Part A: Corporate Finance

Time Value of Money

Financial managers always want to determine how much a periodic receipt of future cash flow is worth in today's dollars. This is important because they are investing today’s dollars for tomorrow's dollars and want to be certain that those future dollars are worth more than their investment. For example, if one considers investing $1,000 in today's dollars for the promise of receiving $225 per year for 5 years, they need to know how much the total payments are worth in today's dollars. Thus, one can compare the cash flow they will be receiving of $1,125 (5 times $225) to the $1,000 they are investing to determine if this is a good investment. This calculation uses the time value of money (TVM) to determine what the future cash flows are worth in today’s dollars. The time value of money refers to the fact that a dollar in hand today is worth more than a dollar received in the future, for example, 5 years from now. The dollar you have in hand today can earn interest for you as time goes by; it will grow to more than a dollar in 5 years. Additionally, a dollar in the future is worth less than a dollar today because of devaluation. Devaluation of the dollar occurs because of inflation, which means it takes more dollars to buy goods and services in the future.

There are five factors to consider in the TVM calculation that include future value (FV), present value (PV), number of years (N), annual interest rate (I), and regular payments received every year (PMT). The interest rate is also often called the cost of capital, opportunity cost, discount rate, or required rate of return in different contexts. When the financial manager determines the future value of an amount invested today, he or she determines how much the investment will grow to over a specific period. When an amount of money is invested for more than one year, then both the original investment and any interest previously earned by the investment will earn interest when additional interest is paid. The concept where interest is earned on previous interest paid is known as compounding. Mathematically, \( FV_n = PV (1 + i)^n \). When interest is paid more than once a year, the future value of an investment can be determined as follows: 
\[
FV_n = PV \left( 1 + \frac{i}{m} \right)^{mn}, \quad \text{where } m = \text{the number of times compounding occurs during the year.}
\]
When interest is paid more often, the original investment will grow faster and will accumulate to a higher future value.

When the financial manager determines the present value, that is, the value in today's dollars of a sum of money to be received in the future, he or she is simply doing the reverse of the compounding.

\[
PV = FV_n \left( \frac{1}{(1 + i)^n} \right)
\]

Most of the time, a financial manager uses financial calculators or spreadsheets to help solve time value of money problems. Use the financial function of the calculator, input the information available (usually four out of the five TVM factors are known), and solve for the unknown factor. The following question demonstrates an example of a TVM calculation: What is the present value of $1,000 to be received in 10 years, given that market interest is 7%? To perform this calculation, input \( N = 10, I = 7, PMT = 0 \) (no recurring regular payments during the period), \( FV = 1,000 \), and solve for PV.

An annuity is a series of equal payments received for a certain number of years. There are two types of annuities. An ordinary annuity provides the payments at the end of each year, while an annuity due provides the payments in the beginning of each year. A financial calculator, spreadsheet, or manual calculation can be used to calculate the information for an annuity. Holding all other factors constant, since annuity due always receives the money a year earlier, it will have a higher value than an ordinary annuity (in both present value and future value).
A perpetuity is an investment that pays the same amount of money forever. It is an annuity that lasts an infinite time. The present value of perpetuity can be calculated as:

\[ PV = \frac{PMT}{I} \]

Where: \( PMT \) = the constant dollar amount received in perpetuity, and \( I \) = the annual interest rate.

These time value of money equations shown above are derived from the following generic TVM formula, which can be used to calculate the PV of any financial asset:

\[ PV = CF_0 + \frac{CF_1}{(1 + r)^1} + \frac{CF_2}{(1 + r)^2} + \ldots + \frac{CF_n}{(1 + r)^n} \]

**Capital Budgeting**

Capital budgeting refers to the decision-making process involved in a company’s selection of long-term investments or capital outlays. Capital budgeting decisions represent some of the most critical decisions a firm’s financial manager makes. During the capital budgeting process, the financial manager estimates the incremental cash flows associated with different investment proposals and determines which proposal(s) bring the most attractive returns relative to the cost.

Capital budgeting projects are typically classified as either independent or mutually exclusive. An independent project does not have an impact on other projects, which means the acceptance of an independent project will not affect the decision about any other project(s). On the other hand, a mutually exclusive project precludes the decision to select any other project and, thus, only one project is selected.

**Capital Budgeting Techniques**

Capital budgeting techniques include the payback period, net present value (NPV), and internal rate of return (IRR) methods. Payback period refers to the number of years it takes to repay the initial investment of the project. For example, if the initial investment of a project is $10,000 and the project profits for the next 4 years are $2,000, $2,000, $4,000, and $5,000, the payback period will be 3.4 years. It takes the first 3 years (afterwards, $2,000 cost left uncovered) and a fraction of the 4th year ($2,000 uncovered cost divided by $5,000 profit of year 4) to recover the initial cost of $10,000. A project is accepted when the payback period is less than a predetermined number of years set by the company’s financial manager. The payback period has major drawbacks even though it is easy to calculate and easy to understand. It ignores the time value of money concept and ignores the cash flows beyond the payback period.

The net present value of an investment project is the present value of future cash inflows less the present value of the initial cost of the project. Positive NPV indicates the project is value-enhancing to the firm. The acceptance criteria are:

1. Accept the project if NPV ≥ 0;
2. Reject if NPV < 0 for independent projects;
3. For mutually exclusive projects, choose the project with the highest NPV.

The internal rate of return (IRR) is the discount rate that makes the project’s NPV = 0. Keep in mind that the IRR is not the required rate of return (K) used by the company to discount future cash flows. The IRR makes the investment cost (cash outflows) equal to the cash received from the investment (cash inflows). Thus, for independent projects, accept a project if the IRR ≥ K and reject the project if the IRR < K. For mutually exclusive projects, the financial manager will choose the project with the highest IRR. There is a connection between the NPV and IRR methods. If IRR ≥ K, one discovers that NPV ≥ 0 and vice versa. On the other hand, if NPV ≥ 0, one discovers that IRR ≥ K, and vice versa. The simplest calculation for the IRR is:

1. Calculate the \( PV_{IFA} = \text{Investment} / \text{Annuity} = PV_{IFA} \);
2. Use Appendix D on the Time Value of Money Tables and locate the PVIFA calculation on the corresponding years of the Annuity (Rows). The IRR is located at the top of the column where the PVIFA is located.

**Cash Flow Estimation in Capital Budgeting**

In order to use the capital budgeting techniques to determine the attractiveness of the projects, the financial manager must measure the cash flows related to the project. In general, there are three major sources of cash flows: initial outlays, incremental cash flows over the project’s life, and terminal cash flows.

Initial outlay includes cash outflows that occur only at the beginning of the project’s life. For expansion projects, the initial outlay generally includes the purchase price of the asset, shipping and installation costs, and changes in net working capital. These amounts are returned when the project is over. The return of the net working capital is part of the project’s terminal cash flow.

Incremental cash flows refer to the ongoing cash flows that result from the project until the end of the project life. Cash flows included in this category are permanent changes in sales, cost of goods sold, and other cash operating revenues and expenses that change because of the asset acquisition. The following formula provides an example of how an incremental cash flow is calculated for expansion projects.

\[
\text{Annual Incremental Cash Flow Estimation} = \text{Sales revenue} - \text{Variable Costs} - \text{Fixed Costs} - \text{Depreciation on new equipment} = \text{Earnings before taxes (EBT)} - \text{Tax payment} = \text{Net Income} + \text{Add back depreciation} = \text{Incremental cash flow}
\]

Terminal cash flow refers to the cash flows that occur when the project ends. This cash flow includes the salvage value of the asset, any taxes associated with salvage, the return of the net working capital, and any other cash flows that occur at the end of the life of the asset. Keep in mind that the salvage value of the old equipment can be either positive or negative depending on whether another company is willing to buy the equipment, positive cash flow, or the company has to pay for the disposal of the equipment.

Sunk costs are costs that have already been incurred and cannot be recovered no matter which projects are selected. Sunk costs should not be considered when calculating a project’s present value. Opportunity costs are the value of the next best use of any asset used in a project. These costs should be considered when calculating the present value of a project.

**Incorporating Risk into Capital Budgeting**

The riskiness of a project is the variability of its expected cash flow. The more uncertain the financial manager is about the cash flows of a project, the riskier the project becomes. Therefore, he or she needs to use a higher discount rate to compensate for the risk. This higher discount rate is defined as the risk adjusted discount rate.

In reality, many companies use a two-step procedure to determine the risk adjusted discount rate. The first step is to use the capital asset pricing model (CAPM) to calculate an overall required rate of return for the whole company. Second, the managers identify all projects as high-risk, average-risk, and low-risk projects. High-risk projects carry a discount rate that is a few percentage points higher than the overall rate for the whole company. For low-risk projects, the managers will reduce the overall rate by a few points.

Capital rationing occurs when a firm has a set budget it can use for capital projects. In this case, only the
best projects should be accepted. Capital rationing can hinder a firm from achieving maximum profitability because positive NPV projects can be rejected.

Working Capital Management

Working capital refers to current assets, and net working capital is equal to current assets minus current liabilities. Working capital management involves the financial manager’s decisions concerning financing and management of the firm’s current assets. The financial manager must decide on the levels of cash, inventory, and accounts receivables to carry and, in addition, how to finance the investment in these current assets. A sound working capital management policy is crucial to the company’s long-term survival.

Working capital management is the financing and management of the current assets of a firm. Working capital decisions are mostly short-term, but the firm will not make it to the long-term without good working capital decisions. Effective working capital management requires a careful allocation of resources among the current assets of the firm. Current assets include cash, marketable securities, accounts receivables, and inventory. The primary goal of working capital management is safety and liquidity or the ability to pay bills and keep the lights on. A secondary goal of working capital management is maximizing returns. There is a standard method for communicating payment terms for most businesses. For example, if a firm offers terms of 2/10, net 30, this means the customer receives a 2% discount if the bill is paid within 10 days. Otherwise, the full amount is due within 30 days.

Efficient inventory management requires balancing carrying costs against ordering costs. The economic order quantity (EOQ) is the order quantity that minimizes the total carrying and ordering costs of inventory. Another important factor in inventory management is the balance between the cost of running out of stock (a stock out) and the cost of carrying safety stock. Just-in-time inventory management is a method that emphasizes quality, minimizes inventory and safety stock, but is susceptible to supply disruptions.

Large creditworthy firms have many opportunities to borrow money. The prime rate is the rate that a bank charges its most creditworthy customers. LIBOR is the rate offered to creditworthy companies with an international presence. Commercial paper is a debt option available to the most creditworthy of large firms. It consists of short-term, unsecured promissory notes. The prime rate is almost always higher than the LIBOR rate and the commercial paper rate.

A compensating balance is an average minimum account balance to be maintained as an alternate to bank fees when borrowing money from the bank. When a compensating balance is required, the effective interest rate is higher than the stated rate.

An increase in net working capital generally leads to less liquidity risk but lower returns. Financial managers should aim for a safe level of net working capital that provides liquidity but that needs to be balanced against the reduced returns typically earned from cash and other current assets. The cash conversion cycle is the amount of time it takes from the cash outlay for a purchase of raw materials to the cash inflow for the sale of a finished product.

The operating cycle is the average time required to acquire inventory, sell the inventory to customers, and collect cash from the inventory sale. The operating cycle is equal to the inventory period plus the accounts receivable period. Several of the critical formulas used in working-capital management are discussed in the following sections.

The inventory period is the time it takes to acquire and sell inventory and is calculated with the following formula:

\[
\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}
\]

\[
\text{Inventory Period} = \frac{365}{\text{Inventory Turnover}}
\]

The accounts receivable period or average collection period is the time it takes to collect the cash for a credit sale and is calculated as follows:
Receivables Turnover = Credit Sales / Average Receivables
Accounts Receivable Period = 365 / Receivables Turnover

The cash cycle is the average time between cash disbursement for purchases and cash received from collections on sales and is calculated with the following formula:

Cash Cycle = Operating Cycle – Accounts Payable Period

The accounts payable period is the time between receipt of inventory and cash payment for the inventory, and it is calculated with the following formula:

Payables Turnover = Cost Of Goods Sold / Average Payables
Payables Period = 365 / Payables Turnover

In the ideal case for a financial manager, short-term assets are financed with short-term debt, and long-term assets are financed with long-term debt and/or equity. However, in reality this scenario is unlikely to happen. Most of the time, cash has not been collected from credit sales before it is time to pay the bills for purchased inventory. Thus, the financial manager must find a way to finance the assets (inventory and accounts receivables).

Firms with flexible operating policies tend to keep a higher level of cash and securities and a larger amount of inventory with increased sales. They also have longer receivables collection periods and larger account receivables balances caused by liberal credit terms. The flexible policy provides better liquidity, but a lower rate of return on investment. On the other hand, firms with a restrictive policy tend to keep a lower level of cash and securities balances and a smaller amount of inventory. They also have a low level of credit sales. The restrictive policy generally provides a higher expected return on investment but increases the risk of default, inventory shortages, and customer dissatisfaction.

There are two major short-term financing methods, including unsecured loans and secured loans. Compared to long-term financing, short-term financing has some significant advantages. It is usually quicker than long-term borrowing and provides more flexibility. The short-term interest rate is generally lower than long-term rates. Yet, with the short-term financing, the interest expense will fluctuate much more than with long-term financing. Additionally, financial distress increases when a firm borrows heavily on a short-term basis.

**Financial Statement Analysis**

Financial statements are a critical source of information about a company and are used by investors, creditors, and governments to make decisions about a company. Major financial statements include the income statement, balance sheet, statement of cash flows, and statement of retained earnings.

The balance sheet is a financial snapshot of a company at a given point in time. The equation:

\[ \text{Assets} = \text{Liabilities} + \text{Shareholders’ Equity} \]

is summarized in the balance sheet and is the foundation for all accounting. This equation tells us what the company has, its assets, and how it got the money to pay for those assets. The cash used to pay for assets must come from the owners (who are also called shareholders) or from debt (or liabilities).

The income statement reports on a company’s net income for a given time period, usually a year or quarter. Net income is equal to revenue minus expenses, and it is also commonly referred to as earnings or profits. The income statement also differentiates between operating and non-operating income such as dividend income, investment profits (or losses), and foreign exchange profits (or losses).
The statement of cash flows identifies a company’s principal sources and uses of cash. The statement of cash flows divides cash flows into three distinct areas: operating activities, investing activities, and financing activities.

The statement of retained earnings shows how net income earned and dividends paid during a given year change retained earnings.

**Cash Flow Analysis**

There are two major activities that occur within a company: generating cash and spending cash. The following example summarizes how a company’s cash flow position is changed by these two different activities.

1. **Sources of Cash (Activities that increase cash)**
   - Increase in long-term debt account (borrowed money)
   - Increase in equity accounts (sold stock)
   - Increase in current liability accounts (borrowed money)
   - Decrease in current asset accounts, other than cash (sold current assets)
   - Decrease in fixed assets (sold fixed assets)

2. **Uses of Cash (Activities that decrease cash)**
   - Decrease in long-term debt account (repaid loans)
   - Decrease in equity accounts (repurchased stock or paid dividends)
   - Decrease in current liability accounts (repaid suppliers or short-term creditors)
   - Increase in current asset accounts, other than cash (purchased current assets)
   - Increase in fixed assets (purchased fixed assets)

**Ratio Analysis**

Based on the information that a financial manager attains from a company’s financial statements, he or she can calculate a list ratios to help evaluate the company’s financial position. A financial manager conducts ratio analysis regularly to identify the company’s changes over time. Ratio analysis is also conducted between two companies to identify financial strengths and weaknesses. There are five major categories of ratios, each providing answers for different questions investors and creditors may have towards the company.

**How liquid is the firm?**
- Current Ratio = current assets / current liabilities
- Quick Ratio = (current assets – inventory) / current liabilities

**How efficient is the company in managing its assets?**
- Accounts receivable turnover = sales / accounts receivable
- Inventory turnover = cost of goods sold / inventory
- Receivables turnover = sales / accounts receivable
- Days’ sales in receivables (days sales outstanding) = 365 / receivables turnover
- Total asset turnover = sales / total assets
- Fixed asset turnover = sales / net fixed assets

**How is the firm financing its assets?**
- Total debt ratio = (total debt) / total assets
- Equity Multiplier = (assets / total equity)
- Times interest earned ratio = EBIT / interest
  **Note:** EBIT is also known as operating profit.

**Are the shareholders receiving an adequate profit?**
- Profit margin = net income / sales
- Return on assets = net income / total assets
• Return on equity = net income / total equity

Is the management team creating shareholder value?
• Price/Earnings = market price per share / earnings per share
• Price/Book = market value per share / book value per share

The DuPont Analysis represents a closer look at a firm’s return on equity (ROE). The DuPont Analysis provides the financial manager with a tool to break down ROE and investigate what areas of the firm need improvement as follows:

\[
\text{ROE} = \frac{\text{Return on Assets}}{1 - \frac{\text{Debt}}{\text{Assets}}} \times \text{Asset Turnover}
\]

Where: Return on Assets = Profit Margin * Asset Turnover

This ratio indicates that a firm’s return on equity depends on its operating efficiency (profit margin), asset use efficiency (total asset turnover), and financial leverage (equity multiplier). For example, if the ROE is rather low, it might be due to a low profit margin or slow asset turnover, given the financing policy remains unchanged.

Cost of Capital
Corporate investments should not be judged by the means of financing the investment. For example, an investment financed with low-cost debt should not be judged against the cost of debt, but at the firm’s overall weighted average cost of capital (WACC).

The WACC is the cost of each capital component (common stock, preferred stock, and debt) multiplied by its proportional weight of the company’s capital structure. The cost of debt is the debt’s yield to maturity adjusted by the company’s tax rate since interest is tax deductible. Retained earnings have an opportunity cost associated with them because if the earnings are not retained they can be paid out to shareholders to reinvest. The cost of retained earnings is equal to the cost of common stock.

The capital asset pricing model (CAPM) is often used to estimate the cost of equity (or common stock). In this model, the cost of equity is equal to the risk-free rate of return plus beta times the stock market rate of return minus the risk-free rate of return. In this model, the risk-free rate is represented by a U.S Treasury bill or bond. Beta is a measure of the volatility, or systematic risk, of the stock in comparison to the overall stock market. The stock market rate of return is represented by the return of the S&P 500 or other broad measure of total stock market return.

In capital budgeting, financial managers use different techniques to choose the most profitable project to improve firm value and to make shareholders better off. In order to determine the value of the project, managers use a required rate of return to discount future cash flows to today’s dollars. It is important to remember that a company’s required rate of return for any given project is the cost of its capital, including debt and equity. The reason a firm must earn a particular rate of return on its assets is because investors, who provide funds to the firm, demand a return on their funds. As a result, the firm must earn enough on its investments to provide the return investors demand. Thus, from the viewpoint of the firm, the required rate of return is the same as the cost of raising capital from investors.

A company raises capital from different sources, and hence, the costs of different types of capital are different. In order to evaluate the overall cost of a company’s capital, the financial manager determines the individual cost of different types of capitals (debt, preferred stock, common stock) and then calculates a weighted average cost of capital. Generally, long-term debt is the least costly source of funds and new common stock is the most costly. The weight on each type of capital is the proportion of that type of capital in the firm’s capital structure, as in 40% debt, 30% common stock, and 30% preferred stock.

Determining Individual Costs of Capital
The before-tax cost of debt \( (k_d) \) is the actual yield to maturity (YTM) of the debt. But the real cost of debt capital will be lower than \( k_d \) because the interest payment for debt is tax free. Issuing debt will have the
benefit of saving tax in the future because interest, which is the cost of debt, is tax deductible. The real cost of debt is the after-tax cost of debt, which is calculated as follows:

\[
\text{After-tax cost of debt} = k_d (1 - T), \text{ where } T \text{ is the marginal tax rate of the company.}
\]

Cost of preferred stock (required rate of return on preferred stock), \( k_{ps} \), equals the dividend yield based upon the net price (market price less flotation costs) or

\[
r_{ps} = \frac{\text{dividend}}{\text{net price}} = \frac{D_p}{NP_{ps}}
\]

Where: net price = \( k_{ps} - F \) (Flotation Costs)

Cost of Common Stock can be calculated using two approaches: the dividend-growth model and the capital asset pricing model.

Dividend-growth model

Cost of internally generated common equity, \( k_{cs} \)

\[
r_{cs} = \frac{\text{dividend in year 1}}{\text{market price}} + \text{growth rate of dividends}
\]

\[
r_{cs} = \frac{D_1}{P_0} + g
\]

Or

\[
r_{cs} = \frac{D_0 (1 + g)}{P_0} + g,
\]

Where \( D_0 \) is the dividend that has just been issued.

Cost of new common stock, \( k_{ncs} \)

\[
r_{ncs} = \frac{D_1}{NP_{cs}} + g
\]

where \( NP_{cs} \) = the market price of the common stock less flotation costs incurred in issuing new shares.

Capital asset pricing model (CAPM)

\[
r_{cs} = r_{rf} + \beta (r_m - r_{rf})
\]

where \( k_{cs} \) = the cost of common stock

\( r_{rf} \) = the risk-free rate

\( \beta \) = beta, measure of the stock’s systematic risk

\( r_m \) = the expected rate of return on the investment

Calculating Weighted Average Cost of Capital (WACC)

WACC is the overall return the firm must earn on its assets; it is the weighted average of the cost of all types of capitals.

\[
WACC = r_{ps} \left( \frac{\text{total preferred stock}}{\text{total assets}} \right) + r_{cs} \left( \frac{\text{total common stock}}{\text{total assets}} \right) + r_d [1-T] \left( \frac{\text{total debt}}{\text{total assets}} \right)
\]

Where: \( r_{ps} \) = the cost of preferred stock

\( r_{cs} \) = the cost of common stock
\[ r_d = \text{the before-tax cost of debt capital} \]
\[ T = \text{the marginal tax rate} \]

Total preferred stock / total assets = percentage of financing from preferred stock
Total common stock / total assets = percentage of financing from common stock
Total debt / total assets = percentage of financing from debt

**Capital Structure**

Leverage magnifies results. Fixed costs create operating leverage that affects the top half of the income statement. Debt creates financial leverage, which affects the bottom half of the income statement. The combined effect of operating and financial leverage is called total (or combined) leverage, and it affects the entire income statement. For profitable firms, an increase in leverage generally leads to increased risk and increased return for the firm.

Capital structure refers to the combination of funds in the form of debt and equity that a firm uses to finance its assets. The **optimum capital structure** is the one that can minimize the cost of capital and maximize the firm’s value. A firm usually sets a **target capital structure**, which is the proportion of debt and equity it wants to use to finance investments. This target capital structure is used as a benchmark when raising funds for investing in new capital budgeting projects.

Business risk of the company is measured by the degree of operating leverage (DOL).

\[
\text{DOL} = \frac{\% \text{ change in EBIT}}{\% \text{ change in sales}}
\]

(e.g., if DOL=2, a 10% rise in sales over the coming period will result in a 20% rise in EBIT.)

Financial risk of the company is measured by degree of financial leverage (DFL).

\[
\text{DFL} = \frac{\% \text{ change in EPS}}{\% \text{ change in EBIT}}
\]

(e.g., if DFL=3, A 10% rise in EPS over the coming time period will result in a 30% rise in EBIT.)

DFL can also be calculated as: 
\[
\text{DFL} = \frac{\text{EBIT}}{\text{EBIT} - I}
\]

Combing DOL and DFL together, one attains the degree of total (or combined) leverage (DTL), measuring the total risk of the company.

\[
\text{DTL} = \frac{\% \text{ change in EPS}}{\% \text{ change in sales}}
\]

DTL can also be calculated as: 
\[
\text{DTL} = \text{DOL} \times \text{DFL}
\]

The formula for the amount of units needed to break even in sales can be helpful in deciding on the level of leverage preferred.

Note: FC = fixed costs, P = price per unit, VC = variable cost per unit, and BE = FC / (P – VC)

There are two major theories regarding capital structure that include **trade-off theory** and **signaling theory**. Trade-off theory states that because of the tax advantage of issuing debt, the value of a firm increases as it uses more debt. However, the theory ignores the costs associated with bankruptcy, which can be considerable. When the costs of bankruptcy are considered, there is a point where the tax benefit of debt becomes nominal, and the risk associated with the heavy use of debt is of immense importance. The trade-off between the benefit of debt determines the amount of debt a company would issue and significantly affects the financial manager’s decision to acquire equity capital.
Signaling theory states that managers have some information that outside investors do not. It is premised that signaling theory occurs because managers would only issue new common stock if they felt that the firm’s future prospects were unfavorable. If the firm’s future were optimistic, managers would issue debt rather than equity to allow the existing shareholders to receive all of the increase in value that will result from the favorable prospects.

Part B: Investments

Risk and Return
In investing, risk is the uncertainty of the potential returns of an investment or the chance of receiving a return other than expected. The greater the variability of an investment’s possible returns, the riskier the investment. Diversifying investment by using a portfolio of investments can lower risk without lowering expected returns. A portfolio that maximizes return for a given level of risk or minimizes risk for a given level of return is called an efficient portfolio.

Measuring Expected Return and Risk
The expected return is the weighted average of all possible outcomes.

\[
\bar{X} = \sum X \cdot P
\]

Where: \(X\) = possible return

\(P\) = the probability of the return

\(\sum XP\) = the sum of all possible returns times their individual probabilities

\[
\sigma \text{ (standard deviation)} = \sqrt{\sum (X - \bar{X})^2 P}
\]

Statistically, risk can be measured by observing the standard deviation of expected cash flows. Because standard deviation measures variation, which is associated with risk, an investment with a lower standard deviation is considered less risky than an investment with a higher standard deviation.

Risk Diversification and Market Risk
Historically, investors have received greater returns for taking higher levels of risk. By combining different types of investments into one portfolio, the financial manager can lower risk without sacrificing expected return. The process of choosing investments with varying levels of risk is called risk diversification.

Generally, the total variability associated with an investment is divided into two parts that include the variability of returns unique to the security (diversifiable or unsystematic risk) and the risk related to market movements (nondiversifiable or systematic risk). By combining different types of assets into one portfolio, the investor can help mitigate a company’s unique risk and attain a more moderate level of risk in the portfolio. Unfortunately, systematic risk cannot be diversified away.

Systematic risk, also called market risk, is calculated by comparing the movement of a stock in response to movement in the market. The resulting measure between a company’s stock and the market movement is defined as the beta coefficient of the stock. It is identified using the Greek symbol \(\beta\). The beta of the market portfolio is 1. Stocks with a beta greater than one have returns that are more volatile than the market portfolio. Graphically, the beta coefficient is measured as follows:
The upward slope of the green line is the beta coefficient. When observing the slope of a line, one can determine that the steeper the line, the higher the market risk. A portfolio's beta is equal to the weighted average of all the betas of the individual stocks contained in the portfolio. The higher a stock's beta coefficient, the higher its volatility to the market.

**Capital Asset Pricing Model (CAPM)**

When investors bear higher risk, they require a higher return as compensation. The excess return based on excess risk is defined as the risk premium. The required rate of return for a given security is expressed as:

\[
\text{Required rate} = \text{risk-free rate} + \text{risk premium for the stock}
\]

\[
= \text{risk-free rate} + \beta_j \left( \text{market return} - \text{risk-free rate} \right)
\]

or

\[
\text{r}_j = \text{r}_{rf} + \beta_j \left( \text{r}_m - \text{r}_{rf} \right)
\]

The required return for a specific stock is equal to the risk-free rate plus an extra amount to compensate for the risk associated with the investment. The extra amount is determined by the stock's beta coefficient (i.e., the market risk in the stock). The graphic illustration of the capital asset pricing model (CAPM) is defined as the security market line (SML). The SML illustrates the risk-return trade-off in the market.
Valuation of Securities
The concept of valuation of securities is straightforward. The value of any security is the present value of all the future cash flows expected from the security. The price an investor is willing to pay today has to be equal to the true value (present value) of the benefits he or she will receive from the investment.

Bond Features
A bond is a long-term debt contract issued by a company or government to someone who is willing to purchase the contract, called a bondholder. Bondholders are entitled to interest payments during the life of the bond plus a return of the principal amount when the bond matures. In case of a company’s insolvency, a bondholder has a priority of claim to the firm’s assets before both preferred and common stockholders. Also, bondholders must be paid interest they are due before dividends can be distributed to the stockholders. A call feature allows the bond issuer to repurchase bonds at a stated price prior to maturity.

Bond Types
There are several bond types. The most common include the following:
- Government bonds: Issued by federal, state, and local governments;
- Corporate bonds: Issued by corporations;
- Mortgage bonds: Secured by real assets as collateral;
- Debenture bonds: Unsecured bond…subordinated debentures represent debt that ranks below other debt with respect to claims on the firm’s assets;
- Zero-coupon bonds: Bonds that pay no interest but are deeply discounted market price below the par value;
- Junk bonds: High-yield bonds with high risk.

Bond Valuation
The value of a bond is simply the present value of the future interest payments and maturity value discounted at the bondholder's required rate of return. The valuation of a bond involves the following factors:
- Principle amount (face value/par value): Amount of money a firm borrows and promises to pay back when the bond matures, usually $1,000;
- Coupon interest payment: Specified amount of money paid to bondholders every year;
- Coupon interest rate: Coupon interest payment divided by principle amount;
- Maturity date: Date when principle amount is repaid to the bondholders.
Example:
Song Co. issues $1,000 par value bonds with 10 years to maturity. The annual coupon interest rate is 7%. Similar bonds have a yield to maturity of 11%. Bondholders require 11% for the bond. The value of the bond is calculated as follows:

\[ N = 10; \ I/Y = 11; \ PMT = 70 \text{ (1,000 \times 7\%)}; \ FV = 1,000; \text{ solve for } PV = -764.43 \]

As shown by the above calculation, if the bondholder’s required rate of return (11%) is higher than the coupon interest rate (7%), the bond is sold below its par value of $1,000. Thus, it is called a “discount bond.” On the contrary, if the current interest rate is lower than the bond’s coupon rate, the bond will sell above its par value. Thus, it is defined as a “premium bond.”

A bond’s yield to maturity (YTM) tells the investor the gain from holding a certain bond. YTM measures the actual rate of return from the day investors buy the bond until the day the bond matures. The value of the bond is calculated as follows:

\[ N = \text{the time left until maturity date}; \ PMT = \text{coupon interest payment}; \ PV = \text{price paid for the bond}; \ FV = 1,000. \]

Solve for I/Y.

Changes in Bond Value Over Time
Market interest fluctuates all the time. The risk free interest rate is equal to the inflation rate plus a real rate of return. When the market interest rate decreases, the value of a bond will increase. When the market interest rate increases, the value of the bond will decrease. This change in value caused by changes in the market’s interest rate is defined as interest rate risk. Longer-term bonds have greater interest rate risk than shorter-term bonds.

Stock Features
Preferred stock features:
- Constant dividends
- No specific maturity date
- In case of a company’s insolvency, a preferred stock holder has a priority of claim to the firm’s assets before the common stockholders, but after the debt holders
- No voting rights
- Can be converted into the common stock of the firm

Common stock features:
- Dividends are not guaranteed
- No specific maturity date
- In case of a company’s insolvency, a common stock holder will be paid after debt holders and preferred stockholders
- Voting rights for election of board of directors
- Common stockholders are the true owners of the company

Stock Valuation
Stock valuation is more difficult than bond valuation because stocks do not have a specific maturity date and dividends are not constant.

1. Zero-growth Model: assumes that the growth rate (g) of the company’s dividend is zero.

The dividend level will not change over time. \( D_0 = D_1 = D_2 \ldots = D \)
Value of the stock $P_0 = \frac{D}{r}$, where $r$ is the required rate of return of stockholders.

2. Constant growth Model: assumes that dividends are expected to grow at a constant growth rate ($g$) each period.

$$D_1 = D_0(1+g); \quad D_2 = D_1(1+g)$$

Value of the stock $P_0 = \frac{D_1}{(r-g)} = \frac{D_0(1+g)}{(r-g)}$

**Shareholder's Expected Rate of Return**

For preferred stockholders, if the market price of the stock and dividend level to be received is known, the expected rate of return from the investment can be determined as follows:

$$\text{Expected rate of return } r_p = \frac{\text{annual dividend}}{\text{market price of the stock}} = \frac{D}{P_p}$$

For common stockholder's expected rate of return

$$\text{Expected rate of return } r_c = \left( \frac{\text{dividend in year 1}}{\text{market price}} \right) + \left( \frac{\text{growth rate}}{1 + \text{growth rate}} \right) = \frac{D_1}{P_c} + g$$

**Financial Market and Environments**

Financial markets consist of institutions and procedures that bring those who have excess funds (investors/lenders) together with those who need funds (borrowers). The function of financial markets is to allocate savings in an economy to the ultimate demander (user) of the savings. Typically, governments and businesses are net demanders of funds and individuals are net suppliers of funds.

There are three basic types of businesses: proprietorships, partnerships, and corporations. There are also hybrid business organizations such as limited liability corporations, limited liability partnerships, and S-corporations. The most common type of business organization is a proprietorship. Proprietorships are easy to set up, have low costs, and generally pay lower taxes. The type of business organization that generates the most revenue and profits is the corporation. Corporations are harder to set up, have higher costs, and generally pay higher taxes. Still, corporations benefit from limited liability. A disadvantage is that corporate profits are subject to double taxation if the corporation pays dividends to its owners.

The primary goal of a financial manager should be to maximize shareholder wealth (or the value of the firm). If managers put their own interests above those of the owner, this is called an agency problem.

**Types of Finance Markets**

Financial markets can be local, regional, national, or global depending on the coverage of the securities traded and the nature of the participants in the markets. Several types of financial markets include:

- **Money markets versus capital markets** - securities with maturities equal to one year or less are traded in money markets, whereas securities with maturities greater than one year are traded in capital markets.

- **Debt markets versus equity markets** - loans are traded in debt markets, whereas stocks are traded in equity markets. Debt associated with real estate is traded in mortgage markets. Consumer debt such as automobile loans, loans for appliances and education, are traded in consumer credit markets.

- **Primary markets versus secondary markets** - new issues of stocks and bonds are sold in primary markets, whereas previously issued (outstanding) securities are traded in secondary markets.
Derivatives markets - where options, futures, swaps, and other “derivative” financial instruments are traded; derivatives are securities whose values are determined (“derived”) from the values of other assets.

Organized security exchanges versus over-the-counter markets - organized security exchanges are tangible entities whose activities are governed by a set of bylaws, such as the NYSE (New York Stock Exchange). Security exchanges physically occupy space, and financial instruments are traded on such premises.

Over-the-counter markets are networks of brokers and dealers around the country that are linked electronically. The NASDAQ (National Association of Security Dealers Automated Quotation system) is a good example of an over-the-counter market.

Market Efficiency
A market is “efficient” when market prices/values adjust quickly as new information becomes available in the financial markets. There are three forms of market efficiency:

Weak-form efficiency - market prices reflect information contained in past price movements.

Semi-strong-form efficiency - market prices reflect all publicly available information including past price movements, firms’ current financial statements, and recent announcements.

Strong-form efficiency - market prices reflect all publicly available private information

Determination of Real or Required Rate of Return
The real rate of return \( (k^*) \) is the nominal, inflation-adjusted, risk-adjusted rate. To attain this rate, start with the market-based risk-free rate and add an inflation premium and a risk premium. This is the interest rate that investors demand for giving up their cash on an adjusted basis considering inflation and risk. The real rate of return is calculated as follows:

\[
r^* = r_f + IP + RP
\]

Where:
- \( r^* \) = real rate of interest
- \( r_f \) = risk free rate
- \( IP \) = inflation premium
- \( RP \) = risk premium

The relationship between a debt security’s rate of return and the length of time until the debt matures is called its term structure of interest rates. A yield curve is a graphic representation of the term structure of a maturity’s interest rate. Three theories strive to explain the yield curve:

1. **Unbiased expectations theory** premises that the term structure is determined by an investor’s expectations about future interest rates.
2. **Liquidity preference theory** suggests that investors require liquidity premiums (additional returns) to compensate them for buying securities, which expose them to a greater risk of fluctuating interest rates.
3. **Market segmentation theory** is based on the notion that legal restrictions and personal preferences limit investment choices to certain ranges of maturities and, therefore, affect the rates of return required in each range.

Using an Investment Banker
The investment banker is a financial specialist who acts as an intermediary in the selling of securities. He or she works for an investment-banking firm. The major responsibilities of an investment bank include:

1. **Underwriting** - The investment banking firm, along with the underwriting syndicate (group of investment banking firms), buys the new issue from the corporation that is raising funds. The
syndicate then sells the issue to the investing public, hopefully at a higher price than it paid the company for the issue.

2. **Distributing** - Investment banking house distributes the securities to the investing public.

3. **Advising** - Investment banking firms advise other companies and firms on the details of selling securities.

### International Markets

Many U.S. corporations have more sales overseas than in the U.S. This exposes them to more risks than purely domestic companies, such as exchange risk and political risk. Currency exchange rates between countries are affected by a number of factors including inflation, interest rates, and government and economic policies in the different countries. There are a number of methods in which a company can expand into other countries, including exporter, licensing, joint venture, and a foreign subsidiary. Foreign expansion subjects firms to currency translation and transaction exposure, which can have a significant impact on earnings.

Compared to the U.S., financial institutions in other countries are much larger with many more branches. In most other countries, there are a few very large financial organizations that service the entire population. Unfortunately, past regulation has restricted the ability of U.S. financial organizations from branching freely and from becoming extremely large. However, deregulation during the past 25 years has helped U.S. financial institutions to become more internationally competitive.

A global, multi-national company crosses many international borders and operates in many differing markets. Often, countries use different currencies and, thus, the financial manager must stay current on exchange rates and their impact on the firm’s profitability and cash flow. This risk is called *foreign exchange risk*, which can be mitigated to a degree through hedging to ensure a firm future exchange rate. Another significant risk faced by the global firm is political instability. Additional difficulties a firm may face in a global environment include foreign inflation rates, country specific regulations, differing financial institutions, and differing workforce requirements to name a few. Many variables affect currency exchange rates. The importance of each variable or set of variables will change as economics and political conditions change throughout the world.

### Spot Rates, Forward Rates, and Cross Rates

1. **Spot rate** - the exchange rate between currencies with immediate delivery.

2. **Forward rate** - the rate of exchange between currencies with a future delivery date.

3. **Cross rates** - the exchange rate between currencies such as Japanese Yen and British pounds based on their exchange rate with another currency such as the Eurodollar.

### Three types of foreign exchange risk exposure

1. **Accounting or translation exposure** - depends upon accounting rules established by the parent company's government. All foreign currency denominated assets and liabilities must be converted at the rate of exchange in effect on the date of financial statement preparation.

2. **Transaction exposure** - foreign exchange gains and losses for U.S. companies are reflected in the income statement for the current period which also increases the firm’s earnings per share volatility.

3. **Economic exposure** - based on the gross domestic product of host countries.

### There are three strategies used to minimize transaction exposure

1. **Hedging in the forward exchange market** - the recipient (seller) of foreign currency in an international transaction sells a forward contract to assure the amount that will be received in domestic currency.

2. **Hedging in the money market** - the recipient borrows foreign currency based on the amount of money to be received and immediately converts the amount into domestic currency. When the receivable is collected, the loan is paid off.

3. **Hedging in the currency futures market** - futures contracts in foreign currencies are traded in the International Monetary Market (IMM) of the Chicago Mercantile Exchange and on the London International Financial Futures Exchange (LIFFE).