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THE ECONOMICS OF WATER RESOURCES DEVELOPMENT

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From the standpoint of economics the development of water resources projects has presented two basic questions. First, what are the benefits of an economic nature that are derived from such projects? Second, how can these benefits be measured quantitatively? In the minds of economists who have given considerable thought to these questions, many of the naive concepts of costs and benefits have been dispelled. They no longer try to measure benefits on a gross product basis, but instead recognize that there are important cost elements which must be taken into consideration. On the other hand, economists have forsaken the strict opportunity cost approach in favor of types of analysis which recognize situations where in fact no alternative opportunities actually exist. There is general recognition also among economists that water resources projects are dynamic investments. The full impact of the investment does not stop with the bringing of water to the land, or with the construction of power generators. Industrial development of the area continues long after the initial impulse is provided and economic growth and developments is experienced over a large area.

It would be hard for me to tell you anything new about the economic generation power of water resources development projects. That is not my purpose in this short paper. In reviewing the literature on the subject, however, I am convinced that we need a considerable reorientation of our thinking if we are to develop a consistent body of theory in this field. It will not be my purpose to present to you such a consistent theory. I must hasten to confess that such a task is far beyond my power. I should like, however, to outline briefly what I think will be the path along which the theory will proceed if a consistent body of thought is to emerge.

From my analysis of the work of the Federal Inter-Agency River Basin committee and of its more recent restatement based upon a "with" and "without" approach to the measurement of benefits, I believe the essential weakness to be an attempt to straddle the micro and macro economics which has us all confused at the present time. What the committee has done in essence is to start with an essentially static approach in which it has tried to build up the sum total of benefits by adding individual net incomes together; at the same time it has tried to make minor concessions to the dynamic factors involved. The result in many respects is inconsistent with both approaches.

The committee states that "the appropriate general setting applicable (for the calculation of costs and benefits) is one in which over the long run an expanding economy will require increasing amounts of goods and services to satisfy increased needs resulting from population growth and higher levels of living." It states further: "The assumption of the setting does not preclude considerations of the occurrence of short run or cyclical fluctuations in the economy," but nevertheless "the total size of a national public works program at any particular time is determined in the light of fiscal and other factors which are independent of those considerations pertinent in the analysis of individual projects." At another point the committee states that "the basic approach of this study reflects consideration of traditional economic theory, with some adjustments for institutional aspects and practical difficulties involved in application."

If the main benefit of water resources projects is the provision of a growing economy with increasing amounts of "goods and services," i.e., more food and fiber from agricultural lands, more mineral resources, cheaper fabricated goods and more opportunities for leisure and recreation, - the product of these projects should be computed in these terms. It would be incumbent upon the analyst either to show in

physical terms how much more goods and commodities are produced with how much less labor and capital, or, if he wishes to deal in monetary terms to demonstrate how much more it would cost to secure the additional quantities produced without the project than with it. Computations of net income of producers will not yield this measure of benefit. It would be even harder to demonstrate how supplemental benefits, i.e., net income derived from secondary and service industries in the project area, - would add materially to the increased consumption and standard of living of a growing population.

If consideration is to be given to the effect of projects of this nature on short run cyclical fluctuations, then an analysis should be made of the investments themselves. This would run along the following lines. How many people will be put to work on the project? What effect will increased investment have through its multiplier upon material income? How much induced investment will there be on the project and throughout the economy? What will be its impact on national income? These questions form the significant factors in cyclical analysis which for the most part are excluded from the analysis recommended by the committee.

Finally, if the traditional economics approach is taken, we assume full employment of resources throughout. The only benefits we consider are market returns, and only those portions of market returns which are in excess of cost of investment with interest. It is in this third category, of traditional economic analysis, that the committee has done its best work. With this phase of the analysis I find little with which to disagree. As long as we keep before us the assumption of full employment, the method of analysis and the cost benefit calculations laid down by the committee can be justified.

My reason for objection to the recommendations of the committee is that the traditional approach is unrealistic and that in the few situations in which there is recognition of cyclical fluctuations in the calculation of costs and benefits, the significant factor of public benefits is overlooked entirely.

If the history and statistical analysis of economic conditions has established anything at all during the past fifty years, it is the fact that business fluctuations are an ever recurring phenomenon. It would not be rash to predict that if and when heavy armament expenditures come to an end, we shall again be faced with periods of severe unemployment. Once again national fiscal policy will concern itself with forms of compensatory spending and investment. Water resources development projects, to my way of thinking, provide an ideal type of national investment opportunity. To overlook the potential benefits that could accrue to the economy by their use as off-cycle spending devices is a serious mistake. The failure to recognize such potential uses of these projects means that the agencies concerned with fiscal policy will not have available the essential information on which to base public investment decisions. We may again find ourselves in a position of severe depression in which for lack of information worthwhile developmental projects are passed by in favor of ones which provide little or no permanent benefits to the national economy.

In the rating of projects as to their degree of desirability as public investment opportunities, several criteria must be kept in mind. First, public investment should interfere as little as possible with the operation of a free enterprise economy. Free enterprise has long been one of the basic institutions of our society. The maintenance of it even during periods of severe depression is an essential objective in our society. Second, we have long been committed to the idea of a progressive society, especially to progress measured in material terms. We want for our people more resources, greater production, and higher standards of living in the future than we have at present. Finally, we desire economy of expenditure on the part of the government to attain the desired social objectives. If with an investment of one billion dollars, the government can induce an investment of an additional three billion dollars from private sources, that type of investment would generally be considered more economical than an outright government investment of four billion dollars

in some other direction, even though the total effect on the national economy would be the same by either method of investment.

Measured by these standards, water resources projects, as well as other resources development projects, will rank high as desirable types of off-cycle investment. Since they are applied to land and water resources, which for the most part are not under private ownership, they afford a minimum of interference with private enterprise. Construction on the project can be undertaken by private enterprise through competitive bidding. The utilization of the resources made available through their construction can be developed by private capital. Even though other types of investment opportunities may generate more induced investment than resources development types of investment, the fact that these investments will interfere less with private enterprise would still make them more desirable types of investment.

From the standpoint of the criterion of economic progress also this type of investment will rank high. What the government investment does, in fact, is to set the conditions for economic development. It takes resources which either are at present too expensive for private capital to exploit or require too long a period of time to yield profitable returns, and places them in a condition in which they come into the range of profitable private operations. Through the development of these resources there is also a significant social gain. There will be available more energy resources to produce needed goods and commodities, more land on which to raise food and fiber for a growing population, more opportunities for recreation to provide greater enjoyments for that population. It is recognized that off-cycle employment can be secured by attacking the consumption function as well as by approaching the problem through the investment function. Subsidies can be provided to increase consumption. Housing and slum clearance projects can be utilized for this purpose also. The criticism of such projects is that they do not conform to the criterion of progress. If a choice is to be made between the two types of projects, resources development and consumption, it is my belief that the public generally will feel that money spent to provide more goods and services in the future will be preferable to an equal amount spent in which no such prospect is in the offing.

Finally, economy of government expenditures is sustained by this type of investment. Resources development projects, by setting the conditions for economic development, carry with them a large induced investment potential. For every dollar of initial expenditure there are several dollars of additional investment of private capital required to bring processing and service industries into the area. The extent of such induced investment will vary with the different projects. The pattern of induced investment, however, is one of the most significant aspects of water resources development projects and it should be studied and analyzed carefully.

We now come to the task of defining the social benefits of water resources development projects. Social benefits, as I conceive them, are benefits over and above the benefits to individuals, except insofar as individual benefits contribute to the over-all social benefits. During depressions, when unemployed resources exist with no apparent alternative uses, the social benefit would include all the investment, autonomous plus induced, together with their multiplier and accelerator effects upon the economy. When unemployed resources no longer exist, the social benefit will be measured by the increased marginal productivity of all employed resources over what they would be without the project. The advantage to the economy in high prosperity would be the greater amount of resources available. This greater quantity of resources will make possible a further extension of the prosperity phase of the cycle before severe inflationary pressures set in. To maximize the benefits, timing of the projects becomes the important factor. If the projects are undertaken during prosperity, the only benefits are the increased production. The investment necessary to secure that increased production is a decrement rather than an increment of benefit. It is in the prosperity phase and in prosperity alone that the traditional economics approach has a meaning, and even in the prosperity phase the manner in which the increased production is brought about is important. Investment, both

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autonomous and induced, may add to the inflationary pressures in such a way as to create social losses rather than gains. The nature of the benefits cannot be treated apart from the effect upon the economy of the manner in which they arise.

From the foregoing it must become obvious that what is a social benefit at one time becomes a social loss at another. Timing, then, becomes an essential factor of the social benefits that are to be included in public investment projects. What should be the procedure for the analysis of resources development projects which would provide the fiscal authority or authorities with the best information upon which to base decisions directed toward maximizing social benefits?

In general a careful analysis should be made of two attributes of water resources development projects which heretofore have been neglected. The first attribute is the induced investment potential of these projects. It must be recognized that different projects located in different areas will have different induced investment potentials. Those projects located in new areas which will result in the building of new transportation facilities, towns and community facilities, and processing and manufacturing plants, will have a much larger induced investment potential than ones which for the most part will utilize existing facilities. Projects which are located in declining or stranded areas will have the least induced investment potential.

The second attribute which should be analyzed is the degree of competitive effect of the products of the projects. Since water development projects usually lead to increased production of basic raw materials and food products, these commodities when produced will have a competitive effect upon areas already under production. If they come into production at a time when these products are in great demand the competitive effect will be beneficial. We must not fail to recognize that even though the long run demand for such products is increasing, nevertheless, the competitive effect in short periods may be generally harmful rather than beneficial. To the present time water resources development project analysis has ignored the competitive effect, on the theory that any individual project would add only infinitesimal amount to the production of any particular commodity. If such products are to be used as off-cycle investments, however, they may add substantially to production, and the competitive effects cannot be ignored.

With the type of analysis described above in mind, the fiscal authority would be in a position to make intelligent decisions with regard to public investment with a view to maximizing social benefits. During periods of inflationary pressure it would select those projects in which the autonomous and induced investment would be the least in comparison with the competitive effect of the projects: - those projects in which total investment is small in comparison with the quantity of resources produced. During severe depressions, however, it would select those projects where the induced investment is large in comparison to the competitive effect. In this manner social benefits would be maximized and the economy would be strengthened throughout the entire investment period.

Finally, the effective administration and planning of resources development projects all agencies having to do with resources development should be under one department, so that planning will be consistently and effectively undertaken. This department would have as its goal the maximizing of social benefits in all public investment activities.