AN ESTIMATE OF THE TANGIBLE WEALTH OF INDIA[1]

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I. THE ESTIMATES

AN estimate of the value of tangible wealth of India is presented in Table I below. The various items of reproducible assets have been shown separately from the value of land. The figures, in concept, always relate to current market value and refer to the end of the financial year 1949–50.

II. METHOD OF ESTIMATION

The various estimates included in the table have been obtained by following different methods, depending mostly on the nature of available data. It will be convenient to describe the procedure followed by certain broad categories of method of estimation. The following five categories have to be distinguished for this purpose:

(1) adjustment of data on assets thrown up by recent nation-wide surveys;

(2) price adjustment of available data on book value of fixed assets by using a historical series of paid-up capital and a relevant price-index number;

(3) to use a time series of actual capital expenditures rather than of paid-up capital and arrive at the estimate by price adjustment with the help of an index number;

(4) to use figures of net assets or accumulated total expenditures and adjust them in an overall way whenever possible; and

(5) to use miscellaneous methods, such as direct evaluation on the basis of number or quantity and price, capitalization of income, aggregation of hypothetical series with current investment figure as the base, etc.

TABLE I

Tangible Wealth in India in March 1950

(Rs. crores) [1]

1. Agriculture, animal husbandry, and allied activities:		
(1) Agricultural implements, including tractors . .		363
(2) Livestock used in farms		2,428
(3) Sheds, barns, etc.		880
(4) Improvement of land and irrigation works: private .		1,304
(5) Improvement of land and irrigation works: public .		229
(6) Plantations other than tea plantations . . .		20
(7) Forestry and fishery.		12
(8) Sub-total		5,236
2. Mining and manufacturing (large scale):		
(1) Mining		110
(2) Electricity generation and transmission . . .		240
(3) Tea plantations		133
(4) Other factory establishments: private . . .		1,206
(5) Other factory establishments: public . . .		1,206
(5) Other factory establishments: public . . .		127
(6) Sub-total		1,816
3. Small enterprises		763
4. Transport and communications:		
(1) Railways		1,574
(2) Communications		93
(3) Roads and bridges		522
(4) Vehicles		281
(5) Transport animals		356
(6) Shipping and navigation companies		18
(7) Public and semi-public capital in ports, docks, light-houses, etc.		71
(8) Airways companies		17
(9) Public capital in aerodromes and aerodrome equipments		8
(10) Other transport companies		48
(11) Sub-total		2,988
5. Trade and commerce:		
(1) Wholesale and retail trade		1,704
(2) Banks, co-operatives, and insurance companies . .		68
(3) Sub-total		1,772
6. House property:		
(1) Urban: private		2,644
(2) Rural: private		1,761
(3) Public		106
(4) Sub-total		4,511
7. Reproducible tangible wealth (RTW) in India . . .		17,086
8. Value of land in India		17,854
9. Value of tangible wealth in India		34,940

[1] 1 crore = ten millions.

It should be noted that these categories are relevant only for describing the procedure of estimation, and it is not necessary to ensure that they are distinct in a logical sense.

III. ESTIMATES BASED ON SURVEYS

The survey estimates cover a fairly large percentage of the total value (about 33 per cent of RTW and 67 per cent of total wealth), and this naturally adds to the reliability of the overall estimate presented. It is indeed reassuring to get estimates in a number of sectors which are more or less independent of arbitrary decisions. Such estimates include the values of agricultural implements, livestock, rural house property, including sheds and barns and land.[1] The estimates used in this paper are drawn from the Rural Credit Survey (RCS)[2] conducted recently by the Reserve Bank of India (RBI). But in several cases it has been possible to check the estimates used by us against estimates based on data thrown up by alternative surveys, such as the National Sample Survey (NSS) or estimates prepared on some other basis.

While using survey data, it is necessary to ascertain how the value reported has been reckoned. If the value is reckoned at current prices and we are certain that the price used takes cognizance of the age of the asset, then the survey value can be accepted as such. This is generally true for RCS data, which we have used extensively. When the value of an asset is reckoned at current market prices but the age distribution of the asset is not taken account of, it becomes necessary to deduct an estimate of accumulated depreciation from the value thus worked out. When, however, the survey data, in addition, refer to original cost, it becomes necessary to adjust both for depreciation and for the change in price level. These considerations will become relevant when we come to discuss the sector estimates.

[1] Reliability here has to be interpreted in a relative sense. We regard these estimates as more reliable than possible alternative estimates under these categories based on other available statistics. Secondly, these estimates are not regarded as less reliable than the estimates in many other sectors.

[2] The following abbreviations have been used in the subsequent text:

RCS: Rural Credit Survey
RBI: Reserve Bank of India
NSS: National Sample Survey
LC: Livestock Census
NIC: National Income Committee
NIU: National Income Unit
SSMI: Sample Survey of Manufacturing Industries

Agricultural implements. It is possible to estimate the current value of agricultural implements in India on the basis of three different bodies of data and also the counts available in the Livestock Census (LC). Firstly, there are many studies on cost of cultivation which enable one to work out an estimate of the value of implements per acre of cultivated land. These studies relate to different regions and different years, and price adjustments are necessary to bring the figures up to date. Estimates of the value of all implements (including bullock carts) per acre given in the *Final Report of the National Income Committee* (NIC) adjusted for 1949–50 prices range between 20 to 25 rupees.[1] Such a figure inflated for the net cultivated area of the Indian Union yields an aggregate of the order of Rs. 500 crores. The second body of data is available in the Poona report of the NSS which puts the value of implements per agricultural household at Rs. 69.25. Adjusted for prices and inflated for the total agricultural population, we get a figure of Rs. 415 crores from this source. An alternative estimate making use of the number of implements reported in the LC, 1951 and the purchase price of implements given in the Poona report of the NSS is also possible, though this is likely to lead to under-estimation because the coverage of the LC in so far as different varieties of implements are concerned is somewhat limited.[2] The all-India estimate on this basis works out at Rs. 400 crores.

The third body of material relates to the RCS conducted by the RBI. The report of the survey clearly states, 'while recording the value of implements and machinery . . . care should be taken not to record their purchase prices. Their approximate value in their present state, that is after some allowance is made for wear and tear, should be taken. The values will, of course, be as given by the cultivator but it should be made sure that he does not give the prices at which the articles were originally purchased' (pp.

[1] For example:

J. P. Bhattacharjee, West Bengal	(1945–56):	Rs.22
G. P. Aggarwal, Uttar Pradesh	(1948–49):	Rs.25.4
D. S. Chauhan, Uttar Pradesh	(1948–49):	Rs.22
D. R. Gadgil, Bombay	(1936–38):	Rs.23.6

Quoted from the *Final Report of the National Income Committee*, p. 41. The figures in the *Report* were adjusted for 1948–49 on the basis of wages of rural artisans.

[2] The implements included are wooden and iron ploughs, carts, sugar-cane crushers, oil engines, electric pumps, and ghanies (i.e. oil crushers). Also, NSS Poona Report records purchase prices which need adjustment for working out current market value.

14–15, RCS, Vol. III). Obviously the estimate obtained from the survey needs no adjustment for depreciation. But the survey figure, which is an average value for the period November 1951 to March 1952, has been adjusted for prices so as to relate to the end of the financial year 1949–50. Secondly, the adjusted survey figure of Rs. 130 per rural cultivating household has been used to work out an estimate for urban cultivating households, the number of such households being known. The aggregate value of agricultural implements works out at Rs. 475 crores.

The estimated value of implements includes the value of bullock carts. For arranging the figures of capital stock by industrial categories according to which national income is given, it is necessary to have a separate estimate of the value of carts. This has been done on the basis of number of carts given in the LC and purchase prices given in the Poona Report of the NSS. As the Poona Report reckons value at purchase prices, the figure has been adjusted for prices and also for depreciation yielding a figure of Rs. 112 crores as the depreciated market value of bullock carts.[1] The residue of Rs. 363 crores has been taken as the value of agricultural implements. The value of carts is included in item 2.4 of Table I, vehicles.

Livestock. Animal husbandry constitutes the largest single item of reproducible capital stock of Indian farmers. It is possible to estimate this value on two independent bases. First, it is possible to estimate the number of animals as on March 1950 on the basis of LC data relating to 1945 and 1951. These figures then can be evaluated by making use of the all-India sample estimates of purchase prices available in the Poona Report of the NSS. As the prices rose, the purchase prices are likely to be lower than the current prices, and hence there is some amount of under-estimation implicit in the procedure. The estimate works out at Rs. 2186 crores on this basis, including a separate estimate for urban animals evaluated at a higher price. We have not, however, used this figure in Table I.

The alternative estimate used by us is based on the RCS, which gives value of animals per rural cultivating household (Rs. 564) and is preferable to the former because this involves only minor adjustments. The RCS report states, 'in the case of large animals, the value should be ascertained from the

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[1] The net effect of price adjustment and allowance for depreciation has been a reduction by about one-third.

cultivator. Usually the value will be estimated from the price the cultivator will have to pay if he has to buy a similar animal' (pp. 14–15, RCS, Vol. III). Thus it is not necessary to adjust for appreciation here. The only price adjustment needed is to translate the figure to our reference date from the survey date of the October 1951 to June 1952 average. The value of animals owned by rural cultivating households worked out in this fashion is Rs. 2,093 crores. For rural non-cultivating households the average value of livestock owned per household is taken in proportion to the ratio of land holdings of cultivating and non-cultivating households. The aggregate for rural areas thus works out at Rs. 2,529 crores. The value of livestock in urban areas is taken to be 10·08 per cent of the value of rural animals from the records of the National Income Unit (NIU) relating to calculation of the increment in stock of animals. The total value of livestock in India works out at Rs. 2,784 crores. We have accepted this figure because it is much more satisfactory than our first estimate based on LC and Poona Report of the NSS. It may be of some interest to note that the RCS neglects the value of smaller animals unless they are owned in large numbers. Any correction on this count would not, however, alter the estimate very much.

For reasons of classification, it is necessary to get an estimate of the value of animals used for traction. This has been worked out on the basis of a percentage (12·8) given in the Final Report of the NIC (p. 54). The residual Rs. 2,428 crores is taken as the value of livestock required for purposes other than transport. The value of draught animals works out at Rs. 356 crores, and is shown as item 4 (5) of Table I.

Rural house property. The Final Report of the NIC gives a figure of Rs. 2,656 crores as the depreciated current value of rural house property (p. 101). This figure has been arrived at by multiplying the number of rural houses given in the census by an average cost of construction of a new house obtained from some preliminary tabulation of the NSS and then depreciating the figure on the basis of NSS data on age composition of rural houses. The total amount of depreciation works out at 42·65 per cent of the undepreciated value. Instead of accepting this figure, we have worked out a separate estimate from RCS which gives a figure of Rs. 1,082 as the average value of rural house property per cultivating household. This figure has been adjusted for our

reference date, and an aggregate has been worked out for the rural cultivating families. The ratio of average land holdings (as in the case of livestock) has been used to work out the average for rural non-cultivating families. The aggregate thus works out at Rs. 4,848 crores. A deduction has been made from this for accumulated depreciation using the overall percentage (42·65) noted above. Lastly, a notional deduction of 5 per cent has been made to allow for the value of land included in the estimate yielding a figure of Rs. 2,641 crores.

Residential house property is taken as two-thirds of the above aggregate, i.e. Rs. 1,761 crores, and the residual, Rs. 880 crores is supposed to cover the value of sheds, barns, and parts of houses used for productive purposes. The relevant percentage has been obtained in the following rough-and-ready manner. The RCS gives average value of house property per household by deciles. It has been assumed that the average value for the lower five deciles is the minimum residential requirement for all households, and what remains over and above this is available for production purposes. This assumption gives a somewhat higher figure for non-residential property, which has been rounded off to 33 per cent, because in any case not much confidence can be placed on the assumption. However, it is well known that the residential houses of the rural population are used extensively for productive purposes, as barns, cowsheds, etc., and 33 per cent used need not necessarily be an over-estimation.

Land. The value of land in rural areas has been obtained directly from the RCS. RCS gives Rs. 3,515 and Rs. 1,391 as value of land holdings respectively for rural cultivating and rural non-cultivating households. These figures are first adjusted to our reference period by making use of a suitable index number, the price index of food grains. Then use has been made of the estimated number of rural cultivating and non-cultivating households to obtain the value of rural land. This figure amounts to Rs. 15,753 crores. To obtain the value of land owned by urban cultivators, the average for rural cultivators has been used, while for the rest of the country the rates relevant for rural non-cultivating households have been used. It is not known how far this procedure is correct. But it may be said in favour of the procedure that while the average size of holdings in urban areas is smaller, the average value per acre is considerably larger. The

aggregate value of land in the country works out at Rs. 17,854 crores.

It should be mentioned that the basis of valuation is the prevalent village rate, and the following quotation from the RCS report is useful while interpreting the results: 'Valuation can only be approximate and it may be necessary to assist the respondent even to arrive at the approximate value of his land. For this purpose, the average land value prevalent in the village should be ascertained from the respondent and unless he is insistent that his lands are either considerably inferior or superior to the average land, the average land value rate should be applied. Dry and wet areas are to be separately valued' (pp. 14–15, RCS, Vol. III).

IV. ESTIMATES BASED ON INVESTMENT COST INDEX AND SERIES OF PAID-UP CAPITAL

The estimates to be considered next are those for which the available current data on book value of either assets or paid-up capital are adjusted by making use of an index number of investment cost. This class of estimates can be divided into two sub-classes: (i) manufacturing industries covered by the Sample Survey of Manufacturing Industries (SSMI) and some other enterprises for which the current book value of assets is available but the historical series relate to paid-up capital only; and (ii) railways, and postal and telegraph service, for which it is possible to get a historical series of investment expenditures, and hence no dependence on the paid-up capital series is necessary for price adjustment. In this section we shall consider estimates of category (i), category (ii) being taken up in the subsequent section. But it is necessary to describe the general procedure before passing on to sector estimates.

The general method of price adjustment followed by us is as follows: Where a paid-up capital series is available over a number of years, the figure in the earliest year considered is multiplied by a relevant price inflator, and after this each increment in paid-up capital is adjusted by an appropriate price inflator until we come to the last year, 1949–50, for which the multiplier is unity. At the end of this, the adjusted values are added to give an estimate of the paid-up capital reckoned at prices of the reference period and the ratio of this to the current book value of paid-up capital is the appropriate multiplying

factor to adjust the current book value of net fixed assets. This, of course, holds only on the assumption that the firms themselves did not adjust their book values upwards due to price rises – an assumption likely to be generally true in India. Undoubtedly a more satisfactory procedure is possible when a book-value series is available for either net assets or gross capital expenditures year after year. In the former case the procedure would give the value at current prices in a straightforward way, while in the latter case a further adjustment for depreciation would be necessary.

But as long time-series data on either net assets or gross assets are not available for many major industrial groups it becomes necessary to press into service the time-series data on paid-up capital in spite of all their limitations. The paid-up capital need not necessarily bear a fixed relation to the net assets of a concern. Some companies may have a preference for borrowed capital rather than equity capital, and in such cases the ratio of net assets to paid-up capital will be low. Secondly, a part of the assets may be purchased out of own savings of the enterprises, and this tends to increase the ratio. Quite apart from this, data on paid-up capital relate only to joint-stock companies, and hence miss those concerns which are not thus organized. But in spite of all this, growth in paid-up capital is likely to reflect some growth in investments in the country in the joint-stock sector, and hence the adjustment described in the last paragraph is likely to have some amount of validity. Also, as joint-stock enterprises cover a sizable part of all enterprises, the use of these adjustment factors to inflate book-value figures of enterprises which do not come under the category of joint-stock companies cannot lead to any considerable error.

We have made some preliminary studies on the stability of the net assets/paid-up capital ratio. Firstly, it is possible to get considerable material on net assets and book value in individual enterprises from the *Investors' Encyclopaedia* and similar publications. We have computed the ratios and observed their variability. It is interesting to note that the averages are not widely different from unity, while the coefficients of variation are generally less than 50 per cent. Thus, even at the level of individual enterprises, some correspondence is to be noticed between the magnitudes of paid-up capital and net fixed assets.

This affords an additional justification of our use of the paid-up capital data. The relevant figures are given in the table [1] below:

Class Range of the Ratio	Number of Establishments					
	Cotton	Jute	Coal	Planta-tions	Sugar	Tea
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0·10–0·49	13	5	3	3	7	..
0·50–0·69	14	10	10	6	6	9
0·70–0·89	26	15	9	17	12	16
0·90–1·09	8	12	9	23	8	32
1·10–1·19	7	7	9	24	9	14
1·30–1·49	7	3	4	14	4	14
1·50–3·09	26	8	16	20	6	19
Average .	1·1225	1·0000	1·1325	1·2226	0·9654	1·1753
Coefficient of variation: per cent .	53·3	38·7	42·7	23·8	34·9	28·9

The second analysis is based on detailed material on paid-up capital and net assets for the years 1947 and 1950–54 available in the study of balance sheets of joint-stock companies conducted by the RBI. This material has been used to study the variation of the ratios as well as to obtain estimates of net investment on the basis of data on paid-up capital whenever necessary. The work has been done separately for thirty-five industry groups, and the results do not warrant a rejection of our procedure.

For price-adjustment purposes we have taken series starting from 1938/39. The reason for not going beyond this date is that while the period for which adjustments were made, i.e. 1938/39–1948/49 witnessed almost a quadrupling of the general price level (wholesale), the period 1930–39 showed very little change in prices in spite of the depression years. Also in the two decades before 1930, the general price level rose for the first half and fell in the second half, the initial and final values of the index being

[1] The ratio of paid-up capital to net fixed assets worked out for individual units are summarized in the table in the form of frequency distributions by the size classes of the ratio. The averages $(\bar{x})$ and the coefficients of variation $(100\sigma/\bar{x})$ where σ's are the standard deviations, have also been shown. The main idea in presenting the table is to disclose the nature of relation between paid-up capital and net assets. This is necessary for assessing the level of reliability of the class of estimates prepared by this procedure. If the relation between these magnitudes were quite chaotic, then there would not have been any ground for our adopting this particular procedure of estimation.

of the same order. It was expected therefore that the book value of assets in 1938–39 would not be very different from their current market value. This surmise proved more or less correct. First, the current market value of total paid-up capital of all joint-stock companies in 1938–39 has been worked out by using a series running up to 1900 and a wholesale price-index number. Data on paid-up capital starting from 1900 have been culled from the publication, *Progress of Joint Stock Companies in India*. The adjusted value thus worked out is slightly lower than the book value for 1938/39. Then the procedure has been repeated for sixteen groups of industries for the period 1920/21–1938/39, and the results are generally not unsatisfactory. It may therefore be concluded that the procedure of using a short series may lead to some under-estimation or over-estimation, but probably the magnitude of error is not large.

Before going into the individual estimates, it may be worthwhile to describe the investment cost-index number, which forms a corner-stone of our estimation procedure. In concept, an investment made t years ago has been multiplied by a factor giving the ratio of the investment price level now and the investment price level t years ago. Thus the overall level of capital stock we show now is very much dependent on the index number used.

As no such index is readily available, it was necessary to construct the index. For this purpose, the import component of investment has been considered separately. A study of the current estimate of capital formation by the NIU indicates that roughly one-fourth of gross investment in recent years is composed of imports. The remaining three-fourths is very largely construction, but some domestic output of investment goods is also included. We have attempted to construct an index of import prices on the basis of quantities and prices of such capital goods for which this information is available. The index thus constructed severely lacks in coverage, the most important types of goods being left out of its purview because of absence of data. Also, quality difference in the assets imported affects this index number, sometimes in an obvious way. We have considered it desirable therefore to use the index of unit values of all imports prepared by the Directorate General of Commercial Intelligence and Statistics, which is available over the period we need, in preference to the index number constructed by us. To

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the extent the average price of all imports differs from the average price of imported capital goods, this procedure is likely to lead us to error. On the other hand, the import-price index constructed by us is subject to known limitations and in any case by no means comprehensive about capital-goods imports.[1]

We have then worked out a construction-cost index by making use of price quotations relating to steel, cement, bricks, and timber, as well as wages of construction workers. The weights assigned to these series have been worked out on the basis of fairly extensive material on the analysis of cost of construction available from several sources.[2] We have used this index number to represent not only the construction counterpart of investment but also the domestic output of investment goods. This is justified on the grounds that such domestic output is small and that some of the components of the index (such as steel and timber) may in fact represent the movement of the price of domestic output of capital goods.

The index as worked out by us is presented below along with the available wholesale price-index numbers:

| Year | Investment-cost Index | | | Wholesale Price Index | |
| | Overall | Building Cost | Import Price | Calcutta | All India |
(1)	(2)	(3)	(4)	(5)	(6)
1938–39	100	100	100	100	100
1939–40	104	103	106	113	113
1940–41	119	117	127	127	125
1941–42	140	136	153	153	143
1942–43	169	161	193	219	180
1943–44	247	264	196	310	232
1944–45	254	275	189	301	250
1945–46	251	267	205	303	258
1946–47	254	252	262	345	284
1947–48	291	287	302	395	325
1948–49	314	301	356	423	383
1949–50	325	318	346	464	399

The fact that the index is well below the wholesale price-index numbers shows that the use of this index is unlikely to lead to over-estimation. On the other hand, the possibility of some

[1] Recently, the RBI has started publishing an index number of import prices of investment goods. But this index dates only from 1953 and cannot be of any help for our purpose.

[2] For example, *Report of the Committee of Experts for Building Works*, *Report of Environmental Hygiene Committee*, and various unpublished data in the Central and State public-works departments.

under-estimation cannot be dismissed. This is particularly true because two components of the construction-cost index, steel and cement, show rather a small rise because of controlled prices. It is probably true that people had to pay more for these items during and after the war than the official prices. However, the import price index of capital goods which we originally constructed depicted a considerably lower rise in the prices than the import-price index used by us. Thus, there may be some amount of compensation, i.e. over-estimation of the value of imported components may be balanced by under-estimation of domestic output. We may now consider briefly the various sector estimates obtained in the manner indicated above. It may be noted that the same index number of investment cost has been used in all cases.

Mining. For mining, the estimation has been made separately for coal-mining, gold-mining, and all other mining. Instead of working out the price-adjustment factor on the basis of paid-up capital series, the investment-cost index has been used to work out a price-adjusted figure of the paid-up capital in 1949–50. This figure is then multiplied by a ratio of net assets to paid-up capital obtained from the analysis of balance sheets of mining companies conducted by the RBI. The resulting figure is of fixed assets inclusive of land, and a deduction of 15 per cent has been made for land. The RBI balance sheet analysis gives the composition of fixed capital showing the share of land separately. But this ratio cannot be used in a straightforward way because the change in value of land is likely to be different from the change in value of other assets during the period considered. The percentage adopted therefore is notional, but it takes account of the RBI data on composition of fixed assets. Finally, the working capital has been estimated by making use of ratios obtained from the RBI balance sheet analysis. Thus for coal-mining a figure of 35 per cent has been used, while for other companies 40 per cent is taken as the ratio of working to fixed capital inclusive of land. The aggregate capital stock in the mining sector works out at Rs. 110 crores.

Factory establishments. For factory enterprises, price-adjustment factors have been worked out for twenty-four industry groups covering 82 per cent of the book value of fixed capital given in the SSMI. For the industries not thus covered, the average adjustment factor for the groups covered has been used.

The value of net fixed assets given in the SSMI are then multiplied by these factors to arrive at the adjusted market value of the fixed assets. The figure at this stage includes the value of land. To this, the value of inventories given in the SSMI has been added to arrive at the aggregate capital stock in factories covered by the SSMI. Only electricity generation and transmission, for which coverage of the SSMI is not adequate, has not been considered here.

Capital stock in the public enterprises included in the SSMI works out at about Rs. 89 crores. This figure has been obtained on the basis of capital employed per person and employment in public enterprises for which separate data are available. Not all government enterprises could, however, be covered in this way, and a figure of about Rs. 42 crores has to be added to get the capital stock in government industries. The method of arriving at this figure of Rs. 42 crores will be described in a subsequent paragraph because this involves a different method of estimation. It should be mentioned here that we have not included ordnance factories and mints under government industries for conceptual reasons. It may be noted, however, that ordnance factories provided more than half of government industrial employment in 1949–50.

While the method of estimation for getting the capital stock in the tea industry is the same as that for any other factory industry, this has been shown separately for analytical reasons.

Lastly, an adjustment was made in all cases for taking out land from fixed capital. For all factory industries, a fixed ratio of 5 per cent has been used on the basis of RBI data on composition of fixed capital. This method, however, is not appropriate for the tea industry, for which the land area under plantations has been evaluated at the average rural land price worked out from the RCS.

We have tried an alternative procedure in the factory-establishment sector which may be briefly described here. There is a good deal of data available in various government and other projects which enable one to work out ratios between capital requirement and value of peak production. These ratios when applied to the actual production figures of 1950–51 give estimates of capital requirement corresponding to the level of output. The figure thus obtained would give an estimate of the upper limit of the capital stock in the individual sectors, while

the current unadjusted book values would give a lower limit. It has been ascertained generally that the estimates accepted by us lie between the two extremes. But corresponding to our estimate of about Rs. 1,500 crores in the factory-establishment sector, this procedure gives a figure of as much as Rs. 3,000 crores, the current book value being of the order of Rs. 1,000 crores.

Miscellaneous sectors. The other sectors in which paid-up capital data have been used in conjunction with the investment-cost index are the following: plantations other than tea plantations, navigation companies, airways companies, other transport companies, such as tramways, trading companies (for ascertainment of fixed capital), and miscellaneous other joint-stock companies. In every case the procedure has been to work out a price-adjusted figure of paid-up capital on the basis of a time series of paid-up capital and the investment-cost index and then to multiply the figure by a ratio of net fixed assets to paid-up capital obtained from the RBI analysis of balance sheets. Whenever necessary a notional adjustment was made to deduct the value of land from that of fixed capital. Also, in all cases except in the trading sector, the estimate of working capital has been worked out by applying a ratio of fixed to working capital obtained from the RBI balance-sheet analysis. For final presentation, the capital in plantations (other than tea) has been shown along with agriculture and allied activities, shipping and navigation companies lumped together and a small item (Rs. 1.24 crores), miscellaneous other joint-stock companies, included in trade.

Trading inventories. The inventory in the trading sector has been calculated on the basis of data furnished by the RBI balance-sheet analysis but in a different way. For this a figure of net output in the trading sector has been worked out and a relation has been established between this and the value of inventories. This relation, together with the estimate of trading income in 1950–51 prepared by the NIU, gives the estimate of inventories in the trading sector. An arbitrary adjustment has, however, been made to split up a fairly large balance-sheet item on 'other expenses' and to postulate that a part of this really constitutes factor income. This procedure gives a figure of Rs, 1,619 crores as the value of stock of all wholesale and retail traders. A figure of Rs. 75 crores for government stocks, mostly of grains, can be estimated on the basis of data on physical stocks and

prices. But this figure is conceived to be included in Rs. 1,619 crores given above.

In the preliminary paper on capital stock referred to earlier, the corresponding figure was Rs. 1,520 crores. This was worked out arbitrarily in the following way: From the figure of trading incomes taxed obtained from taxation sources, the total outlay of such traders was worked out on the assumption of a 10 per cent return, and then the figure of stocks was calculated on the assumption of complete replacement of stocks every three months. The rest of the trading income accruing to small traders was obtained as a residual, and the corresponding estimate of stocks was worked out on the assumption of a return of 12 per cent and complete replacement of stocks eight times every year. The object of citing this example is to show that if our present procedure is valid, the earlier phantasy was also not altogether absurd.

V. ESTIMATES BASED ON SERIES OF CAPITAL EXPENDITURES AND INVESTMENT COST INDEX

We may now consider a group of estimates which depends on the investment-cost index but not on any series of paid-up capital. This group comprises railways, and postal and telegraph services. In these activities it is possible to obtain figures of net or gross assets year after year, and hence straightforward adjustment with the investment-cost index is possible.

Railways. For railways, figures of net assets are available year after year, and hence the price adjustment can be applied in a straightforward way and no deduction for depreciation is necessary. The only adjustment we have made is a notional deduction of 10 per cent for land.

Communications. The procedure followed for communication services such as postal, telegraph, etc., is exactly the same as that used for railways. The sector includes capital stock used in broadcasting and in overseas communication services considered in the next section.

VI. ESTIMATES BASED ON ADJUSTMENT OF ACCUMULATED EXPENDITURES

We now pass on to a group of sectors in which no time-series data are available, and adjustments whenever made are to be made in some overall way. The bulk of these estimates relate to

government investments and are culled from government ac-
counts. As most of the government figures are given gross, the
adjustments would generally entail a scaling down of the figures
on this count and a scaling up of the figures for price changes.
When the items are small we have frequently accepted the figures
given in the government accounts without any adjustment,
hoping that the two corrections will offset one another. Further,
in some cases we have used unadjusted book values on the sup-
position that the use of our inflating method would lead to over-
estimation. The sectors coming under this category are the
following:

(i) government capital stock in irrigation works and agri-
cultural improvement projects; industries not included in
SSMI; public buildings; ports and docks including port
trusts; aerodrome and aerodrome equipment; overseas
communications and broadcasting; water-supply works
and forestry;

(ii) mostly private capital stock in banks; co-operatives; in-
surance companies and shipping companies.

Public irrigation works. In so far as public irrigation works are
concerned, the increase in value of investment over the period
1938/39–1949/50 has not been large. Hence, the accumulated
aggregate for 1949/50 available in the government accounts has
been scaled up by the investment-cost index. From this a de-
duction has been made for accumulated depreciation using the
rate adopted for private irrigation and land-improvement pro-
jects. Lastly, a notional adjustment has been made for land in-
cluded in the asset. The estimate includes capital stock in em-
bankments, drainage works, etc.

Government industries outside SSMI. Accumulated gross ex-
penditures on government industries not included in the SSMI
are taken from the Combined Finance and Revenue Accounts
of the Central and Provincial Governments in India, 1946/47,
and Demands for Grants for the Expenditure of the Central
Government (excluding Railways) for the years 1949/50, 1950/
51, and 1951/52. The figures thus obtained are accepted without
any adjustment, though a deduction has been made for land on
notional grounds. The industries thus covered include the
penicillin factory, Indian rare-earths factory, government hous-
ing factory, Sindri fertilizer factory, etc.

Public buildings. The accumulated expenditure on public buildings has been obtained from the Combined Finance and Revenue Accounts up to 1946/47. To this has been added the gross investment on government buildings in the years 1947/48, 1948/49, and 1949/50 worked out by the NIU. The resulting figure has been accepted as such on the supposition that de-grossing and price adjustment would be offsetting one another. A deduction has, however, been made for land. A small item on central water-supply works has been included in this head.

Other government capital stock. The procedure followed for arriving at the capital stock of port trusts and accumulated capital expenditures on ports, docks, and light-houses is exactly the same as in the above case. For presentation all the heads have been combined into one item in Table I. Out of a total of Rs. 71 crores port trusts account for as much as Rs. 66 crores. The estimate for aerodromes and aerodrome equipments, overseas communications and broadcasting, and forestry are also obtained in this fashion. While the first of these has been shown under a separate heading in the main table, the second has been included in communications, and the third, a very small item, has been lumped with fishery.

Banks, co-operatives, insurance companies, and shipping companies. The estimate of assets of banks has been worked out on the basis of figures available in the RBI balance-sheet analysis and another RBI publication, *Banking and Monetary Statistics of India.* The figure of assets which relates to all commercial banks, the Imperial Bank, and the Reserve Bank of India has been taken as such without any adjustment and has been inflated to cover the co-operative societies by ratio of net output of banks to net output of co-operative societies obtained from NIU records. Similarly, the figure of assets of Indian life-insurance companies obtained from the *Life Insurance Year Book,* 1950, has been adjusted upwards to cover all insurance companies by the ratio of premium income of all companies to the premium income of Indian life-insurance companies only. The resulting figure is Rs. 14 crores. No price adjustment has been made in the above cases, but the figures have not been adjusted for depreciation either. The only adjustment relates to a deduction for land. In so far as 'assets' of banks include an intangible item, 'branch adjustments', the figure is perhaps over-estimated. On the other hand, the procedure followed by us probably leads to

some under-estimation in the co-operative sector, as is indicated by calculations based on some alternative sources. Lastly, regarding shipping companies, the procedure has been to scale up the figure of fixed assets and inventories for the eleven companies available in the RBI balance-sheet analysis to cover all the nineteen existing companies on the basis of some data available in the *Investors' Encyclopaedia*, 1951–52. Here also no further adjustment has been attempted. For presentation purposes, the assets of banks, insurance companies, and co-operative societies have been aggregated, while the assets of shipping companies have been shown together with those of navigation companies.

VII. ESTIMATES BASED ON MISCELLANEOUS METHODS

The remaining estimates have been derived by miscellaneous methods. This group includes values of vehicles, roads, and bridges, and capital stocks in electricity generation and transmission and in fishery obtained by applying price or cost data to the number or amount of assets; urban house property and small enterprises for which the stock has been obtained by capitalizing income;[1] and the value of private land improvement and irrigation works arrived at on some hypothetical considerations.

Vehicles. Data regarding the number of motor vehicles taxed in India in the year 1949–50 are obtained from the *Statistical Abstract*, 1951–52. Average prices of the relevant types of vehicles have been obtained from the Ministry of Transport. The total market value of all vehicles has been calculated on the basis of these prices and the number of vehicles of each type. As the prices relate to vehicles of average age, no deduction has been made for depreciation. No statistics are available either on the total number or on the value of horse-driven and similar other types of vehicles, and a notional figure of Rs. 33 crores has been taken to cover all such items missed.

Roads and bridges. Statistics relating to the length of roads classified under various heads are available in the *Basic Road Statistics of India*, 1954, and the approximate cost of construction of different types of roads are given in *Transport in Modern India*. The value of roads thus obtained has been adjusted for depreciation on the basis of data on age structure and useful life

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[1] The procedure followed for trading inventories was the same, but they are included in fixed capital in the sector.

period of Indian roads from the above publications. The total value of bridges has been calculated on the basis of a ratio of recent capital expenditures on roads to bridges obtained from available data.

Electricity generation and transmission. The estimate has been worked out on the basis of available data on aggregate installed capacity in the country and the cost of installation. Data on cost of installation are available for nineteen States, and we have used a simple average of Rs. 2,200 per kW of capacity in preference to a somewhat lower weighted average. The value thus obtained is gross and relates to fixed assets. An estimate of accumulated depreciation (29·3 per cent) worked out from the RBI balance-sheet analysis has been taken out of this to arrive at the net figure. To get the figure presented in Table I, an estimate of working capital based on the Public Electricity Supply, *All India Statistics*, has been added and a notional deduction (5 per cent of net fixed assets) for land has been made. The estimate of net assets works out at about Rs. 240 crores. The main reason for adopting this method is the availability of a large body of data on current cost of installation, a category of material not extensively available for other industrial sectors.

Fishery. Capital assets used in the fishery sector are in the form of boats, canoes, catamarans, power vessels, and nets, besides inventories. Data relating to vessels of various types used for sea fishing in the whole of the Indian coast (except Bengal and Orissa) are available in the *Report of the Marketing of Fish in the Indian Union*, 1951. The number of vessels used on the Bengal and Orissa coasts is estimated in relation to the share of the total catch in these areas. Likewise, vessels required for inland fishing have been estimated, due weight being given to the fact that the number of boats used for the same catch is likely to be more in sea-fishing than in fresh-water fishing.[1] The number of nets used either in sea-fishing or in fresh-water fishing has been roughly estimated on the basis of the capacity of the different types of vessels to carry men. The average prices of vessels of different types are not available, and notional estimates have frequently been used. Inventory value has been taken at 10 per cent of the fixed assets, the aggregate capital stock amounting to Rs. 11 crores.

Urban house property. For urban house property, the method used was capitalization of rentals as given by the Final Report of

[1] Boats are needed only for a part of the fresh-water fishing.

the NIC on the assumption of a net rate of return of 7·5 per cent.[1] The sector is one of our weakest, considering particularly the large share of total value covered by it. The percentage adopted is probably not unrealistic, but its empirical basis is not strong.

Small enterprises. An estimate of fixed capital stock in small enterprises at purchase prices is available in the NSS fourth-round preliminary tabulation results. This figure is roughly adjusted to stand for present book value of net fixed assets by making use of a ratio derived from some studies made by the Bureau of Industrial Statistics, Calcutta. This figure is then scaled up by the overall price-adjustment factor for the factory establishments considered earlier. A ratio of total capital to fixed capital was then applied to this figure, giving an estimate of total capital stock corresponding to the sample coverage of net output. When this is adjusted for the entire net output of the sector used by the NIU we get the value of capital stock in the small-enterprises sector, the figure being Rs. 763 crores. As the sample estimate of capital stock covers a large part of the sector, this method is hardly one of income capitalization, though blowing up for the entire sector is of this nature. Alternatively, use may be made of the sectoral capital–output ratios obtained from sources such as the NSS; *Report on a Survey of Cottage Industries in Aligarh Town and Surrounding Rural Area for the Year 1949* (Ministry of Commerce and Industry, 1949–50); *Rural Economic Enquiries in Hyderabad State, 1949–50,* by S. K. Iyenger; *Economic Enquiry of Saurastra,* by C. N. Vakil; *Development of Industries in U.P.,* 1949, prepared by Uttar Pradesh Directorate of Cottage Industries; *Report of the Fact-finding Committee (Hand-looms and Mills); Rural Problems in Madras –* Monograph by S. Y. Krishnaswamy; etc. These ratios

[1] Some further material on the rate of return is presented below. A study of transactions in evacuee property in the Uttar Pradesh indicates orders of gross rentals ranging between 5 and 8 per cent. The Planning Commission used a net figure of about 5 per cent for industrial housing. The Delhi Tenants Association considered a net figure of 6 per cent reasonable. S. C. Aggarwal, in his *Industrial Housing in India,* gave a figure of gross return of 6 per cent. In Bombay City gross rent is allowed by courts at the rate of 8·3 per cent of the cost of the building structure plus 6 per cent of the cost of land. Taking this into consideration and also the fact that one-sixth to one-fourth of the total cost is ascribable to land, a figure of about 7·5 per cent could be worked out for urban house property. A recent case study in Calcutta indicated that net returns are above 9 per cent for new houses but 6 per cent or lower for reassessed old houses. None of these studies have a proper sampling base, and hence can only furnish a notional figure. Finally, it is well known that new houses or even new tenants in old houses fetch a larger return. But old tenants, as a rule, pay less, mainly due to rent-control measures.

used in conjunction with output in various sectors worked out by the NIU give an estimate of Rs. 718 crores. The earlier estimate has been used in our main table.

Private land-improvement and irrigation works. The estimate of value of private land improvement and irrigation works has been worked out on the basis of a hypothetical time series of investments. The procedure followed closely corresponds to the method used in the current estimation of capital formation by the NIU. The method involves carrying backward the benchmark figure of per household investment under these heads by index numbers of rural population and value of agricultural production. The long time series thus constructed at constant prices when aggregated yields a figure of as much as Rs. 1,304 crores after adjustments for depreciation (life having been reckoned at forty years) and land.

VIII. CAPITAL–OUTPUT RATIOS

An examination of the relation between the capital stock estimated by us and the net national output is naturally of considerable interest. The following table presents the estimates of capital stock and net domestic output in 1950–51 by some broad sectors and the resulting capital output ratios:

TABLE II

Estimates of Reproducible Capital Stock by Industrial Origin and Capital–Output Ratios

	Reproducible Capital Stock, End of 1949/50 (Rs. crores)	Net Domestic Output, 1950/51 (Rs. crores)	Capital–Output Ratio
1. Agriculture, animal husbandry, and allied activities	5,236	4,890	1·07
2. Mining	110	70	1·57
3. Factory establishment . .	1,706	550	3·10
4. Small enterprises . .	763	910	0·84
5. Communications . .	93	40	2·32
6. Railways . . .	1,574	180	8·74
7. Other transport . . .	1,321	146	9·05
8. Trade and commerce . .	1,772	1,324	1·34
9. House property . . .	4,511	410	11·00
10. Government services, professional services, and other sectors	—	1,030	—
Total . . .	17,086	9,550	1·79

Note: Items in first column correspond to entries in Table I, p. 366.

We get an overall capital–output ratio of 1·79, or a ratio of 3·66 if the value of land is also included. Regarding individual sectors, house property tops the list with a ratio as high as 11, while railways and transport other than railways also have very high ratios, each having an order of 9. Large-scale factory establishments have a ratio of 3·1, followed by 2·3 in communication services and 1·6 in mining. The unorganized sectors have very low ratios, the lowest being 0·8 in small enterprises, followed by 1·1 in agriculture [1] and allied pursuits and 1·3 in trade and commerce.

An attempt has also been made to compute capital–output ratios by making use of estimates of fixed capital only in the numerator. The aggregate estimate of fixed capital is Rs. 11,789 crores, and this gives a capital output ratio of 1·23 when land is excluded and 3·10 when land is included. Sector estimates of fixed-capital–output ratios are less reliable than the total-capital–output ratios presented earlier. The following table gives the two types of ratios for a few sectors in which the comparison is considered to be valid in spite of the limitations in data:

	Fixed Capital–Output Ratio	Total Capital–Output Ratio
1. Agriculture, animal husbandry, and allied activities	0·57	1·07
2. Mining	1·09	1·57
3. Factory establishments	2·16	3·10
4. Small enterprises	0·48	0·84
5. Transport and communications	7·15	8·16
Overall	1·23	1·79

It is not our purpose here to draw any conclusion from these figures. Knowing the reliability of our estimates, we do not think it will be desirable to read too much from them. However, the figures are worth presenting for their obvious importance. This attempt at a numerical hypothesis, it is hoped, will lead to critical appraisal at a quantitative plane, and only in such atmosphere of criticism can more reliable estimates emerge.

[1] It may be of some interest to work out a ratio for agriculture, in which the capital stock includes land. This can be approximated by adding the value of land owned by the cultivating households to the reproducible capital stock in the sector. The figure works out at 3·88.