It has been read and commented on by Mr. James Nakamura of Columbia University, Professor Myohei Shinohara of Hitotsubashi and Professor Tsunehiko Watanabe of Tokyo University.

Table 1.

Distribution of The Gainfully Occupied Population

	Unit 1,000 Persons		15 Years and Above		1881
	Jan. 1, 1876	% of Total	Jan. 1, 1883		
Total Occupied Persons	20,362	100	21,323		20,850
Agriculture	15,761	77.4	16,856		16,350
Industry	747	3.7	793		770
Commerce	1,358	6.7	1,443		1,400
Government	98	0.5	67		
Personal Services	415	2.4	...		2,330
Miscellaneous	1,984	9.7	2,165		
Total Population	34,171		36,653		
Persons 15 Years and Above	23,862		...		
Percent of Occupied Persons to:					
Total Population	59.6		58.2		
Persons 15 Years & Above	85.3		...		

The sources are *Genju Jinko Seitai ni Kansuru Tokei Zairyo*, Ishin Igo Teikoku Tokei Zairyo Isan, Naikaku Tokei Kyoku, No. 2, Feb. 1913, for 1876 data. *Meiji Zenki Zaisei Keizai Shiryo Shusei*, Vol. 18, for 1883 data. An average for the two years is taken for 1881, although such refinements may not be warranted by the quality of the data. Adjustments have been made to the figures in the first source for a few prefectures where female labor force in agriculture appears implausibly low and for a few other aspects. The totals exclude Okinawa.

The high proportions engaged in agriculture are plausible for Japan in 1876 when industrialization had not started. This is so when compared with those in present day underdeveloped countries or with those of later Japanese censuses<sup>2)</sup>.

### 2) Changes in Labor Force Proportions in Japan

	1876	1920	1930	1940	1950
% of population in labor force	60	49	46	47	44
% of population 15 yrs. & above in labor force	85	73	70	71	66

**Note:** Data from respective censuses. The gradual decline in both columns (except for 1930, a depression in which one may expect a shrin-

If these figures are examined on a prefectural basis, the labor force participation ratios do not vary much, except for a few prefectures, as do the Indian censuses of 1921, 1931 and 1941. The few are Tokyo and Osaka where agriculture is of lesser importance and urbanization is greater and three others where female agricultural participation is abnormally low. Adjustments have been made in the latter.

The totals for each division agree approximately with data from other sources. Volume 6 of the *Tokei Nenkan* shows 15.7 million persons engaged in agriculture in December 1884. Volume 5 shows 1.2 million households in trades of various kinds and the number reported in commerce for 1876 and 1883 is 1.3 and 1.4 million respectively. The totals for doctors, priests and officials (excluding lower employees) check fairly closely with government payroll data as reported in the *Tokei Nenkan*<sup>3</sup>.

Two major defects in the labor force figures should be mentioned. First, the registration census does not give sufficient details for each major sector. This is particularly inconvenient for the service sector which is made up of a number of heteroge-

kage in the labor force due to the limited job opportunities) is plausible. The drastic fall from 1876 to 1920 in column 1 is probably due to the widespread establishment of higher schools absorbing persons 15 years and above in education, and more important the greater urbanization of Japanese economic life, carrying with it a smaller participation of women in the labor force.

3). However, the total for fishery as reported by the Agriculture Department is five times larger than the *koseki-hyo*. This discrepancy is due to the fact that most of the Agriculture Department's figure includes fishermen with agriculture as a subsidiary occupation. And since the latter was a socially more respectable occupation, the tendency for such individuals to report themselves as farmers is understandable. The *koseki-hyo*'s total of teachers is only one-seventh of the Education Ministry's total. The reason is that in the rural areas, most of the farmers filled in as teachers in the elementary grades since the latter were part-time occupations.

neous occupations. The following groups may be identified for 1881. In Table 1, an estimate for the service sector of 2.3 million was obtained. The total number employed by the government (including officials, lower employees, armed forces, police, priests, teachers, etc., but excluding postal employees and all other enterprise workers) was 390,000 in 1881. The total number of professionals, doctors, dentists, midwives, pharmacists and buddhist priests is 124,000; also 108,000 hunters and fishermen, 415,000 domestic servants. The sum of all these is 1,047,000 which, if deducted from the total of the service sector, leaves 1.3 million persons. The latter are almost entirely composed of day workers, with only a small number of artists, nurses, writers, masseurs and the like. Though not entirely satisfactory, these groupings are sufficiently homogeneous for the computation of incomes below.

The second defect is the exclusion of labor force below 15 years old. The adjustment is worked out as follows:

	Million Persons
(1) Population less than 20 yr. old (from <i>Tokei Nenkan</i> )	14.7
(2) Population 10 to 15 yr. old (23% of (1))	3.4
(3) Total in (2) attending school	.9
(4) =(2) less (3)	2.5
(5) Total occupied in agriculture	18.2
(6) Total occupied in agri. (15 yr. and above)	16.4
(7) Those less than 15 yr. old occupied in agri. (5) less (6)	1.8
(8) =(4) less (7)	.7

#### Notes

- (1) There is no information on age groups 10 to 15 for 1881.
- (2) In 1884, 23% of those below 20 years old were 10 to 15 years old.
- (3) Children (10 to 15 years) attending school is assumed to be outside of the labor force. Since age distribution of elementary school children is not available, and since children 6 to 14 were required to attend school, it was assumed that students



graduating in 1881—1885 were children within the 10—15 year old group in 1881.

(5) Ministry of Agriculture survey, Jan. 1881.

No age limits were stipulated. *Nomu Tokeihyo*, 1883, pp. 13—14.

(6) Table 1.

To recapitulate, the labor force in 1881 is distributed as follows<sup>4</sup>): (thousand persons).

TABLE 2

Labor Force	Total	Agri.	Indu- stry	Com- merce	Services	Govt.
Persons 15 yr. and above	20,850	16,350	770	1,400	1,940	390
Male	12,030	8,990	570	880	1,200	390
Female	8,820	7,360	200	520	740	...
Persons 10—15 years	2,500	1,800		700		
Total	23,350	18,150		5,200		

Income statistics of which there is a paucity is summarized below:

Data for workers are from *Tokei Nenkan*, Volume 2 et al for 1881 and Volume 5 for 1882. Data

4) Agriculture includes forestry, livestock and fishing. Commerce includes transportation, finance and inn-keeping. Industry includes manufacturing, construction and mining. These are industrial classifications, yet the *koseki-hyo* data were collected mainly on an occupational basis. The question arises: how legitimate is it to assume that occupations coincided with industries in the Japanese economy of 1872?

In a system of occupational classification, individuals are directly classified on the basis of the type of work performed while in a system of industrial classification, individuals are indirectly classified—via their attachments to establishments; it is the establishments which are in reality classified and this on the basis of the type of product or service produced by the establishments. To the extent that the type of work performed by the individual is similar or closely related to the product or service of his establishment, there will be little difference between the two types of classification. It is with the rise of modern industry with its extensive division of labor and specialization of occupation that a divergence between the occupation of a person and his industry takes place. In the Japan of 1872, occupations coincided fairly well with industries. The major exception is the government sector. But here the classification used in the *koseki-hyo* was largely industrial.

TABLE 3

Wage and Salary Statistics

(Annual Earnings in Yen)

Male Workers		Civil Service Officials	
Operatives	120	Chokunin	4,488
Masons	114	Sonin	768
Miners, potters	105	Hannin	212
Commercial employees	105	Jun Hannin	185
Transporters, roofers	102	Average	307
Carpenters, plasterers, mat and furniture makers	99	<b>Non-civil Service Employees</b>	
Blacksmiths	96	Skilled, clerical	104
Thatchers	93	Servants, errand boys, etc.	60
Tailors	84	Police	90
Machine weavers	72	Prison guards	83
Day workers	66	<b>Prefectural Employees</b>	
Farm workers	66	Heads or chiefs	520
Servants	33	Secretaries	145
<b>Workers below 15 Yr. Old</b>		Clerks, skilled, etc.	72
Transporters	42	Servants, errand boys, etc.	46
Miners	36	<b>Village Employees</b>	
Operatives	33	Heads	52
<b>Female Workers</b>		Clerks, etc.	26
Mining	57	Servants, errand boys, etc.	22
Machine Weavers	48		
Transporters	47		
Operatives	45		
Farm workers	42		
Day workers	39		
Servants	20		

for government officials and employees are from Volume 3 and apply to 1882. Average daily wages as reported are converted to an annual basis by multiplying daily rates by 300 for male, female and young workers. The procedure is subject to a number of objections.

First, the *Tokei Nenkan* national averages are unweighted averages of prefectural rates. This implies that the daily wage of a carpenter in a predominantly agricultural prefecture is given the same weight as the rates in Tokyo-fu. In a more extensive study, weights should be assigned on the basis of industrial labor force from the 1876 *koseki-hyo*. Where the prefectural variations are large, these national averages may depart significantly from the *Tokei Nenkan* averages.

A work-year of 300 days has been used. In the *Japan Yearbook* 1910, 300—310 days are reported for persons working in government factories and mines. (In his *Kokumin Shotoku no Kosei*, Prof. Hijikata uses 315 days in construction, 324 days in transport and 302 days in commerce, based on the 1925 unemployment census. Clearly more investi-

gation into the duration of the work-year and, indeed, into the full character of the *Tokei Nenkan* wage statistics is called for. (The problem of duplication due to a worker engaging part of the year in agriculture is discussed at the conclusion of this paper.)

To test the plausibility of the annual earnings of workers in Table 2, salary data of government employees are presented. (Monthly salaries are converted into an annual basis by multiplying with 12.) In general, the annual pay of noncivil service employees are consistent with those of workers. One outstanding exception is the earnings of village employees. However, the latter are not full-time equivalent pay since most of the village employees are part-time workers<sup>5</sup>).

The foregoing statistics of labor force and earnings are brought together with other material to estimate income originating in Japan for the year 1881.

	(In million yen)							
	Agri.	Fish.	Ind- ustry	Com- merce	Ser- vices	Young Workers	Gov't	Total
Income	535	19	58	148	120	25	37	942
Indirect taxes less subsidies								18
Depreciation								28
Gross domestic product at market prices								988

#### Notes to the Table

**Agriculture** (including livestock and forestry). Prof. Ohkawa's estimate (in *Nihon Keizai no Seicho Ritsu*) of gross value is 585 million yen and of net value, 505 million yen. Prof. Ohkawa deducts 14% of gross value as intermediate expenses, more than one-half of which is fertilizer costs (about 30 million yen). The cost deduction may be on the high side. According to the *Noshomuasho (Outlines of Agriculture in Japan 1910, pp. 26—29)*, 29 million yen of purchased fertilizer was used in Japan,

5) This difficulty exists for the annual pay of elementary school teachers as reported in the *9th Annual Report of the Ministry of Education* for 1881. Teachers average 107 yen, assistant teachers 82 yen, assistants 50 yen, and clerks, secretaries, servants, errand boys, 24 yen. The work-week estimated from the *Annual Report* comes up to around 30 hours. Another large group of part-time workers are the postal service employees whose annual wages are 30 yen, as reported in the *5th Annual Report of the postmaster General*.

of which 12 million yen was imported. Before 1890, the Noshomusho asserts that commercial fertilizer was hardly used, the main types being human excrement, farmyard, green manure, straw, weeds, leaves, sea-weed, fish and soya bean cake. (In 1881, only 29,000 yen of fertilizer was imported, according to trade statistics.) To the extent that these types of fertilizer are not included as net output originating within agriculture or in the other sectors, there is no need to deduct them as part of fertilizer costs. This is true of other farm expenses. To the extent that tools, equipment and structures are repaired by the farmers and these activities are not included in other sectors, there is no need to take account of them. The same holds for feed and care of draft animals, irrigation costs, cost of transport. Land and acreage taxes are properly regarded as direct taxes. Arbitrarily, one-half of Prof. Ohkawa's percentage is taken to be deductible expenses.

**Fishery.** Prof. Ohkawa's estimate is used.

**Industry.** Average annual wage of adult males is estimated to be 100 yen and multiplied by 570,000 from Table 2. The average wage is approximated by reference to the distribution of industrial occupation as given for Aomori Prefecture in 1882 (see *Ishin Igo Teikoku Tokei Zairyō Isan*, op. cit., Part 2, p. 42.) Carpenters, plasterers, thatchers, roofers, masons, blacksmiths, mat and cabinet makers (with average wages of around 100 yen) comprise 60% of the total male workers in industry in Aomori. Operatives, miners and potters are above 100 yen but tailors and weavers fall below. For 200,000 women in industry (Table 2), 50 yen seems reasonable, (Table 3).

Data on property incomes are not available. In the *Tokei Nenkan*, 2,033 factories employing 61,000 as of December 1882 are reported to have produced a gross value of 11.5 million yen. Arbitrarily, 20% of gross value for 2 million yen is assumed to comprise net profits. This amount is probably an understatement, especially since most of entrepreneurial returns are omitted.

**Commerce.** On the basis of wages for transporters and commercial employees, an estimate of 110



yen for male and 50 yen for female adults are applied to 880,000 male workers and 520,000 workers as given in Table 2. No data on property incomes are available in the *Tokei Nenkan*. In 1881, there were 1,700 non-industrial companies with a total capitalization of 26.4 million yen. Arbitrarily, a 10% profit on the total capital is assumed, or 3 million yen. Entrepreneurial profits are arbitrarily taken to be four times corporate profits or a total of 15 million yen<sup>6</sup>).

**Services.** The division between professional workers, government employees, and all others in Table 2 is used. Income from work is obtained by multiplying 124,000 workers in the first group by 200 yen. In the *Tokei Nenkan*, Volume 5, government hospitals are reported to have paid an average of 240 yen to their regular staff members. Average wages of domestic workers, male and female, were taken to be 40 and 20 yen, respectively, on the basis of Table 3; for all others 65 yen for male and 45 yen for female workers in Table 3 for day-workers were taken, plus an adjustment to account for miscellaneous professions in the group. Profits of professions are a small part of services and even smaller for the other groups which normally do not possess enterprises. Accordingly profits are ignored.

**Young workers.** The 700,000 young workers in Table 2 are multiplied by 35 yen from Table 3.

**Government.** From the consolidated government account as given below and includes employee compensation and income received from the ownership of property and enterprise.

**Indirect taxes less subsidies.** From the consolidated government account. A small amount of duplication may exist insofar as some part of indirect taxes may be included in the wholesale prices

6) These arbitrary estimates are unsatisfactory and should be replaced with less arbitrary figures. The early volumes of the *Tokei Nenkan* publish data on households engaged in trade classified into 54 different types of stores, etc., for each prefecture. Despite their crudeness, they may serve (together with income data from other sources) as the basis for more adequate estimation.

used as valuation of agricultural products.

**Depreciation.** No basis for the estimation is available. In large part the difficulty is a conceptual one<sup>7</sup>). About 3% of national income at market prices is assumed to be reasonable<sup>8</sup>). This percentage is in line with those of Jefferys and Walters for England in 1907, (see *Income and Wealth*, Series V.)

Net factor income going abroad is probably negligible, especially if interest on public debt is regarded as a transfer.

### 3. Gross National Expenditure, 1881

The main sources from which the consolidated government account was constructed are for the central government, *Nihon Zaisei Soran*, Volumes 1 and 2 by Y. Hosokawa, 1892, and for local governments, *Meiji-Taisho Zaisei Hyo Ron*, 1925, compiled by the Toyo Keizai Shimpo Sha and the early issues of the *Tokei Nenkan*. The major defects of these accounts as published are the difficulty of dividing the local government expenditures into employee compensation, purchase of current goods, and purchase of capital goods. However, enough supplementary data in the *Tokei Nenkan* exist to make possible a tolerably reliable separation. For both the central and local governments, capital expenditures do not separate the purchase of land which is excluded from capital formation. Inventory additions are also not separated. The data are for fiscal years beginning July 1881 and

7) That is to say, in non-mechanized production (whether agricultural or industrial) depreciation accounting is not practiced; instead replacement policies are the rule. Depreciation must be artificially constructed by taking expenditures on tools, equipment and repairs on structure.

8) This percentage is the result of taking 2% of agricultural income as expenditure on tools and repairs and 4% of non-agricultural income. The 2% compares with Prof. Yamada's 3 to 4% for agriculture in 1933 and 4% of net value added in the Indian factory census, 1946—1950, *Fifth Census of Indian Manufacture*, 1950. Current estimates of depreciation in underdeveloped countries, ranging from 5 to 10%, are believed to be too high.

ending June 1882.<sup>9)</sup> In the following it has been found convenient to estimate expenditures within the framework of accounts. As much as possible the design of the accounts and the definitions of the flow follow those of the National Income Unit of the government of Japan.

Consolidated Government  
Account, 1881

Receipts		Payments	
1. Income from property	1.1	7. Government purchases	
2. Surplus from enterprise	2.7	(a) employee compensation	33.3
3. Direct taxes	71.1	(b) current goods	15.5
4. Indirect taxes	19.5	(c) capital goods	21.2
5. Non-tax receipts	2.4	8. Transfer payments	1.4
6. Less interest on public debt.	-15.6	9. Subsidies	1.2
Total	81.2	10. Surplus on current account	8.6
			81.2

Notes to Table

1. **Income from property.** This includes rent from property loaned out and interest from bonds held by schools. It does not include income from local government property for which details are not available.

2. **Surplus from enterprises.** This includes surplus or net profits of mint, naval dockyard, mines,

9) Despite these defects, the budget data of Japan are remarkably well kept. Except for the United Kingdom and a few European countries, there are hardly any major countries with better budget statistics for all levels of government the 19th century. U. S. data are deficient on local government budgets.

A few conceptual problems may be briefly mentioned. The number of honorary officials in the local government is considerable and since they work without pay the accounts do not measure their contribution to the national product. Similarly, work undertaken cooperatively without compensation by villagers under government supervision (such as fire detection and prevention) must have been considerable in the relatively unmonetized, cooperative village economy of the 1880's. Thus, the budget statistics fail to measure government services fully.

Land taxes are overwhelmingly the most important source of revenue in Meiji Japan. Though land taxes may be treated as indirect taxes under the conditions of developed capitalism, this treatment is not valid for the Asian economy, and recently the National Income Unit of India has found it necessary to reclassify land taxes from indirect to direct taxes.

telegraph, railway and postal services. For a few, e. g., forestry, it was not possible to estimate net profits or surplus and are included on a gross basis.

3. **Direct taxes.** These include land taxes of all governments and house taxes (kosuwari.)

4. **Indirect taxes.** Included in this category are customs, sales and commodity taxes and taxes on various enterprises. A more careful consideration of the latter may find it closer to a direct tax or perhaps partly direct and partly indirect. All miscellaneous taxes in the local governments were treated as indirect taxes although some of them may properly be treated as direct taxes.

5. **Non-tax receipts.** No attempt was made to divide this item into non-tax receipts as such and transfer receipts, as called for in the United Nations's *A System of National Accounts and Supplementary Tables*. The item includes school and hospital fees, fines, penalties, gifts; also payments made in lieu of conscription services; also collections to defray school expenses.

6. **Interest on bond.** This item is taken from the expenditure side of the central government account. It does not include local government interest payments which are believed to be small, if any.

7. (a) **Employee compensation.** This includes uniforms and food for the armed forces and payments for convict labor. It excludes travelling allowances. Some amount of capital expenditures on own-account should be classified as employee compensation, although the amount is thought to be small if one excludes temporary employees as government employees. The estimates were constructed on the basis of *Tokei Nenkan* data on compensation of local government employees, accounts for schools, hospitals, police, prisons, etc.

7(b). **Purchase of current goods.** Travelling allowances are included in this item and also the category in the accounts designated as "miscellaneous expenditures." Purchase of services such as fees relating to bond issues is also included.

7(c). **Purchase of capital goods.** This includes new forestry plantings and all of *eizen-hi* which



is assumed to comprise major repairs, although the possibility that it includes some minor repairs and maintenance costs should not be excluded. The demarcation between the two is difficult to specify clearly and Scandinavian countries have treated all repair and maintenance costs as gross capital formation. But *eizen-hi* excludes the bulk of minor repairs and maintenance which are included in employee compensation. Military durable goods are included chiefly because a line between strictly military goods and non-military goods was difficult to draw.

One item we are uncertain about is the contribution of the central government to the capital of government enterprises, etc., designated as *ei-gyo shihon* in the extraordinary account of the budget. The item is large, 4.3 million yen. It has been tentatively classified as a capital expenditure but this does not seem satisfactory, as it may turn out to be mainly a moneyflow as far as the year 1881 is concerned.

8. **Transfer payments.** Besides pensions, gifts, charities and relief payments, prize awards and tuition grants, grants to religious bodies are included in this item<sup>10</sup>.

9. **Subsidies.** These are not clearly identified in the accounts. A large part of expenditures by local government for encouragement of industries may be treated as subsidies, while certain items included as subsidies may be intra-governmental transfers.

10. **Surplus on current account.** This is obtained as a residual and is the balancing item for the two side of the account.

**Balance of Payments.** The *Toyo Keizai Shimpo* has compiled detailed figures in a convenient volume entitled *Foreign Trade of Japan, A Statistical Survey* in English, covering the years 1868 to 1933. Balance of payments data exist only from 1904.

10) This last item may be treated as an intra-governmental transfer, as are the expenditures made for prefectures out of central government receipts (which are excluded from prefectural expenditures and included in central government.)

For the early years, however, as H. Moulton has pointed out, the invisible items (which are the complicating items in passing from commodity trade statistics to international payments statistics) are relatively unimportant. (See *Japan, An Economic and Financial Appraisal*, 1931, p. 496.)

A major problem for the early years is that imports are valued at prices at ports of origin and exports are valued at market prices at ports of clearance, thereby excluding packing to put on ship and delivery charges from the port of clearance to the ship. (See *Foreign Trade of Japan*, p. 41.) The latter undervaluation is minor and may be ignored, but not the former. The cost of packing, shipping, freight and insurance from the (foreign) port of origin to the Japanese port is considerable. Data for adjustment are not available. The figure in the following table is obtained as a residual as described below.

External Account, 1881

Million yen	
Current receipts from abroad	Disposal of current receipts
1. Exports of goods 31.5	4. Imports of goods (F. O. B.) 31.2
2. Sale of services 0.7	5. Purchases of services 4.8
3. Factor payments to Japan ...	6. Factor payments to abroad 0.8
	7. Surplus of the nation on current account -4.6
32.2	32.2

**Notes to the Table**

1. To the total of 31.4 million yen as reported in the *Foreign Trade of Japan*, an arbitrary amount, 0.4, was added for costs incurred from the port of clearance to the ship. (It is assumed that the reported values include export taxes.) Parcel post exports are negligible. See *ibid*.

\* 2. The total comprises the following items: expenditures of foreign governments in Japan (diplomatic, consular, etc., personnel), 0.5 million yen; expenditures of foreign travelers in Japan, 0.1 million yen; freight, insurance, etc., payments of foreigners to Japan, 0.1 million yen. The first item is arbitrarily assumed to be equal to Japanese government expenditures abroad (see item 5). The second item is assumed to be somewhat smaller than its counterpart, expenditures of Japanese travelers abroad (see item 5). The third item is based on one-half the ratio of such payments received

by Japan to total exports in 1904, the earliest year for which official balance of payments data exist. Foreign ship purchases in Japanese ports are assumed to be equal to the converse expenditures of Japanese ships in foreign ports.

3. Factor income payments to Japan are assumed to be negligible, if any.

4. Imports of goods as reported in *ibid.*

5. This item comprises the counterparts to item 2. Japanese government expenditures on diplomatic and consular services (0.5 million yen) from the central government account. Expenditures of Japanese students and officials travelling abroad are from the government account and total 0.15 million yen. Private travelers are assumed to raise the total to 0.2 million yen. Transport, insurance and other expenditures payable by Japan to foreigners are obtained as a residual; see item 7. See above for a discussion of this item.

6. Income payments from Japan to abroad. This comprises 0.8 million yen paid by the government on foreign bonds. Some adjustment should be made for private interest and profit payments made abroad but they are thought to be small.

7. Surplus of nation on current account is usually obtained as the balancing item in balance of payments statistics. But we assumed that in this period, short term capital flows were small, if any. Thus, the major items to be considered are the net export of gold and silver coin and bullion, 5.6 million yen, less repayment of foreign debt by the government, 1.0 million yen. This leaves a total of 4.6 million yen as the negative balance of Japan on current account. The sum of all the items on the debit side subtracted from the sum on the credit side leaves 4.3 million yen which is entered as Japanese payments to foreigners for freight, insurance, packaging and others comprising the margin between F. O. B. and C. I. F. valuation for imports.

The foregoing estimates of invisible items are crude. For most of the items, it is possible to obtain better figures from the unpublished records of transportation and insurance companies and of banks. The residual of 4.3 million yen seems large

and should be studied further.

Available data permit only a partial estimate of capital formation. The value of the physical in business inventories is almost impossible to estimate in an subsistence economy where stocks are kept in tiny amounts by innumerable peasants, traders and handicraftsmen. Nor is it easy to estimate the accumulation of tools, equipment, and structures by these small units which are produced on an own-account basis. These items cannot be approached from the moneyflow side of the capital account in an economy where personal savings are usually not monetized.

Also, for the small units of production, the assumption is made that gross fixed capital formation is equal to depreciation which in turn is equal to replacement expenditures. This assumption is probably valid for the greater part of the farms, craft shops and traders of Japan in 1881. But for the larger farmers, expanding workshops and traders, the assumption may not hold, as will be seen. However, as a first approximation, depreciation is assumed to equal replacement for this sector.<sup>11)</sup>

The following account may be first drawn:  
Gross Fixed Capital Formation: First  
Approximation

Million yen			
Gross investment		Gross saving	
1. Replacement expenditures	28.0	5. Depreciation	28.0
2. Government fixed capital expenditures	21.2	6. Government saving	29.8
3. Imported capital goods	6.4	7. Others	-6.8
4. Net foreign investment	-4.6		
	<u>51.0</u>		<u>51.0</u>

11) These compromises do not vitiate the totals obtained. For a number of uses, fixed capital formation, narrowly defined, is of great value. Indeed, the capital formation data of most of the underdeveloped countries are similarly restricted. And where countries attempt to construct estimates on a broader basis, the total obtained loses its statistical sharpness, beset as it is with problems of valuation and depreciation of small tools, equipment and structures. (E. g., India.)



**Notes to be the Table**

1. Assumed to be equal to depreciation.
2. This is taken from the government account.
3. From the *Foreign Trade of Japan*, the following items are taken as capital-goods imports: horses, cows, oxen, sheep, goats; canvas, gypsum, cement, glass sheets; iron ingots, rods, angles, plates, tubes, rails, wire, sheets made of various metals; anchors, mechanic tools, agricultural implements, other iron manufactures, clocks, scales, tapes, thermometers, barometers, surgical and other scientific instruments, steam and sailing vessels, other vehicles and parts, pumps and other machinery. Clearly, parts of some items are used for the making of consumer goods, for example, pig and scrap iron. To offset such an upward bias, in part, a number of miscellaneous categories have been entirely omitted, and also items such as stoves, radiators, kitchen utensils, copper, brass, bronze manufactures, watches, musical instruments, cannons, muskets, other firearms and furniture have been completely omitted, even though part of these items are purchased for business use. The total obtained is 3.2 million yen.

The mark-up or the margin to be added to import value, is more than the usual percentage. Since the import prices are F. O. B., not C. I. F., the margin includes costs of transport, insurance, etc. from the foreign port of origin to the Japanese port and from there to the location of the final purchaser, plus import taxes. As pointed out, data for these are not easily available. For this study, we simply took 50% of C. I. F. values. (This percentage is most frequently used in underdeveloped countries today.) Import taxes collected amounted to 1.5 million yen of which less than 10% or 0.1 is estimated to be an appropriate sum. The total of all these is 3.2 million yen which is a total margin of 100% on F. O. B. import prices.

4. From the external account.
  5. Equal to item 1.
  6. It is equal to surplus and capital expenditures in the government account.
  7. Obtained as a residual.
- A total of 51 billion yen of fixed capital forma-

tion (or 56 million yen of fixed domestic capital formation) is about 6% of GNP and is plausible for 1881. As the import statistics show, industrialization had barely begun.<sup>12)</sup> But the residual of -6.8 for item 7 is very large. This item includes the net saving of households and of enterprises. A net dissaving figure of such magnitude is difficult to rationalize, even though it is realized that 1881 was a bad crop year. The difficulty does not lie, in the main, with the government data in items 2 and 6, nor with 3 to 5.<sup>13)</sup>

The trouble may lie with the assumption that net fixed capital formation is zero for the small units. There are scattered data to indicate that the assumption does not hold, even though industrialization progressed very slowly. In fishery, the number of fishing boats rose from 190,000 in 1880 to 225,000 in 1884. The number of households engaged in commerce appears to rise considerably from 1881 to 1882. From all indications the number of factories was also rising rapidly. The number of companies and their capitalization doubled between 1881 and 1882. The total number of house-

12) Imports of rails and of carriages commenced in 1880 and 1883. Imports of sewing machines, spindles and looms started also in 1883. Two thousand factories employed only 60,000 workers in 1882 (30 workers per factory and 1% of the non-farm labor force) and 1,800 companies operated with 28 million yen of capital (3% of GNP). Much of the activities of the government were confined to the preparation of industrialization, i. e., the construction of schools, the establishment of a postal system and modern sanitation and public health facilities, a system of modern finance and commerce (e. g., the establishment of national banks and the control of inflation.)

13) If item 2 is reduced, item 6 will fall. Small errors in government surplus are possible but they are not likely to affect the residual very much. (Recall that the government was repaying its bonded debts and redeeming overissued currencies to the extent of 20 billion yen.) Nor is the difficulty traceable to the balance of payments items, 3 to 5. If anything, there is likely to be some duplication between items 2 and 3 which would further increase the negative residual.

carts, *jinrikshas* and freight carts, the main forms of land transportation at this time, increased from 515,000 units to 572,000 units. Local tax yields on business enterprises increased from 2.0 million yen to 3.1 million yen.

In the second approximation, the assumption is made that item 7, saving of households and enterprises is zero. The residual is transferred to the investment side of the account and is assumed to be equal to net fixed capital formation of small units. Instead of 28.0 in item 1, the total now is 34.8 million yen. Using this larger figure, expenditures are as follows:

	Million yen	%
Government current expenditures	48.8	5
Gross fixed domestic investment	62.4	6
Public fixed investment	21.2	
Private fixed investment	41.2	
Net foreign investment	-4.6	-1
Private consumption plus changes in inventory	881.4	90
Gross domestic product	988.0	100

#### 4. Concluding Notes

Space does not permit comparison of the foregoing results with those of other estimators, except to remark that our income figures are from 10 to 25% higher than those of Prof. Yamada and Ohkawa. It is hoped that the paper has demonstrated the feasibility of establishing a benchmark estimate for one of the earlier years of the Meiji period. It is also hoped that others better trained than the present writer in the language, history and statistics of Japan and with more time at their disposal, will undertake a thorough revision of the estimates in the foregoing pages. It may be helpful to conclude with a summary of the shortcomings of our estimates.

The chief difficulty is found in the agricultural sector. Nowhere in our estimates have we included the non-agricultural output of the farm population. This omission is partly offset by the duplication produced by the assumption that the non-

agricultural labor force worked a full year (i. e., 300 days) at their trade. Since a significant part of the non-agricultural labor force does spend some part of the year in agricultural operation, this part of their activity is doubled-counted in the agricultural output statistics. But this duplication only partly compensates for the larger omission of farm output of non-agricultural production. The proportion of the labor force engaged in agriculture is three times that of non-agriculture. The amount of time spent by the typical peasant in producing non-agricultural products is considerable in Japan (as large as one half of the year, perhaps) especially in the 1880's.

Other limitations include the weakness of estimates on property incomes in non-agriculture, which may be too low; the failure to include imputed rentals for owner-occupied dwellings<sup>14</sup>.

On the other hand, one possible source of upward bias may be found in the daily earnings data. It is not unlikely that these statistics were collected from the larger, better-operated establishments, so that as an average for Japan as a whole they may be higher than the true figures.

14) The reason for the omission of imputed rentals is conceptual as well as statistical. Rental (as distinct from owner-occupied) dwellings are of negligible importance in Japan at this time. For perhaps 90% or more households, the dwelling constitutes not only a place of living but also of work, whether for agriculture, industry or trade. Presumably, the business services yielded by the house are already incorporated in the production of the household. The separation of business and consumer services of the dwelling, the valuation of these services where actual rentals rarely take place, and the many other problems relating to this problem even in present-day Japan—all these are obstacles to the computation of a useful magnitude. It seems best to exclude this item altogether.