# A SYNTHETIC ESTIMATE OF THE NATIONAL WEALTH OF JAPAN 1885–1973*

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This article presents estimates, in current prices, of the national wealth of Japan and of about a dozen components for twelve benchmark dates between 1885 and 1973, the distance ranging, with one exception, from five to twelve years. The estimates are derived by a combination of (a) Ohkawa's perpetual inventory estimates of reproducible fixed assets for the period from 1885 to 1940 and Economic Planning Agency censuses for 1950 to 1965, roughly extrapolated to 1973; with (b) estimates of other components of national wealth (land, inventories, consumer durables and net foreign assets) taken for the pre-war period chiefly from census-type data and derived for the postwar period from miscellaneous, mainly official, sources.

As in most countries the current value of Japan's national wealth increased until World War II considerably more slowly than its national product, which expanded with extraordinary rapidity. In the postwar period, however, the ratio showed a slight upward trend reaching by 1973 fully 3½. The ratio of all reproducible assets to national product showed a similar pattern at a lower level, reaching 2½ in 1973. In contrast the ratio of so-called productive assets (non-residential buildings, equipment and inventories) failed to show a definite secular trend remaining between 1.5 and 2.2 at all but one benchmark date.

Changes in the structure of national wealth over the past century were pronounced, but very different before and after World War II. Up to the 1940's, the share of land declined sharply from about one-half to less than one-fourth, to the benefit primarily of producer durables and non-residential structures. In the last quarter of a century, in contrast, the extraordinary rise in urban land prices brought the share of land in national wealth back to one-third (though the share of agricultural land continued to decline rapidly), while that of producer and consumer durables continued to increase.

Statisticians' estimates of a country's national wealth are in part the result of the same motives that induce mountaineers to climb Mount Everest: because it is there, and hence constitutes a challenge. There are, however, a few less irrational reasons for making estimates of the value of national wealth, of its composition and of its sectoral distribution. Four of the most important of these reasons are the need for such estimates to calculate the level and the movements of aggregate capital-output ratios (marginal ratios, of course, require only estimates of gross or net capital expenditures); the structure of national wealth, e.g. the relative importance of gifts of nature (land and subsoil deposits) and of man-made durable goods, particularly "produced means of production"; the distribution of both types of assets among sectors or among narrower groups of economic units within sectors; and national and sectoral balance sheets, which combine the value of tangible assets with those of financial assets and of liabilities and net worth and permit the derivation of relationships like the financial interrelations ratio, i.e. the

* This paper, composed (essentially in the spring of 1972 after a visit to Japan for which I am indebted to the National Science Foundation) as an appendix to a study of the financial development of Japan during the last century, I should not have had to write, and I hope that Japanese economists will regard it as a challenge to do better. However, an estimate of national wealth is essential for the construction of a national balance sheet, and national balance sheets in turn form the statistical core of at least one approach to the analysis of financial structure and development. I therefore had no choice but to do the best I could, being hampered by limitations of time, scarcity of previous work in the field and, most seriously, ignorance of the Japanese language.

quotient of financial assets and of national wealth. National wealth estimates are thus rarely made for their own sake (at least nowadays, though the situation was different in the 19th century) but to be used as components or tools for the analysis of various economic and financial trends and problems.

Thus the estimate presented in this article has been put together not for its own sake, but as a part of an estimate of the national balance sheet of Japan. This may excuse the fact that more liberties have been taken with the data and more shortcuts in the estimates have been accepted than might be regarded as permissible if an estimate of national wealth and its analysis were the primary objectives.

There are essentially two approaches to the estimation of Japan's national wealth during the past century. The first is to string together the official and semi-official estimates in current prices that are available for total national wealth for eight benchmark dates between 1905 and 1935, and the figures for reproducible, tangible assets based on the extensive surveys of the Economic Planning Agency for 1955, 1960, 1965 and (not yet available early in 1974), for 1970. The alternative is the use of the annual estimates, in 1934–36 prices, of reproducible fixed assets developed by Ohkawa and associates for 1874 to 1940 using the perpetual inventory method. Neither of these two approaches provides a single set of estimates that extends over the entire period, covers all components of national wealth, is expressed in current prices as is required for financial analysis, and is reasonably comparable over the entire period of nearly one hundred years.

If strict standards are applied, the development of such a comprehensive and comparable set of estimates for the last century is as yet, and possibly for ever, beyond reach. It appears, however, that by combining existing estimates and filling in gaps in them—some undoubtedly of great importance—a series can be

TABLE 1

SUMMARY ESTIMATES OF NATIONAL WEALTH OF JAPAN, 1885–1973

(billion yen)

| | Land (1) | Reproducible Tangible Assets (2) | Net Foreign Assets (3) | Total (4) |
|---|---|---|---|---|
| 1885 | 2.3 | 2.7 | −0.2 | 4.8 |
| 1900 | 7.1 | 8.2 | −0.2 | 15.1 |
| 1913 | 11.0 | 15.1 | −1.0 | 25.1 |
| 1920 | 39.5 | 47.7 | 4.0 | 91.0 |
| 1930 | 31.9 | 37.6 | 1.7 | 71.2 |
| 1940 | 60.2 | 114.2 | 1.0 | 175.4 |
| 1950 | 2,255 | 7,100 | — | 9,355 |
| 1955 | 9,792 | 16,564 | 199 | 26,555 |
| 1960 | 16,953 | 31,630 | 370 | 48,953 |
| 1965 | 34,767 | 72,410 | −405 | 106,772 |
| 1970 | 79,100 | 162,000 | 2,070 | 243,170 |
| 1973 | 140,000 | 325,000 | 10,400 | 475,400 |

*Sources:*

Col. 1 Table S-1, Col. 4.
Col. 2 Table S-6, Col. 4.
Col. 3 Table S-11.

developed for a substantial number of benchmark dates between 1885 and 1973 that reflects trend and structural changes with sufficient accuracy to serve as a component in a set of national balance sheets, a set to be used as the basis of an analysis of the development of Japan's financial superstructure and of its relation to the country's real infrastructure of national income and wealth; and it is this analysis which is the objective of the exercise.

This set has, briefly, been developed by combining (a) Ohkawa's perpetual inventory estimates of reproducible fixed assets for the period from 1885 to 1940, converting the original constant (1934–36) price estimates into current price figures by Ohkawa's price indices, and Economic Planning Agency figures for the postwar period; with (b) estimates of the other components of national wealth (land, inventories, consumer durables, net foreign assets), taken for the pre-war period chiefly from census-type data, and derived for the post-war period from miscellaneous, partly official sources—in the case of non-agricultural land admittedly by hazardous methods and with a wide margin of error.

The derivation of this set of estimates is described in summary form in the following pages and in the footnotes to the Supplementary Tables while Table 1 provides a summary of the results distinguishing only three main components, viz. land, reproducible assets and net foreign assets. The second section of this paper very briefly presents some of the results, and relates in elementary form the stock estimates of national wealth derived here to the flow magnitude of national product.

## I. Methods of Estimation

### 1. *Land*

Of the important components of national wealth the difficulties of estimation and the errors in the resulting figures are greatest for land, particularly before the first census-type estimates of 1905; and here in particular for non-agricultural land.

(a) *Agricultural land:* Separate figures for agricultural land are apparently given in only three of the series of official or semi-official national wealth estimates available at intervals of six years or less for the period 1905–35[1], viz. 1910 (5.5 bill. yen), 1924 (16.9 bill. yen), and 1930 (16.2 bill. yen). In addition an unofficial detailed estimate, apparently based on official (Ministry of Finance) materials, was made for 1904 by Igarashi and Takahashi (*The National Wealth of Japan*, 1906). This book provides estimates for the value of paddy and dry fields in each prefecture, which total 9.3 billion yen for Japan as a whole, an estimate difficult to accept as it is considerably higher than another unofficial estimate for about 1907[2] and than the Bank of Japan's estimate for 1910.

There is also available a price average of an unknown degree of representativeness for the two main types of agricultural land (paddy and dry fields) which extends without break on an annual basis from 1913 to the present. This average can be combined with the known area of agricultural land to furnish an

[1]See Bank of Japan, *Hundred Year Statistics*, 20/23 and *Supplement*, 13, 15.
[2]T. Sako in *Fifty Years of New Japan* (1910), Vol. I, 577.

independent estimate, shown in Table S-3, of the value of these two types of fields which account for the bulk of the value of agricultural land. Unfortunately there are considerable differences in level and movement between benchmark dates between the census type figures and the index.

A choice, therefore, must be made. It has led to accepting from 1920 on the census value for 1930 and using the index derived from the multiplication of price and area data as extrapolator. One reason for this decision is the fact that "special care was exercised in working out the values of paddy fields, truck farms, residential (i.e. all urban) land and dwellings"[3]; another that the estimates for the end of the period are reasonably close to the results of a different approach, viz. the use of average price of farm land changing hands. In the fiscal year 1969–70 this price averaged 237 yen per $m^2$ for 135 bill. $m^2$ of taxable land changing land which represents about 2.7 percent of all farm land.[4] On that basis the value of all farm land late in 1969 would be slightly below 12 trillion ($10^{12}$) yen, only a little less than the calculated value for 1970 of Table S-2.[5]

Difficulties are more formidable still for the period before 1910. There is no comprehensive estimate and the available scattered data on agricultural land prices are contradictory.[6] There seems to be little doubt, however, that land prices were much lower in the first two or three decades of the Meiji era than during the 20th century; that they fell sharply during the Matsukata deflation of the early 1880's; and that they recovered only slowly for at least another decade. The estimates adopted and shown in Table S-2 are the result of a, hopefully judicious, choice among the available primary data, assuming, not without some supporting evidence, that market values of agricultural land were in the late 1880's close to assessed values.[7] Only an intensive study of all existing material, mostly available in Japanese only and therefore inaccessible to me, will lead to the establishment of figures in which a reasonable amount of trust can be put.[8]

(b) *Forest land:* In the official or semi-official Japanese national wealth estimates forest land (sometimes also listed as "forestry" or "trees") appears at relatively high values. In the census type estimate of the Bank of Japan for 1910, for example, the figure for forests is almost as high as that for agricultural land; even in 1924 it is half as large. The movement of these figures, however, is erratic, and it is doubtful whether much faith can be put in them.

From 1955 on—no census type figures exist after 1935—it is possible to estimate the value of forest land by multiplying the forest area by the reported average price, a calculation illustrated in Table S-4. The resulting estimates for

[3]S. Shiomi, *Kyoto Economic Review*, IX (1934), 29.

[4]Economic Planning Agency, *Economic Survey of Japan (1970–71)*, 256 of Japanese text.

[5]In the OECD's report on *Capital and Finance in Agriculture*, Vol. II (18 of country report on Japan) the volume of agricultural land sales is given at 111 billion yen for 1967 and it is stated that about 0.8% of arable land changes hands annually. These figures imply a value of all arable land of nearly 14 trillion yen. This rough estimate is again not too far from the two other figures.

[6]For a review see *Supplement to Hundred Year Statistics*, 60/62.

[7]This is Rathgen's conclusion (*Japan's Volkswirtschaft und Staatshaushalt*, 1891, 258ff) after an intensive discussion of the data available; cf. also the table 767.

[8]After completing this version of the estimates I discovered a set of figures for a few benchmark dates between 1880 and 1960 developed by two much more knowledgeable agricultural economists, partly from the same basic data used here. Their estimate of the value of arable land is compared below with those of Table S-2 (billion yen through 1940; trillion yen for 1960).

forest land, rising from about two trillion yen in 1955 to about 8 trillion in 1970, are equal to nearly one-half of the estimated value of farm land in 1955 and to nearly two-thirds in 1970, ratios somewhat higher than the apparent relationship before 1935.

An alternative source—the figures on the value of national forests in the central government's patrimonial accounts[9]—had to be discarded as they appear to be conventional, are substantially changed only at long intervals and obviously lag considerably behind market values.

(c) *Non-agricultural land:* This is the most difficult component of national wealth to estimate. Because of its large size and because of the wide margin of the uncertainty necessarily connected with any estimate that can now be made, the error in this component considerably influences the estimates for total land values and even that for total national wealth as well as some of the most important structural relationships in the analysis of national wealth. Unfortunately no set of estimates satisfying even moderate requirements of accuracy and consistency can be prepared, if at all, without extensive analysis of all the materials available, often only in Japanese, and without the collection of new primary data. In this situation the most that the estimates presented—which are essential to any estimate of total national wealth—can claim is to provide an indication of the order of magnitude involved.

There are four census-type, i.e., comprehensive, estimates for the value of all non-agricultural private land, although the exact definitions are not too clear and probably are not exactly comparable.[10] These estimates—for 1904, 1910, 1924

*Footnote 8 continued*

| | Hayami and Ruttan[a] (1) | Table S-2 (2) | Difference [(1) − (2)]/(1) (3) |
|---|---|---|---|
| 1880 | 1.63 | 1.30[b] | +0.20 |
| 1900 | 4.77 | 4.00 | +0.16 |
| 1920 | 23.29 | 22.70 | +0.03 |
| 1940 | 28.82 | 27.00 | +0.06 |
| 1960 | 8.59 | 6.84 | +0.20 |

[a]Y. Hayami and V. Ruttan in *Journal of Political Economy*, 78 (1970), 1117.

[b]1885.

The comparison shows that Hayami and Ruttan's estimates are on the average 13 percent higher than those of this essay, the difference ranging from 3 to 20 percent. However, the excess of their figure for 1880 over this essay's estimate for 1885 can easily be accounted for by the undoubtedly downward trend in farm land prices during the Matsukata deflation, leaving substantial differences only for 1900 and 1960. The long-term movements in both series are practically the same.

[9]See *Hundred Year Statistics*, 160–61 and *Japan Statistical Yearbook*, 1970, 486–87.

[10]An example will give an idea of the difficulties of a researcher not fully familiar with the Japanese language, or of the inadequacies of translation. In all English language (or bi-lingual) sources the Japanese term "takuchi" is translated as "residential" (sc. land). The correct meaning of the term, however, is significantly different, as it also includes commercial and industrial sites (cf. J. Nakamura, *Agricultural Production and the Economic Development of Japan 1873–1922*, 34), thus being identical with or close to all non-agricultural (and non-forest) land.

and 1930—are shown in Col. 1 of Table S-5. No comparable estimate has been made for the last forty years. Unfortunately, it is difficult, if not impossible, to accept all four estimates and to treat them as belonging to one time series if collateral information on non-agricultural land prices, areas, construction costs and land/structure ratios is taken into account. It is, therefore, necessary to supplement, and possibly adjust, the census-type estimates by figures derived by different methods.

Three methods of estimation are available for those benchmark years for which no specific census type estimates exist. The first is the interpolation and extrapolation beyond 1930 of the census type estimates with the help of indices of non-agricultural land prices and areas. The second, related, method is the multiplication of the absolute values for prices and areas for non-agricultural land. The third method is fairly independent, obtaining the value of urban land by multiplying the structure value of buildings by estimates, usually made by real estate experts, of typical land/structure ratios. The results of the three methods unfortunately diverge widely, though more in level than in movement.

The first method starts from the only four census type figures available and tries to derive from them an estimate for the value of non-agricultural land for 1936, the year with which the urban land price index starts. That estimate, unfortunately depends on whether one starts with the census type figures for 1904, 1910, 1924 or 1930, and what assumptions one makes about the trend of urban land prices before 1936, the data on non-agricultural, or urban, areas being less uncertain.

The only census type estimate that permits a direct comparison with urban land prices of 1936 is that for 1904. It points to an increase from 1904 to 1936 by about 240 percent, which is not unreasonable in view of the increase in building costs by about 120 percent,[11] and the usual tendency of the rise in land values to exceed that in building costs. This would yield an estimate of total non-agricultural land values in 1936 of about 8 billion yen, allowing for the increase in urban areas by nearly 20 percent. The census-type estimate leads to a slightly higher estimate—in the order of 10 billion yen.

The difficulty in using the 1924 and 1930 census estimates is that there is no information on the trend of urban land prices in the period 1924 to 1936, and it is dangerous to assume that land prices moved parallel to building costs, leaving the land/structure ratio unchanged. What is worse, the 1930 census estimate is about six times as high as that of 1910 although building costs appear to have increased by only about 70 percent and the urban area expanded by not much more than 5 percent (difficult to believe), implying a sharp increase in the land/structure ratio. The 1930 figure is also difficult to reconcile with that for 1924, being one-third larger in the face of a reported decline in building costs by about one-third and a very small increase in urban area. Thus adjusting the 1924 estimate for changes in building costs and urban area one obtains an estimate for private non-agricultural land in 1936 of about 9 billion yen, while the same procedure yields an estimate of about 18 billion yen if one starts from the 1930 census-type figures.

[11]Ohkawa and associates, *Estimates of Long-term Economic Statistics of Japan*, Vol. 8, 158/59.

Between 1936 and 1970 the urban land price index has risen almost 4,600 times while the urban area has expanded by a little over one-third (Table S-5). Thus the value of private non-agricultural land in 1970 should be, if the land price index is accepted, about 6,200 times what it was in 1936, i.e., if one starts from the 1904 census-type figure, about 50 trillion ($10^{12}$) yen; about 62 trillion if the multiplication is based on the 1910 benchmark; and about 55 and 112 trillion yen if the calculation uses the 1924 or 1930 census-type values and accepts a land price rise in line with construction cost movements between 1924 and 1930 and 1936. While the first three figures can be reconciled for 1970 with the results of Method III, that based on the 1930 census-type benchmark seems to be unacceptably high.

The estimates derived by this method for 1960 and 1965 yielding land/structure ratios of 1.36 and 1.15, however, are undoubtedly too high and move in the wrong direction. The estimate for 1955 (0.66) also seems too high, although the fact that it lies substantially below the values for the following three benchmark dates is in accord with other evidence, particularly the movement of land prices and construction costs.

The figures obtained by the multiplication of the available data (collected, though not published, by the Japan Real Estate Institute) on absolute prices and areas, on the other hand, seem unreasonably high (higher even than the estimate based on the 1930 census figures)—possibly because the price data refer to a narrower concept of non-agricultural area than the area statistics or because I have misinterpreted them, and have been discarded.

The difficulty with the third method is that apparently only one independent estimate of the land/structure ratio of urban building has been published for recent years, which, moreover is limited to residential structures. This estimate can be derived from a survey undertaken in 1963 by the Mitsubishi Economic Research Institute which indicates a land/structure ratio of 0.72.[12] Taking into account the much more rapid rise in residential land prices than in residential construction cost the 1970 ratio would on that basis be a little above unity, and this is in accord with the estimate derived from the land price and area indices.[13]

The only earlier set of estimates permitting the derivation of a land/structure ratio is that of Igarashi and Takahashi for 1904.[14] The value (0.39) is not unreasonable in view of the much more rapid rise in land prices compared to construction costs in the postwar period. It implies a rise by about 240 percent of urban land prices between 1904 and 1936 compared to a rise in construction costs of 135 percent and of the price level (gross national expenditure deflator) of 90 percent.

A lower boundary for the land/structure ratio of non-residential buildings can be obtained from the estimated combined balance sheet of all non-financial

[12] *Economic Survey of Japan* (1970–71) 139. There is no description of the method of derivation of either this or estimates cited in footnote 4 in this source. (The Japanese edition of this publication apparently provides some further information in the Appendix).

[13] The figures in *The Economic Development of Japan*, 1970/71 that apparently permit the derivation of a land/structure ratio for residential buildings actually do not do so because the figures for land cost do not include land already owned by builders or homeowners when beginning construction.

[14] *The National Wealth of Japan*, 1906.

corporations.[15] If the book value of land shown there is related to the book value of structures,[16] the land/structure ratio has risen from 15 percent in 1960 to 28 percent in 1965 and to 35 percent in 1968. Because the valuation at original cost tends to understate the market value of land much more than that of buildings and structures, these ratios may be regarded as minima. The correct ratios are undoubtedly higher, probably considerably so. The extent of the difference between the book and the market land/structure ratios may, however, have declined over the period.[17]

Weighing the fragmentary information on land/structure ratios one may possibly conclude that in 1970 it was in the neighbourhood of unity for the country as a whole and for all types of non-agricultural land taken together, the higher values for residential and commercial land in large cities offsetting the lower values for industrial land and for residential and commercial land in the rest of the country. But this cannot be more than a personal judgement. There can be no doubt, on the other hand, that whatever the value of the land/structure ratio in 1970, it must have been progressively and sharply lower as we go back towards 1950. It also must have been considerably lower than in 1970 during the entire pre-war period, but whether there were marked and consistent trends between 1900 and 1936 we cannot say.

If we accept an estimate of non-agricultural land values for 1970 based on a land/structure ratio of unity, which after all seems to be the least objectionable method, and also accept the validity of the urban price index and the change in urban area, we obtain a back-cast estimate for 1936 of about 9 billion yen. Since this supposedly includes public urban land, private land values might have been in the neighbourhood of 8 billion yen. This is compatible with the extrapolated values for that year based on the 1904, 1910 and 1924 census types, though not with that based on 1930—if urban land prices are assumed to have moved parallel to building costs from 1924 to 1936. If they are supposed to have outrun building costs, as is not at all unlikely, the back-cast estimate for 1936 is considerably below extrapolations based on the 1904, 1910 and 1924 estimates as well.

As one does not want to reject a contemporary respectable estimate without very good reason there seems no way out from accepting the 1904, 1910 and 1924 census-type estimates (with only small upward adjustments to allow for public urban land) and to abandon only the 1930 estimate,[18] substituting for it one more in line with the 1924 estimate, and to accept for 1936 a figure somewhat above the 1930 back-cast estimate and more in line with the 1924 figure, viz. about 10 billion yen.

[15] *Japanese Statistical Yearbook*, 1969, 312/13.

[16] It has been assumed on the basis of the comprehensive national wealth estimate of 1960 that buildings and structures represent 55% of the total value of all fixed reproducible assets.

[17] For 646 nonfinancial corporations listed in the Tokyo Stock Exchange the market value of land in 1967 was estimated by Waho Shoken, a securities company, at more than eight times the book value. While the ratio is probably smaller for the bulk of nonfinancial corporations, this piece of evidence points to a very substantial understatement of land values in corporate balance sheets and hence to a considerably higher land/structure ratio than derived from the balance sheets. (I owe this reference to Professor Kimizuka.)

[18] This is a difficult decision, but it cannot be avoided unless most other evidence is discarded.

Even if we thus basically accept as the least objectionable compromise the 1904, 1910 and 1924 census-type estimates and the 1970 figure based on a land/structure ratio of unity it is not possible to derive estimates for the other benchmark dates by one single method. These estimates rather have to be judgemental, interpolating between benchmark dates on the basis of construction cost indices, land price indices and land/structure ratios, the latter being in turn judgemental. This is how the figures in Col. 8 of Table S-5 have been derived—and may the Lord have mercy on the estimator's soul.

## 2. *Reproducible Fixed Assets*

For this, the most important single component of national wealth, there are fortunately available for the entire period estimates whose method of derivation is known, that are reasonably comparable, and that are designed to fit into a system of social accounts. Up to World War II, Ohkawa's series[19] derived by cumulation of net capital formation, in constant (1934–36) prices, is undoubtedly preferable to the census-type estimates that vary in method and reliability and are not easily comparable over time, notwithstanding the well-known problems created by the difficulty of adjusting the original constant price estimates to reflect the current price level of structures and equipment. The mostly official estimates for the post-war period, which are based on special enquiries rather than on the perpetual inventory method, seem to be consistent with the national accounts figures for net capital formation.

While, as Table S-8 shows, the two sets of estimates for total fixed reproducible assets are reasonably close for the benchmark dates of 1905, 1910, 1913, 1930 and 1935 (the differences are, taking the perpetual inventory figures as basis of comparison, +0, +4, −18, +19 and +18), there are wide and erratic differences in the components. These, together with the large differences in totals and in components in 1919 (not shown) and 1924 and the obviously nonsensical nature of level or movements of some of the census-type figures (e.g. 1919 level, and movements of equipment and non-residential structure estimates for 1905 to 1913) should suffice to rule out the census-type figure as the basis of any serious analysis.

In the postwar period official detailed estimates, prepared by the Economic Planning Agency, are available for 1955 and 1960 and have been accepted.[20] A similar estimate is available for 1965[21], but since it is limited to business type reproducible assets—constituting in 1960 60 percent of the national total—rough extrapolations for dwellings and general government fixed tangible assets had to be made, starting from figures on gross capital expenditures and on the change in the relevant implicit deflators in the national accounts. The 1970 estimate finally was derived from the Economic Planning Agency figure for 1968[22] by extrapolation, based again on the data on capital expenditures and capital goods prices in

[19]Ohkawa and Associates, *Estimates of Long-term Economic Statistics of Japan*, Vol. 3, 134 for capital stock in 1934–36 prices and Vol. 8, 158–59 and 165 for price indices.

[20]*Economic Statistics Annual*, 1970, 277/280.

[21]*Op. cit.*, 281.

[22]*Economic Survey of Japan* (1969—70).

the national accounts. These estimates will have to be revised when the results of the official estimate for all sectors' reproducible assets in 1970 become available later in 1974 or 1975.

3. *Inventories*

For the period from 1913 to 1935 there is, in the absence of any serious study of the matter, apparently no alternative to using the figures in the census-type estimates, even though some of these are suspect. The comparison of the series with the better-founded estimates for the stock of reproducible fixed assets excluding residential structures or national income presented in Table S-9, however, gives no reason to disqualify any of them, except possibly that for 1920 which seems too low.

4. *Consumer Durables*

Here chaos reigns. The original census-type estimates put "furniture" at 10 to 50 percent of fixed reproducible assets—excessive ratios on the basis of the situation in other countries—while in the revised figures the ratio is reduced to about 1 percent from 1905 to 1913 and to 4–5 percent from 1919 to 1935.[23] It, therefore, seems preferable to derive the figures from data on expenditures on consumer durables. On the basis of Ohkawa's figure on expenditures on "furniture and utensils" their stock may be estimated, assuming ten year life and straight-line depreciation, at less than 100 million yen for 1900, fully 200 million yen for 1913 and over 1,200 million yen for 1930, equivalent to about 1, 2 and 4 percent of the value of fixed reproducible assets at these dates. The figures in Table S-10 are based on these ratios.

In the postwar period expenditures on consumer durables are shown separately in the national accounts, and the stock has been calculated on that basis using now a shorter life of eight years, but retaining straight line depreciation. This yields an estimate of the value of the stock at the end of 1970 of about 8½ trillion yen or 7 percent of reproducible fixed assets, about twice the 1930 and four times the 1913 ratio. A sample survey, not available for earlier benchmark years, yields an alternative higher estimate of fully 12 trillion yen, but may be based on a broader definition of consumer durables.

5. *Net Foreign Assets*

Here two methods are available: first, benchmark census-type estimates; and second, the equivalent of the perpetual inventory figures, the cumulation of balance of payments surpluses and deficits. The available data are compared in Table S-11, which shows that the two series, unfortunately, sometimes diverge considerably in the extent though generally not in the direction of the movement. Fortunately net foreign assets are quite small compared to domestic tangible wealth from World War I to the later 1960's so that even a substantial error cannot seriously affect the estimate of total national wealth.

[23] *Supplement to Hundred Year Statistics*, 15.

## II. Some Results

This summary and discussion of the results will be limited to two aspects of national wealth in which current rather than constant values are appropriate, the distribution of national wealth among the main types of tangible assets and the relationship between national wealth and national product.

### 1. *The Structure of National Wealth*

The distribution of total national wealth among the main types of tangible assets is shown for half-a-dozen benchmark dates between 1885 and 1970 in Table 2. Because of the roughness of many of the figures only substantial and protracted changes should be regarded as significant and worthy of notice.

The main structural change, of course, is the declining trend in the share of land. While land constituted nearly one-half of total national wealth in 1885 and 1900 and still more than two-fifths between 1913 and 1930, its share then declined sharply to a low of one-fourth in 1950. The share recovered rapidly to a level of about one-third from 1955 to 1970, reflecting the extraordinarily large rises in land prices in the post-war period.

These movements in the share of land are the result of quite different trends in the share of urban (residential, commercial and industrial) land and of other (farm and forest) land. Over the period as a whole the share of farm and forest land has declined sharply from fully one-third to less than one-tenth, although remaining without much change at a level of slightly below one-third between 1900 and 1930. The decline of the share from the 1930's on is due both to a reduction of the importance of agriculture in the Japanese economy and to the relatively slow rise in farm land prices during the 1960's. Urban land, on the other hand, showed no trend up to the late 1950's, remaining close to one-eighth of total national wealth. The extraordinary rise in urban land prices in the post-war period, particularly the 1960's, sharply increased its share to one-fourth of total national wealth in 1970 (and this may well be an understatement).

An equally diverse trend can be observed among the main components of reproducible tangible wealth which constituted from 52 to 60 percent of total national wealth until 1930, but increased its share to about two-thirds of the total in the post-war period reflecting mainly the process of industrialization and urbanization of Japan. The movement is even more pronounced if livestock is eliminated in which case the share of reproducible tangible assets rises from slightly less than one-half from 1885 to 1930 to nearly two-thirds after World War II. The share of residential buildings declined irregularly from about one-fifth of national wealth in the late 19th century to an average of only about one-tenth from 1955 to 1970, a movement which reflects the relative neglect of housing in the Japanese economy and the resulting low standard of accommodation compared to the level which the rest of the economy has reached. The share of inventories fails to show a definite trend—the average for the eleven benchmark dates is close to one-tenth of national wealth—the irregularity of the movement possibly reflecting the poor quality of the figures before 1955.

The increases are therefore concentrated in the shares of non-residential buildings and structures and in producer and consumer durables. These three

TABLE 2

DISTRIBUTION OF NATIONAL WEALTH, 1885–1970

Percent of Total National Wealth

| | Land | | | | Reproducible Tangible Assets | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total (1) | Fields (2) | Forests (3) | Non-agricultural (4) | Total (5) | Residential Buildings (6) | Other Buildings and Structures (7) | Producer Durables (8) | Inventories (9) | Livestock (10) | Consumer Durables (11) | Net Foreign Assets (12) |
| 1885 | 48.24 | 27.03 | 8.32 | 12.89 | 56.75 | 19.33 | 17.05 | 3.53 | 7.28 | 8.52 | 1.04 | −4.99 |
| 1900 | 47.30 | 26.65 | 6.66 | 13.99 | 54.30 | 21.32 | 14.99 | 4.80 | 6.66 | 5.86 | 0.67 | −1.60 |
| 1913 | 43.94 | 23.90 | 7.01 | 13.03 | 60.21 | 17.13 | 15.58 | 8.65 | 12.27 | 5.70 | 0.88 | −4.14 |
| 1920 | 43.32 | 24.88 | 4.96 | 13.48 | 52.30 | 15.65 | 17.15 | 9.73 | 4.91 | 4.31 | 0.55 | 4.38 |
| 1930 | 44.83 | 22.76 | 9.43 | 12.64 | 52.77 | 11.80 | 18.05 | 8.61 | 8.27 | 4.28 | 1.76 | 2.39 |
| 1940 | 34.15 | 15.43 | 5.97 | 12.75 | 65.29 | 15.17 | 21.69 | 12.76 | 9.72 | 4.52 | 1.43 | 0.57 |
| 1950 | 24.10 | 10.74 | 4.81 | 8.55 | 75.90 | 23.52 | 26.19 | 12.83 | 9.62 | 1.60 | 2.14 | 0.00 |
| 1955 | 37.11 | 17.50 | 7.81 | 11.80 | 62.15 | 10.41 | 24.06 | 11.90 | 11.87 | 1.28 | 2.63 | 0.75 |
| 1960 | 35.21 | 13.83 | 6.92 | 14.46 | 64.02 | 9.31 | 23.04 | 14.11 | 13.31 | 1.41 | 2.84 | 0.75 |
| 1965 | 32.84 | 7.71 | 4.51 | 20.62 | 67.55 | 11.19 | 26.67 | 15.39 | 10.73 | 0.49 | 3.08 | −0.38 |
| 1970 | 32.50 | 5.14 | 3.33 | 24.06 | 66.85 | 38.00 | | 15.10 | 9.70 | 0.45 | 3.60 | 0.85 |
| 1973 | 29.45 | 4.21 | 2.52 | 22.72 | 68.36 | 56.48 | | | 8.41 | 0.32 | 3.16 | 2.19 |

*Sources:* Tables S-1, S-6, S-7 and S-11.

components of wealth increased their share from fully one-fifth of national wealth in 1885 and 1900 to nearly 30 percent in 1930. Their main advance, however, began in the 1930's, raising their share to approximately two-fifths of total national wealth from 1950 and 1960 and to about 45 percent in 1965 and 1970. Among these three components producer and consumer durables together doubled their share from about five percent of total national wealth and one-tenth of reproducible tangible assets in 1885 and 1900 to one-tenth of national wealth and one-fifth of reproducible tangible assets in 1930. Further significant increases occurred in the post-war period which lifted the share of durables close to one-fifth of national wealth and to nearly 30 percent of reproducible tangible assets in 1970. It is, of course, these two categories of national wealth which most clearly reflect the industrialization and mechanization of an economy.

### 2. *The Aggregate Capital-Output Ratio*

Estimates of national wealth in current prices, of course, do not lend themselves to the calculation of marginal capital-output ratios which, correctly expressed in constant prices, are needed in studying production functions and similar relationships. They are, however, useful in measuring and interpreting the relationship between the flow of national product and the stock of tangible assets that cooperate with labour and other factors in producing that income. The relevant figures are shown in Table 3 and, in more detail, in Table S-12.

The broadest, but for economic analysis least useful, ratio is the relation between total national wealth (land, reproducible tangible assets and net foreign assets) and gross national product.[24] This ratio shows a downward trend from 1885 to 1940, declining irregularly from 6.0 to 4.3. A break occurs, as in many other countries, during the 1940's. As a result, the broad capital-output ratio has been only slightly in excess of three since the mid-1950's showing only a very weak and irregular upward movement. Even after the spectacular further rise in land and reproducible asset prices in the early 1970's the ratio appears to have remained well below four through 1973, i.e. below that of any date before World War II. The extraordinarily low value of the ratio in 1950 of 2.4 is not significant, because this date falls in the middle of the recovery period from the destruction and disorganization accompanying and following Japan's participation in World War II.

If land is disregarded the ratio between reproducible tangible assets and national product shows an unexpected decline between 1885 and 1913, a period during which the industrialization of Japan made considerable progress. This is

[24]Since national wealth includes consumer durables as well as structures and equipment owned by the general government, the figure for gross national product used as divisor should conceptually include allowances for the use value of these items. Figures which meet this requirement for Japan are not available, but the difference would be rather negligible and certainly would not influence trends, except possibly during the last decade. Purists could also demand to use as divisor not the year's national product, but its rate at the end of the year, which would have to be approximated by the average of the current and following year's national product or better, but not usually feasible, the average of the fourth quarter of the current and the first quarter of the following year. When national product in current prices increases as rapidly as it has done in Japan—sometimes for an average of as much as 10 percent a year for protracted periods—use of current year's national product may overstate capital-output ratios by 5 percent judged by the stricter standard. For this reason the ratios are shown on both bases for 1970 and 1973.

due largely to a sharp reduction in the ratio of residential building to national product which reflects the secular lag of the housing sector behind overall economic growth. The break accompanying World War II is visible also in this series since the ratio averaged 2.8 from 1913 to 1940 without definite movements, while it averages 2.1 during the post-war period, this time showing an upward trend from 1.8 to 2.2.

Within the ratio, however, some significant changes can be discerned. The ratio of the value of residential structures to gross national product is sharply lower for the post-war period, being only approximately one-third of a year's national product compared to an average of a full year's national product from 1885 to 1920 and one of about three-fifths of it in 1930 and 1940.

The narrow aggregate capital-output ratio (non-residential buildings and structures, producers and consumer durables and inventories including livestock, divided by gross national product) shows no definite trend over the period (and increases by one-half between 1950 and 1970) in contrast to the declines in the broad and the intermediate ratios partly because of the decline in the ratio for residential buildings. That the values of the narrow ratio are lower in the post-war period than they were before 1940 is in part due to the inclusion of government buildings and structures. If these are eliminated, the post-war ratio exhibits a more pronounced upward trend than is shown in Table 3, and is closer to the 1900–1940 levels, the difference reflecting relative neglect of some sectors of the economy's infrastructure in the post-war period. (Between 1955 and 1970 the value of reproducible tangibles of the public sector increased by about 650 percent compared to a rise by nearly 1,000 percent in the non-financial corporate sector.)

The ratio of the share of producer durables rose sharply in the post-war period, and by 1970 had almost recovered the 1920 and 1940 levels. Consumer durables are at a considerably higher level in relation to national product in the post-war period than before 1940, but in 1970 they still did not represent more than six weeks' national product.

Net foreign assets have at all benchmark dates been of only secondary importance in the overall picture. Up to World War I, when Japan was still a net international debtor, the ratio of net foreign assets to national product was negative to the extent of one to over three months' gross national product. The maximum positive ratio up to 1970 also was not much in excess of a quarter's gross national product, values reached in 1920 and 1970, but exceeded substantially during the early 1970's.

It should be borne in mind that these movements, as those of all capital-output ratios expressed in current prices, are influenced by changes in price relationships, particularly the relationship between asset prices (represented in the case of reproducible capital assets by the current costs of construction and of equipment) and the general price level which is dominated by consumer goods prices. Such changes do not seem to have been of great importance before 1930 as the indices of consumer goods and investment goods prices show similar movements—only, however, because the prices of producer durables rose less while construction costs advanced more than the prices of consumer goods—and the relatively small rise in farm land prices appears to have been compensated by a

TABLE 3

THE CAPITAL-OUTPUT RATIO, 1885–1973

| | Broad[a] (1) | Inter-mediate[b] (2) | Narrow[c] (3) | Gross National Product (billion yen) (4) |
|---|---|---|---|---|
| 1885 | 6.00 | 3.41 | 2.19 | 0.80 |
| 1900 | 5.85 | 3.18 | 1.89 | 2.57 |
| 1913 | 4.74 | 2.86 | 2.01 | 5.29 |
| 1920 | 5.70 | 2.98 | 2.06 | 16.21 |
| 1930 | 4.76 | 2.51 | 1.87 | 14.94 |
| 1940 | 4.29 | 2.80 | 2.09 | 40.78 |
| 1950 | 2.37 | 1.80 | 1.18 | 3,947[d] |
| 1955 | 3.09 | 1.92 | 1.52 | 8,624 |
| 1960 | 3.18 | 2.04 | 1.65 | 15,499 |
| 1965 | 3.37 | 2.28 | 1.80 | 31,787 |
| 1970A | 3.43 | 2.28 | 1.77 | 71,010[e] |
| 1973A | 4.21 | 2.88 | 2.30 | 112,870[e] |
| 1970B | 3.25 | 2.16 | 1.66 | 75,000[f] |
| 1973B | 3.66 | 2.50 | 2.00 | 130,000[f] |

[a]Total national wealth, including land, consumer durables and net foreign assets.
[b]All reproducible tangible assets.
[c]Nonresidential buildings and structures and equipment plus inventories (including livestock).
[d]Fiscal year ending 3/31/1951.
[e]Annual total.
[f]Estimated rate at end of year.

*Sources:*
Cols. 1–3 Table S-12.
Col. 4 1885–1940 K. Ohkawa (Revised unpublished series).
1950–1973 *Hundred Year Statistics* 136; Bank of Japan, *Economic Statistics Annual* 1971, and *Economic Statistics Monthly*, March 1974.

rise in urban land prices well in excess of that in the price level of current output. Between 1930 and 1945, however, these broad relationships changed considerably, investment goods prices rising much more than the prices of consumer goods (because of a very sharp rise in construction costs), and land prices lagging behind both. In the post-war period investment goods prices, particularly construction costs, continued to rise considerably more than the prices of consumer goods, but now land prices, and here particularly the price of urban land, moved far ahead of the prices of all types of current output. For the entire period of nearly a century the relationship between investment and consumer goods prices did not change sharply—if the available indices can be trusted—although construction costs rose considerably more than the prices of producer and consumer durables, particularly if change in quality could be taken into account adequately, while land prices rose several times as fast as the prices of commodities and services. Hence if the usual methods of deflation were used, the capital-output ratios excluding land would not be severely affected in the very long run—though they would be over shorter periods—while the broadest capital-output ratio would decline even more

than it does if based on current prices. However, the trend in the ratio of structures and durables to national product would be considerably changed in favour of the latter. In constant terms the ratio of the share of durables to national product would very likely be considerably higher in the 1960's than before World War II.

## SUPPLEMENTARY TABLES

TABLE S-1

ESTIMATE OF VALUE OF LAND, 1885–1973

(billion yen)

| | Fields (1) | Forest Land (2) | Nonagri-cultural Land (3) | Total[a] (4) |
|---|---|---|---|---|
| 1885 | 1.30 | 0.40 | 0.62 | 2.32 |
| 1900 | 4.00 | 1.00 | 2.10 | 7.10 |
| 1904 | 4.50 | 1.14 | 2.20 | 7.84 |
| 1913 | 6.00 | 1.76 | 3.27 | 11.03 |
| 1920 | 22.70 | 4.53 | 12.30 | 39.53 |
| 1930 | 16.20 | 6.71 | 9.00 | 31.91 |
| 1940 | 27.00 | 10.45 | 22.76 | 60.21 |
| 1950 | 1,005 | 450 | 800 | 2,255 |
| 1955 | 4,682 | 2,083 | 3,027 | 9,792 |
| 1960 | 6,836 | 3,412 | 6,705 | 16,953 |
| 1965 | 8,260 | 4,832 | 21,675 | 34,767 |
| 1970 | 12,500 | 8,100 | 58,500 | 79,100 |
| 1973 | 20,000 | 12,000 | 108,000 | 140,000 |

[a]Does not include government non-forest and a few minor categories of land.

*Sources:*

Col. 1 Table S-2, Col. 3.
Col. 2 Table S-4, Cols. 3 and 4.
Col. 3 Table S-5, Col. 8.

TABLE S-2

ESTIMATE OF VALUE OF AGRICULTURAL LAND

| | Fields | | |
|---|---|---|---|
| | Census Value (billion yen) (1) | Fields Value Index (1930 = 1.00) (2) | Estimated Value (billion yen) (3) |
| 1885 | | 0.08 | 1.30 |
| 1900 | | 0.45 | 4.00 |
| 1905 | | 0.49 | 4.50 |
| 1913 | 5.45[a] | 0.67 | 6.00 |
| 1920 | | 1.40 | 22.70 |
| 1924 | 16.93 | 1.36 | 22.03 |
| 1930 | 16.20 | 1.00 | 16.20 |
| 1940 | | 1.69 | 27.00 |
| 1950 | | 62 | 1,005 |
| 1955 | | 289 | 4,682 |
| 1960 | | 422 | 6,836 |
| 1965 | | 510 | 8,262 |
| 1970 | | 771 | 12,500 |
| 1973 | | | 20,000 |

[a]1910.

*Sources:*

Col. 1 1910 Bank of Japan (*Hundred Year Statistics*, 22).
1924 K. Mori, *The Estimate of the National Wealth of Japan Proper* (International Statistical Institute XIXth Session), 19.
1930 Nasu, *Aspects of Japanese Agriculture*, 15.

Col. 2 From Table S-3, Col. 8.

Col. 3 1885–1913 Rough estimates (1913 based on Col. 1).
1920–70 Col. 2 multiplied by 16.20 billion yen.
1973 Rough estimate assuming 15% rise in 1973, the average of the preceding three years.

TABLE S-3

DERIVATION OF INDEX OF VALUE OF PRIVATE AGRICULTURAL LAND, 1885–1973

| | Paddy Fields | | | Ordinary Fields | | | All Fields (billion yen) | Index 1930 = 1.00 |
|---|---|---|---|---|---|---|---|---|
| | Area (million ha) | Price[a] (000 yen per ha) | Value (billion yen) | Area (million ha) | Price[a] (000 yen per ha) | Value (billion yen) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1885 | (2.66) | 0.50 | 1.3 | 2.05 | 0.15 | 0.3 | 1.6 | 0.08 |
| 1900 | 2.76 | 1.80 | 5.0 | 2.79 | 1.40 | 3.9 | 8.9 | 0.45 |
| 1904 | (2.80) | 1.95 | 5.5 | (2.75) | 1.57 | 4.3 | 9.8 | 0.49 |
| 1913 | (2.90) | 3.01 | 8.7 | (2.80) | 1.63 | 4.6 | 13.3 | 0.67 |
| 1920 | 3.01 | 5.94 | 17.9 | 3.02 | 3.29 | 9.9 | 27.8 | 1.40 |
| 1924 | (3.08) | 5.60 | 17.2 | (2.89) | 3.41 | 9.9 | 27.1 | 1.36 |
| 1930 | 3.18 | 4.11 | 13.1 | 2.69 | 2.53 | 6.8 | 19.9 | 1.00 |
| 1940 | 3.18 | 7.00 | 22.3 | 2.85 | 3.97 | 11.3 | 33.6 | 1.69 |
| 1950 | 2.85 | 291 | 829 | 2.20 | 186 | 409 | 1,238 | 62 |
| 1955 | (2.90) | 1,357 | 3,935 | (2.27) | 797 | 1,809 | 5,744 | 289 |
| 1960 | 2.94 | 1,944 | 5,715 | 2.34 | 1,147 | 2,684 | 8,399 | 422 |
| 1965 | 3.10 | 2,162 | 6,702 | 2.66 | 1,296 | 3,447 | 10,149 | 510 |
| 1970 | 3.13 | 3,444 | 10,780 | 2.38 | 1,966 | 4,560 | 15,340 | 771 |
| 1973 | 3.03 | 4,747 | 14,383 | 2.37 | 2,894 | 6,714 | 21,097 | 1,060 |

[a]Until 1920 as of November, from 1930 as of March of following year.

( ) Interpolated or extrapolated figure; applies to all estimates for 1973.

*Sources:*

Cols. 1 and 4 *Hundred Year Statistics*, 19; *Japan Statistical Yearbook* 1970, 3 (for 1965), extrapolated on basis of *Abstract of Statistics of Agriculture*, 1972, 11.

Cols. 2 and 5
- 1885, 1900 Rough estimates, based on scattered data.
- 1904 E. Igarashi and H. Takahashi, *The National Wealth of Japan.*
- 1913–60 *Hundred Year Statistics*, 88/89, prices until 1920 for November, then for March of following year.
- 1965–73 Japan Real Estate Institute (1973 extrapolated on basis of data through 1972).

TABLE S-4

ESTIMATE OF VALUE OF FOREST LAND, 1885–1973

| | Forest Area (million ha) (1) | Forest Land Price (yen per ha) (2) | Value of Forest Land (billion yen) Census (3) | Value of Forest Land (billion yen) Estimated (4) |
|---|---|---|---|---|
| 1885 | 14.8[a] | | | 0.40 |
| 1900 | 22.4 | | | 1.00 |
| 1904 | (22.0) | 53 | 1.14 | |
| 1913 | (20.5) | 86 | 1.76 | |
| 1920 | 18.5 | 245 | 4.53[b] | |
| 1930 | 19.9 | 337 | 6.71 | |
| 1940 | 20.9 | (500) | | 10.45 |
| 1950 | 22.5 | (20,000) | | 450 |
| 1955 | 24.5 | 85,000 | | 2,083 |
| 1960 | 24.2 | 141,000 | | 3,412 |
| 1965 | 25.7 | 188,000 | | 4,832 |
| 1970 | (27.0) | (300,000) | | 8,100 |
| 1973 | | | | (12,000) |

[a]1890. [b]1919.

( ) Interpolated or extrapolated values.

*Sources:*

| | | |
|---|---|---|
| Col. 1 | 1885–1960 | *Hundred Year Statistics*, 19. |
| | 1965 | *Japan Statistical Yearbook*, 1969, 137. |
| Col. 2 | 1904–30 | Col. 3 divided by Col. 1. |
| | 1955–65 | *Japan Statistical Yearbook* 1970, 141; average of price for lumber and for fuelwood and charcoal forests; prices of end of March, for 1955 and 1960, of end of March of following year for 1965 and 1970. |
| Col. 3 | 1904 | E. Igarashi and H. Takahashi, *The National Wealth of Japan*, 1906. |
| | 1913–30 | *Hundred Year Statistics*, 20/21. |
| Col. 4 | 1880–1900 | Rough estimates. |
| | 1940–70 | Col. 1 multiplied by Col. 2. |
| | 1973 | Very rough estimate guided by movements in prices of agricultural land. |

TABLE S-5

VALUE OF RESIDENTIAL, COMMERCIAL AND INDUSTRIAL LAND,[a] 1885–1973

| | Census Value (billion yen) | Urban Land Price Index | Area Index | (2) × (3) | Building Costs | Value of Buildings | Land/ Structure Ratio | Estimated Land Value |
|---|---|---|---|---|---|---|---|---|
| | | (1935 = 1.00) | | | (1934–36 = 1.00) | (billion yen) | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1885 | | | 0.82 | | 0.25 | 1.54 | 0.40 | 0.62 |
| 1900 | | | 0.86 | | 0.52 | 4.69 | 0.45 | 2.10 |
| 1904 | 1.99 | | (0.86) | | 0.49 | 4.67 | 0.47 | 2.20 |
| 1910 | 2.68 | | 0.87 | | 0.58 | 5.95 | 0.50 | 3.00 |
| 1913 | | | (0.88) | | 0.60 | 6.52 | 0.50 | 3.27 |
| 1920 | | | 0.88 | | 1.79 | 22.34 | 0.55 | 12.30 |
| 1924 | 11.98 | | (0.90) | | 1.51 | 19.75 | 0.66 | 13.00 |
| 1930 | 16.20 | | 0.92 | | 0.97 | 14.43 | 0.62 | 9.00 |
| 1935 | | 1.00 | 1.00 | 1.00 | 1.00 | 16.92 | 0.59 | 10.00 |
| 1940 | | 1.23 | 0.07 | 1.32 | 2.45 | 45.51 | 0.50 | 22.76 |
| 1950 | | 70 | 1.14 | 80 | — | 3,500 | — | 800 |
| 1955 | | 336 | (1.20) | 403 | — | 6,054 | 0.50 | 3,027 |
| 1960 | | 1,056 | 1.26 | 1,330 | — | 9,579 | 0.70 | 6,705 |
| 1965 | | 2,345 | (1.30) | 3,049 | — | 25,500 | 0.85 | 21,675 |
| 1970 | | 4,583 | (1.35) | 6,187 | — | 58,500 | 1.00 | 58,500 |
| 1973 | | 8,300 | (1.40) | 11,600 | — | | | 108,000 |

[a]Private land or buildings only.

*Sources:*

Col. 1
- 1904 — E. Igarashi and H. Takahashi, *op. cit.*
- 1910 — *Hundred Year Statistics*, 22.
- 1924 — K. Mori, *loc. cit.*
- 1930 — Difference between total for urban land and farm fields (S. Shiomi, *Kyoto University Economic Review*, IX, 27) and value of farm land (Nasu, *Aspects of Japanese Agriculture*, 15).

Col. 2
- 1935–73 — Japan Real Estate Institute. Average of prices of September and March of following year, roughly estimated for March 1974. It is assumed that prices at end of 1935 were the same as those of September 1936, the base of the index.

Col. 3
- 1880–1960 — *Hundred Year Statistics*, 18. (The term "takuchi" translated erroneously as "residential land" includes commercial and industrial sites; cf. J. Nakamura, *Agricultural Production and the Economic Development of Japan 1873–1922*, 34). Bracketed figures obtained by interpolation or extrapolation.

Col. 5
- 1885–1940 — Ohkawa and Associates, *Estimates of Long-Term Economic Statistics of Japan Since 1868*, Vol. 8, 158–59; averages of current and following year; 1934–36 = 1.00.

Col. 6
- 1885–1970 — From Table 8, Cols. 2 and 3.

Col. 7
- 1885–1900 — Rough estimates.
- 1904, 1910 — Col. 8 divided by Col. 6.
- 1924–35, 1913, 1920, 1950–70 — Rough estimates. Figures try to take account of relative movement of land prices and construction costs.

Col. 8
- 1880–1900, 1930–70 — Col. 6 times Col. 7 (except 1950 which is a rough estimate).
- 1910–24 — Col. 1.
- 1973 — Rough estimate based on movement of Col. 4 between 1970 and 1973.

TABLE S-6

ESTIMATE OF REPRODUCIBLE TANGIBLE ASSETS, 1885–1973
(billion yen)

| | Fixed Assets (1) | Inventories (2) | Consumer Durables (3) | Total (4) |
|---|---|---|---|---|
| 1885 | 2.33 | 0.35 | 0.05 | 2.73 |
| 1900 | 7.05 | 1.00 | 0.10 | 8.15 |
| 1904 | 7.61 | 1.50 | 0.15 | 9.26 |
| 1913 | 11.81 | 3.08 | 0.22 | 15.11 |
| 1920 | 42.74 | 4.48 | 0.50 | 47.72 |
| 1930 | 30.43 | 5.89 | 1.25 | 37.57 |
| 1940 | 94.70 | 17.00 | 2.50 | 114.20 |
| 1950 | 6,000 | 900 | 200 | 7,100 |
| 1955 | 12,701 | 3,163 | 700 | 16,564 |
| 1960 | 23,601 | 6,563 | 1,400 | 31,630 |
| 1965 | 57,610 | 11,500 | 3,300 | 72,410 |
| 1970 | 130,000 | 23,500 | 8,500 | 162,000 |
| 1973 | 265,000 | 40,000 | 15,000 | 320,000 |

*Sources:*

Col. 1 Table S-7, Col. 1.
Col. 2 Table S-9, Col. 6.
Col. 3 Table S-10, Col. 4; plus very rough estimates for dates not shown there.

TABLE S-7

ESTIMATE OF STOCK OF FIXED REPRODUCIBLE TANGIBLE ASSETS

(billion yen)

| End of | Total (1) | Buildings: Residential[a] (2) | Buildings: Other (3) | Other Structures (4) | Producer Durables (5) | Livestock (6) | Construction in Process (7) |
|---|---|---|---|---|---|---|---|
| 1885 | 2.33 | 0.93 | 0.61 | 0.21 | 0.17 | 0.41 | |
| 1900 | 7.05 | 3.20 | 1.49 | 0.76 | 0.72 | 0.88 | |
| 1904 | 7.61 | 3.18 | 1.49 | 0.77 | 0.98 | 1.19 | |
| 1913 | 11.81 | 4.30 | 2.22 | 1.69 | 2.17 | 1.43 | |
| 1920 | 42.74 | 14.28 | 8.06 | 7.59 | 8.88 | 3.93 | |
| 1930 | 30.43 | 8.40 | 6.03 | 6.82 | 6.13 | 3.05 | |
| 1940 | 94.70 | 26.56 | 18.97 | 18.97 | 22.32 | 7.90 | |
| 1950 | 6,000 | 2,200 | 1,300 | 1,150 | 1,200 | 150 | |
| 1955 | 12,701 | 2,774 | 3,280 | 2,898 | 3,172 | 341 | 236 |
| 1960 | 23,601 | 4,590 | 4,989 | 5,764 | 6,958 | 697 | 603 |
| 1965 | 57,610 | 12,000 | 13,500 | 13,000 | 16,500 | 520 | 2,090 |
| 1970 | 130,000 | 28,500 | 30,000 | 29,000 | 36,700 | 1,100 | 4,700 |
| 1973 | 265,000 | 55,000 | | | 210,000 | | |

[a]A recent unpublished estimate of the housing stock in Japan by Professor Colin Clark yields higher figures—in 1965 by about 40 percent—but there is some doubt whether these figures which e.g. allow for quality change, are conceptually entirely comparable with the estimates of Col. 2.

*Sources:*

1885–1940 Obtained by multiplying Ohkawa's estimates in 1934–36 prices (*Estimates of Long-term Economic Statistics of Japan*, Vol. 3, 134) by price indices (Vol. 8, pp. 158–59 and 165), averaging current and following year's indices.

1950 Cols. 1 and 2 extrapolated from 1955 figures respectively on basis of net capital expenditure and price changes as shown in national accounts. Other columns divided in same proportion as in 1955.

1955, 1960 E.P.A. data (*Economic Statistics Annual 1970*, 277–80).

1965 E.P.A. data for business sectors (*op. cit.*), plus rough estimates for public and non-profit sectors.

1970, 1973 Roughly extrapolated on basis of net capital expenditures and price changes as shown in national accounts.

TABLE S-8

COMPARISON OF PERPETUAL INVENTORY AND CENSUS-TYPE ESTIMATES OF REPRODUCIBLE FIXED ASSETS, 1905–35

(billion yen)

| | All Fixed Reproducible Assets | | | Residences | | | Non-residential Buildings and Structures | | | Equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A (1) | B (2) | B/A (3) | A (4) | B (5) | B/A (6) | A (7) | B (8) | B/A (9) | A (10) | B[c] (11) | B/A (12) |
| 1905 | 8.41 | 8.44 | 1.00 | 3.50 | 3.59 | 1.03 | 2.44 | 1.21 | 0.50 | 2.47 | 3.62 | 1.47 |
| 1910 | 10.08 | 10.48 | 1.04 | 3.97 | 4.68 | 1.18 | 3.30 | 1.86 | 0.56 | 2.80 | 3.94 | 1.41 |
| 1913 | 11.81 | 9.68 | 0.82 | 4.31 | 5.42 | 1.26 | 3.91 | 1.08 | 0.28 | 3.60 | 3.18 | 0.88 |
| 1924 A[a] | 40.14 | 18.98 | 0.47 | 12.00 | 9.27 | 0.77 | 15.89 | 1.07 | 0.07 | 12.25 | 8.63 | 0.70 |
| B[b] | | 26.57 | 0.66 | | 13.18 | 1.10 | | 3.66 | 0.23 | | 9.61 | 0.78 |
| 1930 | 30.43 | 36.19 | 1.19 | 8.40 | 17.91 | 2.13 | 12.85 | 5.16 | 0.40 | 9.18 | 13.12 | 1.43 |
| 1935 | 36.75 | 43.19 | 1.18 | 9.81 | 20.34 | 2.07 | 15.65 | 5.87 | 0.38 | 11.29 | 16.98 | 1.50 |

A: Perpetual inventory estimate derived from Ohkawa's data (Table S-7, or calculated in same way); billion yen.

B: Census-type estimate (*Supplement to Hundred Year Statistics*, 14); billion yen.

[a]Comparable with 1905–19.

[b]Comparable with 1930–35.

[c]Apparently includes livestock, hence also included under A.

TABLE S-9

ESTIMATE OF INVENTORIES, 1885–1973

| Year | Census Type Estimate of Inventories (billion yen) (1) | Non-residential Buildings and Equipment (2) | Ratio (1)/(2) (3) | Gross National Product (billion yen) (4) | Ratio (1)/(4) (5) | Estimate of Inventories (billion yen) (6) |
|---|---|---|---|---|---|---|
| 1885 | | 0.99 | | 0.80 | | 0.35 |
| 1900 | | 2.97 | | 2.57 | | 1.00 |
| 1904 | 1.62[a] | 3.24 | 0.50 | 3.14 | 0.52 | 1.50 |
| 1913 | 3.08 | 6.08 | 0.51 | 5.29 | 0.58 | 3.08 |
| 1920 | 4.48 | 24.53 | 0.18 | 16.01 | 0.28 | 4.48 |
| 1930 | 5.89 | 18.98 | 0.30 | 14.94 | 0.40 | 5.89 |
| 1940 | | 60.26 | | 40.78 | | 17.00 |
| 1950 | | | | 3,947[b] | 0.23 | 900 |
| 1955 | 3,163 | 8,350 | 0.38 | 8,624 | 0.37 | 3,163 |
| 1960 | 6,563 | 18,811 | 0.37 | 15.499 | 0.42 | 6.563 |
| 1965 | 11,500 | 34,000 | 0.34 | 31,787 | 0.36 | 11,500 |
| 1970 | 23,500 | 85,000 | 0.28 | 71,010 | 0.33 | 23,500 |
| 1973 | | | | 112,870 | 0.35 | 40,000 |

[a] 1905. [b] Fiscal year ending 3/31/1951.

*Sources:*

| | | |
|---|---|---|
| Col. 1 | 1904–30 | *Supplement to Hundred Year Statistics*, 14. |
| | 1950 | Obtained by deducting increases in inventories during 1951–55 (*United Nations, Yearbook of National Accounts Statistics*, 1957, 134) from 1955 value after adjusting roughly for changes in wholesale prices. |
| | 1955–60 | *Hundred Year Statistics*, 24–25. |
| | 1965–70 | Obtained by adding net inventory investment from national accounts to 1960 figure and adjusting for price changes. |
| Col. 2 | | Table S-7, Cols. 3, 4, and 5. |
| Col. 4 | 1880–1940 | Ohkawa's revised estimates (to be published in *Estimates of Long-Term Economic Statistics of Japan*, Vol. I). |
| | 1950–73 | Table 3, Col. 4. |
| Col. 5 | 1904–70 | Col. 1 divided by Col. 4. |
| | 1973 | Assumed slightly above 1970 ratio because of rapid rise in prices in later part of year. |
| Col. 6 | | Estimated, except for years for which census-type figures are available, on basis of Cols. 4 and 5. |

TABLE S-10

ESTIMATE OF VALUE OF STOCK OF CONSUMER DURABLES, 1900–73

| Period | Average Annual Expenditures on Consumer Durables (billion yen) (1) | Expenditures as Percent of Personal Disposable Income (2) | Price Index[h] (1965=100) (3) | Estimated Stock[h] (billion yen) (4) | (5) |
|---|---|---|---|---|---|
| 1900–04 | 0.02 | 1.1 | | 0.10[a] | |
| 1905–09 | 0.03 | 1.2 | | | |
| 1910–14 | 0.05 | 1.6 | | 0.22[b] | |
| 1915–19 | 0.12 | 2.2 | | | |
| 1920–24 | 0.23 | 2.0 | | | |
| 1925–29 | 0.26 | 2.0 | | 1.25[c] | |
| 1930–34 | 0.24 | 2.2 | | | |
| 1935–39 | 0.46 | 2.8 | | 2.00[d] | |
| 1940–44 | — | — | | | |
| 1945–49 | — | — | | | |
| 1950–54 | — | — | 84 | 700[e] | 1,000[e] |
| 1955–59 | 200 | 2.7 | 88 | 1,400[f] | 2,000[f] |
| 1960–64 | 687 | 4.7 | 98 | 3,300[g] | 4,700[g] |
| 1965–69 | 1,654 | 5.6 | 110 | | |
| 1970 | 2,912 | 6.6 | 115 | 8,500 | 12,100 |
| 1973 | | | | 15,000 | 21,000 |

[a]1900. [b]1913. [c]1930. [d]1940. [e]1955. [f]1960. [g]1965.
[h]End of period.

*Sources:*

Col. 1 1900–39 Expenditure on "furniture and utensils" (Ohkawa and Associates, *op. cit.*, Vol. 6, 234ff).

1955–73 National accounts.

Col. 2 1900–73 Denominators are until 1918 Yamada's estimates of personal consumption and from then through 1929 Yamada's, and for 1930's official figures for personal income. From 1955 on official figures for disposable personal income have been used.

Col. 3 1950–73 Deflator for expenditures on housing other than rent from national accounts.

Col. 4 1900–73 Rough estimate based on expenditures, 8-year life (10 years before 1940), straight line depreciation, and price changes (disregarded up to 1930).

Col. 5 1955–65, 1973 Estimated at 1.4 times Col. 4, the 1970 relationship.

1970 Bank of Japan, *Economic Statistics Annual* 1973, 288. This figure derived from a sample household wealth survey may be based on a broader definition of consumer durables.

TABLE S-11

ESTIMATE OF NET FOREIGN ASSETS, 1885–1973

(billion yen)

| | Census Type Estimate (1) | Cumulated Current Account Balance (2) |
|---|---|---|
| 1885 | | −0.24 |
| 1900 | | −0.24 |
| 1905 | | −0.65 |
| 1913 | −1.11 | −1.04 |
| 1920 | 2.72[a] | 4.00 |
| 1930 | 1.11 | 1.70 |
| 1940 | | 0.99 |
| 1950 | | |
| 1955 | 199 | |
| 1960 | 370 | |
| 1965 | −405 | |
| 1970 | 2,070 | |
| 1973 | 10,400 | |

[a]1919.

*Sources:*

| | | |
|---|---|---|
| Col. 1 | 1913–30 | *Hundred Year Statistics*, 20/21. |
| | 1955–60 | *Economic Statistics Annual, 1970*, 277ff. |
| | 1965–70 | *Nippon Keizai Shimbun*, 3/10/1969 and 1/8/1972. |
| | 1973 | 1970 figure plus net long- and short-term capital export (Bank of Japan, *Economic Statistics Annual*, 1973, 212). |
| Col. 2 | 1880–1940 | Y. Yamamoto (to be published in *Estimates of Long-Term Economic Statistics of Japan*, Vol. 1). |

TABLE S-12

NATIONAL WEALTH OF JAPAN

(Percent of GNP[a])

| | | Land | | | | Reproducible Tangible Assets | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total (1) | Total (2) | Fields (3) | Forests (4) | Non-agricultural (5) | Total (6) | Residential Buildings (7) | Other Buildings and Structures (8) | Producer Durables (9) | Inventories (10) | Livestock (11) | Consumer Durables (12) | Net Foreign Assets (13) |
| 1885 | 600.4 | 289.6 | 162.3 | 49.9 | 77.4 | 340.8 | 116.1 | 102.4 | 21.2 | 43.7 | 51.2 | 6.2 | −30.0 |
| 1900 | 584.9 | 276.6 | 155.8 | 39.0 | 81.8 | 317.6 | 124.7 | 87.7 | 28.0 | 39.0 | 34.3 | 3.9 | − 9.3 |
| 1913 | 474.2 | 208.3 | 113.3 | 33.2 | 61.8 | 285.5 | 81.2 | 73.9 | 41.0 | 58.2 | 27.0 | 4.2 | −19.6 |
| 1920 | 570.1 | 246.9 | 141.8 | 28.3 | 76.8 | 298.2 | 89.2 | 97.8 | 55.5 | 28.0 | 24.6 | 3.1 | 25.0 |
| 1930 | 476.3 | 213.5 | 108.4 | 44.9 | 60.2 | 251.4 | 56.2 | 86.0 | 41.0 | 39.4 | 20.4 | 8.4 | 11.4 |
| 1940 | 428.9 | 146.5 | 66.2 | 25.6 | 54.7 | 280.0 | 65.1 | 93.0 | 54.7 | 41.7 | 19.4 | 6.1 | 2.4 |
| 1950 | 237.1 | 57.2 | 25.5 | 11.4 | 20.3 | 179.9 | 55.7 | 62.1 | 30.4 | 22.8 | 3.8 | 5.1 | 0 |
| 1955 | 309.3 | 114.8 | 54.1 | 24.2 | 36.5 | 192.2 | 32.2 | 74.4 | 36.8 | 36.7 | 4.0 | 8.1 | 2.3 |
| 1960 | 318.0 | 112.0 | 44.0 | 22.0 | 46.0 | 203.6 | 29.6 | 73.3 | 44.9 | 42.3 | 4.5 | 9.0 | 2.4 |
| 1965 | 337.2 | 110.7 | 26.0 | 15.2 | 69.5 | 227.8 | 37.8 | 89.9 | 51.9 | 36.2 | 1.6 | 10.4 | − 1.3 |
| 1970 | 342.4 | 111.4 | 17.6 | 11.4 | 82.4 | 228.1 | 36.3 | 89.7 | 51.7 | 33.1 | 1.5 | 12.0 | 2.9 |
| 1973[b] | 421.2 | 124.0 | 17.7 | 10.6 | 95.7 | 287.9 | | 237.9 | | 35.4 | 4.3 | 13.3 | 9.2 |
| 1973[c] | 365.7 | 107.7 | 15.4 | 9.2 | 83.1 | 250.0 | | 206.5 | | 30.8 | 7.2 | 11.5 | 8.0 |

[a]The decimals, as well as in many cases the last numeral before the decimal point, of course, have no significance in view of the roughness of most estimates. [b]Based on Annual GNP totals, as for preceding years. [c]Based on estimated year-end rate of GNP.