

QFI PM Detailed Study Guide - Sample

HOFIS Chapter 1 (Background Only) 2
Handbook of Credit Risk Management: Chapter 20 16

HOFIS Chapter 1 (Background Only)

Fabozzi (2021)

Overview

This chapter is classified as background reading on the syllabus. Many of the concepts introduced in this chapter are discussed in greater detail in later chapters of the book. You should not worry if you do not understand many of the topics mentioned. Just view this chapter as a preview of many of the chapters to come in this book.

The Handbook of Fixed Income Securities (HOFIS) textbook is one of the main QFI PM textbooks, and you are responsible for many of its chapters. The first chapter gives a broad overview of fixed income markets.

Key topics for the exam include:

- State the three largest issuers of debt
- Describe callable bonds
- Describe sinking-fund provisions
- Compute the make-whole call price
- Briefly describe RMBS and CMBS

Bonds

Three Largest Issuers of Debt

1. Domestic corporations

- Can be public or private and collateralized or unsecured
- *Private placement* is when bonds are sold directly to one or only a few buyers
- One reason that debt financing is popular with corporations is that the interest payments are tax-deductible expenses. As a result, the true after-tax cost of debt to a profitable firm is usually much less than the stated coupon interest rate

2. Municipal governments

- General obligation (GO) bonds are backed by the full faith, credit, and taxing power of the governmental unit issuing them
- Revenue bonds have a creditworthiness that depends on the success of the particular entity within the municipal government issuing the bond

3. Federal government

- Includes federally related institutions and government-sponsored entities (GSEs)

Maturity

- Maturity is the date the bond must be redeemed and the principal paid back
- Maturity is critical because:
 1. Indicates expected life
 - Allows the bondholder to understand the number of periods where coupon payments are expected, and when the principal should be repaid
 2. Affects the yield
 - Short-term bonds vs long-term bonds may have different yields depending on the shape of the yield curve
 3. Affects the volatility
 - Changes in rates will result in much larger changes in price for long-term bonds compared to short-term bonds
- The maturity can be modified by the issuer with a:
 1. **Call privilege** – permits the issuing firm to redeem the bond before the scheduled maturity under certain conditions
 - Corporate and municipal bonds may be callable, but the US government no longer issues callable bonds
 2. **Sinking-fund provision** – mandate that the firm retire a substantial portion of the debt, according to a prearranged schedule, during its life and before the stated maturity
 - With a sinking-fund provision, part of the principal is repaid before maturity – like in a mortgage that amortizes
- “Term bonds” are bond issues that have a single maturity
- “Serial bonds” are bundles of bonds with differing maturities
- Bond maturities for corporate bonds are usually between 1 and 30 years
 - There are some outliers, and some corporate bonds have been sold at a maturity of 100 years
- Can classify bonds as short vs intermediate vs long-term based on their maturity using the approximate classification buckets stated below:
 1. Short-term \Rightarrow Less than 5 years
 2. Intermediate-term \Rightarrow 5 to 12 years
 3. Long-term \Rightarrow Greater than 12 years

Coupon and Principal

- Indenture is a legal contract specifying the bond terms including the interest rate the issuer must pay the bondholder, frequency of payments, denomination of currency paid, and the bond's par value
- The coupon is the periodic interest payment; the principal (aka par value and face amount) is the amount repaid at maturity (or at specified times)
- Coupon – the periodic interest payment made to owners during the life of the bond
 - Included in the quotation of a bond price (e.g. IBM 6.5 due in 2028)
 - Coupon rate is the interest rate that the issuer must pay bondholders during the term of the bond
 - Multiplying the coupon rate times the principal on the bond gives the dollar value of the coupon payment¹
 - Frequency of Coupon Payments
 - * In the US, coupons are typically paid semi-annually
 - * European bonds typically pay coupons annually
 - * Mortgage-backed securities (MBS) and asset-backed securities (ABS) usually deliver monthly cash flows
- Higher coupon bonds have lower volatility
 - Higher coupon bonds have lower duration, and thus less interest rate sensitivity and volatility
- Debt financing is popular with corporations because interest payments are tax deductible expenses (after-tax cost of debt is typically lower than the stated coupon interest rate)
- Original-issue discount bonds (OIDs) – initially issued at a price substantially below par value; coupon rate is deliberately set low enough to make market value equal par value
- Bearer bonds vs registered bonds
 - Bearer bonds – investors must clip coupons and send to obligor for payment
 - Registered bonds – bond owners receive payments automatically
 - * All new bond issues must be registered
- Zero-coupon bonds
 - Pay no coupons; the bonds are purchased at a discounted maturity value
 - Have been issued by corporations and municipalities since the early 1980s

¹Note: If the bond is semi-annual and the coupon rate is annual, then you will also need to multiply times one-half to get the coupon payment.

- Example: Barclay's has a zero-coupon bond outstanding due in August 2036 that was issued on August 2006
- U.S. Treasury does not issue zero-coupon debt with a maturity greater than one year
 - * However, government securities dealers can create such securities under the Treasury's Separate Trading of Registered Interest and Principal Securities (STRIPS) Program
 - * Treasury strips are discussed in more detail in Chapter 7
- The investor in a zero-coupon security typically receives interest by buying the security at a price below its principal and holding it to the maturity date
- Some zeros are issued at par and accrue interest during the bond's life, with the accrued interest and principal payable at maturity
- Inflation-indexed bonds – debt instruments with coupons tied to an inflation index
 - Also called “inflation-linked bonds” or simply “linkers”
 - The US introduced Treasury Inflation Protected Securities (TIPS) in January 1997
 - Can use a variety of designs and reference rates for linkers such as the consumer price index (CPI²)
- Step-up notes – coupon rates increase over the life of the bond
 - Example: A six-year step-up note might have a coupon rate that is 4% for the first two years, 4.5% for the next two years, and 5% for the last two years
- Floating-rate and variable-rate bonds – reset the coupon rate periodically
 - Example: Bank of America issues a floating-rate bond where the quarterly cash flows are computed using a coupon rate equal to 3-month LIBOR plus 50 basis points
 - Floating-rate securities typically reset *more* than once a year based on a *short*-term index rate
 - Variable-rate bonds typically reset *not more* than once a year based on a *long*-term index
- Floating rate bond alternative features:
 - May have maximum or minimum coupon rate
 - * The maximum coupon rate is the cap, while the minimum coupon rate is the floor
 - Coupon can be computed using a variety of indices
 - * Most commonly a benchmark interest rate or interest rate index is used
 - * However, other indices may be used. For example, the coupon could be indexed to movements in commodity prices
 - The coupon rate may move in the opposite direction of the index rate (called inverse/reverse floaters)

²CPI-U is the Consumer Price Index for urban consumers (not seasonally adjusted).

- The coupon rate may be zero if the index rate is outside a certain range (called range notes)
- Reference Rates
 - Global process has started to find an alternative reference rate to LIBOR
 - Secured Overnight Financing Rate (SOFR) chosen by the Alternative Reference Rate Committee (ARRC) as the replacement in the US
 - SOFR is a volume-weighted median rate based on actual transaction data from overnight tri-party repo and cleared overnight bilateral repo markets (excluding Fed transactions)
 - SOFR has been published by the NY Fed since April 2018
 - LIBOR is unsecured with various maturities; SOFR is a secured overnight rate
 - Biggest issuers of SOFR-linked floating-rate debt are the Federal Home Loan Bank (FHLB), Freddie Mac, Fannie Mae, as well as banks, insurance companies and the World Bank
 - There is a global search for alternative reference rates in other countries (e.g. SONIA in the UK, EONIA/ESTER in Eurozone, TONAR in Japan)
- High-yield bonds can defer payments with deferred interest, step-up, or payment-in-kind bonds
- Extendible reset bonds – coupon rates are reset periodically to maintain the price of the bond at a certain level
 - Coupon rate will be the average of rates suggested by investment banking firms
 - New rate will then reflect the level of interest rates at the reset date and the credit spread the market wants on the issue at the reset date
- Prices are quoted as a percent of par value (discussed in more detail in Chapter 7)

Call and Refunding Provisions

- Indenture may have provisions that grant either the bondholders or the issuer the right to alter the maturity of the bond by taking certain actions
- These rights are called *embedded options* and are discussed below
- A call feature / provision gives the issuer the right to retire debt prior to maturity
- Benefits for corporations:
 - Permits them, should market rates fall, to replace the bond issue with a lower-interest-cost issue
 - More flexibility to manage cash and restructure balance sheets

- Detrimental to investors because:
 - Run the risk of losing a high-coupon bond when rates begin to decline
 - Reinvestment will likely be at a lower yield because of the declining interest rates
 - Limits appreciation on bond value
 - * That is, interest rate decreases are typically associated with an increase in PV and bond value. This is limited for a callable bond because it is more likely to be called when rates decrease
- Callable bonds typically have higher yields and are callable at a premium above par
- Bond refunding - the concept of paying off higher-cost bonds with debt that has a lower net cost to the issuer of the bonds. When market rates are about to fall, the borrower may be tempted to replace a high-coupon debt with a new low-coupon bond
 - This action is usually taken to reduce the financing costs of a business
- The price at which the bond may be called is the “call price”
- The difference between the call price and principal is the “call premium”
- Deferment period / period of call protection - specified number of years in the early life of the bond during which the issuer may not call the debt
 - Either non-callable (NC) or nonrefundable (NF) for a specified period
 - A nonrefundable bond can be retired from internally generated funds (not from issuing new debt)
 - A bullet bond is a bond that is non-callable for the life of the bond
 - If a bond does not have any protection against an early call, then it is said to be currently callable
- **Make-whole call provisions**
 - In contrast to the standard call feature that contains a call price fixed by a schedule, a make-whole call price varies *inversely* with the level of interest rates
 - The call price varies with interest rates to protect the investor from reinvestment risk (e.g. when rates are low, the call price is high)
 - * Because the make-whole call price increases as interest rates decrease, this gives investors some protection against reinvestment rate risk
 - An issuer will call a bond if the present value of interest savings is greater than call premium and cost to issue new securities
 - The make-whole call price is the greater of:
 1. 100% of the principal amount + accrued interest
 2. Make-whole redemption amount

- * The make-whole redemption amount is the sum of PV of remaining coupon payments and principal + accrued interest
 - * PV is calculated at a discount rate given by yield on a Treasury security that matches the bond's remaining maturity plus a spread (e.g. Treasury Rates plus 15bps)
- Note: The next green box example and the TIA video series will work through examples of the call price calculation.
 - Municipalities sometimes pre-refund the debt by placing securities in an irrevocable trust

Bond Refunding Example

Suppose a firm has outstanding debt that is callable. The firm is determining if refunding is economically favorable. You are given the information below:

Outstanding debt to be refunded	\$300 million
Coupon rate (annual)	10%
Maturity	15 years
Call price for bonds	\$105 per \$100 par value (or 5% premium)
Issuing expenses and legal fees	\$2 million
Tax Rate	30%
Coupon rate on new similar bond	7.8%

Given the information above, answer the following:

- (a) Compute the after-tax call premium and expenses
- (b) Compute the after-tax annual interest savings
- (c) Compute the PV of refunding. Is it an economically profitable transaction? That is, determine whether the net present value of refunding the transaction is positive.

Solution:

Note that answers below are in units of millions.

$$(a) \text{ After-tax call premium and expenses} = [(\$300)(5\%) + (\$2)](1 - 0.30) = \$11.90$$

$$(b) \text{ After-tax annual interest savings} = (10\% - 7.8\%)(\$300)(1 - 0.30) = \$4.62$$

- (c) The firm has a one-time payment of \$11.90 in exchange for \$4.62 of savings each year for 15 years. The appropriate after-tax discount rate is $7.8\% \cdot (1 - 30\%) = 5.46\%$

$$\text{PV of savings @ after-tax rate of } 5.46\% = (\$4.62)a_{\overline{15}|} = (\$4.62)(10.06) = \$46.48.$$

$$\text{Thus, the net PV is } 46.48 - 11.90 = 34.58 > 0.$$

Thus, PV is positive so it is an economically profitable transaction.

Sinking-Fund Provision

- A *sinking-fund provision* requires the obligor to retire a certain amount of the outstanding debt each year
- This is done by:
 1. Purchasing bonds in open market
 2. Allowing trustee to redeem certain bonds by lottery
- Common in private placements
- Advantages to investor:
 1. Orderly retirement of debt
 2. Enhances liquidity
 3. Prices more stable (issuer continuously buys security)
- Disadvantages to investor:
 1. Time and effort invested in analyzing the bond is wasted if bond is called very early
 2. Bond may be called at par when interest rates are low
 3. Optional acceleration feature – the issuer can retire more than required by sinking fund (issuer will do so if interest rates are low)

Put Provisions

- A *puttable bond* grants the investor the right to sell the issue back to the issuer at par value on designated dates
 - Will do this if interest rates have risen, and the investor can force the issuer to redeem the bond at par
- A *hard put* is one that must be redeemed for cash
 - Soft puts can be cash, common stock, or another debt instrument

Convertible or Exchangeable Debt

- With a convertible bond, the investor can exchange the bond for a given amount of common stock
- Conversion cannot be reversed, and the terms of the conversion are set by the company in the bond's indenture

- The conversion ratio specifies the amount of common stock for one bond (it may change over the life of the bond)
 - For example, the conversion ratio may state that each bond (e.g. \$1,000 of par value) can be exchanged for 20.6949 shares
 - The conversion price is then $\frac{1000}{20.6949}$, or \$48.32 per share
- The conversion privilege may only be for a specified time
- Convertible bonds are usually callable (the issuer can force conversion)
 - May have a call protection period to a specified date or price of the common stock
- An exchangeable bond can be exchanged for the common stock of *another* firm

Warrants

- Warrant - an option for the investor to purchase shares of the company at a preset exercise price (like a call option)
- The exercise price may change over time (according to the bond's indenture)
- Most warrants have a long life
- Some warrants are detachable, meaning they can be traded separately from the bond

Bond Yield

- There are many ways to describe the potential return when investing in a bond
 - Returns can be calculated using a number of different yield measures: current yield, yield-to-maturity, yield-to-call and yield-to-put
 - "Yield-to-worst" refers to the lowest of these and is often quoted for bonds
 - *Note: These terms are discussed in more detail in QFIP-135, where we will see concrete definitions and numerical examples involving these terms. So, for now, just keep in mind this is a brief introduction of what is to come later on in the syllabus*
- Some yields have gone into negative territory (e.g. Eurozone, Switzerland, Sweden, Japan)
- Decline in yields is driven by many factors, including accommodative monetary policy
- Statistics for Bloomberg Barclays Global Aggregate Treasury Index for June 2020:
 - Average duration of 8.6 years
 - Average yield of 0.55%

- Total market value of \$31 trillion
- Comprised of government bonds of 41 developed and emerging countries
- 27% of the index market value offering negative yield
- Bonds with negative yield have such a high current purchase price that the cash flow stream of coupons (if any) and face value at maturity would result in a negative YTM
- Negative yields do not necessarily imply a negative total investment return. For example, a bond with negative yield may appreciate in price and you may get a positive return by selling it before maturity
- Better measure of the potential return from holding a bond over a predetermined investment horizon is the *total return measure*
- Total return measure considers all sources of potential dollar return and can be used to analyze bond swaps and bond performance

Medium-Term Notes

- Medium-term notes are flexible debt instruments that are typically non-callable and unsecured
- Despite the name, terms to maturity range from 9 months to 30+ years
- Structured medium-term notes, or simply structured notes, are debt instruments linked to a derivative position
- Structured notes are usually created with an underlying swap transaction

Preferred Stock

- Preferred stock is a class of stock, not a debt instrument, but it shares characteristics of both common stock and debt
- In between debt and common stock
- Pays dividends that are a specified percentage of the face value
- Failure to pay dividends will not cause bankruptcy
 - Called *cumulative* if the dividends must be paid at a later date
 - Failure to make dividend payments may lead to certain restrictions for management, such as granting preferred stockholders voting rights
- Dividend payments are not tax deductible (versus coupon payments on bonds, which are tax deductible)

- Corporations that invest in preferred stock can exclude 70% of the dividends from taxable income
- Implications of preferred stock dividend taxation:
 1. Most investors in preferred stock are corporations seeking tax advantages
 2. Preferred stock costs less to issue than if there were no tax advantages
- Similarities to debt (if cumulative)
 1. Payments to preferred stockholders promised by the issuer are fixed
 2. Priority over common stockholders in bankruptcy (called senior security)
- Some have no maturity (called perpetual preferred stock)
- Most have sinking fund provisions

Residential Mortgage-Backed Securities (RMBS)

- Residential mortgage-backed security (RMBS) is an instrument whose cash-flow depends on the cash-flows of an underlying pool of mortgages
- Two main groups – agency RMBS and nonagency/private-label RMBS:
 - **Agency RMBS** are issued and fully guaranteed by a government agency like Ginnie Mae, Freddie Mac, or Fannie Mae
 - * Ginnie Mae is a federal government agency within the Department of Housing and Urban Development; guarantees RMBS issues with the full faith and credit of the U.S. government
 - * Freddie Mac and Fannie Mae are government sponsored enterprises (GSEs). In September 2008, these two entities were placed into conservatorship
 - * Bloomberg Barclays U.S. Aggregate Bond Index measures MBS sector
 - **Nonagency RMBS (also called private-label RMBS)** are issued by thrifts, commercial banks, or private conduits (not backed by any government entity)
 - * Structured to provide credit enhancement to support the credit ratings they receive
 - * Prior to 2007, this was split into prime and subprime markets. The prime markets were generally those borrowers with FICO credit scores of 660 or higher (and, subprime was a FICO score below 660)
 - * After the 2008 financial crisis, investors no longer draw as sharp of a distinction between these two sectors of the private-label RMBS market

- RMBS Forms
 1. Mortgage Pass-Through Securities
 2. Collateralized Mortgage Obligations (CMO)
 3. Stripped Mortgage-Backed Securities
- Agency RMBS come in all 3 forms
- Nonagency RMBS are typically CMOs (2nd form)
- Both agency and nonagency RMBS expose investors to prepayment risk
 - Risk that the borrowers in a mortgage pool will prepay their loans when interest rates decline
- Credit risk is the most significant risk associated with nonagency RMBS

Commercial Mortgage-Backed Securities (CMBS)

- Backed by a pool of commercial mortgage loans
- The basic building block of the CMBS transaction is a commercial loan that was originated either to finance a commercial purchase or to refinance a prior mortgage obligation
- Conduits are commercial-lending entities established for the sole purpose of generating collateral to securitize CMBS
- Commercial mortgage loans are non-recourse loans
 - Lender can only look to the income-producing property backing the loan for interest and principal repayment

Asset-Backed Securities (ABS)

- ABS are collateralized by assets that are not mortgage loans (e.g. credit card receivables, home-equity loans, manufactured homes, and automobile loans)
- Pass-throughs (like mortgage pass-throughs) and pay-throughs (like CMOs)
- Three common types of ABS:
 - Credit card receivables
 - Home equity loans
 - Automobile loans

Covered Bonds

- A covered bond is a debt instrument secured by a specific pool of collateralizing assets
- More common in Europe
- Differs from the typical U.S. MBS in the following ways:
 - Cover (collateral) pool stays on issuer's balance sheet
 - Mortgages in cover pool serve only as collateral; principal and interest are paid from issuer's cash flows
 - Cover pool is dynamic – nonperforming mortgages are replaced with performing ones
 - Structured to prevent prepayments before maturity
 - Investors retain an unsecured claim on issuer for any shortfalls

Beyond Traditional Liquid Fixed Income Instruments

- Reasons for the boost of private credit compared to the liquid public fixed income market:
 - Regulatory challenges and pressures on bank balance sheets
 - Decline in interest rates / search for additional yield
- Private/alternative credit has gained traction in recent years and includes:
 - Below investment-grade corporate and securitized bonds
 - Less liquid investments such as direct lending, nonperforming loans and distressed credit
- Private debt borrowers can be grouped into different categories:
 - Residential
 - Commercial Real Estate
 - Corporate
 - Other
- By investing in private credit, investors can take advantage of higher expected return since these opportunities reside in less efficient markets (demanding additional illiquidity premium)
- Private credit strategies typically give more direct control and involve more active involvement than buying or selling publicly traded credit securities
- Investors can get exposure to alternative credit either in a hedge fund structure or in a drawdown structure as private direct lending fund limited partners

Conclusion

- Bonds differ on a number of dimensions (e.g. issuer, maturity, coupon, principal amount, method of redemption, embedded options)
- Medium-term notes are highly flexible debt instruments
 - Can be easily structured in response to changing market conditions and investor tastes
- Structured notes are debt instruments that are linked to a derivative position
 - Allow an issuer to create a customized debt instrument for an investor
- Preferred stock is a security that shares characteristics of debt and equity
- Residential RMBS are classified into agency and nonagency securities
- There are three types of RMBS:
 1. Mortgage Pass-Through Securities
 2. Collateralized Mortgage Obligations (CMO)
 3. Stripped Mortgage-Backed Securities
- Asset-backed securities are collateralized by financial assets other than residential mortgages
- A covered bond is a debt instrument secured by a specific pool of collateral called a collateral pool
- Alternative credit covers a wide range of strategies including liquid investments such as below-investment-grade corporate and securitized bonds, as well as less liquid or illiquid strategies such as direct lending, nonperforming loans, and distressed credit

Handbook of Credit Risk Management: Chapter 20

Bouteille, Coogan-Pushner (2022)

Overview

Chapter 20 covers “Credit Derivatives”. This is a broad chapter that covers many of the essential characteristics of credit default swap (CDS) contracts.

Key topics for the exam include:

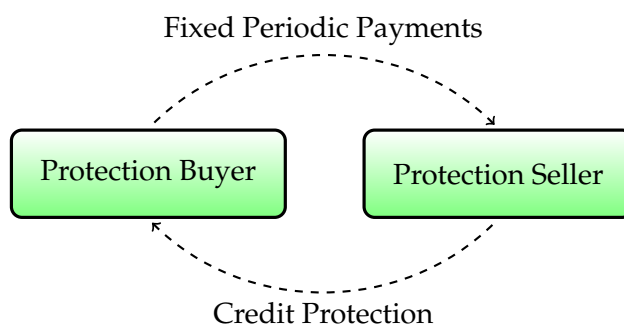
- Compare the role of a protection buyer vs a protection seller for CDS contracts, including a description of potential cash flows for each party
- Describe the payment structure of a CDS, including explaining the difference between upfront and running payments on a CDS contract
- Understand that CDS payment is triggered by *credit events* (and not based on whether the buyer has suffered a loss on the underlying bond)
- State the two types of standard credit events (i.e. bankruptcy and failure to pay)
- Compare cash vs physical settlement of CDS contracts
- State the two disadvantages of physical CDS settlement
- Describe “bond squeeze”
- Briefly explain the basics of accounting treatment for CDS contracts
- State the three predominant uses of CDS contracts

Introduction

- Derivatives often have a poor public reputation
- Warren Buffett: “In my view, derivatives are financial weapons of mass destruction”
- Some forms of credit derivatives did play a major role in the 2007-2008 financial crisis
- Credit derivatives still have a legitimate role in the risk manager’s toolbox
- One point the reading repeatedly mentions is that *you do not have to hold a bond to purchase CDS protection*
 - Also keep in mind the total bond market size does not need to align with the total CDS notional
 - Many parties purchase bonds without CDS protection, and many parties speculate on credit risk and purchase CDS without holding the underlying bond
- Volume has declined significantly from \$60 trillion gross notional outstanding in 2007 compared to \$11 trillion in June 2021

The Product

- Credit derivative is a generic term that captures all derivative products related to the transfer or assumption of credit risk only
- The most common form of a credit derivative is a credit default swap (CDS)
 - Total CDS notional in June 2021 was \$11.3 trillion generated by 598,000 trades
- CDS includes a protection buyer and protection seller:
 - Protection buyer often holds existing credit risk for an entity and wishes to transfer the credit risk. Pays a spread/premium to the protection seller in exchange for protection against default
 - Protection seller is ready to accept the credit risk



- The CDS contract is between the protection seller and the protection buyer
- The reference entity (RE) is typically not involved or even aware the transaction takes place
- In case of default of the reference entity, the protection seller pays the protection buyer
- The reading argues that CDS are an option moreso than an insurance contract or swap
 - They make the argument it is NOT an insurance contract because you can purchase CDS without holding the underlying bond. You don't need to have experienced a loss to be paid for a CDS when there is default on the reference entity
- CDS use standardized forms developed by the International Swap and Derivatives Association (ISDA)
- Notional amount (also called the "floating rate payer calculation amount") is the largest payment that could occur should default occur with no recovery
- Premium/spread is typically quoted annually and paid quarterly
 - Example: Suppose the CDS notional is 10 million and the spread is 80bps
 - Then, quarterly payments of $20\text{bps} \cdot 10 \text{ million} = 20,000$ are due from the protection buyer to the protection seller

- CDS transactions can be quoted as having an upfront plus a running spread
 - Upfront³ is an initial payment and then the running spread is the ongoing cost
 - Upfront payments can be substantial, particularly if the reference entity is distressed
 - Example: A CDS on a junk bond might be 10 percent upfront plus a 500bps running spread. This means 10 percent of notional would be due at inception of the CDS contract, with 125bps quarterly payments
 - Upfront spreads became more common starting in April 2009 (the “Big Bang”), when using both an upfront payment and a fixed running coupon for the lifetime of the derivative contract was introduced
- Typical tenor is five years
 - Most common tenors are 1/3/5/7 years
 - Beyond 7 year tenors is rare
- Largest buyers of CDS:
 - Corporations
 - Insurance companies
 - Hedge Funds
 - Banks
- Largest sellers of CDS:
 - Hedge Funds
 - Banks
- Largest market participants in volume are investment banks such as Deutsche Bank, J.P. Morgan, and UBS
- Trading terminology
 - *Coupon Rate*: Protection buyer pays the notional amount of the contract multiplied by the coupon (e.g. 100 bps p.a.) for the duration of the contract with quarterly payments
 - *Points Upfront (Pts Upf)*: Percentage of notional paid at the inception of the contract
- IBM Example
 - Consider a five-year CDS for IBM Corp trading on May 4th, 2021
 - Priced at “38.494 bps per annum”, meaning for a contract offering five years of protection the buyer would pay .38494% of the exposure each year
 - Assuming a \$10 million exposure, this leads to a payment of \$38,494 per year

³The upfront payment is equal to the present value of the difference between the actual CDS spread and the standard running spread.

- The reading looks at an example where⁴ Pts Upf = -3.0957. The negative sign is to emphasize that in this case, the upfront payment is actually from the seller to the buyer

CDS Payment Example

Suppose a protection buyer purchases a CDS with the following terms:

- Five year tenor
- \$10 million notional
- No upfront premium
- 65bp per annum running spread with quarterly payments

What is the total annual payment for this contract? Describe the payment structure.

Solution:

The annual payment is 65,000. This breaks down into quarterly payments of 16,250.

The Settlement Process

Overview

- CDS payment is triggered by **credit events**
 - Amount of payment for standardized CDS contracts is the same for all buyers of the CDS on the same reference entity
 - Payment is not triggered by any actual loss experienced by the protection buyer (in fact, the protection buyer does not even need to hold the underlying bond)
 - Next, we will look at the concept of credit events more closely

Credit Events

- Payment/settlement process starts once a credit event occurs
- ISDA gives standardization and wording around what constitutes a credit event
- Details are written in the transaction documents

⁴Note that there is an approximate relationship between the spread of 38.494 bps and Pts Upf of -3.0957. We can divide the points upfront by five to convert to annual terms. Of course, this is an approximation because it ignores the time value of money. The approximation is: Spread (p.a.) \approx Coupon (p.a.) + Pts Upf / Tenor, or 38.494% \approx 100% - 3.0957/5.

- The following two events are standard credit events that apply to most contracts:
 - **Bankruptcy**
 - **Failure to pay**
 - * Failure to pay occurs if any interest or principal payment is not made in full by the required time
 - * Sometimes a grace period is defined in the contract, and failure to pay only occurs after the grace period has elapsed
- The next two events *sometimes* qualify as credit events, depending on the transaction documents and definitions used:
 - Debt restructuring
 - * If debt is renegotiated with banks and terms are worsened (e.g. longer maturity) then this may qualify as a credit event
 - Finally, the reading mentions there are other events that may, but rarely qualify, such as obligation default, obligation acceleration, repudiation/moratorium
 - * *Note that these terms are not defined or described in the reading, so you are not responsible for the specifics here. Just understand that the legal language is important and gives the definition of a credit event, which is important and triggers the payment process. What specifically constitutes a credit event can depend on complex legal language and vary.*
- If multiple credit events are defined in the contract, any one of them being met triggers the payment process
- ISDA has created five regional credit derivatives determinations committees (DCs), which decide on credit events and the resulting cash settlements
 - Often credit events are black-and-white, but these committees can help with more involved cases (e.g. complex restructuring)
- Occurrence of a credit event also means the early termination of the CDS prior to maturity
 - In this case, the protection is no longer available after a credit event, in the rare event the defaulted entity keeps operating and defaults again
- ISDA Legal Terms
 - Legal terms used by market participants are updated from time to time by ISDA
 - Definitions published by ISDA in 2014 were updated in 2019; some financial institutions were abusing the 2014 definitions and were engineering bankruptcies primarily in order to trigger a CDS settlement rather than properly reorganizing a struggling company
 - As a result, ISDA published in 2019 a “Narrowly Tailored Credit Event Supplement” to address the shortcomings of previous definitions
 - Main change was the introduction of a “Credit Deterioration Requirement” in the “Failure to Pay” definition, to make sure that companies would not voluntarily fail to pay back their debt but do so only in case of real financial stress

Cash versus Physical Settlement

- Physical settlement prevailed up until the early 2000's
 - Physical settlement presumed buyers were using CDS contracts to protect their actual investments in the reference entity (e.g. bond)
 - Protection buyer would deliver the bond/loan to the protection seller
 - Protection seller would pay the protection buyer the underlying par value
 - Seller would use the bond to recover whatever was available from the sale of the issuer's assets
 - Protection sellers could also sell the bonds and other obligations at deep discounts to third-party investors who specialize in distressed securities
 - Example: Suppose a credit event is triggered
 - * Then the protection buyer will deliver the bond to the protection seller and in return receive the par value (e.g. \$1 million)
 - * The protection seller may then sell the bond for some fractional value (e.g. \$600,000) based on the recovery rate
 - This process has shortcomings because it assumes protection buyers hold the underlying security (e.g. bond), which is not always the case
 - * If they were not holding the bond, they would need to if there was a credit event
 - * Under physical settlement, protection buyers need to hold the bond and so there is a rush to purchase the cheapest-to-deliver bond if there is a credit event
 - * Surge in demand could lead to inflated prices and reduce the amount the protection buyer would collect
 - * This increase in bond prices and reduction in profit is called the "bond squeeze" and occurred for major bankruptcies in the early 2000s such as Enron
 - Two disadvantages of physical CDS settlement:
 1. Bond squeeze effect
 2. Other technical difficulties (e.g. need to deliver the bond of the appropriate contractual terms including the appropriate tenor)
- Cash settlement is more common now and discussed in the next section

Cash Settlement and Credit-Event Auction

- In cash settlement, upon a credit event, the CDS seller pays the CDS buyer a portion of the notional amount of the CDS equal to $(1 - \text{Recovery Rate})$ times the notional CDS amount
- Example: Consider a \$10 million notional loan with a 40% recovery rate.
 - The bondholder receives \$4 million back before any CDS payoff
 - Then the CDS pays off the remaining \$6 million
 - This is calculated as $(1 - 40\%) \cdot \$10 \text{ million} = \6 million
- The objective of cash settlement is to make investors whole when the entity defaults (e.g. provide the remaining \$6 million in the example above)
- Determining the recovery rate can be challenging:
 - After a credit event, buyers seek to be paid right away, but the actual recovery rates on bonds or loans remain unknown for quite some time as bankruptcy proceedings ensue
 - CDS dealers participate in credit-event auctions controlled by ISDA committees
 - Auction establishes a market price for the distressed reference security, which becomes the recovery rate used for the cash settlement of CDS contracts
 - This market price is typically established within a quick timeframe after a credit event, usually within a month
 - Auctions have the advantage of being transparent and quick
- Recovery rate is supposed to mimic the credit risk of a senior unsecured loan
- Some buyers may have credit exposure to the entity but may have a different recovery expectation than most senior unsecured creditors
 - In this case, simply scale the amount of CDS notional purchased appropriately
 - For example, if a junior debtholder expects to recover around half of a typical senior debtholders amount, they could approximate that the notional position should be doubled
- Hertz Example
 - Hertz filed for bankruptcy protection on May 22nd, 2020 as a result of COVID-19
 - On May 24th, the determination committee confirmed a credit event had taken place
 - Auction held on June 24th
 - Settlement occurred on June 26th
 - Final price for the senior unsecured debt was 26.375 cents per dollar of notional
 - CDS protection sellers were then required to pay the remaining 73.625 cents per dollar of notional
 - For a CDS contract with \$10 million of notional, protection sellers paid the buyers \$7.3625 million (equal to the notional less the recovery value)

Valuation and Accounting Treatment

- US GAAP and IFRS require that CDS are marked to market (MTM), and that changes in their values are recognized in income for both the protection seller and protection buyer
- CDS prices are volatile and thus can cause large swings in income
- Volatility may reflect general market uneasiness, which is not necessarily related to the fundamental credit quality of the reference entity
- Corporations may avoid purchasing CDS because it could lead to earnings volatility, which may not be understood by certain stakeholders
- MTM value of a CDS is the present value of the difference between the prevailing market price the day of the valuation and the transaction price
- One mathematical complication with computing MTM is that credit events result in termination of future premium payments
 - Cash flows are uncertain based on the chance of a credit event happening at any point over the tenor of the contract
- Another complication is that buyer and sellers adjust MTM valuations of CDS positions based on the creditworthiness of themselves and their counterparties
 - Called credit valuation adjustments (CVA) and debit valuation adjustments (DVA)
 - CVA involves reducing the value of what's owed based on the creditworthiness of a counterparty
 - DVA involves marking down obligations to counterparties for your own credit risk

CDS MTM Calculation Example

You are given the following about a CDS contract:

- There is no upfront payment and all payments are running
- The initial contract for a CDS purchased previously was 100bps per annum
- Due to deteriorating credit conditions, CDS protection is currently selling at a market price of 150bps per annum
- Assume the notional is \$10 million
- Assume the relevant annuity factor for the remaining payments is 10

Determine the MTM value for the protection buyer and protection seller. You may assume there are no CVA or DVA adjustments made.

Solution:

Credit conditions worsened, so the protection buyer has an MTM gain.

$$\text{Protection Buyer MTM} = (1.5\% - 1\%) \cdot \$10 \text{ million} \cdot 10 = 500,000$$

The protection seller MTM is then -500,000.

Three Predominant Uses of CDS

1. Protection of a Credit Exposure

- *This involves holding a bond and purchasing CDS for credit protection*
- This was the original use of CDS – managing risk for existing bond exposures
- Useful to reduce exposure levels or when there is concern over counterparty credit deterioration
- Disadvantages include income statement volatility and basis risk
- Basis risk captures the difference between the actual loss and the compensation received from the settlement

2. Investment in Credit: Long Credit

- *This involves selling a stand-alone CDS with no underlying bond position*
- Investment in credit by selling the CDS and earning a credit spread
- Motivation of most protection sellers is to make money by taking an exposure to credit risk, that is, to invest in credit risk
- There is a theoretical equivalence that purchasing a US Treasury bond plus selling a CDS has similar risk exposures as corporate bonds
- Advantages of selling CDS:

1. Allows one to take credit risk on a stand-alone basis (e.g. can just sell a CDS without holding a bond and carrying large interest rate risk)
2. Selling a CDS does not require a cash investment
 - However, there may be collateral requirements
 - CDS positions are leveraged, and protection buyers want to ensure that protection sellers have adequate liquidity if a credit event occurs

3. Speculation In Credit: Shorting Credit

- *This involves buying a stand-alone CDS with no underlying bond position*
- Investor can short a reference entity's credit by buying a CDS without having an underlying exposure to protect
- Hedge funds may speculate a negative view on the credit trend of a company and short credit by selling CDS
- Transaction delivers a profit in case the reference entity deteriorates or defaults
- Presence of large short positions may call into question the reference entity's creditworthiness
- This strain can make it harder for the reference entity to get adequate funding in lending markets, and lead to a deterioration of liquidity
- There also may be a conflict of interest. Large short positions may put strain on a company and make a company more likely to default. Speculators could push aggressive short credit positions in hopes of triggering default
- Regulators and government officials dislike naked short CDSs because they could accelerate the demise of a company or of a country
- Challenges include greater credit exposure to counterparties, use of credit lines, and the possible cost of posting collateral
- Bill Ackman, founder of hedge fund Pershing Square, felt COVID could have a devastating effect on the worldwide economy and purchased CDS in early 2020. This generated a realized gain of \$2.6 billion in a few weeks
- Three steps involved for implementing short credit trades:
 1. Fund manager identifies a reference entity where they believe financial conditions will deteriorate more aggressively than the overall market anticipates
 2. Buy CDS, often from multiple counterparties in order to reach a large notional
 3. After the significant credit deterioration occurs, the fund manager can either unwind or sell the position for a profit

Shorting Credit Example

You are given the following:

- Suppose a fund manager purchases CDS with 100 million notional, five year tenor, and 100bps per annum fee
- After two years, the credit quality of the reference entity deteriorates and the market price of CDS contracts is 300bps per annum
- Assume, for simplicity, you can use an annuity factor of 3 (which corresponds to the remaining tenor of the CDS)
- The CDS has no upfront cost and all premiums are running
- Assume no CVA/DVA adjustments

Suppose the fund manager unwinds the transaction today, terminating the future cash flows by settling the difference between the contractual terms and the prevailing market conditions. Compute the MTM gain/loss on the unwind of the CDS.

Solution:

$$(3\% - 1\%) \cdot 100 \text{ million} \cdot 3 = \boxed{6 \text{ million}}$$

Thus, the fund manager experiences a gain of 6 million.

Credit Default Swaps for Credit and Price Discovery

- CDS prices are a source of information regarding an obligor's credit quality (i.e. low spreads imply higher credit quality)
- Prices reflect all the market information about the credit quality of an obligor and tend to react quickly to changes in circumstances

Credit Default Swaps and Insurance

- CDSs are not an insurance product
- They do not reimburse the protection buyer according to their actual losses
- Anyone can buy a CDS even if they do not hold the underlying bond
- Insurers were large sellers of CDS prior to 2007 and experienced huge losses when the mortgage market collapsed
 - Insurer's involvement in CDS markets has decreased since the 2007-2008 financial crisis
 - Activity is mostly focused on purchasing CDS protection to hedge existing corporate bond credit risk

- US insurance regulators frown on licensed insurance carriers from engaging in derivative transactions
 - Require approval, disclosure, and often steep capital charges
- Larger insurers often establish subsidiaries with a parental guaranty, securing a high credit rating and thus securing better terms in dealing with counterparties

Brief Look at Other Varieties of CDS's

The remainder of this chapter takes a very brief look at other varieties of CDS. As you read through the descriptions below, keep in mind the author only touches on each of these very briefly. The details of these securities are not discussed and so you are not expected to have a rigorous understanding of these securities; instead, understand the CDS market is broad with many types of securities such as those listed below.

Indexes

- Credit default swap indices give broad credit risk exposure to many entities
- Three main families of corporate CDS:
 1. North American corporate reference entities (CDX)
 - Can be further broken down into investment grade (CDX.NA.IG) and high yield (CDX.NA.HY) exposures
 2. iTraxx Europe
 3. iTraxx Asia-Pacific
- For credit risk managers using CDS to hedge corporate bond exposure to a particular entity, CDS indices may have limited use
- Credit default swap indices are more helpful for those looking to get exposure to general directional movements of credit spreads

Loan CDS (LCDS)

- Can be called Loan CDS, LCDS, or loan-only CDS
- Meant to cover leveraged, syndicated, secured credit exposures
- This is in contrast to CDS contracts that mimic senior unsecured exposures
- LCDS typically experience higher recovery rates than traditional CDS due to the exposure being secured
 - This is because the debt underlying an LCDS is secured to assets, and thus has priority in liquidation proceedings
- Only reference obligation that can be physically delivered in case of default is a secured loan

- Can be of interest for risk managers anxious to protect exposures on noninvestment-grade names
- *Note: The reading only covers the above points very briefly, so I don't believe you would be responsible for details of LCDS on the exam. If you would like to get further background on LCDS, this is a helpful link.*

Municipal Obligation CDSs (MCDS)

- CDS contracts designed to reference municipal obligations
- These contracts were nonstandardized prior to 2012
- Standardized by the ISDA starting in 2012
 - This meant credit event auctions were used for managing credit events that occurred
 - Due to standardization, the MCDS market grew. However, it is still a small segment of the CDS market
- Volume is low (illiquid) and limited to only a handful of active banks

Asset-Backed Securities (ABS CDS)

- Widely used in the mid-2000s to build synthetic collateral debt obligations
- *Note: This reading does not explain the details of how ABS CDS works, but if you would like to get further background on ABS CDS, this is a helpful link.*