AN APPROACH TO THE MEASUREMENT OF NATIONAL SAVING IN JAPAN (1878—1940)*

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I. *The Estimate of Private Savings*

In the international comparison of economic growth, it has often been pointed out that the growth rate of the Japanese economy has been very rapid compared to western countries in prewar periods as well as in recent postwars years.[2] The question to ask is what factors have contributed to this growth, and attention is naturally concentrated upon analysing the formation of savings and the channels by which saving is transformed into investment. These analyses require historical statistics both on saving and on capital formation within the conceptual framework of national income statistics.

The aim of this paper is, first of all, to estimate national saving and to test its reliability in comparison with an estimate of capital formation which has already been presented.[3]

1. Method of Saving Estimate by Financial Approach

Basic relationships defining savings are comprehensively arranged in '*A Study of Saving in The United States*', by Raymond Goldsmith.[4] He shows the three fundamental relationships as follows.

(1) Saving=Current income*−(Current consumption+Capital consumption allowances)

(2) Saving=Changes in assets−Changes in liabilities**

(3) Saving=Change in earned net worth

Relations (2) and (3) can be additionally rearranged into the next essential feature.

(5) Change in earned net worth=Change in tangible assets+Change in intangible assets−Change in liabilities**

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[1] The author is greatly indebted to Professor Simon Kuznets and Professor Irwin Friend for reading the manuscript and making useful suggestions. However, the results presented here, is only an approximation of saving estimate and the writer alone, of course, responsible for all errors of fact and interpretations.

[2] For example, Colin Clark, *The Conditions of Economic Progress*, 2nd ed., Chap. 5, 1951. Simon Kuznets, *Quantitative Aspects of the Economic Growth of Nations* (I. Level and Variability of Rates of Growth) pp. 9–15. For postwer years, The Bank of Japan and Rissho Univ., *Savings in the Economic Growth of Postwar Japan*, ECAFE Bulletin Vol. XI, No. 2.

[3] Henry Rosovsky, *Capital Formation in Japan (1868-1940)*, The Free Press of Glencoe, 1961. The present author collaborated with Professor Rosovsky on the estimates presented in this work.

[4] R. Goldsmith, *Study of Saving in The United States*, Vol. I, pp. 23–46.

* It must be 'Current income after taxes'.

** They must be adjusted for items of capital transfers and revaluation.

For each economic unit, say for a firm, relation (1) is obtained from the profit and loss statement and relation (5) is reported by the balance sheet. In estimating saving, we may call the former method an income approach and the latter a balance sheet (or wealth) approach. The question is how to estimate various components of nationwide saving, especially as historical series.

Generally speaking, it is difficult to estimate saving by different economic groups. It is necessary to adopt an indirect method, namely the institutional approach[5] in which the existing records of financial intermediaries are used.

Let us assume three economic units in a closed economy, viz. corporations, households and financial institutions, then we have the relations:

$$S_1=\Delta W_1$$
$$=\Delta T_1+\Delta F_1-\Delta L_1 \quad (1)$$
$$S_2=\Delta W_2$$
$$=\Delta T_2+\Delta F_2-\Delta L_2 \quad (2)$$

Here, T=Tangible assets, F=Financial assets including cash holdings, L=Liabilities. W=Net Worth, S=Gross saving, s=Net saving. Suffixes 1, 2 and 3 mean respectively those of corporations, households and financial institutions.

If we assume a simplified model in which the corporate sector invests more than its saving while the household sector saves more than its investments, the relalion is shown as follows.

Corporations $\Delta T_1-S_1=\Delta L_1-F_1$ (3)

Households $S_2-\Delta T_2=\Delta F_2-\Delta L_2$ (4)

And the relation linked with financial institutions is,

$$\Delta F_1+\Delta F_2=\Delta L_3 \quad (5)$$

In corporations, ΔT_1 is larger than S_1 and its difference is shown as the same amount of financial gap between the increase of liabilities and that of financial assets. In other words, investment in the corporate sector is dependent upon the increase of liabilities, namely the external financing through the channels of financial intermediaries. On the other hand, the household sector holds its surplus ($S_2>\Delta T_2$) in various forms of the increase of financial assets over the liabilities. The actual private economy is more or less different from the above simplification and the connection of saving with investment differs according to the development of financial market of each country. However, these four components—savings, tangible assets, financial assets and liabilities have generally grown up with close interrelations among them.[6]

Let's test the relation among these four components in the actual statistics of the United States. Table 1 is very instructive from this viewpoint. First of all, we can see saving is in excess of investment in the non-corporate sector and conversely business corporations invest more than their saving and the respective gaps are filled through the financial transactions. In the private sector as a whole, saving does not meet the demand for net investment and

[5] An evaluation of this method is discussed by Irwin Friend. He describes "By an appropriate sampling of accounts on the books of financial institutions, corporations and governmental units, it should be possible to derive reliable estimates of distribution among economic and other groups of most items of assets and liabilities and saving" (Cf. I. Friend, Institutional Data as a Source of New Information for Use in Social Accounting System. *The Flow-of-Funds Approach to Social Accounting, Studies in Income and Wealth*, Volume 26, NBER. 1962.) However, this method can not be applied back to historical series of financial institutions, particularly the estimates of saving by economic groups. Here the author uses the meaning of institutional approach in a more aggregative sense.

[6] Gurley and Show, *Money in a Theory of Finance*, Chap. IV, V, 1960.

TABLE 1. SOURCES AND USES OF NON-CORPORATE AND CORPORATE FUNDS, *CUMULATIVE TOTALS* (1947–1957)

Unit: Billions of Dollars

	Sources (1)	Uses (2)	(1)−(2)
Non corp.	$s_2=171$	$\Delta F_2=174$	− 3
	$\Delta L_2=168$	$\Delta T_1-d_2=166$	2
Corp.	$s_1=106$	$\Delta F_1=87$	19
	$\Delta L_1=149$	$\Delta T_1-d_1=168$	−19
Combined	$s_1+s_2=277$	$\Delta F_1+\Delta F_2=261$	16
	$\Delta L_1+\Delta L_2=317$	$\Delta T_1+d_1+\Delta T_2-d_2=334$	−17

Here, d means depreciation.

Sources: Dept. of Commerce, *Income and Output*, 1958 ed., pp. 11–12.

this fact shows the dependency of private funds for net investmnt for the purpose of external financing. Here the external financing includes not only the borrowings from financial institutions, but also that of the government and the foreign sector.

If we combine the equations, (1) and (2),

$$S_1+S_2+\Delta L_1+\Delta L_2=\Delta T_1+\Delta T_2+\Delta F_1+\Delta F_2 \tag{6}$$

The left hand shows the sources of funds which consist of internal ($=S_1+S_2$) and external financing ($=\Delta L_1+\Delta L_2$). On the other hand, the right hand means the uses of funds which are divided into physical and financial assets. Transforming the above to a net basis,

$$\begin{aligned} s_1+s_2+\Delta L_1+\Delta L_2&=\Delta T_1-d_1+\Delta T_2-d_2+\Delta F_1+\Delta F_2 \\ &=\Delta t_1+\Delta t_2+\Delta F_1+\Delta F_2 \end{aligned} \tag{7}$$

(d=depreciation, t=net tangible assets)

Here, the author's assumption is to consider that net private saving is roughly equal to the net increase of financial assets held by private sector, namely

$$s_1+s_2\cong\Delta F_1+\Delta F_2 \tag{8}$$

As a matter of fact, however, the precise relation between the sources and uses of funds is quite comlicated because saving is directed not only for the addition of financial assets but also towards other purposes, say for investment and for reducing debts. The latter belongs purely to the sphere of financial transactions. In connection with the latter type of transaction, we can guess that changes in financial assets are fairly closely related to changes in liabilities, especially in the corporate area, and some part of the increase of liabilities may appear as an increase in financial assets. Consequently the equation (8) may be rewritten,

$$s_1+s_2=\Delta F_1+\Delta F_2+X_p \tag{9}$$

Here X_p represents the difference between saving and the net increase of financial assets in the private sector as a whole, accordingly it is interpreted as that portion of internal funds directed to purposes, other than the net increase of financial assets mostly for the new acquision of tangible assets. Equation (10) with (9) shows this relation

$$\Delta L_1+\Delta L_2=I_1+I_2-X_p \tag{10}$$

According to the above two equations, the greater the dependency of funds for net investment on external financing, the smaller is X_p, and then we might say that saving is approximately equal to the net increase of financial assets if we assume in which the funds for new acquisition

of tangible assets are almost all provided by the increase of liabilities. In addition to this assumption, the estimation formula of private saving is shown as follows.

$$s_1+s_2 \cong \Delta F_1+\Delta F_2 \cong \Delta L_3-\Delta F_g \qquad (11)$$

Some financial assets held by non-financial sectors are not necessarily connected with liabilities of financial institutions in such a way as credit of corporations to consumer and direct investment in securities. Here ΔL_3 is considered as the broader concept in which cash holdings and government bonds held by the private sector also are included. ΔF_g means deposits of government with financial institutions.

In Table (1), this assumption is fairly well applicable to the case of the non-corporate area, but not so in the business corporations. Combining both sectors, the disparity between net saving and the increase of financial assets in corporate sector is somewhat mitigated and the ratio of the discrepancy is 5.7 per cent in the accumulated total of eleven years (1947-57).[7] If the difference is kept roughly constant at about five per cent, the assumption is broadly safe in the longer run not only in the non-corporate but also in the private sector as a whole. Let us examine the annual movements of the relation between saving and the net increase of financial assets.

TABLE 2. RELATION BETWEEN SAVING AND FINANCIAL ASSETS

Unit: Billion of Dollars

	s_1 (1)	s_2 (2)	Total private saving (3)=(1)+(2)	ΔF_1 (4)	ΔF_2 (5)	Total financial assets (6)=(4)+(5)	Difference (7)=(3)−(6)	Ratio of difference (8)=(7)/(3)
1946	7.2	13.5	20.7	− .5	13.4	12.9	7.8	0.376
1947	11.4	4.7	16.1	8.6	9.4	18.0	− 1.9	−0.117
1948	12.6	11.0	23.6	5.3	6.9	12.2	11.4	0.482
1949	7.8	8 5	16.3	3.8	6.9	10.7	5.6	0.343
1950	13.0	12.6	25.6	18.6	11.1	29.7	− 4.1	−0.160
1951	10.0	17.7	27.7	8.1	14.1	22.2	5.5	0.198
1952	7.4	18.9	26.3	6.3	20.0	26.3	0	0
1953	7.9	19.8	27.7	2.9	18.9	21.8	5.9	0.212
1954	6.3	18.9	25.2	3.0	17.4	20.4	4.8	0.190
1955	10.9	17.5	28.4	19.7	22.5	42.2	−13.8	−0.485
1956	10.2	21.0	31.2	4.3	22.9	27.2	4.0	0.128
1957	8.8	20.7	29.5	3.8	24.3	28.1	1.4	0.047
Cumulative	113.5	184.8	298.3	83.9	187.8	271.7		

Source: U.S. Dept. of Commerce, *U.S. Income and Output*, 1958, Tables *V*-9 and *V*-10, pp. 194-195. ΔF_2 comes from SEC estimate in Table *V*-9.

From Table 2, we can find that in the non-corporate area, the assumption is roughly applicable to the annual data as well as to the cumulative total. However, in business corporations, the annual level of saving is quite different from that of financial assets although the direction of movement is somewhat similar. In the whole private sector, savings in 1947,

[7] $(\Sigma s_p-\Sigma \Delta F_p)/\Sigma s_p=0.057$ (p=private)

1952, 1956 and 1957 are fairly close to changes in financial assets, but those in 1946, 1948, 1949 and 1955 are not well correlated with the latter.[8]

The above evidence is believable because some financial assets held for liquidity use are quite sensitive to changing business conditions, especially in the corporate area. The big difference in 1948 and 1955 is due to the violent changes in the receivables of corporations from others except consumers. Such changes in financial assets correspond simultaneously with those of short-term sources in liabilities and inventories in physical assets. The changes in government securities held by corporations also are related to the above difference. From the long-run point of view, we must notice the fact that the accumulation of internal funds in corporations has come to provide funds for investment by gradually replacing external financing.

In Japan, the detailed statistics on sources and uses of flow funds by separate groups are not available, but the Bank of Japan has estimated savings from financial statistics since 1933. It considers private savings as the increase of deposits and securities differing from the author's estimates which include changes in cash holdings. Professor Miyohei Shinohara compared the saving estimates of the Bank of Japan with that in the official national income statistics and concluded that corporate investment funds have been highly dependent upon financial institutions in the postwar Japanese economy, when changes in liabilities and depreciation have roughly equaled gross investment in physical assets.[9] In other words, saving has been roughly equal to the sum of changes in cash holdings, deposits and securities. This relation is shown as Table 3.

Except for 1951, these two estimates are close to each other both in their levels and in movements. Shinohara explained the reason for the difference as 'in 1951 when much saving still took the form of cash balance due to the postwar inflation.'[10] In connection with this point, the author tried to adjust these data for changes in cash holdings, but the difference

[8] In this respect, the annual correlations among the annual movements of these four components are shown below.

Table 2a. Correlations among net saving, increase of tangible assets, increase of financial assets and that of liabilities (1946–1957)

	$r_{s\Delta T}$	$r_{s\Delta F}$	$r_{s\Delta L}$	$r_{\Delta T\Delta F}$	$r_{\Delta T\Delta L}$	$r_{\Delta F\Delta L}$
Non-corp.	0.51	0.90	0.46	0.49	0.82	0.66
Corp.	0.57	0.67	0.67	0.21	0.76	0.77
Combined	0.66	0.69	0.60	0.60	0.70	0.90

Source: *ibid.*

The correlrtions listed in Table 2a broadly coincide with the interpretation based on Table 1 and 2. In the non-corporate sector, saving is most highly correlated with ΔF, namely financial assets but not tangible assets. Relatively high correlation of $r_{\Delta T\Delta L}$ is interpreted as meaning that tangible assets are financed by changes in liabilities. This dependency on external financing is also true in the case of corporations. The correlation between ΔF and ΔL is related to the interrelation between loans and deposits in financial activities. If we combine the non-corporate and corporate sectors, none of these correlations with saving is clear. The increase of financial assets are most closely associated with those of liabilities because $r_{\Delta F\Delta L}$ should be unity in a closed economy. $r_{s\Delta T}$ also should be unity, but it is not so high in Table 2a since the relation between sources and uses of funds in other sectors beyond the private sector must be complicated.

[9] *Journal of Political Economy*, Dec. 1959.

[10] *ibid.*

TABLE 3. COMPARISON OF PRIVATE SAVING IN NATIONAL INCOME STATISTICS WITH THAT OF THE BANK OF JAPAN

Unit: million yen

Fiscal year	Economic Planning Agency (1)	Bank of Japan (2)	Adjusted (2)* (3)
1951	933	704	865
1952	885	901	1,138
1953	820	888	954
1954	790	834	829
1955	1,105	1,029	1,200
1956	1,465	1,423**	1,813
1957	1,503	1,507**	1,660

* Column (3)=Column (1)—net increase of cash holdings.

** Since 1956, investment in securities is not estimated by the Bank, but the author computed that part and added it to the net increase of deposits.

Sources: Column (1), *White Paper of National Income*, 1960, Economic Planning Agency.

Column (2), *Economic Statistics of Japan*, The Bank of Japan.

from national income statistics is generally rather greater than the former although that of 1951 is closer than the figure for other years. However, in Table 3, we should notice that it corresponds more closely with saving in the national income statistics to exclude cash holdings in the boom years of 1956–57. It may be said that the difference between the two estimates are inevitable because the conception of saving in the two approaches does not exactly correspond to each other. In other words, in financial statistics, it is difficult to separate exactly the private, government and foreign sectors. However, as Professor Shinohara pointed out, the author's assumption is broadly acceptable in the case of Japanese economy in which corporate investment is highly dependent upon external financing. This is true also in the prewar periods.[11]

2. Measurement of Private Saving

The estimation proceeds in accordance with the assumption that private saving is roughly equal to the net increase of financial assets held by the private sector. The figures of financial

[11] In prewar normal periods, estimates of both are shown as Table 3a.

Table 3a. Comparison of Private Saving Estimates

Unit: million yen

	Economic Planning Agency (1)	Bank of Japan (2)	Bank of Japan (3)*
1933	1,565	1,384	1,541
1934	1,641	1,702	1,789
1935	2,628	2,563	2,718
1936	2,974	2,839	3,113

Notes: Column (1) Calendar year
Column (2) Fiscal year
Column (3)*=Column (2)+Changes in cash holdings (estimated by the author)

assets are obtained from financial statistics most of which are listed on the balance sheets of financial institutions except securities.

Those items are;

(a) Currency, (b) Demand deposits, (c) Time deposits,

(d) Insurance, (e) Securities (Bonds and stocks)

Annual private saving is regarded as the sum of annual increments of these items. Needless to say, inter-duplications among these items should be removed. The estimation formula for each class of assets is shown as follows.

(a) *Currency*

Amount of currency in private hands=Total amount of currency circulated−Currency holding by banks−Currency holding by other financial institutions

In the above formula, net changes are considered as saving through the form of currency. This form of saving includes those of persons, corporations and governments together, so that the part of governments should be excluded from the total amount. But here such adjustments are not taken into consideration since information on currency holdings of these three groups is not available separately.

(b) *Deposits and savings*

Deposits are composed of bank deposits, money trust, postal savings, mutual financing funds and deposits in other financial institutions. The annual increment of the sum of these items is considered as saving in the form of deposits. In calculation of total bank deposits, deposits in the central bank (The Bank of Japan), government deposits and demand deposits are excluded and intra-bank deposits also are deducted. Demand deposits are included under (a) Currency.

(c) *Insurance*

Here ordinary life insurace, post-office life insurance and post-office pension funds are taken into consideration as saving in the form of insurance. There are some conceptual problems in what is the true saving component of insurance. Sometimes it is considered to be the amount of the premium, or as amount of premium minus payment to the insured or as the increment of reserve funds. Here saving through insurance is measured as the annual increment of the following expression:

Net reserve funds=All reserve funds−Loan to the insured
−Deposits in other financial institutions

(d) *Securities*

Saving in the form of securities is measured as the increment of the following.

Net securities held by private sectors=Total amount of securities issued in the domestic market−Securities held by banks−Securities held by other financial institutions−Loans of financial institutions on securities

Here both the amount of foreign securities held by Japanese and that of domestic securities held by foreigners are not considered, as those are taken up in the estimation of national saving.

In the above financial assets, those of both the personal (=individual+unincorporated) and corporate sectors are included. In other words, net retained profits of corporations are already included in the sum of net increases of deposits, securities and other financial assets into which corporate profits are transformed. Therefore personal saving is shown as,

Personal saving=Net increase of financial assets held by
the private sector−Undistributed corporate profits

Undistributed corporate profits=Corporate profits after tax−Personal Dividends

Those of unincorporated firms also should be measured, but it is quite difficult to estimate since there is very little information available.

On the basis of the above method, the estimate of private saving by a financial approach is shown in decennial totals overlapping each five years as Table 4.

TABLE 4. PRIVATE SAVING (DECENNIAL TOTALS OVERLAPPING EACH FIVE YEARS)

Unit: million yen

Decennial years	Time deposits & insurance (1)	Currency & demand deposits (2)	Securities (3)	Personal saving (S_p) (4)	Diposable income (5)	S_p/Y_d (6)=(4)/(5)
1878–1887	85*	− 9	− 20	85**	5,554	1.53%
1883–1892	124*	64*	− 45	188**	6,108	3.07
1888–1897	242	241	128	611	8,762	6.97
1893–1902	358	220	446	1,024	13,777	7.43
1898–1907	702	336	671	1,695	18,799	8.91
1903–1912	1,096	392	1,335	2,708	23,448	11.54
1908–1917	3,036	872	937	4,221	31,466	13.41
1913–1922	7,226	1,793	5,791	14,001	65,799	21.29
1918–1927	8,528	1,029	8,319	17,515	99,099	17.67
1923–1932	7,194	− 221	5,604	12,540	98,394	12.74
1928–1937	12,247	1,170	7,138	18,481	106,759	17.31

Notes: i) Suffix p means personal sector,

S_p=Private saving ((1)+(2)+(3))—Undistributed corporate profits (u.c.p.). But there are no figures of undistributed corporate profits before 1905.

$Y_d=Y$−u.c.p.—(Tax−Pension) Here tax is a sum of central and local governments.

ii) In the first two decennials, the figures obtained from financial statistics are quite low since we guess it comes partly from the severe deflation in which the accumulated paper money issued excessively by both new government and feudal clans was liquidated. In the process of forcible liquidation, figures in current value result in understatement than as it actually was. Therefore the writer interpolated the figures for that deflation span by computing the least-square trend between the decennials of 1873–82 and 1888–97. Figures with asterisk(*) are those estimated by least-square method and those with double asterisks(**) are the totals in which negative figures are not taken consideration. If the figures of total savings estimated by such method are shown, they are 324 in 1878–1887 and 468 million yen in 1883–1892 and ratios to income are respectively 5.83 and 7.66 per cent.

Table 4 tells us that private saving has grown with a steadily upward trend since the first decennial years, both in its level or in its ratio to disposable income. This rapid growth of private saving is mainly composed of saving through time deposits and through securities which have kept pace with each other, ignoring exception like marked recession of the latter in 1908–1917. On the other hand, increases in currency and demand deposits are rather moderate and drop sharply in 1923–32, differing from the others. This means that financial assets in the form of currency and demand deposits naturally did not form an important part of saving to support investment.

We find that the figures for saving in the earlier decennial years are too low. In addition to the above remarks, we could note the another reason is that it is only since 1893 that

systematic financial statistics[12] is available, so that the statistics before then cover the financial activities poorly. More basically, the modern economic system operating through a financial market was not established yet and it was under the process to be caught rapidly in a monetary economy. The results might be understated because various kinds of inconvertible notes which were issued excessively by the new and old governments after Meiji Restoration (1868) were liquidated in the process of the severe deflation which Japan experienced in 1878–83 and so the calculated saving is smaller than the actual saving reflected in monetary amount even if expressed in real terms.

The average saving-income ratio in real terms, excluding the years 1878–1892, is about 16 per cent. The periodic ratio of personal saving to income also is fairly high in comparison with that of the United States, as shown in Table 5.

TABLE 5. COMPARISON OF PERSONAL SAVING-INCOME RATIO BETWEEN JAPAN AND THE UNITED STATES

Year periods	(1) Japan	(2) U.S.*
1897–1908	7.9%	10.9%
1909–1914	9.5	10.4
1915–1921	21.9	13.3
1922–1929	13.8	12.8
1930–1933	10.2	0.4
1934–1938	24.2	5.7

* U.S. saving-income ratio is adopted from Goldsmith's estimates (*Study of Saving in the United States*, Vol. I, p. 243) and it is based on a social accounting concept excluding consumer durables. Japanese figures are redivided to be comparable with those of Goldsmith in which year periods are divided from an economic point of view. However, the economic meaning of the division into periods is not necessarily the same for both countries.

In Table 5, the method and range of estimation are not exactly same, but we compare, in broader sense, Column (1) and (2). Personal saving-income ratios in Japan are generally higher than those of the United States, particularly quite bigger in both prosperous periods of the First World War, and of the last quinquennium in Table 5, in which quasi-war periods in Japan are included. We might say that saving-income ratios in Japan are higher in inflationary periods, but they are strongly supported against downward movements, whereas U.S. ratios are not so responsive in boom times, but drop remarkably in depression. The difference probably arises from the different pattern of personal saving behavior in the two countries and broadly speaking, from the different stages of economic growth.

[12] *Reference on Financial Materials* (*Kinyūjikō-sankōsho*), Ministry of Finance, (1893–1942).

II. *Estimate of Government Savings*

The formula which is used to measure government saving is shown as the next equation.

$$R_g+\Delta L_g=C_g+M+I_g+\Delta F_g \qquad (12)$$

Here, R_g=Government revenue

ΔL_g=Net increase of government liabilities, which includes government bonds and other borrowings. It also includes government notes issued by the government.

C_g=Government consumption including transfer payments to the private sector.

M=Military expenditures (includes military investment)

I_g=Net Government Investment

ΔF_g=Net increase of financial assets held by government

In the equation (12), the left hand shows sources of funds which the government acquired with uses of funds in the right side. Transforming equation (12),

$$T-(C_g+M)=I_g+\Delta F_g-\Delta L_g \qquad (13)$$

In the above equation, the left hand means the current surplus in the government budget and the right hand shows the forms of assets to which its surplus is transformed. In other words, the amount of government saving equals government investment plus net increase of financial

TABLE 6. GOVERNMENT SAVING

Unit: million yen

Decennial years	I_g (1)	ΔF_g (2)	ΔL_g (3)	Total (S_g) (4)=(1)+(2)−(3)	R_g (5)	S_g/R_g (6)=(4)/(5)
1878–1887	123	52	18	157	925	17.1%
1883–1892	160	2	16	146	1,070	13.6
1888–1897	250	40	192	98	1,338	7.3
1893–1902	488	12	273	227	2,192	10.3
1898–1907	688	439	768	359	3,774	9.5
1903–1912	1,081	619	966	734	6,052	12.1
1908–1917	1,470	660	624	1,302	7,943	16.4
1913–1922	3,046	790	2,282	1,350	13,179	10.2
1918–1927	5,575	107	3,710	1,967	22,609	8.7
1923–1932	6,282	−588	4,242	1,457	28,323	5.0
1928–1937	5,988	−383	8,784	−3,179	34,308	− 9.4

Here, I_g covers both investment of construction and durable equipment by the central government and local public authorities, but excludes military investment. The figures are taken from Rosovsky's book. The netness ratio to get net investment is calculated by the author himself.

ΔF_g is net increase of financial assets held by government and ΔL_g is composed of the net increase of government bonds, short-term government bills, borrowings and the net increase of notes and auxiliary coins issued by government. Government borrowings are those from the Bank of Japan and Trust Fund Bureau.

R_g is the current revenues of central and local governments, which are composed mostly of taxes.

assets held by government. Of course, all items are the total of central and local governments and then the duplication between the two is netted out. Concerning I_g in the equation of (13), Professor Rosovsky's estimate[13] is the most reliable one which we have and the net increase of financial assets or liabilities is available from official statistics. Table 6 shows the decennial totals, overlapping each five years.

In Table 6, we find that government saving valued in current prices has roughly shown an upward trend, if we ignore the last decennial figures. Its sources have been mainly provided by private funds, through the continuous expansion of the tax system. The main uses of government fund are government investment, but not increase of financial assets, differing from the case of personal saving. The upward trend of government investment explains the role of government in capital formation in Japan as is analyzed in the later section. It is always over the amount of ΔL_g except in the periods of 1898–1907 and 1928–1937. The former period includes the two war periods of Sino- and Russo-Japanese War and the latter is related to the quasi-war periods. I_g excludes military investment while ΔL_g includes debt for military purposes. Column (6) is government saving-income ratio. Comparing with those of private saving in Table 4, the characteristics of government saving are understandable, especially its important role in the initial foundation of Japanese modern economy while the big deficits in the last decennial years are covered by the high share ratio of private saving.

III. *The Foreign Capital Imports*

In connection with measurement of net foreign investment in Japan, we can use the official figures of balance of payments since 1902. It is measured as the balance of current transactions (commodity trade and invisible trade) with capital or gold movements as counterpart of the former. The trouble is in estimating net foreign investment before 1901. So the writer has tried to measure the balance of payments in terms of accumulated totals during 1868–1887 in Table 7.

Of all items in both sides of Table 7, those marked with asterisk were estimated by the writer and others are available in individual series. The ratio of residual items in non-trade current transactions to the total amount of exports or imports are computed and then that percentage is applied to fill up the figures for the periods before 1901. Here is shown only the decennial totals overlapping each five years, linking the author's estimates before 1901 with the official ones since 1902.

In Table 8, Column (6) is considered as net foreign assets or foreign capital imports (or exports). As is seen in Column (6), we can find that plus or minus in the balance of payments is fundamentally decided by the movements in the balance of trade in which imports are generally more than exports over the entire periods except the opening periods of Japanese foreign trade and during the rapid expansion of her exports during the first World War. On the other hand, the invisible trade which includes ordinary (transportation and insurance) and extra-ordinary items (investment income), are shown as a lump in Table 8, mostly moves to cover the deficit in the balance of trade even though it shows a minus in the earlier

[13] *ibid.* Chap. VII, pp. 135–175, VIII, pp. 177–208.

TABLE 7. BALANCE OF PAYMENTS IN JAPAN
(ACCUMULATED TOTALS DURING 1868-1887)

Unit: million yen

Receipt			Payment			Balance
R_1	Export	549	P_1	Import	572	− 23.0
R_2	Transportation and insurance*	26.1	P_2	Transportation and insurance*	119.8	
R_3	Customs on export	29.4	P_3	Purchases of warship and other ordnances*	28.8	
R_4	Receipt of foreign loan	7.0	P_4	Redemption of borrowings	5.6	
R_5	Others*	2.5	P_5	Redemption of foreign bonds	34.6	
			P_6	Others*	4.8	−128.6
R_6	Export of gold and silver	152.5				
R_7	Deposits in foreign banks*	80.9	P_7	Import of gold and silver	64.4	+169.0
				Total balance		+ 17.4

Sources: 1) Koichi Emi, *Balance of Payments in the First-half of Meiji Era*, Historical Statistics, The Inst. of Economic Research of Hitotsubashi Univ., 1957 (mimeographed).
2) Ministry of Finance, *Records of Public Finance in the First-half of Meiji Era.*

TABLE 8. BALANCE OF PAYMENTS OF JAPAN, 1878-1937
(DECENNIAL TOTALS OVERLAPPING EACH FIVE YEARS)

Unit: million yen

Decennial years	Export (1)	Import (2)	Balance of trade (3) = (1) − (2)	Invisible trade (4)	Gold & silver (5)	Net foreign investment (6) = (3) + (4) + (5)
1878-1887	359	326	33	−9	26	50
1883-1892	572	510	62	−9	−26	27
1888-1897	988	1,074	−86	−10	−95	−191
1893-1902	1,757	2,065	−308	58	−2	−252
1898-1907	2,990	3,498	−508	780	155	427
1903-1912	4,024	4,532	−508	1,222	−5	709
1908-1917	6,886	6,076	810	879	−288	1,401
1913-1922	13,561	13,331	230	2,139	−1,109	1,260
1918-1927	18,496	21,246	−2,750	2,788	−766	−728
1923-1932	17,744	20,190	−2,446	1,560	934	48
1928-1937	20,547	20,844	−297	−100	1,138	741

Sources: 1878-1907, estimated by the author.
1903-1937, Yuzo Yamada, *A Comprehensive Survey of National Income in Japan*, 1957.
Both estimates are based on *A Detailed Survey of Foreign Trade in Japan*, Oriental Economist Co., 1934.

Notes: i) In exports and imports of trade, those to old territories (Korea, Taiwan and Kwantung) or those from there are considered as exports to or imports from foreign countries. But the trade with Sakhalin can not be recounted separately as that of a foreign country.
ii) As it is quite difficult to pick out the part of old territories in invisible trade, it is not taken consideration in Column (4) of the above Table.

and the last periods observed here. Thus Column (6) is induced as the final balance of payments and there a positive figure means an increase in net foreign assets and those marked minus means their decrease. Here we may consider the former as capital export and the latter as capital import in the components of capital formation.

IV. *A Comparison of Financial Approach with the Commodity Flow Series*

National saving is composed of private saving and government saving which have already been estimated in the previous sections. If the case is a closed economy, national saving should be equal to domestic investment. However, as is seen in the measurement of net foreign investment, in a country like Japan which is highly dependent upon foreign trade, national saving is strongly related not only to domestic but also to foreign investment. The relation is:

National saving=Domestic investment+Net foreign investment

Therefore,

Domestic (or national) investment=National saving−Net foreign investment

Consequently national saving and national investment can be calculated by combining the estimates of each sector in the previous chapters. Expressing the above equations in the author's terms,

$$S_n=S_p+S_g$$
$$=\Delta F_p+I_g+\Delta F_g-\Delta L_g \quad (14)$$
$$S_n=I_d+NFI \quad (15)$$

or
$$I_d=S_n-NFI \quad (16)$$

Here NFI is net foreign investment and notations of S, I, F, and L are respectively savings, investment, financial assets and liabilities. Suffixes n, d, p and g mean respectively national, domestic, private and government.

It is quite interesting whether or not national investment from financial approach coincides with that from the commodity flow series which is presented by H. Rosovsky.[14] His series are on net capital formation within the country, whether financed from home or abroad. Therefore we could compare the author's national savings with his series plus net foreign investment as shown in equation (15). Net foreign investment is related to the financial gap between domestic (or national) saving and investment. If NFI is negative, it means that the domestic economy requires capital imports for its capital formation in addition to domestic saving. In such case, equation (15) is rewritten as;

$$S_n=I_n-\text{Capital imports} \quad (17)$$

Rervesely if NFI is positive, it is interpreted that some part of domestic saving leaves domestic use for foreign investment. Namely,

$$S_n=I_n+\text{Capital exports} \quad (18)$$

In Table 9, the author's national saving is compared with Rosovsky's series, in which NFI is adjusted by equations (17) and (18).

In Table 9, Columns (4) and (5) are comparable to each other and we can find that national savings in Column (5) agree relatively well with Rosovsky's series adjusted NFI in

[14] *ibid.* pp. 109-110.

Column (4) in the long run, ignoring the fairly big difference in the overlapping two decennial years of 1913–22 and 1918–27. These decennia range from mid- to post-World War I when the Japanese economy rapidly expanded through an unprecedented war boom. Which side does more influence the above gaps, commodity flow series is underestimated or financial approach exaggerate the increase of financial assets?

Let us check this point in Chart 1 which shows five year moving averages in current values. At a glance, the *NCF* series moves upwards smoothly while *NS* fluctuates repeatedly with violent up and down swings. In other words, *NS* appears higher than *NCF* in the prosperous periods whereas the former drops sharply compared with the latter in cyclical recession. The main reason for the difference between the two series lies in the method of estimation, namely the effects of changing price levels on re-valuations in the financial approach. As is explained in Section 1, private saving is computed as annual changes obtained

TABLE 9. COMPARISON OF NATIONAL SAVING WITH NET CAPITAL FORMATION (DECENNIAL TOTALS OVERLAPPING EACH FIVE YEARS)

Unit: million yen

Decennial years	*GCF* (1)	*NCF* (2)	*NFI* (3)	Adjusted *NCF* (4)=(2)+(3)	S_n* (5)
1878–1887			50		242
1883–1892			27		334
1888–1897	1,066	556	−191	365	468
1893–1902	1,696	1,019	−252	767	1,031
1898–1907	2,435	1,436	427	1,863	1,732
1903–1912	3,726	2,231	709	2,940	3,165
1908–1917	5,271	3,263	1,401	4,664	5,275
1913–1922	13,369	8,690	1,260	9,950	14,367
1918–1927	21,488	14,440	−728	13,712	18,814
1923–1932	21,052	14,084	48	14,132	14,209
1928–1937	25,830	17,538	741	18,274	16,166

Notations: *NCF*=Net Capital Formation, *GCF*=Gross Capital Formation, *NNP*=Net National Products, *GNP*=Gross National Products

* Here S_n does not include cash holdings.

i) Column (1) *GCF*; Rosovsky's *GCF* (*ibid.* pp. 109–110)—military

ii) *NFI* comes from Table 8.

iii) $S_n=S_p$ (excluding cash holdings and demand deposits)$+S_g$

iv) The ratio of net to gross investment is computed by the following form.

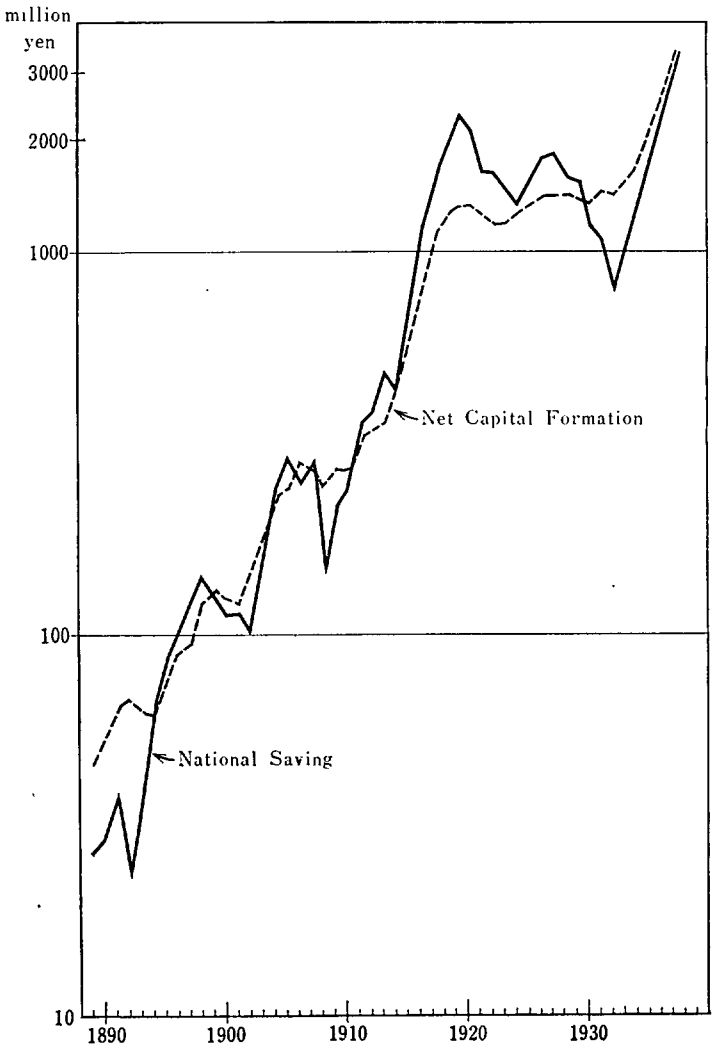
$$\frac{NCF}{GCF}=\frac{GCF-(GNP-NNP)}{GCF}$$

The results are;

1888–1897	61.6%
1893–1902	60.1
1898–1907	59.0
1903–1912	59.9
1908–1917	61.9
1913–1922	65.0
1918–1927	67.2
1923–1932	66.9
1928–1937	67.9

by subtracting the amount of financial assets in stock at the previous year end from those at the current year end. In the rising phase of price changes, the results are exaggerated. Conversely on the way to deep depression, the estimates are probably understated. In other words, financial assets, like stocks are more sensitive to changes in business conditions. Accordingly, we could surmise the gaps between the series in the periods in question are due to the overvaluation of such kinds of financial assets. In addition, we might point out another reason in that some duplications among financial assets are not completely netted out in inflationary periods. The quite low level of *NS* in the earlier periods comes from the fact that, as has been already pointed out, the financial net work mobilizing saving to investment

CHART. COMPARISON OF NATIONAL SAVING WITH NET CAPITAL FORMATION
(FIVE YEARS MOVING AVERAGES)



had not been sufficiently established over the country.

Second, the results may be affected in some degree by the procedure that inventory accumulation is not taken consideration in *NCF* series while it is included together in the financial sides. This should be noted in interpreting the estimation of *GCF* because inventory investment is a factor in business fluctuations, especially in short run changes. Thirdly, the comparison also may be affected slightly by the static element in the commodity flow series in which ratios or percentages used to estimate each components of capital formation are sometimes assumed as constant or moderate rates in their changes. Let us compare the saving-income ratios of the two series in Table 10. In Table 10, the difference between Column

TABLE 10. COMPARISON OF SAVING- AND INVESTMENT-INCOME RATIOS BETWEEN FINANCIAL AND COMMODITY FLOW SERIES (1878–1937) (IN TERMS OF DECENNIAL OVERLAPPING QUINQUENNIA)

Unit: million yen in Column (4)

Decennial years	National saving (1)	Domestic investment (2)	Net Capital Formation (3)	National Income (4)
1878–1887	3.23%	2.56%		7,478 (100.00%)
1883–1892	4.72	4.34		7,072 (100.00)
1888–1897	4.64	6.55	5.51%	10,084 (100.00)
1893–1902	6.47	8.11	6.39	15,935 (100.00)
1898–1907	7.69	6.10	6.38	22,499 (100.00)
1903–1912	10.75	8.45	7.57	29,437 (100.00)
1908–1917	13.24	9.79	8.19	39,821 (100.00)
1913–1922	17.97	16.40	10.87	79,912 (100.00)
1918–1927	15.46	16.06	11.86	121,652 (100.00)
1923–1932	11.33	11.29	11.23	125,393 (100.00)
1928–1937	11.42	10.29	12.39	141,468 (100.00)

Notes: i) Column (1)=Emi's estimates.
Column (2)=National saving−Net Foreign Investment.
Column (3)=Resovsky's estimates.
Column (4)=Ohkawa's estimates.

(1) and (2) equals the ratio of net foreign investment to national income, namely the ratio of capital exports if Column (1) is larger than Column (2) or that of capital imports if it is appeared reversely. Column (2) and (3) are to be compared as domestic investment even though they are computed from different approaches. The two series move almost with the same ratio to national income except in the overlapping two decennia of 1913–1927. Here we find that the averaged saving-income ratio computed for 1888–1937 in real terms is 11.4 per cent and those of both domestic investment and net capital formation are a little bit smaller than that of saving, namely 11.0 per cent in the former and 10.6 per cent in the latter. The relatively small balance of net foreign investment means that Japan did not import capital to a significant extent.[15] In sofar as a long run point of view is concerned, investment ratios estimated by the two different approaches are fairly well agree with each other, although a big question still remains as to the causes of gaps between the two in mid- and post-World War I periods.

V. *The Distribution of National Saving among Personal, Corporate, Private and Government*

Needless to say, national saving is composed of private and government saving and the former is distributed between the personal and corporate sectors. Personal saving is further divided into individuals' and unincorporated sector, but the statistics for unincorporated savings are not available although we can guess that part has taken a fairly large share of personal savings in prewar as well as in postwar experience.[16] The share distribution of national saving among personal, corporate, private and government is shown as Table 11.

TABLE 11. SHARE DISTRIBUTION OF NATIONAL SAVING BY SECTOR

Unit: million yen

Decennial years	Personal (1)	Corp. (2)	Private (3)=(1)+(2)	Gov't (4)	Total (5)=(3)+(4)
1878–1892			35.2%	64.8%	242 (100.0%)
1883–1892			56.3	43.7	334 (100.0)
1888–1897			79.1	20.9	468 (100.0)
1893–1902			78.0	22.0	1,031 (100.0)
1898–1907			79.3	20.7	1,732 (100.0)
1903–1912	73.2%	3.6%	76.8	23.2	3,165 (100.0)
1908–1917	63.5	11.8	75.3	24.7	5,275 (100.0)
1913–1922	88.7	1.9	90.6	9.4	14,367 (100.0)
1918–1927	90.4	−0.9	89.5	10.5	18,814 (100.0)
1923–1932	88.8	0.3	90.1	9.9	14,209 (100.0)
1928–1937	100.4	12.5	119.9	−19.9	16,166 (100.0)

Notes: Personal saving=Private saving−Corp. saving
Corp. saving=Gross profits−(Dividends+Losses+Corp. taxes)

Table 11 clearly illustrate that the overwhelming part of national saving has been provided by the personal sector. On the other hand, business corporations have a quite small share (or dissaving) in the overlapping three decennials 1913–32, although it held fairly firm in the other prosperous periods. Judging from the above features, we can guess that the high rate of saving in the personal sector has supported corporate investment, which has been linked with high growth rate of Japanese economy.

The relation that excess saving over investment in the personal sector is closely connected with excess investment over saving in the business corporation sector can be seen by comparing with the ratio of investment by each sector in Table 12.

[15] Many economists refer to the evidence that Japan successfully laid the foundation of capitalistic economy without relying on net capital imports. For example, Paul Samuelson, *Economics* 5th ed., p. 790; L. R. Klein, A Model of Japanese Economic Growth (1878–1937), *Econometrica*, Vol. 29, No. 3. July, 1961. p. 279.

[16] M. Shinohara, *Consumption Function* (in Japanese), p. 220, 1958. In the United States also, it is shown by Professors I. Friend and I. Kravis that the share distribution and the level of unincorporated saving quite high. ('Entrepreneur Income, Saving and Investment', *American Economic Review*, 1957, p. 270).

TABLE 12. RATIOS OF SHARE DISTRIBUTION OF NATIONAL INVESTMENT BY SECTOR

Unit: million yen

Decennial years	Personal (3)	Corp. (2)	Private (3)=(1)−(2)	Gov't (4)	Total (5)=(3)−(4)
1908–1917	21.1%	33.9%	55.0%	45.0%	3,263 (100.0%)
1913–1922	22.6	42.3	65.0	35.0	8,690 (100.0)
1918–1927	25.3	36.1	61.4	38.6	14,440 (100.0)
1923–1932	23.2	32.2	55.4	44.6	14,084 (100.0)
1928–1937	16.2	49.7	65.9	34.1	17,538 (100.0)

Notes: This table is made by adjusting Rosovsky's figures. Here the author tentatively assumes that personal investment is composed of residential and commercial building construction, because shops for commodity sales are numerous, but unimportant in terms of investment. Therefore building construction for commercial use is assumed as almost all that of unincorporated businesses. This might overestimate commercial investment of non-corporate business in the personal sector, but it is supposed to be offset by considering all industrial construction as that of corporate business. The incompleteness of farm investment in Rosovsky's estimate understates the investment of personal sector, but a fair part of agricultural construction is covered by government investment for agriculture.

Tables 11 and 12 do not exactly correspond, as already mentioned, but the saving-investment relation is broadly explainable in those tables. Here we should notice that the low level of investment in the personal sector comes from the relatively poor quality of Japanese housing[17] and numerous, but small scale of unincorporated business units. Therefore we might say that this feature released personal savings for investment in the corporate and government sectors although it did so in a passive sense.

Turning our attention to the saving-investment relation in the government sector, government saving is less in stationary while fairly high in the prosperous periods. However, looking at the investment side, its constantly high ratio, say 35 to 45 per cent, is impressive. Here we should stress that capital formation in Japan has been strongly pushed through the system of government expenditures.

Concerning the role of net foreign investment to economic growth, we find that Japan successfully laid the foundation of capitalistlc economy in the first two decennia without relying on net capital imports and after that the need for capital imports has been relatively small. In other words, we may say that Japan has maintained a high rate of capital formation depending mostly on her internal sources.

The question is "how Japan has been able to mobilize her internal sources of funds for capital formation?". This is to answer the secret of the high ratio of saving in Japan. From the macroscopic point of view, the answer is closely related to the problem of the share distribution of income, an oligopolistic alliance between industry and finance, and the wage rates and price mechanism of the market and so on. The continuing but mild inflation which she has experienced must play a significant role. The dominant source of saving has been provided by the personal sector as already seen. Accordingly, the reason for the high propensity to save in the personal sector must be clarified. The saving pattern of households

[17] Koichi Emi, 'Capital Formation in Residential Real Estate in Japan, 1887–1940'. *The Annals of the Hitotsubashi Univ.*, Vol. IX No. 2. April 1959.

and the unincorporated sector is connected not only with economic structure, but also with the social background. To answer all the related questions is beyond the scope of this paper and the author wishes to develop this problem in another paper.*

* After this article were already in galley proofs, I received very useful, detailed comments from Professor Lawrence R. Klein of the University of Pennsylvania. His substantial criticisms are mostly directed at the inadequacy of assumptions underlying the methods of estimation and at my incompleteness in explanation of the methods themselves. He also pointed out certain generalizations which he felt were unwarranted on the basis of the data presented. It is too late to make here the alterations suggested, but I plan to develop the data further and to make other revisions for subsequent use.