

Finance and Financial Systems

January 9, 2019 5:44 PM

What is finance?

- The study of how money is allocated between lenders and borrowers
- Study of finance requires a basic understanding of:
 - Securities
 - Corporate laws (due to possibility of fraud)
 - Financial institutions and markets (intermediaries between lender and borrower)

Real assets are tangible items owned by persons and businesses

- Land
- Buildings
- Appliances
- Machinery

Financial assets are what one individual has lent to another

- Consumer credit
- Loans
- Mortgages

The Financial System (overview)

- The household is the primary provider of funds to businesses and government
- Households must accumulate financial resources throughout their careers to have enough savings to live during retirement
- Transforms the money to something else

- Financial intermediaries transform the nature of the securities they issue and invest in (ir. Banks, insurance, mutual funds, etc.)
- Market intermediaries, such as investment brokers simply help to make markets work by adding liquidity
- Does not transform money, just trades stocks / securities

Channels of Intermediation

- Funds can be channeled from savers to borrowers in three ways:
 - Direct transfer from lender to borrower in a non-market transaction
 - Direct intermediation through a market intermediary such as a broker
 - Indirect claims through a financial intermediary where the financial intermediary, such as a bank offers deposit-taking services and ultimately lends the money out as mortgages or loans

Financial Intermediaries, Canadian Chartered Banks

- Deposits from numerous depositors from Canada are 'pooled' into banks
- Pooled funds are lent to households and businesses in the form of mortgages and loans
- The bank transforms the original nature of the depositors money
- Individual depositors save in small amounts and want to face little or no risk, but expect to withdraw their deposit at any time
- Loans and mortgages are usually large in amount, borrowed for long periods of time and for risky purposes, and may not always be repaid in full
- Banks can perform this transformation function because they become experts at risk assessment, financial contracting and monitoring the activities of borrowers

The Financial Intermediaries - Insurance Companies

- Insurers sell policies and collect premiums from customers based on the pricing of those

- policies given the probability of a claim and the size of the policy and administrative fees
- Premiums are invested so that the accumulated value in the future will grow to meet anticipated claims of the policy holders
- Risks that would be unaffordable by an individual, such as the death of wage earners or the destruction of a business's assets are therefore shared among a large number of policy holders through the insurance company
- Insurance allows households, businesses and governments to engage in risky activities without having to bear the entire risk of loss themselves

The Financial Intermediaries - Pension Plan Assets

- Individuals and employees make payments over their entire working lives to pension plans, which invest those funds to grow over time
- The accumulated value of the pension can be used to fund retirement
- Pension plans accumulate large sums of money; their managers invest those funds with long-term investment time horizons in diversified investment portfolios

The Financial Intermediaries - Canadian Mutual Fund Assets

- Mutual funds give small investors access to diversified professionally managed portfolios of securities
- Small investors often do not have the funds necessary to invest directly into market-traded financial instruments such as stocks and bonds

The Major Borrowers

- Public Department
 - Government of Canada
 - Provincial and territorial governments
 - Municipalities
 - Crown corporations
- Private Department
 - Households
 - Non-financial corporations

Financial Instruments

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Financial assets are formal legal documents that set out their rights and obligations of all the parties involved

There are two major categories of financial securities:

- Debt Instruments
 - Represent legal obligations to repay borrowed funds at a specified maturity date and provide interim interest payments as specified in the agreement
 - ie. treasury bills, bonds, mortgage loans, commercial paper
- Equity Instruments
 - These represent an ownership stake in a company
 - ie. common share, preferred share

Characteristics of Non-Marketable Assets

- Cannot be traded between or among investors
- May be redeemable (a reverse transaction between the borrower and the lender)
- ie. savings accounts, term deposits, guaranteed investment certificates, Canada Savings Bonds
- Must liquidate them before trading

Characteristics of Marketable Assets

- Can be traded between or among investors after their original issue in public markets and before they mature or expire
- The market value will change over time due to changes in the general economic environment (for example, interest rate increases / decreases) and/or changes in the financial condition or prospects of the issuer of the security
- Marketable securities can be categorized according to their time to maturity
 - *Money market securities* are short-term debt securities that are pure discount notes and usually have maturities of less than one year (ie. treasury bills, commercial paper)
 - *Capital market securities* are long-term debt or equity securities with maturities greater than one year (ie. bonds, common shares, preferred shares)

Financial Markets (overview)

- *Primary Markets*
 - Markets that involve the issue of new securities by a company in exchange for cash from investors
 - Primary markets are the key to the wealth creation process, since they enable money to be transferred to those who can make best use of it in terms of developing new real assets
- *Secondary Markets*
 - Markets that involve buyers and sellers of existing securities. Funds flow from the buyer to the seller of the securities, and the buyer becomes the new owner of the security
 - No new capital is formed; this is only the exchange of already existing securities representing already formed capital
 - Secondary markets provide trading (or market) environments that permit investors to buy and sell existing securities

Types of Secondary Markets

- There are two major types of secondary markets
- Exchange or auction markets involve a bidding process that takes place in a specific location (ie. TSX, NYSE)
- Dealer or over-the-counter (OTC) markets do not have a physical location and consist of a network of dealers who trade directly with each other (ie. NASDAQ)
 - Money market instruments and long-term debt instruments, such as bonds trade in money markets
- Third Market
 - The trading of securities that are listed on organized exchanges in OTC markets
 - This market has been particularly important for "block trades", which are extremely large transactions involving 10,000 shares or over \$100,000
- Fourth Market
 - Refers to the trading of securities directly between investors (usually between two large institutions) without

- the involvement of brokers or dealers
- Operates through the use of privately owned automated systems such as Instinet

The Global Financial Community

- Represents an important source of funds for borrowers
- Provides investors with important alternatives as they seek to build wealth through diversified portfolios
- Money markets and bond markets are global
- Domestic equity markets are increasingly linked because of globalization and consolidation
- The correlation between markets is high, especially during a systemic downturn
- Result of increasing correlation is financial crisis in any market can be transmitted worldwide in a matter of hours

Forms of Business Organizations

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Types of Business Organizations

- Sole partnerships
- Partnerships
 - Limited liability partnerships (LSPs)
- Trusts
 - Income and royalty trusts
- Corporations

Sole Proprietorships

- Nature of the Business
 - A business owned and operated by one person
 - Legally inseparable from the person who owns and operates the business
 - Reports income, both gross and net, on personal income tax statements
 - Net business income is taxed at the person's marginal tax rate
- Financing
 - Limited to the resources of the individual owning and operating the business and their personal capacity to borrow
- Advantages
 - Easy to start
 - Little formality, but business records must be maintained
- Disadvantages
 - Unlimited legal liability (personal assets can be claimed for business debt in the case of bankruptcy)
 - Net income is taxed at the personal marginal tax rate
 - Financing is limited to the resources of the owner
 - The life of the enterprise is limited to the working life of the owner

Partnerships

- Nature of the Business
 - Involves two or more partners
 - Must have at least one general partner, who has unlimited legal liability for the activities of the business, while all other partners are referred to as limited partners and have limited legal liability (limited to amount person has invested in the business)
- Financing
 - A function of the combined resources of the partners
 - Can attract additional resources through limited partner contributions
- Formality
 - Must be registered under the provincial partnership legislation
 - Should be formalized through a partnership agreement outlining partner responsibilities, how partners invest and divest of the business, and the division of net business income
- Advantages
 - Harnesses the combined talents and energies of all the partners
 - Potential for greater combined financial resources of the partners
 - Spreads liability across the partners (jointly and separately)
- Disadvantages
 - Income is taxed at the individual's marginal rate
 - Governed by provincial partnership legislation and often requires a formal partnership agreement
 - Unlimited legal liability
 - Non-partnership business arrangements can be deemed partnerships under Canadian law

- It can be legally challenging to disassociate oneself from and/or dissolve a partnership agreement

Limited and General Partnerships

- Used for Tax Purposes:
 - Limited partners are often able to use unused non-cash deduction such as depreciation and/or business losses to offset personal tax liabilities
- The General Partner
 - There must be one general partner, which is responsible for operating the business and has unlimited legal liability
 - Often the general partner is a corporation
- Limited Partners
 - Passive investors
 - Contribute money to business, share profits

Trusts

- Nature of the Business
 - Trusts are used to separate *ownership* from *control*
 - Controlled by a trustee in accordance with trust documents for the benefit of the named beneficiary(ies)
 - Invest in both debt and shares of one company in order to function as a pass-through entity
 - Net cash flows from the business operations of the company pass through the trust without taxation
- Purpose of the Structure
 - To minimize income tax payable on the cash flows generated by the underlying business so that more cash flow passes to the trust's unit holders than through a traditional common stock investment
- Formality
 - Established through a formal trust agreement naming trustee and beneficiary(ies)
- Status
 - On October 31, 2006 the Minister of Finance (Jim Flaherty) announced any newly established Income and Royalty Trusts would be taxed as corporations and that previously-established trusts would be taxed starting in 2011
- Advantages
 - Funds flowing through the trust are not subject to income tax
 - Separates ownership and control
- Disadvantages
 - Governance structure may only be appropriate for well established firms with little further needs for capital investment
- Examples
 - Open-ended mutual funds organized as unit trusts
 - Many corporations have restructured themselves as income and royalty trusts

Corporations

- Nature of the Business
 - A separate legal entity (person) under the law that can be incorporated under provincial or federal legislation
 - Governed by a Board of Directors (BOD) elected by shareholders, managed by professional managers and owned by shareholders
- Financing
 - Highly flexible and long-term including issuing stocks, bonds and other hybrid securities to raise capital
- Formality
 - Articles of Incorporation, and corporate bylaws and practices are governed by corporate and securities law
- Advantages

- No limit to how long an enterprise can operate, so it can issue securities with very long terms to maturity
- Potential to attract large amount of financing by expanding its base of shareholders
- Potential to attract well qualified people to its BOD and to use their expertise to advance the firm's interests
- Has the potential to hire professional managers to build value
- Disadvantages
 - Formality and structure may slow the speed of organizational response
 - Canadian tax law double-taxes dividends: dividends paid to shareholders are taxed first as income of the corporation and then again as personal income of the shareholder

Corporate Governance and Agency Costs

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Corporate Governance

- Shareholders, as owners of the corporation, have residual claims to profits and assets and voting rights
- Shareholders vote to:
 - Elect a Board of Directors
 - Adopt financial statements
 - Approve the auditors for the coming year
- The Board of Directors and Management are responsible for the day-to-day operation of the corporation in accordance with standards set out in the *Canada Business Corporations Act*

Separation of Ownership and Management

- Professional managers and directors manage the corporation and are the *agents* of the shareholders who are the *principal owners*
- It is possible for agents (management) to pursue their own goals at the expense of the principal (shareholders)
- The fact that owners (shareholders) have limited access to information about the company they own, and the managers and the board of directors hold superior information, creates further potential for conflict
- Corporate law anticipates the potential for *principal-agent conflict* and imposes responsibilities and reporting controls on management to reduce the probability of such conflicts
- Management (the agent) has more information about the company than shareholders (the principal), which establishes an information asymmetry

Information Asymmetry

- To reduce the potential for conflict arising out of information asymmetry, corporate and securities law requires regular release of information about corporate performance and the right to require approval from shareholders for major changes in the corporation, including:
 - Annual shareholder meetings with proper notice
 - Audited financial statements
 - Shareholder approval of audits for the coming year
 - Shareholder approval for changes to bylaws and articles of incorporation

Goals of the Corporation

- Professional managers of corporations face pressures and have responsibilities to many different stakeholders
- Profit maximization* is an inadequate goal to guide officers and directors of the corporation
 - It fails to consider the risks undertaken by the firm to pursue profit (managers may not be there to reap benefits of long-term benefits)
 - It focuses on accounting profit (numbers can be manipulated to show more profits in the short term)
 - Its focus on one year's accounting profit can potentially be at the expense of long-term interests of the shareholders
- Shareholder wealth maximization* is considered to most appropriate goal to guide the corporation's directors and officers
 - Its focus is on genuine economic profit
 - It reflects the value of all economic profits of the corporation now and into the future
 - It takes into account the timing, magnitude and riskiness of all prospective (future) cash flows and the corporation's capital investment is expected to generate
 - The agents (management) of the corporation must:
 - Operate legally and in compliance with contractual responsibilities
 - Act in the interest of the principals (shareholders) by creating value for them

Summary

- Managers work on behalf of shareholders in an **agency relationship**
- Agency problems** can arise due to the potential divergence of interest between managers, shareholders and creditors

Agency Relationships and Agency Costs

- Direct Agency Costs** result from management making decisions that do not maximize shareholder value
 - Example: managers avoiding high-risk projects to avoid looking bad if it fails, spending money on personal perks
- Indirect Agency Costs** are incurred by the firm in the attempt to avoid *agency costs*
 - Examples: compensation schemes that attempt to align the interest of managers and shareholders (such as stock options), reporting requirements placed on management, etc.
- Managers and shareholders may have differing goals, attitudes towards risk, and differential access to information about the firm, all of which can lead to disagreement
- Executive Compensation**
 - Compensation is tied to performance measures in an effort to align management and shareholder interests
 - Performance-based compensation schemes are not always effective in achieving the goal of aligning interests and have led to concerns about excessive management compensation
 - Executive stock options, for example, magnify returns to management when the stock price rises regardless of whether the rise is attributable to managerial performance, but don't expose management to the losses shareholders will endure if the stock price falls

Corporate finance involves the **financial management** of a corporation's assets and **corporate financing decisions**

Financial Management of Assets

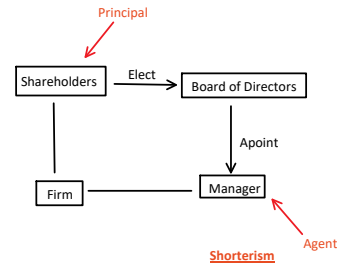
- Capital budgeting decisions*, including the analysis of asset investment, acquisition and replacement proposals
- Credit (accounts receivable) policy
- Cash management
- Capital budgeting = investment decisions

Corporate Financing Decisions

- Managing capital structure: the ratio of debt and equity
- Raising new equity capital either through profit retention or new share issues
- Dividend policy
- Borrowing decisions and liability management
- Capital structure = financing decisions
- Dividend policy payout decision = how much of profit to give to shareholders (as dividends or share buy-backs)

Finance Careers

- Non-Financial Firms
 - CFO / SVP of Finance
 - Treasurer
 - A pure finance role with responsibilities including: forecasting, financial management, capital budgeting, cash management, credit management, financing and risk management
 - Controller
 - A role that combines finance and accounting with responsibilities including: compliance, tax management, systems, internal audit, accounting and budgeting
- Financial Firms
 - Analysts
 - Associates
 - Managers
 - Account managers
 - Banking associates
 - Portfolio managers
 - Financial and Investment analysts
 - Etc.



- Suppression of ownership from control
- Controlled by managers
 - Owned by shareholders



Summary of Learning Objectives

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Define finance and explain what is involved in the study of finance

- Finance is the study of how and under what terms savings (money) are allocated between lenders and borrowers

List the major financial and real assets held by Canadians

- The four major sectors of the economy are government, business, households, and non-residents.
- On an aggregate level, the first three sectors are real assets
- Households own positive net financial assets which include mortgages and consumer loans

- Explain how money is transferred from lenders to borrowers and the role played by market and financial intermediaries
 - Money is transferred from lenders to borrowers through the following three channels
 - Financial intermediaries
 - Market intermediaries
 - Non-market transactions

Identify the basic types of financial instruments that are available and explain how they are traded

- The major types of financial instruments are debt and equity
 - Debt instruments are loans
 - Equity instruments involve ownership
- Financial markets are divided into two divisions, primary and secondary. (secondary can be auction or dealer)

Forms of Business Organizations

- Four main forms of business organizations
 - Sole proprietorship: a business owned and operated by one person
 - Partnership: a business owned and operated by two or more people
 - Trust: a legal organization in which assets are owned by one party and managed or controlled by a different party
 - Corporation: a business organized as a separate legal entity under corporate law, with ownership divided into transferable shares

Describe the goals of the firm

- Corporations are owned by the shareholders but managed by executives. Link between groups is the BOD
- The primary goal of the organization is to maximize the shareholder value. The BOD has a fiduciary responsibility to represent the best interest of the shareholders

Agency Costs

- Agency costs are the costs associated with the agency problem
- There are two major types of agency costs
 - Direct costs, which arise from suboptimal decisions from managers
 - Indirect costs, costs made in attempt to avoid direct agency costs

Aligning the interests of management and the interests of the shareholders

- Management's personal interest and compensation may determine how hard it works to serve the best interests of the shareholders. It is important to align the interests of management with the interests of shareholders in order to maximize the shareholders' value

Main corporate finance decisions

- Financial managers in corporations make both short-term working capital decisions and long-term capital budgeting decisions
 - Both short and long-term decisions have implications for the capital needs of the company

Framework for Financial Analysis

January 14, 2019 5:42 PM

Stakeholders of the firm:

- Employees
- Customers
- Suppliers
- Government
- Shareholders
 - Current shareholders
 - Potential shareholders

Consistent Financial Analysis

- Financial statement analysis studies, absolute numbers, comparative statements and ratios to:
 - Ascertain trends in the financial statements
 - Identify areas of strength and concern
- Consistent financial analysis across companies, industries and countries is important
- Analysts must understand the challenges to comparability and attempt to ascertain the financial health of the organizations they study, understanding the limitations inherent in financial accounting practice
- **Intra-Company Comparisons**
 - GAAP provides considerable latitude for the company
 - Once a firm chooses an acceptable accounting treatment for revenue recognition, capitalization of expenses, inventory valuation, etc. then the firm must use these same provisions year after year
 - Any change in accounting principles must be noted in the notes to the financial statements and prior years restated to ensure there is a common basis of comparison to the present
 - Therefore, internal comparisons, year-over-year, are possible and supported by GAAP

• ROE is one of the most commonly references ratios: it measures the return earned by the equity holders on their investment in the company. It is calculated as the new income (NI) divided by shareholders' equity (SE)

- Next step in financial analysis is to understand where ROE came from
- The DuPont System gives a framework for the analysis of financial statements through the decomposition of the ROE ratio as shown in figure

• ROE is not a pure ratio because it involves dividing an income statement item (a flow) by a balance sheet (or stock) item

$$ROE = \frac{\text{Net Income}}{\text{Shareholders' Equity}} = \frac{NI}{SE} = \left(\frac{NI}{\text{Sales}} \times \frac{\text{Sales}}{TA} \right) \times \frac{TA}{SE}$$

• Instead of using ending shareholders' equity, many argue that average shareholders' equity over the period should be used because shareholders' equity changes over the year as income ins earned and as retained earnings grow

• Return on assets (ROA) shows the ratio of income to assets used to produce the income, and it can be further decomposed as the product of the net profit margin and sales to total assets ratio:

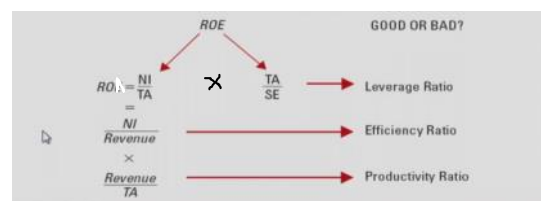
$$ROA = \frac{NI}{TA} = \frac{NI}{\text{Sales}} \times \frac{\text{Sales}}{TA}$$

• Multiplying ROA by leverage (TI / SE), we obtain ROE

• The DuPont system provides a good starting point for any financial analysis because:

- It shows that financial strength comes from many sources: profitability, asset utilization and leverage
- It reinforces the concept that good financial analysis requires looking at each ratio in the context of the others
- It shows that it is important to look at a sample of ratios from each major category to identify areas of strength and weakness

• **COVER EXAMPLE IN SLIDES**



Analysis of Leverage and Efficiency

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Leverage Ratio

- Financial leverage occurs when a firm uses sources of financing that carry a fixed cost, such as long-term debt, and uses this to generate greater returns to shareholders
- Leverage means magnification of both profits and losses
- Leverage ratios include
 - Debt ratio
 - Debt-equity ratio
 - Times interest earned
 - Cash flow to debt
- The debt ratio is a stock ratio that indicates the proportion of total assets financed by debt as at the balance sheet date; $\text{Debt Ratio} = \text{Total Liabilities} / \text{Total Assets}$
- The debt-equity (D/E) ratio is a stock ratio that indicates the proportion that total debt represents in relationship to the shareholders' equity (both common stock and retained earnings) at the balance sheet date;
 $\text{D/E ratio} = \text{Total Debt} / \text{Shareholders' Equity}$
- The times interest earning (TIE) ratio is an income statement (flow) ratio that indicates the number of times the firm's pre-tax income (EBIT, earnings before tax & interest) exceeds its fixed financial obligations to its lenders, as in; $\text{TIE} = \text{EBIT} / \text{Interest Expense}$

Efficiency Ratios

- Efficiency ratios measure how efficiently a dollar of sales is turned into profits; these include:
 - Degree of total leverage
 - Break-even point
 - Gross profit margin
 - Operating margin
- Efficiency ratios give insight into a firm's cost structure and can help analysts determine if problems exist with either variable or fixed costs or both
- DTL is an income statement ratio that measures the exposure of profits to changes in sales;
 $\text{DTL} = \text{Contribution Margin} / \text{Earnings before taxes} = \text{CM}/\text{EBT}$
- The greater the DTL the greater the leverage effect
- The break-even point estimates the unit volume that must be produced and sold in order for the firm to cover all costs, both fixed and variable; $\text{BEP} = \text{Fixed Costs} / \text{Contribution Margin}$
- The break even point tends to increase as the use of fixed costs increases
- Gross profit margin demonstrates the proportion of sales that are available to cover fixed (period) costs and financing expenses after variable costs have been paid; $\text{GPM} = (\text{Sales} - \text{COGS}) / \text{Sales}$
- A declining GPM raises concerns about the firm's ability to control variable costs, such as direct materials and labour
- The operating margin measures the cumulative effect of both variable and period costs on the ability of the firm to turn sales into operating profits to cover interest, taxes, depreciation and amortization (EBITDA);
 $\text{OM} = \text{Net Operating Income} / \text{Sales}$

Analysis of Productivity and Liquidity

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Productivity Ratios

- Measure the firm's ability to generate sales from its assets
 - Receivables turnover
 - Average collection period (ACP)
 - Inventory turnover
 - Average days revenue in inventory (ADRI)
 - Fixed asset turnover
- Excessive investment in assets with little or no increase in sales reduces the rate of return on both assets (ROA) and equity (ROE)
- **Receivable turnover** measures the sales generated by every dollar of receivables
- $Receivables\ turnover = \frac{Sales}{AR}$
- **Average collection period (ACP)** estimates the number of days it takes for a firm to collect on its account receivables
- $ACP = \frac{AR}{Average\ Daily\ Credit\ Sales} = \frac{365}{Receivables\ Turnover}$
- **Inventory turnover** measures the number of times ending inventory was "turned over" or sold during the year
- $Inventory\ Turnover = \frac{COGS}{Inventory} OR \frac{Revenues}{Inventory}$
- **Average Days Sales in Inventory (ADSI)** estimates the number of days of sales tied up in inventory, based on ending inventory values (want to be low)
- $ADSI = \frac{Inventory}{Average\ Daily\ Sales} = \frac{365}{Inventory\ Turnover}$
- **Fixed asset turnover** estimates the number of dollars of sales produced by each dollar of net fixed assets (want to be high, means managers are using assets to generate more sales)
- $Fixed\ Asset\ Turnover = \frac{Revenues}{Net\ Fixed\ Assets}$

Liquidity Ratios

- Measure the ability of the firm to meet its financial obligations as they mature using liquid resources, including
 - Working capital
 - Current
 - Quick (acid test)
- The **working capital ratio** measures the proportion of total assets invested in current assets
- $Working\ Capital = \frac{Current\ Assets}{Total\ Assets}$
- The **current ratio** measures the number of dollars of current assets for each dollar of current liabilities (better than WCR since we are using current assets and current liabilities, not including long-term. Rule-of-thumb is that this ratio should be around 2.0)
- $Current\ ratio = \frac{Current\ Assets}{Current\ Liabilities}$
- The **quick ratio or acid test ratio** recognized that inventories and other current assets may be less liquid
- Therefore the quick ratio gives a clearer indication of the firm's ability to meet its maturing financial obligations out of very liquid current assets
- Rule-of-thumb: 1 - good if above (is meeting debt expectations)

- $Quick\ ratio = \frac{Cash + Marketable\ Securities + Accounts\ Receivable}{Current\ Liabilities}$

- **Estimating Net Realizable Value**

- When firms are financially strained and no longer a going concern, book values become less valid
- Instead, net liquidation values can be estimated by discounting asset values based on their degree of liquidity
- Liquid assets are valued at close to or the same as book value
- Liabilities are stated in nominal terms, because it takes those dollars to satisfy debt obligations
- Preferred stock value is based on residual values, if any residual remains after liquidation

Valuation Ratios

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Valuation Ratios

- Used to assess how the market is valuing the firm (ie. It's share price) in relation to its assets, earnings, profits and dividends. These include:
 - Equity book value per share (BVPS)
 - **Dividend yield**
 - **Dividend payout**
 - **Trailing Price-Earnings (P/E)**
 - **Forward P/E**
 - **Market-to-book**
 - Earnings before interest, taxes, depreciation and amortization (EBITDA) multiple
- **Book value per share (BVPS)** expresses shareholders' equity on a per share basis
- $$BVPS = \frac{SE}{\# \text{ of Shares}}$$
- **Dividend yield** expresses the dividend payout as a proportion of the current share price
- $$\text{Dividend yield} = \frac{\text{Dividend Per Share}}{\text{Price per Share}}$$
- The dividend yield can be compared to the yield on other investment instruments, such as bonds or the stocks of other dividend-paying companies
- **The P/E ratio (also called trailing P/E)** is an earnings multiple based on the most recent earnings
- The P/E ratio is often used to estimate the value of a stock
 - Example: A stock trading at a P/E multiple of 10 will take 10 years at current earnings to recover it's price
- If P/E is based on estimated earnings, we have forward-looking P/E, looking at current P/E is trailing P/E
- $$P/E = \frac{\text{Share Price}}{\text{Earnings Per Share}}$$
- **The forward P/E ratio** is an earnings multiple based on forecast earnings per share and is often used to estimate the value of a stock for companies with rapid growth in EPS
- Low P/E shares are regarded as value stocks
- High P/E shares are regarded as growth stocks
- $$\text{Forward P/E} = \frac{\text{Share Price}}{\text{Estimated Earnings Per Share}}$$
- **The market-to-book ratio** estimates the dollar of share price per dollar of book value per share (estimates growth)
- Given historical cost accounting as the basis for BVPS, the degree to which market value per share exceeds BVPS indicates the value that has been added to the company by management
- $$\text{Market to book} = \frac{\text{Share Price}}{BVPS}$$
- **The EBITDA multiple** expresses total enterprise value (TEV) for each dollar of operating income, or earnings before interest, taxes, depreciation and amortization (EBITDA)
- Total enterprise value is an estimate of the market value of the firm (ie. The market value of both it's equity and debt)
- $$EBITDA \text{ Multiple} = \frac{TEV}{EBITDA}$$

Summary of Learning Objectives

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Issues to consider in applying consistent financial analysis

- There are generally **no accepted financial ratios**. Thus, it is always important, when looking at ratios generated by another party, to examine how they are calculated. Even some of the most basic ratios can vary between corporations, even when input data is the same

ROE as a key financial ratio used to assess a firms' performance

- The return on equity ROE ratio is an accounting measure of the return on the owners' investment. It is a very important ratio for financial analysts as it measures **overall profitability from the owners' (shareholders') perspective**

Evaluation of the key ratios relating to financial leverage

- Leverage ratios measure the **amount of borrowing** that a company has done (debt), and the ability of the company to **pay interest and repay principal** on its debts

Evaluation of the key ratios relating to financial efficiency

- Efficiency ratios measure **margins and profitability**

Evaluation of key ratios relating to financial productivity

- Productivity ratios measure how **efficiently a company uses its assets** - that is, how much revenue it gets out of its assets

Evaluation of key ratios relating to financial liquidity

- Liquidity ratios reflect net working capital - the amount of **short-term assets relative to the amount of short-term liabilities**. Liquidity ratios are of particular interest to short-term lenders, who use short-term assets as collateral

Evaluation of key ratios relating to the valuation of a company

- Valuation ratios provide insight into whether **stock prices are overvalued or undervalued**
- Financial statement analysis studies, absolute numbers, comparative statements and ratios to:
 - Ascertain trends in the financial statements
 - Identify areas of strength and concern

Time Value of Money

January 26, 2019 8:10 PM

Opportunity Cost

- Money has a time value because it can be invested today and be worth more tomorrow
- The **opportunity cost of money is the interest rate that would be earned by investing it**
- Required rate of return (k) is also known as a discount rate
- To make time value of money decisions, you will need to identify the relevant discount rate you should use

Simple Interest

- Simple interest is interest paid or received only on the initial investment (principal)
- The same amount of interest is earned in each year
 - Value(time n) = $P + (n \cdot P \cdot k)$
 - P = principal
 - n = number of periods
- Notice that $P \cdot k$ = interest

Compound Interest

- Compound interest is interest that is earned on the principal amount *and* on the future interest payments
- The future value of a single cash flow at any time 'n' is calculated using
 - $FV_n = PV_0(1 + k)^n$

Compound vs Simple Interest

- Simple interest grows principal linearly
- Compound interest grows principal exponentially

Future Value Interest Factor (FVIF)

- A term that represents the future value of an investment at a given rate of interest and for a stated number of periods
 - $FVIF_{n=?,k=?} = (1 + k)^n$
- The FVIF for the next 10 years at 8% would be
 - $FVIF_{n=10,k=0.08} = (1 + 0.08)^{10} = 2.1589$
- \$100 invested for 10 years at 8% would be
 - $FV_{10} = \$100 \cdot (1 + 0.08)^{10} = \$100 \cdot 2.1589 = \$215.89$

Computing Present Values (discounting)

- The inverse of compounding is known as discounting
- You can find the present value of any future single cash flow using

$$\text{○ } PV_0 = \frac{FV_n}{(1 + k)^n}$$

Present Value Interest Factor

- PVIF is the inverse of FVIF
 - $PVIF_{n=?,k=?} = \frac{1}{(1 + k)^n}$
- This means that the greater the discount rate, the greater the FVIF and vice-versa
- Also, discount factors are always less than one as long as discount rates are positive ($k > 0$)
 - This means that future dollars are usually worth less than the same dollars today

Estimating Holding Period and Discount Rates

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Section is just practice questions

Annuities

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Annuities and Perpetuities

- An annuity is a finite series of equal and periodic cash flows
- A perpetuity is an infinite series of equal and periodic cash flows'

Annuities and Annuities Due

- An ordinary annuity offers payments at the end of each period'
- An annuity due offers payments at the beginning of each period (ie. rent, insurance)

Annuity Formula

- The formula for the **future sum** of an **ordinary annuity** is

$$\circ FV_n = PMT \left(\frac{(1+k)^n - 1}{k} \right)$$

Annuity Due Formula

- The formula for the **future sum** of an **annuity due** is

$$\circ FV_n = PMT \left(\frac{(1+k)^n - 1}{k} \right) (1+k)$$

Present Value of an Annuity Formula

- The formula for the present value of an annuity is

$$\circ PV_0 = PMT \left(\frac{1 - \frac{1}{(1+k)^n}}{k} \right)$$

Present Value of an Annuity Due Formula

- The formula for the present value of an annuity due is

$$\circ PV_0 = PMT \left(\frac{1 - \frac{1}{(1+k)^n}}{k} \right) (1+k)$$

Perpetuities, Growing Perpetuities and Growing Annuities

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Formula for the Present Value of a Perpetuity

- A perpetuity is an infinite series of equal and periodic cash flows
- $PV_0 = \frac{PMT}{k}$

Growing Annuities and Perpetuities

- A growing perpetuity is an infinite series of periodic cash flows where each cash flow grows larger at a constant rate
- The present value of a growing perpetuity is found by

$$\circ PV_0 = \frac{PMT_0(1+g)}{k-g} = \frac{PMT_1}{k-g}$$

Growing Annuities

- An annuity is a finite series of periodic cash flows where each subsequent cash flow is greater than the previous by a constant growth rate
- The formula for a growing annuity is

$$\circ PV_0 = \frac{PMT}{k-g} \cdot \left(1 - \left(\frac{1+g}{1+k}\right)^n\right)$$

Effective Annual Rates and Determination of Mortgage Amounts

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Quoted vs Effective Rates

- A **nominal rate** of interest is a 'stated rate' or **quoted rate (QR)**
- An **effective annual rate (EAR)** rate takes into account the frequency of compounding (**m**)
- $EAR = k = \left(1 + \frac{QR}{m}\right)^m - 1$

Loan or Mortgage Payments

- A **mortgage loan** is a borrowing arrangement where the principal amount of the loan borrowed is typically repaid (**amortized**) over a given period of time making equal and periodic payments
- A blended payment is one where both interest and principal are retired in each payment

Summary of Learning Objectives

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Important of the time value of money

- Time value of money is the idea that money invested today has more value than the same amount invested later. This concept helps us to understand how interest is earned and why investors are indifferent to investment today and future value later

Simple interest and explain how it works

- Simple interest is interest earned on the original principal
- The growth in value of an investment is simply the sum of the annual interest earned

Compound interest and explain how it works

- Compound interest is interest earned on the principal amount invested and on any accrued interest
- Compound interest can result in dramatic growth in the value of an investment over time

Ordinary annuity and an annuity due date, and perpetuities

- Annuities are streams of identical payments made at regular time intervals
- An ordinary annuity has payments at the end of each period
- An annuity due has the same number of payments as an ordinary annuity, but the payments occur at the beginning of each period
- Perpetuities are streams of identical payments made at regular time intervals, forever

Determine the present value of growing perpetuities and annuities

Quoted rates and effective rates

- Quoted rates are also called stated rates or annual percentage rates, which are measured annually and used for quoting purposes
- The effective rate for a period is the rate at which a dollar invested grows over that period

Annuity and valuing loans and mortgages

- Loans can be valued as annuities since they meet the three characteristics of an annuity: they have equal payments, are for a fixed period of time, and are based on the same discount rate.

Bond Features

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The Basic Structure of Bonds

- In the broadest sense, a bond is any debt instrument that promises a fixed income stream to the holder
- Bonds usually have the following characteristics:
 - A **fixed face or par value**, paid to the holder at maturity
 - A **fixed coupon**, which specifies the interest payable over the life of the bond
 - A fixed maturity date
- Fixed income securities are often classified according to maturity:
 - Bills or paper have maturities less than one year
 - Notes have maturities between one and seven years
 - Bonds have maturities greater than seven years
- Bonds may be either bearer bonds or registered bonds
- The market price of a bond is the present value of the payments promised by the bond

Bond Indenture

- The bond indenture is the contract between issuer and holder, which specifies:
 - Details regarding payment terms
 - Collateral
 - Positive or negative comments
 - Par value or face value (usually in increments of \$1,000)
 - Bond pricing, usually shown as the price per \$100 of face value, which is equal to a percentage of the bond's face value

Term to Maturity

- Term to maturity is the time remaining to the maturity date
- Coupon rate is the annual percentage interest paid on the bond's face value
 - Multiply the coupon rate by the bond's face value to calculate, and divide by two if the coupon is paid semi-annually
 - Example: A \$1,000 bond with an 8% coupon rate will have an \$80 annual coupon or a \$40 semi-annual coupon

Security and Protective Provisions

- Mortgage bonds are secured by real assets
- Debentures are either unsecured or secured with a floating charge over the firm's assets
- Collateral trust bonds are secured by pledged financial assets, such as common stock, other bonds or Treasury bills
- Equipment trust certificates are secured by pledged equipment, such as railway rolling stock

Covenants

- Covenants are another type of protective provision
 - Positive covenants specify actions the firm agrees to do, such as supply periodic financial statements and maintain certain ratios
 - Negative covenants specify actions the firm agrees to avoid, such as restrictions on the size of its debt or acquiring or disposing of assets

Bond Features

- Call features allow the issuer to redeem or pay off the bond prior to maturity, usually at a premium
- Retractable bonds allow the holder to extend the bonds back to the issuer before maturity
- Extendible bonds allow the holder to extend the bond's maturity
- Sinking funds are funds set aside by the issuer to ensure the firm is able to redeem the bond at

maturity

- Convertible bonds can be converted into common stock at a pre-determined conversion price

Bond Valuation

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Bond Valuation

- The following function shows the price of a bond is a function of:
 - F -> Face value
 - n -> Term to maturity
 - I -> Interest or coupon payment
 - k_b -> discount rate (investor's required ROR)
- $$B = \frac{I}{k_b} \left(1 - \frac{1}{(1 + k_b)^n} \right) + \frac{F}{(1 + k_b)^n}$$

Annual Coupons

- Example: The market price of a 5% annual coupon-paying Eurobond with 10 years to maturity, a face value of \$1,000 and a yield-to-maturity of 6% is \$926.40
- Solution using a TI BAII+ calculator:
 - (CLRTVM)
 - 1000 (FV)
 - 50 (PMT)
 - 10 (N)
 - 6 (I/Y)
 - (CPT) (PV)

Factors Affecting Bond Prices

- Interest rates are inversely related to bond prices (bond price increases when interest decreases)
- The relationship between the coupon rate and the bond's yield to maturity (YTM) determines if the bond will sell at a premium, a discount or at par

Coupon vs YTM	Price vs Face Value	Pricing
Coupon Rate < YTM	Price < Face Value	Discount
Coupon Rate = YTM	Price = Face Value	At Par
Coupon Rate > YTM	Price > Face Value	Premium

Semiannual Coupons

- Example: find the price of a 4% semi-annual coupon Government of Canada bond has five years to maturity, \$1,000 in face value and a YTM of 6%
- Solution using a BAII+ calculator:
 - (CLRTVM)
 - 1000 (FV)
 - 20 (PMT)
 - 3 (I/Y)
 - 10 (N)
 - (CPT) (PV)
 - = \$914.70

Determinants of Bond Prices and Yields

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Factors Affecting Bond Price Volatility

- Yield to maturity, time to maturity and size of coupon affect the price volatility of a bond
- Yield to Maturity
 - Bond prices increase when the YTM decreases
 - Bond prices decrease when the YTM increases
 - The price-YTM relationship is convex to the origin
 - Because of convexity, the price rise due to a fall in YTM is greater than the price decline due to a rise in YTM given an identical change in YTM
 - For a given change in YTM, bond prices will change more when interest rates are low than when they are high
- Time to Maturity
 - Long-maturity bonds have greater price volatility than short-maturity bonds
 - The longer the bond, the longer the period for which the cash flows are fixed
- Size of Coupon
 - Low coupon bonds have greater price volatility than high coupon bonds
 - High coupon bonds act like a stabilizing device, since a greater proportion of the bond's total cash flows occur closer to today and are therefore their present value is less affected by a change in YTM

Interest Rate Risk and Duration

- The sensitivity of a bond's price to change in interest rates is a measure of the bond's interest rate risk. Interest rate risk is affected by: YTM, TTM and size of coupon
- The impact of interest rate risk is measured using duration

Duration and Bond Quotations

- Duration measures interest rate risk as a change in price for a given change in interest rates
- For example, the price of a bond with a duration of 10 would be expected to increase ~10% if interest rates fell 1%
- The higher a bond's duration, the more sensitive its price is to changes in interest rates
- A bond's duration will be higher if it's
 - YTM is lower
 - Term to maturity is longer
 - Coupon is lower

Bond Quotations

- Bond quotations
 - Example: This quotation shows the issuer, the associated coupon rate, the date the bond matures, the previous day closing price and the associated yield

<u>Issuer</u>	<u>Coupon</u>	<u>Effective Maturity</u>	<u>Price</u>	<u>Yield</u>
Canada	2.75%	2022-Jun-01	\$109.29	1.36%

Cash vs Quoted Prices

- The quoted price is the price reported by the media
- The cash price is the price paid by an investor, and includes both the quoted price plus any interest that has accrued since the last coupon payment date
- Example: Suppose you want to purchase a \$1,000 bond with a 5% coupon, paid semi-annually. Today is July 15th and the last coupon was paid on June 30th. If the quoted price is \$902, how much is the cash price?
- Solution: $902 + (1000 \cdot 5\%) \cdot \left(\frac{15}{365}\right) = \904.25

Bond Yields

- The YTM is the discount rate used for bond valuation
- YTM is the yield an investor would earn if
 - She purchases the bond at the current market price
 - She holds the bond to maturity
 - She reinvests all of the coupons paid by the bond at the YTM
- YTM is, therefore, the bond's internal rate of return (IRR)
- YTM is also the discount rate that causes the present value of the bond's future cash flows to equal its current price
- $$B = \frac{I}{YTM} \left(1 - \frac{1}{(1 + YTM)^n} \right) + \frac{F}{(1 + YTM)^n}$$

Determining YTM

- There is no closed-form algebraic solution to the following equation for YTM, so we must use a computer or calculator to solve YTM
- Example: What is the YTM on a 6% semi-annual coupon bond with 20 years to maturity that is selling for \$1,030?
- Solution (using TI BAII+ calculator):
 - (CLRTVM)
 - 30 (PMT)
 - -1,030 (PV)
 - 1,000 (FV)
 - 40 (N)
 - (CPT) (I/Y)
- Note that for the calculator, always enter PV (price) as a negative number since it is a cash outflow to purchase the bond, and the principal payments and coupons as positives since they're inflows

Current Yield

- A bond's current yield (CY) is the yield on the bond's current market price provided by the annual coupon
- Since current yield does not consider potential capital gains or losses, it's not a true measure of return to the bondholder
- Example: what is the current yield of a 5.5% coupon bond with a current market price of \$1,050
- $$CY = \frac{\text{Annual Interest}}{B} = \frac{\$55}{\$1,050} = 5.24\%$$

Interest Rate Determinants

- Interest is the "price" of borrowed money
- Interest is measured in basis points, or 1/100th of 1% (250 basis points is 2.5%)
- Interest rates rise when the demand for loanable funds rise
- Interest rates fall when the demand for loanable funds falls
- The risk-free interest rate
 - The risk-free interest rate is an abstract concept, and usually the yield on short-term government treasury bills is used as a proxy for practical purposes
 - The risk-free rate is comprised of two components
 - The real rate, which is compensation for deferring consumption
 - The expected inflation rate, which is compensation for the expected loss of purchasing power over the term of the short-term T-bill

Global Influences on Interest Rates

- Canadian interest rates are heavily influenced by changes in interest rates in other countries
- Macroeconomic factors, both domestic and global also play an important role
- Interest rate parity theory (IRP) states that foreign exchange forward rates will be established that equalize the yield an investor can earn, whether investing domestically or in a foreign

jurisdiction

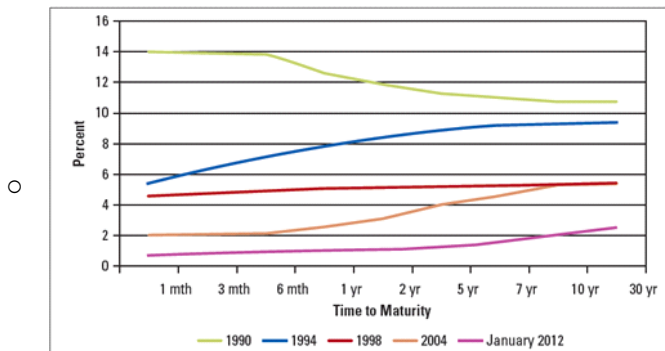
- Example: a country with both high inflation and high interest rates will have a depreciating currency

Term Structure of Interest Rate

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Interest Rate Term Structure

- The relationship between interest rates and the term to maturity on underlying debt instruments is referred to as the term structure of interest rates
- The term structure of interest rates is the set of rates (YTM) for all maturities of a given risk-class of debt securities (ie. Government of Canada bonds) at a given point in time
- When plotted on a graph the result is called a yield curve
- There are three typical shapes for the yield curve:
 - Upward sloping / normal (1994)
 - Downward sloping / inverted (1990)
 - Flat (1998)



Three Theories of The Term Structure

- Liquidity preference theory posits that investors must be paid a liquidity premium in order to be compensated for the interest rate risk inherent in holding less liquid, long-term debt
- Expectations theory suggests that longer-term interest rates are the result of expectations of future short-term interest rates. Or, on other words, the interest rates of various maturities are dependent on each other
- Market segmentation theory suggests that different markets exist for securities of different maturities that therefore the two ends of the yield curve can have different factors affecting them

Risk Premiums and Yield Spreads

- More risky bonds (ie. BBB-rated corporate bonds) will have their own yield curve and it will plot at higher YTM at every maturity than government bonds because of the additional default risk that BBBs carry
- The yield spread is the difference between the YTM on a BBB-rated corporate bond and a Government of Canada bond of the same maturity and it represents the default risk premium investors demand for investing in the more risky corporate bond
- Yield spreads widen during recessions and narrow during times of economic expansion
- The following equation can be used to determine the YTM on a corporate bond
 - $k_b = RF \pm \text{Maturity yield differential} + \text{Spread}$
 - RF is the risk-free rate
 - The maturity yield differential is the extra yield required for taking on a longer maturity
 - The spread is the additional yield required for default risk

Debt Ratings

- Rating agencies, such as the Dominion Bond Rating Service (DBRS), Standard & Poors (S&P), and Moody's assign all publicly traded bonds a risk rating

S&P and DBRS	Moody's	Description		
AAA	Aaa	highest credit quality	} High quality	} Investment grade
AA	Aa	very good quality		
A	A	good quality	} Medium grade	
BBB	Baa	medium quality		
BB	Ba	lower medium quality	} Non-investment grade	
B	B	poor quality		
CCC	Caa	speculative quality		
CC	Ca	very speculative quality	} In default	
D	C	default		
Suspended		rating suspended		

Source: Standard & Poor's, www.standardandpoors.com; DBRS, www.dbrs.com; Moody's: www.moody's.com

Risk, Liquidity, and Bond Features Determine YTM

- The greater the default risk, the higher the required YTM
- The less liquid the bond, the higher the required YTM
- Call features generally increase the required YTM
- Extendable bonds generally have lower required YTM
- Retractable bonds generally have lower required YTM

Other Types of Debt Instruments

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Treasury Bills

- Treasury bills are short-term obligations of the government with an initial term to maturity of one year or less
- Issued at a discount to face value with face value being paid at maturity
- The difference between the discounted issue price and the face value is treated as interest income
- The following equation can be used to value a treasury bill:
 - $$P_{T-bill} = \frac{F}{1 + k_{BEY} \left(\frac{n}{365} \right)}$$
 - P - the market price of the T-bill
 - F - the face value of the T-bill
 - k_{BEY} - the bond equivalent yield
 - n - the number of days until maturity
- Example: What is the price of a \$1 million Canadian treasury bill with 80 days until maturity and a bond equivalent yield of 4.5%?
- Solution: $\frac{1,000,000}{1 + 0.045 \left(\frac{80}{365} \right)} = \$990,233.32$

Zero Coupon Bonds

- Zero coupon bonds are bonds issued at a discount which pay no coupons and mature at par or face value
- Since no coupons are paid, there is no investment at risk
- The following equation can be used to get the price of a zero-coupon bond:
 - $$B = \frac{F}{(1 + k_b)^n}$$
- Example: What is the market price of a \$50,000 zero coupon bond with 25 years to maturity that is currently yielding 6%?
- Solution: \$11,649.93

Floating Rate, and Csboreal Return

- Floating rate bonds have coupon rates that float with some reference rate, such as the yield on Treasury bills
 - Since the coupon rate floats, or is variable the market price with typically be close to the bond's face value
- Real return bonds are issued by the Government of Canada to protect investors against unexpected inflation
 - Each period, the face value of the real return bond is grossed up by the inflation rate. The coupon is then paid on the grossed up face value

Canada Savings Bonds

- Canada Savings Bonds (CSBs) are issued by the Government of Canada as either regular interest bonds (interest paid annually) or compound interest bonds (interest compounds over the life of the bond)
 - There is no secondary market for CSBs; instead they are redeemable at any chartered bank in Canada at their face value