

The Capital Structure of the Economy

Changes over the Two Plan Periods

Uma Datta

The actual levels of investment over the two Plan periods and their effect in terms of increase in production are important for any technical assessment of the Five Year Plans.

In this paper the overall increase in production has been studied against the estimates of capital stock as well as additions to capital.

This has also led to an examination of the annual estimates of capital formation vis-a-vis the levels of reproducible tangible wealth as it existed in 1949-50 on the eve of planning and as at the end of the Second Plan.

The most important factor which comes to light is that no satisfactory estimate of even the rate of capital formation over the two Plan periods is available, not to speak of the distribution of the investment over years by sectors according to their industrial use.

Both the estimates of capital formation and reproducible tangible wealth in India need to be examined much more carefully before they can be used for analytical studies of the capital structure of the economy and changes in it.

[The views expressed are those of the author and not of the organisation to which she belongs.]

OVER the past decade covering the First and Second Five Year Plans, the national income in India has increased by as much as 42 per cent. This growth as measured by higher levels of production in different fields could be the result of either greater output per unit of existing inputs or increase in the inputs themselves. One would be quite justified in assuming that planning in India has resulted in both greater availability and use of factors of production as well as better utilisation of inputs as they existed before the advent of planning. For purpose of any analysis the inputs could be classified into two broad groups, those which are current and are included under current costs of production and those which are the basic factors of production and are essentially of a different character. The latter can be broadly grouped into capital and labour. For planned increase in production of different items it is essential to ensure the supply of all essential inputs whether current or other.

The formulation of the Five Year Plans and their execution have primarily been in terms of capital formation, though the targets of production set out for selected commodities as well as employment have been equally important points for consideration. The actual levels of investments over the two Plan periods and their effects in terms of increase in production will therefore be im-

portant points for consideration in any technical assessment of the achievements of the Five Year Plans. In this paper, the overall increase in production has been studied against the estimates of capital stock as well as additions to capital. This has in the process also led to an examination of the annual estimates of capital formation vis-a-vis the levels of reproducible tangible wealth as it existed in 1949-50 on the eve of planning and as at the end of the Second Five Year Plan.

Varying Estimates

Capital formation on the one hand signifies additions to reproducible tangible wealth of the country and, on the other, measures that part of domestic/national production which is retained for use in further production. Other factors remaining constant a higher rate of growth of national product would be the result of higher rate of investment unless the increase in production follows from decline in the average capital-output ratio with constant or even lower rates of investment. The rate of capital formation, i.e., the proportion of net domestic/national product used as additions to capital (domestic or national) is, therefore, the principal factor in the economic development of a country. Enough doubts have already been raised regarding the actual levels of capital formation in the country over the two Plan periods and these have

been aggravated by the widely differing results¹ revealed by independent estimates of savings and investment prepared by different research institutions.² Only one of these present figures of capital formation while the rest are primarily estimates of savings. The rates of investment as revealed by the estimates of C S O³ are presented in Table 1 as an introduction to the analysis that follows.

Though any critical examination of these estimates and the determination of the possible rate of investment is beyond the scope of the present paper, a few remarks regarding the results may not be out of place. The rate of net capital formation was, according to the estimates, as much as 10.7 per cent at the beginning of the Second Plan and reached the high figure of 15.5 per cent in the very next year and declined to 11.7 per cent in 1957-58. The wide fluctuations in these estimates are to some extent due to variations in levels of net addition to inventories. The ratios of fixed capital formation to national output do not record such wide fluctuations though the picture over the period does not change very much. At constant prices, the rate of investment (gross) is not only at a high level but between 1950-51 and 1960-61 it rises from 1.23 per cent to 17.7 per cent for fixed investment and 13.2 per cent to 19.4 per cent for total investment. This is no small

increase. There are doubts about the reliability of these estimates, particularly since they not only contradict the levels as stated in the Third Five Year Plan Report⁴ but also present a picture which is contrary to the experience in other countries in similar stages of development.⁵ It is, of course, true that other countries in similar stages of economic development did not have the political and social system existing in India today nor did they have planned economic development of India's type which may be said to be investment oriented. However even the Indian Plans as formulated or as assessed do not present a picture of such high rates of investment. They agree more with the rates and levels as experienced in other countries. According to the estimates presented above, the level of capital formation has been much more than envisaged in the plans and if this presents the true economic condition of the country, raising of funds for investment should be no problem during the Third Plan period. In this connection, it might be worthwhile to refer to the experience in other countries in periods of economic development. Table 2 presents the details for a few selected countries in different stages of economic development.

According to Kuznets⁶, "the ratio of gross domestic capital formation to gross domestic product is positively related to income per capita, being higher for the high income, developed countries than for the low

income, under-developed countries ... at best, the net capital formation proportions have "not gone much above 15 per cent, either in the non-Communist or in the Communist countries".⁷ Could India have reached this level of approximately 15 per cent net capital formation at the beginning of the Second Plan and continued around that level throughout the Plan period? The figures presented in Table 1 also imply that the rate of investment at the end of the First Plan had already

Table 2 : Long-Term Changes in Proportions of Capital Formation to National Product (Current Prices)
(Percentages)

Country	Period	Gross Domestic Cap For to Gross National Product	Net National Cap For to Net National Product
U K	1870-99	9.8	11.0
	1890-1913	9.9	11.9
	1950-55	14.3	7.2
France	1853-78	N.A.	9.9
	1878-1903	N.A.	6.9
	1903-11	N.A.	9.7
	1950-55	18.3	N.A.
Sweden	1860-90	9.2	2.2
	1881-1910	15.0	5.7
	1901-30	19.8	12.5
	1950-55	20.5	N.A.
Italy	1861-90	10.1	3.6
	1881-1913	12.5	7.0
	1921-40	16.8	7.4
	1951-55	20.3	9.9
U S A	1869-98	21.9	13.5
	1899-1928	20.5	12.7
	1919-48	21.3	8.7
	1950-55	18.1	11.1

Source: "Six Lectures on Economic Growth" S Kuznets.

Table 1: Rate of Capital Formation 1950-51 to 1960-61
(Percentages)

Year	At Current Prices		At 1958-59 Prices		Total Gross Cap For as P C of Gross National Product	Gross Fixed Cap For as P C of Gross National Product
	Total Cap For as P C of National Product	Fixed Cap For as P C of National Product	Total Gross Cap For as P C of Gross National Product	Gross Fixed Cap For as P C of Gross National Product		
	Gross	Net	Gross	Net		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1950-51	N.A.	N.A.	N.A.	N.A.	13.2	12.3
1955-56	17.3	10.7	16.7	10.0	16.2	15.6
1956-57	20.9	15.5	17.3	11.7	20.9	17.3
1957-58	17.7	11.7	18.9	13.0	17.4	18.6
1958-59	19.3	13.8	16.6	10.9	19.3	16.6
1959-60	19.0	13.3	17.0	11.3	19.0	17.1
1960-61	19.3	14.0	17.6	12.2	19.4	17.7

Source: "Estimates of Capital Formation in India, 1948-49 to 1960-61", C S O (mimeographed).

reached the level which was planned to be achieved at the end of the Second Plan. It is difficult to reconcile such levels for the beginning of the Second Plan and the levels set out in the Plan.

Viewing these estimates of capital formation from a different angle, net addition to capital over the two Plan periods—according to these estimates—has been Rs 13,202 crores⁸ at 1960-61 prices. The addition to national income over the same period has been Rs 4,346 crores at 1960-61 prices.⁹ This would mean an incremental capital-output ratio of 3.04:1 over the first two Plan periods. According to the Second Plan (page 11), the incremental capital-output ratio was expected to be 2.30 during the Second Plan period against 1.88 during the First Plan period. These estimates are at 1952-53 prices. The change in prices between 1952-53 and 1960-61 would to a certain extent, affect the marginal capital-output ratio. The differences in capital-output ratios at different price levels depend very much on the trends in prices of individual components as changes in prices need not necessarily affect both investment and net output to the same extent and in the same direction. The effect of such changes on the capital-output ratio would be different according to the relative movement of prices of the two components. For the period 1955-56 to 1959-60 the implicit price indices for net national output (P_y) and investment (p_i) and the relative

change as measured by the ratio $r = \frac{p_y}{p_i}$ are presented in Table 3.

3.

Table 3 : Relative Price Changes in Net National Output and Investment, 1955-56 to 1959-60

Year	p_y	p_i	$r = \frac{p_y}{p_i}$
1955-56	0.8440	0.9039	0.9337
1956-57	0.9328	0.9355	0.9971
1957-58	0.9539	0.9706	0.9828
1958-59	1.0000	1.0000	1.0000
1959-60	1.0147	1.0152	0.9995

Note: P_{yt} has been obtained as the ratio of national income at current and 1958-59 prices using revised series of national income and P_{it} by a similar method, using estimates of gross capital formation at current and 1958-59 prices.

The indices show that the rise in the implicit price index has been relatively more for investment than for total national product. This is likely to be true in periods of heavy investment. However the order of difference has not only not been substantial over the period but appears to have practically disappeared by the end of the period. Any change in the marginal capital-output ratio as a result of the shift in the base price, therefore, could be broadly measured by the rise in the investment cost index over the period. Adjustment of the ratios presented in the Second Plan report for such price changes over the period 1952-53 to 1960-61 gives a figure of marginal capital-output ratio of approximately 2.5 over the first two Plan periods against 3.04 worked out from the estimates of capital formation.¹⁰

Sources of Over-Estimation

It is not easy to specify the factors which might have led to this over-estimation of the level of capital formation in the country. However, a few points regarding the method of estimation may be worth mentioning. Firstly, value of construction estimated on the basis of availability of construction materials and wages and salaries paid to workers engaged in construction activity is likely to have been over-estimated. For all building materials except iron and steel and timber,¹¹ net total available supply (domestic production plus net imports adjusted for changes in stocks) has been assumed to have been used in construction. This method seems to have been used not only for items like bricks and tiles but even for items like hume pipes, asbestos and asbestos cement products, paints and varnishes, electrical insulators, sanitary equipments and fittings, refractories, tiles, sheet glass etc. It may be desirable to allow for the possible use of such materials for purposes other than construction rather than assume the use of the total value of available supply for construction only. Deduction has been made from the value of construction thus estimated, to account for current repairs and maintenance. Current repairs and maintenance form 8.6 per cent of total value of construction in 1950-51, rise to the level of 9.8 per cent in 1952-53 and sub-

sequently go down in proportion to form only 7.1 per cent in 1960-61. It is true that during periods of large net additions to capital, proportions of current repairs and maintenance is likely to be less but it seems unlikely that the total current repairs and maintenance expenditure in the country was only Rs 50 crores in 1950-51, particularly since the estimate of construction includes not only *pucca* residential construction but all construction covering factory and office buildings, schools, hospital buildings etc, both in the public and private sectors, irrigation projects and construction in activities like railways and other transport services.

Similarly, the proportions of parts of capital goods and partly capital goods assumed to form part of gross capital formation might have been over-estimated. Thus in 1960-61, Rs 198 crores worth of parts of capital goods were added to the gross capital in the country against Rs 38 crores in 1950-51. The available supply of finished capital goods during the same period increased from Rs 242 crores to Rs 597 crores. The proportions of partly capital goods assumed to form part of capital formation are based on very scanty data and some of these ratios might be over-estimated. Ninety per cent of radio-receivers and house service meters and 80 per cent of portable room air conditioners are assumed to add to capital stock against 75 per cent for type-writers and 50 per cent for sewing machines.

Another possible factor which might result in over-estimation is the trade and transport margin which for individual items are based on very limited data and varies from 25 per cent of ex-factory value for 'bricks and tiles' to 56.4 per cent in the case of timber. It may also be mentioned in this connection that the trade and transport margin has been assumed to be constant over the period as also the production from large and small enterprises. These few points have been raised not to highlight the limitations of the capital formation estimates but to indicate the possible sources of over-estimation. Further examination along these and similar lines might lead to

more realistic series of capital formation estimates.

Reserve Bank's Estimate

In the light of the preceding discussion, it might be useful next to examine the other independent estimate of addition to capital in the country on the basis of the estimates of reproducible tangible wealth (RTW) in India for the years 1949-50 and 1960-61 and their relation with the levels of net output over the same period. Estimates of reproducible tangible wealth for the year 1960-61 have been prepared by the Reserve Bank of India¹² in a manner which would ensure their comparability with the estimates for the year 1949-50 available otherwise.¹³ The addition to capital over the period obtained from these¹ estimates has been compared with the independent estimates of capital formation discussed so far as well as with the levels of investment during the first two Plan periods as estimated in the Third Plan Report. The RTW as on April 1, 1950 has been estimated to be Rs 17,086 crores at current prices. To obtain the corresponding estimate at 1960-61 prices either the overall implicit price index of capital goods as available from the CSO estimates of capital formation can be used or the investment cost index by sectors used by the RBI for estimating RTW for 1960-61. The estimate using the former method has been obtained by the Reserve Bank of India and gives the reproducible tangible wealth in 1949-50 at 1960-61 prices as Rs 21,557 crores. The estimate obtained by using relevant investment cost indices for the estimates of capital stock in each individual sector gives the figures of Rs 20,622 crores of RTW in 1949-50 at 1960-61 prices. For the present analysis, use has been made of the latter estimate which not only is obtained on the basis of prices comparable with those used for the capital estimate for 1960-61 but also gives the distribution by sectors of capital stock in 1949-50 at 1960-61 prices.

The capital-output ratios for 1949-50 at two different price levels give a broad idea of the effect of price changes on such measurement. Also, the changes in implicit investment cost index (p) and domestic

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DATE	REFERENCE	DEPARTMENT	QTY REC	PRICE	IN	OUT	TOTAL STOCK	V1	V2	BALANCE	V3	V4	V5	TOTAL STOCK
1-1-58	D/F		-	-	-	-	25	15	25	7	10	7	10	99
3-1-58	L/111	LOAN	-	-	3	3	22	15	25	7	10	7	10	96
1-1-58	V8/78	V5	3	10/30	25	-	22	15	25	7	10	32	10	121
10-1-58	V3/66	Safe	-	-	5	8	22	15	25	2	10	32	10	116

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product deflator (p) were not of the same order, i.e., 'r' as defined in Table 3 has been generally less than unity over the period 1949-50 to 1960-01. The three possible estimates of capital stock as on April 1, 1961 presented in Table 4 indicate broadly the order of difference between the estimates. Since the base estimate of capital stock as on

April 1, 1950 is common for all the three alternative estimates, these, strictly speaking, present independent estimates of the addition to capital over the two Plan periods. The difference between Estimate I and III is not large enough to be considered significant, and may be taken to indicate broadly the possible level of investment over the two Plan periods as well as the

capital stock in the country at the end of the Second Plan period. As regards Estimate II, it has already been argued that the estimate appears to be too high. Perhaps in cast; of these estimates the absolute level at the beginning of the Plan period as well as the growth over the period have both been over-estimated.

**Table 4 : Capital Stock and Capital-Output Ratios at 1960-61
Prices : Alternative Estimates**

Item	1949-50		1950-51	1960-61 (At Current Prices)		
	At Current Prices	At 1960-61 Prices	At 1960-61 Prices	Estimate I	Estimate II	Estimate III
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Reproducible tangible wealth (Rs crores)	17,086	20,622	21,224	32,164	34,426	31,899
2. Net domestic product (Rs crores)	9,030	9,834	9,867	14,210	14,210	14,210
3. Capital-output ratio	1.89	2.10	2.15	2.26	2.42	2.24

- Notes: (1) Estimates of capital formation during 1950-51 at 1960-61 prices (*RBI Bulletin*, January 1963) have been added to RTW as on April 1, 1950, for estimating the figure in Col (4).
 (2) Col (5) item 1 presents estimate prepared by RBI (Estimate I).
 (3) Col (6) item 1 presents RTW as sum of RTW as on April 1, 1950 at 1960-61 prices and additions to capital over 1950-51 to 1960-61 at 1960-61 prices on the basis of CSO estimates of capital formation at current prices and investment cost indices (*RBI Bulletin* January, 1963) (Estimate II).
 (4) Col (7) item 1 presents RTW as sum of corresponding item in col (4) and investments over First and Second Plan periods as estimated in Third Plan Report. Average investment cost index over 1951-56 (*RBI*, Series II) has been used to estimate investment over First Plan period at 1960-61 prices. For the Second Plan period, the investment as given in "Third Five Year Plan" is assumed to be approximately at 1960-61 prices and hence no adjustment is made (Estimate III).
 (5) Estimate of reproducible tangible wealth following the same method as Estimate II (Col 6, item 1) is also available in "An Estimate of the Reproducible Tangible Wealth of India in March 1961" by M Mukherjee (mimeographed). Being an alternative estimate under col 6 it is not presented separately as an independent estimate. However, the estimate arrived at is Rs 33,635 crores (at 1961-62 prices) which is different from item 1 col 6.

**Table 5 : Distribution of Capital by Sectors
(Percentages)**

Sectors	1949-50		1960-61	Addition to Capital 1949-50 to 1960-61
	At Current Prices	At 60-61 Prices	At Current Prices	
(1)	(2)	(3)	(4)	(5)
1 Agriculture	31.4	29.4	28.2	26.2
2 Mining	0.6	0.6	0.6	0.3
3 Large enterprises	9.2	10.2	16.1	26.6
4 Small enterprises	4.6	4.6	3.7	2.1
5 Railways	9.2	9.6	8.6	6.7
6 Communications	0.6	0.6	0.6	0.7
7 Trade and transport	16.6	17.1	17.3	17.8
8 Services	27.8	27.9	24.9	19.6
TOTAL	100.0	100.0	100.0	100.0

Growth of Capital by Sectors

The estimates of RTW in 1919-50 and 1960-01 can next be considered in detail to examine broadly the growth of capital by sectors and the structural changes over the period as revealed by shifts in capital-output ratios. The addition to capital presented in col 5 of Table 5 covers a period slightly longer than the two IMans and would reflect the combined effect of the patterns of investment over the two Plan periods. As no details on distribution of investment by sectors in the private sector during the First Plan are available, it is not possible to make any direct comparison of col 5 with other independent data. The estimates of capital formation prepared by the CSO cannot be used for any such comparison as only distribution by types are available and not distribution by industrial use. It is known that, the pattern of investment during the First Plan period was substantially different from that during the Second Plan period inasmuch as agricultural development was given a higher priority during the First against capital intensive heavy industries during the Second. The details also make it clear that over the period, capital structure of the economy has changed substantially in favour of the large enterprises which has a much larger share in total capital in 1960-61 than before the Plans.

Whereas the average capital-output ratio at a point of time gives a broad idea of the capital structure of the economy, the marginal capital-output ratio brings to light the association between investment and addition to output over a given period. It is true that addition to output might also result from other independent factors like larger or smaller inputs of raw materials, natural resources, or labour or technological changes. Though the

Table 6 : Capital-Output Ratios in 1949-50 by Sectors
(at current prices)

Sectors	RTW (Rs crores)	Net Output (Rs crores)	Capital-Output Ratio
1 Agriculture	5369	4490	1.20
2 Mining	110	60	1.83
3 Large enterprises	1773	540	2.91
4 Small enterprises	763	900	0.85
5 Railways	1574	180	8.74
6 Communications	93	30	3.10
7 Trade and transport	2845	1450	1.96
8 Services	4759	1380	3.45
Overall	17086	9030	1.89

influence of factors other than capital on output and its growth cannot be denied, the association between the two can be assumed to be strong enough to warrant an examination of the ratio between the two. It is also true that for a satisfactory measure it would perhaps be desirable to make allowance for the lag between investment and additions to output particularly for projects with long gestation periods. Any such adjustment of lag between investment and increment in output would require a detailed study of the individual projects. Further, the lag may not be large enough to affect significantly the ratios measured over a decade or a five-year period. The data on average capital-output ratios in 1949-50 and 1960-61 are presented first and the study is extended subsequently to marginal capital-output ratios over the period.

Tables 6 and 7 considered together throw some light on different aspects of growth in output in relation to reproducible tangible capital in the country. Thus, according to the estimates presented, capital-output ratios in 1949-50 measured at 1960-61 prices show an increase in all sectors except mining where it registers a fall and agriculture where it remains unchanged. This change in the ratios is solely due to changes in prices and give some idea of the trend in prices of the two aggregates, viz, capital and output in different sectors. It is obvious from the two sets of ratios measured at two different price levels that the prices of capital goods and total domestic

product (covering both capital and consumer goods) did not move in the same direction except perhaps in agriculture where the shifts in the two aggregates were neutralised, resulting in no change in the capital-output ratio. The prices of capital goods, i.e., the investment cost index has generally moved faster than overall index for total domestic product. However, in the case of agriculture, livestock used on farm which forms a large proportion of the total capital stock in the sector, did not increase in price¹ whereas the price index of agricultural production increased to some extent. In the case of mining, the position is slightly different as the overall price of mineral production has increased much more than not only the investment cost index but the prices of production in other sectors as well as the total domestic product.

Fall in Capital-Output Ratio in Some Sectors

Comparison of the capital-output ratios for 1949-50 and 1960-61 by sectors show the slight structural changes which might have occurred in the form of either increase or decrease in the amount of capital per unit of product. Thus over the decade, agriculture, large enterpri-

ses, small enterprises and trade and transport appear to have become slightly more capital intensive, i.e., greater capital per unit of output while for the rest of the sectors the situation is the reverse. Over the two Plans, large investments have been made in all sectors of the economy, though the order of the expenditure has not been uniform in all cases. It is generally expected that the economy would advance towards a more capital intensive base as a result of such planned investment. However, for a few sectors, the output per unit of capital appears to have increased over the period. This could be the result of either factors other than capital influencing production or increase in productivity of capital as a result of utilisation of excess capacity or technological changes. Such results could, on the other hand, also be due to under-estimation of the actual level of addition to capital stock over the period.

Thus in mining, according to the estimates of capital stock in 1900-61 published in the *RBI Bulletin* (January 1903) the addition to capital over the period 1919-50 to 1960-61 has been of the order of Rs 36 crores only. This seems to be a substantial under-estimate. According to the Third Plan report.

Table 7 : Capital-Output Ratios, 1949-50 and 1960-61
(at 1960-61 prices)

Sectors	1949-50			1960-61		
	RTW (Rs crores)	Net Output (Rs crores)	Capital-Output Ratio	RTW (Rs crores)	Net Output (Rs crores)	Capital-Output Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Agriculture	6057	5093	1.19	9065	6900	1.31
2 Mining	147	87	1.69	183	160	1.14
3 Large enterprises	2109	679	3.11	5177	1320	3.92
4 Small enterprises	955	1014	0.94	1200	1120	1.04
5 Railways	1970	214	9.21	2746	360	7.63
6 Communications	116	30	3.86	198	60	3.30
7 Trade and transport	3518	1301	2.70	5577	1920	2.90
8 Services	5750	1416	4.06	8018	2370	3.38
Overall	20622	9834	2.10	32164	14210	2.26

Note: It has been argued that for a satisfactory measurement of the capital-output ratio at the end of the Second Plan period, it would be desirable to account for gestation between investment and output at least with respect to the capital expenditure during the last year of the Plan. This aspect would be important particularly for multipurpose irrigation projects and the basic capital goods industries like the new steel plants in the public sector. The extent of such capital expenditures would in all probability not exceed Rs 750 crores or so. Such adjustment would result in slightly reducing capital-output ratios in agriculture and large enterprises. The overall ratio then would be reduced to 2.21 instead of 2.26 as estimated.

the capital expenditure on petroleum refining during the Second Plan alone has been of the order of Rs 30 crores. Besides, each of the programmes of industrial development in the two plans has been closely linked with development of related mineral production required as raw material. Very rough estimates of investment on such projects of mineral development during the Second Plan alone amount to nearly Rs 50 crores. The RBI estimates of capital stock in mining have been based on the balance sheets of mining companies which might have led to this under-estimation. However, it is not possible to indicate the likely sources of under-estimation without a detailed examination of the estimates. It may, however, be desirable to examine the figures more carefully.

Another sector which records substantial fall in capital-output ratio is railways (besides communication where the fall is marginal). For both railways and communication, the figures of capital stock and net output may be said to be based on more comprehensive data than for most of the other sectors. Only the estimates of depreciation are based on certain assumptions regarding the rate. Apparently then, the rise in productivity per unit of capital might be ascribed to other factors like technological progress, utilisation of excess capacity etc. The unsatisfactory quality of basic data used for estimation might also be an important factor accounting for such results. The results in such a case might be very far from correct. It may be mentioned in this connection that figures of addition to capital stock in railways appear to be very much under-estimated when compared with the levels of investment during the First and Second Plans¹⁵. Definite comment on this point is possible only after careful examination of the basic data. This becomes difficult in the absence of other independent sources of information.

In view of the approximate nature of the estimates of both output and capital stock it may not be desirable to read much into the shift in the capital-output ratio in the services sector except to state that this sector includes services which are varied in structure and

have substantially different rates of growth and services like government administration where the net output has increased significantly since 1950-51 might to some extent be responsible for such change.

The estimate of capital stock in the small enterprises sector though apparently satisfactory is based on an assumed figure of capital-output ratio itself and hence has no independent basis. As a matter of fact such estimates are quite often misleading. It is essential therefore that such limitations are clearly indicated and necessary steps taken for collection of relevant data so that the estimates have factual basis rather than being pure conjectures. This is particularly desirable in view of the special policies laid down by the Government in the Plans for investment leading to mechanisation and development of small-scale industries.

Conclusions

To conclude the study, it might be useful to present the data on incremental capital-output ratios over the period 1949-50 to 1960-61

along with the rates of growth of capital and output by sectors. For the Second Plan period, distribution of investment by sectors is readily available¹⁶. It might be useful to compare the marginal capital-output ratios at the end of the Second Plan period as available from these estimates with those presented in Table 8.

The capital-output ratios as measured over the Second Plan period differ—occasionally substantially—from those measured over the decade. The patterns of investment over the First and Second Plan periods have been different and this is likely to be reflected in the overall measures of capital-output ratios. From this point of view, the ratios presented in Tables 8 and 10 are not strictly comparable. However, if nothing else, they at least bring out the more capital intensive nature of the investments during the Second Plan period. It might also be useful to examine more closely the ratios, particularly for a few of the sectors mainly because two independent sets of estimate* of capital expenditure have been used for working out the

Table 8 : Incremental Capital-Output Ratios, 1949-50 to 1960-61
(at 1960-61 prices)

Sectors	Additions During 1949-50 to 1960-61		Incremental Capital Output Ratio
	Capital Stock (Rs crores)	Net Output (Rs crores)	
Agriculture	3008	1807	1.66
Mining	36	73	0.49
Large enterprises	3068	641	4.79
Small enterprises	245	106	2.31
Railways	776	146	5.31
Communications	82	30	2.73
Trade and transport	2059	610	3.33
Services	2268	954	2.38
Overall	11542	4376	2.64

Note: If account is taken of the lag between investment made towards the end of the Second Plan period and the output therefrom, the marginal capital-output ratio in large enterprises as well as the overall ratio would be reduced slightly.

Table 9 : Growth in Capital Stock and Output During 1949-50 to 1960-61
(percentages)

Sectors	Percentage Increase During 1949-50 to 1960-61	
	Capital Stock	Net Output
Agriculture	49.66	35.48
Mining	24.49	83.91
Large enterprises	145.47	94.40
Small enterprises	25.65	10.45
Railways	39.39	68.22
Communications	70.68	100.00
Trade and transport	58.53	47.58
Services	39.44	67.37
Overall	55.97	44.50

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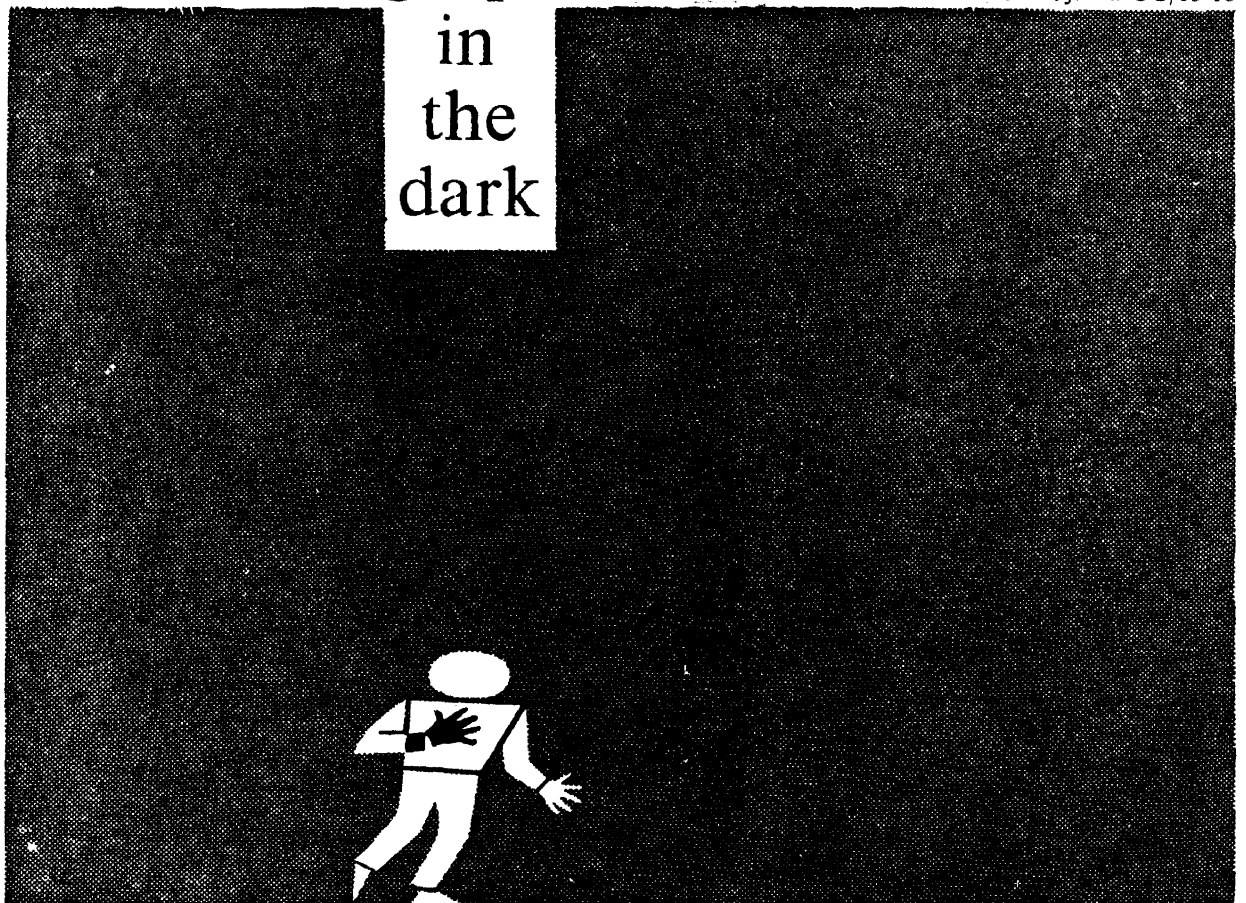


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ratios and critical examination might throw more light on the quality of the estimates themselves. For example, doubts regarding the estimates of capital stock in mining or railways or the estimates of net output in small enterprises are strengthened very much when one compares the two sets of ratios. Just as the marginal capital-output ratio of 0.49 for mining over the decade seems most unlikely, the ratio of 8.71 (highest of all the sectors!) for small enterprises over the Second Plan period is certainly incorrect. It is difficult to comment on the estimates of investment during the Second Plan in this sector as no details or alternative estimates are available but it can be stated more or less definitely that the addition to net output over the period is a substantial under-estimate. The estimate of capital stock in this sector, as indicated earlier, is hardly of any significance being estimated by the method of capitalisation of income with an assumed ratio of capital to output for the purpose.

Study over Longer Periods Necessary

On the basis of the results presented one would be tempted to draw conclusions regarding the structural change in agriculture over the Second Plan period. This would, however, not be advisable in view of the fact that the ratio in this sector is influenced largely by fluctuations in levels of production and it would be necessary to study the trends in both investment and output over longer periods eliminating thereby the influence of climate and the like before drawing any conclusions regarding structural change.

These details bring to light the wide variations in both the average and marginal capital-output ratios between sectors. These variations become meaningful when it is realised that the ratios, particularly marginal, depend largely on the structures of the investments in individual sectors as different types of capital goods are characterised by different ratios to their additional outputs. Thus construction generally results in long-lived capital goods with a high value of the ratio while producers' equipment has in comparison a lower incremental ratio of reproducible capital stock to net output. Similarly, the marginal capital-output ratio would be still lower for stock accumulation in

trading sector. It is in view of such structural differences between capital goods that one expects a high capital-output ratio for residential houses and a low ratio in non-mechanised agriculture where most of the implements used for cultivation have a much shorter economic life. At the same time, one might expect a comparatively higher marginal capital-output ratio for agriculture when highly mechanised cultivation is introduced for the first time. Though the data presented so far are very much consolidated over sectors and do not enable any such detailed analysis of the capital-output ratios, a broad examination of the results does raise doubts in one's mind regarding some of the ratios presented and the corresponding estimates of income and capital.

Erratic Fluctuations

It may be relevant in this connection also to keep in mind the fact that the values of the ratios can be quite erratic depending on the rates of growth of net output of the sectors. Thus, if the percentage rate of growth is high, the ratio will be

low while with a low percentage rate of growth, the ratio will be high. Thus when studied in conjunction with Table 9 the low incremental capital-output ratio in mining and the high ratio in small-scale industries shown in Table 8 might have little significance from the point of view of structural difference between the two sectors. The same is even more true of the small enterprises sector in view of the results presented in Tables 10 and 11. Similarly, it might be desirable to examine more carefully and in detail the level and distribution of investment in railways since 1949-50 with a view to determining whether the recent investments have in fact been less capital intensive than the overall structure of the sector as it existed in 1949-50. The estimates presented in Table 10 strengthen the case for such a careful examination.

Alternative Estimate

An alternative estimate of reproducible tangible wealth, though not strictly independent, is available in a working paper of the Planning Division of the Indian Statistical

Table 10: Incremental Capital-Output Ratios, 1956-61
(at 1960-61 prices)

Sectors	Investment (Rs crores)	Increase in Net Output (Rs crores)	Capital-Output Ratio
Agriculture	1200	1037	1.16
Mining	50	47	1.06
Large enterprises	1995	367	5.44
Smallscale industries	270	31	8.71
Railways	850	102	8.33
Communication	50	19	2.63
Trade and other transport Services	1016	355*	2.85
	1325	587	2.26
Overall	6750	2545	2.65

Notes: (1) Investment figures for community development have been reclassified under agriculture, small enterprises and services while capital expenditure for power generation has been separated from irrigation and included under industry.

(2) Overall incremental capital-output ratio for the First Plan period at 1960-61 prices works out to be 2.14 : 1

* Includes banking and insurance

Table 11: Pattern of Investment and Growth of National Income during the Second Plan Period
(at 1960-61 prices)

Sectors	Increase in National Income, 1956-61 (per cent)	Percentage Distribution	
		Investment	Increase in National Income
Agriculture	17.69	17.78	40.75
Mining	41.59	0.74	1.85
Large enterprises	38.51	29.56	14.42
Smallscale industries	2.85	4.00	1.22
Railways	39.53	12.59	1.01
Communications	46.34	0.74	0.75
Trade and other transport Services	22.68	14.96	13.95
	32.92	19.63	23.05
Overall	21.82	100.00	100.00

Institute entitled "An Estimate of the Reproducible Tangible Wealth in India in March, 1961" by M Mukherjee (mimeographed). These estimates have been prepared by using the perpetual inventory method on the basis of estimates of capital formation for the period 1950-51 to 1960-61 prepared by the CSO and the estimate of RTW relating to March 1950 prepared by the same author jointly with N S R Sastry.³⁷ The paper presents annual estimates of reproducible tangible wealth and capital-output ratios at all-India level at current and 1949-50 prices and for three broad sectors at 1949-50 prices only. Strictly speaking, this estimate for April 1, 1961 at current prices should be the same as the one in column 6 of Table 4. According to this estimate, the reproducible tangible wealth at the beginning of the year 1961-62 was Rs 33.635 crores. This is nearly 2 per cent below the figure of Rs 34, 426 crores in Table 4. The estimates in Table 4 are also obtained by using the figures of capital formation and implicit price indices prepared by CSO and as such could be said to have been prepared by the perpetual inventory method. It is difficult to determine the factors which have led to the difference between the two estimates. Further details regarding the figures in the paper under reference are necessary before the differences can be explained. The overall estimates of RTW being slightly less, the capital-output ratio is also worked out as 2.3: 1 at the beginning of 1961-62 in Mukherjee's paper instead of 2.42 : 1 as in Table 4 of the present paper. This paper by Mukherjee also presents the sectoral estimates of capital stock and capital-output ratios for three broad groups, namely, un-organised sectors, more organised sectors and house property. However, these estimates of capital stock and also capital-output ratios at the sectoral level are represented at 1919-50 prices. The sector classification is also much more aggregative than the one adopted in the present paper. It has, therefore, not been possible to make any direct comparison between the alternative estimates by sectors available in Mukherjee's paper and those in the present paper.

It is true that the present analysis does not throw much light on the structural changes within the eco-

nomy since 1940-50 and the effects of investment over the two Plan periods. It may still be worthwhile to summarise broadly the conclusions that emerge from the present study. The most important factor which comes to light is that no satisfactory estimate of even the rate of capital formation over the two Plan periods is available, not to speak of the distribution of the investment over years by sectors according to their industrial use. The only two sources are the estimates prepared by the CSO and those available from the reports of the Plans. The former gives the distribution only by types of capital goods produced and not by industrial use while the latter gives such distribution for the Second Plan period but not for the First Plan period. As regards the rate of capital formation, the figures for different sources are so contradictory that a satisfactory determination of the level is not possible.

The only other source of information is the estimate of reproducible capital stock as on April 1 of the years 1950 and 1961. These estimates enable some detailed examination of the changes in the capital structure of the economy that might have occurred as a result of the two Plans. Though detailed analysis shows that the Indian economy might have become slightly more capital-intensive as a result of the investment over the last decade, the estimates are not satisfactory enough to enable one to draw such conclusions at the sectoral level and it might be desirable to examine some of the estimates more critically and revise them before any conclusions at the sectoral levels can be drawn. This tendency towards more capital intensiveness has been more pronounced during the Second Plan period rather than during the First Plan period. Broad indications regarding the sectors like large enterprises, agriculture or railways might however be useful for further analytical study. If nothing else, these discussions have at least brought to light the fact that both the estimates of capital formation and reproducible tangible wealth in India are as yet quite unsatisfactory and need to be examined much more carefully before they can be used for analytical studies regarding the capital structure of the economy and changes therein.

Notes

- (1) "Savings in India", National Council of Applied Economic Research.
- (2) "Estimates of Saving and Investment in the Indian Economy, 1950-51 to 1958-59", *Reserve Bank of India Bulletin*, August 1961.
- (3) "Estimates of Capital Formation in India, 1948-49 to 1960-61" C S O (mimeographed).
- ² Recently both National Council of Applied Economic Research and CSO have revised their estimates and these to some extent reduce the order of difference between the two sets of estimates. The revised estimates of the latter are, however, available in the form of a research paper by S G Tiwari and others and not as official estimates of the C S O and are yet to be finalised. The author was not aware of these estimates at the time of preparation of this paper.
- ³ The arguments that follow might have to be revised if the CSO's final estimates of capital formation are at the level estimated in the recent paper "Estimates of Capital Formation in India for 1950-51 to 1961-62" by S G Tiwari, B Kumar and J Kumar.
- ⁴ "Net investment as a proportion of national income would have to rise from about 11 per cent at present (end of Second Plan) to 14-15, 17-18, and 19-20 per cent annually by the end of the Third, Fourth, and the Fifth Plans" ("Third Five Year Plan", p 28).
- ⁵ The revised estimates of capital formation ("Estimates of Capital Formation in India for 1950-51 to 1961-62" by S G Tiwari, B Kumar and J Kumar) give the rates of net capital formation at current prices as 10.8 per cent in 1955-56 increasing to around 12 per cent in 1960-61 with the rate in 1956-57 at 14.3 per cent. Rates at constant prices cannot be estimated as the new series of capital formation are at 1960-61 prices while national income estimates are at 1958-59 prices.
- ⁶ "Six lectures on Economic Growth", Simon Kuznets.
- ⁷ "Quantitative Aspects of the Economic Growth of Nations" Simon Kuznets in *Economic Development and Cultural Change*.
- ⁸ *Reserve Bank of India Bulletin*, January 1963.
- ⁹ The estimates of national income at 1960-61 prices have been obtained using the overall implicit price index of national income between 1948-49 and 1960-61 for each individual sector.
- ¹⁰ The revised estimates of capital formation give the marginal capital-output ratio as 2.87 at 1960-61 prices over the two Plan periods.
- ¹¹ Also 'cement according to the revised estimates
- ¹² *Reserve Bank of India Bulletin*, January 1963.
- ¹³ "Income and Wealth", Series VIII (Bowes & Bowes).
- ¹⁴ "Estimates of Tangible Wealth in India" (RBI *Bulletin*, January 1963)
- ¹⁵ Third Five Year Plan.
- ¹⁶ Third Five Year Plan report.
- ¹⁷ "Income and Wealth", Series VIII (Bowes and Bowes).