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ECONOMIC ANALYSIS OF PUBLIC INVESTMENT DECISIONS: INTEREST RATE POLICY AND DISCOUNTING ANALYSIS

A REPORT

OF THE

SUBCOMMITTEE ON ECONOMY IN GOVERNMENT

OF THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

TOGETHER WITH

SEPARATE AND SUPPLEMENTARY VIEWS

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LETTER OF TRANSMITTAL

SEPTEMBER 23, 1968.

To the Members of the Joint Economic Committee:

Transmitted herewith for your consideration and use and for the use of other Members of Congress, Federal Government agencies, the business and academic communities, and other interested parties, is a report by the Subcommittee on Economy in Government, entitled "Economic Analysis of Public Investment Decisions: Interest Rate Policy and Discounting Analysis."

The report is based on hearings which the subcommittee held in January, July, and August. These hearings focused on the procedures used by the agencies of the Federal Government in evaluating their investment programs. The inquiry was especially concerned with the present inconsistency in procedures among agencies, and the existence of inappropriate procedures in some agencies.

I express the appreciation of the subcommittee to Comptroller General Staats and his staff in the General Accounting Office for the outstanding report, "Survey of Use by Federal Agencies of the Discounting Technique in Evaluating Future Programs." This report was the basis for the January hearings and prompted the followup hearings in July and August. Their study has made a special contribution to economy in Government and will be of assistance in improving the allocation of public resources.

WILLIAM PROXMIRE,
Chairman, Joint Economic Committee.

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Economic Analysis of Public Investment Decisions: Interest Rate Policy and Discounting Analysis

I

Interest Rate Policy and Discounting Analysis—An Abstract

In this report, the Subcommittee on Economy in Government presents its conclusions on the application of discounting procedures in Federal Government bureaus and agencies and submits its recommendations on this matter. The subcommittee accepts without qualification the proposition that consistent discounting procedures and appropriate interest rate policy must be adopted throughout the Federal Government if wise and economic investment decisions are to be made. Testimony presented to the subcommittee demonstrated that such consistency is not now present. The subcommittee recommends that no public investment be deemed "economic" or "efficient" if it fails to yield overall benefits which are at least as great as those which the same resources would have produced if left in the private sector. Currently, the rate of return on alternative minimum-risk private spending is at least 5 percent. Indeed, some of the economists appearing before the subcommittee argued for substantially higher interest rates—rates in the 7 to 12 percent range.

On the basis of the testimony presented, the subcommittee recommends that—

1. The Bureau of the Budget insist on the adoption of consistent discounting procedures by all agencies;

2. The Bureau of the Budget, in conjunction with an appropriate Government agency, immediately undertake a study to develop a method for estimating the weighted-average opportunity cost of private spending displaced by Government investment. This method should recognize that the financing of the Federal Government entails a reduction in both private consumption and private investment spending;

3. An appropriate Federal agency undertake the on-going publication of this weighted-average opportunity cost interest rate as guidance to those agencies applying discounting analysis to public investment decisions. This interest rate calculation and publication should be pursuant to and based upon the above-mentioned study;

4. The proposal of the Water Resources Council which ties the interest rate to the yield on Government securities with long terms to maturity be adopted. The subcommittee judges that the yield on long-term Federal Government securities is the lowest possible rate consistent with the minimum-risk opportunity cost of displaced private spending;

5. The Bureau of the Budget and the program evaluation staffs of all Federal agencies intensify their efforts to formulate accurate monetary estimates of the benefits and costs of public investments; and

6. The Congress review, with the purpose of relaxing, existing legal and institutional constraints on agency efforts to implement sound economic evaluation of proposed investments. These constraints are especially severe in the area of transportation investments.

This report, then, deals with the optimum discounting procedures to be used in evaluating the economics of public investments. It does not argue that the democratically chosen representatives of the people should ignore the noneconomic impacts of public spending or refrain from placing a high value on them. The subcommittee, however, does urge that when and if a program warrants funding because of these noneconomic effects, the cost of attaining these other objectives be clearly recognized. It is only with the accurate evaluation of the real national economic impacts that the costs of securing these other social objectives can be recognized and appraised.

II

The Planning-Programing-Budgeting System Is the Means for More Efficient Government Decisions

From its birth nearly a decade ago, the evolution of the planning-programing-budgeting system has been followed with great interest by the Joint Economic Committee. Within the past year, the Subcommittee on Economy in Government has held hearings on this new Federal budgeting system,[1] the form of the Federal budget as proposed by the President's Commission on Budget Concepts,[2] and the report of the Comptroller General on inconsistent discounting and interest rate procedures in the agencies.[3] The most recent series of hearings on consistent interest rate policy for discounting analysis [4] is an outgrowth of these preceding committee inquiries. These investigations have demonstrated that the process of precisely defining objectives, searching for alternative means of satisfying them, and then doing analysis to determine the preferred program or combination of programs for gaining these objectives is an essential step in insuring an efficient and effective Federal Government. While benefit-cost analysis and cost-effectiveness analysis play somewhat different roles in the decisionmaking process, in that only the former is of direct assistance in deciding whether or not to achieve a specific objective, accurate application of both techniques is necessary for public decisions which are economically efficient.

Following the subcommittee's early inquiries, which were summarized in its report entitled *The Planning-Programing-Budgeting System: Progress and Potentials*,[5] its attention became focused on the interest rate question. In January of this year, the Comptroller General reported to the subcommittee that the interest rates applied by agencies in discounting their proposed investment alternatives range from a minimum of 0 percent to a maximum of 20 percent.[6] The committee was informed that the discount rate employed in analyzing most long-lived capital investments was below that considered justifiable by most professional economists. Moreover, the Comptroller General reported that there exists no consensus among agencies on the appropriate interest rate concept for discounting the future streams of benefits and costs of public investments.

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[1] "The Planning-Programing-Budgeting System: Progress and Potentials," hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, 1967, and "The Planning-Programing-Budgeting System: Progress and Potentials," report of the Subcommittee on Economy in Government of the Joint Economic Committee, 1967.

[2] "Review of Report of the President's Commission on Budget Concepts," hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, 1967.

[3] "Interest Rate Guidelines for Federal Decisionmaking," hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, 1968.

[4] "Economic Analysis of Public Investment Decisions: Interest Rate Policy and Discounting Analysis," hearings before the Subcommittee on Economy in Government of the Joint Economic Committee, 1968.

[5] "The Planning-Programing-Budgeting System * * *," op. cit.

[6] "Interest Rate Guidelines * * *," pp. 3–7.

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In the most recent series of hearings,[7] the subcommittee limited its consideration of the economic analysis of public investments to the question of discounting procedures and interest rate policy. Because of its newly proposed interest rate procedure, both the Chairman of the Water Resources Council and its Executive Director were asked to testify. In addition, testimony on the question of appropriate discounting analysis was requested from the Bureau of the Budget, three executive agencies, and two prominent economists noted for their work in this area. These hearings were guided by the following objectives:

1. To seek an appropriate and meaningful conceptual framework upon which consistent interest rate policy could be based.
2. On the basis of this concept, to establish an accurate measure of the interest rate which should be currently used.
3. To determine a methodology by which the appropriate base interest rate could be calculated on a continuing basis.
4. To insure consistency among agencies in interest rate policy and the application of discounting procedures for evaluating public investments.

The discussion which follows is based upon the record of these hearings. In addition, it draws upon the previous inquiries of the subcommittee into the question of consistent discounting practice and interest rate policy. The subcommittee believes that its assessment as presented below reflects the overwhelming judgment of the economics profession on these matters.

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[7] "Economic Analysis of Public Investment Decisions * * *."

III

The Discounting Procedure Must Be Used if Good Public Investment Decisions Are To Be Made

Sound investment policy in both private business and the Government requires that the decisionmaker know the expected rate of return on the alternative projects competing for a share of his budget. For the decisionmaker in private business, this knowledge enables him to allocate his budget among the competing claims so as to obtain the maximum difference between the revenues and outlays for his firm. The public decisionmaker, however, does not focus on these financial flows. Rather, he is concerned with the social returns and costs attributable to his investment undertakings. His objective is to gain the maximum difference between social benefits and costs for each dollar which he spends. For investments in which both benefits and costs are evaluated in monetary terms, procedures must be sought to capture all social returns and losses in the quantitative estimates. However, even when confronted with public investments whose benefits cannot be accurately measured in dollar terms or expenditures whose impacts spill over onto third parties in some unknown way, the public decisionmaker must undertake discounting analysis to determine the effectiveness of alternative expenditures in satisfying objectives.

A characteristic of investments—whether public or private—is that they commit resources in the future and carry an expectation of gains which only materialize over time. It is the expectation of gains and costs which will be realized only in the future which poses the crucial problem for investment analysis. Because a dollar expected a decade from now is not worth as much as a dollar expected tomorrow, even if the price level does not change, some procedure must be found for placing streams of benefits and costs with different time patterns on a common basis. Only then can they be accurately compared.

The procedure recommended by both economists and businessmen for accomplishing this common-time-basis adjustment is known as *discounting*. It works by ascertaining how much a dollar held today could be turned into in future years if invested wisely and by then applying this adjustment to dollars of gains and costs not expected to be received or incurred until future years. For example, if one could, through properly investing it, transform $100 into $105 next year, then it is clear that $105 expected next year is worth only about $100 today. In this case, dollars not expected to materialize until future years get reduced through the discounting procedure by 5 percent for each year which they are deferred. Thus, an individual who spends $100 of his income on consumption goods today, foregoes the $105 which he could have received and spent next year if he had foregone current consumption today.

The following table presents a simple example of the impact of the discounting procedure on the economic evaluation of an investment.

Investment X is expected to cost $5 million next year. The project is expected to yield benefits or revenues of $600,000 per year for the next 25 years which if simply added up, total $15 million. It requires the continued expenditure of $100,000 per year to keep it in operation.

THE EFFECT OF DISCOUNTING ON THE EVALUATION OF A TYPICAL INVESTMENT, USING DISCOUNT RATES OF 0, 3, 5, AND 10 PERCENT

[Dollar amounts in thousands]

	Interest rate (in percent)			
	0	3	5	10
Value today of total benefits	$15,000	$10,448	$8,456	$5,442
Value today of total costs	$7,500	$6,741	$6,409	$5,906
Benefit-cost ratio	2.00	1.45	1.32	0.92
Value today of excess of benefits over costs	$7,500	$3,707	$2,047	—$468

From the calculation displayed in the table, the necessity for accurate and consistent discounting is clear. The expected benefit-cost ratio of the example project is 2 if no discounting is applied. The ratio drops to 1.3 with an interest rate of 5 percent and to below unity with a rate of 10 percent. If the costs and benefits are added with no account taken of the time factor, the project shows an excess of benefits over costs of $7.5 million. If an interest rate of 10 percent is applied, costs are estimated to *exceed* benefits by nearly $0.5 million.

A cogent example of the importance of correctly accounting for the time factor in analyzing Federal undertakings was presented to the subcommittee in the statement of a Defense Department official. This example, which deals with the supersonic transport programs is reported in the appendix to this report. (See p. 20.)

IV

Current Discounting Practices in the Federal Agencies Are Neither Consistent nor Adequate

From the testimony of the Comptroller General and agency representatives, the subcommittee learned of current discounting practices in the Federal agencies. As the report of the Comptroller General so clearly demonstrated, discounting practices are neither consistent across agencies nor, in all cases, are they appropriate. In the subcommittee's judgment, substantial room for improvement remains in both the application of the discounting technique and in the appropriate interest rate used for discounting. Accepting as an ideal the situation in which all agencies apply the discounting technique to all expenditures which involve either benefit or cost commitments extending into the future and utilize an appropriate interest rate in performing the discounting, the subcommittee found substantial weaknesses in Federal Government practice. We have concluded the following:

1. The application of economic analysis to public expenditures will be of primary importance in assisting the decisionmaker to choose among alternative expenditures designed to accomplish similar objectives and of substantially less help in determining the optimal size of the Government budget or its allocation among programs with divergent objectives. The practice of accurately and appropriately discounting future benefits and costs is an essential element in the economic analysis of investment alternatives. It is of crucial importance in assisting the decisionmaker both to choose effectively among alternatives that accomplish the same objective and, where feasible, to make cross-program evaluations.[8]

2. While most agencies are aware of the importance of discounting and are applying the technique when appropriate, there are notable exceptions. These exceptions occur where agencies are either constrained by law from doing benefit-cost analysis or report the application of a zero interest rate in evaluating proposed investments.[9]

3. Some of the most effective applications of the discounting technique are found in agencies whose program benefits (and sometimes costs) are among the most difficult to accurately measure. For example, in evaluating alternative defense expenditures with the same objective but with different time profiles of future cost commitments, discounting practice has been consistent and effective.[10] As representatives of the Department of Defense noted, while cost-effectiveness analysis is regularly one of the factors considered in reaching program decisions, it is an aid to judgment and not a substitute therefore.[11] Similarly, in evaluating human

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[8] Ibid., pp. 18–19 and 22.
[9] Ibid., pp. 151–153 and 169–172.
[10] Ibid., pp. 136–137 and 146–150 and "Interest Rate Guidelines * * *", pp. 17–18.
[11] "Economic Analysis of Public Investment Decisions * * *", p. 136.

resource projects, the Office of Economic Opportunity has tested the sensitivity of the computed value of investments by using a number of different interest rates in the analysis.[12] While citing the progress in economic analysis displayed in these areas, the subcommittee is not to be interpreted as passing judgment on program decisions in these departments.

4. Significant inconsistencies exist among agencies and among departments and bureaus in the same agency regarding discount rate policy for use in public investment analysis. For those agencies performing discounting analysis, the range of interest rates applied extends from about 3 percent to more than 15 percent. This range is not explained nor is it defended on economic grounds. Its existence is judged to result from a lack of consistent interest rate policy.[13] The effect of this discrepancy is to bias the decision process in favor of the sectors using low (or zero) interest rates and against those sectors using higher rates. Moreover, where the rate of interest used is lower than that used in the private sector, funds are being guided from uses bearing a higher return to uses bearing a lower return. The result of both of these effects is to depress the size of the national income and to sacrifice potential economic growth.

5. While substantial progress has been made in instituting analysis in the agencies, some agency personnel resist the application of economic criteria to programs in their departments. The record of the hearings shows, for example, the statement of the Director of the Bureau of Public Roads claiming that the "Bureau of Public Roads does not use discounting techniques in administering the Federal aid and direct Federal highway construction programs. In addition, we do not plan to use discounting techniques in the future." [14] This is in contrast to the position of the representative of the Bureau of the Budget who argued that economic analysis and discounting should be consistently applied to investments undertaken by all agencies of the Federal Government.[15] It likewise contradicts the testimony of the other experts that discounting analysis applied to the highway program would be especially useful.[16]

6. The water resource agencies are currently applying an interest rate of 3¼ percent to both future benefits and costs. This rate is among the lowest in the Federal Government and is generally conceded to be too low by observers both in the Government and outside.[17] The application of this interest rate implies a substantial diversion of high return funds owned by private citizens to lower return public investments.

7. The proposal of the Water Resources Council for a new interest rate policy is to be commended. The subcommittee states its full support of the revised procedure. The proposed formula yields a current rate of 4⅝ percent which is based on the yield of Government long-term securities. This procedure, which includes the

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[12] Ibid., pp. 161–163.
[13] "Interest Rate Guidelines * * *".
[14] Economic Analysis of Public Investment Decisions * * *, p. 169.
[15] Ibid., pp. 21–22, 29, and 34–35.
[16] Ibid., pp. 32–33, and 168.
[17] Ibid., pp. 8–15, 22, 29, 55–56, 57–65, and 141–150 and "The Planning-Programing-Budgeting System * * *", pp. 130–181.

provision that the rate may be increased or decreased by not more than one-fourth percent per year to reflect the trend in the yield on long term Government securities, is defended by the Water Resources Council as being a more appropriate formula.[18] The subcommittee, however, notes the position of the Bureau of the Budget and the prevailing judgment of economic experts that this rate is at the floor of the acceptable range.[19] The subcommittee also notes the need for additional efforts to accurately measure and quantify the real benefits and costs of investment in this and other public investment areas.[20]

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[18] "Economic Analysis of Public Investment Decision * * *", pp. 15–16.
[19] Ibid., pp. 28–29, 51–56, 57–65, and 141–150.
[20] Ibid., pp. 6–7, 23, 40–41, and 165–168.

V

The Appropriate Interest Rate Concept Is the Opportunity Cost of Displaced Private Spending

In the recent hearings on discounting procedures, a number of witnesses referred to the range of concepts offered by economists and others as a basis for the appropriate Government discount rate. This range of concepts exists because our economy is neither perfectly competitive nor perfectly functioning. Were it so, all borrowing and lending would occur at a single interest rate. In the absence of different degrees of risk and uncertainty regarding future events, this interest rate would be faced by all borrowers and lenders. This rate would determine the ideal level of investment and would insure that the volume of saving would be equal to it. Moreover, in such a world the best combination of investment projects available to the private sector would be undertaken. Under these circumstances, a dollar taken by the Government from the private economy would displace a private investment and thus, if society were not to lose from the exchange, this dollar would have to be used by the Government in a way which would return at least as much as it would have if left in the private sector.

The economy, however, is not such a perfect one. The capital market is highly imperfect; there is capital rationing; lenders and borrowers do not have full knowledge; the Government levies differential tax treatment on businesses and households; and market adjustment processes are sticky. These factors mean that no single rate observed in the market can properly be used for Government discounting.[21] It is because of these imperfections that a wide range of concepts are offered as the rationale for an appropriate public discount rate. The most prominent of the interest rate concepts offered by economists and evaluated in the subcommittee hearings are as follows:

1. THE SOCIAL RATE OF TIME PREFERENCE

Some professional economists argue that observed interest rates in the private economy give little guidance in determining the appropriate public rate of discount because of imperfections in the capital market.[22] The primary imperfection cited in defense of this position pertains to the failure of the capital market to reflect the collective desires of citizens to provide for future generations in their private decisionmaking. Such provision, it is argued, can only be undertaken by the Nation collectively. Citizens are willing to voluntarily contribute to the attainment of this goal only if they recognize that their fellow citizens are also making a contribution. They fail to do so if they believe themselves to be the only contributor. To adequately provide for future generations, this position claims, the Federal Government

[21] Ibid., pp. 25–26, 51–56, and 143–144.
[22] Ibid., pp. 25–26, 52, 69, and 142–143.

should increase the level of public investment. It should do so by choosing a low social rate of interest, thereby expanding the number of public investment projects which appear feasible.

The subcommittee believes that this rationale has a number of significant shortcomings. It notes the following reservations to this concept presented in the hearings:

(*a*) It is not clear that there is a collective willingness to transfer more income from current to future generations than is implied by the current interest rate structure. Considering our investment in durable goods and structures to be provision for the future, we are already transferring nearly 30 percent of each year's gross national product from current consumption to investment in the future. The wisdom of imposing additional sacrifice on the current population (with a per capita income of $4,250) to increase the wealth of future citizens whose per capita income will be $10,000 in the year 2000 even without additional transfers is highly questionable.[23]

(*b*) Even if there is a social desire to undertake additional sacrifice now to aid future generations, the provision of subsidized capital to the public sector is not a desirable way of accomplishing this goal. A superior way is to achieve a more rapid rate of economic growth through the adoption of policies to stimulate both public and private capital accumulation. The recent investment tax credit legislation is an example of this latter type of policy instrument.[24]

(*c*) Given current knowledge and practice in the estimation of project benefits and costs, a low rate of interest applied to only investments in the public sector would cause many public projects with low returns to be undertaken at the expense of more productive investments in the private sector. The net effect of this would be to lower the rate of national economic growth, therefore undermining the objective of increasing the provision for future generations.[25]

2. THE COST TO THE TREASURY OF BORROWING

In past discussions within the Government, in the language of the President's 1969 Budget Message, and in the January 1968 Report of the Comptroller General's Office, an interest rate equal to the cost to the Federal Government of borrowing has been suggested. In the Comptroller General's report, this concept was statistically explored and the true cost to the Government of borrowing was estimated, taking into account the tax revenues which the Treasury sacrificed in the borrowing process as well as other adjustments.[26]

Implicit in this position is the presumption that the Government is an independent organization which should seek the greatest differential between its revenues and outlays as does a private business.[27]

The subcommittee rejects this view of the Federal Government when it functions as an investor of capital. In this role, the Government

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[23] Ibid., pp. 25–26.
[24] Ibid., pp. 26, 54, and 143.
[25] Ibid., pp. 25–26, 69, and 143.
[26] "Interest Rates Guidelines * * *", pp. 60–63.
[27] "Economic Analysis of Public Investment Decisions * * *", pp. 26 and 27.

should make those worthwhile investments which private investors cannot undertake, fail to undertake, or undertake in insufficient quantity. As such, the Government is an arm of the society itself and should calculate so as to achieve the greatest difference between social costs and benefits rather than to maximize its own net worth. The purpose of the Federal Government as an investor should be to sustain the private sector and not to exploit private citizens to achieve its own ends.

3. THE OPPORTUNITY COST OF DISPLACED PRIVATE SPENDING

A third concept for establishing a social rate of interest was presented to the subcommittee. It is based on the argument that the Federal Government as investor should have as its objective the maximum well-being of the Nation as a whole as reflected in the national income.[28] It proposes that no public investment be undertaken which earns a return (including third party or spillover effects) which is less than the return on the alternative use of the funds which it absorbs. This approach therefore looks to the private capital markets in determining the value which the funds channeled into the Government would have earned if they were left in the private sector. This approach was summarized for the subcommittee as follows:

> In examining * * * foregone opportunities, and then identifying the opportunity costs, one must ask these questions:
>
> (*a*) Where would the resources have been used in the absence of the particular public investment—in the public sector or in the private sector?
>
> (*b*) If the resources are drawn from the public sector, that is, if the particular public investment is at the expense of other public expenditures within a fixed budget, what return would have been earned?
>
> (*c*) If the resources are drawn from the private sector, are they obtained through taxation or through additional government borrowing? If general fiscal policy considerations require that the additional resources be obtained through taxation, one must postulate a specific set of tax changes in order to identify what private expenditures are foregone, and one must then measure the returns in those alternative uses. If general fiscal policy permits the public investment to be financed by public borrowing, one must trace what private investments are foregone because of this particular government claim in the capital market.
>
> (*d*) Does the public investment preempt a private opportunity at the physical site, or in the same product market, or in utilizing a scarce natural resource? If there is preemption of private investment, an additional test must be performed to assure that the public investment is superior to the preempted private opportunity.[29]

The Subcommittee on Economy in Government finds this to be a sound position and suggests that it be studied further with a view toward its empirical measurement. It believes that private citizens should not, in general, be forced to give up a portion of their incomes in the form of higher taxes to support public undertakings which are of less social value than the uses to which their funds would otherwise

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[28] Ibid., pp. 25, 56, 57–61, 137, and 1424–145.
[29] Ibid., pp. 52–53.

be put. The way for the Federal Government to assure this result is to adopt in public investment appraisal an interest rate policy which reflects the private sector opportunities foregone.

In opting for this conceptual basis, however, the subcommittee recognizes that the estimation of an interest rate representing the cost of displaced private spending is not a settled matter. In testimony before the subcommittee, three distinct methods for estimating this rate were suggested. Each of these procedures assumes a different method of financing Federal investment and, consequently, each finds a different pattern of private spending displaced. These positions are summarized as follows:

(*a*) *The opportunity rate of return on private investments.*—In this approach, the public sector would look to the before-tax rate of return on private investment for guidance on interest rate policy. This position presumes that any holder of funds in the private sector has access to investments with this high rate of return and, therefore, this rate has normative significance for social interest rate policy.[30]

(*b*) *The opportunity cost of tax-financed investments.*—This approach to interest rate estimation assumes that the Federal Government finances its spending by withdrawing funds from the private sector through taxes. Because the imposition of taxes forces some individuals to forego consumption and other individuals to forego investment, the opportunity cost must reflect some combination of both types of sacrifice.[31] To calculate this rate then requires that dollars raised in taxes be traced to their ultimate source so that the social returns foregone in these sectors can be estimated. A carefully worked out model for calculating this rate under various taxation assumptions was presented to the subcommittee.[32]

(*c*) *The opportunity cost of public investments financed by borrowing.*—Instead of presuming that the Federal Government obtains investment funds through the tax mechanism, this approach assumes that public investments, like some private investments, are financed through the capital market.[33] The estimation task in this case requires that the dollars borrowed be traced through the economy to ascertain the private activities which are displaced. This approach to opportunity cost estimation was described to the subcommittee as follows:

> [To] use private-sector rates of return to obtain the opportunity cost of public funds, what is clearly called for, at least under present institutional arrangements in the capital market, is a weighted average of the rates of return applying in all relevant sectors of the private economy, the weights reflecting the degree to which investment in each sector is estimated to be displaced by public-sector borrowing.[34]

While advocating the opportunity cost of displaced private spending as a correct conceptual basis for the Government discount rate, the subcommittee does not presume to advocate a precise method for calculat-

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[30] "The Planning-Programing-Budgeting System: Progress and Potentials," hearings, pp. 133–143.

[31] "Economic Analysis of Public Investment Decisions * * *," pp. 25, 27, 56, 137, and 143–144.

[32] Ibid., pp. 82–134.

[33] Ibid., pp. 57–65.

[34] Ibid., p. 58.

ing this rate. We do, however, caution against the reliance on the observed rates of return in a limited subsector of the private economy as a normative guide to Federal Government interest rate policy. We agree with the Bureau of the Budget's reluctance to "adopt * * * the rate of return on private investment foregone alone because government funds are drawn from both consumption and investment." [35]

However, having advocated a conceptual basis for the public discount rate, the subcommittee notes that a number of subsidiary issues essential for sound discount rate policy remain unresolved. These concern matters such as the following:

1. The role of risk and uncertainty in public investment decisions and interest rate policy;
2. The appropriate interest rate for application to public investments which displace specific private investments; and
3. The treatment of inflationary influences on observed interest rates.

The subcommittee does not presume to define a single correct approach to these issues. A number of suggestions presented to the subcommittee, however, do appear worthy of emphasis.

Nearly all of the witnesses appearing before the subcommittee noted that the estimation of the opportunity cost of displaced private spending by reference to realized private returns builds into the interest rate measurement an average allowance for risk and uncertainty present in the private sector.[36] Use of this rate to evaluate public investments implies that they bear risk and uncertainty characteristics similar to those in the private sector. While this might be an acceptable practice, the subcommittee finds worthy of continued study the suggestion that a basic minimum-risk interest rate be used by the Federal Government and that explicit allowances be made for risk and uncertainty in the benefit and cost estimates of each public investment.[37] The subcommittee notes that, in the judgment of nearly all of the witnesses, the "current yield on long-term Government securities" is the lowest reasonable estimate of this basic minimum-risk rate. We note further that it is on this basis that the Bureau of the Budget and other witnesses support the new interest rate formula proposed by the Water Resources Council. "A long-term riskless rate reflecting a private opportunity cost should not be less than the current yield on Treasury bonds with long terms to maturity." [38]

In the testimony presented to the subcommittee, a number of witnesses addressed the question of the risk and uncertainty present in real investments. They agreed that, while the benefits and costs of all real investments are to some extent risky and uncertain, some undertakings are significantly more venturesome and hazardous than others. If, then, a basic, minimum-risk interest rate is applied to the investment, the estimated streams of benefits and costs should be adjusted to allow for risk and uncertainty. Further, the degree of adjustment should be related to the degree of hazardousness present in the investment.[39] Hence, the benefits of an investment in a hydroelectric project would typically require less adjustment for risk and uncertainty than, say, an investment in an experimental, nuclear power generating facility.

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[35] Ibid., pp. 27 and 41–42.
[36] Ibid., pp. 27–28, 67, and 144.
[37] Ibid., p. 28.
[38] Ibid., p. 28.
[39] Ibid., pp. 27–28, 72–73, 77, and 144.

Alternatively, the subcommittee visualizes that an allowance for risk and uncertainty could be incorporated into interest rates used for discounting public investments.[40] The greater the degree of risk and uncertainty present in the project, the greater would be the adjustment made to the basic minimum-risk interest rate. Thus, starting from a given base rate, the interest rate used in discounting the benefits of low risk projects would require a minimum upward adjustment while the rate used to evaluate the output of a highly uncertain undertaking would be substantially above the base rate. The subcommittee realizes, however, that these adjustments for risk and uncertainty do not lend themselves to precise slide-rule evaluation.

In further analyzing the various types of investments undertaken by the public sector, witnesses distinguished between those investments that have no counterpart in the private sector and those investments which, when undertaken by the Federal Government, displace similar private investments.[41] An example of the former would be the construction of a new weapons system; the public production of many research and development outputs exemplifies the latter. The suggestion was made that the analysis of those projects which displace no specific private sector alternative should be thought of as imposing a general opportunity cost over the economy as a whole equal to the value of private spending displaced. Projects which displace specific private investments should be evaluated by the rate of return prevailing in the sector from which the specific investment is displaced. The subcommittee finds this distinction to be a meaningful one and urges further study to refine this "two-part pricing" scheme.

The question of the influence of inflationary expectations on observed interest rates and the desirability of including this influence in the interest rate used to evaluate public projects is, in the subcommittee's view, one of the least settled technical issues pertaining to interest rate policy.[42] This matter cannot be divorced from the question of which prices analysts of public investments employ in estimating future benefits and costs. While the current practice of using prices observed at the time the analysis is undertaken has substantial administrative merit, the subcommittee is aware of the position held by some that analysis should undertake the projection of future prices. This matter must be resolved prior to the development of sound and consistent evaluation policies. Again, further study seems in order.

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[40] Ibid.
[41] Ibid., pp. 27–29, 177–178.
[42] Ibid., pp. 28, 33–34, and 40–41.

VI

The Current Minimum-Risk Interest Rate Which Should Be Used for Evaluating Public Investments Is at Least 5 Percent

As outlined above, estimates of the interest rate for discounting public investments vary with the concept chosen as the appropriate basis for measurement. However, because the evaluation of public investments should accurately reflect the value of private sector alternatives foregone, the appropriate range of estimates is narrowed substantially. The consensus among the experts appearing before the subcommittee could be summarized as follows:

1. If explicit allowance for risk and uncertainty is made in the estimates of benefits and costs, a minimum-risk base interest rate can be used for discounting. In this case, the average current yield on Government securities with long terms remaining to maturity is an appropriate minimum estimate of the opportunity cost of displaced private spending. This rate is currently about 5 percent. The new procedure proposed by the Water Resources Council is consistent with this basic minimum-risk concept and represents a major improvement over past interest rate policy.

2. If specific allowance for risk and uncertainty is not made in the benefit and cost estimates, an average allowance can be incorporated in the base interest rate. In this case, the opportunity cost of displaced private spending, as observed in private capital markets, should be accepted as the base interest rate. As stated above, this rate is estimated as a weighted average of the observed rates of return over the private consumption and investment sectors. Depending on the system of weights adopted, this rate is currently in the 8–10 percent range.

VII

All Federal Agencies Should Establish Consistent and Appropriate Discounting Procedures Utilizing an Appropriate Base Interest Rate Computed and Published on a Continuing Basis

The subcommittee believes that substantial gains have been made in the application of economic criteria to proposed Federal expenditures. It wishes to commend the Bureau of the Budget and the agencies for the progress made in this area. We wish to emphasize the importance of this kind of analysis in guiding the decisions of the executive agencies and the Congress. While recognizing that decisions cannot be made on the basis of economic considerations alone, we believe that the explicit statement of the economic impacts of expenditures is extremely useful. At the least, this kind of analysis will enable decisionmakers to recognize the economic costs incurred to undertake investments which satisfy other noneconomic, yet worthy, objectives.

Notwithstanding the progress which has been made, the subcommittee is greatly concerned about some notable problem areas in the implementation of economic analysis and appropriate discounting procedures. Among these are:

1. The failure of some agency personnel to stress the importance of effective discounting analysis in their agencies;
2. The sizable range of inconsistency in the evaluation procedures applied by agencies, especially in the discounting process;
3. The inappropriately low-interest rate applied by a number of agencies in evaluating investment alternatives;
4. The existence of significant legal and institutional constraints which inhibit the effective implementation of analysis in the agencies;
5. The current lack of the knowledge and data necessary for sound analysis of the economic benefits and costs of certain public investments, especially in the human resource areas. The concerns of the Public Works and Appropriations Committees of the House and Senate, and the Senate Committee on Interior and Insular Affairs regarding the need for improved benefit-and-cost evaluation procedures is noted by the subcommittee;
6. The potential for the misallocation of funds inherent in most grant-in-aid type support programs which funnel investment funds from the Federal Government where a commitment to the economic analysis of alternatives exists to State and local governments where no such consistent system or commitment exists;
7. The current inability and unwillingness of the Congress to make consistent use of the objective evidence on the benefit-and-cost impacts of its spending decisions and to search consciously for superior means of accomplishing its objectives.

Based upon the testimony presented to it, and reflecting the above-stated concerns, the Subcommittee on Economy in Government offers the following recommendations:

1. The Bureau of the Budget should undertake to require all agencies to develop and implement consistent and appropriate discounting procedures on all Federal investments entailing future costs or benefits. The subcommittee, however, recognizes that procedures among investment areas may legitimately vary depending on the measurability of benefits and other factors.[43]

2. The Bureau of the Budget should, in conjunction with other appropriate Government agencies, immediately undertake a study to estimate the weighted-average opportunity cost of private spending which is displaced when the Federal Government finances its expenditures. This study should—

(*a*) Be guided by an advisory panel of experts to consult with the study personnel on the development of an appropriate methodology and submit an evaluation of the report's conclusions. The panel should be composed of recognized experts in the field of public expenditure analysis without ties to any particular agency or expenditure program;

(*b*) Make appropriate assumptions about the sources of the funds which finance public investments; calculate the observed before-tax rates of return prevailing in these sectors, and estimate the opportunity cost prevailing over the economy as a whole, giving appropriate weight to both the private consumption and investment which is foregone; and

(*c*) Culminate in a report proposing the methodology and preferred arrangements for the continuing computation and publication of an interest rate representing the opportunity cost of displaced private spending.[44]

3. Some appropriate Federal Government agency, perhaps the Office of Business Economics, should estimate and publish on a continuing basis the weighted-average opportunity cost interest rate defined in point 2 above for guidance to all Federal agencies in undertaking the analysis of public investments. This published rate should be adopted by the Bureau of the Budget and specified by the Bureau as a guideline for agencies on budget and program submissions.[45]

4. The Water Resources Council should adopt its proposed interest rate procedure as stated in the announcement of July 22, 1968. The subcommittee believes that this proposal is a significant improvement over the current practice and that it is not inconsistent with—though the lowest reasonable estimate of—the current minimum-risk opportunity cost of displaced private spending. Given that this interest rate is a minimum-risk rate under current capital market conditions, it should be noted that explicit allowances for elements of risk and uncertainty should be made when

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[43] "Interest Rate Guidelines * * *," passim., "Economic Analysis of Public Investment Decisions * * *," pp. 22, 28–29, 34–35, and 137.

[44] "Economic Analysis of Public Investment Decisions * * *," pp. 41, 45, 56, 57–65, 143–144, and 179–181.

[45] Ibid., pp. 45, 78, and 179–186.

such elements are present. Consistent with its strong endorsement of this proposal, the subcommittee gives its full support to agency efforts to develop more accurate measurement procedures for estimating the real impacts of proposed investments.[46]

5. The Bureau of the Budget and the program evaluation staffs in all Federal Government agencies should intensify their efforts to quantify in monetary terms the real economic impacts of Government programs and to formulate improved estimation procedures for the ongoing evaluation of public expenditures.[47]

6. The Congress should without delay review existing institutional and legal constraints which impede or prohibit the agencies from developing and applying sound procedures of economic evaluation. Such study is especially needed in the transportation area where the vast bulk of the Federal Government's highway construction budget is exempt from such analysis. As specified by the representative of the Department of Transportation, effective economic analysis in this area requires a reconsideration of—

(*a*) Those components of sections 4 and 7 of the Department of Transportation Act which restrict the implementation of effective discounting procedures;

(*b*) The process of determining the size of the highway grant budget and its allocation to States with a view toward instituting the application of appropriate discounting procedures; and

(*c*) Current policy which permits Federal highway funds to be allocated by State agencies without reference to the economic evaluation of the expenditures.[48]

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[46] Ibid., pp. 12–16, 28–32, and 46–47.
[47] Ibid., pp. 30, 39–40, and 145–146.
[48] Ibid., pp. 150–160, 169–172, and 181.

APPENDIX

The SST and the Interest Rate—An Example of the Role of Discounting

PRESENTED TO THE SUBCOMMITTEE BY DR. LAURENCE E. LYNN, DEPUTY ASSISTANT SECRETARY OF DEFENSE, DEPARTMENT OF DEFENSE, ECONOMICS AND RESOURCE ANALYSIS [49]

The following table shows the potential profitability of the supersonic transport program purely as a financial investment: the present value of total program costs to the Government is subtracted from the present value of the return flow of funds from the manufacturer. * * * All SST costs prior to fiscal year 1969 are considered "sunk," and the calculations assume a fresh decision can be made on whether to continue the program. [As an evaluation of the financial return to the Federal Government, this analysis does not address the question of the relationship of social returns and costs of the SST.]

PRESENT VALUE OF SST INVESTMENT

[In millions of dollars]

	Discount rate (percent)		
	5	10	15
SST market as calculated by Institute for Defense Analyses (IDA)	−344	−528	−579
SST market as calculated by Federal Aviation Administration (FAA)	218	−239	−421

Based on FAA estimates of the potential size of the SST market, the program breaks even as far as the Government is concerned at a discount rate of 6.85 percent. If the opportunity cost of the program's funds is estimated at greater than 6.85 percent, the program will not break even. Using IDA estimates of market size (which assume that sonic boom restrictions will limit sales), the break-even rate is 1.33 percent. If a higher discount rate is used, the program will not break even.

The following table shows results from the same calculations but allowing interest charged to accumulate through 1990, rather than discounting program costs back to the present.

[In millions of dollars]

	SST program costs to 1990 including interest charges at—		
	5 percent	10 percent	15 percent
IDA estimates of market size	−1,057	−4,370	−14,401
FAA estimates of market size	670	−2,143	−10,477

[49] Ibid., pp. 149–150.

Thus, if the opportunity cost of funds is estimated at 5 percent, the program will lose a billion dollars by 1990 using the IDA estimates of market size, but will earn a return for the Government of $670 million using FAA market estimates. At 10 percent, the program will cost the Government $4.4 billion by IDA market estimates, $2.1 billion by FAA market estimates. The choice of a discount rate will significantly influence estimates of the program's profitability as a financial investment.

SEPARATE VIEWS OF REPRESENTATIVE PATMAN

I would like to express my disagreement with the conclusions presented in this committee report concerning the discount rate yardstick for the evaluation of public investments. The essence of the report's conclusions is that public investments can be evaluated in a manner similar or identical to that which is relevant for private investments. I believe that this is not true, and that once this premise is abandoned, the remainder of the conclusions can no longer be valid.

A Joint Economic Committee study estimated that in the decade 1966–75, public facilities costing $500 billion—half a trillion dollars—will be needed in communities across our land. Many of these facilities will provide services which will substantially improve the quality of life in our society, but these are improvements not easily measured in dollars and cents. Furthermore, many Government activities may have few direct economic benefits, but may have indirect, or longterm, economic and social effects which will expand the productive capacity of our economy over the long run and greatly increase the national welfare. Reliance on profit-oriented business criteria to evaluate Government investments would inevitably result in the abandonment of projects with more potential and far-reaching benefits, such as I described above, in favor of those which showed an immediate financial return. I believe this would be disastrous to the fulfillment of a whole range of the goals of our society.

The committee report recommends, in particular, that public projects be evaluated with the use of a discount (interest) rate which reflects the potential return on private sector spending which has been displaced by the public investment. This private sector rate would be higher than that generally used by Government agencies today in the evaluation of alternative public investments.

According to the report: "* * * where the rate of interest used (by the Government) is lower than that used in the private sector, funds are being guided from uses bearing a higher return to uses bearing a lower return. The result * * * is to depress the size of the national income and to sacrifice potential economic growth."

This finding would be conclusive support for the recommendations of the report only if several conditions were met: (a) if the noneconomic benefits of Government projects could be included in the measure of returns from these projects to make them fully comparable to measurements in the private sector; (b) if the measure of return from Government projects could also include all the longer term indirect economic benefits, which do in fact contribute to the productive capacity of our economy, and (c) if we were all agreed that the size of our national income were the single and uppermost goal of our society. I believe that none of these three arguments can currently be supported.

I think we should also bear in mind the implications of accepting strict, business-oriented criteria for Government activity. Do we mean

to say that we believe society will benefit more from a new gadget than from the construction of a new school or sewage system because the immediate financial return on the former might be 6.5 percent as opposed to 5 percent on the latter?

The argument for judging the value of public investments on the basis of rates of return, or interest rates, in the private sector is further weakened when we realize what sort of factors go into determining the private sector rates. The discussion on appropriate interest rates in the committee report, itself, is begun with the admission that the capital market in our economy is far from being a perfectly competitive one. The interest rates established in this market are influenced not merely by the regular forces of supply and demand, but also, among other factors, by the policies adopted by various government units. In particular, the Federal Reserve System plays a major role in the determination of interest levels, and these levels have been maintained at an artificially high level for many years. Indeed, as I have pointed out on numerous occasions, the Fed is the beneficiary of a $50 billion portfolio on which it collects these inflated interest rates. The Congress, itself, has been lax in acting to allow interest rates to fall to levels which would better accommodate the needs of our economy.

One of the distressing aspects of our economic and social development as a society is that there are serious imbalances. We have neglected human resources in the interest of material things too often. One reason for this is that the public sector is on the low end of the scale so far as the credit of the Nation is concerned. Whenever money is tightened and interest rates boosted, our public facilities suffer, along with the small businessman and homebuilders. That is what is happening right now. Not only do the public facilities have much more difficulty in obtaining credit when scarcity prevails, but they must increase their expenses to pay high interest charges. This is a grievous burden for them and involves a transfer from the ordinary citizen to the wealthier class who have the lending power.

I must, therefore, disagree with the conclusions expressed in this committee report with respect to the appropriate discount rate for evaluating Government investments. Our society has many objectives which could never be shown on a profit-and-loss statement, and our Government has obligations to its citizens which cannot be dismissed by reference to a profit-maximizing rate of return.

SEPARATE VIEWS OF SENATOR SPARKMAN

Unquestionably, the many demands of the people upon their Government for facilities and services make it necessary that Government establish priorities for the investment of public funds. It is equally true, however, that a system of priorities which is appropriate for investment in the private sector may not necessarily be appropriate for the investment of public funds. This is true because private investment seeks only economic efficiency, whereas public investment seeks objectives which are a mix of economic and social goals. It is this fact which prevents my endorsement of the committee report.

The committee report, and the record of the hearings upon which it is based, place far too little emphasis upon the need for a more effective system of measuring the direct and indirect benefits accruing from public investment designed to meet these economic and social goals. This is particularly true in the case of investment in water resource projects, where low rates of economic return prevail in early years, and the mushrooming benefits of area development in later years are whittled away to insignificance by the kind of discount rate and procedure advocated by the committee report.

While there may be a need for a more efficient system of establishing public investment priorities, and while there may be a need for some degree of uniformity in the application of such a system by various public agencies, I am not prepared to advocate specific findings and recommendations in these areas until such time as a more thorough and balanced investigation of the matter has been made.

SUPPLEMENTARY VIEWS OF SENATORS SYMINGTON, JORDAN, AND PERCY

We recognize that there is wide variance and inconsistent policy among the Federal agencies with respect to the use and application of discounting analysis in evaluating public expenditures. We endorse the finding, outlined in the report, of the need for improved and consistent application of sound economic analyses in the decisionmaking process with regard to public investments.

However, from our experience in the business world, we know that what often appears to be sound theory is not always sound in practice or acceptable in impact. We have basic agreement with many of the recommendations of the report and believe the attempt should be made, after thorough study by the agencies of the Federal Government under the supervision of the Bureau of the Budget, to develop a sound and consistent discounting analysis policy and especially to develop a method of quantifying and evaluating the social benefits of public investment which thus far have been either inadequately measured or determined immeasurable. The subcommittee has not addressed itself to the full consideration of what the impacts may be of specific application of the policies and procedures to be developed, particularly in the areas where grants-in-aid, matching funds, and other financial programs are involved in the Federal-State relationship.

Therefore, we cannot at this time concur with the immediate *implementation* of the procedures and policies recommended to be developed without first having opportunity to review and determine the impacts thereof.

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