CHAPTER 10

EVALUATING PROPOSED CAPITAL EXPENDITURES
Table of Contents

CHAPTER 10

EVALUATING PROPOSED CAPITAL EXPENDITURES

Table of Contents (Continued)

CHAPTER 10

EVALUATING PROPOSED CAPITAL EXPENDITURES

- ☐ ANALYZING THE CURRENT SITUATION
- ☐ CAPITAL ASSET PLANNING AND APPROVAL
- ☐ OVERVIEW OF CAPITAL INVESTMENT ANALYSIS METHODS
- ☐ USING NET PRESENT VALUE TO EVALUATE PROPOSED CAPITAL INVESTMENTS
- ☐ USING CAPITAL RATIONING TO RANK ALTERNATIVE CAPITAL PROJECTS
- ☐ CHOOSING THE FINANCING METHOD: LEASE VS. DEBT

1000 INTRODUCTION

1000.1 Small businesses periodically face various decisions relating to proposed capital expenditures. Those decisions typically include evaluating whether the business should make a specific capital investment, selecting among several capital investment alternatives, and choosing how to finance a proposed investment. Capital investments include both new projects and major extensions of existing projects. Carefully evaluating both the cost-related and qualitative aspects of each proposal usually ensures an appropriate decision. Analysis may also be needed to evaluate proposals for disposing of existing older assets and replacing them with newer assets. In most small businesses, the controller plays a major role in this process, particularly when evaluating an investment's cost-related aspects or validating the revenue generation projections. Nowadays, a company might wish to consider disposing of assets and outsourcing some processes, an alternative that cannot be overlooked in the current business world.

1000.2 Unfortunately, many small business owners make significant capital investment decisions based only on gut reaction or instinct. The decisions can significantly impact the company's future operating results and cash flows because the investments are typically long term. If the business owner considered the investment's financial aspects at only a cursory level or not at all, the business could suffer disastrous results. To reverse such decisions and dispose of acquired assets may involve tremendous costs. The problems a company could face include investments that do not provide sufficient net return due to excess costs relative

to returns and excess unused capacity. Failure to invest in enough capacity could result in lost opportunities to generate profitable revenue. Excessive investments or the failure to replace older, inefficient assets may result in increased product costs. Higher product cost estimates may put pressure on the sales force to raise prices to a noncompetitive level, thereby decreasing sales. This, in turn, could lead to decreased production, resulting in more unused capacity with a consequent increase in product costs. This continuous mounting pressure to increase sales prices as production drops creates a "death spiral." Controllers should use their influence to safeguard the business by convincing the owner and key managers to incorporate capital investment analysis into the decision-making process. In the event of unused capacities, unused capacity costs should be isolated and not incorporated into the product costs. This amount will show as an added expenditure due to excess capacity, alerting management to tackle the problem of reducing these costs by increasing sales and consequent production, renting out the excess capacity, or disposing of it at a loss. In no case, however, should the cost of unused capacity be passed on to products and recovered through increased sale prices.

1000.3 This chapter provides practical guidance to help controllers perform capital investment analysis for small businesses. It includes the following sections:

- **Analyzing the Current Situation.** Section 1001 presents a simple method—using a diagnostic checklist at Appendix 10A—for analyzing the company's existing capital investment evaluation process. In addition, the summary checklist at Appendix 10B will quickly lead controllers through the key steps in the capital evaluation process.
- **Capital Asset Planning and Approval.** Section 1002 discusses the planning and approval aspects of the capital evaluation process. Controllers may use the related worksheets to prepare capital budgets and request approval for specific capital investment projects.
- **Overview of Capital Investment Analysis Methods.** Section 1003 presents several methods controllers commonly use to analyze proposed capital investments. The advantages and disadvantages of each method are included.
- **Using Net Present Value to Evaluate Proposed Capital Investments.** Section 1004 provides detailed guidance and illustrative worksheets that controllers may use to perform capital investment analysis using the net present value method.
- **Using Capital Rationing to Rank Alternative Capital Projects.** Section 1005 describes how controllers may use the net present value method to rank two or more alternative capital investment proposals.
- **Choosing the Financing Method: Lease vs. Debt.** Section 1006 shows how controllers may use discounted cash flow analysis to evaluate financing options once the business has made the capital investment decision.

The appendix includes practice aids—worksheets and checklists—for performing both the capital investment and financing analyses.

1001 ANALYZING THE CURRENT SITUATION

1001.1 Before implementing or changing how a company evaluates its proposed capital investments, controllers should study the company's existing evaluation program to determine its strengths and weaknesses. That analysis will reveal how effective and practical the current evaluation process is. The following paragraphs discuss a diagnostic questionnaire and a summary checklist (work program) that controllers may

use to analyze the existing capital evaluation program and obtain an overall understanding of the key steps the evaluation process requires.

Using a Diagnostic Approach

1001.2 A diagnostic of the existing capital expenditure evaluation program will provide controllers information to assess each key phase of the process, including planning and approval, expenditure evaluation, capital rationing, and financing. Appendix 10A includes a diagnostic checklist that will quickly identify and target which aspects of the capital evaluation process the business can improve.

1001.3 The questionnaire topics are also covered in the chapter, but in greater detail. Thus, if questionnaire items are unclear or more information is desired, the controller can easily consult the chapter for clarification or more detailed discussion.

Using a Summary Checklist

1001.4 Appendix 10B supplements the diagnostic questionnaire with a summary checklist that quickly leads controllers through the capital expenditure evaluation process. The appendix includes the key steps and related practice aids recommended for performing each aspect of the capital evaluation process.

1002 CAPITAL ASSET PLANNING AND APPROVAL

1002.1 Two key aspects of the capital asset planning and approval phase include the long-term capital budgeting process and the process used to request approval for specific capital assets. Small businesses that have sufficient financing sources and limited capital asset needs may successfully employ an unstructured planning and approval process. They should, however, be concerned about building excess capital assets that may result in significant unused capacities. These have the characteristics of making the cost of production not competitive. However, small businesses with tight cash flows or significant capital asset requirements may require a more structured approach, as the following section discusses.

Capital Asset Budgeting

1002.2 The first step in planning a company's capital asset needs involves preparing a capital budget. The controller is often responsible for coordinating the small business's budgeting process, which typically consists of the following steps:

a. Department heads prepare a listing of capital asset needs for the next two to five years.
b. The controller reviews the proposals and summarizes the lists into a preliminary capital budget plan. It is important for the controller to list the capacities of each capital asset, the expected unused capacities, and the depreciation schedule. With interlinked assets, a bottleneck capacity limitation should also be noted.
c. The management group reviews the preliminary capital budget plan (and supporting financial analyses, if applicable) and suggests changes. (If available funds are limited, the group often will rank alternative projects at this time.) The group reviews the capacities proposed for creation through the capital budget plan and considers them with a view of both short-run and long-run expectations. Long-run needs may require building excess capacities in the shorter run. The short run may even last for a few years until the long-run expected production goals are reached. It is important to understand that such excess capacities and their costs should be isolated and reported for management attention.

d. A final capital budget is prepared, approved, and coordinated with any existing company operating budgets (see Chapter 9, Budgeting).

1002.3 The controller and other management group members should consider certain factors when reviewing the proposed budget, including:

- Do the proposed expenditures appear cost justified?
- Are proposed major repair and replacement costs reasonable based on the age and condition of existing capital assets?
- Have disposal costs and salvage value been considered, or are those proposed reasonable?
- Will existing equipment and facilities and proposed new additions adequately meet expected growth? What is the time horizon for this anticipated growth?
- Have alternative vendors and contractors been considered?
- Where is the bottleneck in the present production process? How will it change with the proposal?
- Are proposed costs reasonable based on experience and judgment, and does the budget anticipate inflation?
- Does the budget reflect how each department's proposed expenditures will impact all other departments?
- How well is the expected growth predicted and how much reliance can be placed on the numbers generated?
- Is the capital budget consistent with the overall company business plan?
- What are the chances that the buildup in assets will result in significant excess capacities? How long might such a situation last? Is there a definite plan or are there opportunities to fill up this capacity?

1002.4 After approving the final budget, management should remind department managers that the budget is merely an overall plan. The budget typically does not grant authority to make the individual expenditures without further action and specific approval, as discussed in Paragraph 1002.6 et seq.

1002.5 **Capital Budget Worksheet.** Appendix 10C includes a worksheet for preparing capital budgets. Individual department heads may use it to list their capital asset needs, and the controller may use it to summarize the company's overall capital asset needs. Department heads should identify and justify their capital asset needs relating to major repairs and replacements, improvements, new additions, and any other major capital expenditures for each of the next three years. Furthermore, they should provide details of additional production capacities created. They should also justify how they have identified, or plan to identify, vendors and contractors.

Requesting Approval for Specific Capital Assets

1002.6 As discussed previously, the approved capital budget is simply a plan for an overall capital spending level and typically does not represent final spending approval for any specific asset. In most cases, proposed capital expenditures will undergo an in-depth evaluation and a specific approval process. (Section 1003 and Section 1004 cover the evaluation process in detail.) However, the company may wish to forgo the evaluation process for assets below a specified minimum amount. Before beginning the in-depth evaluation process, however, the authors recommend that each department submit the proposed capital investment requests to

an appropriate management member for review, evaluation, and approval. A controller may consider checking in with department heads to get a sense of what is being considered.

1002.7 **Capital Asset Request Form.** Appendix 10D includes a capital asset request form to use when requesting approval for specific capital assets. Part 1 instructs the person submitting the form to document the estimated costs, savings, and additional production capacity from the proposed capital investment. The controller uses Part 2 to document and explain the results of the financial analysis (see Section 1003 and Section 1004). The last part of the form documents the approval or denial of the request.

Monitoring Capital Projects

1002.8 Once management has authorized a capital project, controllers should monitor actual expenditures compared to budget using an established method. Often, current-year capital expenditures can be adequately monitored when added to a separate capital expenditure section of the operating budget. However, significant capital expenditure projects that are "in process" for an extended time frame (for example, a real estate construction project) may require a more precise monitoring of the project's progress. In those situations, the controller should compare the project's initial authorized cost to the current estimated cost for each period until the project is complete. Current estimated costs should be the sum of actual costs incurred to date (current period and previous periods) plus estimated remaining costs to complete the project. Any significant deviation between the estimated cost and the actual cost should be noted and, if necessary, investigated. Appendix 10E includes a form for monitoring such longer-term capital projects.

1002.9 Capital project progress must also be monitored. For capital projects of longer duration, in particular, the budget should also detail the estimated time to complete the phases of the project, along with their costs. Critical phases that must be completed on time to complete the entire project on schedule (for example, dependencies or critical path items) should be identified at the time of budget creation. During the project, the controller should monitor whether these critical phases are completed on time and if not, revise the final date for project completion as well as revised costs.

1003 OVERVIEW OF CAPITAL INVESTMENT ANALYSIS METHODS

1003.1 The company typically bases its decision to approve or deny a proposed capital investment on a cost/benefit analysis performed by the controller. (See Section 1002.) Controllers rely on various methods when analyzing proposed capital investments. Small businesses most commonly use the following methods:

- Accounting rate of return method
- Payback method
- Discounted cash flow methods, such as the net present value (NPV) method and the internal rate of return method

1003.2 These methods apply only to those capital projects that lend themselves to a quantitative analysis (in other words, projects generating cash inflows through additional revenues or expense reductions). It is often difficult to quantify labor or other cost savings or additional revenues when analyzing capital expenditures for office furniture, computer systems, etc. In those cases, decision makers typically must rely on judgment in lieu of the quantitative methods when deciding whether the expenditure is justified.

1003.3 This section briefly discusses each quantitative method; however, the authors concentrate primarily on the discounted cash flow methods, which are generally preferred over the other methods. Exhibit 10-1 briefly overviews each method's key aspects.

EXHIBIT 10-1

Overview of Capital Investment Evaluation Methods

Desired Features	Accounting Rate of Return	Payback	Net Present Value	Internal Rate of Return
a. Useful for "quick and dirty" screening	X	X		
b. Easily understood		X		
c. Considers cash flows of project		X	X	X
d. Considers time value of money			X	X
e. Considers entire project life			X	X
f. Incorporates cost of capital into calculation			X	
g. Allows comparison to cost of capital rate or an alternative acceptable rate of return	X			X
h. Explicitly considers project risk			X	
i. Indicates project liquidity		X		

Accounting Rate of Return Method

1003.4 A method some small businesses use for analyzing proposed capital investments is the accounting rate of return (ARR) method. The ARR method determines the average return on the proposed investment based on the project's estimated revenues and expenses. This method ignores cash transactions that do not affect revenues or expenses. The estimated average annual income over the project's expected life is divided by the expected average investment[1] (or sometimes by the expected initial investment) to determine the investment's return.

1003.5 To illustrate, assume a company is considering acquiring equipment that costs $25,000. The company expects the equipment to generate profits of $2,000 per year over its 10-year estimated life, as follows:

Expected profits before depreciation and taxes	$ 5,530
Depreciation (straight line)	(2,500)
Net profits before taxes	3,030
Income taxes (assume 34%)	(1,030)
Net profits after tax	$ 2,000
Accounting Rate of Return	16%

1003.6 The ARR in this example is 16%, computed by dividing the company's average annual net profits of $2,000 by the average investment of $12,500 [($25,000+$0) ÷ 2]. Management must then decide whether that rate is acceptable.

[1] Average investment is computed as the sum of the initial investment cost, and the ending net book value (initial cost less accumulated depreciation) divided by two.

1003.7 The ARR method is relatively easy to understand and is based on accounting concepts familiar to most controllers. The method has certain limitations, however. For example, the ARR method ignores the timing of the revenues and expenses. Also, this method does not directly address how the capital investment will impact cash flows. In addition, this method depends on the choice of a depreciation method, either straight line or accelerated. If accelerated depreciation is used, the ARR will differ over the years and an average of all the rates may be used. Typically, during the life of the asset, repair and maintenance costs increase. This will have the effect of showing decreased after-tax profits over time. The average investment value will also decrease over time as it is calculated as the average of the beginning and ending book values. The controller may wish to estimate the ARR over the expected life of the asset and take the average. These limitations require controllers who use the ARR method for significant projects to supplement it with discounted cash flow methods (see Paragraph 1003.12 et seq.), particularly for long-term projects with uneven cash flows.

Payback Method

1003.8 The payback method is another less-advanced way to analyze capital expenditures. Businesses sometimes use this method to perform an initial screening of proposed capital investments. The payback method computes the expected number of years that a project takes to recover its initial investment through future cash flows. Management then must exercise judgment to decide whether the payback period is acceptable.

1003.9 To illustrate the payback method, assume the same facts as in the preceding example (the machinery will cost $25,000 and will generate profits of $2,000 per year for each of the next 10 years). Because the payback method uses cash flows instead of profits, net income must first be converted to cash flows, as follows:

Net profits after taxes	$ 2,000
Add back depreciation	2,500
Net cash flows	$ 4,500
Payback ($25,000 ÷ $4,500)	5.5 years

1003.10 Some small business owners favor the payback method because it’s easy to understand and use. Businesses suffering a tight cash situation that are primarily seeking a quick return of their investment may benefit from using the payback method. However, the payback method has certain limitations. Similar to the ARR method, it disregards the timing of cash flows. It also views the project primarily from a breakeven standpoint, ignoring cash flows earned that exceed the project’s initial investment as well as potential increased maintenance expenses in the later years.

1003.11 The payback method can be a useful tool for evaluating relatively short-term projects when liquidity is a key concern. For significant projects that cover an extended period, however, discounted cash flow techniques are preferable. Discounted cash flow techniques consider both the timing of cash flows and cash flows beyond the breakeven point.

Discounted Cash Flow Methods

1003.12 Discounted cash flow (DCF) methods are considered the most appropriate techniques for evaluating proposed capital investments. The primary advantage of DCF methods is that they weigh the timing of expected cash flows by factoring the time value of money into the calculations.

1003.13 Businesses use two primary DCF methods: net present value (NPV) and internal rate of return (IRR). The NPV method computes the *present value* of expected future cash flows using a predetermined discount rate, whereas the IRR method computes the *discount rate* that causes discounted cash flows to equal zero. Thus, the IRR method does not require a company to determine a discount (hurdle) rate in advance. Some companies use both methods to evaluate proposed capital investments. Of course, the IRR method alone can be used and the calculated rate compared with the hurdle rate or any other cost-of-capital rate.

1003.14 **Net Present Value (NPV) Method.** The NPV method, the most commonly used method for discounting cash flows, converts future expected cash flows to a present value amount (in other words, today's dollars). If the amount is positive, the business should tentatively accept the proposed investment. If the amount is negative, the business should tentatively reject the proposed investment. However, this is based on purely economic considerations. Strategic considerations may indicate other alternatives.

1003.15 To use the NPV method effectively, a company must first determine an appropriate hurdle (discount) rate. The company then uses the hurdle rate to discount expected future cash flows by using either a business calculator, such as Texas Instrument's "TI Business Analyst," or present value tables. (Section 1004 provides detailed guidance on determining future cash flows, computing an appropriate hurdle rate, and discounting the future cash flows to a net present value amount.)

1003.16 The following example illustrates the NPV method using the same facts as the payback method example (see Paragraph 1003.9). The proposed investment is expected to be $25,000 and future after-tax cash flows are estimated at $4,500 for each of the next 10 years. The company has decided that the investment must produce a future cash flow return (after taxes) of at least 14% to be acceptable. The NPV of the estimated future cash flows is determined as follows:

Year	Description	After-tax Cash Flow	14% Discount Factor	Discounted After-tax Cash Flow
0	Cost of investment	$(25,000)	1.000	$(25,000)
1–10	Annual cash inflows	4,500	5.216	23,472
	Net present value			$ (1,528)

1003.17 The net present value of future cash flows is a negative $1,528. The negative NPV indicates that the return is less than the 14% hurdle rate the company established. Thus, the company would tentatively reject the project. However, management must then decide whether to consider any nonquantitative reasons for accepting the project before making a final decision.

1003.18 While the NPV method is probably the most effective method of evaluating proposed capital projects, it has certain drawbacks. Management must establish a specific hurdle rate for each project, which can be time consuming. In addition, this method does not provide management with the actual rate of return on the proposed capital investment. Overall, however, it is generally the best method for evaluating proposed capital investments. In situations where the cash outflow for the investments occurs over several years and the savings from the investment vary across the years, this method is particularly good at calculating the value of the investment. On the other hand, if the project is expected to last only a few years, the payback method may be preferable as it does not require the company to determine a discount rate.

1003.19 **Internal Rate of Return (IRR) Method.** In contrast to the NPV method, the IRR method computes the actual rate of return on a proposed capital project. The IRR method typically computes the rate of return by using trial and error to discount expected cash inflows and outflows until they net to zero. That rate of return represents the proposed project's internal rate of return (IRR).

1003.20 The simplest way to determine the IRR is to use a business calculator or financial formulas in spreadsheet software. When cash flows are constant in each period, controllers may use the business calculator to solve for the missing interest rate variable. Because cash flows typically are uneven, however, controllers often use a trial-and-error approach, substituting discount rates until the calculated net present value of cash flows equals zero. For example, the previous illustration computed a negative NPV of $1,528 based on a 14% discount rate. Since the 14% discount rate produced an NPV below zero, a smaller discount rate is needed to raise the NPV to zero. Thus, a business calculator will compute the true IRR of 12.4%. Alternatively, the IRR can be determined mathematically by selecting rates that produce both a positive NPV and a negative NPV and then extrapolating the results, as follows:

	Discount Rate	NPV
	14%	$ |(1,528)|
	12%	|426|
Change (absolute value)	2%	$ |1,954|

$$IRR = 12\% + (\$426 \div 1{,}954 \times 2\%) = 12.4\%$$

1003.21 After determining the IRR, management must decide whether the rate is acceptable. Comparing the rate to the company's hurdle rate is often helpful. If the IRR exceeds the hurdle rate, management would tentatively accept the project, subject to qualitative considerations.

1003.22 The primary benefit of using the IRR method is that management obtains the actual rate of return based on the project's expected future cash flows. Another benefit is that management is not necessarily required to determine a hurdle rate to compute the IRR. As discussed earlier, however, management often needs the hurdle rate to evaluate whether the IRR is acceptable.

1003.23 A disadvantage of the IRR method is that, under certain circumstances, the IRR method will compute unreasonable rates, or two or more widely different rates. Unreasonable or divergent rates typically result when cash outflows occur in other than the first year. The following projected cash flow stream of a proposed capital investment project illustrates this occurrence:

Year	Description	Cash Flow Amounts	Discount Factors (100% Rate)	Present Value
0	Initial cash outflow	$(2,000)	1.00	$(2,000)
1	Cash inflow	8,000	.50	4,000
2	Final cash outflow	(8,000)	.25	$(2,000)
	Net cash outflow	$(2,000)		$ —

1003.24 As shown in the cash flow column, the project is obviously unacceptable since it generates a negative net cash flow of $2,000. However, the IRR method reveals that the project has an internal rate of return of 100% (as discussed in Paragraph 1003.19, the internal rate of return is that rate which causes the net present value of cash flows to equal zero, as computed in the last column). Thus, the IRR method would

erroneously suggest that management should accept the project since a 100% return exceeds any conceivable hurdle rate. Even though the figures used in this example are clearly exaggerated, controllers should remember that distortions in IRR calculations can result whenever cash outflows occur in other than the first year. This problem is particularly exacerbated when the cash inflows are uncertain and the outflows are certain.

Summary and Recommendation

1003.25 The authors believe that companies should use the discounted cash flow approach to evaluate most proposed capital investments, for the reasons discussed in the previous section. Non-DCF approaches, such as the payback and accounting rate of return methods, may help evaluate less significant, relatively short-term proposed capital investment projects. Management may also combine these methods with DCF approaches to perform a preliminary screening of proposed projects.

1003.26 The authors recommend that businesses use the two DCF techniques in tandem, relying on the NPV approach as the primary evaluation tool and the IRR method to occasionally supplement NPV results. The authors prefer the NPV method because it incorporates a hurdle rate (based on the company's cost of capital) into the present value calculation and avoids the IRR method's mathematical limitations (see Paragraph 1003.23). The remainder of this chapter concentrates on the NPV approach to capital expenditure analysis and provides specific guidance for determining the company's hurdle rate and future cash flows from proposed capital projects.

1003.27 In the above discussion, cash inflow is taken as the net profit with add-back for depreciation and reduction for taxes. Should the operation involving this capital investment raise significant accounts receivable, accounts payable, or inventory accounts, adjustments will be needed to arrive at the appropriate cash flow.

1004 USING NET PRESENT VALUE TO EVALUATE PROPOSED CAPITAL INVESTMENTS

1004.1 This section provides detailed guidance on applying the NPV method (other methods may be useful in certain situations; see Section 1003). Evaluating proposed capital investments using NPV techniques requires these key steps:

- Determining the project's hurdle rate based on the company's cost of capital, project risk, and additional return expected from the project.
- Estimating future cash flows.
- Computing the NPV of cash flows.
- Reaching a decision on the proposed capital investment.

This chapter's appendix presents a hurdle rate worksheet (Appendix 10F) and a discounted cash flow worksheet (Appendix 10G) that controllers may use to perform discounted cash flow calculations.

Determining the Project's Hurdle Rate

1004.2 Typically, the first step in evaluating a proposed capital investment using the NPV method is to determine the project's hurdle rate. This rate discounts each project's estimated future cash inflows and outflows to their net present values.

1004.3 At a minimum, hurdle rates should reflect the company's after-tax cost of capital. Other factors—such as additional profits required or risks the project may incur—can either be incorporated into the hurdle rate or considered separately. The authors prefer to incorporate such factors into the hurdle rate. The principal components of the hurdle rate—cost of capital, desired profits, and risk—are discussed below.

1004.4 **Cost of Capital Component.** The hurdle rate's primary component is the company's after-tax cost of capital, which includes both the debt and equity elements.

a. The debt portion of capital cost is simply the company's weighted average borrowing rate (net of income taxes) on its interest-bearing debt. The rate is net of taxes because interest costs are generally deductible for income tax purposes. (If a company has several debt instruments outstanding at different interest rates, the weighted average before-tax rate can be derived by dividing total annual interest expense by average debt outstanding.)
b. The equity portion of capital cost represents the return company shareholders expect. For small businesses, shareholders typically view net earnings as the primary indicator of their return. Thus, the equity component of capital cost for most small businesses is reasonably approximated by the company's return on equity (net income ÷ average equity balance). Unlike the borrowing rate for the debt portion of capital costs, the equity cost rate is not tax affected because distributions to shareholders are not deductible.

If the company expects its cost of capital to vary significantly over the project's life because of inflationary pressures or other factors, the debt and equity capital rates should be based on the approximate average rates expected over the project's life.

1004.5 In addition, you may wonder why the borrowing rate on the capital actually used to finance the capital investment would not be used instead of the company's overall cost of capital. The reasoning is that new financing generally will change the debt/equity relationship, which could affect the rate paid on existing debt (assuming the existing debt's rate is variable). Significant new debt will also raise the risk to equity holders, which theoretically would raise the required return they would seek. Thus, the company's overall cost of capital should generally be used. However, as discussed in Paragraph 1004.9, the existing cost of capital should reflect any major new financing on the investment if the capital cost will be significantly affected.

1004.6 Once management has determined the debt and equity elements of a company's cost of capital, each element must be appropriately weighted based on the ratio of each element to total capital. The two components are then combined to derive the company's overall weighted average cost of capital. In addition to the reasons specified in Paragraph 1004.5 for calculating the cost of capital in this manner, using the company's own cash reserve, rather than borrowing, creates an opportunity cost to the firm, as the cash reserve could have been used elsewhere to generate positive returns.

1004.7 The following example illustrates how to calculate a company's cost of capital. Assume the company's marginal income tax rate is 34% and its interest rate on borrowings is 13%. The company's capital structure at year end is as follows:

Description		Balance
Note payable to bank		$400,000
Stockholder's equity:		
Common stock		10,000
Additional paid-in capital		40,000
Retained earnings:		
Beginning of year	$220,000	
Net earnings	30,000	250,000
Total stockholder's equity		300,000
Total debt and equity capital		$700,000

1004.8 The company's after-tax cost of debt in this example is 8.58% [13% x (1 - .34)]. Its equity cost of capital is 10.53%, determined by dividing earnings of $30,000 by average equity of $285,000 [($270,000 + $300,000) ÷ 2]. The company's 9.42% overall cost of capital is determined by weighing the debt and equity components as follows:

	(A)	(B)	(C)	(D)	(E)
			Cost of Capital		
Description	Year-end Balance	Percent of Total	Before-tax Rate	After-tax Rate	Hurdle Rate
					(B) × (D)
Debt	$400,000	57%	13.00%	8.58%	4.89%
Equity	300,000	43%	10.53%	10.53%	4.53%
Totals	$700,000	100%			9.42%

1004.9 The above calculation is based on existing capital and related costs of capital. However, when a large capital investment is proposed with financing that will significantly change the capital structure and costs, the cost of capital should be modified to reflect this change. This can generally be done by substituting the existing year-end capital balances and cost of capital amounts for the expected amounts after the acquisition. Modifying the existing cost of capital is particularly important when the company is receiving low-rate incentive financing, such as industrial development bonds.

1004.10 **Profit Component.** After determining the company's cost of capital, management should consider whether it wishes to include an additional profit factor in the hurdle rate. In other words, does management wish to simply recover its cost of capital or seek additional profits on the proposed investment? Companies commonly seek an additional return of 3 to 5% or more on proposed capital investments. For certain types of investments, such as those related to long-term high-growth areas, the firm may seek a lower return. This may also be the case when the firm is trying to establish a market.

1004.11 In addition, management may have other reasons for adjusting the hurdle rate's profit component. For instance, if a company's cost of equity capital is unreasonably low because earnings are poor, the company may compensate by increasing the hurdle rate. To illustrate, assume a company's return on equity (cost of equity capital) is currently 4.0%, but management believes a more appropriate return based on industry norms would be 9.5%. In that situation, the company may wish to increase its hurdle rate by the product of the 5.5% difference multiplied by the company's equity percentage. In other words, if the company's equity equaled 50% of its total capital, it would increase its cost of capital percentage by 2.75% (5.5% × 50%) to provide for the additional profit. On the other hand, if a company's return on equity is unrealistically high in the current year, the company may choose to lower the hurdle rate.

1004.12 **Risk Component.** The final component of the hurdle rate is the risk factor. Management should exercise judgment when assessing the degree of risk associated with each proposed capital project. A proposal to modernize certain factory equipment may carry a low risk, but a proposal to expand into a completely new line of business may represent a moderate or high risk. This is termed the market risk. Management may also need to consider timing risk when the completion of a project within a scheduled timeframe is very uncertain. In such a situation, markets may change or be lost.

1004.13 Capital investment projects generally fall into three broad categories that present varying levels of risk:

Project Type	Explanation	Degree of Risk
Cost reduction	Projects to reduce costs generally require a low return because they are more predictable.	Low
Existing product line expansion	These projects require a moderate level of return because there is a lesser amount of risk due to existing product line knowledge.	Moderate
New product line introduction	These projects require a high level of return because of higher risk due to less knowledge of product line. The company may also face excess capacity situations because of the unpredictability of new product sales.	High

1004.14 A table such as the following may help the company specify a risk factor for proposed capital projects:

Degree of Risk	Risk Factor
Little or no risk	0%
Low risk	1-5%
Moderate risk	6-10%
High risk	11-15%

1004.15 **Worksheet for Computing Hurdle Rate.** Appendix 10F includes a worksheet management may use to compute hurdle rates for proposed capital investments. Exhibit 10-2 presents a completed worksheet incorporating the cost of capital information from the example in 1004.6 et seq. Assume the company desires an additional 3% profit on the investment and has assigned a 1% risk factor because it believes the project has a low risk. The exhibit reveals a 13.42% hurdle rate after adjusting the company's 9.42% cost of capital rate for the assumed profit and risk factors.

Estimating Future Cash Flows

1004.16 The next step in analyzing a proposed capital investment using NPV analysis is to estimate the project's future cash flows. The estimated cash flows should include the cost of the initial investment (including delivery, installation, commissions, etc.), all related operating cash inflows and outflows for each project year, and estimated salvage value at the project's end. This analysis should include tax considerations such as a tax shield due to depreciation expense. Although depreciation does not utilize cash, it does give rise to cash savings in tax payments.

1004.17 **Operating Cash Flows.** If the proposed capital project represents a revenue generating activity, such as introducing a new product line or acquiring an existing business, operating cash flows will consist of the net cash effect of revenues less related expenses in each year. If the proposed capital project represents a cost savings activity, such as acquiring replacement machinery, cash flows will consist of the net cash effect

of cost reductions in each period. For example, replacement machinery could affect the following costs, which would typically impact cash flows, in each year:

- Reduction in maintenance costs (based on historical maintenance costs, as well as projected higher costs if the existing equipment had not been replaced)
- Reduction of scrap material (based on the newer equipment being more efficient)
- Labor reductions
- Lower utility costs
- Changes in tax payments due to changes in depreciation amounts

Whether an actual cash savings occurs is what matters. For instance, if a product's per unit cost is lowered simply because the new machinery produces output at a higher rate, actual cash savings may not occur if the lower per unit cost results simply from allocating fixed overhead costs over a greater number of units. However, if the increase in production rate increases capacity and subsequent revenue, it results in additional cash inflow that must be considered.

1004.18 **Other Related Cash Flows.** Other factors affecting cash flows that management should consider include the following:

- **Working capital.** Estimated future cash flows for a proposed capital project should include estimates of the project's working capital needs, such as inventories and receivables required to finance projected sales levels. For example, an increase in the net working capital amount should be shown as a cash outflow in the year it occurs and as a cash inflow at the project's end.

EXHIBIT 10-2
Hurdle Rate Worksheet

	(A)	(B)	(C)	(D)	(E)
	Year Ended 12-31-20XX		Cost of Capital %		Hurdle
	Balance	% of Total	Before Tax	After Tax	Rate
Cost of Capital:					
Debt	$400,000	57%	13.00%	8.58%	4.89%
Equity	$300,000	43%	10.53%	10.53%	4.53%
Subtotal	$700,000	100%			9.42%(F)
Adjustments to Cost of Capital:					
Desired additional return on capital (G)					3.00%
Risk factor (H)					1.00%
Adjusted Hurdle Rate (I)					13.42%

Notes:

(A) Enter the company's year-end equity and interest-bearing debt balances.

(B) Compute the percentage of each to total capital.

(C) Enter the company's before-tax cost of capital:
Debt-The company's estimated borrowing rate over the project's life.
Equity-Net earnings divided by average equity balance (i.e., return on equity).

(D) Enter the company's after-tax cost of capital:
Debt-Column C × (1 -marginal tax rate (34% in this example)).
Equity-Same as Column C (in other words, taxes don't impact the cost).

(E) Compute the weighted cost of capital by multiplying Column B by Column D.

(F) This subtotal represents the company's expected cost of capital (minimum hurdle rate) over the project's life.

(G) Increase the cost of capital rate (per "F" above) for additional profits desired, if any, on capital investments.

(H) Increase the cost of capital rate (per "F" above) for additional risk, if any, on the investment. The following table may provide some guidance in selecting a risk factor:

Degree of Risk	Risk Factor
Little or no risk	0%
Low risk	1–5%
Moderate risk	6–10%
High risk	11–15%

(I) This represents the company's adjusted hurdle rate that will be used for making capital investment evaluations.

- **Financing costs.** Deciding *how* to finance a proposed project is a separate decision from deciding *whether* to invest in the project. If other financing alternatives exist, controllers normally should exclude the financing effects (principal and interest payments) from the NPV analysis. (Section 1006 provides guidance on choosing the appropriate financing method.) If no other funding alternatives exist, the financing effects (debt payments) may be included in the NPV calculations. Also, if the project feasibility depends on receiving low-rate incentive financing, such as industrial development bonds, the financing costs should be considered in the analysis and the weighted average cost of capital used in calculating the hurdle (discount) rate should be lowered proportionately. However, unless the after-tax borrowing rate is the same as the discount rate (which generally is not the case), the NPV amounts calculated with and without the financing costs will differ.[2]
- **Impact of inflation.** Management should usually factor the effects of inflation into capital project cash flow estimates, unless it expects inflation to be insignificant over the project's life. In addition, management should adjust the hurdle rate portion attributable to cost of capital if anticipated inflationary pressure or other factors are expected to affect interest rates (see Paragraph 1004.4).
- **Income taxes.** The cash flow estimate should reflect the tax effect of all estimated cash inflows and outflows and depreciation for a proposed capital project. Taxes should reflect the company's marginal tax rate as opposed to its average tax rate. The rate should also reflect the tax rate expected to be in effect over the project's life. Because forecasting future tax rates is difficult, however, the current year's marginal tax rate is usually acceptable. Any available tax credits should also be included.
- **Depreciation.** Because depreciation is a noncash item, a cash flow estimate would not directly include it. However, the estimate should include any tax benefits derived from taking the depreciation deduction. Depreciation should be based on the method the company expects to use for income tax purposes.
- **Residual value.** If the company expects the project to have a residual value at the end of its life, the cash flow estimate should include an estimated residual cash value.

1004.19 **Worksheet for Summarizing Cash Flows.** After determining a project's cash flow components, the controller should logically summarize the incremental cash flows for each year. Accumulating taxable items separately from nontaxable items expedites the tax calculation. Appendix 10G includes a worksheet for accumulating those items and computing the NPV of each year's estimated cash flows. The following

[2] The present value of principal and *before-tax* interest payments will always equal the amount borrowed when discounted at the *before-tax* interest rate of the borrowing. Similarly, the present value of principal payments and *after-tax* interest payments will always equal the amount borrowed when discounted at the *after-tax* interest rate of the borrowing. Thus, including principal and interest payments in the calculation has no impact on present values unless the discount rate differs from the borrowing rate. A discount rate below the after-tax borrowing rate will produce a higher NPV than if the principal and interest payments were excluded, and a discount rate above the after-tax borrowing rate will produce a lower NPV.

paragraphs illustrate a completed copy of the worksheet (see Paragraph 1004.27 and Exhibit 10-5) and provide guidance on computing the present value of future cash flows.

Computing the Net Present Value of Cash Flows

1004.20 Once a project's hurdle rate and estimated annual future cash flows have been determined, calculating the net present value of the cash flows is fairly straightforward. The calculation process will vary, however, depending on whether the cash flows are even or uneven in each period and whether a business calculator, spreadsheet (such as Microsoft Excel), or present value tables are used to make the calculations.

1004.21 The following paragraphs provide specific guidance on using a business calculator to determine the present values of the initial investment and future cash flows. If a business calculator (or computer spreadsheet) is unavailable, Appendix 10H includes present value tables and further guidance on their use.

1004.22 **Present Value of Initial Investment.** In most DCF calculations, the initial investment is made when the project begins. Thus, the investment's original cost and its present value are the same. In longer-term projects, investments may be made periodically. In such cases, the appropriate present value of total investments should be calculated.

1004.23 **Computing Present Value When Future Cash Flows Are Even.** When a project's estimated future cash flows are even each year, the NPV calculation of future cash flows is slightly easier than when future cash flows are uneven; only a single calculation is needed. The annual cash flow amounts are discounted to their present values based on the discount rate (hurdle rate) and the number of years the company expects to receive cash flows.

1004.24 Appendix 10H-1 provides a present value table for use when computing the NPV for a series of even cash flows. Exhibit 10-3 demonstrates using a TI Business Calculator to make the calculations.

EXHIBIT 10-3

Discounting a Series of Even Cash Flows Using a TI Business Calculator

Assumptions				
Hurdle rate				14%
Number of years				10
Estimated annual cash flows				$4,500
Procedure		**Press**		**Display**
1. Clear calculator and select financial mode.	ON/C	2nd	FIN	0
2. Enter total number of periods to be discounted.	10	N		10
3. Enter interest rate per period.	14	%i		14
4. Enter future cash flow (payment) amount.	4500	PMT		4500
5. Compute present value.	CPT	PV		23472
Present value				$ 23,472

1004.25 The present value of the future cash flows determined using a calculator in the preceding example equals $23,472. The present value amount equals the amount computed using a present value table factor, as shown in the example in 1003.16. If the $23,472 present value equals or exceeds the initial investment cost (present value of investments, in the case of longer-term projects), management would generally accept the project. Otherwise, the project would be rejected.

1004.26 **Computing Present Value When Future Cash Flows Are Uneven.** When a proposed project's estimated annual future cash flows are uneven, present value calculations are slightly more time consuming because a separate present value calculation must be made for each year. Each annual cash flow amount is discounted to its present value based on the project's hurdle rate and the year each cash flow is expected to be received.

1004.27 Appendix 10H-2 provides a present value tables for use when computing the NPV of uneven cash flows. Exhibit 10-4 shows how to use a TI Business Calculator to make the calculations.

1004.28 As shown in Exhibit 10-4, the combined present value of the future cash flows totaled $13,586. If the NPV of $13,586 equals or exceeds the initial investment cost, management would generally accept the project. Otherwise, the project would be rejected.

1004.29 Using the present value table in Appendix 10H-2, approximately the same present values would be computed using factors based on a 15% discount rate, as follows (differences are due to rounding):

Period	Amount	Factor	Present Values
1	5,000	.870	$ 4,350
2	7,000	.756	5,292
3	6,000	.658	3,948
			$ 13,590

1004.30 **Discounted Cash Flow Worksheet.** Appendix 10G includes a worksheet that controllers may use to summarize and discount estimated future cash flows to their present values. Exhibit 10-5 presents a completed sample copy of the worksheet. The example was based on a hurdle rate of 13.42% (see calculation of hurdle rate at Exhibit 10-2 and Paragraph 1004.12) and the following assumptions:

Capital Asset Assumptions

- Acquire machinery costing $50,000 at the beginning of the first year.
- Depreciate the machinery for tax purposes using MACRS (Modified Accelerated Cost Recovery System) over a seven-year period.
- Dispose of the machinery at the end of the ninth year for $5,000.

Estimated Future Cash Flow Assumptions

- Annual labor savings of $7,500 (increased annually by an estimated 4% inflation factor).

- Annual savings on maintenance and utilities of $1,300 (increased annually by an estimated 4% inflation factor).
- Income tax rate of 34% per year.

To determine the tax effect of cash flows, the worksheet is divided into taxable and nontaxable cash flow sections. The bottom of the worksheet computes the NPV of combined taxable and nontaxable cash flows.

1004.31 At first glance, the project at Exhibit 10-5 might appear acceptable since it has a positive net cash flow (before discounting) of $32,400. After discounting, however, the project has a negative net present value of $4,100. The negative NPV indicates that management should reject the project because the future cash flows are not expected to achieve the stated 13.42% return. Before making a final decision, however, management should carefully reevaluate cost factors (cash flows, discount rates, etc.) and any subjective factors, as discussed in the following paragraphs.

EXHIBIT 10-4

Discounting a Series of Uneven Cash Flows Using a TI Business Calculator

Assumptions	
Hurdle rate	15%
Estimated annual cash flows:	
Year 1	$5,000
Year 2	7,000
Year 3	6,000

Procedure		**Press**			Display
1. Clear calculator and select financial mode.		ON/C	2nd	FIN	0
2. Enter interest rate per period.		15	%i		15
3. Compute the present value of each future cash flow:					
	1st Period	5000	FV		5000
		1	N		1
		CPT	PV		4348
	2nd Period	7000	FV		7000
		2	N		2
		CPT	PV		5293
	3rd Period	6000	FV		6000
		3	N		3
		CPT	PV		3945

Summary of Present Values	
Year 1	$4,348
Year 2	5,293
Year 3	3,945
Total PV	$13,586

EXHIBIT 10-5

Illustrative Discounted Cash Flow Worksheet

	(in thousands, except present value factors)										
	Yr. 0	**Yr. 1**	**Yr. 2**	**Yr. 3**	**Yr. 4**	**Yr. 5**	**Yr. 6**	**Yr. 7**	**Yr. 8**	**Yr. 9**	**Total**
NONTAXABLE CASH FLOWS:											
Initial cost of investment	(50.0)	–	–	–	–	–	–	–	–	–	(50.0)
Additional working capital											
_____											
_____											
_____											
Total nontaxable cash flows	(50.0)	–	–	–	–	–	–	–	–	–	(50.0)
TAXABLE CASH FLOWS:											
Income-increases (decreases)											
Salvage value	–	–	–	–	–	–	–	–	–	5.0	5.0
_____											
_____											
_____											
_____											
Expenses-(increases) decreases											
Labor reductions	–	7.5	7.8	8.1	8.4	8.7	9.0	9.4	9.8	10.2	78.9
Utilities and maintenance	–	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	15.3
Depreciation	–	(7.1)	(12.2)	(8.7)	(6.3)	(4.5)	(4.5)	(4.5)	(2.2)	–	(50.0)
_____											
_____											
Net taxable income (loss) savings	–	1.7	(3.0)	0.9	3.7	5.9	6.3	6.8	9.6	17.3	49.2
Income tax benefit (expense)	–	(0.6)	1.0	(0.3)	(1.3)	(2.0)	(2.1)	(2.3)	(3.3)	(5.9)	(16.8)
Net income savings	–	1.1	(2.0)	0.6	2.4	3.9	4.2	4.5	6.3	11.4	32.4
Add back depreciation	–	7.1	12.2	8.7	6.3	4.5	4.5	4.5	2.2	–	50.0
Total taxable cash flows	–	8.2	10.2	9.3	8.7	8.4	8.7	9.0	8.5	11.4	82.4
Total cash flows	(50.0)	8.2	10.2	9.3	8.7	8.4	8.7	9.0	8.5	11.4	32.4
NET PRESENT VALUE:											
Present value factors (based on hurdle rate of 13.42%). (See Exhibit 10-2.)	1.00	0.88	0.77	0.69	0.61	0.54	0.47	0.41	0.36	0.32	
NPV of cash flows	(50.0)	7.2	7.9	6.4	5.3	4.5	4.1	3.7	3.1	3.7	(4.1)

Reaching a Decision on the Proposed Capital Investment

1004.32 The decision to accept or reject a proposed capital investment using NPV analysis is based on whether the net present value of cash flows is positive or negative. If the NPV of future cash flows is greater than the initial capital investment, management should tentatively accept the proposed investment. If the NPV of future cash flows is negative (as demonstrated in the example in Exhibit 10-5 and Paragraph 1004.31), the investment should be tentatively rejected.

1004.33 Management may sometimes believe that subjective factors, such as improved customer service or intended market penetration, should also be considered, even though the benefits of those factors are difficult to quantify. In those cases, management should use judgment to rank how important each subjective factor is in relation to the NPV analysis results. If the subjective factors outweigh either the positive or negative results of the quantitative analysis, management may decide to reassess the proposed project. In this case, the analysis can still provide useful cash impact information for making this decision.

1004.34 For more complex capital investments, such as those with multiple combinations of potential financial variables, the controller may wish to refine the capital investment analysis to help identify and reduce risk. Section 1006 provides tools and guidance on techniques such as sensitivity analysis to help controllers accomplish this.

1004.35 Management should assess the impact of existing capacity expansion in terms of the overall capabilities of the company. Do other subsequent processes in the production have adequate capacity to utilize the increased capacity of the proposed project? If not, this specific capacity enhancement should be combined with expansion of other related process capacities.

1005 USING CAPITAL RATIONING TO RANK ALTERNATIVE CAPITAL PROJECTS

1005.1 When two or more independent capital projects are proposed, but limited resources permit funding of only one project, management must rank the proposals. The process of ranking alternative proposals and selecting the best alternative is often called capital rationing.

1005.2 The net present value approach discussed in the preceding section may help rank alternative proposals in certain situations. The process requires management to compute and compare the NPV of each project's cash flows, then select the project with the largest positive NPV. However, this approach can produce misleading results when the size of each project's initial investment is not comparable.

Using the Profitability Index

1005.3 A ratio that may be combined with NPV analysis to rank alternative projects of different sizes is the "profitability index." This ratio is computed by dividing the NPV of cash inflows by each project's initial investment. The project with the highest profitability index will likely produce the greatest return on investment.

1005.4 To illustrate, assume the net present values of expected future cash flows are expected to exceed the initial investments for two alternative projects by $25,000 and $40,000, as follows:

	Project A	Project B
Initial investment	$(100,000)	$(250,000)
Present value of future cash inflows	125,000	290,000
Net present values	$ 25,000	$ 40,000
Profitability index	1.25%	1.16%

1005.5 At first glance, Project B might be considered the better investment since it has a higher net present value than Project A. However, the profitability index shows that Project A provides a greater return on invested capital than Project B (25% versus 16%). Thus, when the relationship of the cash inflows to the initial investment is also considered, Project A is clearly the preferable investment.

1005.6 An additional factor to consider is the strategic importance of choosing one specific project over another. If one project is for a new product introduction and the other is for expanding current production, the stated strategy and vision of management becomes an important consideration. The riskiness of the product market may be another important factor to consider.

1006 REFINING THE CAPITAL INVESTMENT ANALYSIS: MAJOR INVESTMENTS

1006.1 For complex proposed capital investments, controllers may wish to consider ways to refine the analysis and reduce risk. Even though some degree of risk is inherent in most proposed capital investments (see Paragraph 1004.10 et seq.), controllers should not simply accept the apparent risks; steps should be taken to identify and minimize these risks whenever possible. The section covers the following:

- Isolating Capital Investment Risks
- Controlling Capital Investment Risk

Isolating Capital Investment Risks

1006.2 There are various sophisticated probability-based methods for isolating capital investment risks, such as Monte Carlo simulation studies and decision tree analyses. However, for the typical small to mid-sized company's capital investment needs, there are less complicated methods that do not rely on statistical probability to assess risk. The most common of these are sensitivity analysis and breakeven analysis. In addition, these analyses can be further refined by adding a very basic probability aspect. Each of these is discussed below.

1006.3 **Sensitivity Analysis.** Most controllers already use sensitivity analysis on a regular basis, although they may be unaware of it by this name. The most common example of sensitivity analysis is forecasting earnings using an electronic spreadsheet that contains multiple variables, such as sales volume, sales prices, cost of goods sold percentage, etc. The controller will usually change each of these variables to determine how "sensitive" the bottom line is to changes in each variable. In essence, he or she is using judgment to identify various scenarios for critical variables. The controller is trying to assess the investment risk by determining the impact on the investment's desirability if variables change from the original plan.

1006.4 Although in simple spreadsheet analyses the impact of a change in a variable is relatively obvious, it becomes more obscure when there are numerous variables and many of the variables depend on other variables. For example, when preparing a cash forecast, you must first forecast sales levels and then cash generated from those sales. In this case, there are numerous variables to consider, such as sales volume, sales prices, accounts receivable turnover, sales returns and allowances, and bad debt expense. You then go through a similar process for all other source of income, cost of goods sold, and other expenses to determine the cash impact of each of them. Thus, it becomes virtually impossible to see the importance of each variable's bottom line impact on cash without performing some form of sensitivity analysis.

1006.5 A simple illustration of sensitivity analysis is shown in Exhibit 10-6. In this illustration, Jones Company is considering buying a piece of equipment costing $4 million. Other assumptions are as follows:

Annual cash flows from sales:	$2.5–$3 million
Annual sales growth rate:	5%
Variable costs:	50% of cash from sales
Annual fixed expenses:	$500 thousand
Income tax rate:	35%
Depreciation:	$100 thousand
Salvage value:	$1.5–$2.5 million

Life of investment:	5 years
After-tax hurdle rate	10%

For simplicity, revenues and expenses are assumed to be on a cash basis.

EXHIBIT 10-6

Sensitivity Investment Risk Analysis

Example 1 (higher sales; lower salvage value)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Sales		$3,000,000	$3,150,000	$3,307,500	$3,472,875	$3,646,519	$16,576,894
Variable costs		(1,500,000)	(1,575,000)	(1,653,750)	(1,736,438)	(1,823,259)	(8,288,447)
Contribution		1,500,000	1,575,000	1,653,750	1,736,438	1,823,259	8,288,447
Fixed expenses		500,000	500,000	500,000	500,000	500,000	2,500,000
Operating income		1,000,000	1,075,000	1,153,750	1,236,438	1,323,259	5,788,447
Income tax expense		350,000	376,250	403,813	432,753	463,141	2,025,956
Net income		650,000	698,750	749,938	803,684	860,119	3,762,490
Add back depreciation		100,000	100,000	100,000	100,000	100,000	500,000
Cash from operations		750,000	798,750	849,938	903,684	960,119	4,262,490
Salvage value received						1,500,000	1,500,000
Total cash received		750,000	798,750	849,938	903,684	2,460,119	5,762,490
Initial Investment paid	(4,000,000)						(4,000,000)
Net cash received (paid)	($4,000,000)	$750,000	$798,750	$849,938	$903,684	$2,460,119	$1,762,490
Present value at 10%	($4,000,000)	$681,818	$660,124	$638,571	$617,229	$1,527,540	$125,281

accept

Example 2 (lower sales; higher salvage value)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Sales		$2,500,000	$2,625,000	$2,756,250	$2,894,063	$3,038,766	$13,814,078
Variable costs		(1,250,000)	(1,312,500)	(1,378,125)	(1,447,031)	(1,519,383)	(6,907,039)
Contribution		1,250,000	1,312,500	1,378,125	1,447,031	1,519,383	6,907,039
Fixed expenses		500,000	500,000	500,000	500,000	500,000	2,500,000
Operating income		750,000	812,500	878,125	947,031	1,019,383	4,407,039
Income tax expense		262,500	284,375	307,344	331,461	356,784	1,542,464
Net income		487,500	528,125	570,781	615,570	662,599	2,864,575
Add back depreciation		100,000	100,000	100,000	100,000	100,000	500,000
Cash from operations		587,500	628,125	670,781	715,570	762,599	3,364,575
Salvage value received-net						2,500,000	2,500,000
Total cash received		587,500	628,125	670,781	715,570	3,262,599	5,864,575
Initial Investment paid	(4,000,000)						(4,000,000)
Net cash received (paid)	($4,000,000)	$587,500	$628,125	$670,781	$715,570	$3,262,599	$1,864,575
Present value at 10%	($4,000,000)	$534,091	$519,112	$503,968	$488,744	$2,025,817	$71,732

accept

Variable Assumptions:	**Example 1**	**Example 2**
Sales	$3,000,000	$2,500,000
Cost of goods sold %	50%	50%
Salvage value	$1,500,000	$2,500,000
Sales growth rate	5%	5%

Note: Slight differences are due to rounding.

1006.6 Four of these assumptions have been set up as variables at the bottom of the worksheet. This allows the variables to be easily changed so their bottom-line impact can be readily seen. The exhibit shows two example worksheets with certain variables changed. In Example 2, sales have been lowered from $3 to $2.5 million and salvage value have been increased from $1.5 to $2.5 million.

1006.7 As can be seen in the total column of each worksheet, the investment in both examples has positive present values of $125,281 and $71,732, respectively. Thus, both would be acceptable if the assumed variables reflect reality. The investment in Example 2 remains acceptable despite the assumed decline of $500,000 in annual sales only because the decline was offset by a projected $1 million increase in salvage value. If this does not occur, the investment would not be profitable and would be rejected. Several combinations of variable changes can be considered and analyzed in this manner. If some present values come out negative and some come out positive, it will become necessary to judge the most likely outcomes prior to making a final decision on the investment.

1006.8 In some situations, it may be wise to assume the worst-case scenario and calculate the net present value. Such an approach is very risk averse but may lead to losing good capital investment opportunities. At the other extreme, the firm can be risk tolerant and consider very optimistic projects. A third option is to consider three situations, each with optimistic, pessimistic, and most likely outcomes. It is common to consider a weighted average of the net present values with a weight of 4/6 to the most likely outcome and 1/6 weight each to the other two outcomes. To do this for each variable would make the number of combinations too large. However, judgment can be exercised to identify which variables create the most uncertainty and perform the sensitivity analysis with respect to them.

1006.9 **Breakeven Analysis.** Breakeven analysis is another tool for isolating capital investment risk because it tells you what level of sales are needed to cover your related costs. In breakeven analysis, you first divide all costs into fixed and variable cost categories. Once this is done, you simply total the projected fixed costs and determine the variable costs as a percentage of sales. Breakeven sales are then calculated by simply dividing the fixed costs by the contribution margin ratio (1-variable cost percentage). For example, if fixed costs are $2 million and variable costs are 60% of sales, breakeven sales are $5 million ($2 million ÷ 40%).

1006.10 In the example, all costs are divided into variable and fixed components. In the case of mixed costs, the fixed and variable portions can be added to the overall fixed and variable categories. In some situations, the firm may have to consider step costs, when an activity-based costing approach may be helpful. That is, the firm may consider when the fixed cost may increase when the activity level crosses a threshold (for example, beyond an initial threshold production level, it may be necessary to add a new machine component or an operator). The analysis may appear complicated, but with very slight adjustments, the illustration in Exhibit 10-7 may be modified to incorporate this consideration.

1006.11 Thus, breakeven analysis identifies the risk associated with the mix of fixed versus variable costs. As costs are shifted from variable to fixed, potential profits increase because for each increase in sales dollar, the overall costs (variable and fixed) as a percentage of sales drops. However, risks also increase because these fixed costs must be covered even if sales don’t reach the projected levels.

1006.12 For example, consider the following extreme scenarios in which a company has the option of making its costs either all fixed ($5 million) or all variable (90%). The following shows each scenario at a $4 million and a $10 million sales level:

	$10 Million Sales		$4 Million Sales	
	All Variable	**All Fixed**	**All Variable**	**All Fixed**
Sales	$10,000,000	$10,000,000	$4,000,000	$4,000,000
Variable costs	9,000,000	—	3,600,000	—
Contribution	1,000,000	$10,000,000	400,000	$4,000,000
Fixed costs	—	5,000,000	—	5,000,000
Net profit	1,000,000	5,000,000	400,000	(1,000,000)
%	10%	50%	10%	(25%)

1006.13 As can be seen, the all-fixed costs scenario produced a 50% profit margin when sales were high, but it produced a 25% loss when sales fell short of expectations. In the all-variable costs scenario, profits remained at 10% in both scenarios. Thus, if a company has uncertainty about the potential sales volume for a proposed capital investment, a shift to variable costs will help lower this risk. However, for a shift in sales from $4 million to $10 million, it may be necessary to increase the fixed costs as well (since the increase in sales is more than double, one may need more machines, raw materials, supervisors, etc.), and this may change the net profit percentage. This is an extreme example to illustrate the point that trading off fixed cost investments for variable costs will increase risk if sales figures have uncertainty. This analysis can be used to determine the sales amount that will result in breakeven sales or zero profit to the firm. The trade-off between fixed and variable costs also involves other considerations, such as the trade-off between giving sales staff a commission versus a fixed salary. Such a scenario may require relying not only on the smaller breakeven sales dollar but also considering the probability of achieving breakeven sales as trade-offs impact incentives to the sales staff.

EXHIBIT 10-7

Breakeven Analysis

Example 1 (Breakeven before Considering Present Value)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Sales		$2,018,565	$2,119,493	$2,225,468	$2,336,741	$2,453,578	$11,153,846
Variable costs		(1,009,283)	(1,059,747)	(1,112,734)	(1,168,371)	(1,226,789)	(5,576,923)
Contribution		1,009,283	1,059,747	1,112,734	1,168,371	1,226,789	5,576,923
Fixed expenses		500,000	500,000	500,000	500,000	500,000	2,500,000
Operating income		509,283	559,747	612,734	668,371	726,789	3,076,923
Income tax expense		178,249	195,911	214,457	233,930	254,376	1,076,923
Net income		331,034	363,835	398,277	434,441	472,413	2,000,000
Add back depreciation		100,000	100,000	100,000	100,000	100,000	500,000
Cash from operations		431,034	463,835	498,277	534,441	572,413	2,500,000
Salvage value received						1,500,000	1,500,000
Total cash received		431,034	463,835	498,277	534,441	2,072,413	4,000,000
Initial Investment paid	(4,000,000)						(4,000,000)
Net cash received (paid)	($4,000,000)	$431,034	$463,835	$498,277	$534,441	$2,072,413	($0)
Present value at 10%	($4,000,000)	$391,849	$383,335	$374,363	$365,030	$1,286,805	($1,198,618)

Example 2 (Breakeven after Considering Present Value)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Sales		$2,907,126	$3,052,482	$3,205,106	$3,365,362	$3,533,630	$16,063,706
Variable costs		(1,453,563)	(1,526,241)	(1,602,553)	(1,682,681)	(1,766,815)	(8,031,853)
Contribution		1,453,563	1,526,241	1,602,553	1,682,681	1,766,815	8,031,853
Fixed expenses		500,000	500,000	500,000	500,000	500,000	2,500,000
Operating income		953,563	1,026,241	1,102,553	1,182,681	1,266,815	5,531,853

Income tax expense		333,747	359,184	385,894	413,938	443,385	1,936,149
Net income		619,816	667,057	716,660	768,743	823,430	3,595,705
Add back depreciation		100,000	100,000	100,000	100,000	100,000	500,000
Cash from operations		719,816	767,057	816,660	868,743	923,430	4,095,705
Salvage value received-net						1,500,000	1,500,000
Total cash received		719,816	767,057	816,660	868,743	2,423,430	5,595,705
Initial Investment paid	(4,000,000)						(4,000,000)
Net cash received (paid)	($4,000,000)	$719,816	$767,057	$816,660	$868,743	$2,423,430	$1,595,705
Present value at 10%	($4,000,000)	$654,378	$633,931	$613,568	$593,363	$1,504,759	($0)

Variable Assumptions:	**Example 1**	**Example 2**
Sales	$2,018,565	$2,907,126
Cost of goods sold %	50%	50%
Salvage value	$1,500,000	$1,500,000
Sales growth rate	5%	5%

Note: Slight differences are due to rounding.

1006.14 Breakeven analysis may be used to forecast breakeven sales using net present value as well as non-net present value. For capital investment analysis, net present value is preferable. When using net present values, the worksheet approach is often easier than the formula approach for most controllers. Using the worksheet approach, you simply adjust the sales value until a zero present value results. Exhibit 10-7 presents a breakeven version of the example presented previously at Exhibit 10-6. It shows a breakeven before (Example 1) and after (Example 2) applying present values, which demonstrates the importance of calculating present values.

1006.15 When calculating breakeven in Example 1, sales in year 1 were set at $2,018,565 and the Jones Company achieved a breakeven at total sales of $11,153,846. However, after considering present values in Example 2, the Company required a much higher level of sales in year 1 of $2,907,126 (total of $16,063,706) before breaking even. Thus, the present value breakeven showed that almost $5 million total additional sales were needed to breakeven.

1006.16 Breakeven analysis can be used effectively to assess new marketing and advertising proposals. For example, if the new marketing effort is expected to cost $1 million, given the contribution margin ration of 10%, the required increase in sales to justify this marketing expenditure is $1 million divided by 10%, or $10 million.

1006.17 **Simple Probability Analysis.** The sensitivity analysis discussed previously allows controllers to insert various combinations of variables to determine their impact on the bottom line. However, at some point, management must decide the appropriate amounts to use for each variable in order to accept or reject the proposed investment. Normally, most variables will fall within a reasonable range. For example, as previously discussed in Exhibit 10-6 , management used a sales range of $2.5 to $3 million and a salvage value of $1.5 to $2.5 million. Both examples produced a positive net present value, indicating the investments should be accepted.

1006.18 However, because there are numerous variables and each variable generally has a specified range it can fall within, a more accurate technique is to assess the likelihood of the amounts falling at different points within the range. For example, assume management expects sales for the investment to range between $1.250 million and $4 million. It believes $2.5 million is the most likely outcome, and there is a much

less chance of hitting the $1.25 million low end or the $4 million dollar high end. It could then assign percentages to several levels within the range to arrive at a weighted amount as follows:

Amounts	Likelihood	Weighted
$1,250,000	10%	125,000
$1,500,000	20%	300,000
$2,500,000	40%	1,000,000
$3,000,000	20%	600,000
$4,000,000	10%	400,000
	Weighted total	$2,425,000

1006.19 Thus, $2,425,000 would be the most likely estimate of sales. You would then use this amount in preparing the capital investment analysis. Exhibit 10-8 presents an example using the previous Jones Company example (see Exhibit 10-6). The bottom half of the worksheet calculates a weighted total for each of the four assumptions. That total is then used in the worksheet to calculate the net cash received and its present value.

EXHIBIT 10-8

Simple Investment Probability Risk Analysis

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Sales		$2,425,000	$2,529,275	$2,638,034	$2,751,469	$2,869,782	$13,213,561
Variable Costs		1,212,500	1,264,638	1,319,017	1,375,735	1,434,891	6,606,780
Contribution		1,212,500	1,264,638	1,319,017	1,375,735	1,434,891	6,606,780
Fixed expenses		500,000	500,000	500,000	500,000	500,000	2,500,000
Operating income		712,500	764,638	819,017	875,735	934,891	4,106,780
Income tax expense		249,375	267,623	286,656	306,507	327,212	1,437,373
Net income		463,125	497,014	532,361	569,228	607,679	2,669,407
Add back depreciation		100,000	100,000	100,000	100,000	100,000	500,000
Cash from operations		563,125	597,014	632,361	669,228	707,679	3,169,407
Salvage value received-net						1,900,000	1,900,000
Total cash received		563,125	597,014	632,361	669,228	2,607,679	5,069,407
Initial Investment paid	(4,000,000)						(4,000,000)
Net cash received (paid)	(4,000,000)	563,125	$597,014	$632,361	$669,228	$2,607,679	$1,069,407
Present value at 10%	($4,000,000)	$511,932	$493,400	$475,102	$457,091	$1,619,164	($443,311)
							reject

Variable Assumptions:

	Likelihood					
	Downside			Upside		Weighted
	Unlikely	Maybe	Most Likely	Maybe	Unlikely	Totals [1]
	10%	20%	40%	20%	10%	100%
Sales	1,250,000	1,500,000	2,500,000	3,000,000	4,000,000	
Weighted sales	125,000	300,000	1,000,000	600,000	400,000	2,425,000
Variable costs %	60%	55%	50%	45%	40%	
Weighted cost of goods sold %	6%	11%	20%	9%	4%	50%
Salvage value	1,000,000	1,500,000	2,000,000	2,250,000	2,500,000	
Weighted salvage value	100,000	300,000	800,000	450,000	250,000	1,900,000
Sales growth rate	-0.05	0%	0.05	0.08	0.12	
Weighted sales growth rate	-1%	0%	2%	2%	1%	4%

[1]The four totals in this column are the variables used in calculating the above investment analysis amounts.

Note: Slight differences are due to rounding.

1006.20 As can be seen in Exhibit 10-8, when applying the probability approach to the analysis, the investment produces a positive net cash flow of $1,069,407. However, when discounted to present value, it results in a negative $443,311. Thus, in contrast to the previous outcome in Exhibit 10-6, the capital investment now would be rejected since it fails to produce the required 10% return.

1006.21 The variable assumptions shown in Exhibit 10-8 were generally independent. In other words, a change in one variable did not significantly impact other variables. However, in some capital investment analyses, certain key variables, such as sales price, will impact other variables, such as sales volumes and costs of goods sold percentages. In this situation, a separate worksheet should be prepared for changes to each key variable. For example, assume a product has possible sales prices of $300 and $500. At the $300 price, sales volume ranges from 3 to 5 million units. At the $500 price, sales volume ranges from 1 to 3 million units. Thus, separate worksheets should be prepared using the $300 price and the $500 price.

1006.22 This approach can also be used to support strategic decision making. The budgeting process is a good place to analyze strategic alternatives. Some of the alternatives posed are with respect to selling price per unit (with a consequent change in expected sales volume), changes in fixed cost investments in order to reduce variable costs, changes in fixed cost payments with a decrease in variable costs (such as an increase in salaries in lieu of commissions), proposals to spend on advertising, etc.

Controlling Capital Investment Risk

1006.23 After identifying and isolating various capital investment risks, you should then look for ways to reduce risks. Since there is often a tradeoff between risk and return, it may be necessary to give up some potential profits to make the risks acceptable. Some methods to consider for controlling risk are discussed in the following paragraphs.

1006.24 **Perform More Extensive Analysis and Testing.** The above presented some basic techniques for identifying risk. However, as already noted, more sophisticated tools that may be used to lower risk, such as Monte Carlo simulation studies and decision tree analysis, are also available. In addition, test marketing and test production models are ways to reduce risk without expensive full-scale startup costs.

1006.25 **Shift Fixed Versus Variable Cost Risks.** As discussed above (Paragraph 1006.9 et seq.), higher fixed costs in relation to variable costs increases the risks but also the potential profits. Thus, companies that are uncertain of the viability of a proposed capital investment should favor variable costs over fixed costs at least in the early stages of the project. If the project appears successful, the company can then begin to shift to a fixed cost strategy. Prior to switching to a larger amount of fixed costs, it is important to make sure that the success experienced in the project is long-standing. Otherwise, the company may end up with excess capacities and no way to reduce the fixed costs.

1006.26 **Employ a Staged-Investment Approach.** A staged-investment strategy follows the same rational as the fixed versus variable approach discussed above. Instead of taking an all-or-nothing approach, most capital investments allow some degree of staged investment. In other words, the expenditures can be made in stages over a specified time period with checks of market viability at periodic intervals. Thus, controllers should look for ways to employ this strategy whenever possible. Although the company will likely give up some profits in the early stages if the investment is successful, it will reduce its risk in case the project falls short of expectations.

1006.27 **Modify Pricing Strategy.** Most companies judgmentally decide on a price for proposed projects and roll the product out at this initial price. However, state of the art products often allow companies to introduce them at significantly higher prices and then lower prices when demand starts to fall off. Leading edge buyers who perceive a high benefit for this product and are prone to be less price sensitive, will often acquire the product even at the higher price. Other buyers will be attracted by the lower price at a later date. This common pricing strategy lowers risks by bringing down the average breakeven point by raising the contribution margin (see breakeven discussion at Paragraph 1006.9 et seq.). Thus, companies that are introducing state of the art products should consider a modified pricing strategy.

1006.28 **Diversify Capital Investments.** Although this strategy applies mainly to companies that have a larger number of capital investments, it can also be employed by mid-sized companies. The logic is to diversify the types of investments to reduce the overall risk to the investments as a whole in case one of the investments should have problems. Although smaller businesses generally do not have a large number of capital investments allowing extensive diversification, the strategy can help lower risk even for a company that has only three of four types of investments. Moreover, risks can be reduced by geographic diversification by avoiding undue concentrations in a particular region of the country.

1006.29 **Reduce Leverage.** Leverage refers to the extent of the project that is financed by debt (or other fixed cost financing, such as long-term leasing) versus other non-debt sources of capital. Higher leverage increases risk and potential profits increase and lower leverage decreases risk and potential profits. Higher risk occurs because, similar to fixed versus variable cost strategy, the company locks itself into a fixed series of payments even if the investment turns sour. Thus, companies should control the debt-financing component when they wish to control the risk of a particular capital investment.

1007 CHOOSING THE FINANCING METHOD: LEASE VS. DEBT

1007.1 The decision about how a company should finance a proposed capital investment should usually be made separately from the initial investment decision. In other words, a company should first evaluate *whether to invest* in a proposed capital project and then decide *how to finance* the investment. The first part of this chapter dealt with evaluating the proposed capital investment. This section deals with determining the best financing method once the investment has been approved. It compares the two most common types of financing: lease[3] versus debt.

1007.2 This section includes the following topics:

[3] The term “lease” as used in this section refers to an operating lease. Leases that result in recorded debt, such as financing leases, are considered in this section as a form of debt financing.

- Overview of lease-versus-debt analysis
- Example of lease-versus-debt analysis
- Performing lease-versus-debt analysis

Overview of Lease-Versus-Debt Analysis

1007.3 Evaluating the most appropriate financing method (lease versus debt) parallels the approach used in analyzing discounted cash flows (DCF), as discussed in Section 1003. Expected annual cash outflows (and any inflows, such as salvage value) that are unique to each financing proposal are discounted to net present values (NPV). Each proposal will produce a negative net cash flow, but the proposal with the lowest net cash outflow (on an NPV basis) represents the best choice from a cost standpoint.

1007.4 **Expected Cash Flows.** Expected cash flows for each financing proposal primarily consist of cash outflows that are unique to each proposal, less income tax benefits and any salvage or residual value. Cash outflows for debt financing proposals typically include down payments and principal and interest payments. Cash outflows for lease financing proposals typically consist of lease payments. Other costs, such as maintenance, insurance, and property taxes, would be considered only on an incremental basis. For example, if property taxes and insurance are the lessee's responsibility, the analysis could ignore the expenses since no incremental costs result when comparing the lease and debt financing options (obviously assuming that the borrower is also responsible for these expenses in the debt financing option). Paragraph 1006.10 et seq. discuss factors companies should consider when estimating cash flows.

1007.5 **Discount Rate.** In contrast to the buildup approach used to derive the discount (hurdle) rate for making the initial capital investment, the discount rate used in lease-versus-debt analysis is typically the company's after-tax incremental borrowing rate. The same incremental borrowing rate is used to discount both the lease and the debt alternatives.

1007.6 **Lease Terminology.** Controllers will encounter the following common lease terms:

- **Lessor.** The party that provides the property in a lease arrangement in exchange for lease payments.
- **Lessee.** The party that uses the property in a lease arrangement and makes lease payments.
- **Residual value.** The estimated value of the leased property when the lease term ends.
- **Open end lease.** A lease arrangement where the lessee guarantees the residual value of the leased asset. If the actual fair value at the end of the lease term is less than the guaranteed residual value, the lessee pays the lessor for the difference.
- **Closed end lease.** A lease arrangement where the lessee does not guarantee the residual value.

Example of Lease-Versus-Debt Analysis

1007.7 To illustrate how the NPV approach may be used to perform lease-versus-debt analysis, assume that XYZ Company is considering buying equipment that costs $50,000. The company can either lease the equipment or purchase it with bank financing. The purchase and lease assumptions are as follows:

	Purchase	Lease
Down payment	$10,000	N/A
Interest rate (after tax)	8.3%	N/A
Term	60 months	60 months
Monthly payment	$817	$1,125
Life of asset	5 years	5 years
Bargain purchase option	N/A	None
Residual value	$4,500	N/A
Annual maintenance costs	$1,500	None
Refundable security deposit	None	$2,500

Tax assumptions include:

- 34% effective tax rate
- Lease payments are deductible for tax purposes
- 200% MACRS (Modified Accelerated Cost Recovery System) declining balance method over a five-year recovery period using a half-year convention

1007.8 Exhibit 10-9 presents a comparison of the lease-versus-debt financing assumptions using the net present value approach. The amounts are stated in thousands of dollars. A discount rate of 8.36% (the incremental borrowing rate) was used in each present value calculation.

1007.9 In the Exhibit 10-9 example, the debt financing proposal is the lower cost alternative because, on a present value basis, it has a net cash outflow of only $33.2 thousand as compared to the lease alternative net cash outflow of $36.0 thousand. Before making a final decision, however, the company may wish to consider other factors such as the following:

- The lease financing option requires less up-front cash ($2,500 versus $10,000).
- The debt financing option analysis has more uncertainties than the lease option, such as maintenance costs and salvage value.

Thus, if cash flow is tight or the company wishes to transfer ownership risks (such as maintenance and salvage value) to the lessor, it might select the lease option since the difference between the two alternatives is less than $3,000.

Performing Lease-Versus-Debt Analysis

1007.10 Lease-versus-debt analysis consists of four basic steps: collecting information relating to each financing alternative, determining the appropriate tax classification of the lease, analyzing the financial data for each financing alternative, and making the final decision (considering subjective factors). Each step is discussed in the following section.

1007.11 **Data Collection.** The first step in performing lease-versus-debt analysis involves accumulating relevant cost data relating to each lease and debt financing alternative. Appendix 10I includes a checklist controllers may use to help ensure that all pertinent information is accumulated.

EXHIBIT 10-9

Comparison of Lease-Versus-Debt Financing

Debt Financing Option

(in thousands, except present value factors)

	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Total
NONTAXABLE CASH FLOWS:								
Principal payments	(10.0)	(6.7)	(7.3)	(8.0)	(8.6)	(9.4)	-	(50.0)
Total nontaxable cash flows	(10.0)	(6.7)	(7.3)	(8.0)	(8.6)	(9.4)	-	(50.0)
TAXABLE CASH FLOWS:								
Interest expense	-	(3.1)	(2.5)	(1.9)	(1.2)	(0.4)	-	(9.1)
Maintenance costs	-	(1.5)	(1.5)	(1.5)	(1.5)	(1.5)	-	(7.5)
Tax depreciation	-	(10.0)	(16.0)	(9.5)	(5.8)	(5.8)	(2.9)	(50.0)
Other costs:								
Less salvage value, if any	-	-	-	-	-	-	4.5	4.5
Net taxable loss	-	(14.6)	(20.0)	(12.9)	(8.5)	(7.7)	1.6	(62.1)
Less income tax benefit	-	5.4	7.2	4.7	3.2	2.9	(0.5)	22.9
Net loss	-	(9.2)	(12.8)	(8.2)	(5.3)	(4.8)	1.1	(39.2)
Add back depreciation	-	10.0	16.0	9.5	5.8	5.8	2.9	50.0
Total taxable cash outflows	-	(0.8)	3.2	1.3	(0.5)	1.0	4.0	10.8
Total cash outflows	(10.0)	(5.9)	(4.1)	(6.7)	(8.1)	(8.4)	4.0	(39.2)
NET PRESENT VALUE:								
Present value factors (based on a 12.6% discount rate)	1.00	0.915	0.854	0.791	0.728	0.667	0.625	
NPV of debt cash flows	(10.0)	(5.4)	(3.5)	(5.3)	(5.9)	(5.6)	2.5	(33.2)

Lease Financing Option

(in thousands, except present value factors)

	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Total
NONTAXABLE CASH FLOWS:							
Refundable security deposit	(2.5)	-	-	-	-	2.5	-
Total nontaxable cash flows	(2.5)	-	-	-	-	2.5	-
TAXABLE CASH FLOWS:							
Lease payments	-	(13.5)	(13.5)	(13.5)	(13.5)	(13.5)	(67.5)
Maintenance costs							
Other costs:							
Net taxable loss	-	(13.5)	(13.5)	(13.5)	(13.5)	(13.5)	(67.5)
Less income tax benefit	-	4.6	4.6	4.6	4.6	4.6	23.0

	Debt Financing Option						
	(in thousands, except present value factors)						
	Yr. 0	**Yr. 1**	**Yr. 2**	**Yr. 3**	**Yr. 4**	**Yr. 5**	**Yr. 6**	**Total**
Net loss		-	(8.9)	(8.9)	(8.9)	(8.9)	(8.9)	(44.5)
Add back noncash items, if any		-	-	-	-	-	-	-
Total taxable cash outflows		-	(8.9)	(8.9)	(8.9)	(8.9)	(8.9)	(44.5)
Total cash outflows		(2.5)	(9.9)	(9.9)	(9.9)	(9.9)	(7.4)	(49.5)
NET PRESENT VALUE:								
Present value factors (based on a 8.3% discount rate)		1.00	0.915	0.854	0.791	0.728	0.667	
NPV of debt cash flows		(2.5)	(8.1)	(7.6)	(7.0)	(6.5)	(4.3)	(36.0)

1007.12 **Tax Classification of Lease.** Before comparing the data relating to the lease and debt alternatives, the controller should first analyze the lease to determine whether it is considered a capital lease or an operating lease for tax purposes. Under Internal Revenue Code Section 162 (and Section 179 in 2012), lease payments are deductible as rent expense if the IRS is satisfied that the lease is a genuine lease and not a form of installment sale. On the other hand, rent payments are not deductible if the lessee will acquire title or equity in the property because of payments made. In that situation, depreciation and interest deductions are typically available (Internal Revenue Code Sections 167 and 168).

1007.13 The following are examples of lease provisions suggesting that a lease is a capital lease for tax purposes:

- Title passes to lessee when lease term ends.
- Lessee obtains a bargain purchase option.
- Portion of lease payment is designated as interest.
- Lease payment exceeds fair rental value.
- Lease has a renewal option with very low renewal lease payments over the asset's remaining life.
- Lease agreement restricts the lessee's ability to incur debt or pay dividends.
- Lease payments (under a lease with an option to buy) approximate the installment payments under a purchase option.
- Portion of lease payments (under a lease with an option to buy) are applied to the lessee's equity in the asset.

1007.14 **Analyzing Data.** The next step in lease-versus-debt analysis consists of analyzing the net after-tax cash flows under each financing proposal and computing their net present values. The proposal with the smallest net cash outflow on a present value basis indicates the lowest cost alternative. Appendix 10J includes worksheets that controllers may use to document annual cash flows under each alternative and compute net present values. Taxable cash flows have been separated from nontaxable cash flows on the worksheet to streamline the tax computation. Exhibit 10-9 (discussed in Paragraph 1007.8 et seq.) provides a sample completed worksheet.

1007.15 **Making the Final Decision: Subjective Considerations.** The final decision to accept either the lease or debt alternative should be based primarily on the lowest cost alternative (in other words, the alternative with the lowest costs on a net present value basis) but should also consider other nonquantitative factors. Exhibit 10-10 presents various subjective factors management may consider before making the final decision.

EXHIBIT 10-10

Subjective Factors to Consider

Item	Lease Financing	Debt Financing
100% financing	Leases often provide 100% financing, although a security deposit may be required.	Loan agreements often require a down payment of 10% or more.
Cancellation option	Some leases offer the lessee an option to cancel the lease. If the company faces excess capacity situations due to a downturn in expected growth, leasing can be terminated.	Purchases through debt financing are not cancelable. With no cancellation feature, the company will have to live with any excess capacity costs.
Fixed payments	Lease payments are generally fixed, although some leases contain escalation provisions.	Loan payments may contain fixed or floating rates and payment options.
Maintenance cost risks	Responsibility for maintaining the asset can rest with either the lessor or lessee. The lessee can often obtain a maintenance contract to keep the cost of maintaining the equipment at a fixed amount.	Purchasers through debt financing are virtually always responsible for maintenance costs, although maintenance contracts may be available.
Covenants	Leases typically do not have covenants that restrict operations.	Loan agreements may contain covenants that restrict operations.
Borrowing capacity	Operating leases are considered off-balance-sheet financing and thus do not affect the lessee's working capital or debt-to-equity ratios.	Loans typically affect financial ratios and borrowing capacity.
Residual value risk	In open-end leases, the lessee bears the risk of a decline in the asset's value.	Purchasers virtually always bear the risk of a decline in the asset's value.

APPENDIX
CHAPTER 10
Table of Contents

APPENDIX 10A
DIAGNOSTIC CHECKLIST

Company Name: _____

Prepared by: _____ Date Completed: _____

Instructions: Controllers may use this form to quickly gain a preliminary snapshot of the company's existing capital expenditure evaluation process. The questions are structured to encourage concise responses while, at the same time, providing a broad overview of the process. Each checklist section corresponds to a related chapter section. A negative response typically indicates a potential for improvement. Appendix 10B includes a work program that summarizes the key steps performed during each phase of a capital investment evaluation.

Additional Guidance—See Paragraph 1001.2 et seq.

Inquiry	Response
Introduction	
1. Does the company use quantitative methods to assist in each of the following capital investment decision areas:	
a. Evaluating the proposed capital investment?	
b. Ranking two or more alternative capital investment proposals?	
c. Replacing existing capital assets?	
d. Choosing the appropriate financing method for the capital investment?	
e. Facilitating strategic decision making on unit pricing, fixed cost investment versus variable cost incurrence?	
Capital Asset Planning and Approval	
2. Has the company considered the following techniques to provide more structure and control over capital expenditures:	
a. Preparing a capital asset budget for at least three years, based on expected needs submitted by key department heads?	
b. Requiring all departments to submit written requests for capital expenditures in advance for management evaluation and approval?	
d. Requiring departments facing unused capacities to submit a plan indicating how long it will take to fill the unused capacities and providing a trajectory for doing so?	
Overview of Capital Investment Analysis Methods	
3. Does the company use the following quantitative analysis methods in the appropriate situations:	
a. Accounting rate of return method?	
b. Payback method (if so, is the approach justified by the shorter duration of the investment horizon)?	
c. Discounted cash flow methods, such as net present value and internal rate of return?	
4. Is the net present value method the primary approach the company uses to evaluate significant proposed capital investments?	
Using Net Present Value to Evaluate Proposed Capital Investments	
5. Is a hurdle rate determined (and documented) for each significant capital investment proposal, and does it consider the following factors:	
a. Company's after-tax cost of debt and equity capital?	
b. Additional profit desired from the capital investment?	

c. Risks associated with the capital investment?

d. Strategic choices in congruence with the goals of top management?

6. Are estimated cash flows from the proposed capital investment documented, and do they include other cash flows, such as:

   a. Working capital costs?

   b. Inflation?

   c. Income taxes?

   d. Depreciation (tax effect only) of proposed new assets and assets that are to be replaced?

   e. Residual value of proposed new assets and assets that are to be abandoned, if any?

7. Are the net present value calculation and the decision to accept or reject the proposed investment clearly documented?

Using Capital Rationing to Rank Alternative Capital Projects

8. If cash available for capital investments is limited, does the company use discounted cash flow methods, such as the profitability index method, to help choose among two or more alternative capital investment proposals?

Choosing the Financing Method: Lease versus Debt

9. Does the company usually decide how to finance a proposed capital investment independently from deciding whether to make the investment?

10. Are capital investment financing decisions made primarily by comparing the discounted cash outflows under each financing alternative?

11. Before making the final capital investment financing decision, does management also consider any important nonquantitative factors (for example, has the company considered the possibility of unused capacities and the advantages of entering into a cancelable lease)?

Refining the Capital Investment Analysis: Major Investments

12. Are techniques such as sensitivity analysis or breakeven analysis used to refine the analysis by identifying capital investment risks?

13. Once potential risks are identified, are steps taken to control them?

APPENDIX 10B
SUMMARY CHECKLIST

Company Name: _____

Prepared by: _____ Date Completed: _____

Instructions: This work program summarizes the key steps and practice aids concerning the four aspects of capital expenditure analysis: evaluating the proposed capital investment, ranking alternative capital investment proposals, evaluating financing alternatives, and isolating and reducing risks. Controllers may use this form to quickly lead them through a capital expenditure analysis project.

Additional Guidance—See Paragraph 1001.4.

Steps	Completed by or N/A
Evaluating a Capital Investment Proposal—Net Present Value Method	
1. Compute a hurdle rate for the proposed capital investment using the Hurdle Rate Worksheet at Appendix 10F. Consider the following factors: a. Company's after-tax cost of debt and equity capital. b. Profit expectations from investment. c. Investment risk.	
2. Determine the investment's estimated future cash flows for each year using the Discounted Cash Flow Worksheet at Appendix 10G. Generally, exclude estimated financing costs, but, if applicable, consider costs such as: a. Initial cost of investment (including delivery, installation, commissions, etc.) and timing of differential investments for long-term projects. b. Net working capital costs (inventories plus receivables less payables). c. Operating costs (increases or decreases in costs, such as maintenance, labor, utilities, insurance, property taxes, etc.). d. Inflation (compounded annually). e. Income taxes. f. Depreciation (tax effect only). g. Residual value of asset at project's end. h. Disposal value or dismantling cost of existing asset proposed to be replaced.	
3. Compute the net present value of the estimated future annual cash flows using the Discounted Cash Flow Worksheet at Appendix 10G.	
4. Tentatively accept investments having a positive net present value of future cash flows.	
5. Make a final decision on the proposed investment after considering any subjective factors in addition to the preceding quantitative analysis.	
Ranking Two or More Alternative Capital Investment Proposals	
6. Compute the net present value of each project's estimated future cash flows by following steps 1–3 of this checklist. If the degree of risk varies for each project, compute a separate hurdle rate for each investment.	
7. If each project's initial investment is comparable, the project having the largest net present value would generally be preferable.	

8. If each project's initial investment is not comparable, compute a profitability index (NPV of cash inflows ÷ initial investment) and select the project with the highest index.

Refining the Capital Investment Analysis: Major Investments

9. Consider sensitivity analysis to help determine which variables or combinations of variables have the greatest impact on the desirability of the investment.
10. Consider breakeven analysis to find the optimum mix between fixed and variable costs. List any incentive effects that may influence the sales or production staff.
11. Consider various techniques to reduce risks.

Choosing the Financing Alternative: Lease Versus Debt

12. Accumulate relevant financial data for both the lease and debt financing alternatives. (Use the checklist at Appendix 10I.)
13. Determine whether the lease is a capital or an operating lease for tax purposes.
14. Document the estimated annual net cash outflows for each financing alternative using the worksheets at Appendix 10J.
15. Compute the net present value of cash flows for each financing proposal using the worksheets at Appendix 10J.
16. Tentatively select the proposal with the lowest net cash outflows on a present value basis.
17. Before making a final selection decision, also consider subjective factors, if any.

APPENDIX 10C
THREE-YEAR CAPITAL BUDGET WORKSHEET

Company Name: _____ Date: _____

Prepared by: _____ Title: _____

Status: Unapproved _____ Approved _____ Date: _____

Instructions: This worksheet helps companies prepare a three-year capital budget. Department heads may use it to prepare individual department budgets, which can then be combined into the overall company-wide budget. Department heads should briefly justify or explain why each capital expenditure is needed in column (f). The financial effects of the first year's amounts (column c) should be included in the current operating budget.

Additional Guidance—See Paragraph 1002.5.

		Estimated Costs by Year			
Asset Description (a)	**Department (b)**	**19_____ (c)**	**19_____ (d)**	**20_____ (e)**	**Justification (f)**
Major Repairs and Replacements:					
Improvements:					
New Additions:					
Other:					
Totals					

APPENDIX 10D
CAPITAL ASSET REQUEST FORM
Instructions

Companies may use this form to document requests and approvals for capital expenditures. It includes sections to document the estimated costs and savings from the proposed expenditure (Part 1), summarize the cost analysis the controller performs (Part 2), and document key management members' approvals (Part 3).

Part 1A should be completed by the department requesting the expenditure. Information provided should include the estimated initial or up-front costs of the capital expenditure and any estimated subsequent costs that exceed what the company is currently spending (in other words, consider only incremental costs). Excess costs include increased labor costs to operate the equipment, higher insurance and property taxes, higher utility costs, etc. In Part 1B, the requesting department should also describe any savings or benefits expected from the capital expenditure, such as lower maintenance costs or proceeds from sale of replaced assets. Any intangible benefits, such as improved customer service, should also be included (or listed separately), even though the dollar amount of the savings is unknown or not readily determinable.

Part 2 generally should be completed by the controller. It should briefly summarize the results of the proposal's financial analysis based on an appropriate method of capital expenditure analysis, such as the net present value method (see worksheet at Appendix 10G).

Part 3 should be used to document approvals by designated key management members.

Additional Guidance—See Paragraph 1002.7.

CAPITAL ASSET REQUEST FORM

Project Description: _____ Requested by: _____

Date of Request: _____ Department: _____

PART 1A—ESTIMATED COSTS OF PROPOSED PROJECT

Initial Costs			Subsequent Costs		
Dates	Description	Amounts	Dates	Description	Amounts

PART 1B—ESTIMATED SAVINGS OR BENEFITS FROM PROPOSED PROJECT

Dates	Description	Amounts

PART 2—ACCOUNTING/FINANCIAL ANALYSIS OF PROPOSED PROJECT

Results of Financial Analysis	Explanation

PART 3—RECOMMENDATION/DECISION

Signature	Date	Approval (Y or N)	Comments
Dept. Head			
Controller			
President			

APPENDIX 10E
CAPITAL EXPENDITURE STATUS FORM
Instructions

Controllers may use this form to track the costs of significant capital expenditure projects (such as construction projects) that span an extended term. It should monitor actual costs compared to budget until the project is operational (in other words, during the construction phase). Each project's costs may be tracked in total or by major components of the project, such as professional fees, design costs, electrical, and capitalized interim interest.

The manager responsible for the project should regularly update the form. Even though the controller will frequently help the project manager complete the form, the manager should be expected to supply the "estimated remaining costs" figures and explain any variances. The manager may use the bottom section of the form to explain any variances.

Additional Guidance—See Paragraph 1002.8.

CAPITAL EXPENDITURE STATUS FORM

Company Name: _____ Period End: _____ Date: _____

Project Description (1)	Complete? (Yes or No) (2)	Authorized Total Cost (3)	Expenditures (Actual Plus Estimates to Complete)					Variance
			Paid in Previous Periods (4)	Current Period		Estimated Remaining Costs (7)	Estimated Total Costs (8)	Estimated (Over) Under Authorized (Col. 3–8)
				Paid (5)	Committed (6)			
Comments								

APPENDIX 10F
HURDLE RATE WORKSHEET

Company Name: _____ Prepared by: _____ Date: _____

Instructions: Controllers may use this worksheet to determine the hurdle rate for proposed capital expenditures. After calculating the hurdle rate, they should use it to discount expected future cash flows to present values using the worksheet at Appendix 10G.

Additional Guidance—See Paragraph 1004.2 et seq.

	(A) Year Ended ___-___-___	(B)	(C) Cost of Capital %	(D)	(E) Hurdle	
Description	**Balance**	**% of Total**	**Before Tax**	**After Tax**	**Rate**	
Cost of Capital:						
Debt	$	%	%	%	%	
Equity	$	%	%	%	%	
Subtotal	$	100%			%	(F)
Adjustments to Cost of Capital:						
Desired additional return (G)					%	
Risk factor (H)					%	
Adjusted Hurdle Rate (I)					%	
						(To Appendix 10G)

(To Appendix 10G)

Notes:

(A) Enter the company's year-end equity and interest-bearing debt balances. However, if proposed new financing will significantly alter the capital mix or the cost of capital, the new financing costs generally should be factored into the hurdle-rate calculation.

(B) Compute the percentage of each to total capital.

(C) Enter the company's before-tax cost of capital:

Debt-The company's estimated borrowing rate over the project's life.
Equity-Net earnings divided by average equity balance (i.e., return on equity).

(D) Enter the company's after-tax cost of capital:

Debt-Column C (1 - marginal tax rate).
Equity-Same as Column C (in other words, taxes don't impact the cost).

(E) Compute the weighted cost of capital by multiplying Column B by Column D.

(F) This subtotal represents the company's expected cost of capital (minimum hurdle rate) over the project's life.

(G) Increase the cost of capital rate (per "F" above) for additional profits desired, if any, on capital investments.

(H) Increase the cost of capital rate (per "F" above) for additional risk, if any, on the investment. The following table may provide some guidance in selecting a risk factor:

Degree of Risk	Risk Factor
Little or no risk	0%
Low risk	1–5%
Moderate risk	6–10%
High risk	11–15%

(I) This amount represents the company's adjusted hurdle rate that will be used for making capital investment evaluations.

APPENDIX 10G
DISCOUNTED CASH FLOW WORKSHEET
Instructions

Controllers may use this worksheet to evaluate a proposed capital expenditure by discounting expected future cash flows to a net present value based on a predetermined hurdle rate (see Appendix 10F). The worksheet has been divided between nontaxable and taxable cash flows, as described below.

Nontaxable cash flows should include cash items that do not enter directly into the determination of taxable income. They should include items such as the acquisition cost of the proposed capital asset and incremental working capital needs, if any, such as accounts receivable and inventories.

Taxable cash flows should include all incremental income and expense items concerning the proposed expenditure that enter into the determination of taxable income. They include increases or decreases in items such as maintenance and utility costs, as well as any tax depreciation (since it reduces taxes paid) relating to the expenditure. After determining income tax expense or benefit, add back all noncash items, such as depreciation, to net income to derive total taxable cash flows.

Net present value (NPV) of the cash flows is determined by applying discount factors to total cash flows (nontaxable plus taxable cash flows) for each year. (Calculate discount factors using the present value tables in Appendix 10H.) Positive NPVs indicate acceptable projects, whereas negative NPVs indicate unacceptable projects. In either case, qualitative factors could also impact the final decision to accept or reject the project.

Additional Guidance—See Paragraph 1004.19.

DISCOUNTED CASH FLOW WORKSHEET

Company Name: _____ Date: _____

Name of Capital Expenditure Project: _____

	(in thousands, except present value factors)											
	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8	Yr. 9	Yr. 10	Total
NONTAXABLE CASH FLOWS:												
Initial cost of investment												
Additional working capital:												
Total nontaxable cash flows												
TAXABLE CASH FLOWS:												
Income-increases (decreases):												
Salvage Value												
Expenses-(increases) decreases:												
Labor reductions												
Depreciation												

Net taxable income (loss)
Income tax benefit (expense)
Net income
Add back depreciation
Total taxable cash flows
Total cash flows
NET PRESENT VALUE:
Present value factors (based on hurdle rate of _____). (See Appendix 10F.)
NPV of cash flows

APPENDIX 10H
PRESENT VALUE TABLES
Instructions

Companies may use the tables at Appendixes 10H-1 and Appendix 10H-2 (in lieu of a business calculator) to compute the present value of future cash flows.

- Use Appendix 10H-1 when a *series of even cash flows* occurs in future years.
- Use Appendix 10H-2 when *one or more uneven cash flows* occur in future years.

The tables assume cash flows occur annually and at the end of each year. If cash flows occur other than annually (such as monthly), a reasonable approximation of the present value amounts generally can be obtained by analyzing the cash flow amounts, number of periods, and the discount rate.

Series of Even Cash Flows (Appendix 10H-1). Select the appropriate factor based on the discount rate and the number of periods the cash amount is expected to be received. For example, if cash flows of $1,000 are expected to be received at the end of each of the following five years, the net present value would be $3,993 ($1,000 × 3.9927) assuming an 8% discount rate.

Series of Uneven Cash Flows (Appendix 10H-2). Select the appropriate factor based on the discount rate and the number of periods between the current date (present value date) and the date the cash amount is expected to be received. For example, if a cash amount of $5,000 is expected to be received at the end of year 5, the net present value would be $3,403 ($5,000 × .68058) based on an 8% discount rate.

Additional Guidance—See Paragraph 1004.20 et seq.

APPENDIX 10H-1
PRESENT VALUE—SERIES OF EVEN CASH FLOWS IN FUTURE YEARS

Periods	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	Periods
1	0.9434	0.9346	0.9259	0.9174	0.9081	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8547	0.9475	1
2	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5852	1.5656	2
3	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.2096	2.1743	3
4	3.4651	3.3872	3.3121	3.2397	3.1699	3.1025	3.0374	2.9745	2.9137	2.8550	2.7982	2.7432	2.6901	4
5	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	3.1994	3.1272	5
6	4.9173	4.7865	4.6229	4.4859	4.3553	4.2305	4.1114	3.9976	3.8887	3.7845	8.6847	3.5892	3.4976	6
7	5.5824	5.3853	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.8224	3.8115	7
8	5.2098	5.9713	5.7466	5.5348	3.3349	5.1461	4.9676	4.7988	4.8389	4.4873	4.3436	4.2072	4.0776	8
9	6.8017	6.5152	6.2469	5.9953	5.7590	5.5371	5.3283	5.1317	4.9464	4.7716	4.6065	4.4506	4.3030	9
10	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0186	4.8332	4.6586	4.4941	10
11	7.8869	7.4987	7.1390	6.8052	6.4591	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.8364	4.6560	11
12	8.3538	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9177	5.6603	5.4206	5.1971	4.8884	4.7932	12
13	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4236	6.1218	5.8424	5.5832	5.3423	5.1183	4.9095	13
14	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	5.2293	5.0081	14
15	9.7123	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	5.3242	5.0916	15
16	10.1059	9.4467	8.8514	8.3126	7.8237	7.3782	6.9740	6.6039	6.2651	5.9542	5.6685	5.4053	5.1624	16
17	10.4773	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	5.4746	5.2223	17
18	10.8276	10.0691	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	8.4874	6.1280	5.8179	5.5339	5.2732	18
19	11.1581	10.3356	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1962	5.8775	5.5845	5.3162	19
20	11.4699	10.5940	9.8182	9.1286	8.5136	7.9633	7.4694	7.0248	6.8231	6.2593	5.9288	5.6278	5.3528	20
21	11.7641	10.8355	10.0166	9.2922	8.6457	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	5.6648	5.3837	21
22	12.0416	11.0812	10.2007	9.4424	8.7715	8.1757	7.6447	7.1695	6.7429	6.3587	6.0113	5.6964	5.4099	22
23	12.3034	11.2722	10.3711	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3986	6.0443	5.7234	5.4321	23
24	12.5504	11.4693	10.5288	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0728	5.7465	5.4510	24
25	12.7834	11.6536	10.6748	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4642	6.0971	5.7662	5.4669	25
26	13.0032	11.8258	10.8100	9.9290	9.1610	8.4861	7.8957	7.3717	6.9061	6.4906	6.1182	5.7831	5.4804	26
27	13.2105	11.9867	10.9352	10.0266	9.2372	8.5478	7.9426	7.4086	6.9352	6.5135	6.1364	5.7975	5.4819	27
28	13.4062	12.1371	11.0511	10.1161	9.3066	8.6016	7.9844	7.4412	6.9607	6.5335	6.1520	5.8099	5.5016	28
29	13.5907	12.2777	11.1584	10.1983	8.3696	8.6501	8.0218	7.4701	6.9830	6.5509	6.1658	5.6204	5.5098	29
30	13.7648	12.4090	11.2578	10.2737	9.4269	8.6938	8.0552	7.4957	7.0027	6.5660	6.1772	5.8294	5.5165	30
31	13.9281	12.5318	11.3498	10.3428	9.4720	8.7332	8.0850	7.5183	7.0119	6.5791	6.1872	5.8371	5.5227	31
32	14.0840	12.6466	11.4350	10.4062	9.5264	8.7686	8.1116	7.5383	7.0350	6.5905	6.1959	5.8437	5.5277	32
33	14.2302	12.7538	11.5139	10.4644	9.5694	8.8005	8.1354	7.5560	7.0482	6.6005	6.2034	5.8493	5.5320	33
34	14.3681	12.8540	11.5869	10.5178	9.8086	8.8293	8.1566	7.5717	7.0599	6.6091	6.2098	5.8541	5.5356	34
35	14.4983	12.9477	11.6546	10.5668	9.6442	8.8552	8.1755	7.5856	7.0701	6.6166	6.2153	5.8582	5.5386	35
36	14.6210	13.0352	11.7172	10.6115	9.6765	8.8786	8.1924	7.5975	7.0790	6.6231	6.2201	5.8617	5.5412	36
37	14.7368	13.1170	11.7752	10.6530	9.7059	8.8996	8.2075	7.6057	7.0868	6.6288	6.2242	5.8647	5.5434	37
38	14.8460	13.1935	11.8289	10.6908	9.7327	8.9186	8.2210	7.6183	7.0937	6.6338	6.2278	5.8673	5.5453	38
39	14.9491	13.2649	11.8786	10.7255	9.7570	8.9357	8.2330	7.6268	7.0995	6.6381	6.2308	5.8695	5.5468	39
40	15.0463	13.3317	11.9246	10.7574	9.7791	8.9511	8.2438	7.6344	7.1050	6.6418	6.2335	5.8715	5.5482	40

Periods	19%	20%	21%	22%	23%	24%	26%	26%	27%	28%	29%	30%	Periods
1	0.8403	0.8333	0.8265	0.8197	0.8130	0.8065	0.8000	0.7937	0.7874	0.7813	0.7752	0.7692	1
2	1.5465	1.5278	1.5095	1.4915	1.4740	1.4568	1.4400	1.4235	1.4074	1.3619	1.3761	1.3610	2
3	2.1399	2.1065	2.0739	2.0422	2.0114	1.9813	1.9520	1.9234	1.8956	1.8684	1.8420	1.8161	3
4	2.6386	2.5887	2.5404	2.4936	2.4483	2.4043	2.3616	2.3202	2.2800	2.2410	2.2031	2.1662	4
5	3.0576	2.9906	2.9260	2.8636	2.8035	2.7454	2.6893	2.6351	2.5827	2.5320	2.4830	2.4356	5
6	3.4098	3.3255	3.2446	3.1669	3.0923	3.0205	2.9514	2.8850	2.8210	2.7594	2.7000	2.8428	6
7	3.7057	3.6048	3.5080	3.4155	3.3270	3.2423	3.1611	3.0833	3.0087	2.9370	2.8682	2.8021	7
8	3.9544	3.8372	3.7256	3.6913	3.5179	3.4212	3.3289	3.2407	3.1564	3.0758	2.9986	2.9247	8
9	4.1633	4.0310	3.9054	3.7863	3.6731	3.5655	3.4631	3.3657	3.2728	2.1842	3.0987	3.0190	9
10	4.3369	4.1925	4.0541	3.8232	3.7993	3.6819	3.5705	3.4648	3.3644	3.2689	3.1781	3.0915	10
11	4.4865	4.3271	4.1769	4.0354	3.9019	3.7757	3.6564	3.5435	3.4365	3.3351	3.2388	3.1473	11
12	4.6105	4.4382	4.2785	4.1274	3.9852	3.8514	3.7251	3.6060	3.4933	3.3868	3.2859	3.1903	12
13	4.7147	4.5327	4.3624	4.2028	4.0530	3.9124	3.7801	3.6555	3.5381	3.4272	3.3224	3.2233	13
14	4.8023	4.6106	4.4317	4.2646	4.1082	3.9616	3.8241	3.6949	3.5733	3.4587	3.3507	3.2487	14
15	4.8759	4.6755	4.4890	4.3152	4.1530	4.0013	3.8593	3.7261	3.6010	3.4834	3.3726	3.2682	15
16	4.9377	4.7286	4.5364	4.3587	4.1894	4.0333	3.8874	3.7509	3.6228	3.5027	3.3896	3.2832	16
17	4.9897	4.7746	4.5755	4.3908	4.2190	4.0591	3.9099	3.7705	3.6400	3.5177	3.4026	3.2948	17
18	5.0333	4.8122	4.6079	4.4187	4.2431	4.0799	3.9279	3.7851	3.6536	3.5295	3.4130	3.3037	18
19	5.0700	4.8435	4.6346	4.4415	4.2627	4.0967	3.9424	3.7985	3.6642	3.5386	3.4210	3.3105	19
20	5.1009	4.8695	4.6567	4.4603	4.2786	4.1103	3.9539	3.8083	3.6726	3.5458	3.4271	3.3158	20
21	5.1268	4.8913	4.6750	4.4756	4.2916	4.1212	3.9631	3.8162	3.6792	3.5514	3.4319	3.3198	21
22	5.1485	4.9094	4.6900	4.4882	4.8021	4.1300	3.9705	3.8223	3.6844	3.5558	3.4356	3.3230	22
23	5.1669	4.9245	4.7025	4.4985	4.3106	4.1371	3.9764	3.8273	3.6885	3.5592	3.4384	3.3254	23
24	5.1822	4.9371	4.7128	4.5070	4.3176	4.1428	3.8811	3.8312	3.6916	3.5619	3.4405	2.3272	24
25	5.1952	4.9476	4.7213	4.5139	4.3232	4.1474	3.9849	3.8343	3.6943	3.5640	3.4424	3.3286	25
26	5.2060	4.9563	4.7264	4.5196	4.3278	4.1512	3.9879	3.8367	3.6963	3.5656	3.4437	3.3297	26
27	5.2151	4.9836	4.7342	4.5243	4.3316	4.1542	3.9903	3.8387	3.6979	3.5669	3.4447	3.3305	27
28	5.2228	4.9697	4.7390	4.5281	4.3346	4.1566	3.9923	3.8402	3.6991	3.5679	3.4455	3.3312	28
29	5.2292	4.9747	4.7430	4.5312	4.3371	4.1585	3.9938	3.8414	3.7001	3.5687	3.4461	3.3317	29
30	5.2347	4.9789	4.7463	4.5338	4.3391	4.1601	3.9951	3.8424	3.7009	3.5693	3.4466	3.3321	30
31	5.2392	4.9825	4.7490	4.5359	4.3407	4.1614	3.9960	3.8432	3.7015	3.5697	3.4470	3.2324	31
32	5.2430	4.9854	4.7512	4.5376	4.3421	4.1624	3.9968	3.8438	3.7019	3.5701	3.4473	3.3326	32
33	8.2463	4.9878	4.7531	4.5390	4.3431	4.1632	3.9875	3.8443	3.7023	3.5704	3.4475	3.3328	33
34	5.2490	4.9898	4.7546	4.5402	4.3440	4.1639	3.9980	3.8447	3.7026	3.5708	3.4477	3.3329	34
35	9.2512	4.9915	4.7559	4.5411	4.3447	4.1644	3.9884	3.8450	3.7028	3.5708	3.4478	3.3330	35
36	5.2531	4.9930	4.7569	4.5419	4.3453	4.1649	3.9987	3.8452	5.7030	3.5709	3.4479	3.8831	36
37	5.2547	4.9941	4.7576	4.5426	4.3458	4.1652	3.9980	3.8454	3.7032	3.5710	3.4480	3.3331	37
38	5.2561	4.9951	4.7585	4.5431	4.3462	4.1655	3.9992	3.8456	3.7033	3.5711	3.4481	3.3332	38
39	3.2572	4.9959	4.7591	4.5435	4.3465	4.1657	3.9993	3.8457	3.7034	3.5712	3.4481	3.3332	39
40	5.2382	4.9966	4.7596	4.5439	4.3467	4.1659	3.9995	3.8458	3.7034	3.5712	3.4482	3.3332	40

APPENDIX 10H-2
PRESENT VALUE—SERIES OF UNEVEN CASH FLOWS IN FUTURE YEARS

Periods	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	Periods
1	.943396	.934579	.925926	.917431	.909091	.900901	.892857	.884956	.877193	.869565	.862069	.854701	.847458	1
2	.889996	.873439	.857339	.841680	.826446	.811622	.797194	.783147	.769468	.756144	.743163	.730514	.718184	2
3	.839619	.816298	.793832	.772183	.751315	.731191	.711780	.693050	.674972	.657516	.640658	.624371	.608631	3
4	.792094	.762895	.735030	.708425	.683013	.658731	635518	.613319	.592080	.571753	.552291	.533650	.515789	4
5	.747258	.712986	.680583	.649931	.620921	.593451	.567427	.542760	.519369	.497177	.476113	.456111	.437109	5
6	.704961	.666342	.630170	.596267	.564474	.534641	.506631	.480319	.455587	.432328	.410442	.389839	.370432	6
7	.665057	.622750	.583490	.547034	.513158	.481658	.452349	.425061	.399637	.375937	.353830	.333195	.313925	7
8	.627412	.582009	.540289	.501866	.466507	.433926	.403883	.376160	.350559	.326902	.305025	.284782	.266038	8
9	.591898	.543934	.500249	.460428	.424098	.390925	.360610	.332885	.307508	.284262	.262953	.243404	.225456	9
10	.558395	.508349	.463193	.422411	.385543	.352184	.321973	.294588	.269744	247185	.226684	.208037	.191064	10
11	.526788	.475093	.428883	.387533	.350494	.317283	.287476	.260698	.236617	.214943	.195417	177810	161919	11
12	.496969	.444012	.397114	.355535	.318631	.285841	.256675	.230706	.207559	.186907	168463	.151974	.137220	12
13	.468839	.414964	.367698	.326179	.289664	.257514	.229174	.204165	.182069	.162528	145227	.129892	.116288	13
14	.442301	.387817	.340461	.299246	.263331	.231995	.204620	.180677	.159710	.141329	.125195	.11019	.098549	14
15	.417265	.362446	.315242	.274538	.239392	.209004	.182696	.159891	.140096	.122894	.107927	.094888	.083516	15
16	.393646	.338735	.291890	.251870	.217629	.188292	.163122	.141496	.122892	.106865	.093041	.081101	.070776	16
17	.371364	.316574	.270269	.231073	.197845	.169633	.145644	.125218	.107800	.092926	.080207	.069317	.059980	17
18	.350344	.295864	.250249	.211994	.179859	.152822	.130040	.110812	.094561	.080805	.069144	.059245	.050830	18
19	.330513	.276508	.231712	.194490	.163508	.137678	.116107	.098064	.082948	.070265	.059607	.050637	.043077	19
20	.311805	.258419	.214548	.178431	.148644	.124034	.103667	.086782	.072762	.061100	.051385	.043280	.038506	20
21	.294155	.241513	.198656	.163698	.135131	.111742	.092560	.076798	.063826	.053131	044298	.036991	.030937	21
22	.277505	.225713	.183941	.150182	.122846	.100669	.082643	.067963	.055988	.046201	.038188	.031616	.026218	22
23	.261797	.210947	.170315	.137781	.111678	.090693	.073788	.060144	.049112	.040174	.032920	.027022	.022218	23
24	.246979	.197147	.157699	.126405	.101526	.081705	.065882	.053225	.043081	.034934	.028380	.023096	.018829	24
25	.232999	.184249	.146018	.115968	.092296	.073608	.058823	.047102	.037790	.030378	.024465	.019740	.015957	25
26	.219810	.172195	.135202	.106393	.083905	.066314	.052521	.041683	.033149	.026415	.021091	.016872	.013523	28
27	.207368	.160930	.125187	.097608	.076278	.059742	.046894	.036888	029078	.022970	.018182	.014421	.011460	27
28	.195630	.150402	.115914	.089548	.069343	.053822	.041869	.032644	.025507	.019974	.015674	.012325	.009712	28
29	.184557	.140563	.107328	.082155	.063039	.048488	.037383	.028889	.022375	.017369	.013512	.010534	.008230	29
30	.174110	.131367	.099377	.075371	.057309	.043683	.033378	.025665	.019627	.015103	.011648	.009004	.006975	30
31	.164255	.122773	.092016	.069148	.052099	.039354	.029802	.022624	.017217	.013133	.010042	.007696	.005911	31
32	.154957	.114741	.085200	.063438	.047362	.035454	.026609	.020021	.015102	.011420	.008657	.006577	.005009	32
33	.146186	.107235	.078889	.058200	.043057	.031940	.023758	.017718	.013248	.009931	.007463	.005622	.004245	33
34	.137912	.100219	.073045	.053395	.039143	.028775	.021212	.015680	.011621	.008635	.006433	.004805	.003598	34
35	.130105	.093663	.067635	.048986	.035584	.025924	.018940	.013876	.010194	.007509	.005546	.004107	.003049	35
36	.122741	.087535	.062825	.044941	.032349	.023355	.016910	.012279	.008942	.006529	.004781	.003510	.002584	36
37	.115793	.081809	.057986	.041231	.029408	.021040	.015098	.010867	.007844	.005678	.004121	.003000	.002190	37
38	.109239	.076457	.053690	.037826	.026735	.018955	.013481	.009617	.006880	.004937	.003553	.002564	.001856	38
39	.103056	.071455	.049713	.034703	.024304	.017077	.012036	.008510	.006035	.004293	.003063	.002192	.001573	39
40	.097222	.066780	.046031	.031838	.022095	.015384	.010747	.007531	.005294	.003733	.002640	.001873	.001333	40

Periods	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%	Periods
1	.840336	.833333	.826448	.819672	.813008	.806452	.800000	.793651	.787402	.781250	.775194	.769231	1
2	.706185	.694444	.883013	.671862	.660982	.650364	.640000	.629882	.620001	.610352	.600925	.591716	2
3	.593416	.578704	.584474	.550707	.537384	.524487	.512000	.499906	.488190	.476837	.485834	.465166	3
4	.498669	.482253	.468507	.451399	.436897	.422974	.409600	.396751	.364402	.372529	.361111	.350128	4
5	.419049	.401878	.385543	.369999	.355201	.341108	.327680	.314882	.302678	.291038	.279931	.269329	5
6	.352142	.334898	.318631	.303278	.288781	.275087	.282144	.249906	238329	.227374	.217001	.207176	6
7	.295918	.279082	.263331	248589	.234782	.221844	.209715	.198338	.187661	.177636	.188218	.159366	7
8	.248671	.232568	.217629	.203761	.190879	.178907	.167772	.157411	.147765	.138778	.130401	.122589	8
9	.208987	.193807	.179869	.167017	.156187	.144280	.134218	.124930	.116350	.108420	.101086	.094300	9
10	.175602	.161506	.148844	.136899	.126168	.118354	.107374	.099150	.091614	.084703	.078382	.072538	10
11	.134688		.122846	.112213	.093834		.085899	.078891	.072137	.068174	.060746	.055799	11
12	.124004	.112157	.101526	.091978	.083395	.075673	.068719	.062453	.056801	.051699	.047089	.042922	12
13	.104206	.093484	.083906	.075391	.067801	.061026	.064976	.049586	.044725	.040390	.036503	.033017	13
14	.087567	.077887	.069343	.061796	.055122	.049215	.043980	.039338	.035217	.031554	.028297	.025398	14
15	.073586	.064905	.057309	.060653	.044815	.039689	.035184	.031221	.027730	.024652	.021936	.019537	15
16	.061837	.064088	.047382	.041519	.036435	.032008	.028147	.024778	.021834	.019259	.017005	.015028	16
17	.051964	.045073	.039143	.034032	.029622	.025813	.022518	.019665	.017192	.015046	.013182	.011580	17
18	.043667	.037561	.032349	.027896	.024083	.020817	.018014	.015607	.013537	.011755	.010218	.008892	18
19	.038895	.031301	.026735	.022865	.019580	.016788	.014412	.012387	.010659	.009184	.007921	.006840	19
20	.030836	.026084	.022095	.018741	.015918	.013538	.011529	.009831	.008393	.007175	.006141	.005262	20
21	.025913	.021737	.018260	.015362	.012942	.010918	.009223	.007802	.006609	.005605	.004760	.004048	21
22	.021775	.018114	.015091	.012592	.010622	.008805	.007379	.006192	.005204	.004379	.003690	.003113	22
23	.018299	.015095	.012472	.010321	.008564	.007101	.005903	.004914	.004097	.003421	.002860	.002395	23
24	.015377	.012579	.010307	.008460	.006955	.005726	.004722	.003900	.003228	.002673	.002217	.001842	24
25	.012922	.010483	.008519	.008934	.005654	.004618	.003778	.003096	.002540	.002088	.001719	.001417	25
26	.010859	.008735	.007040	.005684	.004597	.003724	.003022	.002457	.002000	.001631	.001333	.001090	28
27	.009125	.007280	.005818	.004869	.003737	.003003	.002418	.001950	.001575	.001274	.001033	.000839	27
28	.007668	.0060ee	.004809	.003819	.003038	.002422	.001934	.001547	.001240	.000996	.000801	.000645	28
29	.006444	.005055	.003974	.003130	.002470	.001953	.001547	.001228	.000977	.000778	.000621	.000496	29
30	.005415	.004213	.003284	.002566	.002008	.001575	.001238	.000975	.000769	.000608	.000481	.000382	30
31	.004550	.003511	.002714	.002103	.001633	.001270	.000990	.000774	.000606	.000475	.000373	.000294	31
32	.003824	.002926	.002243	.001724	.001328	.001024	.000792	.000614	.000477	.000371	.000289	.000226	32
33	.003213	.002438	.001854	.001413	.001079	.000826	.000634	.000487	.000375	.000290	.000224	.000174	33
34	.002700	.002032	.001532	.001158	.000877	.000666	.000507	.000387	.000296	.000226	.000174	.000134	34
35	.002269	.001693	.001266	.000949	.000713	.000537	.000406	.000307	.000233	.000177	.000135	.000103	35
36	.001907	.001411	.001048	.000778	.000580	.000433	.000325	.000244	.000183	.000138	.000104	.000079	36
37	.001602	.001176	.000865	.000638	.000472	.000349	.000260	.000193	.000144	.000108	.000061	.000081	37
38	.001347	.000980	.000715	.000523	.000383	.000282	.000208	.000153	.000114	.000064	.000063	.000047	38
39	.001132	.000816	.000591	.000429	.000312	.000227	.000166	.000122	.000089	.000066	.000049	.000036	39
40	.000951	.000680	.000488	.000351	.000253	.000183	.000133	.000097	.000070	.000051	.000038	.000028	40

APPENDIX 10I
LEASE-VERSUS-DEBT DATA COLLECTION CHECKLIST

Name of Project: _____ Date: _____

Instructions: This checklist helps ensure that the company has obtained data needed to perform a lease-versus-debt analysis. It applies primarily to transactions involving personal property, although it can be adapted to real property financing transactions. The form is divided into three data sections: general, debt financing, and lease financing.

Additional Guidance—See Paragraph 1007.11.

Analysis Data	Completed by or N/A
General Data	
1. Discount rate (typically the company's incremental borrowing rate).	
2. Company's effective tax rate.	
3. Estimated life of capital asset.	
Debt Financing Data	
4. Acquisition cost of asset, including:	
a. Purchase price.	
b. Taxes (sales, excise, etc.).	
c. Freight.	
d. Installation.	
5. Terms of debt agreement, including:	
a. Down payment and loan amount.	
b. Interest rate (fixed or variable).	
c. Repayment amounts and period.	
d. Loan fees.	
6. Estimated annual maintenance costs over the asset's life (costs will often increase in later years because of the asset's age and inflation).	
7. Other costs (such as property taxes, insurance, etc.).	
8. Estimated salvage value and disposal date.	
9. Tax depreciation method and recovery period.	
Lease Financing Data	
10. Lease terms:	
a. Period.	
b. Payment amount (including any escalation provisions).	
c. Responsibility for maintenance, insurance, and other costs.	
d. Ownership provisions at end of lease term (including any bargain purchase option).	
e. Amount of residual value if it accrues to lessee.	
f. Any residual value guaranteed to the lessor by the lessee.	
g. Amount of security deposit (refundable or nonrefundable).	
11. Deductibility of lease payments for tax purposes (capital or operating lease for tax purposes).	

APPENDIX 10J
LEASE-VERSUS-DEBT FINANCING WORKSHEETS
Instructions

Controllers may use the worksheets at Appendix 10J-1 and Appendix 10J-2 to decide whether debt or lease financing is the most cost beneficial method for financing a planned capital acquisition. Each worksheet computes the net present value of cash flows for each year of the asset's economic life. The preferable financing option is the one that produces the smallest net cash outflow (on a present value basis). Each worksheet has been divided between nontaxable and taxable cash flows, as described below.

Nontaxable cash flows should include cash items that do not enter directly into the determination of taxable income. For debt financing, they include items such as principal payments. For lease financing, they might include a refundable security deposit.

Taxable cash flows should include all taxable income and expense items concerning the proposed expenditure that are unique to each financing proposal. Items that are identical between the two financing options will not affect the analysis and can thus be ignored. Taxable items under a debt financing option include items such as interest expense, maintenance, and tax depreciation relating to the expenditure. Taxable items under a lease financing option include items such as lease payments and maintenance costs. After the net taxable loss has been determined, all noncash items, such as depreciation under the debt alternative, are then added back to the net loss to derive the total taxable cash outflows under each proposal.

Net present value (NPV) of the cash outflows under each financing option is determined by applying discount factors to total cash outflows (nontaxable plus taxable cash flows) for each year. Discount factors are typically based on the company's after-tax incremental borrowing rate. (Obtain each year's discount factors using the present value tables in Appendix 10H.) The preferable proposal is the one that produces the lowest cash outflow (on a present value basis). However, also consider qualitative factors since they could impact the final decision to accept or reject the project.

Additional Guidance—See Paragraph 1007.14.

APPENDIX 10J-1
DEBT FINANCING OPTION WORKSHEET

Company Name: _____ Date: _____

Description of Capital Asset: _____

	(in thousands, except present value factors)											
	Yr. 0	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8	Yr. 9	Yr. 10	Total
NONTAXABLE CASH FLOWS:												
Principal payments												
Total nontaxable cash flows												
TAXABLE CASH FLOWS:												
Interest expense												
Maintenance costs												
Tax depreciation												
Other costs:												
Less salvage value, if any												
Net taxable loss												
Less income tax benefit												
Net loss												
Add back depreciation												
Total taxable cash outflows												
Total cash outflows												
NET PRESENT VALUE:												
Present value factors (based on a _____% discount rate).												
NPV of lease cash flows												

APPENDIX 10J-2
LEASE FINANCING OPTION WORKSHEET

Company Name: _____ Date: _____

Description of Leased Asset: _____

	(in thousands, except present value factors)											
	Yr. 0	**Yr. 1**	**Yr. 2**	**Yr. 3**	**Yr. 4**	**Yr. 5**	**Yr. 6**	**Yr. 7**	**Yr. 8**	**Yr. 9**	**Yr. 10**	**Total**
NONTAXABLE CASH FLOWS:												
Refundable security deposit												
Total nontaxable cash flows												
TAXABLE CASH FLOWS:												
Lease payments												
Maintenance costs												
Other costs:												
Net taxable loss												
Less income tax benefit												
Net loss												
Add back noncash items, if any												
Total taxable cash outflows												
Total cash outflows												
NET PRESENT VALUE:												
Present value factors (based on a _____% discount rate).												
NPV of lease cash flows												