COMMENTS ON USE OF ECONOMICS IN PUBLIC PROJECT EVALUATION

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A number of factors enter into evaluation of public projects. Some are economic while some are social, political, engineering, etc. Each at one time or another influences decisions about initiating and evaluating a given project. Comments in this paper will be limited to selected economic factors.

The weight, or importance, of economics in project evaluations varies over time and with individuals and projects. Nevertheless, it is fashionable to use—or misuse—economics. Often promoters and/or the news media associate economic terms with factors that imply conclusions that are economically incorrect. This is true of various types of public projects, including those that are water related.

One of the terms that gets lots of use is the economic "multiplier." Gill explains it this way. "The multiplier tells us by how much an increase in spending will raise the equilibrium level of national income."[1] Hutchinson presents it as ". . . simply a number that, multiplied times any change in aggregate demand, gives you the change in the equilibrium level of production."[2] (It is noteworthy that a change in the level of spending means that the amount of change is on a continuous basis and not a one time expenditure.) The size of the multiplier (K) is determined by the marginal propensity to consume (which is that part of an extra dollar of income that consumers will wish to spend on consumption), i.e.,

$$K = \frac{1}{1 - MPC}.$$

It should be noted that the multiplier is reversible. A decrease in spending will result in a multiple reduction in the equilibrium level of production and income. This fact is often ignored. Also, for the new level of income to be achieved, the assumption that other things remain the same must apply.

The usual elementary presentation of this concept is along these lines. Total spending is divided into three categories, individual or personal consumption (C), business investment (I), and government spending (G). The equilibrium level of income or GNP may be shown graphically as in Figure 1 at the point designated GNP_1. Now suppose there is an increase in the level of spending, say from E_1 to E_2; then the new equilibrium level of income is at GNP_2. Since the scale on the horizontal axis is the same as the vertical axis, it is obvious that the increase in GNP is greater than (or a multiple of) the increase in spending.

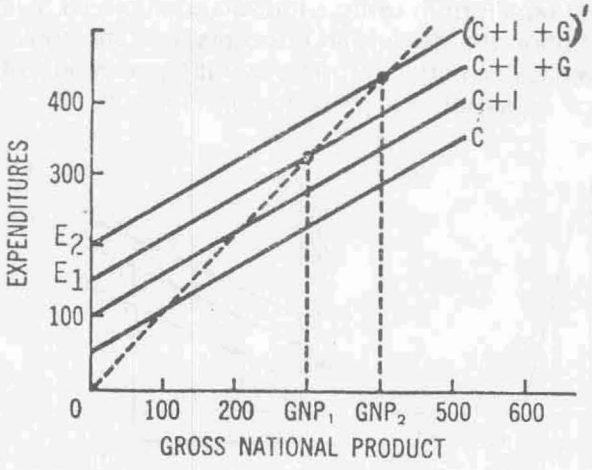

Figure 1. Illustration of Equilibrium Levels of Gross National Product. Source: Adapted from Hutchinson, p. 263.

A few factors are worthy of note. The change in GNP would be the same (increase or decrease) regardless of the source of change in spending. That is to say, a given change in spending in the private sector of the economy would have the same effect on GNP as a change in spending in the public sector. The illustration assumes no leakages other than savings, i.e., a closed economy with no imports or exports and one with no taxes which vary with income changes. The implication of this assumption is that the size of the multiplier in a local area is less than for the U. S. For example, Mississippi Power and Light Company built a new generating plant at Vicksburg at a reported cost of $60 million. An article in a newspaper, attributed to the Mississippi Agricultural and Industrial Board, said the spending would have a multiplier effect of 5 on the economy of Vicksburg. The multiplier for the nation as a whole may be about that size, but not for such a small area as Vicksburg. Wade et. al. estimated the multiplier for Mississippi to be 1.7 and around 4 for the U. S.[3] Surely the impact on the economy of Vicksburg would not be as great as 5 because of the fact that much of the initial expenditure was for equipment purchases from outside Vicksburg. Such expenditures did not enter the local economy at all. Obviously, there are leakages in the local economy. Suppose a worker uses wages to buy groceries in Vicksburg. If the grocer bought the products from outside the area, that represents a leakage. It also assumes other things will remain the same. In effect, this is where the elementary presentation stops, which is sufficient to show the basic

concept of the multiplier.

However, other factors influence the general equilibrium level of GNP. Hutchinson presents the simplified theory of income determination and general equilibrium using a four diagram model. It is based upon the Keynesian concepts, and the above diagram is one of the four. The four diagram model of general equilibrium is presented in Figure 2.

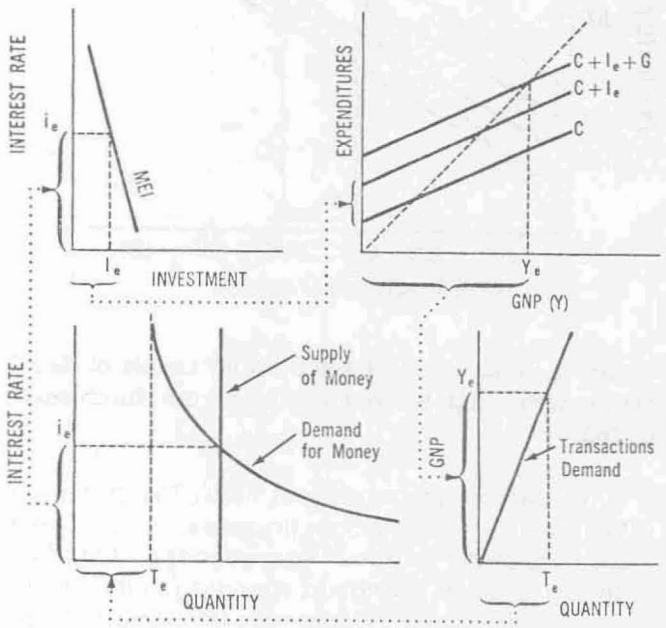

Figure 2. An Economy in "General" Equilibrium
Source: Adapted from Hutchinson, p. 333.

The upper left hand diagram shows that the level of investment, I, is determined by the marginal efficiency of investment (in effect businessmen's expectations), MEI, and the interest rate, i. The lower the interest rate, the greater the amount of investment. The upper right hand diagram is as discussed and presented in Figure 1. These two diagrams are sometimes presented as the basis for determination of equilibrium in the commodity market (the level of output of goods and services). The two bottom diagrams are used to present the basis for determining equilibrium in the money market. The bottom right hand diagram shows that the amounts of money demanded for transactions, T (to pay for ordinary purchases between paydays), is determined by the level of income, Y. The greater the income, the more money needed for transactions. The diagram at the left on the bottom shows that the interactions between the supply of money (taken as determined by the Federal Reserve) and demand for money determines the equilibrium rate of interest, i. It may be noted that the demand for money is presented as two basic components. They are the transactions demand for money, determined by the level of income, Y, and asset demand for money. The negative slope indicates that a larger quantity of money is held for purchase of assets at lower rates of interest. As may be seen, the goods market influences the money market and vice-versa. Now, to have general equilibrium in the economy, the goods market and the money market must both be in equilibrium and consistent with each other.

An analysis of the economy as a whole shows that the result of a change in spending and thus the size of the multiplier is different than when the commodity market alone is used to derive a multiplier. In Figure 3 general equilibrium is illustrated initially at a level of income of Y_0.

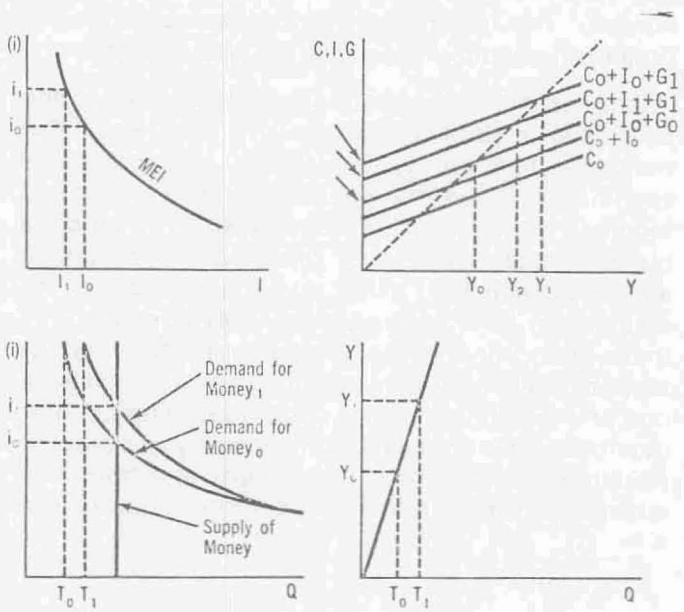

Figure 3. Effect of Increase in Government Spending Deficit Borrowed from Nonbank Public
Source: Adapted from Hutchinson, p. 263.

Now suppose a public works project is approved and results in an increase in government expenditures from G_0 to G_1. That would indicate that the new equilibrium level of income would be Y_1 based just upon the illustration of the multiplier concept shown in Figure 1. However, such an increase in income would result in an increase in the demand for money for transactions from T_0 to T_1. This would result in an increase in total demand for money from Demand for $Money_0$ to Demand for $Money_1$. Under this illustration, it is assumed that tax collections are not increased and the money to facilitate the increased government expenditure is borrowed from the nonbank public. (Other assumptions could be made but the point being illustrated would be the

same.) The increase in demand for money would result in an increase in the interest rate from i_0 to i_1. That would reduce investment from I_0 to I_1; thus, aggregate demand would drop and the indicated level of income would be at Y_2. Following the reactions through the model for additional "rounds" would show additional changes. Suffice it to say that without changes in the relationships, the new equilibrium level of income would be more than Y_0 and less than Y_1. Thus, the multiplier would be smaller than would be suggested by the elementary presentations of its concepts, illustrated in Figure 1 and the formula $K = \frac{1}{1\text{-MPC}}$.

The economic profession may be divided into two groups, those who subscribe to the Keynesian concepts and the "Monetarists." The Monetarists, based upon their analysis of the economy and extensive research, feel that the results would be different from those which follow from the model presented above. They contend, among other things, that "Fiscal policy, without changes in the money supply, has little or no effect on aggregate demand or the level of GNP."[4] Thus, the net effect on the economy of a government project would be to shift economic activity from the private sector to the public sector.

Another economic term that deserves attention is a concept that is often referred to as the "number of times the dollar turns over." It seems fashionable to say that the dollar turns over, for example, seven times and imply that the multiplier is seven and thus that the level of income will increase seven times the amount of any specified expenditure, even though the expenditure is on a one-time basis rather than continuous.

The number of times a dollar turns over is expressed in economics as the "Velocity of Money." It refers to the number of times the average dollar is spent during a given time period, usually a year. It can be measured by dividing the total value of sales by the stock of money. For example, if the value of things purchased—the Gross National Product (GNP)—is $200 and the amount of money (M) is $20, then Velocity (V) is:

$$V = \frac{GNP}{M} = \frac{\$200}{\$20} = 10$$

If one wishes to show a higher rate of turnover of the dollar, then it could be measured by dividing the stock of money into the total value of all transactions rather than into GNP, which is the dollar value of **new** goods and services only. Current production, however, is generally of greater interest, and thus it is generally more appropriate to divide the stock of money into the value of newly produced goods and services.

Several things could happen that would change the rate of turnover of the dollar without producing a multiplier effect on income. For example, if the length of time between paydays were to be reduced, the velocity of money would increase. Suppose wages and salaries are paid once per month, then a decision is made to make payment twice per month. A smaller stock of money will suffice to do the same work. Thus, an increase in the frequency of payment habits tends to reduce the transactions demand for money and increase transactions velocity.

Misuse of this concept is common. The area of tourism provides an illustration. Recent hearings by the Tourism Study Commission of the Mississippi Legislature bore this out. A representative of a neighboring state remarked that the tourist dollar turned over seven times in his state. Moreover, tourism was his state's leading industry. Such a use of the economic concept is misleading. To say, for instance, that the dollar turns over seven times when individuals drive from one area of the state to another and spend $50,000 implies that the multiplier is seven and consequently that the level of income in the state would increase by $350,000 ($50,000 x 7). Such statements, of course, are completely false, unsupported by research, and are classic examples of how public policymakers are influenced to allocate resources to areas where the benefits received are not justified in terms of other alternatives.

Comments also seem in order on economic benefits versus economic impact and project justification. Suppose a firm is considering a new project such as building and operating a plant at a water park to make souvenirs to sell to tourists. The expenditures of the firm for the building, wages, supplies, utilities, interest on the money, etc., are considered as costs. Revenues would be the income from sale of souvenirs produced. None of the expenditures of the firm are considered benefits; they are costs. For the project to be feasible, the firm must make a profit which is the difference between income (revenues) and expenses (costs). The revenues must be equal to or greater than costs, or else the firm encounters a loss. So the revenue/cost ratio must be greater than one for the venture to be profitable.

Traditionally, benefits and costs of public projects have been calculated similarly. That is to say, expenditures for the construction, operation and maintenance, etc., of the project are considered as costs. They are not benefits. Benefits are calculated as values produced by the project. An example would be the amount people pay for water provided or the amount people would be willing to pay for recreation at the project facilities. Here again, benefits must be at least as great as the costs for the project to be economically feasible.

Suppose a reservoir is constructed to provide water

for municipal and industrial use and for recreational purposes. Assume that the cost of construction, operation, maintenance, etc., over the life of the project converted to an annual basis is $200,000. These types of transactions in the economy are costs of the project—not benefits of the project. Benefits of the project would be income received from the sale of water and revenue received from the use of the project for recreation (sometimes calculated as the amount people would be willing to pay for such use). For the project to be justifiable on economic grounds, the benefits, converted over the life of the project on the same basis as costs, must be at least $200,000 annually. Any time a government project does not generate as much income to the government as it costs, the project must be subsidized through taxation. Often there is no relationship between those who are taxed and who use and/or benefit from the project.

Economic impact, on the other hand, includes the amount of economic activity associated with a project. Being associated with the project does not mean, however, that the economic activity is the result of the project. Impact includes cost of development, operation and maintenance of the project, as well as other economic activity associated with the project.

Considering economic impact as benefits means overstating the economic benefits. **Mississippi Water News,** Volume VI, No. 4, April, 1977, contains a case in point. It includes a table entitled "Economic Impact, Ross Barnett Reservoir, 1976" compiled by Wortman & Mann, Inc. The table includes three categories: (1) Direct District Impact, which is subdivided into wages and salaries, operations and maintenance, capital outlay, and other district funds; (2) District Related Impacts which includes commercial leases, residential construction, resale and financing, etc., and (3) Adjacent Property Impact which contains items similar to those in No. 2. The table shows a total impact in 1976 of $52,172,632 and 1,688.3 jobs created. This does not mean that without the reservoir that the level of economic activity of the Jackson SMSA would have been $52 million less and that there would have been 1688 fewer jobs. For example, many, if not all, of the people who live at or near the reservoir would probably live in the Jackson area even if the reservoir did not exist. Likewise, the people employed in housing construction, financing, refinancing, etc., would be employed and the economic activity would exist without the reservoir. If the money had not been spent by the District, most, if not all of it, would have been spent by the taxpayers and/or loaned to other borrowers for expenditures. Simply stated, it is to a large extent a matter of the location of economic activity rather than the level of economic activity.

The table by Wortman & Mann, Inc. refers to the items as "economic impact." The write-up in **Mississippi Water News** indicates that the District issued $25 million in bonds for the reservoir. It states that "when a project can generate more than $52 million annual benefits from a $25 million total investment, and with no flood damage reduction included, it is hard to visualize any reservoir that cannot be economically justified."

What Wortman & Mann, Inc. called economic impact is not the net economic benefit of the reservoir. Based on that line of reasoning, the district could increase the benefits of the reservoir by increasing salaries and wages, hire more people, become less efficient, become wasteful, etc., in order to increase the cost of operation and maintenance. It is far-fetched to consider the resale and/or refinancing of a house in the general vicinity of the reservoir as an economic benefit of the reservoir. Clearly it is a misuse of the **economic** concept of benefits.

Following the invalid line of reasoning that (1) any expenditure by a governmental unit is income to someone and thus an economic benefit, (2) any income that one gets is respent, the dollar turns over and you can get a multiplier effect (ignoring the fact that before the government can spend any money it must obtain it and thus make it unavailable for someone else to spend and thus produce a reverse multiplier effect), one could justify any government expenditure. For example, assume a government expenditure (cost) of $100 million for something. Someone receives the $100 million and the benefit/cost ratio is 1, but the dollar turns over generating a "multiplier effect." Multiply the expenditure times the multiplier and benefits are greater than costs. The larger the multiplier conceived, the greater the benefit/cost ratio.

These are examples of how "Economic Concepts" are misused. If economic concepts were more correctly used, public policy would improve, and lead to a better allocation of resources and a better standard of living for the American people.

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NOTES

1. Gill, p. 229.
2. Hutchinson, p. 264.
3. Wade, et. al., p. vii.
4. Ibid, p. 379.