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Version:	1.0
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Document Details:

Title:	ERID-094804 1) CIRCULAR A-94 GUIDLINES AND DISCOUNT RATES FOR BENEFIT COST ANALYSIS FOR FEDERAL PROGRAMS
ERID Number.StartPage:	ERID-094804
Office of Record:	ENV-ERSS
Date Received:	02/02/2007
Official Use Only:	N
Page Count:	22
Record Type:	Report
Document Date:	01/01/1900
To:(Addressees - Organization) *(separate multiple values with semicolons)*	N/A
From:(Senders - Organization) *(separate multiple values with semicolons)*	N/A
Other Document Number(s): *(separate multiple values with semicolons)*	N/A
TA: *separate multiple values with semicolons)*	N/A
PRS Number(s): *(separate multiple values with semicolons)*	N/A
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CIRCULAR A-94

GUIDELINES AND DISCOUNT RATES

FOR BENEFIT-COST ANALYSIS OF FEDERAL PROGRAMS

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CIRCULAR NO. A-94
(Transmittal Memo No.64)

MEMORANDUM FOR HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs

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1. **Purpose**. The goal of this Circular is to promote efficient resource allocation through well-informed decision-making by the Federal Government. It provides general guidance for conducting benefit-cost and cost-effectiveness

analyses. It also provides specific guidance on the discount rates to be used in evaluating Federal programs whose benefits and costs are distributed over time. The general guidance will serve as a checklist of whether an agency has considered and properly dealt with all the elements for sound benefit-cost and cost-effectiveness analyses.

2. **Rescission**. This Circular replaces and rescinds Office of Management and Budget (OMB) Circular No. A-94, "Discount Rates to Be Used in Evaluating Time-Distributed Costs and Benefits," dated March 27, 1972, and Circular No. A-104, "Evaluating Leases of Capital Assets," dated June 1, 1986, which has been rescinded. Lease-purchase analysis is only appropriate after a decision has been made to acquire the services of an asset. Guidance for lease- purchase analysis is provided in Section 8.c.(2) and Section 13.

3. **Authority**. This Circular is issued under the authority of 31 U.S.C. Section 1111 and the Budget and Accounting Act of 1921, as amended.

4. **Scope**. This Circular does not supersede agency practices which are prescribed by or pursuant to law, Executive Order, or other relevant circulars. The Circular's guidelines are suggested for use in the internal planning of Executive Branch agencies. The guidelines must be followed in all analyses submitted to OMB in support of legislative and budget-programs in compliance with OMB Circulars No. A-11, "Preparation and Submission of Annual Budget Estimates," and No. A-19, "Legislative Coordination and Clearance." These guidelines must also be followed in providing estimates submitted to OMB in compliance with Executive Order No. 12291, "Federal Regulation," and the President's April 29, 1992 memorandum requiring benefit-cost analysis for certain legislative proposals.

a. Aside from the exceptions listed below, the guidelines in this Circular apply to any analysis used to support Government decisions to initiate, renew, or expand programs or projects which would result in a series of measurable benefits or costs extending for three or more years into the future. The Circular applies specifically to:

   (1) Benefit-cost or cost-effectiveness analysis of Federal programs or policies.

   (2) Regulatory impact analysis.

   (3) Analysis of decisions whether to lease or purchase.

   (4) Asset valuation and sale analysis.

b. Specifically exempted from the scope of this Circular are decisions concerning:

   (1) Water resource projects (guidance for which is the approved Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies).

(2) The acquisition of commercial-type services by Government or contractor operation (guidance for which is OMB Circular No. A-76).

(3) Federal energy management programs (guidance for which can be found in the Federal Register of January 25, 1990, and November 20, 1990).

c. This Circular applies to all agencies of the Executive Branch of the Federal Government. It does not apply to the Government of the District of Columbia or to non-Federal recipients of loans, contracts or grants. Recipients are encouraged, however, to follow the guidelines provided here when preparing analyses in support of Federal activities.

d. For small projects which share similar characteristics, agencies are encouraged to conduct generic studies and to avoid duplication of effort in carrying out economic analysis.

5. **General Principles**. *Benefit-cost analysis* is recommended as the technique to use in a formal economic analysis of government programs or projects. *Cost-effectiveness analysis* is a less comprehensive technique, but it can be appropriate when the benefits from competing alternatives are the same or where a policy decision has been made that the benefits must be provided. (Appendix A provides a glossary of technical terms used in this Circular; technical terms are italicized when they first appear.)

a. Net Present Value and Related Outcome Measures,. The standard criterion for deciding whether a government program can be justified on economic principles is *net present value* -- the discounted monetized value of expected net benefits (i.e., benefits minus costs). Net present value is computed by assigning monetary values to benefits and costs, discounting future benefits and costs using an appropriate discount rate, and subtracting the sum total of discounted costs from the sum total of discounted benefits. Discounting benefits and costs transforms gains and losses occurring in different time periods to a common unit of measurement. Programs with positive net present value increase social resources and are generally preferred. Programs with negative net present value should generally be avoided. (Section 8 considers discounting issues in more detail.)

Although net present value is not always computable (and it does not usually reflect effects on income distribution), efforts to measure it can produce useful insights even when the monetary values of some benefits or costs cannot be determined. In these cases:

(1) A comprehensive enumeration of the different types of benefits and costs, monetized or not, can be helpful in identifying the full range of program effects.

(2) Quantifying benefits and costs is worthwhile, even when it is not feasible to assign monetary values; physical measurements may be possible and useful.

Other summary effectiveness measures can provide useful supplementary information to net present value, and analysts are encouraged to report them also. Examples include the number of injuries prevented per dollar

of cost (both measured in present value terms) or a project's internal rate of return.

b. Cost-Effectiveness Analysis. A program is cost-effective if, on the basis of *life cycle cost* analysis of competing alternatives, it is determined to have the lowest costs expressed in present value terms for a given amount of benefits. Cost-effectiveness analysis is appropriate whenever it is unnecessary or impractical to consider the dollar value of the benefits provided by the alternatives under consideration. This is the case whenever (i) each alternative has the same annual benefits expressed in monetary terms; or (ii) each alternative has the same annual affects, but dollar values cannot be assigned to their benefits. Analysis of alternative defense systems often falls in this category.

Cost-effectiveness analysis can also be used to compare programs with identical costs but differing benefits. In this case, the decision criterion is the discounted present value of benefits. The alternative program with the largest benefits would normally be favored.

c. Elements of Benefit-Cost or Cost-Effectiveness Analysis.

(1) Policy Rationale. The rationale for the Government program being examined should be clearly stated in the analysis. Programs may be justified on efficiency grounds where they address market failure, such as public goods and externalities. They may also be justified where they improve the efficiency of the Government's internal operations, such as cost-saving investments.

(2) Explicit Assumptions. Analyses should be explicit about the underlying assumptions used to arrive at estimates of future benefits and costs. In the case of public health programs, for example, it may be necessary to make assumptions about the number of future beneficiaries, the intensity of service, and the rate of increase in medical prices. The analysis should include a statement of the assumptions, the rationale behind them, and a review of their strengths and weaknesses. Key data and results, such as year-by-year estimates of benefits and costs, should be reported to promote independent analysis and review.

(3) Evaluation of Alternatives. Analyses should also consider alternative means of achieving program objectives by examining different program scales, different methods of provision, and different degrees of government involvement. For example, in evaluating a decision to acquire a capital asset, the analysis should generally consider: (i) doing nothing; (ii) direct purchase; (iii) upgrading, renovating, sharing, or converting existing government property; or (iv) leasing or contracting for services.

(4) Verification. Retrospective studies to determine whether anticipated benefits and costs have been realized are potentially valuable. Such studies can be used to determine necessary corrections in existing programs, and to improve future estimates of benefits and costs in these programs or related ones.

Agencies should have a plan for periodic, results-oriented evaluation of program effectiveness. They should also discuss the results of relevant evaluation studies when proposing reauthorizations or increased program funding.

6. **Identifying and Measuring Benefits and Costs**. Analyses should include comprehensive estimates of the expected benefits and costs to society based on established definitions and practices for program and policy evaluation. Social net benefits, and not the benefits and costs to the Federal Government, should be the basis for evaluating government programs or policies that have effects on private citizens or other levels of government. Social benefits and costs can differ from private benefits and costs as measured in the marketplace because of imperfections arising from: (i) *external economies or diseconomies* where actions by one party impose benefits or costs on other groups that are not compensated in the market place; (ii) monopoly power that distorts the relationship between marginal costs and market prices; and (iii) taxes or subsidies.

a. Identifying Benefits and Costs. Both intangible and tangible benefits and costs should be recognized. The relevant cost concept is broader than private-sector production and compliance costs or government cash expenditures. Costs should reflect the opportunity cost of any resources used, measured by the return to those resources in their most productive application elsewhere. Below are some guidelines to consider when identifying benefits and costs.

(1) Incremental Benefits and Costs. Calculation of net present value should be based on incremental benefits and costs. Sunk costs and realized benefits should be ignored. Past experience is relevant only in helping to estimate what the value of future benefits and costs might be. Analyses should take particular care to identify the extent to which a policy such as a subsidy program promotes substitutes for activities of a similar nature that would occur without the policy. Either displaced activities should be explicitly recorded as costs or only incremental gains should be recorded as benefits of the policy.

(2) Interactive Effects. Possible interactions between the benefits and costs being analyzed and other government activities should be considered. For example, policies affecting agricultural output should reflect real economic values, as opposed to subsidized prices.

(3) International Effects. Analyses should focus on benefits and costs accruing to the citizens of the United States in determining net present value. Where programs or projects have effects outside the United States, these effects should be reported separately.

(4) Transfers. There are no economic gains from a pure *transfer payment* because the benefits to those who receive such a transfer are matched by the costs borne by those who pay for it. Therefore, transfers should be excluded from the calculation of net present value. Transfers that arise as a result of the program or project being analyzed should be identified as such, however, and their distributional effects discussed. It should also be recognized that

a transfer program may have benefits that are less than the program's real economic costs due to inefficiencies that can arise in the program's delivery of benefits and financing.

b. Measuring Benefits and Costs. The principle of *willingness-to-pay* provides an aggregate measure of what individuals are willing to forego to obtain a given benefit. Market prices provide an invaluable starting point for measuring willingness-to-pay, but prices sometimes do not adequately reflect the true value of a good to society. Externalities, monopoly power, and taxes or subsidies can distort market prices.

Taxes, for example, usually create an *excess burden* that represents a net loss to society. (The appropriate method for recognizing this excess burden in public investment analyses is discussed in Section 11.) In other cases, market prices do not exist for a relevant benefit or cost. When market prices are distorted or unavailable, other methods of valuing benefits may have to be employed. Measures derived from actual market behavior are preferred when they are available.

(1) Inframarginal Benefits and Costs. Consumers would generally be willing to pay more than the market price rather than go entirely without a good they consume. The economist's concept of *consumer surplus* measures the extra value consumers derive from their consumption compared with the value measured at market prices. When it can be determined, consumer surplus provides the best measure of the total benefit to society from a government program or project. Consumer surplus can sometimes be calculated by using econometric methods to estimate consumer demand.

(2) Indirect Measures of Benefits and Costs. Willingness-to-pay can sometimes be estimated indirectly through changes in land values, variations in wage rates, or other methods. Such methods are most reliable when they are based on actual market transactions. Measures should be consistent with basic economic principles and should be replicable.

(3) Multiplier Effects. Generally, analyses should treat resources as if they were likely to be fully employed. Employment or output multipliers that purport to measure the secondary effects of government expenditures on employment and output should not be included in measured social benefits or costs.

7. **Treatment of Inflation**. Future inflation is highly uncertain. Analysts should avoid having to make an assumption about the general rate of inflation whenever possible.

a. Real or Nominal Values. Economic analyses are often most readily accomplished using *real* or *constant-dollar* values, i.e., by measuring benefits and costs in units of stable purchasing power. (Such estimates may reflect expected future changes in relative prices, however, where there is a reasonable basis for estimating such changes.) Where future benefits and costs are given in *nominal* terms, i.e., in terms of the future purchasing power of the dollar, the analysis should use these

values rather than convert them to constant dollars as, for example, in the case of lease-purchase analysis.

Nominal and real values must not be combined in the same analysis. Logical consistency requires that analysis be conducted either in constant dollars or in terms of nominal values. This may require converting some nominal values to real values, or vice versa.

b. Recommended Inflation Assumption. When a general inflation assumption is needed, the rate of increase in the Gross Domestic Product deflator from the Administration's economic assumptions for the period of the analysis is recommended. For projects or programs that extend beyond the six-year budget horizon, the inflation assumption can be extended by using the inflation rate for the sixth year of the budget forecast. The Administration's economic forecast is updated twice annually, at the time the budget is published in January or February and at the time of the Mid-Session Review of the Budget in July. Alternative inflation estimates, based on credible private sector forecasts, may be used for sensitivity analysis.

8. **Discount Rate Policy**. In order to compute net present value, it is necessary to discount future benefits and costs. This discounting reflects the time value of money. Benefits and costs are worth more if they are experienced sooner. All future benefits and costs, including nonmonetized benefits and costs, should be discounted. The higher the discount rate, the lower is the present value of future cash flows. For typical investments, with costs concentrated in early periods and benefits following in later periods, raising the discount rate tends to reduce the net present value. (Technical guidance on discounting and a table of *discount factors* are provided in Appendix B.)

a. Real versus Nominal Discount Rates. The proper discount rate to use depends on whether the benefits and costs are measured in real or nominal terms.

(1) A real discount rate that has been adjusted to eliminate the effect of expected inflation should be used to discount constant-dollar or real benefits and costs. A real discount rate can be approximated by subtracting expected inflation from a nominal interest rate.

(2) A nominal discount rate that reflects expected inflation should be used to discount nominal benefits and costs. Market interest rates are nominal interest rates in this sense.

b. Public Investment and Regulatory Analyses. The guidance in this section applies to benefit-cost analyses of public investments and regulatory programs that provide benefits and costs to the general public. Guidance related to cost-effectiveness analysis of internal planning decisions of the Federal Government is provided in Section 8.c.

In general, public investments and regulations displace both private investment and consumption. To account for this displacement and to promote efficient investment and regulatory policies, the following guidance should be observed.

(1) Base-Case Analysis. Constant-dollar benefit-cost analyses of proposed investments and regulations should report net present value and other outcomes determined using a real discount rate of 7 percent. This rate approximates the marginal pretax rate of return on an average investment in the private sector in recent years. Significant changes in this rate will be reflected in future updates of this Circular.

(2) Other Discount Rates. Analyses should show the sensitivity of the discounted net present value and other outcomes to variations in the discount rate. The importance of these alternative calculations will depend on the specific economic characteristics of the program under analysis. For example, in analyzing a regulatory proposal whose main cost is to reduce business investment, net present value should also be calculated using a higher discount rate than 7 percent.

Analyses may include among the reported outcomes the *internal rate of return* implied by the stream of benefits and costs. The internal rate of return is the discount rate that sets the net present value of the program or project to zero. While the internal rate of return does not generally provide an acceptable decision criterion, it does provide useful information, particularly when budgets are constrained or there is uncertainty about the appropriate discount rate.

(3) Using the *shadow price of capital* to value benefits and costs is the analytically preferred means of capturing the effects of government projects on resource allocation in the private sector. To use this method accurately, the analyst must be able to compute how the benefits and costs of a program or project affect the allocation of private consumption and investment. OMB concurrence is required if this method is used in place of the base case discount rate.

c. Cost-Effectiveness, Lease-Purchase, Internal Government Investment, and Asset Sales Analyses. The Treasury's borrowing rates should be used as discount rates in the following cases:

(1) Cost-Effectiveness Analysis. Analyses that involve constant-dollar costs should use the real Treasury borrowing rate on marketable securities of comparable maturity to the period of analysis. This rate is computed using the Administration's economic assumptions for the budget, which are published in January of each year. A table of discount rates based on the expected interest rates for the first year of the budget forecast is presented in Appendix C of this Circular. Appendix C is updated annually and is available upon request from OMB. Real Treasury rates are obtained by removing expected inflation over the period of analysis from nominal Treasury interest rates. (Analyses that involve nominal costs should use nominal Treasury rates for discounting, as described in the following paragraph.)

(2) Lease-Purchase Analysis. Analyses of nominal lease payments should use the nominal Treasury borrowing rate on marketable securities of comparable maturity to the period of analysis. Nominal Treasury

borrowing rates should be taken from the economic assumptions for the budget. A table of discount rates based on these assumptions is presented in Appendix C of this Circular, which is updated annually. (Constant dollar lease-purchase analyses should use the real Treasury borrowing rate, described in the preceding paragraph.)

(3) Internal Government Investments. Some Federal investments provide "internal" benefits which take the form of increased Federal revenues or decreased Federal costs. An example would be an investment in an energy-efficient building system that reduces Federal operating costs. Unlike the case of a Federally funded highway (which provides "external" benefits to society as a whole), it is appropriate to calculate such a project's net present value using a comparable-maturity Treasury rate as a discount rate. The rate used may be either nominal or real, depending on how benefits and costs are measured.

Some Federal activities provide a mix of both Federal cost savings and external social benefits. For example, Federal investments in information technology can produce Federal savings in the form of lower administrative costs and external social benefits in the form of faster claims processing. The net present value of such investments should be evaluated with the 7 percent real discount rate discussed in Section 8.b. unless the analysis is able to allocate the investment's costs between provision of Federal cost savings and external social benefits. Where such an allocation is possible, Federal cost savings and their associated investment costs may be discounted at the Treasury rate, while the external social benefits and their associated investment costs should be discounted at the 7 percent real rate.

(4) Asset Sale Analysis. Analysis of possible asset sales should reflect the following:

(a) The net present value to the Federal Government of holding an asset is best measured by discounting its future earnings stream using a Treasury rate. The rate used may be either nominal or real, depending on how earnings are measured.

(b) Analyses of government asset values should explicitly deduct the cost of expected defaults or delays in payment from projected cash flows, along with government administrative costs. Such analyses should also consider explicitly the probabilities of events that would cause the asset to become nonfunctional, impaired or obsolete, as well as probabilities of events that would increase asset value.

(c) Analyses of possible asset sales should assess the gain in social efficiency that can result when a government asset is subject to market discipline and private incentives. Even though a government asset may be used more efficiently in the private sector, potential private-sector purchasers will generally discount such an asset's earnings at a rate in excess of the Treasury rate, in part, due to the cost of bearing risk. When there is evidence that government assets can be used more efficiently in the private sector, valuation

analyses for these assets should include sensitivity comparisons that discount the returns from such assets with the rate of interest earned by assets of similar riskiness in the private sector.

9. **Treatment of Uncertainty**. Estimates of benefits and costs are typically uncertain because of imprecision in both underlying data and modeling assumptions. Because such uncertainty is basic to many analyses, its effects should be analyzed and reported. Useful information in such a report would include the key sources of uncertainty; expected value estimates of outcomes; the sensitivity of results to important sources of uncertainty; and where possible, the probability distributions of benefits, costs, and net benefits.

a. Characterizing Uncertainty. Analyses should attempt to characterize the sources and nature of uncertainty. Ideally, probability distributions of potential benefits, costs, and net benefits should be presented. It should be recognized that many phenomena that are treated as deterministic or certain are, in fact, uncertain. In analyzing uncertain data, objective estimates of probabilities should be used whenever possible. Market data, such as private insurance payments or interest rate differentials, may be useful in identifying and estimating relevant risks. Stochastic simulation methods can be useful for analyzing such phenomena and developing insights into the relevant probability distributions. In any case, the basis for the probability distribution assumptions should be reported. Any limitations of the analysis because of uncertainty or biases surrounding data or assumptions should be discussed.

b. Expected Values. The expected values of the distributions of benefits, costs and net benefits can be obtained by weighting each outcome by its probability of occurrence, and then summing across all potential outcomes. If estimated benefits, costs and net benefits are characterized by point estimates rather than as probability distributions, the expected value (an unbiased estimate) is the appropriate estimate for use.

Estimates that differ from expected values (such as worst-case estimates) may be provided in addition to expected values, but the rationale for such estimates must be clearly presented. For any such estimate, the analysis should identify the nature and magnitude of any bias. For example, studies of past activities have documented tendencies for cost growth beyond initial expectations; analyses should consider whether past experience suggests that initial estimates of benefits or costs are optimistic.

c. Sensitivity Analysis. Major assumptions should be varied and net present value and other outcomes recomputed to determine how sensitive outcomes are to changes in the assumptions. The assumptions that deserve the most attention will depend on the dominant benefit and cost elements and the areas of greatest uncertainty of the program being analyzed. For example, in analyzing a retirement program, one would consider changes in the number of beneficiaries, future wage growth, inflation, and the discount rate. In general, sensitivity analysis should be considered for estimates of: (i) benefits and costs; (ii) the discount rate; (iii) the general inflation rate; and (iv) distributional assumptions. Models used in the

analysis should be well documented and, where possible, available to facilitate independent review.

d. Other Adjustments for Uncertainty. The absolute variability of a risky outcome can be much less significant than its correlation with other significant determinants of social welfare, such as real national income. In general, variations in the discount rate are not the appropriate method of adjusting net present value for the special risks of particular projects. In some cases, it may be possible to estimate *certainty-equivalents* which involve adjusting uncertain expected values to account for risk.

10. **Incidence and Distributional Effects**. The principle of maximizing net present value of benefits is based on the premise that gainers could fully compensate the losers and still be better off. The presence or absence of such compensation should be indicated in the analysis. When benefits and costs have significant distributional effects, these effects should be analyzed and discussed, along with the analysis of net present value. (This will not usually be the case for cost-effectiveness analysis where the scope of government activity is not changing.)

a. Alternative Classification. Distributional effects may be analyzed by grouping individuals or households according to income class (e.g., income quintiles), geographical region, or demographic group (e.g., age). Other classifications, such as by industry or occupation, may be appropriate in some circumstances.

Analysis should aim at identifying the relevant gainers and losers from policy decisions. Effects on the preexisting assignment of property rights by the program under analysis should be reported. Where a policy is intended to benefit a specified subgroup of the population, such as the poor, the analysis should consider how effective the policy is in reaching its targeted group.

b. Economic Incidence. Individuals or households are the ultimate recipients of income; business enterprises are merely intermediaries. Analyses of distribution should identify economic incidence, or how costs and benefits are ultimately borne by households or individuals.

Determining economic incidence can be difficult because benefits and costs are often redistributed in unintended and unexpected ways. For example, a subsidy for the production of a commodity will usually raise the incomes of the commodity's suppliers, but it can also benefit consumers of the commodity through lower prices and reduce the incomes for suppliers of competing products. A subsidy also raises the value of specialized resources used in the production of the subsidized commodity. As the subsidy is incorporated in asset values, its distributional effects can change.

11. **Special Guidance for Public Investment**. This guidance applies only to public investments with social benefits apart from decreased Federal costs. It is not required for cost-effectiveness or lease-purchase analyses. Because taxes generally distort relative prices, they impose a burden in excess of the revenues

they raise. Recent studies of the U.S. tax system suggest a range of values for the marginal excess burden, of which a reasonable estimate is 25 cents per dollar of revenue.

a. Analysis of Excess Burdens. The presentation of results for public investments that are not justified on cost-saving grounds should include a supplementary analysis with a 25 percent excess burden. Thus, in such analyses, costs in the form of public expenditures should be multiplied by a factor of 1.25 and net present value recomputed.

b. Exceptions. Where specific information clearly suggests that the excess burden is lower (or higher) than 25 percent, analyses may use a different figure. When a different figure is used, an explanation should be provided for it. An example of such an exception is an investment funded by user charges that function like market prices; in this case, the excess burden would be zero. Another example would be a project that provides both cost savings to the Federal Government and external social benefits. If it is possible to make a quantitative determination of the portion of this project's costs that give rise to Federal savings, that portion of the costs may be exempted from multiplication by the factor of 1.25.

12. **Special Guidance for Regulatory Impact Analysis**. Additional guidance for analysis of regulatory policies is provided in Regulatory Program of the United States Government which is published annually by OMB. (See "Regulatory Impact Analysis Guidance," Appendix V of Regulatory Program of the United States Government for April 1, 1991 to March 31, 1992.)

13. **Special Guidance for Lease-Purchase Analysis**. The special guidance in this section does not apply to the decision to acquire the use of an asset. In deciding that, the agency should conduct a benefit-cost analysis, if possible. Only after the decision to acquire the services of an asset has been made is there a need to analyze the decision whether to lease or purchase.

a. Coverage. The Circular applies only when both of the following tests of applicability are satisfied:

(1) The lease-purchase analysis concerns a capital asset, (including durable goods, equipment, buildings, facilities, installations, or land) which:

(a) Is leased to the Federal Government for a term of three or more years; or,

(b) Is new, with an economic life of less than three years, and leased to the Federal Government for a term of 75 percent or more of the economic life of the asset; or,

(c) Is built for the express purpose of being leased to the Federal Government; or,

(d) Is leased to the Federal Government and clearly has no alternative commercial use (e.g., a special- purpose government installation).

(2) The lease-purchase analysis concerns a capital asset or a group of related assets whose total fair market value exceeds $1 million.

b. Required Justification for Leases. All leases of capital assets must be justified as preferable to direct government purchase and ownership. This can be done in one of three ways:

(1) By conducting a separate lease-purchase analysis. This is the only acceptable method for major acquisitions. A lease represents a major acquisition if:

(a) The acquisition represents a separate line-item in the agency's budget;

(b) The agency or OMB determines the acquisition is a major one; or

(c) The total purchase price of the asset or group of assets to be leased would exceed $500 million.

(2) By conducting periodic lease-purchase analyses of recurrent decisions to lease similar assets used for the same general purpose. Such analyses would apply to the entire class of assets. OMB approval should be sought in determining the scope of any such generic analysis.

(3) By adopting a formal policy for smaller leases and submitting that policy to the OMB for approval. Following such a policy should generally result in the same lease- purchase decisions as would conducting separate lease- purchase analyses. Before adopting the policy, it should be demonstrated that:

(a) The leases in question would generally result in substantial savings to the Government that could not be realized on a purchase;

(b) The leases are so small or so short-term as to make separate lease-purchase analysis impractical; and

(c) Leases of different types are scored consistently with the instructions in Appendices B and C of OMB Circular No. A-11.

c. Analytical Requirements and Definitions. Whenever a Federal agency needs to acquire the use of a capital asset, it should do so in the way that is least expensive for the Government as a whole.

(1) Life-Cycle Cost. Lease-purchase analyses should compare the net discounted present value of the life-cycle cost of leasing with the full costs of buying or constructing an identical asset. The full costs of buying include the asset's purchase price plus the net discounted present value of any relevant ancillary services connected with the purchase. (Guidance on the discount rate to use for lease-purchase analysis is in Section 8.c.)

(2) Economic Life. For purposes of lease-purchase analysis, the economic life of an asset is its remaining or productive lifetime. It begins when the asset is acquired and ends when the asset is retired from service. The economic life is frequently not the same as the useful life for tax purposes.

(3) Purchase Price. The purchase price of the asset for purposes of lease-purchase analysis is its fair market value, defined as the price a willing buyer could reasonably expect to pay a willing seller in a competitive market to acquire the asset.

(a) In the case of property that is already owned by the Federal Government or that has been donated or acquired by condemnation, an imputed purchase price should be estimated. (Guidance on making imputations is provided in Section 13.c.(6).)

(b) If public land is used for the site of the asset, the imputed market value of the land should be added to the purchase price.

(c) The asset's estimated residual value, as of the end of the period of analysis, should be subtracted from its purchase price. (Guidance on estimating residual value is provided in Section 13.c.(7).)

(4) Taxes. In analyzing the cost of a lease, the normal payment of taxes on the lessor's income from the lease should not be subtracted from the lease costs since the normal payment of taxes will also be reflected in the purchase cost. The cost to the Treasury of special tax benefits, if any, associated with the lease should be added to the cost of the lease. Examples of such tax benefits might include highly accelerated depreciation allowances or tax-free financing.

(5) Ancillary Services. If the terms of the lease include ancillary services provided by the lessor, the present value of the cost of obtaining these services separately should be added to the purchase price. Such costs may be excluded if they are estimated to be the same for both lease and purchase alternatives or too small to affect the comparison. Examples of ancillary services include:

(a) All costs associated with acquiring the property and preparing it for use, including construction, installation, site, design, and management costs.

(b) Repair and improvement costs (if included in lease payments).

(c) Operation and maintenance costs (if included in lease payments).

(d) Imputed property taxes (excluding foreign property taxes on overseas acquisitions except where actually paid). The imputed taxes approximate the costs of providing municipal services such as water, sewage, and police and fire protection. (See Section (6) below.)

(e) Imputed insurance premiums. (See Section (6) below.)

(6) Estimating Imputed Costs. Certain costs associated with the Federal purchase of an asset may not involve a direct monetary payment. Some of these imputed costs may be estimated as follows.

(a) Purchase Price. An imputed purchase price for an asset that is already owned by the Federal Government or which has been acquired by donation or condemnation should be based on the fair market value of similar properties that have been traded on commercial markets in the same or similar localities. The same method should be followed in estimating the imputed value of any Federal land used as a site for the asset.

(b) Property Taxes. Imputed property taxes may be estimated in two ways.

(i) Determine the property tax rate and assessed (taxable) value for comparable property in the intended locality. If there is no basis on which to estimate future changes in tax rates or assessed values, the first-year tax rate and assessed value (inflation adjusted for each subsequent year) can be applied to all years. Multiply the assessed value by the tax rate to determine the annual imputation for property taxes.

(ii) As an alternative to step (i) above, obtain an estimate of the current local effective property tax rate from the Building Owners and Managers Association's Regional Exchange Reports. Multiply the fair market value of the government-owned property (inflation adjusted for each year) by the effective tax rate.

(c) Insurance Premiums. Determine local estimates of standard commercial coverage for similar property from the Building Owners and Managers Association's Regional Exchange Reports.

(7) Residual Value. A property's residual value is an estimate of the price that the property could be sold for at the end of the period of the lease-purchase analysis, measured in discounted present value terms.

(a) The recommended way to estimate residual value is to determine what similar, comparably aged property is currently selling for in commercial markets.

(b) Alternatively, book estimates of the resale value of used property may be available from industry or government sources.

(c) Assessed values of similar, comparably aged properties determined for property tax purposes may also be used.

(8) Renewal Options. In determining the term of a lease, all renewal options shall be added to the initial lease period.

14. **Related Guidance**.

a. OMB Circular No. A-11, "Preparation and Submission of Annual Budget Estimates."
b. OMB Circular No. A-19, "Legislative Coordination and Clearance."
c. OMB Circular No. A-70, "Federal Credit Policy."
d. OMB Circular No. A-76, "Performance of Commercial Activities."
e. OMB Circular No. A-109, "Policies to Be Followed in the Acquisition of Major Systems."
f. OMB Circular No. A-130, "Management of Federal Information Resources."
9. "Joint OMB and Treasury Guidelines to the Department of Defense Covering Lease or Charter Arrangements for Aircraft and Naval Vessels."
h. Executive Order 12291, "Federal Regulation."
i. "Regulatory Impact Analysis Guidance," in Regulatory Program of the United States Government.
j. "Federal Energy Management and Planning Programs; Life Cycle Cost Methodology and Procedures," Federal Register, Vol. 55, No. 17, January 25, 1990, and Vol. 55, No. 224, November 20, 1990.
k. Presidential Memorandum of April 29, 1992, "Benefits and Costs of Legislative Proposals."

15. **Implementation**. Economic analyses submitted to OMB will be reviewed for conformity with Items 5 to 13 in this Circular, through the Circular No. A-11 budget justification and submission process, and Circular No. A-19, legislative review process.

16. **Effective Date**. This Circular is effective immediately.

17. **Interpretation**. Questions concerning interpretation of this Circular should be addressed to the Office of Economic Policy, Office of Management and Budget (202-395-5873) or, in the case of regulatory issues and analysis, to the Office of Information and Regulatory Affairs (202-395-4852).

APPENDIX A

DEFINITION OF TERMS

Benefit-Cost Analysis -- A systematic quantitative method of assessing the desirability of government projects or policies when it is important to take a long view of future effects and a broad view of possible side-effects.

Capital Asset -- Tangible property, including durable goods, equipment, buildings, installations, and land.

Certainty-Equivalent -- A certain (i.e., nonrandom) outcome that an individual values equally to an uncertain outcome. For a riskaverse individual, the certainty-equivalent for an uncertain set of benefits may be less than the mathematical expectation of the outcome; for example, an individual may value a 50-50 chance of winning $100 or $0 as only $45. Analogously, a risk-averse individual may have a certainty-equivalent for an uncertain set of costs that is larger in magnitude than the mathematical expectation of costs.

Cost-Effectiveness -- A systematic quantitative method for comparing the costs of alternative means of achieving the same stream of benefits or a given objective.

Consumer Surplus -- The maximum sum of money a consumer would be willing to pay to consume a given amount of a good, less the amount actually paid. It is represented graphically by the area between the demand curve and the price line in a diagram representing the consumer's demand for the good as a function of its price.

Discount Rate -- The interest rate used in calculating the present value of expected yearly benefits and costs.

Discount Factor -- The factor that translates expected benefits or costs in any given future year into present value terms. The discount factor is equal to $1/(1 + i)^t$ where i is the interest rate and t is the number of years from the date of initiation for the program or policy until the given future year.

Excess Burden -- Unless a tax is imposed in the form of a lump sum unrelated to economic activity, such as a head tax, it will affect economic decisions on the margin. Departures from economic efficiency resulting from the distorting effect of taxes are called excess burdens because they disadvantage society without adding to Treasury receipts. This concept is also sometimes referred to as deadweight loss.

External Economy or Diseconomy -- A direct effect, either positive or negative, on someone's profit or welfare arising as a byproduct of some other person's or firm's activity. Also referred to as neighborhood or spillover effects, or externalities for short.

Incidence -- The ultimate distributional effect of a tax, expenditure, or regulatory program.

Inflation -- The proportionate rate of change in the general price level, as opposed to the proportionate increase in a specific price. Inflation is usually

measured by a broad-based price index, such as the implicit deflator for Gross Domestic Product or the Consumer Price Index.

Internal Rate of Return -- The discount rate that sets the net present value of the stream of net benefits equal to zero. The internal rate of return may have multiple values when the stream of net benefits alternates from negative to positive more than once.

Life Cycle Cost -- The overall estimated cost for a particular program alternative over the time period corresponding to the life of the program, including direct and indirect initial costs plus any periodic or continuing costs of operation and maintenance.

Multiplier -- The ratio between the direct effect on output or employment and the full effect, including the effects of second order rounds or spending. Multiplier effects greater than 1.0 require the existence of involuntary unemployment.

Net Present Value -- The difference between the discounted present value of benefits and the discounted present value of costs.

Nominal Values -- Economic units measured in terms of purchasing power of the date in question. A nominal value reflects the effects of general price inflation.

Nominal Interest Rate -- An interest rate that is not adjusted to remove the effects of actual or expected inflation. Market interest rates are generally nominal interest rates.

Opportunity Cost -- The maximum worth of a good or input among possible alternative uses.

Real or Constant Dollar Values -- Economic units measured in terms of constant purchasing power. A real value is not affected by general price inflation. Real values can be estimated by deflating nominal values with a general price index, such as the implicit deflator for Gross Domestic Product or the Consumer Price Index.

Real Interest Rate -- An interest rate that has been adjusted to remove the effect of expected or actual inflation. Real interest rates can be approximated by subtracting the expected or actual inflation rate from a nominal interest rate. (A precise estimate can be obtained by dividing one plus the nominal interest rate by one plus the expected or actual inflation rate, and subtracting one from the resulting quotient.)

Relative Price -- A price ratio between two goods as, for example, the ratio of the price of energy to the price of equipment.

Shadow Price -- An estimate of what the price of a good or input would be in the absence of market distortions, such as externalities or taxes. For example, the shadow price of capital is the present value of the social returns to capital (before corporate income taxes) measured in units of consumption.

Sunk Cost -- A cost incurred in the past that will not be affected by any present or future decision. Sunk costs should be ignored in determining whether a new investment is worthwhile.

Transfer Payment -- A payment of money or goods. A pure transfer is unrelated to the provision of any goods or services in exchange. Such payments alter the distribution of income, but do not directly affect the allocation of resources on the margin.

Treasury Rates -- Rates of interest on marketable Treasury debt. Such debt is issued in maturities ranging from 91 days to 30 years.

Willingness to Pay -- The maximum amount an individual would be willing to give up in order to secure a change in the provision of a good or service.

APPENDIX B

ADDITIONAL GUIDANCE FOR DISCOUNTING

1. Sample Format for Discounting Deferred Costs and Benefits

Assume a 10-year program which will commit the Government to the stream of real (or constant-dollar) expenditures appearing in column (2) of the table below and which will result in a series of real benefits appearing in column (3). The discount factor for a 7 percent discount rate is shown in column (4). The present value cost for each of the 10 years is calculated by multiplying column (2) by column (4); the present value benefit for each of the 10 years is calculated by multiplying column (3) by column (4). The present values of costs and benefits are presented in columns (5) and (6) respectively.

Year since initiation, renewal or expansion (1)	Expected yearly cost (2)	Expected yearly benefit (3)	Discount factors for 7% (4)	Present value of costs Col. 2 x Col. 4 (5)	Present value of benefits Col. 3 x Col. 4 (6)
1	$10.00	$ 0.00	0.9346	$ 9.35	$ 0.00
2	20.00	0.00	0.8734	17.47	0.00
3	30.00	5.00	0.8163	24.49	4.08
4	30.00	10.00	0.7629	22.89	7.63
5	20.00	30.00	0.7130	14.26	21.39
6	10.00	40.00	0.6663	6.66	26.65
7	5.00	40.00	0.6227	3.11	24.91
8	5.00	40.00	0.5820	2.91	23.28
9	5.00	40.00	0.5439	2.72	21.76
10	5.00	25.00	0.5083	2.54	12.71
Total				$106.40	$142.41

NOTE: The discount factor is calculated as $1/(1 + i)^t$ where i is the interest rate (.07) and t is the year.

The sum of column (5) is the total present value of costs and the sum of column (6) is the total present value of benefits. Net present value is $36.01, the difference between the sum of discounted benefits and the sum of discounted costs.

2. End-of-Year and Mid-Year Discount Factors

The discount factors presented in the table above are calculated on the implicit assumption that costs and benefits occur as lump sums at year-end. When costs and benefits occur in a steady stream, applying mid-year discount factors is more appropriate. For instance, the first cost in the table may be estimated to occur

after six months, rather than at the end of one year to approximate better a steady stream of costs and benefits occurring over the first year. Similarly, it may be assumed that all other costs and benefits are advanced six months to approximate better a continuing steady flow.

The present values of costs and benefits computed from the table above can be converted to a mid-year discounting basis by multiplying them by 1.0344 (the square root of 1.07). Thus, if the above example were converted to a mid-year basis, the present value of costs would be $110.06, the present value of benefits would be $147.31, and the net present value would be $37.25.

3. **Illustrative Discount Factors for Discount Rate of 7 percent**

Year since Initiation, Renewal or Expansion	Year-end Discount Factors	Mid-year Discount Factors	Beginning-of-year Discount Factors
1	0.9346	0.9667	1.0000
2	0.8734	0.9035	0.9346
3	0.8163	0.8444	0.8734
4	0.7629	0.7891	0.8163
5	0.7130	0.7375	0.7629
6	0.6663	0.6893	0.7130
7	0.6227	0.6442	0.6663
8	0.5820	0.6020	0.6227
9	0.5439	0.5626	0.5820
10	0.5083	0.5258	0.5439
11	0.4751	0.4914	0.5083
12	0.4440	0.4593	0.4751
13	0.4150	0.4292	0.4440
14	0.3878	0.4012	0.4150
15	0.3624	0.3749	0.3878
16	0.3387	0.3504	0.3624
17	0.3166	0.3275	0.3387
18	0.2959	0.3060	0.3166
19	0.2765	0.2860	0.2959
20	0.2584	0.2673	0.2765
21	0.2415	0.2498	0.2584
22	0.2257	0.2335	0.2415
23	0.2109	0.2182	0.2257
24	0.1971	0.2039	0.2109
25	0.1842	0.1906	0.1971
26	0.1722	0.1781	0.1842
27	0.1609	0.1665	0.1722
28	0.1504	0.1556	0.1609
29	0.1406	0.1454	0.1504
30	0.1314	0.1359	0.1406