9.0 - Chapter Introduction

In this chapter, you will learn to use net present value analysis in cost and price analysis.

Time Value of Money. The time value of money is probably the single most important concept in financial analysis. When we say that money has time value, we mean that a dollar to be received today is worth more than a dollar to be received at any future time. Money has a time value because of the opportunity to earn interest or the cost of paying interest on borrowed capital.

For example, assume that you need to buy a new car but do not have the money that you need to pay for it. You must borrow the entire purchase price. Two dealers offer to sell you identical cars for $21,000. Dealer #1 requires cash on delivery. Dealer #2 will provide you an interest-free loan for one year. Where would you buy the car? Probably from Dealer #2, because you will save all the interest for the first year of ownership.

Present Value. In the example above, Dealer #2 was clearly the low-cost choice (because of the interest-free loan for one year), but what if Dealer #1 offered the car at a lower price, say $20,000? Which would be the low-cost choice then?

To make that decision, you must be able to determine the present value of each alternative. If you could invest $20,000 at 5.0 percent interest, it would be worth $21,000 at the end of one year. Based on that calculation, we could say that $20,000 is the present value of $21,000 one year from now when the interest rate is 5.0 percent. At that interest rate, you would presumably be indifferent about where to buy your car because the present value of the two choices is the same.

Net Present Value. Calculating present value may involve receipts as well as expenditures. For example, the alternatives may have some salvage value after their useful life has ended. The estimated receipt from the sale of the item must be considered in your analysis. The difference between the present value of the receipts and the present value of the expenditures is net present value. The best financial choice is the alternative with the highest net present value. In procurement, the alternative with the

highest net present value is the alternative with the smallest payment net present value.

Factors Affecting Net Present Value   . The major factors affecting present value are the timing of the expenditure (receipt) and the discount (interest) rate. The higher the discount rate, the lower the present value of an expenditure at a specified time in the future. For example, as you learned above, $20,000 is the present value of $21,000 one year from now when the interest rate is 5.0 percent. If the interest rate were 10.0 percent, $19,09 would be the approximate present value of $21,000 one year from now.

   Note that the change in the interest rate would have a significant affect on your net present value analysis in the car case. Your choice is still to pay $20,000 now or $21,000 a year from now. At an interest rate of 10 percent you could invest $19,090.90 today to earn the $21,000 a year from now. So it appears that the low-cost choice is to wait and pay the $21,000 in one year.

Office of Management and Budget (OMB) Circular A-94   Circular A-94 , Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, delineates the rates that you should use in Government net present value analysis. These rates are based on the rate that the Treasury Department pays to borrow money for periods from 91 days to 30 years and they are updated annually at the time of the President's budget submission to Congress. These rates can be found on the internet at http://www.whitehouse.gov/OMB/circulars/index.html   or obtained by telephoning (202) 395-3381.

Net Present Value Analysis   . Regardless of the application, you should use this 5-step process in net present value analysis:

Step 1.   Select the discount rate.

Step 2.   Identify the costs/benefits to be considered in analysis.

Step 3.   Establish the timing of the costs/benefits.

Step 4.   Calculate net present value of each alternative.

Step 5. Select the offer with the best net present value.

Lease-Purchase Analysis Examples (OMB Circular A-94, Paragraph 13). In this chapter, we will demonstrate the application of net present value analysis concepts using lease-purchase examples. Our use of these examples is not meant to ignore other uses of net present value analysis in Government contracting. We selected the lease-purchase decision because of the emphasis in OMB Circular A-94 and because of the growing Government interest in leasing as a viable alternative to purchase.

9.1 - Identifying Situations For Use

OMB Suggested Use (FAR 23.203 and OMB Circular A-94, Paragraph 4). Unless precluded by agency procedures, OMB suggests the use of net present value analysis in any analysis 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. Examples of acquisition decisions that involve such analyses include:

- Lease-purchase analyses;
- Analyses of different lease alternatives;
- Life-cycle cost analyses; and
- Trade-off analyses considering acquisition costs and energy-utilization costs of operation.

Required Lease-Purchase Analysis (OMB Circular A-94, Paragraph 13). In addition to the suggested application to any benefit-cost analysis, OMB Circular A-94 requires that any decision to lease a capital asset be justified as preferable to direct Government purchase and ownership in situations where both the following are true:

- The lease-purchase analysis concerns a capital asset or a group of related assets whose total fair market value exceeds $1 million.
- The lease-purchase analysis concerns a capital asset (including durable goods, equipment, buildings, facilities, installations, or land) which is:
    - o Leased to the Government for a term of three or more years;

- o New, with an economic life of less than three years, and leased to the Government for a term of 75 percent or more of the economic life of the asset;
- o Built for the express purpose of being leased to the Government; or
- o Leased to the Government and clearly has no alternative commercial use (e.g., a special-purpose Government installation).

The analysis conducted in support of that justification should involve net present value analysis and can be performed in one of three ways, as delineated in the table below:

Methods of Lease-Purchase Analysis	Use...
Conduct a separate lease-purchase analysis for each acquisition.	Only for major acquisitions. A lease is a major acquisition when one of the following is true: • Acquisition is a separate line item in the Agency's budget. • The agency or the OMB determines that the acquisition is a major one. • The total purchase price of the asset or group of assets will exceed $500,000.
Conduct periodic lease-purchase analysis of the recurring acquisition of assets for the same general purpose.	For an entire class of assets.
Adopting a policy for smaller leases and submitting the policy to OMB for approval.	Normally after the agency demonstrates that: • The leases in question would generally result in substantial savings to the Government. • The leases in question are so small or so short as to

	make separate analyses impractical. • Leases of different types are scored consistent with the requirements of OMB Circular A-11, Preparation and Submission of Annual Budget Estimates.

9.2 - Selecting A Discount Rate

OMB Discount Rate Guidance (OMB Circular A-94, Appendix C). Unless precluded by agency practice, you should use the current discount rates contained in OMB Circular A-94, Appendix C.

Nominal Treasury Rates (OMB Circular A-94, Appendix A & Appendix C). For most benefit-cost analysis you should use nominal discount rates (i.e., discount rates that include the effect of actual or expected inflation/deflation). The following rates are the actual rates contained in OMB Circular A-94, Appendix C for use through January 1999:

Nominal Discount Rates	
Maturity in Years	**Discount Rate**
≤ 3 years	5.6%
5-year	5.7%
7-year	5.8%
10-year	5.9%
≥ 30 years	6.1%

Real Treasury Rate (OMB Circular A-94, Appendix A & Appendix C). For some projects (e.g., long-term real estate leases), you may find it more reasonable to state payments in terms of stable purchasing power (that is, constant dollars) and adjust them separately using a pre-determined price index. In such situations, cash flows should be discounted using the real Treasury borrowing rate for debt of comparable maturity. The real Treasury rate is the nominal Treasury rate adjusted to eliminate the effect of anticipated inflation/deflation. These rates are also

contained in OMB Circular A-94, Appendix C of and are updated annually. The following real rates are to be used for discounting dollar cash flows through January 1999.

Real Discount Rates	
Maturity in Years	Discount Rate
< 3 years	3.4%
5 year	3.5%
7 year	3.5%
10 year	3.6%
> 30 years	3.8%

Selecting the Rate for Analysis. Whether you are using nominal or real treasury rates, match the rate to the analysis period (e.g., use 5.6 percent to discount all expenditures/ receipts for a 3-year lease analysis).

To analyze a project requiring analysis for a period different from those presented above, use linear interpolation to determine the appropriate discount rate.

Step 1. Estimate the change in the discount rate for each year between the next lower and next higher maturity period with identified discount rates.

$$R_c = \frac{M_2 - M_1}{R_2 - R_1}$$

Where:

R_C = Change in the discount rate for each year difference in the project maturity period

M_1 = Next lower maturity period with an identified discount rate

M_2 = Next higher maturity period with an identified discount rate

R_1 = Discount rate for maturity period M_1

R_2 = Discount rate for maturity period M_2

Step 2. Calculate the interpolated rate using the rate for the next lower maturity period with an identified rate and the estimated change in the discount rate for each year difference in the maturity period.

$$R_I = R_1 + R_c (M_p - M_1)$$

Where:

R_I = Interpolated discount rate for the project maturity period

M_p = Maturity period for the project

All other symbols are as defined above

Linear Rate Interpolation Example. The following example demonstrates the steps involved in interpolating a nominal interest rate for evaluating an 8-year lease:

Step 1. Estimate the change in the discount rate for each year between the next lower and next higher maturity period with identified discount rates.

$$
\begin{aligned}
R_c &= \frac{M_2 - M_1}{R_2 - R_1} \\
&= \frac{5.9\ 5.8}{10 - 7} \\
&= \frac{.1}{3} \\
&= .033
\end{aligned}
$$

Step 2. Calculate the interpolated rate using the rate for the next lower maturity period with an identified rate and the estimated change in the discount rate for each year difference in the maturity period.

$$
\begin{aligned}
R_I &= R_1 + R_c (M_p - M_1) \\
&= 5.8 + .033\,(8 - 7) \\
&= 5.8 + .033\,(1) \\
&= 5.8 + .033 \\
&= 5.833
\end{aligned}
$$

9.3 - Identifying Cash Flows To Consider

Cash Flow. A cash flow is a receipt or expenditure related to the proposed lease or purchase. Guidance on the costs/benefits that you should consider in lease-purchase analysis is provided in both FAR and OMB Circular A-94. The solicitation should require each offeror to identify relevant cash flows associated with its proposal. Remember, the purpose of the Government evaluation is to identify the best net present value.

Analysis Period (OMB Circular A-94, Paragraph 13c8). In lease-purchase analysis, the proper period for analysis is the lease period including all renewal options. The period of the projected lease must be defined in the solicitation to assure identification and analysis of all relevant cash flows.

Points to Consider in Identifying Costs and Benefits for Analysis (OMB Circular A-94, Para 6a1 & 13c1).

   Lease-purchase analysis should compare the net present value of the incremental costs related to leasing the asset with the incremental costs related to purchasing (or constructing) and owning the asset. You should consider incremental costs associated with acquisition as well as the ancillary costs related to acquisition and ownership. Use the following general guidelines as you identify incremental benefits and costs to include in your analysis:

- Analysis should consider costs or benefits associated with one alternative in the evaluation of other alternatives. For example, if the lease payments include maintenance, the purchase alternative should also include the cost of maintenance.
- Analysis should consider costs or benefits that will be different for different alternatives. For example, if different alternatives will use substantially different amounts of electricity, the cost of electricity should be considered.
- Analysis should not consider sunk costs or benefits. Past experience is relevant only in helping to estimate future costs or benefits. For example, if the Government has decided to replace existing equipment, the value of that equipment is not relevant.
- Analysis should not consider costs which will be identical for all alternatives. For example, if the

Government has decided to replace existing equipment, the cost of removing that equipment is not relevant because it must be accomplished for all alternatives.

Examples of Lease-Purchase Costs and Benefits Commonly Considered (FAR 7.401 and OMB Circular A-94 Paragraph 13c).

Lease-purchase analysis is one area where you might be required to use net present value analysis. The costs and benefits identified below for lease-purchase analysis demonstrate the type of cash flows that you should consider in a net present value analysis.

- **Net Purchase Price.** Any net present value analysis of a decision to purchase an asset must consider the purchase price. OMB defines the purchase price of the asset as the price a willing buyer could reasonably expect to pay a willing seller in a competitive market to acquire the asset. Normally, lease-purchase decisions do not consider trade-ins of existing equipment. Disposal of existing equipment should be handled following agency property disposal procedures and considered as part of disposal costs and salvage value as presented below.
- **Lease Payments.** Any decision to lease property using net present value analysis must consider the amount and timing of lease payments.
- **Ancillary Services.** If ancillary costs differ between alternatives, they should be considered. (If costs and timing are the same for all alternatives, they need not be considered.) Both OMB Circular A-94 and the FAR provide guidance on the ancillary costs and benefits that you should consider in lease-purchase analysis. The following points combine the recommendations from both sources:
    o All costs associated with acquiring the property and preparing it for use including:
        ▪ Costs;
        ▪ Transportation;
        ▪ Installation;
        ▪ Site preparation;
        ▪ Design; and
        ▪ Management.
    o Repair and improvement costs, including:
        ▪ Estimated unplanned service calls; and

- Improvements projected to be required during the lease period to assure continued operation.
  o Operation and maintenance costs, including:
    - Operating labor and supply requirements; and
    - Routing maintenance.
  o Disposal costs and salvage value, including the:
    - Cost of modifications required to return related equipment to its original configuration;
    - Cost or modifications required to return related facilities to their original configuration; and
    - Equipment value to the Government at the end of the lease period (e.g., salvage value).

9.4 - Determining Cash Flow Timing

The timing of cash flows is a vital element of any net present value analysis. This section presents two methods for considering that timing.

- 9.4.1 – Discount Factors for End-of-Year Payment
- 9.4.2 – Discount Factors for Mid-Year Payment

General Equation for Present Value Calculation. You can compute the present value of any cash flow (expenditure/receipt) in the future, by multiplying the amount by the appropriate discount rate:

PV = DF(CF)

Where:

PV = Present value

DF = Discount factor

CF = Cash flow

Discount Factors. The discount factor that you use in net present value analysis will depend on the discount rate that you use and the timing of the cash flow. In defining the timing of the cash flow, you must identify the year and

the timing during the year. There are two commonly used assumptions about when during the year the payment occurs:

- End-of-year payment -- use this assumption when a single payment is made at the end of the year or the beginning of the year.
  - A payment that is due immediately is not discounted.
  - A payment that is due at the beginning of Year t is evaluated as a payment due at the end of Year t-1. For example, payments due at the beginning of Year 2 and Year 3 will be treated as if they are due at the end of Year 1 and Year 2.
- Mid-year payment -- use this assumption when a single payment will be made mid-year or payments will be made at regular intervals throughout the year.

Offer-Identified Cash Flows. Solicitations must require all offerors to clearly define the amount and timing of each cash flow (expenditure/receipt) unique to the proposal. The proposal should also include a rationale to support the timing of any cash flow unless the timing is set forth in the contract.

For example: The timing of lease payments does not require any additional support because the timing (e.g., monthly, quarterly, or annually) is defined in the lease agreement. However, the lease agreement may include additional charges (e.g., on-call equipment repair). For such charges, the rationale for both the estimated expenditure and its timing should be clearly defined in the proposal.

Government-Identified Cash Flows. Government technical personnel must identify cash flows related to different proposals that are beyond the control of the offerors.

For example: The amount and timing of expenditures related to Government ownership must also be identified prior to proposal evaluation. Normally, Government personnel will be responsible for preparing these estimates based on available information. However, each offeror may be required to provide information required to develop these estimates (e.g., costs to modify equipment to meet anticipated changes in Government requirements).

9.4.1 - Discount Factors For End-Of-Year Payment

When to Use End-of-Year Discount Factors. Use end-of-year discount factors when payments are due at the end of the year or the beginning of the year. Remember, that a payment due at the beginning of Year 3 is the same as a payment due at the end of Year 2.

End-of-Year Discount Factor Calculation. The discount factor formula for each end-of-year cash flow (payment/receipt) is written:

$$DF = \frac{1}{(1+i)^t}$$

Where:

DF = End-of-year discount factor

i = Discount rate

t = Number of years until the payment (receipt is due)

For Example: Determine the present value (PV) of a payment of $1,000 due at the end of 1 year using the nominal discount rate for three years or less, 5.6 percent.

Discount Factor Calculation:

$$
\begin{aligned}
DF &= \frac{1}{(1+i)^t} \\
&= \frac{1}{(1+.056)^1} \\
&= \frac{1}{1.056^1} \\
&= \frac{1}{1.056} \\
&= .9470
\end{aligned}
$$

Present Value Calculation:

$$
\begin{aligned}
PV &= DF(CF) \\
&= .9470\,(\$1,000) \\
&= \$947 \text{ (rounded to the nearest dollar)}
\end{aligned}
$$

Sum Factors for Repetitive End-of-Year Cash Flows. When
there is a repetitive cash flow such as a lease payment,
you can use a sum factor to speed the calculation process.

PV = SF(CF)

Where:

PV = Present value

SF = End-of-year sum factor

CF = Cash flow

For example: Determine the present value of a series of
three payments of $1,000 each due at the end of each of the
next three years, when the discount rate is 5.6 percent.

Year	Payment	Formula	Calculation	Discount Factor (DF)	Present Value (PV)
1	$1,000	$1/(1.056)^1$	1/1.0560	.9470[a]	$ 947[b]
2	1,000	$1/(1.056)^2$	1/1.1151	.8968	$ 897
3	1,000	$1/(1.056)^3$	1/1.1776	.8492	$ 849
			Total	2.6930	$2,693

[a] Factors are rounded to the four decimal places.
[b] Amounts are rounded to the nearest dollar.

The present value of a series of three $1,000 end-of-
year payments is $2,693 when the discount rate is 5.6
percent. The sum of the three factors is 2.6930. Using the
sum factor and the equation above:

PV = SF(CF)
   = 2.6930($1,000)
   = $2,693 present value (rounded to the nearest dollar)

Note: The answer calculated using the sum factor is the
same as the answer calculated using individual discount
factors. However, answers may vary slightly because of
differences in rounding.

End-of-Year Nominal Discount Tables. Appendix A-1,
Discount Factors -- Nominal Rates, End-of-Year Payments,

contains factors for the 3-year, 5-year, 7-year, 10-year, and 30-year discount rates.

End-of-Year Real Discount Tables. [Appendix A-3, Discount Factors -- Real Rates](#), End-of-Year Payments, contains factors for the 3-year, 5-year, 7-year, 10-year, and 30-year discount rates.

9.4.2 - Discount Factors For Mid-Year Payment

When to Use Mid-Year Discount Factors. Use mid-year discount factors when a single payment will be made mid-year or payments will be made at regular intervals (e.g., monthly or quarterly) throughout the year.

Mid-Year Discount Factor Calculation. The discount factor formula for mid-year cash flow (payment/receipt) is written:

$$MYDF = \frac{1}{(1 + i)^{(t-.5)}}$$

Where:

MYDF = Mid-year discount factor

i = Discount rate

t = Number of years until the payment (receipt) is due

For example: Determine the present value of a series of 12 monthly payments of $1,000 each due at the beginning of each month for 1 year. The total amount for the year is $12,000. These payments are spaced evenly over the year; hence the use of a MYDF would be appropriate.

Discount Factor Calculation:

$$MYDF = \frac{1}{(1+i)^{(t-.5)}}$$

$$= \frac{1}{(1.056)^{(1-.5)}}$$

$$= \frac{1}{1.056^{.5}}$$

$$= \frac{1}{1.0276}$$

$$= .9731$$

Present Value Calculation:

$$PV = MYDF(CF)$$
$$= .9731\ (\$12,000)$$
$$= \$11,677\ \text{(rounded to the nearest dollar)}$$

Sum Factors for Repetitive Mid-Year Cash Flows. When there is a repetitive cash flow such as a lease payment, you can use sum factors to speed the calculation process.

$$PV = MYSF(CF)$$

Where:

PV = Present value

MYSF = Mid-year sum factor

CF = Cash flow

For example: Determine the present value of a series of 36 monthly payments of $1,000 each due at the beginning of each month for the next three years; that is, $12,000 per year for three years. These payments are spaced evenly over the year; hence the use of a MYDF would be appropriate.

Year	Payment	Formula	Calculation	Discount Factor (MYDF)	Present Value (PV)
1	$12,000	$1/(1.056)^{.5}$	1/1.0276	.9731[a]	$11,677[b]
2	$12,000	$1/(1.056)^{1.5}$	1/1.0852	.9215	$11,058
3	$12,000	$1/(1.056)^{2.5}$	1/1.1459	.8727	$10,472
			Total	2.7673	$33,207

[a] Factors are rounded to the four decimal places.
[b] Amounts are rounded to the nearest dollar.

The present value of a series of three $12,000 mid-year payments is $33,207, when the discount rate is 5.6 percent. The sum of the three mid-year discount factors is 2.7673. Using the sum factor and the equation above:

$$
\begin{aligned}
PV &= MYSF(CF) \\
&= 2.7673(\$12{,}000) \\
&= \$33{,}208 \text{ present value (rounded to the nearest dollar)}
\end{aligned}
$$

Note: The answer calculated using the sum factor is slightly higher than the one calculated using individual discount factors, because of rounding differences.

Mid-Year Nominal Discount Tables. Appendix A-2, Discount Factors -- Nominal Rates, Mid-Year Payments, contains factors for the 3-year, 5-year, 7-year, 10-year, and 30-year discount rates.

Mid-Year Real Discount Tables. Appendix A-4, Discount Factors -- Real Rates, Mid-Year Payments, contains factors for the 3-year, 5-year, 7-year, 10-year, and 30-year discount rates.

9.5 - Calculating Net Present Value And Selecting The Best Alternative

Net Present Value Analysis. Remember from the Chapter Introduction that you should use the following 5-step process in net present value analysis:

Step 1. Select the discount rate.

Step 2. Identify the costs/benefits to be considered in analysis.

Step 3. Establish the timing of the costs/benefits.

Step 4. Calculate net present value of each alternative.

Step 5. Select the offer with the best net present value.

This section will demonstrate the use of that 5-step process in two lease-purchase decision examples using nominal discount rates. You should follow the same steps for any net present value analysis whether you are using nominal discount rates or real discount rates.

 Lease-Purchase Decision Example 1. Assume that you want to determine which of the following proposals will result in the lowest total cost of acquisition?

Offeror A: Proposes to lease the asset for 3 years. The annual lease payments are $10,000 per year. The first payment will be due at the beginning of the lease, the remaining two payments are due at the beginning of Years 2 and 3.

Offeror B: Proposes to sell the asset for $29,000. It has a 3-year useful life. Salvage value at the end of the 3-year period, will be $2,000.

Step 1. Select the discount rate. The term of the lease analysis is three years, so we will use the nominal discount rate for three years, 5.4 percent.

Steps 2 and 3. Identify and establish the timing of the costs/benefits to be considered in analysis. The expenditures and receipts associated with the two offers and their timing are delineated in the table below: (Parentheses indicate a cash outflow.)

Offer-Related Expenditures/Receipts		
t	Offer A	Offer B
0	($10,000)	($29,000)
1	($10,000)	-0-
2	($10,000)	-0-
3	-0-	$2,000

Step 4. Calculate net present value. The tables below summarize the net present value calculations applied to each alternative.

Net present value of Offer A			
t	Cash Flow	DF	PV
0	($10,000)	1.0000	($10,000)

1	($10,000)	0.9470	($9,470)
2	($10,000)	0.8968	($8,968)
	Net Present Value		($28,438)

Note the following points in the net present value calculations above:

- o There are no cash inflows associated with Offer A, only outflows.
- o Payments due now are not discounted.
- o Offeror A payments due at the beginning of Years 2 and 3 are treated as if they are due at the end of Years 1 and 2.
- o You could have calculated the net present value of Offer A using the Sum of Discount Factors (Appendix A-1) for the payments due at the beginning of Years 2 and 3. Remember that payments due now are not discounted and payments due at the beginning of Years 2 and 3 are treated as if they are due at the end of Years 1 and 2. The calculations would be:

$$NPV = -\$10,000 + 1.8438(-\$10,000)$$
$$= -\$10,000 - \$18,438$$
$$= -\$28,438$$

Net present value of Offer B			
t	Cash Flow	DF	PV
0	($29,000)	1.0000	($29,000)
3	$2,000	0.8492	$ 1,698
	Net Present Value		($27,302)

Note the following points in the net present value calculations above:

- o Offer B salvage value is treated as a cash inflow at the end of Year 3.
- o Payments due now are not discounted.

Step 5. Select the offer with the best net present value. In this example, we would select Offer B, the offer with the smallest negative net present value.

Lease-Purchase Decision Example 2. Assume that we want to determine which of the following proposals will result in the lowest acquisition cost?

Offeror A-Proposes to lease the asset for 3 years. The monthly lease payments are $1,500; that is, the total amount for each year is $18,000. These payments are spaced evenly over the year, so the use of a MYDF would be appropriate.

Offeror B-Proposes to sell the asset for $56,000. It has a 3-year useful life. At the end of the 3-year period it will have a $3,000 salvage value.

Step 1. Select the discount rate. The term of the analysis is three years, so we will use the nominal discount rate for three years, 5.6 percent.

Steps 2 and 3. Identify and establish the timing of the costs/benefits to be considered in analysis. The expenditures and receipts associated with the two offers and their timing are delineated in the table below:

Offer Expenditures/Receipts		
t	Offer A	Offer B
0	-0-	($56,000)
1	($18,000)	-0-
2	($18,000)	-0-
3	($18,000)	$3,000

Step 4. Calculate net present value. The tables below summarize the net present value calculations applied to each alternative.

Net present value of Offer A			
t	Cash Flow	DF	PV
1	($18,000)	0.9731	($17,516)
2	($18,000)	0.9215	($16,587)
3	($18,000)	0.8727	($15,709)
		Net Present Value	($49,812)

NOTE the following points in the net present value calculations above:

- There are no cash inflows associated with Offer A, only outflows.
- Offeror A payments are due monthly, so we used the nominal rate, mid-year factors from Appendix A-2.
- You could also calculate the net present value of Offer A using the Sum of Discount Factors in Appendix A-2. That calculation would produce a slightly different answer due to rounding differences.

$$NPV = -2.7673(-\$18,000)$$
$$= -\$49,811$$

Net present value of Offer B			
t	Cash Flow	DF	PV
0	($56,000)	1.0000	($56,000)
3	$3,000	0.8492	$2,548
		Net Present Value	($53,452)

Note the following points in the net present value calculations above:

- Offer B salvage value is treated as a cash inflow at the end of Year 3.
- Payments due now are not discounted.

Step 5. Select the offer with the best net present value. In this example, we would select Offer A, the offer with the smallest negative net present value.

9.6 - Identifying Issues And Concerns

Questions to Consider in Analysis. As you perform price/cost analysis, consider the issues and concerns identified in this section, whenever you use net present value analysis.

- ***Is net present value analysis used when appropriate?***

Net present value analysis should be used in any analysis supporting 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.

- ***Are the dollar estimates for expenditures and receipts reasonable?***

The base for all present value calculations is estimated future cash flows. The rationale for those estimates must be documented and supported just like any cost estimate. This includes estimates of costs that will be included in the contract or lease agreement and estimates of other cash flows that are not included. All may be used in present value calculations.

- ***Are the times projected for expenditures and receipts reasonable?***

Discount factors depend on the discount rate and the timing of the cash flow. The timing of any cash flow not documented in the contract or lease agreement must be clearly supported. The offeror is responsible for estimating and defending cash flow estimates included in the proposal. Government technical personnel have that responsibility for estimated costs related to item ownership.

- ***Are the proper discount rates used in the net present value calculations?***

Unless precluded by agency policy, discount rates should be taken from Appendix C of OMB Circular A-94. If they are not, the rationale must be documented.

- The rate selected should be based on the number of time periods included in the analysis. If the period of the analysis does not match any of the discount rate periods delineated in OMB Circular A-94, linear interpolation should be used to estimate a rate for that period of time.

  o Nominal discount rates should be used for any analysis not based on constant year dollars. Real discount rates should be used for any analysis that is based on constant year dollars.

- ***Are the proper discount factors used in analysis?***

The discount factor should be calculated considering the timing of the cash flow.

- End-of-year discount factors (Appendices A-1 and A-3) should be used for cash flows at the beginning or end of the year.
- Mid-year discount factors (Appendices A-2 and A-4) should be used for cash flows in the middle of the year or regularly throughout the year (e.g., monthly or quarterly).

- ***Are discount factors properly calculated from the discount rate?***

End-of-year or mid-year discount rates should be calculated following the procedures delineated in Section 9.4.

- ***Have all cash flows been considered?***

Net present value analysis must consider all relevant cash flows throughout the decision life cycle.