**Bond Valuation and Interest Rates**

**Learning Outcomes**

After completing this module, students will be able to:

1. Calculate the value of a bond and its yield to maturity.
2. Describe the different types of bonds, bond features, credit rating systems, and the operation of the bond market.
3. Discuss the components of an interest rate including the real risk-free rate, inflation, interest rate risk, reinvestment risk, and other types of risk premiums.
4. Explain why a yield curve can be upward sloping, flat, or inverted and how it can be used to forecast an economic downturn.
5. Forecast forward interest rates using spot rates from the yield curve.

**Introduction**

Valuing a bond is like valuing a share except the cash flows are not dividends but the interest payments and return of principal at the end of the bond’s life. A bond’s future cash flows are easier to estimate as they are usually fixed by contract, but there may be significant uncertainty if the company is experiencing financial difficulties or engaging in high-risk projects that will make it more difficult to service its debt.

The discount rate used to value a bond is determined by its level of risk. This is measured by assessing the company’s liquidity, solvency, and growth potential, but bond features such as protective covenants, collateral requirements, subordination, guarantees, and call protection are also important factors to consider.

Bonds are a major source of permanent debt financing, especially for larger firms that must raise significant amounts of funds and can justify the high issuance costs. Bonds allow businesses to by-pass commercial lending institutions like chartered banks and borrow directly from investors which will lower their cost of borrowing. Bonds can be sold publicly or through a private placement. Private placements can help raise funds more quickly and further reduce borrowing costs, but these investments are less liquid for investors and more strictly monitored.

* 1. **| Corporate Bond Valuation**

The value of a straight or “plain vanilla” bond equals the present value of the interest payments investors receive over the bond’s life plus the return of principal at maturity. The formula is:

Present value of interest payments

P0 = (I) (1 – (1 + kd)-n) / kd + F / (1 + kd)n

Present value of the return of principal

The present value of the interest payments is calculated using the present value of an annuity formula since the payments are equal and occur at the end of each period. The variables are:

**Face value (F).** The face, par, or principal value that is returned to investors when the bond matures. Bonds are typically sold in denominations with a face value of CAD 1,000.

**Bond price (P0).** The market value of the bond or the amount investors will pay to purchase the bond or the amount they will receive if they sell it.

**Number of periods (n).**  The number of interest payments investors receive over a bond’s life. Bond interest is normally paid semi-annually at the end of the period so a bond with a 10-year term has 20 payments. Instead of stating the bond’s term in years an actual maturity date such as October 31, 2030, is usually quoted.

**Coupon payment (I).**  The interest paid each period equals the face value times the coupon or legal rate. The coupon rate is expressed annually with semi-annual compounding because interest is paid every six months. This rate must be divided by two to determine the semi-annual interest rate. Coupon rates are typically quoted to three decimal places.

**Cost of debt (kd).** The interest rate that equates the bond’s future cash flows with the current price of the bond. This is the return that bond investors are currently earning and is also called the market rate or yield to maturity.

At the beginning of a bond’s life, its coupon rate and market rate are usually the same, so the bond’s price equals its face value. This is because the interest that will be earned in the future at the coupon rate is removed by discounting these cash flows at the same rate leaving only the face value. Over the bond’s life, the market rate will change but the coupon rate will remain the same. If the market rate rises above the coupon rate, a bond will become unattractive to investors as new bonds will pay a higher return. To continue to attract investors, the bond’s price will fall so investors earn the same coupon rate but on a smaller investment yielding the higher market rate. If the market rate falls below the coupon rate, a bond will become attractive to investors. These investors will bid up the value of the bond so that the return falls to the lower market rate. All bonds trade at the current market rate in efficient capital markets.

When bonds sell for less than their face value, they are trading at a discount. If they sell for more than their face value, they are trading at a premium. If the coupon rate and market rate are the same, the bond will trade at par, but this rarely occurs as it is unlikely the coupon rate and market rate will be the same other than on the first day of the bond’s life. Users are often confused about how to use the coupon rate and market rate when valuing a bond. The coupon rate is only used to determine the interest payments received every six months, while the present value of future cash flows is always calculated using the current market rate.

Occasionally, some governments issue perpetual or consol bonds where investors receive interest payments in perpetuity but no return of principal as the bonds never mature. This financing is like equity because of its permanent nature and is valued like a preferred share using the present value of a perpetuity formula:

P0 = I / kd

**Bond Quotations and Yields**

When quoting the value of a bond, the market convention is to express the bond’s value as a percentage of its face value. For example, a CAD 1,000 bond trading at CAD 1,035.32 would have a bond quotation of 103.532. Bond quotations are normally taken to three decimal places and the percentage sign is left out for simplicity. If bonds are sold between their six-month interest dates, any accrued interest to the date of sale is included in the value of the bond which is called its “dirty” price. The “clean” price does not include accrued interest and is the price generally quoted by financial information firms and market participants.

Yield to maturity is typically used to measure the return on a bond, but there are two other measures:

Current yield $\frac{Annual coupon payments}{Current bond price}$

Yield to call P0 = (I) (1 – (1 + kd)-n) / kd + Call Price / (1 + kd)n

Current yield relates the cash income a bond generates each year to its current price. This return measure is inaccurate as it does not include the capital gains or losses realized over the bond’s life. Yield to call is useful when a bond has a call feature that allows the issuer to buy back the bond early at its call price. They will do this if the current market interest rate falls below the coupon rate and it is more cost-effective for the company to replace the bond after considering all other administrative expenses. Yield to call is a more accurate return measure than yield to maturity if a bond is likely to be called.

**Floating-Rate, Zero-Coupon Corporate, and Deep-Discount Bonds**

The interest rate on floating-rate bonds is linked to a benchmark interest rate that rises and falls with the current market interest rate, so the bond always trades near its par value. Zero-coupon bonds do not pay any interest over their life, so they trade at a large discount.

P0 = F / (1 + kd)n

The difference between the bond’s purchase price and the face value received at maturity for a zero-coupon bond provides the investor with a return equal to the current market interest rate. The discount becomes smaller each year as the bond approaches maturity. This increase in value is equivalent to the interest for the year and is taxed by the government as interest and not a capital gain. Zero-coupon bonds are also called stripped bonds because investment bankers meet the demand for these instruments by taking straight government or high-quality corporate bonds and selling the interest payments and return of principal separately to different investors depending on their financial needs. Some investors want regular interest income while others need a fixed payout at a specific date in the future. A deep discount bond is like a zero-coupon bond as it has a low coupon rate that causes it to trade at a large discount. To appreciate why companies may issue floating-rate, zero-coupon bonds, or deep discount bonds, it is important to understand two types of risk.

**Interest Rate Risk**

The risk that interest rates will rise and cause the value of a bond to fall is called interest rate risk. Mathematically, rising interest rates have a greater negative effect on bond prices the further the cash flows are in the future. This includes bonds with long maturities or those with low or zero coupons where the largest cash flow is the return of principal at the end of the bond’s life. The exhibit below shows that for a CAD 100 straight bond with a coupon and market rate of 10%, compounded semi-annually, a 1% increase in interest rates causes a significantly larger decline in the value of a 20-year bond versus a 5-year bond.

**Exhibit 1: Straight Bonds**

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|  | **5-Year Bond** | **20-Year Bond** |
| Value before the rate increase |  5 ($\frac{1-(1+ .05)^{-10}}{.05}$) + $\frac{100}{(1+ .05)^{10}}=100 $  | 5 ($\frac{1-(1+ .05)^{-40}}{.05}$) + $\frac{100}{(1+ .05)^{40}}= 100$  |
| Value after a 1% rate increase | 5 ($\frac{1-(1+ .055)^{-10}}{.055}$) + $\frac{100}{(1+ .055)^{10}}= 96.23 $ | 5 ($\frac{1-(1+ .055)^{-40}}{.055}$) + $\frac{100}{(1+ .055)^{40}}= 91.98$ |
| Decline in value | $$\frac{(100.00-96.23)}{100.00}= .038 or 3.8\%$$ | $$\frac{(100.00-91.98)}{100.00}= .080 or 8.0\%$$ |

Zero-coupon bonds have greater interest rate risk than straight bonds as cash flows only occur at the end of the bond’s life. The next exhibit shows that for a CAD 100, zero-coupon bond with a market rate of 10%, compounded semi-annually, a 1% increase in interest rates causes a much larger decline in value as its maturity increases.

**Exhibit 2: Zero-Coupon Bonds**

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|  | **5-Year Bond** | **20-Year Bond** |
| Value before the rate increase |  $\frac{100}{(1+ .050)^{10}}=61.39$ |  $\frac{100}{(1+ .050)^{40}}=14.20$ |
| Value after a 1% rate increase | $$\frac{100}{(1+ .055)^{10}}=58.54$$ | $$\frac{100}{(1+ .055)^{40}}=11.75$$ |
| Decline in value | $$\frac{(61.39-58.54)}{61.39}= .046 or 4.6\%$$ | $$\frac{(14.20-11.75)}{14.20}= .173 or 17.3\%$$ |

Investing in floating-rate bonds eliminates interest rate risk as the coupon rate is regularly adjusted so it approximates the current market interest rate. As a result, it always trades near its par value.

**Re-investment Risk**

The traditional bond valuation formula assumes that the coupons paid every six months are reinvested at the coupon rate when calculating the yield to maturity. This is not usually true as market interest rates are constantly changing. Re-investment risk is when market interest rates fall, and investors are forced to reinvest their coupons at a lower rate which reduces the bond’s actual yield to maturity. Yield to maturity can be calculated by solving for the market interest rate in the bond valuation formula or by taking the future value of all cash flows to the end of the bond’s life and then calculating the discount rate that equates these cash flows with the face value of the bond today. The second method is more accurate because different reinvestment rates can be incorporated as shown in the exhibit below.

**Exhibit 3: Reinvestment Risk**

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| Investment: CAD 100 bondCoupon rate: 10%, compounded semi-annuallyTerm: 2 years |
| Traditional formula |
|  100 = 5 ($\frac{1-(1+ i)^{-4}}{i}$) + $\frac{100}{(1+ i)^{4}} $ i = .050 or 10.0%, compounded semi-annually |
| Another approach is to calculate the bond’s yield to maturity using the future value of all cash flows reinvested at 10%, compounded semi-annually. |
|  (5) (1 + .05)3 = 5.788 (5) (1 + .05)2 = 5.512 (5) (1 + .05)1 = 5.250 (5) (1 + .05)0 = 5.000 (100) (1 + .05)0 = 100.000 100 = $\frac{121.550}{\left(1+i\right)^{4}}$ i = .050 or 10.0%, compounded semi-annuallyThe yield to maturity is unchanged as the coupons are reinvested at the same market rate.  |
| What if the bond’s yield to maturity is calculated using the future value of all cash flows reinvested at 5%, compounded semi-annually? |
|  (5) (1 + .025)3 = 5.384 (5) (1 + .025)2 = 5.253 (5) (1 + .025)1 = 5.125 (5) (1 + .025)0 = 5.000 (100) (1 + .025)0 = 100.000 100 = $\frac{120.762}{\left(1+i\right)^{4}}$ i = .048 or 9.6%, compounded semi-annually The yield to maturity falls as the coupons are reinvested at the lower market rate. |

Zero-coupon bonds do not have reinvestment risk as there is no coupon to re-invest every six months. These bonds allow investors to lock in a rate of return over the life of the bond. This is important to financial institutions such as life insurance companies and pension plans who must accurately plan their cash flows to meet specific payouts to their beneficiaries.

* 1. **| Corporate Bond Features and Markets**

Financing a business with corporate bonds is like using commercial loans. Interest is paid regularly at a fixed or variable rate. Bond sinking payments are also made that help keep the balance of the loan below the declining value of any collateral pledged. All terms and conditions are outlined in a lending agreement called a bond indenture or deed of trust which is enforced by an independent third party, usually a trust company, who protects the interests of bondholders. Trustees carefully monitor the issuer and distribute all interest and sinking fund payments as received.

Companies finance their operations with both bonds and commercial loans because of the different advantages each offers to issuers and investors. Bonds are preferred over commercial loans because they:

* Enable businesses to by-pass financial institutions (i.e. the middleman) and borrow directly from investors thus lowering their cost of borrowing.
* Trade publicly providing greater market liquidity to investors who will in turn accept lower interest rates.
* Have a less restrictive monitoring process with fewer lending conditions.
* Provide funding for extended periods of up to 30 years as bondholders are longer-term investors than chartered banks who finance their operations primarily with one to five-year term deposits.

Commercial loans are preferred over bonds because they:

* Can be arranged more quickly as they do not go through the public placement process and are originated using the lender’s extensive branch banking system.
* Have lower up-front issuance costs that small issuers can more easily abord.
* Can better customize repayment to meet a firm’s unique cash flow needs.
* Are easier to modify than bond indentures if an issuer wants to change the conditions in the lending agreement.
* Do not require a bond rating.
* Avoid the detailed financial disclosures required in a public placement.

**Bond Features**

Although bond financing is generally less restrictive than commercial lending, a bond indenture is still a complex legal document containing the terms and conditions of the loan and numerous other provisions relating to protective covenants, sinking funds, credit ratings, collateral, subordination, guarantees, call options, and conversion features.

**Interest rate and currency.** Bonds typically pay interest semi-annually at a fixed rate over the life of the security. Some bonds have floating or adjustable rates equal to an interest rate benchmark such as the prime rate, banker’s acceptance rate, commercial paper rate, or London Interbank Offering Rate (LIBOR) plus a spread that reflects the issue’s risk. Interest rates are reset daily, weekly, monthly, quarterly, semi-annually, or annually depending on when the interest rate benchmark is re-calculated. Floating rate bonds are popular if companies expect interest rates to fall, and they do not wish to lock in financing at a high rate. If interest rates are expected to rise, some bonds allow issuers to convert to a fixed rate. Others have interest floors and caps that place a lower and upper limit on rates. Indexed or real return bonds specify a real interest rate but then add an inflation benchmark such as the Consumer Price Index to ensure nominal interest rates cover inflation. Income bonds agree to pay the bond’s principal, but only pay the coupon if the company has enough profits. Missed interest payments on income bonds may be either cumulative or non-cumulative but cannot be used to force a company into bankruptcy. These types of bonds are suitable for mature companies with variable sales and high fixed costs which causes earnings to fluctuate a lot or start-up companies with low initial profits. They are also useful for companies that are either in bankruptcy or attempting to reorganize as they have limited cash flows. Stepped bonds have low-interest rates initially that rise over their lives providing the borrower with greater financial flexibility.

Instead of issuing bonds domestically, companies can raise funds in other countries to either finance their operations in that country or repatriate funds for domestic use. Foreign bonds are sold in another country in that country’s currency and are regulated by that government. Companies may decide to raise funds abroad because of lower interest rates and a less restrictive regulatory environment. Foreign bonds sold in CAD in the Canadian market are called Maple Bonds.

Eurobonds are a more flexible alternative to foreign bonds. Eurobonds can be sold in any country but must be denoted in a currency other than the currency of that country. These bonds are named based on their face currency. For example, Eurodollar bonds are denoted in USD but could be sold in any country other than the U.S. Eurobonds give issuers the flexibility to sell bonds in many countries and denote them in whatever currency they need to hedge their currency risks. The name Eurobond is confusing as these bonds are not related to Europe, the European Union, or the Euro currency.

**Bond indenture and protective covenants.** A company is in default of its bond indenture if it violates any terms or conditions of the agreement including the protective covenants. The main reason for default is non-payment of interest and principal, but the violation of one of the bond’s many protective covenants is also grounds for demanding immediate payment. Borrowers are often given a limited amount of time called a grace or “cure” period to attempt to rectify any covenant violations before the bond is called. The lender may also have the option to waive default in exchange for a fee or to modify the bond indenture to provide the lender with better protection. Protective covenants are classified as either negative, which are actions the company cannot take, or positive, which are actions they must take. Some typical covenants include:

**Exhibit 4: Typical Covenants**

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| **Negative Pledge Clause** | The company cannot pledge any assets to another lender if it gives the current bondholders less protection. |
| **Acceleration Clause** | If the issuer defaults on specific terms or conditions, all interest and principal payments are immediately payable. |
| **Cross Default** | A default on any lending agreement is considered a default on all lending agreements. |
| **Maintenance Test** | Certain liquidity ratios such as the current ratio or cash flow coverage ratio must be maintained at a specified level when reported or the loan is in default. |
| **Incurrence Test** | Limits are placed on borrowing as measured by different leverage ratios such as the debt ratio and long-term debt to total capitalization ratio. Ratio maximums may be lowered over time to encourage the company to reduce its borrowing. |
| **Limitations on Mergers** | Leverage ratios requirements must be met post-merger to prevent over-leveraging the company in a take-over. Debt holders cannot have a weaker claim after the merger. |
| **Limitation on Restricted Payments** | Restricted payments to redeem subordinated debt, repurchase equity, or provide dividends are limited to protect the bondholders. Investments in subsidiaries that are not subject to the loan covenants are also limited.Restricted payments are any payments that take funds out of a business that could be used to pay the obligations of the bondholders and thus puts bondholders in a weaker position.  |
| **Limitation on Asset Sales** | All pledged collateral must be properly maintained, and any sales must be for cash and used to pay down debt or buy replacement assets. This prevents risky diversification and ensures the asset base to support the debt is maintained. |
| **Limitation on Sale/Leaseback** | These transactions are limited as it reduces the collateral available to bondholders and burdens companies with additional fixed charges. |
| **Limitation on Sale of Stock in Subsidiaries** | The company cannot sell additional shares of its subsidiaries. This protects the asset base available to the bondholders of the parent by preventing a change of control of the subsidiary. |
| **Limitation on Guarantees by Restricted Subsidiaries** | Subsidiaries cannot provide guarantees to other companies to reduce the support they can provide to the parent. |
| **Limitations on Transactions with Affiliates** | Transactions with affiliates must be at market value and cannot be used to make restricted payments. Trustee approval may be required for all transactions. |
| **Change in Control** | Bondholders have the right to sell their bonds at a premium to the company if there is a change in control. Change in control can be measured by percentage ownership (50 percent or more), board member replacement, or “rating triggers.” Rating triggers means if the bond rating falls below investment grade it is considered a change in control. |
| **Material Adverse Change** | Default occurs if there is a change in any law or regulation affecting the business, loss of a major customer, or other material event affecting the business. |
| **Line of Business Test** | The company is not allowed to enter new a new line of business. Owners may not have the expertise to operate the new business or it may be in a riskier industry. |
| **Fall Away Event** | Certain covenants will not be enforced if the company can improve its credit rating over the life of the debt agreement. |
| **Provision of Financial Statements** | Audited financial statements must be provided regularly. |

**Bond sinking funds.** A bond indenture may require that a portion of an issue be bought back each year to ensure that the depreciating assets pledged as security are worth more than the outstanding loan. If the sinking fund payment is not made, the bond is in default and can be called. Regular sinking fund payments make the bond safer for investors lowering the coupon rate issuers must pay. Companies can make bond sinking fund payments by:

**Option 1** Buying back bonds of equivalent value on the open market.

**Option 2** Buying back bonds of equivalent value on a random or pro-rata basis among existing bondholders at par value or a special sinking fund call price that usually starts at the issuance price but moves to par value by maturity.

**Option 3** Make a cash payment to the bond trustee who invests the funds and uses to proceeds to retire the bond issue at maturity.

Businesses normally choose either Option 1 or 2 depending on whether the current market price or the sinking fund call price is lower. These options get the debt off the balance and help improve the company’s solvency ratios.

Sinking fund payments can be of equal value or vary over time to accommodate a firm’s cash flow needs. They can start low as a business becomes established and move higher with a large balloon payment when the bond matures. A doubling option allows the issuer to buy back twice the prescribed amount of principal if they want to further reduce their use of financial leverage or replace bonds that have high coupon rates.

**Collateral.** A bond may be either secured by collateral or unsecured. The collateral consists of specific physical assets (i.e. land, plant, equipment, inventory) or financial assets (i.e. receivables, marketable securities) or blanket claims on entire asset groups. As with commercial loans, collateral should be properly appraised and carefully monitored over the life of the bond. A title search ensures the borrower owns the asset and has not pledged it to another creditor. A lien against the asset should be properly registered with the government so the lender’s claim is valid and enforceable. The borrower must carry adequate insurance and properly protect and maintain the assets in their possession.

Pledging high-quality collateral increases a bond’s credit rating thus lowering its coupon rate. Complying with collateral requirements can be costly for both the issuer and lender. The issuer will also have less financial flexibility as the collateral cannot be sold or pledged to support other loans in the future.

Unsecured bonds with lives of under 10 years are also referred to as medium or intermediate-term notes, while those with lives of 10 years or greater are called debentures. The words bond and debenture are sometimes used interchangeably, so users should always ensure what is meant. Unsecured bonds are generally sold by issuers who are financially strong and will only realize a minimal reduction in their borrowing costs by pledging collateral; have already pledged all of their collateral; or have mostly intangible assets that are not typically accepted as collateral due to a lack of physical substance.

**Subordination.** To provide additional protection, some bonds, notes, or debentures are designated as senior which means they must be paid in full before any other junior or subordinate obligations. Subordinated notes or debentures are common in high-risk lending where companies have pledged all their collateral to their current creditors and their bond indentures stipulate that any new borrowing must not weaken current bondholders’ claims.

**Guarantees.** Companies may require a third-party guarantee to comply with a covenant in a bond indenture or simply use it as credit enhancement to reduce their borrowing costs. Guarantees usually come from a parent corporation, a government organization promoting economic growth, financial institutions through a back-up line of credit or standby letter of credit, or a bond insurer. Bond insurers are well-capitalized companies with AAA credit ratings who can reduce a company’s cost of borrowing with a lower credit rating by guaranteeing its debt in exchange for an insurance premium. Municipal Bond Insurance Association (MBIA) and Ambac Financial Group are the major public providers of bond insurance.

**Credit rating.** An up-to-date credit rating is typically needed to issue bonds and many other debt obligations. A credit rating is a “forward-looking opinion of the creditworthiness” of either a specific debt issue or a company. Both types of opinions evaluate the company’s “capacity and willingness to meet its financial commitments as they come due,” but the assessment of a specific bond issue also considers currency risk if relevant; collateral pledged; subordinations; and guarantees. In general, firms with large, stable profits and lower debt ratios have better credit ratings as do senior obligations and bonds with more collateral and third-party guarantees.

Canadian companies are served by four major U.S.-based credit rating agencies including DBRS, Standards & Poor Global Ratings, Moody’s Investment Services, and Fitch Ratings. The company issuing bonds and not its bondholders pay the credit rating agency for the assessment. Experts feel this creates a conflict of interest as the rating agency may provide better ratings to retain clients. Credit ratings are often referred to as bond ratings, but they apply to many different types of debt obligations besides bonds that are issued by public and private corporations and federal, provincial, and municipal governments.

Rating agencies provide rating scales for both short-term obligations (i.e. under a year) and long-term obligations (i.e. over a year). These scales vary by the rating agency, but they are all similar. Rating agencies also provide warning systems for potential credit rating changes. With S&P’s CreditWatch®, a “positive” designation means a rating may be raised, “negative” means it may be lowered, and “developing” means it may be raised, lowered, or affirmed. The long-term credit rating scale at S&P is:

**Exhibit 5: S&P Long-term Credit Ratings**

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| **Category** | **Definition** |
| **AAA** | An obligation rated ‘AAA’ has the highest rating assigned by S&P Global Ratings. The obligor’s capacity to meet its financial commitments on the obligation is extremely strong. |
| **AA** | An obligation rated ‘AA’ differs from the highest-rated obligations only to a small degree. The obligor’s capacity to meet its financial commitments on the obligation is very strong. |
| **A** | An obligation rated ‘A’ is somewhat more susceptible to the adverse effects of changes in circumstance and economic conditions than obligations in higher-rated categories. However, the obligor’s capacity to meet its financial commitments on the obligation is still strong. |
| **BBB** | An obligation rated ‘BBB’ exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to weaken the obligor’s capacity to meet its financial commitments on the obligation. |
| **BB, B, CCC, CC, and C** | Obligations rated ‘BB’, ‘CCC’, ‘CC’, and ‘C’ are regarded as having significant speculative characteristics. ‘BB’ indicates the least degree of speculation and ‘C’ the highest. While such obligations will likely have some quality and protective characteristics, these may be outweighed by large uncertainties or major exposure to adverse conditions. |
| **BB** | An obligation rated ‘BB’ is less vulnerable to nonpayment than other speculative issues. However, it faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions that could lead to the obligor’s inadequate capacity to meet its financial commitments on the obligation. |
| **B** | An obligation rated ‘B’ is more vulnerable to nonpayment than obligations rated ‘BB’, but the obligor currently has the capacity to meet its financial commitments on the obligation. Adverse business, financial, or economic conditions will likely impair the obligor’s capacity to meet its financial commitments on the obligation. |
| **CCC** | An obligation rated ‘CCC’ is currently vulnerable to nonpayment and is dependent upon favorable business, financial, and economic conditions for the obligor to meet its financial commitments on the obligation. In the event of adverse business, financial, or economic conditions, the obligor is not likely to have the capacity to meet its financial commitments on the obligation. |
| **CC** | An obligation rated ‘CC’ is currently highly vulnerable to nonpayment. The ‘CC’ rating is used when a default has not yet occurred, but S&P Global Ratings expects default to be a virtual certainty, regardless of the anticipated time to default. |
| **C** | An obligation rated ‘C’ is currently highly vulnerable to nonpayment, and the obligation is expected to have lower relative seniority or lower ultimate recovery compared with obligations that are rated higher. |
| **D** | An obligation rated ‘D’ is in default or in breach of an imputed promise. For non-hybrid capital instruments, the ‘D’ rating category is used when payments on an obligation are not made on the date due, unless S&P Global Ratings believes that such payments will be made within five business days in the absence of a stated grace period or within the earlier of the stated grace period or 30 calendar days. The ‘D’ rating also will be used upon the filing of a bankruptcy petition or the taking of similar action and where default on an obligation is a virtual certainty, for example due to automatic stay provisions. An obligation’s rating is lowered to ‘D’ if it is subject to a distressed exchange offer. |
| Ratings from ‘AA’ to ‘CCC’ may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the rating categories. |

Source: S&P Global Ratings

Bonds rated from AAA to BBB are classified as investment grade while bonds rated below BBB are called non-investment grade, high-yield, or “junk” bonds. High-yield bonds are normally issued to finance distressed firms or leveraged buyouts of other companies that require a large amount of debt. Non-investment grade bonds have higher default rates than investment-grade bonds, so many institutional investors are not allowed to invest in them to protect against high losses. Other institutional investors do not have this limitation and find that the higher yields more than compensates for the greater risk if they maintain a diversified bond portfolio.

**Callable bonds.** Most bonds are callable at a premium above their face values of up to one year’s interest (e.g. 104), but this call premium declines as the bond mature and reaches its face value (i.e. 100) at maturity. Issuers can call all or part of a bond issue on specific dates. If less than the full issue is being bought back, bonds are purchased either randomly or on a pro-rata basis in the bond market. This call option allows issuers to reduce their use of financial leverage; re-finance at a lower interest rate if rates have fallen or the company’s credit rating has improved; or replace bonds that have strict protective covenants or ones that are about to be violated. Replacing an existing bond with a new bond is called refunding. Companies must carefully compare any potential interest savings with the cost of the call premium and issuing new replacement debt before proceeding.

Calling a bond is inconvenient for investors and usually results in them receiving a lower interest rate when they re-invest, so they will demand a higher coupon rate and may negotiate call protection using a deferred call. This prevents issuers from buying back their bonds for any reason for a specified period at the beginning of the bond’s life. This “cushion” is typically five to ten years depending on the type of bond. A weaker defense is refund protection where issuers can buy back bonds for any reason except to refinance at a lower interest rate.

Retractable bonds or puttable bonds are the opposite of callable bonds. Investors can force the issuer to buy their back bonds at par value on a specified date if interest rates rise above the coupon rate. Another option is extendable bonds which allow investors to extend the life of their bonds if the coupon rate is above the market interest rate when the bonds mature. To encourage investors to extend their bonds, issuers frequently offer a higher coupon rate in the second term. Both retractable and extendable bonds benefit the bondholder, so the issuer pays a lower coupon rate.

**Convertible bonds.** These bonds are convertible into the borrower’s common shares at a specified conversion ratio such as 5-to-1 which means each CAD 1,000 bond can be exchanged for five shares at a conversion price of CAD 200. Most conversions are at the discretion of the investor, but companies may be able to force conversion by calling the bonds. Conversion options are commonly used with high-risk lending such as subordinated bonds to attract investors. If a company is successful and its share price rises above the conversion price, investors will realize a sizeable profit when they convert, and the company will be able to turn debt into equity to reduce its financial leverage to a safer level. If the company continues to struggle, investors will continue to receive bond interest and rank ahead of the shareholders if the company fails and is forced to liquidate. Conversion features serve as an “equity kicker” or “sweetener” for the company which reduces the coupon rate they must pay and allows them to issue bonds with fewer protective covenants. Convertible bonds are hybrid securities as they combine two or more financial instruments. Prices of these bonds are greatly influenced by changes in the underlying share price so they cannot be valued using the normal bond valuation formula.

Another type of “equity kicker” is a warrant which allows an investor to buy a specified number of shares at a fixed exercise price usually equal to the market value of the share when the warrants were issued. Again, if the company is successful and its share price rises, the investor can exercise the warrants and earn a profit. If the firm is not successful, the warrants will expire worthless and the investor still has their bonds. Warrants have an advantage over convertible bonds and other hybrid securities in that they are detachable which means they can be exercised or sold separately in the stock market without having to convert the bond. Hybrid securities have both debt and equity components such as callable and convertible bonds.

**Corporate Bond Market**

A public company attempting to raise a large amount of long-term debt typically issues bonds using a public placement instead of negotiating a commercial loan as the size of the issue justifies the high up-front costs. The public placement process for issuing new bonds is like the one used for equities. Once the bonds are sold in the primary market, they then trade in an active secondary market. Unlike stocks, bonds do not trade on public exchanges. They trade “over the counter” (OTC) with bond dealers standing ready to buy bonds from or sell them to investors. Instead of providing a single price quotation, a bid price and an ask price are supplied for each bond. The bid price is what the dealer will pay for a bond and the ask price is what they will sell it for. The spread between the bid and ask prices is the dealer’s profit. A small spread indicates that the bond market is competitive, and the bond is easier to sell with less risk of loss for the dealer. Bond dealers are different from stockbrokers as they maintain an inventory of securities that they use to fill customers’ orders as they arise. This inventory requires financing and exposes the dealer to the risk of falling bond prices as the owner.

Bonds trade OTC because each bond is unique with its own maturity date, coupon rate, credit rating, and bond indenture terms and conditions while stocks have similar features making them easier to trade on public exchanges. Bond trades can also take weeks to complete while stock transactions are typically executed in a few minutes. OTC markets are not as closely regulated as public exchanges and tend to be less liquid for investors and less transparent about bid and ask price and volume data which raises the cost of trading. The Canadian Securities Administrators (CSA) initiated a program in 2015 to collect bond price and trading volume information from bond dealers and make it available to the public so they can better scrutinize trading costs.

Securities regulators realize that the formal public placement process is not always needed to protect investors. If securities are sold directly to a limited number of institutional investors and high-net-worth individuals, regulators feel these investors are sophisticated enough to deal with issuers directly without government protection. They also believe that bond issues sold mostly to business insiders and their family, friends, and business associates require less scrutiny because of their involvement in the firm. To help companies raise debt financing more easily with minimal paperwork and government supervision, regulators may exempt companies from having to file a prospectus and allow them to sell exempt securities directly to these investors in a private or direct placement.

Private placements offer several advantages compared to public placements. These include being able to negotiate funding more quickly; lower issuance costs; being more receptive to smaller, higher-risk issues; being able to hand-pick compatible investors with the desired competencies; diversification of funding sources; greater customization of repayment schedules and loan conditions; no bond rating requirement; and more privacy including no public disclosure of company information.

Alternatively, exempt securities issued in private placements are much less liquid than those issued in public placements which leads to higher interest costs. Also, private placements are generally for shorter periods and smaller amounts compared to public placements. They have higher lending standards and stricter loan conditions and are more closely monitored by lenders. This is mainly because private placements have traditionally been used by small and medium-sized businesses (SMEs) who have higher risk profiles.

The private placement industry is becoming more sophisticated and the sizes of placements are increasing. New institutions are forming such as TSX Private Markets that brings together issuers and investors in the private placement market and then provides them with an active secondary market to trade their securities enhancing their liquidity. As a result, private placements are increasingly being used by large public companies as well as SMEs to raise needed debt and equity capital.

* 1. **| Interest Rates**

**Interest Rate Components**

Interest rates are the cost of borrowing money. They consist of the following components:

Real Risk-Free Rate

+

Inflation Premium

=

Nominal Risk-Free Rate

+

Interest Rate Risk

+

Reinvestment Risk

=

Government Rate

+

Additional Risk Premium

=

Nominal Required Rate of Return

The real risk-free rate is the interest rate that investors expect to earn for delaying consumption and allowing a risk-free borrower to use their funds for a certain period usually a year. Also, investors must receive an inflation premium, so they are fairly compensated for general price increases over the investment period giving the nominal risk-free rate (RFR). The government rate is generally used as a proxy for the RFR because most developed countries are not likely to default on their debts. Government debt is not risk-free though as it is subject to both interest rate risk and reinvestment risk. Financial market participants still typically use the government rate as a proxy for the RFR. Corporations have additional sources of risk that raise their cost of borrowing above the RFR or government rate. These potential risk premiums include:

**Default.** Non-government borrowers have a greater risk of not paying their required interest and principal requirements as they come due. The added risk premium is dependent on the company’s liquidity, solvency, and business prospects.

**Liquidity.** Securities that cannot be sold quickly at a reasonable price must pay a higher interest rate to fairly compensate investors. Bonds that are placed privately and do not trade in an active secondary market typically require a higher rate.

**Size of issue.** Large bond issues require a higher rate to generate enough investor demand so the issue can be absorbed by the market.

**Covenants, collateral, guarantees.** More lenient loan conditions, low collateral requirements, and fewer guarantees in the bond indenture result in greater risk and higher interest rates due to less monitoring and security for the lender.

**Call risk.** Investors must be compensated for the risk of having their high coupon bonds called early by the issuing company.

**Exchange risk.** Payments on securities issued in foreign currencies vary as the currency fluctuates.

**Country and political risk.** Securities issued by governments and corporations in unstable countries are riskier.

**Tax Risk.** Potential changes in tax policy may lower after-tax returns.

The nominal required rate of return is the proper interest rate to use when valuing a bond as it includes all types of risk.

**Yield Curve**

A yield curve indicates how interest rates for similar quality investments change over their maturity or term. Similar quality investments are used so differences in interest rates are only due to time. Yield curves are normally upward sloping which means interest rates rise as the term increases, but occasionally they become flat or even inverted.

**Exhibit 6: Yield Curves**

Inverted

Flat

Normal

Three theories help explain why long-term interest rates are usually higher than short-term rates.

**Liquidity premium theory.** Longer-term investments are riskier because of greater uncertainty, so investors demand higher returns to compensate for the added risk. Also, companies are willing to pay a premium to lock in a fixed interest rate for a longer period to reduce rollover risk.

**Segmentation theory.** Companies want to borrow more long-term than short-term since most of their financing needs are for long-term assets like land, building, and equipment resulting in higher long-term interest rates due to greater demand for funds. Investors prefer supplying short-term funds because of the lower default risk resulting in lower short-term interest rates because of a greater supply of funds. Investors must be paid an interest rate premium to encourage them to lend longer term.

**Expectation theory.** The yield curve indicates future expectations for interest rates and most of the time the economy is growing with rising inflation and interest rate expectations, so the yield curve is normally upward sloping. Interest rate changes are largely due to inflation as the real interest rate is relatively stable.

An inverted yield curve does not happen often, but they are a reliable leading indicator of a future economic slowdown and falling stock prices which is valuable information for any investor. This is true because knowledgeable CFOs have an idea when a boom in the economy is coming to an end, so they do not borrow long-term when interest rates are high at the end of a business cycle. Instead, they borrow short-term hoping to refinance in the future when long-term rates have fallen once economic growth moderates. When CFOs all borrow short-term at once, they drive up short-term and lower long-term rates. The economy is usually growing, so an upward sloping yield curve is the norm, but usually six months before an economic slowdown the yield curve becomes flat or inverted.

**Interest Rate Forecasting**

Borrowers and lenders negotiate the interest rates on the yield curve at the different maturities. A consensus interest rate will result at each point if the markets are working efficiently. Interest rates are defined two ways:

**Spot interest rate.** Rate on a loan that starts today.

**Forward interest rate.** Rate on a loan that starts at a future date.

Spot and forward interest rates are denoted using the symbols:

arb

r = Interest rate

a = Start time of the loan

b = Length of the loan

The yield curve is a collection of spot interest rates that can be used to forecast implied forward rates using the following formula:

arb (1 + 0ra)a (1 + arb)b = (1 + 0r(a + b))(a + b)

An example:

1r2 (1 + 0r1 )1 (1 + 1r2 )2 = (1 + 0r3)3

This formula means that if a company borrows funds for one year starting today (0r1) and borrows again in one year for two years (1r2), this will be equivalent to borrowing today for three years (0r3). Arbitrageurs will keep markets efficient, so this occurs.