PUBLIC HEALTH FINANCE TUTORIAL SERIES
Module IV

FINANCIAL EVALUATION OF NEW PROGRAM INITIATIVES

MODULE THEME:
EVALUATION OF TANGELO COUNTY HEALTH DEPARTMENT'S NEW CLINIC INITIATIVE

Tangelo County, which encompasses roughly 875 square miles, has a population of approximately 250,000 spread among a central city (Tangelo City) of roughly 100,000, several smaller communities, and unincorporated rural areas. The public health needs of the county are administered by the Tangelo County Health Department (TCHD). TCHD has 238 full-time employees (FTEs) and an annual budget of roughly $16 million. In the most recent year, TCHD provided clinical services for over 30,000 active clients in the areas of primary medical care (adult and pediatric), dental care, family planning, and specialty care (HIV and STD). In addition to clinical services, TCHD conducts a wide range of programs in disease intervention, environmental health, preventive medicine, and public health preparedness.

TCHD routinely evaluates proposals for new programs—in a typical year, five proposals are presented to the executive committee for approval. Many of the proposals require no upfront investment, so the financial resource requirement consists only of operating costs. Occasionally, however, a proposal requires an initial "investment" in land, buildings, or equipment to get the program "up and running." Currently, TCHD is evaluating one such proposal; the establishment of a primary care clinic in Minneola, the county's second largest community. This program will entail the purchase of a building and a portion of the equipment necessary to operate the clinic. (Some of the equipment required for the clinic will be leased.)

To ensure that opening the new clinic is a sound decision, TCHD's managers will conduct a thorough analysis that focuses on two factors. First, does the clinic further TCHD's mission? Second, does TCHD have the financial capacity to open and operate the clinic? In other words, will the clinic require financial resources that can only be obtained by degrading services that are currently in place?

To ensure that these questions are addressed in a systematic way, TCHD requires that all new program initiatives are analyzed within a business plan framework. By the end of this module, you will have a better understanding of the process.

Learning Objectives

After studying this module, you should be able to do the following:

- Describe the role of financial analysis in program evaluation.
- Discuss the key elements of a business plan.
- Perform basic discounted cash flow (DCF) calculations.
- Perform breakeven (payback) analyses.
- Measure the financial return on an investment in both dollar and percentage terms.
- Understand the value of and perform risk analyses.
- Describe the concept and importance of post-audits.

INTRODUCTION

Within public health organizations it is common to embark on programs that require a significant commitment of financial resources. Because of the scarcity of such resources, it is essential that such efforts be fully evaluated before the final decision to go forward is made.

In general, major new program initiatives are presented for review in the form of a business plan. Although business plans often are considered to be useful only in for-profit businesses, such plans are vital to governmental and other not-for-profit organizations. Typically, for-profit business plans focus on financial goals, such as wealth creation, while not-for-profit and governmental organization business plans focus on meeting mission goals. Still, the financial consequences of proposed programs must be fully understood before an initiative is undertaken. Because business plans often form the framework for financial evaluations, we begin this module with an overview of business plans.

BUSINESS PLANS

A *business plan* is a document that describes an ongoing or new initiative in detail, primarily from marketing, operational, and financial perspectives. The idea behind a business plan is to present a detailed description of an initiative's potential costs and benefits to managerial decision makers, who then can modify the proposal as necessary to ensure the greatest net benefit to the organization. Only after very careful consideration of the business plan will the decision be made as to whether or not to implement the program.

> Key Concept: Business Plan
>
> A business plan is a detailed description of a proposed program (or entire organization). It covers all aspects of the initiative, including how it fits into the organizational mission. For purposes here, the most important section of the plan is the financial analysis.

Although the discussion here focuses on business plans used to describe and evaluate a new program, business plans are also useful in describing entire organizations, especially ones that are just being formed. In essence, business plans allow managers to review the organization's reason for being (mission), how well it is meeting it mission, and the financial resources required to ensure mission success.

There are many different formats used in business plans and the best one depends on the nature of the initiative being evaluated. That said, here is a generic format to give you some idea of the contents of a business plan:

- **Table of Contents.** This page lays out the format and contents of the plan, which helps readers find sections of interest.
- **Executive Summary.** This section, generally no more than one or two pages, provides a summary of all relevant information pertaining to the program. Its purpose is to allow readers to become acquainted with the initiative without having to read the entire plan. The executive summary is especially useful to managers who do not possess the technical skills to understand all elements of the complete plan.
- **Program Description.** This section explains the proposed program in detail. In addition, this section typically includes information on how well the program fits into the organizational mission.
- **Organizational Setting.** Here, the organizational history and setting are described, with emphasis on how the program will supplement or complement current programs.
- **Market Analysis.** This section describes the market in which the initiative will be carried out. Often, this section contains a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. (SWOT analysis is beyond the scope of this tutorial, but more information is readily available from online resources.)

- **Operational Details.** Here, the resources required to conduct the program are delineated. This section must be in sufficient detail to support the financial analysis conducted in the final section of the plan. All required resources associated with facilities, labor, equipment, supplies, and marketing must be identified. Furthermore, any revenues associated with the program must be identified based on volume of services provided and fees collected.
- **Risks and Exit Strategy.** This section forces the organization to specify the risks involved in the program, including financial, and to consider what should be done if the program does not live up to mission or financial expectations.
- **Financial Analysis.** For purposes of this tutorial, the financial analysis section is the most important part of the business plan. It contains revenue and cost projections along with breakeven information and, if appropriate, profitability measures. (Most of the remainder of this tutorial is devoted to these topics.)
- **Appendixes.** Any data that is overly complex or lengthy should be placed in an appendix.

Although business plans historically have been used primarily by for-profit businesses, their ability to define in detail the nature and operations of entire organizations as well as programs within those organizations make them useful tools for all organizations. Thus, it is a certainty that public health entities will be using business plans more often in the future than they have in the past.

Self-Test Questions

1. What is the purpose of a business plan?

2. Why are business plans useful to public health organizations?

3. Briefly describe the contents of a typical business plan.

THE ROLE OF FINANCIAL ANALYSIS

For investor-owned (for-profit) businesses, the role of financial analysis in new initiative decision making is clear: Proposals that contribute to owners' wealth should be undertaken, while those that do not should be ignored. However, what about public health organizations, which do not have wealth maximization as a goal? In such organizations, the appropriate goal typically is to preserve, protect, and promote the health of the communities served. In this situation, new initiative decisions must consider many factors besides the program's financial implications.

Still, good decision making requires that the financial impact of new initiatives be recognized. If a public health organization embarks on a new initiative that consumes more financial resources than it generates, those resources must either be obtained from external sources (appropriations, grants, contributions, and the like) or be taken from other programs, which would have the potential of degrading other mission-related activities. Public health managers may make a conscious decision to accept an initiative with a poor financial prognosis because of its nonfinancial virtues, but they must know the financial impact beforehand so that they are not surprised when the program places a strain on the organization's financial resources. With advance knowledge, public health managers can ensure that adequate financial resources are available both to fund the proposed initiative and continue current programs at appropriate funding levels.

Self-Test Question

1. What is the role of financial analysis in the evaluation of new initiatives within public health organizations?

CASH FLOW ESTIMATION

The first step in the financial evaluation of new programs is *cash flow estimation*. To illustrate the financial evaluation of a new initiative, starting with cash flow estimation, consider the situation facing Tangelo County Health Department (TCHD). It currently operates a single primary care clinic in Tangelo City, the county seat, but a proposal has been made to open a second clinic about 15 miles away in the town of Minneola. The main clinic has about 30,000 clients, while it is estimated that the proposed clinic will serve about 3,500 clients.

To qualify for services at the proposed clinic, all clients must be Tangelo County residents, have Medicaid, Medicare, a third payer source, or be at or below 100 percent of federal poverty level. All children eligible for Medicaid would be accepted at the clinic and given three months to get on Medicaid. Services include physical exams, screenings, lab services, certain prescription medications, referrals to a contracted x-ray provider, vaccines, treatment of sexually transmitted diseases, and specialty referrals. It is expected that the new clinic will offer the same services and have roughly the same client mix as the existing Tangelo City clinic.

> Key Concept: Incremental Cash Flow
>
> Incremental cash flows are flows that are properly included in program evaluation. The term *incremental* means that the flows arise solely because of program acceptance—if the program is accepted, and only if the program is accepted, these cash flows will result. The term *cash flow* means that these are the amounts of cash that actually flow into or out of the organization. Some flows might appear to be incremental flows, but if they occur whether or not the program is initiated and hence are non-incremental to the decision, they should not be included in the analysis.

The most difficult, yet most important, step in evaluating the financial implications of program proposals is cash flow estimation. Many separate (component) cash flows are involved and many individuals typically participate in the process. Often, historical data can be used to help make the cash flow estimates. But, for programs that involve completely new services, scant data are available. Thus, forecasts often are not much better than rough estimates. Making accurate forecasts of the costs and revenues associated with many programs is difficult, so forecast errors can be quite large. For this reason, risk analyses, which we discuss in a later section, should be performed on all program proposals.

Neither the difficulty nor the importance of cash flow estimation to good financial analyses can be overstated and it is easy to make conceptual errors in the process. Here are some guiding principles that can help public health managers eliminate most of the common errors that arise.

- **Focus on Incremental Cash Flows.** The relevant cash flows to consider when evaluating a new program are the program's *incremental cash flows*, which are formally defined as the organization's cash flows in each period (typically a year) if the program is undertaken minus the cash flows if the program is not undertaken. In financial evaluations, the focus must be based on the actual dollars that flow into and out of the organization rather than on revenues and expenses defined by accountants for other purposes. After all, it is cash flow that creates financial capability. The focus on cash flow actually makes the estimation process easier, because it is not necessary to apply a set of arbitrary accounting rules. In theory, program cash flows should be analyzed exactly as they are expected to occur; that is, daily, weekly, and so on. Of course, there must be a compromise between accuracy and simplicity, so it is common in program analyses to assume annual cash flows, and hence ignore the fact that the flows actually occur more frequently.

- **Include Effects on Other Programs**. Program analyses must consider the effects of the program under consideration on the organization's other programs. Such effects can be either positive or negative. To illustrate, assume that some of the clients of the proposed clinic currently use the Tangelo City (main) clinic. In such circumstances, any revenues that would otherwise have accrued to the main clinic would be lost. In essence, no new (incremental) revenues would be created by these clients. At the same time, any costs that would be avoided at the main clinic due to these clients will now be borne by the proposed clinic. If possible, both positive and negative effects on other services should be quantified, but at a minimum they should be noted to ensure that these effects are subjectively considered when the final decision regarding the program is made.

- **Include Inflation Effects.** Because inflation can have a considerable influence on a program's revenues and costs, it must be considered in all financial analyses. The best way to deal with inflation is to apply inflation effects to each component cash flow using the best available information about how each component will be affected. For example, labor costs might be increased by the wage inflation rate, supplies costs would be adjusted by the supplies inflation rate, revenues would be adjusted by price inflation, and so on.

- **Ignore Sunk Costs.** A *sunk cost* refers to an outlay that has already occurred or has been irrevocably committed, so it is unaffected by the current decision to accept or reject a new initiative. To illustrate, suppose that TCHD paid $2,000 to a consultant last year to conduct a market analysis for the proposed clinic. This cash flow is **not** relevant to the decision at hand because it has already occurred, and hence should not be included in the clinic's cash flow estimates.

With these points in mind, TCHD's managers estimated the cash flows for the new clinic for five years of operations. The results are contained in Exhibit 1. Here, the cash flow forecasts have been placed on a *time line*, which is a way to show when in the future cash flows are expected to occur. The time line may be a physical line, as shown in Exhibit 1, or it merely may be the rows or columns on a spreadsheet. Note that the cash flows are forecasted on an annual basis. As discussed earlier, it usually is impractical to forecast cash flows more frequently with any confidence. Also, note that the cash flows are forecasted for only five years, although the clinic could have a far longer life. Because of the difficulties in making forecasts into the distant future, it is common to assume a relatively short life, often five years. Finally, note that a real world analysis would almost certainly have more lines that our illustration. The focus here is on financial analysis techniques rather than on cash flow estimation techniques.

EXHIBIT 1 Proposed Clinic Program: Forecasted Cash Flows

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
1. Building costs	-$200,000					
2. Net revenue		$150,000	$300,000	$315,000	$330,750	$347,288
3. Labor costs (wages and benefits)		$100,000	$123,600	$127,307	$131,127	$135,061
4. Medical supplies		15,000	30,000	31,500	33,075	34,729
5. Utilities		11,820	12,411	13,032	13,683	14,367
6. Lease expense		18,000	36,000	36,000	36,000	36,000
7. Other operating expenses		20,000	26,250	27,563	28,941	30,388
8. Total operating expenses		$164,820	$228,261	$235,402	$242,826	$250,545
9. Net cash flow	-$200,000	-$ 14,820	$ 71,739	$ 79,598	$ 87,924	$ 96,743

Here is a line-by-line description of the Exhibit 1 cash flows:

Line 1. It is estimated that the building, along with required remodeling and most of the equipment, will cost $200,000. This amount is known with relative certainty as the purchase price is known and renovation bids have been received. Note that the initial cost is placed in Year 0 (the beginning of Year 1), which marks program initiation. It is expected that the clinic remodeling and equipping will take 6 months, so the clinic is expected to be operational half-way through Year 1.

Line 2. Here, the expected revenues associated with the clinic are listed. These revenues are based on TCHD's experience in the existing (Tangelo City) clinic coupled with the expected client volume in the new (Minneola) clinic. Note that the Year 1 revenue estimate of $150,000 represents only 6 months of operation. In Year 2, with a full year of operation, revenues are forecasted to be $300,000. After that, volume, and hence revenues, are assumed to grow at a five percent annual rate. Because future reimbursement rates are highly uncertain, the cash flows assume that these rates will remain constant over the five-year forecast, so revenue growth is due solely to increasing volume. Finally, note that revenues that stem from clients currently using the Tangelo City clinic are not included on Line 2.

Line 3. It is estimated that labor costs in the first full year of operation (Year 2) will be $123,600. This expense is based on the costs at the Tangelo City clinic scaled down to reflect the lower expected volume at the proposed clinic. Labor costs in Year 1 are reduced because of partial year operations. However, these costs are not half as much because the staff will be required to help ready the facility for operations. Finally, after Year 2, labor costs are expected to increase at a three percent rate.

Line 4. At the Tangelo City clinic, medical supplies costs run roughly ten percent of revenues. It is assumed that the same relationship would hold at the proposed clinic. For example, the Year 1 supplies costs are $0.10 \times \$150{,}000 = \$15{,}000$, while the Year 2 costs are $0.10 \times \$300{,}000 = \$30{,}000$. Other year's costs were estimated in the same way.

Line 5. Utilities costs are based on estimates provided by local utilities providers. The Year 1 estimate is not reduced because utilities will be needed for the building renovation. Utilities costs are assumed to increase at a 5 percent rate.

Line 6. Some of the equipment used in the clinic will be leased. A five-year lease contract on the required items will cost $36,000 per year. This amount was reduced by half in Year 1.

Line 7. Other operating expense is a catchall that contains costs not covered in Lines 3-6. Examples include housekeeping and building maintenance, office supplies, and an allowance for incremental overhead costs. Note that overhead services, such as billing and collections, which will be provided by TCHD's support departments will **not** be included in the analysis **unless the clinic requires an increase in such costs**. Reallocation of currently existing overhead costs are **not** incremental cash flows.

Line 8. This line totals the expenses contained in Lines 3-7.

Line 9. Line 9 contains the clinic's forecasted net cash flows. Except for Year 0, the amounts are calculated as Line 2 – Line 8 (Net revenue – Total operating expenses). In Year 0, the building costs are merely carried down to Line 9.

Self-Test Question

1. Briefly explain the following concepts relevant to cash flow estimation:

    a. Incremental cash flow

    b. Effects on other programs

    c. Inflation effects

    d. Sunk costs

BREAKEVEN ANALYSIS

Breakeven analysis was introduced in Tutorial II in conjunction with profit analysis. Now, we apply the breakeven concept in a program financial analysis setting. In such analyses, many types of breakeven can be calculated. Rather than discuss all the possible types here, we will focus on time breakeven, which is measured by *payback period*, or just *payback*.

Payback Period

The best way to calculate payback is to examine the program's cumulative cash flows. At any point in time, the cumulative cash flow is merely the sum of all the cash flows (with proper sign indicating an inflow or outflow) that have occurred up to that point. Payback occurs when the cumulative cash flow turns positive.

To illustrate payback, consider the net cash flows for TCHD's new clinic first presented in Exhibit 1. Exhibit 2 summarizes the clinic's annual cash flows and lists the cumulative cash flows. The cumulative cash flows are calculated in the following way. First, at Year 0, the cumulative cash flow is merely the starting investment amount: -$200,000. Then in each succeeding year, the cumulative cash flow is obtained by adding the next year's cash flow (with the proper sign) to the accumulated amount. Thus, at Year 1 the cumulative cash flow is -$200,000 + (-$14,820) = -$214,820; at Year 2 it is -$214,820 + $71,739 = -$143,081; at Year 3 it is -$143,081 + $79,598 = -$63,483; and so on.

EXHIBIT 2 Proposed Clinic Program: Annual and Cumulative Cash Flows

Year	Annual Cash Flow	Cumulative Cash Flow
0	-$200,000	-$200,000
1	-14,820	-214,820
2	71,739	-143,081
3	79,598	-63,483
4	87,924	24,441
5	96,743	121,184

As shown in the far-right column, the $200,000 initial cost of clinic is expected to be recovered at the end of Year 4 because that is the year that the cumulative cash flows turn positive. Furthermore, if the cash flows are assumed to come in evenly during the year, breakeven will occur $63,483 (the amount left to recover at the end of Year 3) divided by $87,924 (the amount expected in Year 4), or about 0.7 years into Year 4. Thus, the new clinic's payback is 3.7 years.

Key Concept: Payback Period

Payback period (or payback) is the number of years that it takes to recover the initial cost of a program. For example, assume that a smoking cessation program costs $2,500 to initiate and is expected to net $1,000 in cash flow in each of the next five years. If things go as expected, the $2,500 investment will be recovered in three years (with $500 left over), so the payback is 3 years, or more precisely, 2.5 years. The shorter the payback, the better, as the organization will more quickly recover its initial investment.

At one time, payback was used by managers as the sole measure of a program's financial attractiveness: for example, an organization might accept all programs with paybacks of five years or less. However, payback has two serious deficiencies when it is used in this way.

First, payback ignores all cash flows that occur after the payback period. To illustrate, TCHD might be evaluating a competing program that has the same cash flows as the clinic in Years 0 through 4. However, the alternative program might have a cash inflow of $150,000 in Year 5 (versus $96,743 for the clinic). Both programs would have the same payback—3.7 years—and hence be ranked the same, even though the alternative program clearly is better from a financial perspective.

Second, payback ignores the time value of money. (Time value is discussed in a later section.) For these two reasons, payback generally is no longer used as the primary financial evaluation tool.

In spite of its deficiencies, payback is still useful in program analysis. The shorter the payback, the more quickly the funds invested in a program will become available for other purposes within the organization. Also, cash flows expected in the distant future generally are regarded as riskier than near-term cash flows because they are harder to estimate, so programs with long paybacks are considered to be more risky in the financial sense than are programs with short paybacks. Considering both of these factors, the shorter the payback, the more financially attractive the program.

Using Cash Flows to Identify External Financing Requirements

In addition to calculating payback, a program's cumulative cash flows can be used to identify external financing requirements, where the term *external* as used here means outside the program. To illustrate, again consider the clinic's cash flows contained in Exhibit 2. The annual cash flows, shown in the center column, indicate that $200,000 will be required upfront to start the program. In addition, the program is expected to lose $14,820 during the first year. Thus, TCHD will have to find a total of $214,820 in funding from external sources to get the program off the ground.

To look at the external financing requirement in another way, consider the cumulative cash flows shown in the right-most column. Here we see that the program is not expected to pay for itself until Year 4. In other words, the net cash flows from the program itself will not be sufficient to pay for the initial investment and Year 1 operating loss until the end of Year 4. Of course, the precise value is the payback period: 3.7 years.

Self-Test Question

1. What is payback? What are its benefits and deficiencies?

2. What role does payback play in the financial evaluation of new programs?

3. How can cumulative cash flows be used to identify a program's external financing requirements?

DISCOUNTED CASH FLOW (DCF) ANALYSIS

Up to this point, our financial analysis of TCHD's new clinic program has been limited to breakeven analysis. We have laid out the expected cash flows from the program and estimated that it would take 3.7 years for TCHD to recover its initial investment in the clinic, **assuming that everything occurs as expected**.

Key Concept: Time Value of Money

The time value of money principle is based on the fact that money in hand is worth more than funds expected to be received in the future. For example, consider $100 in hand today versus $100 to be received in one year. If the $100 in hand today is invested in a bank account that pays 5 percent interest, it will earn $5 in interest and be worth $105 at the end of one year. However, the $100 to be obtained at the end of the year is only worth $100 when received. The recognition of time value is an essential part of the financial analysis of new programs initiatives.

If we were whizzes at processing information, we might be able to merely look at the Exhibit 1 cash flows and the payback and make a complete judgment about the clinic program's financial attractiveness. But, most people cannot do this, so summarizing the information contained in the cash flows would be useful.

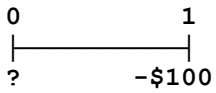
The process of assigning appropriate values to cash flows that occur at different points in time and then summarizing this information in a single value is called *discounted cash flow (DCF) analysis*. DCF analysis is an important part of public health finance because many financial analyses involve future cash flows. The economic principle that underlies DCF analysis is *time value of money*.

The time value of money principle is based on the fact that a dollar to be received in the future is **worth less** than a current dollar because a dollar in hand today can be invested in an interest-bearing account and hence can be worth more than one dollar in the future. Because current dollars are worth more than future dollars, program decisions must account for both the magnitude and the timing of the forecasted cash flows.

Future Value (Compounding)

We start our discussion of discounted cash flow analysis by examining how money invested today grows over time. The process of moving from today's value to a future value is called *compounding* because the value increases, or compounds, over time.

Although compounding is not used in most discounted cash flow analyses, it is the best starting point for learning DCF concepts. To illustrate compounding, suppose you deposit $100 in a bank account that pays 5 percent annual interest (interest is credited to the account at the end of each year). How much would be in the account at the end of one year? Here is the time line setup:



Note that the account is opened with a deposit of $100 at Year 0. This amount is shown as an outflow, because you will be turning the money over to the bank. The question mark at Year 1 signifies that you want to know the value of the account at that time, after being on deposit for one year.

During one year's time, you will earn 5 percent interest on the initial $100, so the interest earned is $100 × 0.05 = $5. Thus, at the end of one year the amount in the account is $100 + $5 = $105. Note that the balance in the account at Year 1 can be calculated directly by multiplying the starting amount, $100, by 1 + Interest rate (expressed as a decimal). Thus, the ending amount after one year is $100 × (1 + 0.05) = $100 × 1.05 = $105.

What would be the value of the $100 if you left the money in the account for two years? At the start of the second year, the account balance is $105. Interest of $105 × 0.05 = $5.25 is earned on the now larger beginning amount during the second year, so the account balance at the end of Year 2 is $105 + $5.25 = $110.25. The Year 2 interest, $5.25, is higher than the first year's interest, $5, because $5 × 0.05 = $0.25 in interest is earned on the first year's interest. Again, we could calculate the balance after two years as $105 × 1.05 = $110.25. In addition, we could calculate the balance at the end of Year 2 directly from the initial starting amount, $100, as follows: $100 × 1.05 × 1.05 = $100 × $(1.05)^2$ = $110.25. By multiplying by 1.05 two times, we recognize that the initial deposit is compounded at a 5 percent rate over two years.

What about the balance after five years? The compounding process continues, and because the beginning balance is higher in each succeeding year, the annual interest earned increases in each year. At the end of Year 5, the balance would be $100 × $(1.05)^5$ = $127.63. Thus, after five years, you would earn $27.63 in total interest on your initial $100 investment.

Future values, as well as most other DCF calculations, can be performed in three ways: regular calculator, financial calculator, or spreadsheet. We include the regular calculator solution in our discussions (when applicable). To use a regular calculator to solve compounding problems, multiply the PV by (1 + I) for N times or use the exponential function to raise (1 + I) to the Nth power and then multiply the result by the PV. Perhaps the easiest way to find the future value of $100 after five years when compounded at 5 percent is to enter $100, then multiply this amount by 1.05 for five times. If the calculator is set to display two decimal places, the answer would be $127.63.

Present Value (Discounting)

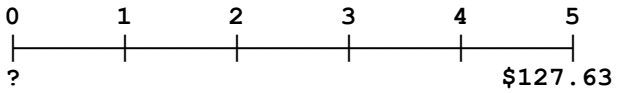
Suppose you have been offered the opportunity to purchase a low-risk security that will pay $127.63 at the end of five years. How much would you be willing to pay for that security? In other words, what is the security worth today? To answer that question, you need another piece of information: the interest rate you could earn on other investments of similar risk to the security being offered. If similar investments offer a 5 percent annual rate of return (interest rate), then 5 percent should be used to value the offer.

The compounding example presented in the previous section shows that an initial amount of $100 invested at 5 percent per year would be worth $127.63 at the end of five years. Thus, you should be indifferent to the choice between $100 today and $127.63 at the end of five years.
Today's $100 is defined as the present value of $127.63 due in five years when 5 percent is the comparison rate of return. If the price of the security being offered is exactly $100, you could buy it or turn it down because that is the security's "fair value." If the price is less than $100, you should buy it. But, if the price is greater than $100, you should decline the offer.

Conceptually, the present value of a cash flow due N years in the future is the amount which, if it were on hand today, would grow to equal the future amount when compounded at the appropriate comparison rate. In effect, the present value tells us what amount would have to be invested to earn the return available on similar alternative investments. If the investment can be obtained for a lesser amount, a higher rate will be earned. If the investment costs more than the present value, the rate earned will be less than that available on similar alternatives.

Finding present values is called *discounting*, because the amount you are calculating (the present value) is smaller than the starting amount (the future value). Discounting is simply the reverse of compounding: if the PV is known, compound to find the FV; if the FV is known, discount to find the PV.

Here is the time line for calculating the security's present (current) value:



While compounding problems are solved by multiplication, discounting problems are solved by division. Thus, the present value of $127.63 expected to be received in 5 years is found (using a regular calculator) by entering $127.63 and then dividing it five times by 1.05. The answer is $100. Note that our purpose here is not to turn you into a finance expert. Rather, it is to give you an appreciation for the techniques used to assess the financial attractiveness of new initiative proposals.

Opportunity Cost of Capital

In the last section, we chose an interest (discount) rate to value the proposed security investment. We used 5 percent, the interest rate available on similar alternative investments. In doing this, we implemented a concept called the *opportunity cost of capital*. The opportunity cost of capital plays a crucial role in DCF analysis.

To illustrate, suppose you found the winning ticket for the Florida lottery and now have $1 million to invest. Should you assign some cost to these funds? At first blush it might appear that this money has zero cost because its acquisition was purely a matter of luck. However, as soon you think about what to do with the $1 million, you must think in terms of the opportunity costs involved.

By using the money to invest in any one alternative, you forgo the opportunity to make some other investment with the same funds. Thus, there is an opportunity cost associated with any investment planned for the $1 million, even though the lottery winnings were "free."

Because one investment decision automatically negates all other possible investments with the same funds, the cash flows expected to be earned from any investment must be discounted at a rate that reflects the return that could be earned on similar alternative investments.

Key Concept: Opportunity Cost of Capital

The opportunity cost of capital (money) is a tried-and-true economic principle. If you invest $100 in Investment A, those funds will not be available for any other purpose. Thus, you should require that the return on Investment A be at least as good as the return on similar alternative investments. If Investment A is not as good as similar Investment B, then the $100 should be invested in B rather than in A. In other words, Investment A has an opportunity cost, and that cost is the return that could be earned on similar investments.

Within for-profit businesses, the opportunity cost rate can be estimated with some confidence. (See any healthcare finance or corporate finance textbook.) However, this rate is not as easily identified, either conceptually or in practice for public health organizations. However, to ignore time value would be to ignore one of the cornerstones of good financial analysis. In many public health situations, a reasonable opportunity cost rate can be obtained by looking at the return available on U. S. Treasury securities (T-bonds). For example, in mid-2011 the interest rate on 10-year T-bonds is roughly 3.5 percent. That rate might be used to discount cash flows that have the same (almost zero) risk as T-bonds. If the cash flows have more risk, then the opportunity cost rate must be increased to reflect higher risk. (Risk analysis is covered in a later section.)

Self-Test Questions

1. What is discounting? How is it related to compounding?

2. Why does an investment have an opportunity cost of capital even when the funds employed have no explicit cost?

3. How are opportunity cost rates established?

RETURN ON INVESTMENT (ROI)

Now that you have a basic understanding of DCF analysis, we can continue with TCHD's new clinic analysis. The most important measure of a program's financial attractiveness is its expected profitability, or *return on investment (ROI)*. In this section, we discuss two ROI measures: net present value and internal rate of return.

Net Present Value

Net present value (NPV), is a dollar ROI measure that uses DCF analysis, so it is often referred to as a DCF profitability measure. NPV is calculated and interpreted as follows:

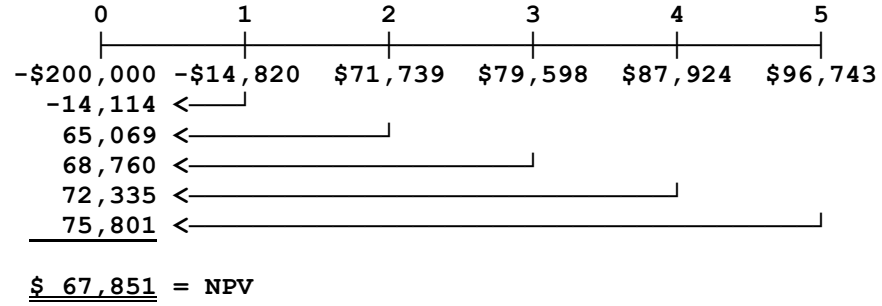
- *Find the present values.* Find the present (Time 0) value of each cash flow, including both inflows and outflows, when discounted at the opportunity cost of capital.

- *Sum the present values.* The resulting sum is defined as the program's NPV. (The term NPV is used because it is the sum, or net, of the present values of an investment's expected cash flows.)

- *Interpret the NPV.* If the NPV is positive, the program is expected to be profitable in the economic sense; and the higher the NPV, the more profitable the program. If the NPV is zero, the program just breaks even; if the NPV is negative, the program is expected to be unprofitable.

To calculate the NPV of TCHD's clinic program, we first need a discount rate (opportunity cost of capital). As discussed in the last section, assume that the interest rate on 10-year T-bonds currently is 3.5 percent and the clinic cash flows laid out in Exhibit 1 have somewhat more risk. To reflect the added risk, we will use a 5 percent opportunity cost rate in the analysis. (In a later section, we will assess the riskiness of the program.)

Using a 5 percent discount rate, the NPV of the clinic program is calculated as follows:



We did the calculation by hand. For example, the present value of the Year 1 cash flow is -$14,820 ÷ 1.05 = -$14,114 (note the negative sign stays with the cash flow) and the present value of the Year 2 cash flow is $71,739 ÷ 1.05 ÷ 1.05 = $65, 069. The present values for the Year 3, 4, and 5 cash flows are calculated in a similar manner. Then, all the present values are added together (keeping track of the signs) to obtain the NPV: $67,851. Note that financial calculators and spreadsheets have NPV functions that easily perform the mathematics, given the cash flows and opportunity cost of capital.

Key Concept: Net Present Value (NPV)

Net present value (NPV) measures the dollar profitability value of an investment on the basis of its opportunity cost of capital. To illustrate, assume a $100 investment is expected to return $120 after one year. Furthermore, the return available on similar investments (the opportunity cost of capital) is 5 percent. The NPV of this investment is ($120 ÷ 1.05) - $100 = $114.29 - $100 = $14.29. Thus, the investment is expected to (1) return the $100 initial investment, (2) provide a 5 percent return on those funds, and (3) create $14.29 of additional value (on a present value basis). An NPV of zero means that the investment just breaks even in the sense that it earns its opportunity cost of capital but no more.

The rationale behind the NPV method is straightforward. An NPV of zero signifies that the clinic's cash inflows are just sufficient to (1) return the capital invested in the program and (2) provide the required rate of return on that capital (meet the opportunity cost of capital). Because the program has a positive NPV, it is generating excess cash flows, and these excess cash flows are available to TCHD's management to reinvest in other programs.

If a program has a negative NPV, its cash inflows are insufficient to compensate the organization for the capital invested or perhaps even insufficient to recover the initial investment, so the program is unprofitable financially and would require operating funds from sources external to the program. Note, however, that in a public health setting a negative NPV does not mean that the program should be rejected. Its community benefit may be sufficiently high that it warrants the "go ahead." Still, managers must realize that the program will require resources that could have been used for other (presumably worthwhile) purposes within the organization.

The NPV of TCHD's clinic program is $67,851, so on a present value basis, the program is expected to generate a value of more than $67,000 **after all costs, including the opportunity cost of capital, have been considered**. Thus, the program is profitable by itself and its acceptance would have a positive impact on TCHD's financial condition. It will generate financial resources that can be redeployed within the health department. Finally, note that NPV is, in reality, an expected value, although it typically is not called "expected NPV." Thus, the actual (realized) profitability of the clinic program may be greater than or less than the (expected) NPV of $67,851, depending on whether the realized cash flows are greater than or less than those expected when the program was analyzed.

Internal Rate of Return

Like NPV, *internal rate of return (IRR)* is a discounted cash flow return on investment (ROI) measure. However, whereas NPV measures dollar profitability, IRR measures percentage profitability; that is, expected rate of return. Mathematically, IRR is defined as the discount rate that equates the present value of the program's expected cash inflows to the investment outlay. (Another way of saying the same thing is that IRR is the discount rate that forces the NPV of the program to be zero.)

For TCHD's clinic program, the IRR is the rate that causes the sum of the present values of the operating cash flows to equal the $200,000 cost of the program; that rate is 13.7 percent. Put another way, the clinic is expected to generate a 13.7 percent rate of return on its $200,000 initial cost. The IRR is the rate of return expected on the investment **assuming all the cash flows anticipated actually occur**.

Key Concept: Internal Rate of Return

Internal rate of return (IRR) measures the expected rate of (percentage) return of an investment. Assume that a $100 investment is expected to return $110 after one year. The discount rate that equates the present value of the expected $110 cash inflow to the $100 cost is 10 percent. Thus, the IRR of this investment is 10 percent. In other words, the $100 investment is expected to earn a 10 percent return. If the opportunity cost rate is 5 percent, this investment is expected to provide a return above those available on similar investments.

If the IRR exceeds the opportunity cost rate, a financial surplus is expected to remain after recovering the invested capital and paying for its use. If the IRR is less than the opportunity cost rate, however, taking on the program is expected to impose a financial burden on the organization. The proposed clinic's expected rate of return (13.7 percent) exceeds its opportunity cost rate (5 percent). Thus, as measured by IRR, the program is profitable, and it ultimately will not only pay for itself but will generate financial resources that can be used to support TCHD's other programs. Note that as with NPV, IRR actually represents the **expected** rate of return. After the program is completed, the actual (realized) rate of return may be higher than or lower than that expected.

Like NPV, IRR can be easily calculated using a financial calculator or a spreadsheet program. However, our purpose here is to introduce the concepts necessary to understand program financial evaluation, not to turn you into a financial staff member.

Comparison of the NPV and IRR Methods

Consider a program with a zero NPV. In this situation, the IRR must equal its opportunity cost rate. The program only earns its opportunity cost of capital, so acceptance would neither enhance nor diminish the organization's financial condition. To have a positive NPV, the program's IRR must be greater than its opportunity cost rate, and a negative NPV signifies a program with an IRR that is less than its opportunity cost rate. Thus, programs that are deemed financially self-sustaining by the NPV method will also be deemed self-sustaining by the IRR method.

In TCHD's clinic analysis, the program would have a positive NPV for all opportunity cost rates less than 13.7 percent. If the opportunity cost rate was greater than 13.7 percent, the program would have a negative NPV. In effect, NPV and IRR are perfect substitutes for each other in measuring whether or not a program is financially attractive.

Self-Test Questions

1. What is the difference between return on investment and profitability?

2. How are NPV and IRR interpreted?

3. Can NPV and IRR lead to different conclusions about a program's financial attractiveness?

4. Evaluate the following statement: "NPV and IRR are expected values."

PROGRAM SCORING

Clearly, many other factors, beside financial, must be considered in a complete analysis of new initiatives. To incorporate multiple factors into the decision process, many organizations use a quasi-subjective *program scoring* approach that attempts to capture both financial and nonfinancial factors. Exhibit 3 illustrates one such approach.

EXHIBIT 3 Program Scoring Approach

Relative Score	2	1	0	-1
Stakeholder Factors:				
Managers	Strongly support	Support	Neutral	Opposed
Employees	Greatly helps morale	Helps morale	No effect	Hurts morale
Clients	High value	Moderate value	No value	Negative value
Mission/Operational Factors:				
Mission value	Greatly supports	Somewhat supports	No effect	Hurts
Worker productivity	Greatly increases	Somewhat increases	No effect	Decreases
Technology	Breakthrough	Improves current use	No effect	Lowers current use
Workforce	Large decrease in FTEs	Decrease in FTEs	No change	Adds FTEs
Financial Factors:				
Payback	Less than 2 years	2-4 years	4-6 years	Over 6 years
IRR	Over 15%	10-15%	5-10%	Less than 5%

Stakeholder Factor score	4
Mission/Operational Factor score	0
Financial Factor score	2
Total score	6

Here, programs are evaluated on three dimensions: stakeholder, mission/operational, and financial. Within each dimension, multiple factors are examined and assigned scores that range from two points for very favorable impact to minus one point for negative impact. The scores within each dimension are added to obtain scores for each of the three dimensions, and then the dimension scores are summed to obtain a total score for the program. The total score gives public health managers a feel for the relative values of programs under consideration when multiple factors, including financial, are taken into account.

To illustrate program scoring, assume that TCHD uses the Exhibit 3 scoring matrix and that the clinic program has been judged as indicated by the factors underlined and colored dark red. With these judgments, the program has a stakeholder factor score of 4, a mission/operational factor score of 0, and a financial factor score of 2, which combines to create a total score of 6.

Key Concept: Program Scoring

Program scoring is a technique for incorporating both financial and nonfinancial factors when assessing new program initiatives. The various factors, such as IRR (a financial factor) and mission value (a nonfinancial factor), are scored on a numerical scale. The scores are then added, and the total score reflects the overall attractiveness of the program. The higher the total, the more attractive the program, considering both financial and nonfinancial factors.

The score for the clinic program can then be compared with scores of other program proposals, ongoing programs, or with the average score of past proposals. Note that the scoring system is completely arbitrary, so the new clinic program with a score of 6, for example, is not necessarily twice as good as a program with a score of 3 or half as good as a program with a score of 12. Nevertheless, a program scoring system forces public health managers to address multiple issues when making program decisions, and the system does provide a relative ranking of programs under consideration.

Finally, note that the Exhibit 3 program scoring matrix is merely an illustration of the concept. Public health organizations have unique characteristics depending on the governmental level and the specific mission, goals, and objectives of the organization. Thus, it is best if organizations develop their own scoring matrixes that reflect their unique organizational circumstances.

Self-Test Question

1. Describe the concept and use of a program scoring system.

EVALUATING PROGRAMS WITH NO INVESTMENT REQUIREMENTS

In public health settings, many new initiatives can be started with little or no upfront investment. In such situations, return on investment (ROI) measures cannot be used to assess financial attractiveness. To illustrate, consider Exhibit 4. Here, we assume that the building for the clinic can be leased for $20,000 annually and that no renovation is required. Without an initial (Year 0) investment, the traditional profitability measures of NPV and IRR have no meaning.

EXHIBIT 4 Proposed Clinic Program: Forecasted Cash Flows (No Initial Investment)

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
1. Building costs						
2. Net revenue		$150,000	$300,000	$315,000	$330,750	$347,288
3. Labor costs (wages and benefits)		$100,000	$123,600	$127,307	$131,127	$135,061
4. Medical supplies		15,000	30,000	31,500	33,075	34,729
5. Utilities		11,820	12,411	13,032	13,683	14,367
6. Lease expense		38,000	56,000	56,000	56,000	56,000
7. Other operating expenses		20,000	26,250	27,563	28,941	30,388
8. Total operating expenses		$184,820	$248,261	$255,402	$262,826	$270,545
9. Net cash flow		-$ 34,820	$ 51,739	$ 59,598	$ 67,924	$ 76,743
10. Margin		-23.2%	17.2%	18.9%	20.5%	22.1%

With no initial investment, how can the financial attractiveness of the clinic program be assessed? Perhaps the best way is to examine the annual cash flow contribution of the program to TCHD's overall financial worthiness. This can be measured by the *profit margin* (or just *margin*) in each year. For example, the Year 1 margin is Net cash flow ÷ Net revenue = -$34,820 ÷ $150,000 = -23.2%. Thus, in Year 1, costs exceed revenues, which leads to a negative margin. A negative Year 1 margin indicates that the clinic program, at least in the first year, is expected to require more in costs than the revenues it generates, and hence funds external to the program will have to be contributed to keep the program alive. The margin in the second year is a positive 17.2 percent, and the margins in all succeeding years are positive, which indicates that the clinic is expected to be self-sustaining after the first year.

The financial attractiveness of the overall program can be summarized by the average margin over the program's five-year life: Total net cash flow ÷ Total net revenue = (-$34,820 + $51,739 + $59,598 + $67,924 + $76,743) ÷ ($150,000 + $300,000 + $315,000 + $330,750 + $347,288) = $221,184 ÷ $1,443,038 = 15.3%. The positive average margin tells TCHD's managers that the program is expected to generate excess cash flow over its life and hence will enhance the financial capability of the organization.

Self-Test Question

1. Describe how programs with no initial investment can be financially evaluated?

RISK ANALYSIS

Generically, *risk* is defined as "a hazard; a peril; exposure to loss or injury." Thus, risk refers to the chance that an unfavorable event will occur. If a person engages in skydiving, he or she is taking a chance with injury or death; skydiving is risky. If a person gambles at roulette, he or she is not risking injury or death but is taking a financial risk. Similarly, when TCHD initiates a program, such as the new clinic, it is taking a financial risk.

> Key Concept: Financial Risk
>
> Programs are risky because the cash flows are not known with certainty when the program is being analyzed. When a program's net cash flows are uncertain, so are the estimates of the program's profitability (NPV and IRR). Thus, there is virtually always some chance that a program will turn out to be less profitable than expected beforehand. The higher the probability that the realized return will be far below that expected, the greater the financial risk.

To illustrate financial risk, consider two potential personal investments. The first investment consists of a $1,000 investment in a one-year bank certificate of deposit (CD). The interest rate on the CD is 5.0 percent, so the expected interest earned is $1,000 × 0.05 = $50. The return on the CD is fixed by contract and, furthermore, is insured by a governmental agency. Thus, there is virtually a 100 percent probability that the investment will actually earn the 5.0 percent rate of return that is expected. In this situation, the investment is described as *risk-free*.

Now, assume that the $1,000 is invested in a biotechnology company. If the company develops a new commercially valuable product, its rights will be sold for $2,000, producing a rate of return of 100 percent. But, if nothing worthwhile is developed, the investment will end up being worthless and no money will be received. The investor may expect to earn $2,000 from the investment, but there also is a chance of losing the entire $1,000. Because there is some possibility of earning a return that is less than expected, the biotechnology investment is risky. Thus, financial risk is related to the probability of earning a return less than expected. The greater the chance of earning a return **far below** the return expected, the greater the amount of financial risk.

Now let's apply the concept of financial risk to TCHD's clinic program. Exhibit 1 contains the program's cash flow analysis. If all of the component cash flows (reimbursement rates, volume, operating costs, and so on) were known with certainty, the program's projected profitability (NPV) would be known with certainty, and hence the program would be risk-free.

However, in virtually all financial analyses, future cash flows, and hence profitability, are uncertain, and in many cases highly uncertain, so risk is present. For example, the annual supplies expense estimates for TCHD's new clinic is based on historical experience coupled with the expected volume and medical needs of the clinic's clients. If the clinic is opened, the actual (realized) supplies expense will almost certainly be higher or lower than the initial estimates. The same reasoning applies to the net revenue estimates, labor cost estimates, and the like. The bottom line here is that the net cash flows in Exhibit 1 are merely estimates of what is expected to happen financially rather than a sure bet. Because of the uncertainty in the cash flow forecasts, the $67,851 NPV (as well as the 13.7 percent IRR) is also uncertain. After five years, and hence looking back on realized results, the actual profitability of the program could be much less than expected. In fact, the program could end up being a big financial loser.

Scenario Analysis

The questions now facing TCHD's managers are how can we assess the financial risk of the clinic program and once we do, how is that risk assessment incorporated into the program's financial analysis? One common way to assess financial risk is by *scenario analysis*. To conduct a scenario analysis, managers start with the initial cash flow estimates (the *base case*) and then pick a bad set of circumstances (low volumes and reimbursement rates, high supplies costs, high labor costs, and so on) and a good set (high volumes and reimbursements, low supplies costs, low labor costs, and so on). Next, managers use the component cash flow values from the bad and good circumstances (scenarios) to forecast profitability under alternative assumptions to those used in the base case.

Key Concept: Scenario Analysis

Scenario analysis is a risk assessment technique that examines the impact of alternative (often three) scenarios on a program's projected profitability. Once the net cash flows are forecasted for the alternative (best and worst case) scenarios, the NPVs can be estimated. The difference between the base and worst case NPVs gives managers a feel for the riskiness of the program—the greater the difference, the greater the risk.

To illustrate scenario analysis, again consider TCHD's clinic program. Assume that TCHD's managers regard a drop in Year 1 net revenue below $125,000 as unlikely, with a resultant Year 2 revenue estimate of $250,000. Conversely, a Year 1 revenue higher than $175,000 (with a corresponding Year 2 estimate of $350,000) is also improbable. All other cash flow estimates are expected to be close to their base case (Exhibit 1) values.

TCHD's managers can now use the worst and best case values for net revenue to obtain the NPV that corresponds to each scenario. TCHD's managers used a spreadsheet model to conduct the analysis, and Exhibit 5 summarizes the results. The base case results in a positive NPV (calculated earlier); the worst case produces a negative NPV; and the best case results in a large, positive NPV.

EXHIBIT 5 Clinic Program Scenario Analysis

	NPV
Worst case	-$169,843
Base case	67,851
Best case	252,544

Although there are some statistical methods that can be used to interpret scenario analyses, they also can be interpreted in a more subjective way. The difference between the most likely NPV ($67,851) and the worst case NPV (-$169,843) is $237,694. The larger this difference, the greater the chance that the program will have a return far below that expected, and hence the greater the risk.

Note that the potential loss of almost $170,000 represents an estimate of the worst possible financial consequences of the clinic program. TCHD is a roughly $16 million enterprise in sound financial condition, so it can absorb such a financial loss without much impact. Thus, the program does not represent a significant financial threat to the organization.

Conversely, if such a loss would mean financial disaster for TCHD, its managers might be unwilling to undertake the program, regardless of its profitability under the base and best case scenarios. Note that the risk of the program is **not** changing in these two situations—what is changing is the ability of the organization to **bear** the risk inherent in the program. Thus, large organizations in sound financial condition can afford to take on more financial risk than can smaller organizations in poor financial condition.

Qualitative Risk Assessment

In some situations, perhaps in many, conducting a quantitative risk assessment is difficult, because predicting the values needed for a scenario analysis is simply hard to do with any confidence. In such situations, rather than ignore program risk, many healthcare organizations use a *qualitative risk assessment* approach. For example, TCHD uses the questions listed in Exhibit 6 to subjectively assess program risk:

EXHIBIT 6 Qualitative Risk Assessment Tool

- *Type of initiative.* Does the program represent a new service (as opposed to expansion of an existing service)?
- *Scope of expertise.* Is the program outside the scope of current management expertise?
- *Recruitment.* Does the program require difficult-to-recruit clinical or technical specialists?
- *Competition.* Will the program place us in competition with other providers?
- *Technology.* Does the program require the use of new, unproven technology?

To assess program risk, each "yes" answer is assigned one point, so the final range of values is from 0 to 5. If the program score is zero or one, it is judged to have low risk. If it has two or three points, it is judged to have average risk, while a score of four or five points indicates high risk. When TCHD's managers applied the qualitative risk assessment tool to the new clinic program, they assigned "no" as the answer to all questions except the fourth (Competition) giving a final total of one, which indicates low financial risk.

Although such a subjective approach initially appears to have little theoretical foundation, a closer examination reveals that each question in the above list is tied to cash flow uncertainty. Thus, the greater the number of "yes" answers, the greater the cash flow uncertainty and hence the greater the chance of a return far below that expected and the greater the financial risk of the program.

Even when a scenario analysis is feasible, a separate qualitative assessment is a good idea. The value of using the qualitative risk assessment approach in conjunction with a scenario analysis is that it forces managers to think about program risk in an alternative framework. If the quantitative and qualitative assessments do not agree, then clearly the risk assessment requires more consideration.

Risk Incorporation

The next step in the financial analysis of a new program is to incorporate the risk analysis into the decision process. This can be done in either a quantitative or qualitative way. To incorporate risk quantitatively, the opportunity cost rate used to calculate NPV (and to compare with IRR) can be adjusted to account for risk. In TCHD's new clinic analysis, an opportunity cost rate of 5 percent was used initially. The logic applied was that the return available on 10-year Treasury securities, which are basically riskless, was 3.5 percent; the clinic's cash flows had somewhat more risk, but not a great deal; and hence a somewhat higher opportunity cost rate (5 percent) was appropriate.

The scenario and qualitative risk analyses performed by TCHD's managers did not indicate that the new clinic was a high-risk undertaking, so the initial analysis was considered to incorporate the correct amount of risk. However, if the risk analyses of the new clinic had indicated high risk, it would be appropriate to increase the opportunity cost rate above the 5 percent assumed in the initial analysis. There is no good methodology for determining how much this risk adjustment should be, so must organizations have a standard adjustment; say, 3-5 percentage points. Thus, if the risk analysis of the new clinic had indicated high risk, the opportunity cost rate might have been increased to 8 or 10 percent and the NPV recalculated. (With an IRR of 13.7 percent, the NPV would still be positive at a 10 percent opportunity cost rate.)

Financial risk also can be incorporated into the decision process is a less formal way. In essence, TCHD's managers must decide whether or not the potential benefits (both financial and nonfinancial) are sufficient to make up for the clinic's financial risk. The final decision, of course, depends on many factors, such as the ones considered in the Exhibit 3 program scoring matrix. The end result will be a subjective decision that considers both the expected financial implications of the program as well as its financial risk.

Self-Test Questions

1. Define the concept of financial risk.

2. What makes one program riskier than another?

3. Briefly describe scenario analysis.

4. Describe qualitative risk assessment. Why does it work?

5. How can a risk assessment be incorporated into the decision process?

POST-AUDITS

Program evaluation is not a static process. If there is a long lag between a program's acceptance and its implementation, any new information concerning the program should be analyzed before the final start-up occurs. Furthermore, the performance of each program should be monitored throughout the program's life.

The process of formally monitoring program performance over time is called the *post-audit*. It involves comparing actual results with those projected; explaining why differences occur; and analyzing potential changes to the program's operations, including replacement or termination.

The post-audit has several purposes:

- *Improve forecasts.* When managers systematically compare forecasts to actual outcomes, estimates tend to improve. Conscious or unconscious biases that occur can be identified and, one hopes, eliminated; new forecasting methods are sought as the need for them becomes apparent; and managers tend to do everything better, including forecasting, if they know that their actions are being monitored.

- *Develop historical risk data.* Post-audits permit managers to develop historical data on new program initiatives. These data can then be used to make judgments about the relative risk and profitability of future programs as they are evaluated.

- *Improve operations.* All organizations, including public health entities, can perform at higher or lower levels of efficiency. When a forecast is made, say, by a clinic director, that person is putting his or her reputation on the line. If costs are above predicted levels and volume is below expectations, that manager will strive, within ethical bounds, to improve the situation and to bring results into line with forecasts. As one local health department director put it: "You academics worry only about making good decisions. In public health, we also have to worry about making decisions good."

- *Reduce losses.* Post-audits monitor the performance of programs over time, so the first indication that termination or replacement should be considered often arises when the post-audit indicates that a program is performing poorly.

Self-Test Questions

1. What is a post-audit?

2. Why are post-audits important to the operational effectiveness of public health organizations?

KEY CONCEPTS

The financial evaluation of new program initiatives is a critical activity for public health managers. The ability of public health organizations to meet mission goals requires that the financial impact of new initiatives be as carefully considered as their contribution to community health. The key concepts of this tutorial are:

- Within public health organizations it is common to embark on programs that require a significant commitment of financial resources. Because of the scarcity of such resources, it is essential that such efforts be *fully evaluated* before the final decision to go forward is made.

- Often, new program proposals are presented in the form of a *business plan*. There are many different formats used in business plans and the best one depends on the nature of the initiative being evaluated.

- The most critical and most difficult step in analyzing a program proposal is estimating the *incremental cash flows*.

- In determining incremental cash flows, *opportunity costs* (cash flows forgone) must be considered, but *sunk costs* (cash outlays that cannot be recouped) are not included. Furthermore, any impact of the program on the organization's *other programs* must be included in the cash flow forecasts.

- The *effects of inflation* must be considered in program analyses. The best procedure is to build inflation effects directly into the component cash flow estimates.

- Time breakeven, which is measured by *payback*, provides managers with insights into a program's liquidity and risk.

- *Compounding* is the process of determining the future value of a current cash flow.

- *Discounting* is the process of finding the present value of a future cash flow.

- Program profitability is assessed by *return on investment (ROI)* measures. The two most commonly used ROI measures are net present value and internal rate of return.

- *Net present value (NPV)*, which is simply the sum of the present values of all the program's cash flows when discounted at the opportunity cost rate, measures a program's expected dollar profitability. An NPV greater than zero indicates that the program is expected to be profitable after all costs, including the opportunity cost of capital, have been considered. Furthermore, the higher the NPV, the more profitable the program.

- *Internal rate of return (IRR)* measures a program's expected rate of (percentage) return. If a program's IRR is greater than its opportunity cost rate, the program is expected to be profitable, and the higher the IRR, the more profitable the program.

- Firms often use *program scoring* to subjectively incorporate a large number of factors, including financial and nonfinancial, into the new initiative decision process.

- *Program risk* is associated with the chance of earning a return less than that expected. The greater the probability of a return far below expected, the higher the risk.

- *Scenario analysis* defines a program's best, most likely, and worst cases and then uses these data to assess risk.

- In many situations, conducting a quantitative program risk assessment is impractical. In these cases, many organizations use a *qualitative approach* to risk assessment.

- Ultimately, *new program decisions* require an analysis of a mix of objective and subjective factors such as profitability, financial risk, and compatibility with organizational goals. The process can be messy, but good public health managers do their best to ensure that none of the relevant factors are ignored.

- The *post-audit* is a key element in program assessment. By comparing actual results with initial predictions, managers can improve both operations and the cash flow estimation process.

This tutorial contains a great deal of detail about the financial evaluation of program initiatives. The key point is that the financial characteristics of new programs must play an important role in the decision process.

This module was prepared by Louis C. Gapenski, PhD, Department of Health Services Research, Management and Policy, University of Florida. It was supported by a grant from the Robert Wood Johnson Foundation.