Cost-Benefit Analysis and Economic Growth

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The title of this essay is perhaps a bit misleading. I am not directly concerned with assessing the contribution which cost-benefit analysis can make to economic growth, which is perhaps what the title connotes.

I am instead concerned with exploring the way in which different views of the growth process imply different norms for the analysis of costs and benefits of individual projects, and vice versa.

The main point, that I want to make is a simple one. If we accept at face value the commonly-held notion that economic growth is almost solely the result of investment, then We must revise drastically the norms which are usually applied in the analysis of costs and benefits.

On the other hand, if we accept the norms usually applied in cost-benefit analysis, we must, if we arc to be consistent, accept a view of the growth process in which investment plays a very small role.

THE interest rate used in cost-' benefit analysis is (or should be) a measure of the marginal productivity of capital in the economy. The whole idea of cost-benefit analysis is to try to ensure that the limited capital resources of the economy are well-used—to attempt to reach a goal in which no available project which is rejected represents a more productive use of capital than any project which is undertaken. One can never hope really to achieve this goal, for there are risks of many kinds involved in investment decisions. Some projects are bound to turn out less well than was foreseen, and it is always possible with hindsight to say that some projects which were rejected at a certain point in time would have yielded greater returns than those actual projects which In fact turned out poorest. Cost-benefit analysis is not designed to eliminate or escape the real risks that are involved in practically all Investment decisions, but it is designed and does not attempt to utilize the best knowledge and foresight available so as to prevent capital resources from being used in ways which are less productive than "reasonable" alternatives. I say "reasonable" alternatives because it is never possible to ensure that there is no available project, anywhere in the economy, which is more productive than a given one which is under scrutiny. What is important is that for a project to be acceptable the capital used in it should promise to be as productive as in the general run of alternative investments. If the rate of productivity of "reasonable" alternatives, in this sense, is 10 per cent per annum, then we Should discount the expected stream of benefits, and accumulate the expected stream of capital costs of a project using this rate of discount, in order to see whether it is really worthwhile undertaking (discounted benefits greater than accumulated costs), or inferior to the general run of alternative investments (accumulated costs greater than discounted benefits). This, in any case, is the philosophy behind the approach of cost-benefit analysis; and It serves to explain in what sense the rate of discount used in such analysis reflects for should reflect) the marginal productivity of capital in the economy.

Now the actual discount rates used in the cost-benefit work under lying investment decisions on power and irrigation projects in India range from 3 to 4½ per cent. Let us now explore the consequences of interpreting rates of return in this range as representing the marginal productivity of capital in India.

Rates of Return

In the course of the First and Second Plans net capital formation in India amounted to some Rs 12,000 crores. If this investment had a marginal productivity of 3 per cent it would have produced a growth in annual national income of some Rs 360 crores; if its marginal productivity were 4½ per cent, it would have produced a growth in national income of Rs 540 crores. In point of fact, national income (in 1958-59 prices) grew by over Rs 3,000 crores. This, I believe establishes that if the norms currently used in cost-benefit analysis are correct, the role of investment in economic growth is quite small.

Let us now turn to the other extreme—to the view, which I shall call the "investment only" view, that investment is responsible for all of economic growth. This view would interpret the experience of the first two Plans as saying that Rs 12,000 crores of net investment had produced an increment of Rs 3,000 crores in annual output—a ratio of incremental net output to incremental capital of 0.25. What does this view imply about cost-benefit analysis? I would suggest that it implies that in order to make the best use of a given amount of capital for investment, one should allocate that capital first to the projects with the highest ratios of net output to capital, then to those with slightly lower ratios, etc, working down the list of projects arranged in descending order of net output/capital ratios until the available funds are exhausted. Now this was clearly not the way in which investments were chosen during the First and Second Plans. It should also therefore be a part of the view under discussion that one would have got a greater increase in income during the first two Plans if one had followed the "net output/capital ratio" criterion in choosing investments. Just where the margin would have been found in working down the list of possible investments until the available investible funds had been spent over the 10 year period I do not know. But it is quite possible that if the net output/capital ratio had been the criterion, outlets could have been found for all the resources which in fact were invested before projects with ratios of less than 0.3 would have been reached. Just to suggest the grounds for this state-

ment, let me note that in 1959 the 1001 companies in the Reserve Bank of India Survey had net fixed assets of under Rs 1,000 crores, and gross fixed assets of around Rs 1,500 crores, with stocks and stores of around Rs 400 crores, and that their net value added during that year was almost Rs 700 crores. These figures make one wonder whether one might not have been able to exhaust the investible funds of the First and Second Plans Jong before reaching net output/capital ratios as low as 0.3.

In any case, I hope I have shown that the view that investment is almost the sole cause of economic growth implies that cost-benefit analysis should be made using vastly different norms than those now in use.

II
"Investment-Only" View

In this section I propose to look behind the "investment-only" view to test its plausibility as a description of the growth process in the Indian economy and as a basis for retting cost-benefit norms. At first glance at least, I must confess that, it is an exceedingly attractive hypothesis as to the nature of growth. Not. only is it a simple, and in that sense strong hypothesis, but also it translates easily into policy prescriptions, and enables one to conceive of procedures for reaching investment decisions which are based on a pair of "big", easily estimated magnitudes (value added and capital), instead of on a much more-complicated set of calculations. Moreover, its principal underlying assumption, that the wages paid to labour in the operation of a project do not really represent a "cost" from the social point of view, has a great deal of plausibility and appeal in an economy with such an abundance of labour as India.

What I want to do in this section is to inquire which of the investments actually undertaken in India would easily pass muster under the cost-benefit criterion implied by the "investment-only" view, and which would have a harder time of it. But in order to do this it is convenient first to point out the effects of high discount rates on certain aspects of cost-benefit accounting (and decision-making). High discount rates operate strongly against long gestation periods, and against long-lived projects. Using a discount rate of 30 percent, a capital investment of Rs 1 crore would be worthwhile if it paid off, starting a year after the capital outlay, in a perpetual stream of value added of Rs 30 lakhs per year. If the stream of value added (gross of depreciation) lasted only 10 years, it would have to be around Rs 32.5 lakhs per year in order for the investment of Rs 1 crore to pay off; and if the stream of value added lasted only 5 years, it would have to be in the order of Rs 41 lakhs per year in order to justify the investment of Rs 1 crore. Thus drastic shortening of the span of time during which the flow of value added comes does not have much effect on the criterion for acceptance. And since long-lived projects usually cost substantially more than short-lived projects, a high discount rate militates quite heavily against their acceptance.

Discount Rates and Long-term Projects

By the same token, investments with long gestation periods become very difficult to accept when a high discount rate is used. The figures above allow for a 1-year span between the capital outlay and the beginning of the stream of returns and show, for a 10-year project, a critical ratio of gross value added to capital of 0.325. If the gestation span is extended to 2 years, this ratio becomes 0.423, and if the gestation span is extended to 3 years this ratio becomes 0.55. I must take this opportunity to note that the criterion mentioned in the preceding section, of choosing investments by descending the scale of net output/capital ratios applies precisely only when all gestation periods are the same. The general criterion implied by the "investment only" view is to choose projects by descending the scale of internal rates of return, where the internal rate of return of a project is defined as that one which makes the present value (at a point in time) of the stream of value added gross of depreciation just equal to the present value (accumulated to the same point in time) of capital costs. The net value added/capital ratio criterion can be adjusted so as to be equivalent to the above by taking as the denominator the "capital-at-charge" obtained by accumulating past capital outlays at the critical discount rate, and of course adjusting the "capital-at-charge" for depreciation during each year of use. But in practice it is preferable to deal with gross value added rather than net, because of the vagaries and uncertainties of depreciation accounting.

Table I (See p 219,) presents a series of gross value added/capital ratios, based on the Reserve Bank of India's survey of 1,001 companies. Here gross value added is defined as the sum of salaries and wages, employees welfare expenses, excise duty, interest, managing agents' remuneration, depreciation provision, and profits before tax.[1]

Inventories As Capital

The three columns of table 1 present ratios which differ in respect to the measure of capital used in the denominator. In col (1), net fixed asset:; are used; in col (*2)* net fixed assets plus stocks and stores are used, and in col (3' gross fixed assets plus stocks and stores constitute the denominator.

In a sense, my presenting column (1) may be a mistake; it seems at first glance to be too much of a concession to the naive and unprofessional view that machinery and buildings are somehow more properly "capital" than are inventories. In point of fact the scare? resources which are embodied in inventories could have been used for plant and machinery, if it were not true that inventories were essential to the process of production. But there is a more sophisticated ground on which the presentation of col (1) might be defended. The inventories actually

[1] Excise duties are not. normally included in computations of value added, but they are part of the difference between the value of the input and the value of the output of a process of production, and one should accordingly include them when one measures the benefits of carrying on that process. A difficulty arises when one attempts to divide value added into a part "attributable" to labour and a part "attributable" to capital, for then one has to decide on a method for dividing the excise tax contribution into these two components. But the "investment-only" view attributes all of value added to capital in any case, so this difficulty does not arise.

observed to be held by companies in the year 1959 could be largely financed by bank loans carrying rates of interest in the order of 6 or 7 per cent, and such loans were not generally available on fixed capital collateral. Hence, a holder of the "investment-only" view might assert that in 1959 far too much capital was held in inventories as a result of these extremely favourable credit facilities. He might go on to say that far less inventories would in fact be held if they were required to pay off at 30 per cent per annum or so, so that for assessing which activities would pass muster at such high ratios of value added/capital, we must not implicitly "require" firms to hold as much inventory as they did in 1959. On this view columns (1) and (2) are sort of limiting cases, column (1) being "correct" if inventories would be practically eliminated if forced to pay off at extremely high rates, and column (2) being "correct" if inventories would remain practically unchanged in the face of this demand.

Value of Capital Stock

The capital stock measure underlying column (2) is at least conceptually the correct one for the actual amounts of capital in use in 1959, But it is subject to possible complaint on two practical grounds. First of all, there is a general tax-induced tendency for business firms to claim as high depreciation allowances as they can, and if they succeeded in the past in claiming more than the true economic depreciation of their assets, the net fixed capital figure for 1959 would be understated. On top of this there was an inflation of some magnitude in India in the late 1950's, and it is likely that the book value of capital equipment bought before the inflation understates the true economic value of that equipment in 1959. Thus one is pressed in the direction of a higher capital stock figure for two distinct reasons. I have used the gross capital figure because it quite certainly overcorrects for the first source of error, for it allows no depreciation of any asset. It thus has " some thing left over" to help correct (and possibly overcorrect) for the second sort of error as well.

The industries surveyed in Table 1 stand up quite well under the cost-benefit criterion implied by the "investment only" view, at least when the critical ratio of gross value added to capital is taken to be in the order of 0.25 or 0.30. The industries are listed in the table in descending order of gross value added/capital ratios, using the definition of capital taken for column (3). This definition is the most conservative of the three, in the sense of being least likely to overstate the ratio of benefits to costs and I believe that it is a better approximation of the true value of capital employed in each activity than either of the alternatives.

Priority Ordering of Investments

The "priority ordering" of investments, as revealed in Table I, may seem a bit strange, but it is important to realise that this is roughly the priority ordering which the "investment-only" view implies, given the present pattern of relative prices in the economy. I say "roughly" because the ratios presented in Table I do not incorporate any secondary benefits or external eflects, apart from the "employment effect," which is taken into account by including the wage bill as part of the product attributable to capital. These adjustments might be important in a few cases, but one must bear in mind that all the activities under review are basically commercial in nature and that buyers will typically acquire the products of these activities up to the point where additional units bought would not have a value to the buyers in excess of the price they have to pay for them. I would, accordingly, not expect that adjustments for secondary benefits would strike very many of the activities listed in amounts that would be substantial enough to make a significant difference in the "priority ordering" given in the Table. More important, the priority ordering may be distorted because one should make different adjustments for the inflation of capital goods prices for the different industries. Those (eg textiles) with predominantly old capital assets may appear to have higher than their correct position in the priority ordering, for one would properly have to make a greater adjustment in their capital figures than one would for the newer industries. (This was pointed out to me by Professor Gadgil).

One striking feature of this "priority ordering" is the high position in it of commodities subject to heavy excise taxation. Matches, tobacco, rubber manufactures, sugar, mineral oils, and edible oils all have substantial excise tax components in gross value added. Their presence high on the priority list highlights a dilemma which always arises when commodities are subjected to excise taxation at widely differing rates. On the one hand, a cost-benefit approach calls for substantial expansions in those activities taxed at high rates, for the total value produced by expansions far exceeds the resource costs involved. On the other hand, the only reliable way to get such substantial expansions and still sell all the output is by lowering tax rates and this deprives the exchequer of badly needed revenue. There is no way out of this dilemma so long as tax rates differ widely from activity to activity. The "theoretical" solution is to make excise tax rates equal across-the-board, so that the desired amount of revenue is achieved without influencing the priority ordering of investments, but this is rarely a practical solution.

If one accepts the tax structure as it is, rejecting the possibility of expanding highly-taxed activities via a reorganization of the tax system, then one is in effect reduced under the "investment-only" view, to tooking at the ratio of gross value added net of tax to total capital employed. This ratio is given in column (2) of Table II. (See P 221.) For comparison, column (3) of Table I is reproduced as column (1) of Table II. One can see by comparing columns 0) and (2) of Table II that the exclusion of excise taxes from gross value added greatly reduces the range of variation of the output/capital ratios of the different industries, while making only a few im-

I called these "sort of" limiting cases because one can obviously apply the same type of argument to the various components of the fixed capital stock. The "limits" are really such if the proportions in which the various components of the fixed capital stock existed in 1959 would be unaltered in the transition to a situation of high implicit interest rates.

portant changes (especially sugar) in their rank ordering[1].'

Investments Which Fall to Pass Muster

As indicated earlier, and regardless of which approach one takes to excise taxes, the activities under review stand up well under the cost-beneflt criterion implied by the "investment-only" hypothesis. One does get a few inklings of trouble, in cases like iron and steel and basic chemicals when excise taxes are counted in gross value added, and in these cases (plus cement and sugar) when excise taxes are excluded. In all these instances the calculated ratios of value added to capital are in the neighbourhood of 18 to 20 per cent, and one must bear in mind that these are industries with substantial gestation periods, so that the critical ratio for them would be higher, and possibly substantially higher, than the discount rate used for the coat-benefit calculations (under the "investment-only" view >.

But the above mentioned cases' do no more than suggest the difficulties faced by holders of the 'investment-only" position. The real trouble emerges in other cases, of which, for simplicity, I shall consider four : power, irrigation, roads, and residential housing. Of these four, only power (electricity generation and supply) apears in the Reserve Bank of India's survey of limited companies, and it stands at the foot of the list regardless of which concept of capital is used and regardless of whether excise taxes are counted in the measure of product or net- Here only private sector electricity enterprises are represented, but it is well-known that public sector power production has substantially lower ratios of value added to capital than private sector power production. In the case of irrigation projects, or mixed power-irrigation enterprises, it is common to find that even after substantial allowance for secondary benefits they only "pay off" at rates in the range of 4-6 per cent. In the case of roads, one does not have the range of empirical cost-benefit studies that one has in the case *of* power and irrigation projects, but one must realize that transport between any two places is rarely impossible, and that the basic benefit of a road or a road improvement is the saving in time and inconvenience which accrues, as a result of the investment, to the traffic passing over the road. Once this is realized, it becomes difficult to imagine that a very large fraction of the road investments being made in India produce annual benefits anywhere near a quarter or a third of the capital cost involved. Finally, in the case of residential construction, we have the facts that even ''black market'' rents are considered high when they amount to 15 per cent of the value of the property, that controlled rents on privately owned dwellings range around 10 per cent of the value of the property, and that the rents charged on publicly-owned dwellings are lower even than this. Yet the "investment-only" view, if it requires that investments "should" pay off at something like 25 or 30 per cent per annum, would demand, making due allowance for maintenance and repair, etc, ratios of rent to value of around 3D or 35 per[1] cent,

Value Added and Prices

If these cases represent challenges to the "investment-only'" position, it must also be admitted that there are some lines of defence against them. The first line of defence stems from the fact that the calculated ratios of gross value added to capital are computed on the basis of the prices now prevailing. It is quite possible that if electricity rates were about doubled, which is what it would take to treble gross value added (fuel and material costs being currently about equal to gross value added), as much or nearly as much electricity could be sold as is sold now. If this representation of the "facts" is accepted, holders of the "investment-only" view are not required, for consistency, to hold that present levels of investment in power projects are uneconomic. But consistency would require them to press for very drastic upward revision of electricity rates.[4]

Similar arguments can be presented in the cases of irrigation projects and residential construction, but here it is much less likely than in the case of power that present levels of investment would be justified at the prices needed to yield ratios of value added to investment in the neighbourhood of 25 or 30 per cent. Even with heavy allowance for secondary benefits, irrigation projects are far from the 25 to 30 per cent range. And arguments resting on the special "social" benefits of ttood housing might, in India, be better placed in pressing for a modicum of protection from the elements for the great masses of extremely poor people. Increases in rents can be made to accrue to the public exchequer by special taxation on rents, but it is doubtful whether very sizeable rent increases would have any political support at all. If holders of the "investment-only" view support the present policies relating to bouse construction and rents, they should recognize that under their view those policies are

[3]I give no importance to the high ratio observed for the "land and estate" industry. This industry operates with very little capital, and the profits it gets are basically attributable not to the capital employed but to the activities of agents, speculators, etc. I doubt that even the most extreme holders of the "investment-only" view would contend that these profits really were an appropriate measure of the productivity of capital in the "land and estate" industry.

[1]I dismiss the third alternative which would admit that an overall 'social" payoff of, say, 30 per cent should be required of electricity enterprises, but would support the society's subsidizing the use of electricity on grounds of external economies, etc. Electricity is very important for economic development, and there are very good grounds for arguing against special taxes, etc which would make electricity artificially expensive. Hut the grounds are weak, if they exist at all, for making electricity artificially cheap. If electricity is important in modern processes of production, this fact should be reflected in a willingness and ability of electricity users to pay high prices for it, if necessary; it does not in any way require that users be subsidized, in the sense of the society's accepting lower-than normal rates of return on investment in power projects. Some industries do require subsidization for special reasons, but it is hard to justify giving subsidies to firms and industries in proportion to the amount of electricity they consume.

bought at a high price in terms of the productivity of capital In alternative uses.

Wages As Transfer Payment

There is a second line of defence for the "investment-only" position, however, on which investments in irrigation, in road building, and in residential construction appear to fare better. The "investment-only" position assumes that the alternative product of labour employed in almost any activity is at or near zero. When measuring the benefits of a project, this is taken into account by attributing ail value added to capital, and none to labour. Why not, when measuring the costs of a project, also take this into account? And is not the proper way of doing so simply to ignore the wages paid to labour? In a sense, an affirmative answer to both questions is indicated. If labour's alternative marginal product is zero, then the wages paid to labour are in the nature of trans' fer payments rather than being measures of the product foregone in other places for having used the labour here. They "ought" therefore to be placed in the transfer payment section of the national accounts rather than in the "wages and salaries" section. Following this line of argument, it is easy to see that the capital cost of such labour-intensive projects as irrigation, roads, and houses would be substantially reduced, and on this new, much lower capital base, the ratio of value added to capital cost in these activities might be very high even at prevail' ing prices.

But—and here's the rub—these arguments also say that a large fraction of the Rs 12,000 crores of net investment during the First and the Second Plans wasn't really investment, but only transfer payments. Thus if one follows this lino one must re-do all paper calculations Of the type made earlier in this paper, using a much smaller capital base, and one would come out with critical discount rates much higher than the 0.25 or 0.30 figures used above, if one were to explain all observed growth as stemming from investment.

Implications of "Investment-Only" View

There is, I believe, a simple rejoinder to the line of argument we are here considering. This is that the available funds for investment in the Indian economy (represented by both private and public savings) are for various reasons, social and political as well as economic, rather stringently limited. Assume, for simplicity, that in a given period they are strictly given. Then the question of promoting maximal growth amounts to getting the most out of a given sum of available savings. The investible funds axe just as much "spent" when they are paid out for labour services as when they are paid out for machinery or for capital services. Maximizing the rate of growth from a given investible surplus, therefore, entails getting the most per dollar of investible funds paid out, regardless of whether the payment is made for the services of labour or for those of capital. Thus if one accepts the commonly-held (and, I believe, correct) view that the investible surplus in India is very hard to expand, one cannot escape the difficulty of justifying investments in houses, roads, and irrigation projects under the "investment-only" position by excluding wage payments made in these projects from the invested sums.

Let me sum up this section by stating that in spite of the surface plausibility of the "investment-only" view, it runs into difficult waters when its implications in the field of cost-benefit analysis are traced out. There is nothing logically wrong with this position, but one begins to question whether its underlying assumptions are valid as approximate descriptions of the Indian economy. I will not here try to prove or disprove the applicability of these assumptions in India. But I do want to emphasize that holders of the '-investment-only" view of the growth-process in India should, if they are to be consistent, also advocate massive upward revision of power rates, and should probably press for a drastic curtailment of the investment funds allocated to housing, irrigation, and load building.

III

Cost-Benefit Analysis

The position implied by present official procedures of cost-benefit analysis is much more easily dealt with than the "investment-only" position. This "cost-benefit" position accepts that the marginal productivity of capital relevant for project decisions is in the range of 3, 4, or 5 per cent or so. It is fairly easy to show that for a wide range of investments in the Indian economy, the productivity of capital is higher than this. Columns (3) and (4) of Table II accept the assumption made in current cost-benefit procedures that the wages and salaries paid in an activity represent the alternative product of the labour involved, i e that the wages paid out represent a "social" as well as a "financial" cost. The return to capital in any activity is taken to include profits gross of company income taxes in both columns (3) and (4). In column (3) the product of capital is also taken to include a share of the excise duties borne by each industry; the share in each case being the ratio of profits, gross of company income tax, to value added net of excise tax.[r] Column (3) thus can be compared with column (1), to see how much difference is made in the measure of the marginal product of capital in moving from the assumption that the social cost of labour is zero per cent of the wage bill to the assumption that the social cost of labour is 100 per cent of the wage bill, when excise taxes are included in the measure of marginal product. And column (4) can be compared with column (2) to see the results of the same alteration of assumptions when excise taxes are excluded from the measure of marginal product.

Rates of Return on Capital

It is easy to sec, looking at columns (3) and (4), that regardless of which treatment we accord to excise taxes, the measures of marginal product of capital in each of the activities examined lie far above the 3-5 per cent range. One can easily, on the basis of these figures, defend a

[r] This allocation assumes that the materials used in production bear a fixed proportionate relationship to the quantum of output. In this case a tax of a certain percentage on the output of an activity would be equivalent in all its effects to a tax of an appropriately higher percentage on the value added in that activity. And the normal adjustment of a firm to a flat-rate tax on value added would be for the value of the marginal product of both labour and capital to exceed the rewards paid to these factors by the same percentage as the tax payments bear to value added.

10 per cent rate of discount as being a conservative estimate of the marginal productivity of capital, and one might be able to go a bit higher without having to conclude that a great many of the listed activities were poor outlets for additional investment under the prevailing price structure.[4]

Thus, whereas the "investment-only" view, which assigns a zero social cost to labour, would require one's moving the discount rate used in cost-benefit analysis all the way to 25 or 30 per cent, we now find that even under the assumption that wage payments are true measures of the social cost of labour the evidence would appear to require moving this discount rate into the range of 10 per cent or more.

Once again, there is a line of defence which supporters of present cost-benefit procedures may take. They may accept the figures in columns (3) and (4) of Table II at face value, accepting that the capital actually employed in the listed activities is yielding returns at roughly the rates there indicated, but they may question whether much additional capital could be employed without driving rates of return in these activities much lower. They may also accept the principle of allocating investible funds first to those activities with highest rates of return, and then to progressively lower ones, but they may argue that

'One should recall, in examining columns (3) and (4), that the measure of the return to capital is still gross of depreciation. When discount rates in the range of 10 per cent are used, there is much less "pressure" against long-lived projects and against long-gestation spans than when discount rates of 25 or 30 per cent are employed. To help interpretation of the results of columns (3) and (4) let me point out that the critical ratio of gross earnings to capital for a project whose productive life is 10 years is 0.162 when the gestation span is 1 year, 0.178 when the gestation span is 2 years, and 0.196 when the gestation span is 3 years. When the productive life of the project is 20 years (which is probably a better average figure for India than 10 years), the corresponding critical ratios are 0.117, 0.129 and 0.142, respectively.

by the time the point is reached where the available funds are exhausted, one would have worked down far past rates of return of 10 per cent or so, and would in fact be in the range of 3-5 per cent actually used in official cost-benefit calculations,

A holder of this view would also object to my statement in Section I of this paper that Rs, 12,000 crores of investment made during the First and Second Plan periods would account, at 3 per cent, for only Rs, 360 crores out of the more than Rs. 3,000 crores by which annual national income actually grew. He would say that although 3 per cent might be the appropriate cut off rate for marginal investments, it does not represent the marginal productivity of capital in all investments. There could be many infra-marginal investment opportunities yielding higher rates of return, and these would not be evidence against the use of a 3 per cent discount rate, so long as such opportunities were sufficiently limited in volume that they could all be taken advantage of before the available funds were exhausted.

Investment Opportunities

Let me first of all accept the validity of this criticism of my introductory statement, which I made in such an extreme form only to emphasize the fact that present cost-benefit procedures imply a view of the growth process in which investment plays a small role. I believe, in fact, that there must be in any year a number of opportunities for investment in India where capital has a marginal productivity of 20 or 30 per cent, and progressively more opportunities at lower rates of marginal ' productivity. It is logically admissible that, say Rs 10,000 crores of the net investment during the First and Second Plans was at marginal productivities ranging from 20 to 30 per cent, and only Rs 2,000 crores at 3 per cent. This would mean that investment had accounted for some Rs 2,560 crores [(25% *x* 10,000) + (3% x 2,000)] out of the Rs 3,000 crores of income growth. But it is patently absurd to think that if it were possible to invest Rs 10,000 crores at rates of return above 20 per cent, It would not have been possible to find outlets for the remaining Rs 2,000 crores long before the 3 per cent margin would have been reached. Reaching the 3 per cent margin would be much more plausible if there were, say, opportunities for Rs 1,000 crores of investment at rates of 20-30 per cent, Rs 2,000 crores at rates of 10-20 per cent, Rs 4,000 crores at rates of 6-10 per cent, and Rs 5,000 crores at rates of 3-5 per cent. This would mean that investment had accounted for some Rs 1,050 crores of income growth [(25% x 1000) + (15% x 2000) + (7½% x 4000) + (4% x 5000)], but in these circumstances I believe the conclusion would still be warranted that investment was playing a comparatively modest role in the process which brought about Rs 3,000 crores of income growth.

But the important issue is whether investment opportunities at relatively high rates of return are so limited in India that one could nol exhaust all available investment funds long before the 3-5 per cent range was reached. I read the evidence of columns (3) and (4) of Table II as suggesting strongly that it would be possible to find outlets for all available funds at rates of return of 10 per cent or more. The activities listed there cover almost the whole range of the industrial sector, and other sectors are also represented. If this wide range of activities does not have the capacity to absorb very substantial amounts of additional capital without driving rates of return down to the 3-5 per cent margins used in cost-benefit work, then one wonders whether we ail were wrong all along in thinking that capital was seriously scarce in the Indian economy. And of course if additional savings, extracted from the community either by voluntary savings schemes or by the more painful process of additional taxation, can find investment outlets only at rates of marginal productivity of 3-5 per cent, then one cannot rely on additional savings to raise India's rate of economic progress substantially. It is horribly revealing to realize that even if 100 per cent of the national income were invested, all of it with a marginal productivity of 4 per cent, it would only produce a 4 per cent annual growth in income.

IV

Cost-Benefit Procedures

It should be clear by now that my own belief that the truth lies some-

where between the extremes represented by the "investment-only" view on the one hand and by the present official cost-benefit procedures on the other. I do not want to take a dogmatic stand on precisely where between these extremes a full knowledge of the facts would lead us. We do not have complete evidence, nor can we expect .to be in that happy position in the future. We must necessarily rely on limited evidence, amply salted with presumption and judgments at a number of critical points, and in these circumstances there is no room for rigid dogmatism.

What I hope that this paper will help to promote is a much more limited objective, namely to narrow somewhat the range of disagreement on the nature of the growth process, and on the cost-benefit norms appropriate for India at its present stage.

Doubts About Price Policy

Let us begin by tentatively assuming that all wage and salary payments do in fact represent social costs, and that the investible surplus of the economy is limited, and that the objective of economic policy is to maximize the contribution to economic growth which can be obtained from this investible surplus. These assumptions lead us to look at columns (3) and (4) of Table II. Here the evidence points to the use of a rate of discount of around 10 per cent for cost-benefit work. With a 10 per cent rate of discount, investment in activities like power, irrigation and residential construction is still hard to justify at the present scale, using present prices as measure. One is pressed, therefore, but not nearly as hard as holders of the "investment-only" view are pressed, in the direction of advocating higher electricity prices, higher irrigation charges and higher rents. Doubts about the price policy of other public enterprises are also raised when a 10 per cent discount rate is used. Professor V V Ramanadhan, in his study, "The Structure of Public Enterprise in India," shows (p 99) that the average ratio of profit (after taxes) to capital plus re-' serves for 10 industrial undertakings completed and in full operation, was only 3.2 per cent in 1958-59, and also (p 100) that this ratio averaged even less for commercial and financial undertakings in the sector. Allowing for taxes at some 50 per cent of profits before taxes would still not bring the average rate of payoff on these investments up to 10 per cent.

For some of the enterprises in question, alterations of price policy might not be the answer; they may be truly "uneconomic" when judged in terms of a discount rate of 10 per cent, in the sense that at no price which they might get would demand be sufficient to yield them a 10 per cent return. But it is to be presumed that many of these public enterprises would be able to earn at least a 10 per cent return after needs to know which ones would fall in this category and which (if any) might more properly be called "uneconomic" in order to form judgments about the allocation of new investment funds. At the same time, a serious effort to make public sector enterprises yield a 10 per cent rate of return would surely enlarge the investible surplus of the economy.

Narrower Range of Discount

Now let us assume that, say, half the wages and salaries paid in industrial and public sector enterprises represent the true social cost of the labour employed, the other half being in nature of a transfer payment.

Table I: Gross Value Added/Capital
(Ratios for Companies in India, 1959, based on RBI Survey of 1001 firms)

Industry	With Capital = Net Fixed Assets	With Capital = Net Fixed Assets plus Stocks and Stores	With Capital = Net Fixed Assets plus Stocks and Stores
	(1)	(2)	(3)
Matches	5.14	3.00	2.09
Land and Estate	2.54	2.52	2.08
Tobacco Manufactures	6.00	1.51	1.24
Rubber and Rubber Manufactures	1.43	.72	.59
Mining and Quarrying (excl Coal)	1.32	.79	.55
Coal Mining	1.39	1.02	.52
Trading	3.32	.59	.52
Sugar	1.49	.67	.49
Processing of Grains and Pulses	1.41	.71	.48
Chemicals (not elsewhere specified)	1.47	.63	.48
Mineral Oils	.74	.62	.47
Cotton Textiles	1.37	.69	.44
Edible, Vegetable, and Hydrogenated Oils	1.33	.58	.43
Tea Plantations	.81	.57	.43
Electrical Machinery	1.39	.48	.38
Medicines and Pharmaceutical Preparations	.93	.51	.37
Pottery, China, and Earthenware	.89	.56	.36
Machinery (excl Electrical and Transport)	1.05	.48	.36
Coffee Plantations	.60	.43	.36
Rubber Plantations	.44	.39	.35
Paper and Paper Products	.70	.51	.34
Cement	.62	.45	.33
Silk and Woollen Textiles	.72	.51	.33
Jute Textiles	.90	.50	.31
Hotels, Restaurants, and Eating Houses	.78	.49	.29
Aluminium	.53	.36	.28
Transport Equipment	.73	.32	.26
Construction	2.42	.26	.24
Iron and Steel	.37	.30	.23
Basic Industrial Chemicals	.31	.31	.18
Shipping	.18	.17	.13
Electricity Generation and Supply	.18	.16	.12

Source: Reserve Bank of India Bulletin, Sept and Oct 1961.

This represents something of a retreat from the "investment-only" position, but it accepts the basic idea that the wages paid in the industrial and public sectors are substantially above the alternative productivity of the labour employed. It surely cannot be true that labour of all types and skills is so superabundant in the Indian economy as to have a marginal productivity of zero. Indeed, most authorities now recognize that even in agriculture (where the "zero marginal product" hypothesis has its roots) the marginal productivity of labour is significantly higher than zero during the months of peak activity. Professor K N Raj's study of the Bhakra-Nangal project also contains evidence which supports the view that even common labour is not easy to obtain in large quantities, even at what for India are good wages, and even in an area where the local population is devoted largely to agriculture.

Between the Two Limits

The above assumption requires us to use as a measure of the rate of productivity of capital in a given activity a figure halfway between those of columns (2) and (4) of Table II (if excise taxes are excluded from the calculation) or halfway between those of columns (1) and (3) (if excise taxes are included). Using this measure we find that 9 of the listed activities had rates of productivity of 20 per cent or below when excise taxes are excluded, and 7 had rates in this range when excise taxes are included. It would accordingly be hard to defend the use of a discount rate higher than 20 per cent if the above assumption is taken to be correct.

If the true social cost of the labour used in industry and in the public sector enterprises lies somewhere between 50 per cent and 100 per cent of the wages and salaries paid, and if the inferences drawn above are accepted, then we have narrowed the range in which the proper discount rate per cost-benefit work must lie from 3-30 per cent (which is where we started) to 10-20 per cent. This narrowing makes possible a much greater degree of professional consensus than would be possible with the extreme views considered in the earlier sections of this paper. Existing power rates are too low under either a 10 per cent rate including no wage payments as part of the product of capital or under a 20 per cent rate including half of wage payments as part of the product of capital. I would guess also that at least half of the irrigation projects, being undertaken would have a hard time passing muster under either set of norms. Residential construction policy (or rent policy) would likewise be questioned with a critical rate of discount of either 10 or 20 per cent.

There is still a lot of room foe differences of opinion between the two limits I am suggesting. Those who would consider only 50 per cent of industrial wage payments to be true social costs would specially favour projects which, once in operation, will employ lots of labour, while those who consider the alternative product of labour to be measured by 100 per cent of wage payments would not allow considerations of labour-intensity to affect their judgments as to the relative merits of different projects. Those who

Table II: Alternative Ratios of Product to Capital, 1959

(Capital is in each case defined as gross fixed assets plus stocks and stores)

Industry	With Product = Gross Value Added	With Product = Gross Value Added less Excise Duty	With Product = Gross Earnings of Capital plus Capital's Share of Excise Duty	With Product = Gross Earnings of Capital
	(1)	(2)	(3)	(4)
Matches	2.09	.53	.90	.23
Land and Estate	2.08	2.08	1.32	1.32
Tobacco Manufactures	1.24	.42	.59	.20
Rubber and Rubber Manufactures	.59	.37	.29	.18
Mining and Quarrying, (excl Coal)	.55	.54	.20	.19
Coal Mining	.52	.52	.09	.09
Trading	.52	.52	.21	.21
Sugar	.49	.20	.28	.12
Processing of Grains and Pulses	.48	.41	.30	.26
Chemicals (not elsewhere specified)	.48	.46	.26	.25
Mineral Oils	.47	.28	.38	.24
Cotton Textiles	.44	.35	.12	.09
Edible, Vegetable, and Hydrogenated Oils	.43	.30	.18	.13
Tea Plantations	.43	.43	.15	.15
Electrical Machinery	.38	.37	.19	.19
Medicines and Pharmaceutical Preparations	.37	.36	.15	.15
Pottery, China, and Earthenware	.36	.36	.16	.16
Machinery (excl Electrical and Transport)	.36	.36	.15	.15
Coffee Plantations	.36	.36	.12	.12
Rubber Plantations	.35	.34	.16	.15
Paper and Paper Products	.34	.25	.20	.15
Cement	.33	.19	.20	.11
Silk and Woollen Textiles	.33	.30	.23	.22
Jute Textiles	.31	.31	.11	.11
Hotels, Restaurants, and Eating Houses	.29	.28	.09	.09
Aluminium	.28	.27	.17	.17
Transport Equipment	.26	.25	.14	.13
Construction	.24	.24	.08	.08
Iron and Steel	.23	.20	.13	.11
Basic Industrial Chemicals	.18	.18	.11	.11
Shipping	.13	.13	.07	.07
Electricity Generation and Supply	.12	.12	.09	.09

Source: Reserve Bank of India Bulletin, Sept and Oct 1961

count 100 per cent of wages as true costs, however, would be more lenient on gestation periods and more interested in long-lived projects than those who count only 5ft per cent or' wages as costs, because the former group would be content with a 10 per cent discount rate, while the latter would have to use a, much higher (l have suggested 20 per cent) rate. There would surely be projects which would, for one or' another of the reasons indicated above, pass muster under both sets of norms, and on these professional opinion could present a more or less united front.

Hole of Investment in Growth

Likewise, views of the rule of investment, and especially of adding to the rate of investment, in the process of economic growth may be brought a bit closer together if the general line of argument of this paper is accepted. Let us consider a case in which net investment is to be increased from 10 per cent of the national income to 15 per cent of the national income. By starting from a "base" of 10 per cent investment, we do not have to worry about inframarginal investments having a productivity higher than the marginal rate, for these most-productive investments would (or should) be undertaken even if investment stays at 30 per cent of the national income. Pressing investment up above 10 per cent of income should bring into the picture only projects which would not have been undertaken but for the increase in investible funds. The "investment-only" view would expect this increase in investment to raise the growth rate by some 1.5 per cent per year [(5 per cent more of national income invested) times a SO per cent rate of marginal productivity], while the defenders of existing cost-benefit procedures would expect it to raise the growth rate by only perhaps 0.2 per cent per year |(5 per cent more of national income invested) times a 4 per cent rate of marginal productivity].

These differences are narrowed substantially if the "investment-only" view is modified, as suggested above, to accept 20 per cent as an apropriate measure of the marginal product of capital, and if the cost-benefit position is modified to incorporate a 10 per cent discount rate. Then the predicted increase in the growth rate stemming from the investment of an additional 5 per cent of the national income ranges between 0.5 and 1.0 per cent. This is still a significant difference, but I submit it is not of a size to generate vehement disagreement about the role of investment in economic growth. Supporters of either a 10 per cent on a 20 per cent discount rate as measuring the marginal productivity of additional investments in India would, I suspect, be quick to admit thai other factors (improved technical skills, education, dissemination of intarnation, improved management of production processes, and probably more) make (or can make) important independent contributions to the rate of economic growth. Surely, they must hope that this is the case, for with neither a 10 per cent nor a 20 per cent rate of marginal productivity can one expect a dramatic increase in India's rate of growth to come from additional investment. If, as we all hope, such a dramatic increase can be achieved, it will have to be the resultant of many forces working simultaneously, and not exclusively or even predominantly the result of a*n* increased rate of investment.