

Entrepreneurial Financing



INVESTMENT PROJECT EVALUATION AND RISK MANAGEMENT

Prepared by Dr. Mohamed Soliman

Lecture 8

ENT 632

Entrepreneurial Financing



- a) Identify Categories of Investment Purposes.**
- b) Identify Steps for Project Selection.**
- c) Identify Types of Projects.**
- d) Identify Risk and its Sources. Where Would Risk Come From?**
- e) Identify Methods of Risk Management.**

Introduction

- ALL FIRMS, large and small, would at some point have to make some sort of longterm investment.
- In addition to the commonly known investment in financial securities, **firms are often engaged in a more important investment that is crucial to their operations and survival.**
- That is the **investment in both current and fixed assets, which takes a variety of forms and sizes and shapes.**
- **As the effectiveness of current assets is tied to the operating cycle within a year, current expenditures is defined as the outlay which would reap in benefits during a year**, such as the account receivable, prepaid expenses, and inventory.
- **Fixed assets**, on the other hand, **are those assets that would serve the operations over a prolonged period of time, extending beyond a year and for many operating cycles.**
- Therefore, **the outlay of funds that is expected to continue to reap services for the long run is called capital expenditures.**
- Since firms are usually involved in investment allocation of both assets, a systematic process is needed to enable the firm to **evaluate and select the right investment** at the right time and according to the firm's priorities.

- **Investment project evaluation** is the firm's internal process to prioritize, assess, select, and allocate funds for the long-term investment in its assets to achieve its goals.
- **Capital budgeting** is a similar concept about the process to justify and use the capital expenditures to generate higher gains where the present value of the cash inflow exceeds the current value of the cash outflow.
- More specifically, **capital budgeting** would be the process to analyze the firm's potential investment projects in order to enable managers in their decisions to enlist different projects in the capital budget.
- **There are many examples of capital outlay for a firm's investment projects such as:**
 - **Funds to acquire another company or to finance the purchase of land**, building, and equipment.
 - **Funds to expand business operations**, enhance the working capital system, better manage inventories, and control account receivable.
 - **Funds to upgrade research and development** or to pay for promotion and advertisement.
- Each and every one of these investment projects can be a good reason for the firm's capital spending.

1. Categories of Investment Purposes

Replacement Projects

- This category **requires capital expenditures on the replacement of obsolete, outdated, worn out, and broken machines and equipment.**
- Most often the **managerial decision to spend on replacement is assessed against the cost and benefit of the alternative way of repairing and reconditioning.**

Renewal Projects

- This is another alternative to replacement or partial repair of machines and equipment.
- It **involves a complete rebuilding, overhauling, or retrofitting an entire plant or section of machinery to improve the efficiency of operation.**

Expansive Projects

- These projects **require capital spending on introducing a new product** or developing another line of an existing product.
- It also **includes venturing into a new market and extending the service outlets and expanding the distribution and storage facilities.**

1. Categories of Investment Purposes (Cont.)

Cost-Reduction Projects

- This category **includes all projects aiming at reducing the cost of production through lower costs of labor, raw material, and energy, as well as through a better technology.**
- **Lower costs of production could also be achieved by moving production to less-expensive locations and establishing a better personnel training.**

Conforming Projects

- This category **includes all the projects that require capital expenditures to comply with federal and state regulations and honoring production and services according to the required codes and standards, especially in the fields of health, safety, and environmental reservation.**

Other projects

- These are the **projects that may result in:**
 - **increasing sales and boosting revenues such as advertisement projects, or**
 - **those that may revolutionize operations such as research and development, or**
 - **those that may increase efficiency such as managerial consulting and staff training.**

2. Steps for Project Selection

- After recognizing a certain need and identifying the category of projects which would satisfy that need, firm's usually solicit ideas and proposals either internally or externally.
- The internal solicitation could be directed to all employees or limited to specialized committees.
- Project proposals submitted by outside investors would be highly competitive and often selected for their capacity to reduce cost and deliver high quality results.
- Regardless of who would carry out the projects, firms usually follow the standard procedures of decision-making for consistency and efficiency.
- The following **nine steps** would briefly describe the process of project selection:
 1. Exploring a pool of proposed investment projects, and generating a list of the most qualified proposals to form the alternative projects under consideration. By focusing on the initially strong and promising projects, this step would also be a screening step to eliminate all unfeasible or unworthy proposals.

2. Steps for Project Selection (Cont.)

2. **Estimating the project cash flow which is a stream of returns that would occur in a future time.** It should, therefore, be considered with the appropriate level of uncertainty, risk, and bias. A major bias could be the natural tendency to be overoptimistic, which may lead to underestimation of costs and overestimation of benefits. **It is essential to rely on professionals and unbiased experts who use objective measures to minimize any over- or underestimation.** **This step usually emphasizes three important criteria:**

a. Cash flow measurement should be done on an incremental basis. It means that a project's cash flow takes a marginal sense as the difference between the firm's cash flow before and after the initiation of that project.

b. Cash flow estimation should be considered on after tax basis using the firm's marginal tax rate and should **include the effects of depreciation and all other noncash expenses** that would be considered for income tax purposes.

c. Cash flow estimation should include all indirect effects of the project throughout its lifetime. For example, the possible interference and overlap with other products, services, or functions of the firm.

2. Steps for Project Selection (Cont.)

3. **Determining the firm's cost of capital that would serve as the discount rate for converting the value of cash flow from the future to the present time. It is equivalent to the required rate of return by the firm's investors.**

4. **Assessing the various potential risks** that may be associated with certain projects.

5. **Evaluating the alternative investment projects** in order to choose and accept the best alternative project **that would yield the maximum return for the firm.**

- The fundamental criterion for establishing the measure of desirability and preference for a specific project **is the comparison of the present value of the expected cash inflows with the initial cash outflow.**

- The project that wins the allocation of capital has to show that the **present value of its expected returns is higher than the initial capital outlay.**

2. Steps for Project Selection (Cont.)

6. Preparing and writing a summary report that would highlight the top alternative projects and justify their fit to the firm and its need. Often this report comes with the final recommendations that would be submitted to the ultimate decision maker in the firm.
7. After the decision has been made in selecting of a project, the chosen proposal would be submitted to the appropriation department to secure the fund and signal for the implementation stage.
8. Following up the implementation process and monitoring its phases in order to assure a match between what is expected and what is obtained.
9. Devising and taking some corrective action should the actual results deviate from the expected ones.
 - If any corrective action is not feasible, terminating the project would be the last choice to cut the costs and minimize the damages.

3. Types of Projects

- The investment projects that may be submitted for approval can be classified according to their relationship to each other.
- In other words, projects would be judged according to their independence, and divided into independent projects and mutually exclusive projects.

Independent Projects

- An **independent project** is a project that does not compete with other submitted projects for the firm's approval.
- In other words, it is a project the acceptance of which by the firm would not necessarily eliminate or reduce the opportunity for other projects to get approved.
- In this case, the firm's capacity to fund projects would not be an issue of consideration in the capital allocations.
- Such a project would be evaluated and judged only by its merit to meet the required criteria.

3. Types of Projects (Cont.)

Mutually Exclusive Projects

- A **mutually exclusive project** is a project that competes with other submitted projects to gain the firm's approval for funding.
- The firm's capacity to fund such projects would play a major role to determine the outcome of project competition.
- For example, if a firm receives five proposals, but its allocated capital is enough only to fund at most two projects, then approving two projects out of five would eliminate the chance of the other three to get approved regardless of the project's merit to meet the firm's criteria.
- It is just the limitation of capital in this example that imposed this status of being mutually exclusive.
- The firm can also be limited by its need.
- For example, if only one piece of equipment is needed, then the firm would choose only one project that would satisfy this need in the best way.
- That specific project would become mutually exclusive of all other projects that would be able to satisfy the firm's need for that piece of equipment.

Mutually Exclusive Projects (Cont.)

Firms generally have two approaches for their decision-making in project evaluation:

- The first is the **Yes/No approach** in which the firm either grants its approval to a specific project or delivers its rejection.
- This means that there is no in-between decision such as a partial funding or conditional approval.
- The second approach is the **flexible approach** in which the firm would rank projects based on certain criteria, where either some or all projects get approved but according to a certain ranking that is ranging from top to bottom.
- For example, a number of projects could be ranked according to the size of return, or speed of completion, or least of costs or any other criteria.
- The highly ranked proposal would get the highest funding and the lowly ranked would get the least funding.
- Firms are different in terms of the size of capital available for funding their investment projects.
- **Firms with plenty of capital** would be able to accept all the independent projects to satisfy their needs.
- **Firms with limited funds** would have to be extra careful in choosing the projects to be funded.
- They **would most likely follow a policy of capital rationing** to allocate their investment capital for the necessary projects.

4. Risk and its Sources

- **Risk** refers to the condition in which there are multiple possible outcomes and the probability of each alternative outcome is either known or can be estimated.
- **Uncertainty** shares the first element with risk – the existence of multiple possible outcomes – but differs in the second element, so that the probability of each outcome is either unknown or cannot be estimated.
- Managerial decisions often follow a certain scheme when it comes to facing conditions of risk or uncertainty. The scheme includes the following steps:
 - Predicting a set of possible future conditions that would affect any possible managerial decision. These are often called the **states of nature**.
 - Estimating the **expected payoff** for each possible decision and each possible state of nature.
 - Organizing these elements for each managerial decision would form a **payoff matrix**.

4. Risk and its Sources (Cont.)

- Suppose that a manager has to choose among three possible decisions: opening a new branch for the company, expanding and updating the existing branch, or just keeping the current branch with no change.
- Also suppose that the company sees the possibility of the economy descending into a recession during the next period. If the company can estimate the alternative outcomes in terms of the amount of total profits that can be earned in each of the possibilities, a payoff matrix can be constructed like [Table 13.11](#).

Decision/State of Nature	Recession	No Recession
Opening a new branch	\$290,000	\$350,000
Expanding the current branch	\$480,000	\$400,000
Keeping the current branch as it is	\$300,000	\$320,000

- Comparing the option of no change with that of building a new branch reveals that doing nothing would do slightly better in a recession and slightly worse in no recession.
- However, the picture is significantly different when considering an expansion and renovation project.
- It would do much better than keeping the current state of the company in both economic conditions.
- However, comparing the expansion and renovation to establishing a new branch seems much better in recession and slightly better in no recession.
- This concludes and confirms that **going with the expansion and renovation project is the winning decision no matter where the economy is heading.**

Where Would Risk Come From?

- Many possible sources can introduce certain potentials of risk to the managerial decision-making process. **Most of these sources are external to the firm.** We can group the most common sources into four categories.

Economic Sources

- This category includes a variety of sources that are related to the economic environment of a country.
- **The fluctuations in the financial market pose a credible risk to the value of assets in the current and future periods. Such a risk is known as “market risk.”**
- Major economic factors such as inflation and interest rate pose yet other significant impacts on prices and the value of lending and borrowing and their impact on earnings.
- **Changes in the credit obligation and in the state of liquidity can also introduce credit risk and liquidity risk,** in addition to the **currency risk** that can stem from changes in the exchange rate between the domestic and foreign currencies.
- In addition, **the state of competition in the same industry or region** poses another type of economic risk.

Where Would Risk Come From? (Cont.)

Political Sources

- This type of risk is related to the government policies, domestically and internationally.
- Some policies may introduce certain risks to an industry, in particular, or to the economy as a whole.
- **One specific risk is the change in tax policies.**
- Another possible risk is the “**expropriation risk,**” where a government abroad may seize the property, restrict the rights, or remove the privileges of the hosted firm.
- **Terrorism** nowadays constitutes a significant political risk on business activities of all firms, domestically and globally.

Where Would Risk Come From? (Cont.)

Social Sources

- This category **includes the cultural, religious, and environmental sources such as certain social norms or trends that affect consumer preferences and demand.**
- For example, certain food or clothing items or even weather-related products may not have any chance to be marketed in certain areas or countries, which can be a big reason to determine the orientation of businesses dealing with such products.
- Consumer taste and preferences are usually subject to change, domestically and globally, and **any business that cannot respond and keep up with those changes would face the risk of losing its market share.**

Internal Sources

- A variety of risks can arise from within a certain firm or from within the industry for commercially competitive reasons, or for power conflicts and political struggles among the leadership personnel.
- They can also be related to the firm's inability to cope with the rising cost of production, declining demand of its products, or its failure to keep up with the technological advances in its own industry.

5. Methods of Risk Management

Here, we discuss three common methods of risk management. They are the risk adjusted rate (RADR), the risk-adjusted returns (RARs), and the statistical adjustment method.

1) Risk-Adjusted Discount Rate (RADR)

- This method **is based on adjusting the discount rate used in calculating the net present values of the proposed projects.**
- The **adjustment** here means **raising up the rate for the projects that would somehow be considered risky.**
- Riskiness of the projects would be measured, in one way, by the **coefficient of variation of the expected returns (V).**

5. Methods of Risk Management(Cont.)

2) Risk-Adjusted Returns (RARs)

- Instead of adjusting the discount rate for potential levels of risk as we have seen in the RADR method, the adjustment would be here on the stream of cash flow or returns as they are treated by certain levels of certainty.
- The major instrument for this adjustment is the **certainty-equivalent coefficient** (α).
- **In a game context**, **certainty-equivalent** is defined as the compensation that renders a player indifferent to a risky gamble, or it is the sure sum which is equal to the expected value of a risky outcome.
- **In the business risk context**, certainty-equivalent means the portion of estimated return which project managers would prefer to obtain “as certain” over any other return that is “just probable.”
- It indicates a certain preference of certainty over uncertainty, and in this sense, it is related to the concepts of risk aversion and risk taking.

5. Methods of Risk Management (Cont.)

3) The Statistical Adjustment

- Business risk can be accounted for by statistical tools such as standard deviation and coefficient of variation which can be instrumental in measuring the variability of returns to investment in relation to a certain expected return.
- The **standard deviation** (σ_i) measures the dispersion around the expected value of a project's stream of cash inflows, while the **coefficient of variation** (**V**) measures the relative dispersion of the cash inflows, as it is calculated by dividing the standard deviation by the expected value of returns.
- Knowing these instruments accurately requires a lot of detailed information, especially on the probability of each potential return.
-
- Since most business firms, and particularly small firms, cannot afford collecting and processing such elaborate data, it became plausible to assume some subjective probabilities that can be reasonable representative of a normal distribution of three possibilities:
 - The **optimistic estimation**, which is how probable is to get the best returns.
 - The **pessimistic estimation**, which is how probable is to get the worse returns.
 - The **moderate estimation**, which is how probable is to get the ordinary returns that would be in-between and the most likely occurrence.

6. Sensitivity Analysis, Scenario Analysis, and Simulation

- **Sensitivity analysis** is a technique to get a general sense of risk in potential business projects using the variability among the outcomes such as the project's future returns and estimated net present values.
- One of the most simple examples in the application of sensitivity analysis is to use the simple range of estimates to make a general comparison.
- Projects yielding a wide range in their projected returns or net present values would be considered riskier than those projects exhibiting a narrow range.
- This idea is close to the idea of using the statistical measures such as the standard deviation and coefficient of variation in that the tighter the estimates among themselves the more reliable and safe they would be in comparison to the estimates which are spread out.

- **Table 13.19** compares project X to project Y by obtaining the ranges of both the return estimates and the net present values.
- The range value is obtained by subtracting the worst estimate of the pessimistic probability from the best estimate of the optimistic probability.
- The results are clearly pointing out to **Project X as riskier than project Y** since both ranges are much larger in Project X than in project Y.
- That is 90,000 in returns and 28,902 in net present value, as compared to 30,000 in returns and 7014 in net present value for project Y.

Table 13.19.

State of Estimation	Project X	Project Y
Returns		
Optimistic	100,000	65,000
Normal	45,000	45,000
Pessimistic	10,000	35,000
Range	90,000	30,000
Net Present Value		
Optimistic	19,402	8564
Normal	4950	5000
Pessimistic	-9500	1550
Range	28,902	7014

- Sensitivity analysis can also **focus on randomizing the value of one key variable in a financial model in order to test the impact of such a single change on the rest of the related variables in the model.**
- In this sense, it would be able to establish how sensitive the model is in its response to that random change.
- For example, a sensitive analysis can be performed on the next present value model through changing the unit price of the product frequently and tracking down the impact of such changes on the returns that would be an essential variable in the NPV calculation.
- Another similar technique is called **Scenario Analysis**, **which differs from the sensitivity analysis only by extending the randomization of change to more than one variable and tracking down the multiple impacts simultaneously.**
- **Scenario analysis is considered as a short version of financial simulation.**
- **Both sensitivity and scenario analyses are simpler and more practical and affordable than the more comprehensive simulation.**

- **Simulation** is a thorough mathematical technique that utilizes predetermined probability distributions and random values to assess the state of probable future events where projects' rates of return and risk indices can be estimated.
- Similar to the iconic models in the physical world of design and engineering, which are made to reduce the potential risks, explore flaws, and enhance the positive features, as well as to estimate costs, mathematical simulation models are designed to mimic the realities of the business world and deal with their changes.
- They present yet another technique that assists the decision maker in exploring all the possibilities surrounding the problem at hand when it comes to dealing with risky and uncertain conditions.
- The essential features of the real world can be translated into a multivariable model complete with estimations of the probability distributions of the key variables.
- **The model can be tested repeatedly with random variables given to the variables in each test until a probability distribution and risk for the general model are estimated** so that they can be used to calculate the expected outcome for any given variables.

Decision Tree

- The decision tree technique allows the decision maker to map out the decision inputs and their probabilities of occurrence in a branched-out fashion that resembles the tree branches.
- In other words, **decision tree** is a graphical representation of the possible paths of alternative decisions and subsequent decisions according to their potential probabilities and values and under possible conditions.
- Table 13.20 presents two competing projects with three probable estimates for the present value of their returns.
- The decision to choose the best project is made by calculating the expected net present value for each, which would require subtracting the initial capital investment for each from the expected present value of their cash inflows.
- The information on Table 13.20 is mapped out in a decision tree as it is in Figure 13.13, which shows an ordered layout of both alternatives from the start on the left-hand side to the end of the right-hand side.
- The end is narrowed down to a comparison of the two calculated figures representing the expected net present value of the two projects.
- The larger figure of project B (25,500) would be the final choice over project A (23,125).

Table 13.20

	Project A		Project B		
Probability Pr_i	PV_A	$PV_A Pr_i$	Pr_i	PV_B	$PV_B Pr_i$
0.25	-37,500	-9375	0.15	-100,000	-15,000
0.35	350,000	122,500	0.35	280,000	98,000
0.40	250,000	100,000	0.50	125,000	62,500
Expected Present Value A		213,125	Weighted Present Value B		145,500
Initial Capital		-190,000	Initial Capital		-120,000
→ Expected NPV _A		23,125	Expected NPV _B		25,500

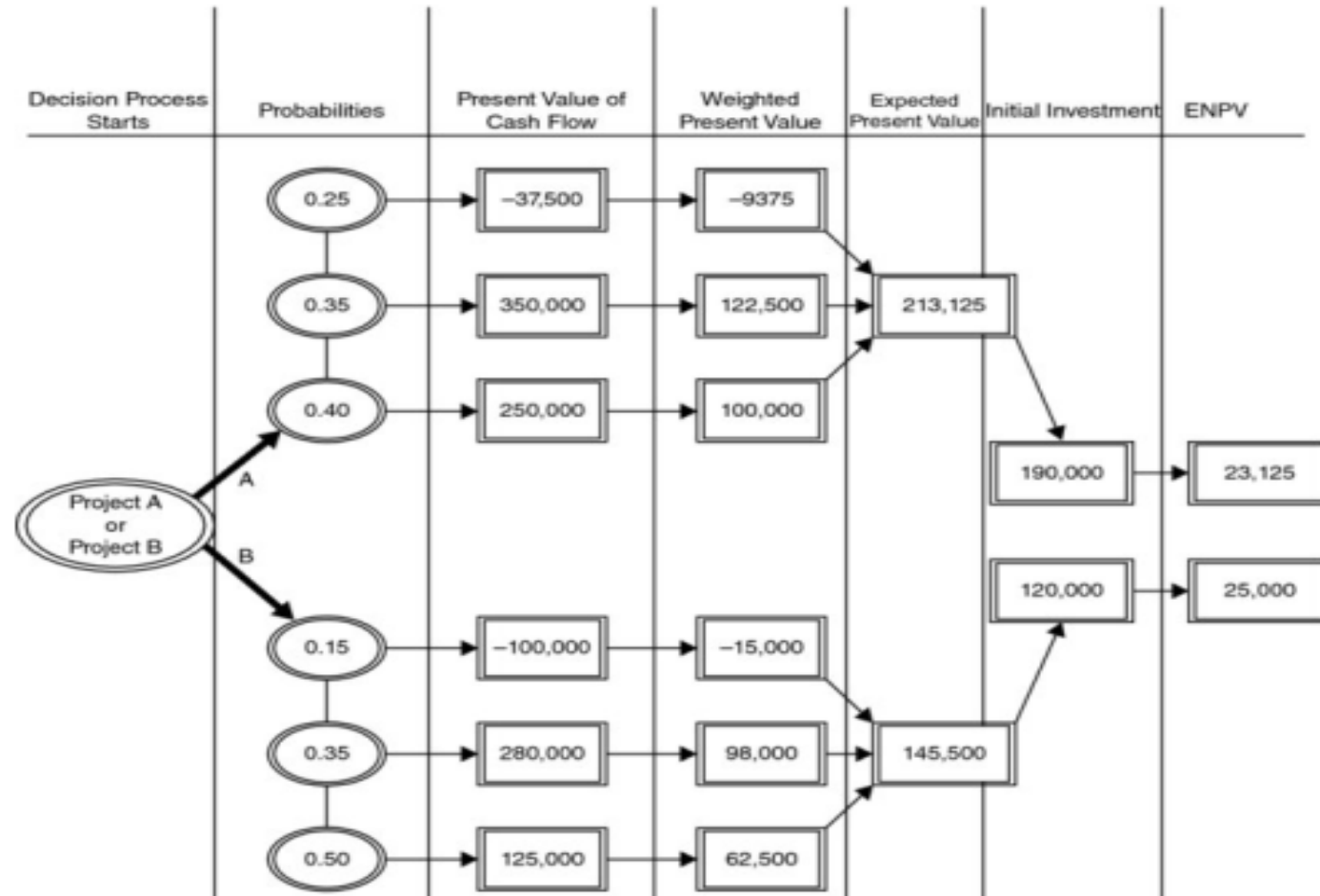


Figure 13.13 The Decision Tree

- In this chapter, we discussed the investment project evaluation and risk management.
- We started off by defining the project evaluation and its connection to capital budgeting and explained the purpose of the investment projects as they usually come up for any business firm.
- Those purposes were categorized into six categories: the replacement, renewal, expansion, cost-reduction, conforming, and all other projects.
- We then described the formal process of project selection in nine systematic steps and classified the projects into independent and mutually exclusive ones.
- The next topic was to explain the cash flow criteria of assessment for both, the conventional and non-conventional patterns of order in cash returns.
- Project evaluation techniques came next with the most common methods in two groups: In the group that does not consider the time value of money, two methods were discussed, the Average Rate of Return (ARR) and the Payback period. In the group that takes into account the time value of money, three methods were discussed: The net present value (NPV), the Internal Rate of Return (IRR), and the Profitability Index (PI).
- A comparison was made between the net present value and Internal Rate of Return for the mutually exclusive projects, and other related topics were discussed.
- Among these topics were the net present value profile, the crossover rate, reversal of ranking, and capital rationing. The second part of the chapter was dedicated to business risk.
- What is risk and what are its sources was the first topic, followed by methods of risk management.
- These methods included the RADR, RAR, and the statistical method that uses the standard deviation and the coefficient of variation.
- Also discussed in this chapter were the sensitivity analysis, scenario analysis, and simulation, while the last subject was a brief description of the decision tree with an illustrative diagram.



مجموعة جامعة
الجميع الذكية
للتعليم القابضة

MIDOCEAN
UNIVERSITY
BY EVERYONE'S SMART UNIVERSITY



Thank You

