

Introduction to Fixed Income World

Anton Ivanov
Center of Mathematical Finance
Moscow State University
cmf.ivanov@gmail.com

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1 Introduction

Before we start, I want you to answer the following questions: 1. What is a debt security? Did you have any previous experience with them? 2. Does debt differ from equity or a derivative? In which way? 3. Are you familiar with time value of money concepts? 4. Why learn fixed income?

The objectives of this course are: 1. Describe important fixed income securities classes and markets, 2. Describe interdependencies and the roles of the different players in the debt markets, 3. Develop tools for valuing fixed income securities and managing interest rate risk, 4. Develop economic intuition.

The course covers: 1. Traditional bonds and term structure concepts, 2. Fixed income derivatives, 3. Interest rate modeling.

2 Features of Debt Securities

2.1 Basic concepts

In its simplest form, a fixed income security is a financial obligation of an entity that promises to pay a specified sum of money at specified future dates. The entity that promises to make the payment is called the *issuer* of the security. Fixed income securities fall into two general categories: 1. debt obligations, 2. preferred stock. In the case of a debt obligation, the issuer is called the *borrower*. In contrast to a fixed income security that represents a debt obligation, preferred stock represents an ownership interest in a corporation. Dividend payments are made to the preferred stockholder and represent a distribution of the corporation's profit.

Fixed income securities that are debt obligations include:

- Bonds,
- Mortgage-backed securities,
- Asset-backed securities,
- Bank loans.

The *term to maturity* of a bond is the number of years the debt is outstanding or the number of years remaining prior to final principal payment. Some market participants view bonds with a maturity between 1 and 5 years as “short term.” Bonds with a maturity between 5 and 12 years are viewed as “intermediate-term,” and “long-term” bonds are those with a maturity of more than 12 years. The issuer can agree to pay the entire amount borrowed in one lump sum payment at the maturity date. That is, the issuer is not required to make any principal repayments prior to the maturity date. Such

bonds are said to have a *bullet maturity*. We will frequently use the terms “fixed income securities” and “bonds” interchangeably.

The *par value* of a bond is the amount that the issuer agrees to repay the bondholder at or by the maturity date. This amount is also referred to as the principal value, face value, redemption value, and maturity value. The practice is to quote the price of a bond as a percentage of its par value. When a bond trades below (above) its par value, it is said to be *trading at a discount* (*trading at a premium*).

The *coupon rate*, also called the *nominal rate*, is the interest rate that the issuer agrees to pay each year. The coupon is determined by multiplying the coupon rate by the par value of the bond. When describing a bond of an issuer, the coupon rate is indicated along with the maturity date. For example, the expression “6s of 01/12/2020” means a bond with a 6% coupon rate maturing on 01/12/2020. The “s” after the coupon rate indicates “coupon series.” In the United States, the usual practice is for the issuer to pay the coupon in two semiannual installments. Mortgage-backed securities and asset-backed securities typically pay interest monthly. For bonds issued in some markets outside the United States, coupon payments are made only once per year. Investors tend to find zeros less attractive in lower-interest-rate markets because compounding is not as meaningful as when rates are higher.

2.2 Classification of coupon rates

Bonds that are not contracted to make periodic coupon payments are called *zero-coupon bonds* or *discount bonds*. The holder of a zero-coupon bond realizes interest by buying the bond substantially below its par value (i.e., buying the bond at a discount). Interest is then paid at the maturity date, with the interest being the difference between the par value and the price paid for the bond. One important risk is eliminated in a zero-coupon investment—the reinvestment risk. Because there is no coupon to reinvest, there isn’t any reinvestment risk.

Straight-coupon bonds have an interest rate set for the life of the issue, however long or short that may be, they are also called *fixed-rate bonds*.

There are securities that have a coupon rate that increases over time. These securities are called *step-up notes* because the coupon rate “steps up” over time. For example, a 5-year step-up note might have a coupon rate that is 5% for the first two years and 6% for the last three years.

Floating-rate securities, sometimes called *variable-rate securities*, have coupon payments that reset periodically according to some reference rate. The typical formula on certain determination dates when the coupon rate is reset is as follows:

$$\text{coupon rate} = \text{reference rate} + \text{quoted margin}$$

The quoted margin is the additional amount that the issuer agrees to pay above the reference rate.

A floater may have a restriction on the maximum coupon rate that will be paid at any reset date. The maximum coupon rate is called a *cap*. For example, suppose for a floater whose coupon formula is the 3-month Treasury bill rate plus 50 basis points,¹ there is a cap of 9%. If the 3-month Treasury bill rate is 9% at a coupon reset date, then the coupon formula would give a coupon rate of 9.5%. However, the cap restricts the coupon rate to 9%. Thus, for our hypothetical floater, once the 3-month Treasury bill rate exceeds 8.5%, the coupon rate is capped at 9%. Because a cap restricts the coupon rate from increasing, a cap is an unattractive feature for the investor. In contrast, there could be a minimum coupon rate specified for a floater. The minimum coupon rate is called a *floor*. A floor is an attractive feature for the investor.

Typically, the coupon formula for a floater is such that the coupon rate increases when the reference rate increases, and decreases when the reference rate decreases. There are issues whose coupon rate moves in the opposite direction from the change in the reference rate. Such issues are called *inverse floaters* or *reverse floaters*. It is not too difficult to understand why an investor would be interested in an inverse floater. It gives an investor who believes interest rates will decline the opportunity to obtain a higher coupon interest rate. The coupon formula for an inverse floater is:

$$\text{coupon rate} = K - L \times (\text{reference rate})$$

where K and L are values specified in the prospectus for the issue.

Why create so many different types of coupon rate? The short answer is that some of these coupon formulas allow the investor to take a view on either the movement of some interest rate (i.e., for speculating on an interest rate movement) or to reduce exposure to the risk of some interest rate movement (i.e., for interest rate risk management).

2.3 Indenture and covenants

The promises of the issuer and the rights of the bondholders are set forth in great detail in a bond's *indenture*. Bondholders would have great difficulty in determining from time to time whether the issuer was keeping all the promises made in the indenture. This problem is resolved for the most part by bringing in a trustee as a third party to the bond or debt contract. A corporate trustee is a bank or trust company with a corporate trust department and officers who are experts in performing the functions of a trustee. The corporate trustee must, at the time of issue, authenticate the bonds

¹A basis point, or bp, is a common unit of measure for interest rates and other percentages in finance. One basis point is equal to 1/100th of 1%, or 0.01% (0.0001).

issued – that is, keep track of all the bonds sold, and make sure that they do not exceed the principal amount authorized by the indenture. It must then be a watchdog for the bondholders by seeing to it that the issuer complies with all the covenants of the indenture. These covenants are many and technical, and they must be watched during the entire period that a bond issue is outstanding.

As part of the indenture, there are *affirmative covenants* and *negative covenants*. Affirmative covenants set forth activities that the borrower promises to do. The most common affirmative covenants are:

1. To pay interest and principal on a timely basis,
2. To pay all taxes and other claims when due,
3. To maintain all properties used and useful in the borrower's business in good condition and working order,
4. To submit periodic reports to a trustee stating that the borrower is in compliance with the loan agreement.

Negative covenants set forth certain limitations and restrictions on the borrower's activities. The more common restrictive covenants are those that impose limitations on the borrower's ability to incur additional debt unless certain tests are satisfied.

There may be provisions in the indenture that allow either the issuer or bondholder to alter a bond's term to maturity.

2.4 Accrued interest

The coupon payment is made to the bondholder of record. Thus, if an investor sells a bond between coupon payments and the buyer holds it until the next coupon payment, then the entire coupon interest earned for the period will be paid to the buyer of the bond since the buyer will be the holder of record. The seller of the bond gives up the interest from the time of the last coupon payment to the time until the bond is sold. The amount of interest over this period that will be received by the buyer even though it was earned by the seller is called *accrued interest*.

The bond buyer must pay the bond seller the accrued interest. The amount that the buyer pays the seller is the agreed price for the bond plus accrued interest. This amount is called the *full price*. (Some market participants refer to this as the *dirty price*.) The agreed upon bond price without accrued interest is simply referred to as the *price*. (Some refer to it as the *clean price*.) There are exceptions to the rule that the bond buyer must pay the bond seller accrued interest. The most important exception is when the issuer has not fulfilled its promise to make the periodic interest payments. In this case, the issuer is said to be in default.

2.5 Bond provisions

Fixed income securities backed by pools of loans (mortgage-backed securities and asset-backed securities) often have a schedule of partial principal payments. Such fixed income securities are said to be *amortizing securities*. For many loans, the payments are structured so that when the last loan payment is made, the entire amount owed is fully paid. For amortizing securities that are backed by loans that have a schedule of principal payments, individual borrowers typically have the option to pay off all or part of their loan prior to a scheduled principal payment date. Any principal payment prior to a scheduled principal payment date is called a *prepayment*. The right of borrowers to prepay principal is called a *prepayment option*.

An indenture may require the issuer to retire a specified portion of the issue each year. This is referred to as a *sinking fund requirement*. The alleged purpose of the sinking fund provision is to reduce credit risk. This kind of provision for debt payment may be designed to retire all of a bond issue by the maturity date, or it may be designed to pay only a portion of the total indebtedness by the end of the term. If only a portion is paid, the remaining principal is called a *balloon maturity*. Generally, the issuer may satisfy the sinking fund requirement by either:

1. Making a cash payment to the trustee equal to the par value of the bonds to be retired; the trustee then calls the bonds for redemption using a lottery,
2. Delivering to the trustee bonds purchased in the open market that have a total par value equal to the amount to be retired.

Selected issues may permit variable periodic payments, where payments change according to certain prescribed conditions set forth in the indenture. Many bond issue indentures include a provision that grants the issuer the option to retire more than the sinking fund requirement. This is referred to as an *accelerated sinking fund provision*.

At any time a firm may execute a *tender offer* and announce its desire to buy back specified debt issues. Firms employ tender offers to eliminate restrictive covenants or to refund debt. Usually the tender offer is for “any and all” of the targeted issue, but it also can be for a fixed dollar amount that is less than the outstanding face value. An offering circular is sent to the bondholders of record stating the price the firm is willing to pay and the window of time during which bondholders can sell their bonds back to the firm. If the firm perceives that participation is too low, the firm can increase the tender offer price and extend the tender offer window.

2.6 Conversion privilege

A *convertible bond* is an issue that grants the bondholder the right to convert the bond for a specified number of shares of common stock. Such a feature allows the bondholder to take advantage of favorable movements in the price of the issuer's common stock. An *exchangeable bond* allows the bondholder to exchange the issue for a specified number of shares of common stock of a corporation different from the issuer of the bond. Convertibles allow investors to enjoy the upside on the issuer's stock, although this comes at a cost of lower yield. The issuer of a convertible bond benefits from lower borrowing cost but existing shareholders may face dilution² if the conversion option is exercised.

The *conversion value* of a convertible bond is the value of the common stock into which the bond can be converted. The *conversion ratio* is the number of shares the holder receives from conversion for each bond. Conversion value is calculated as:

$$\text{conversion value} = \text{market price of stock} \times \text{conversion ratio}$$

The *straight value* of a convertible bond is the value of the bond if it were not convertible – the present value of the bond's cash flows discounted at the required return on a comparable option-free issue. The *minimum value of a convertible bond* is greater of its conversion value or its straight value.

As an example consider a convertible bond with a 7% coupon that is currently selling at \$985 with a conversion ratio of 25 and a straight value of \$950. Suppose that the company's common stock is currently \$35 per share. The conversion value of this bond is $25 \times \$35 = \875 . Since the straight value of \$950 is greater than the conversion value of \$875, the bond is worth at least \$950.

2.7 Embedded options

It is common for a bond issue to include a provision in the indenture that gives the issuer and/or the bondholder an option to take some action against the other party. These options are referred to as *embedded options* to distinguish them from stand alone options (i.e., options that can be purchased on an exchange or in the over-the-counter market). They are referred to as embedded options because the option is embedded in the issue.

2.7.1 Embedded options granted to issuers

An issuer generally wants the right to retire a bond issue prior to the stated maturity date. The issuer recognizes that at some time in the future interest

²A reduction in the ownership percentage of a share of stock caused by the issuance of new stock. Dilution can also occur when holders of stock options (such as company employees) or holders of other option contracts exercise them.

rates may fall sufficiently below the issue's coupon rate so that redeeming the issue and replacing it with another lower coupon rate issue would be economically beneficial. This right is a disadvantage to the bondholder since proceeds received must be reinvested in the lower interest rate issue. As a result, an issuer who wants to include this right as part of a bond offering must compensate the bondholder when the issue is sold by offering a higher coupon rate, or equivalently, accepting a lower price than if the right is not included. The right of the issuer to retire the issue prior to the stated maturity date is referred to as a *call provision*. A bond issue that permits the issuer to call an issue prior to the stated maturity date is referred to as a *callable bond*. The price which the issuer must pay to retire the issue is referred to as the *call price* or *redemption price*. When a bond is issued, typically the issuer may not call the bond for a number of years. That is, the issue is said to have a *deferred call*. The date at which the bond may first be called is referred to as the *first call date*. However, firms retire their debt for other reasons as well. For example, firms retire their debt to eliminate restrictive covenants, to alter their capital structure, to increase shareholder value, or to improve financial/managerial flexibility.

There are two types of call provisions included in corporate bonds – a *fixed-price call* and a *make-whole call*. With a standard fixed-price call provision, the bond issuer has the option to buy back some or all of the bond issue prior to maturity at a fixed price. In contrast to a standard fixed-price call, a make-whole call price is calculated as the present value of the bond's remaining cash flows subject to a floor price equal to par value. For example, in March 2001, Coca-Cola announced the issuance of \$500 million of 5.75% coupon global notes with a maturity date of March 15, 2011. These notes are redeemable at any time either in whole or in part at the issuers option. The redemption price is the greater of 1. 100% of the principal amount plus accrued interest or 2. the make-whole redemption price, which is equal to the sum of the present value of the remaining coupon and principal payments discounted at the Treasury rate plus 15 basis points. The spread of 15 basis points is the aforementioned make-whole call premium. Thus the make-whole call price is essentially a floating call price that moves inversely with the level of interest rates.

The most common embedded options that are granted to issuers or borrowers include:

1. The right to call the issue,
2. The right of the underlying borrowers in a pool of loans to prepay principal above the scheduled principal payment,
3. The accelerated sinking fund provision,
4. The cap on a floater.

The accelerated sinking fund provision is an embedded option because the issuer can call more than is necessary to meet the sinking fund requirement. An issuer usually takes this action when interest rates decline below the issue's coupon rate even if there are other restrictions in the issue that prevent the issue from being called. The cap of a floater can be thought of as an option requiring no action by the issuer to take advantage of a rise in interest rates. Effectively, the bondholder has granted to the issuer the right not to pay more than the cap. Notice that whether or not the first three options are exercised by the issuer or borrower depends on the level of interest rates prevailing in the market relative to the issue's coupon rate or the borrowing rate of the underlying loans (in the case of mortgage-backed and asset-backed securities). These options become more valuable when interest rates fall.

2.7.2 Embedded options granted to bondholders

An issue with a *put provision* included in the indenture grants the bondholder the right to sell the issue back to the issuer at a specified price on designated dates. The specified price is called the *put price*. Typically, a bond is puttable at par if it is issued at or close to par value. For a zero-coupon bond, the put price is below par. The advantage of a put provision to the bondholder is that if, after the issuance date, market rates rise above the issue's coupon rate, the bondholder can force the issuer to redeem the bond at the put price and then reinvest the put bond proceeds at the prevailing higher rate.

The most common embedded options granted to bondholders are:

1. Conversion privilege,
2. The right to put the issue,
3. Floor on a floater.

The value of the conversion privilege depends on the market price of the stock relative to the embedded purchase price held by the bondholder when exercising the conversion option.

3 Market Players Objectives

Markets in which borrowers issue debt securities to raise capital are known as *primary debt markets*.³ In primary markets, investors buy debt securities and thereby provide capital to borrowers. Once the debt securities are issued in the primary markets and capital has been raised, the investors who bought the debt securities might want to either increase or decrease

³A wide topic of a primary market for bonds is beyond the scope of this paper.

their holdings. They can accomplish this in the *secondary debt markets*. In the secondary market, an issuer of a bond – whether it is a corporation or a governmental unit – may obtain regular information about the bond’s value. The periodic trading of a bond reveals to the issuer the consensus price that the bond commands in an open market. Most of the secondary market trading occurs in the *over-the-counter* (OTC) markets or multilateral markets, although bonds are also traded in organized exchanges and through electronic platforms around the world.

There are several related reasons for the transition to the electronic trading of bonds. First, because the bond business has been a principal business (where broker-dealer firms risk their own capital) rather than an agency business (where broker-dealer firms act merely as an agent or broker), the capital of the *market makers*⁴ is critical. The amount of capital available to institutional investors to invest throughout the world has placed significant demands on the capital of broker-dealer firms. As a result, making markets in bonds has become more risky for broker-dealer firms. Second, the increase in bond market volatility has increased the capital required of broker-dealer firms in the bond business. Finally, the profitability of bond market trading has declined and their bid-offer spreads have decreased.

Very broadly, the players in debt markets can be classified into three categories. First there are *issuers*, who issue debt securities to borrow money to fund their capital or liquidity needs. Second are *investors*, who invest their savings or capital by purchasing debt securities in primary and secondary markets. They may also change their holdings of debt securities by trading in the secondary markets. Finally there are *intermediaries*, who assist buyers and sellers by making markets, underwriting, and providing risk management services. In addition to these key players, there are central bank and Government Treasury.

Investors are sometimes referred to as representing the *buy side*, whereas investment banks, which intermediate in primary and secondary markets to help issuers issue securities and help investors to buy or sell debt securities, are referred to as the *sell side*. It is clear that investors would prefer to see a low bid-offer spread to lower the costs of portfolio rebalancing. On the other hand, intermediaries would like to earn more by charging a higher bid-offer spread to enhance revenues from market making. Investors on the buy side tend to hold securities over longer horizons, relative to intermediaries on the sell side. This implies that the buy-side investors care a good deal more about the risk premium that is priced into debt securities. Such investors would like to buy the securities when the risk premium is high (so that the security prices are low) and sell the securities when the risk premium is low,

⁴A broker-dealer firm that accepts the risk of holding a certain number of shares of a particular security in order to facilitate trading in that security. Each market maker competes for customer order flow by displaying buy and sell quotations for a guaranteed number of securities.

other things being equal. On the other hand, market makers on the sell side will typically hedge the price risk of their book of inventories of debt securities. They are interested in earning the bid-offer spreads by selling at the offer and buying at the bid. They are less interested in the risk premium because their horizon is short. Some of the key objectives of these players are shown in Table 1. Households are the primitive units: They own homes, consumer durables, automobiles, and other assets, which they must finance. They have pensions and savings, which they must invest. They buy insurance policies for life and health. They send children to schools and colleges. Most of the fixed income markets are keyed off these basic needs of households:

1. Banks and financial institutions provide households with mortgage loans, securitize them, and service them,
2. Households own automobiles, and they finance them by taking out auto loans,
3. Most households use credit cards, which are issued by banks and financial institutions,
4. Households' pensions are invested by asset management companies which have led to the growth of investment products.

4 Overview of Bond Sectors

4.1 Government securities

U.S. Treasury securities are direct obligations of the U.S. government issued by the Department of the Treasury. They are backed by the full faith and credit of the U.S. government and therefore are considered to be free of credit risk.⁵ Agency securities, in contrast, are obligations of specific entities that are either part of or sponsored by the U.S. government. Agency securities typically do not have an explicit government backing but nevertheless are viewed as having very low credit risk. The creditworthiness and supply of the securities have resulted in a highly liquid round-the-clock secondary market with high levels of trading activity and narrow bid-ask spreads. These same attributes make Treasury securities a key reserve asset of central banks and other financial institutions. Finally, exemption of interest income from state and local taxes helps to make the securities a popular investment asset to institutions and individuals.

The Treasury issues securities with original maturities of one year or less as discount securities. These securities are called *Treasury bills*. Securities

⁵Another reason for an “absence” of credit risk is the ability of the U.S. government to issue necessary amount of dollars.

Issuers	Intermediaries	Investors
To sell securities at the best possible market price	To provide primary market-making services, such as bidding in auctions, underwriting, and distributing securities	To buy securities at a fair market price
To have an orderly and liquid secondary market for repurchase and refinancing	To provide market-making services and earn bid-offer spreads in secondary markets	To obtain diversification at a low cost
To be able to reverse and modify earlier issuance decisions in response to market and issuer-specific conditions	To provide proprietary trading activities	To reverse or modify prior investment decisions at a low cost and in an efficient manner
To design and issue debt securities in order to minimize funding costs	To provide fee-based services on risk management, issuance, etc.	To get advisory services and capital markets expertise efficiently

Table 1: Objectives of Players in Fixed Income Markets

with original maturities of more than one year are issued as coupon securities. Coupon securities with original maturities of more than 1 year but not more than 10 years are called *Treasury notes*. The Treasury currently issues notes with maturities of 2 years, 3 years, 5 years, and 10 years. Coupon securities with original maturities of more than 10 years are called *Treasury bonds*. In January 1997, the Treasury began selling *inflation-indexed securities*. The principal of these securities is adjusted for inflation using the consumer price index for urban consumers. Semiannual interest payments are a fixed percentage of the inflation-adjusted principal, and the inflation-adjusted principal is paid at maturity.

Marketable Treasury securities are sold in the primary market through different types of auctions. Each auction is announced several days in advance by means of a Treasury Department press release. The announcement provides details of the offering, including the offering amount and the term and type of security being offered, and describes some of the auction rules and procedures. While the primary market is open to all investors, the *primary government securities dealers* play a special role. Primary dealers are firms with which the Federal Reserve Bank of New York interacts directly in the course of its open-market operations. They include large diversified securities firms, money center banks, and specialized securities firms and are foreign- as well as U.S.-owned.⁶ Among their responsibilities, primary dealers are expected to participate meaningfully in Treasury auctions, make reasonably good markets to the Federal Reserve Bank of New York's trading desk, and supply market information and commentary to the Fed. The dealers also must maintain certain designated capital standards.

In addition to trading with their customers, the dealers trade among themselves through *interdealer brokers*. The brokers offer the dealers proprietary electronic screens or electronic trading platforms that post the best bid and offer prices of the dealers, along with the associated quantities bid or offered (minimums are \$5 million for bills and \$1 million for notes and bonds). The dealers execute trades by notifying the brokers (by phone or electronically), who then post the resulting trade price and size. In compensation for their services, the brokers charge a small fee. Interdealer brokers thus facilitate information flows in the market while providing anonymity to the trading dealers. For the most part, the brokers act only as agents and serve only the primary dealers and a number of non-primary dealers.

Zero-coupon Treasury securities are created from existing Treasury notes and bonds through *coupon stripping* (the Treasury does not issue them). Coupon stripping is the process of separating the coupon payments of a security from the principal and from one another. After stripping, each piece of the original security can trade by itself, entitling its holder to a particular

⁶The list of current primary dealers firms is located at http://www.newyorkfed.org/markets/pridealers_current.html

payment on a particular date. A newly issued 10-year Treasury note, for example, can be split into its 20 semiannual coupon payments (called coupon strips) and its principal payment (called the principal strip), resulting in 21 individual securities. Since the components of stripped Treasury securities consist of single payments (with no intermediate coupon payments), they are often called zero coupons or zeros as well as strips. The Treasury introduced its Separate Trading of Registered Interest and Principal Securities (STRIPS) program in February 1985 to improve the liquidity of the zero-coupon market. The program allows the individual components of eligible Treasury securities to be held separately in the Federal Reserve's book-entry system.

Agency securities are direct obligations of *federal government agencies* or *government-sponsored enterprises*. Federal agencies are entities of the U.S. government, such as the Tennessee Valley Authority. Government-sponsored enterprises are publicly chartered but privately owned and operated entities, such as the Federal National Mortgage Association ("Fannie Mae"), the Federal Home Loan Mortgage Corporation ("Freddie Mac"), the Federal Home Loan Banks, and the Farm Credit Banks. The agencies issue debt securities to finance activities supported by public policy, including home ownership, farming, and education.

4.2 Commercial paper

Historically, the money market has been defined as the market for assets maturing in one year or less. The assets traded in this market include Treasury bills, commercial paper, some medium-term notes, bankers acceptances, federal agency discount paper, short-term municipal obligations, certificates of deposit, repurchase agreements, floating-rate instruments, and federal funds.

A corporation that needs long-term funds can raise those funds in either the equity or bond market. If, instead, a corporation needs short-term funds, it may attempt to acquire those funds via bank borrowing. An alternative to bank borrowing is *commercial paper*. Commercial paper is short-term unsecured promissory notes issued in the open market as an obligation of the issuing entity. The commercial paper market once was limited to entities with strong credit ratings, but in recent years, some lower-credit-rated corporations have issued commercial paper by obtaining credit enhancements or other collateral to allow them to enter the market as issuers.

Although the original purpose of commercial paper was to provide short-term funds for seasonal and working capital needs, it has been issued for other purposes in recent years, frequently for "bridge financing." For example, suppose that a corporation needs long-term funds to build a plant or acquire equipment. Rather than raising long-term funds immediately, the issuer may elect to postpone the offering until more favorable capital market conditions prevail. The funds raised by issuing commercial paper are used

until longer-term securities are sold. Commercial paper has been used as bridge financing to finance corporate takeovers.

The maturity of commercial paper is typically less than 270 days, the most common maturity is less than 45 days. There are usually legal reasons for this. To pay off holders of maturing paper, issuers generally issue new commercial paper.

Investors in commercial paper are institutional investors. The minimum round-lot transaction is \$100000. Some issuers will sell commercial paper in denominations of \$25000. Corporate issuers of commercial paper can be divided into financial companies and non-financial companies. The majority of commercial paper outstanding historically was issued by financial companies.

Commercial paper is classified as either *direct paper* or *dealer paper*. Direct paper is sold by the issuing firm directly to investors without using a securities dealer as an intermediary. A large majority of the issuers of direct paper are financial companies. Because they require a continuous source of funds in order to provide loans to customers, they find it cost-effective to establish a sales force to sell their commercial paper directly to investors. In the case of dealer-placed commercial paper, the issuer uses the services of a securities firm to sell its paper. Commercial paper sold in this way is referred to as dealer paper.

The typical investor in commercial paper is an entity that plans to hold it until maturity, given that an investor can purchase commercial paper with the specific maturity desired. Should an investor's economic circumstances change such that there is a need to sell the paper, it can be sold back to the dealer, or in the case of directly placed paper, the issuer will repurchase it.

4.3 Corporate debt instruments

In its simplest form, a corporate bond is a debt instrument that obligates the issuer to pay a specified percentage of the bond's par value on designated dates (the coupon payments) and to repay the bond's par or principal value at maturity. Failure to pay the interest and/or principal when due (and to meet other of the debt's provisions) in accordance with the instrument's terms constitutes legal default, and court proceedings can be instituted to enforce the contract. Bondholders as creditors have a prior legal claim over common and preferred shareholders as to both the corporation's income and assets for cash flows due them. This legal priority does not insulate bondholders from financial loss. Indeed, bondholders are fully exposed to the firm's prospects as to the ability to generate cash flow sufficient to pay its obligations.

In common usage, a corporate bond is assumed to have a par value of \$1000 unless otherwise explicitly specified. Obligations due in under 10 years are called *notes*. Most corporate borrowings take the form of *bonds* due in

20 to 30 years.

Investors who buy corporate bonds prefer some kind of security underlying the issue. Either real property (using a mortgage) or personal property may be pledged to offer security beyond that of the general credit standing of the issuer.

A *lien* is a legal right to sell mortgaged property to satisfy unpaid obligations to bondholders. A *mortgage bond* grants the bondholders a first-mortgage lien on substantially all its properties. This lien provides additional security for the bondholder. As a result, the issuer is able to borrow at a lower rate of interest than if the debt were unsecured. If a default occurs, there is usually a financial reorganization on the part of the issuer, in which provision is made for settlement of the debt to bondholders. The mortgage lien is important, though, because it gives the mortgage bondholders a very strong bargaining position relative to other creditors in determining the terms of a reorganization.

Some companies do not own fixed assets or other real property and so have nothing on which they can give a mortgage lien to secure bondholders. Instead, they own securities of other companies, they are holding companies, and the other companies are subsidiaries. To satisfy the desire of bondholders for security, they pledge stocks, notes, bonds, or whatever other kinds of obligations they own. These assets are termed *collateral* (or personal property), and bonds secured by such assets are *collateral trust bonds*. Some companies own both real property and securities. They may use real property to secure mortgage bonds and use securities for collateral trust bonds.

While bondholders prefer to have security underlying their bonds, all else equal, most bonds issued are unsecured. These unsecured bonds are called *debentures*. With the exception of the utilities and structured products, nearly all other corporate bonds issued are unsecured. Debentures are not secured by a specific pledge of designated property, but this does not mean that they have no claim on the property of issuers or on their earnings. Debenture bondholders have the claim of general creditors on all assets of the issuer not pledged specifically to secure other debt. And they even have a claim on pledged assets to the extent that these assets have value greater than necessary to satisfy secured creditors. In fact, if there are no pledged assets and no secured creditors, debenture bondholders have first claim on all assets along with other general creditors. These unsecured bonds are sometimes issued by companies that are so strong financially and have such a high credit rating that to offer security would be superfluous.

Many corporations issue *subordinated debenture bonds*. The term *subordinated* means that such an issue ranks after secured debt, after debenture bonds, and often after some general creditors in its claim on assets and earnings. Owners of this kind of bond stand last in line among creditors when an issuer fails financially. Because subordinated debentures are weaker in their claim on assets, issuers would have to offer a higher rate of interest unless

they also offer some special inducement to buy the bonds. The inducement can be an option to convert bonds into stock of the issuer at the discretion of bondholders. If the issuer prospers and the market price of its stock rises substantially in the market, the bondholders can convert bonds to stock worth a great deal more than what they paid for the bonds. This conversion privilege also may be included in the provisions of debentures that are not subordinated.

Non-U.S. issuers have frequently used *private placements* of securities to access the U.S. capital markets while avoiding the registration requirements mandated by the Securities Act of 1933 (Securities Act). However, prior to the adoption of *Rule 144A*, private placements were generally not as advantageous to issuers when compared to public offerings, principally due to the limitation on resale applicable to privately placed securities. Because a privately placed security is less liquid than a security registered with the Securities and Exchange Commission (SEC), issuers could expect to receive less competitive pricing when selling a privately placed security than when selling the same security in a public offering. Rule 144A was adopted in April 1990 to ease such resale restrictions.

Rule 144A provides non-issuers with a non-exclusive safe harbour exemption from the registration requirements of the Securities Act for resales to qualified institutional buyers (QIBs) of privately placed securities and removes the restriction on immediate resale of such privately placed securities. Although Rule 144A does not apply to issuers, it is nevertheless valuable to issuers because it reduces an issuer's costs of raising capital by improving the liquidity of the institutional secondary market for privately placed securities, which in turn has a positive impact on pricing. A significant advantage of a Rule 144A offering is that it allows a non-U.S. issuer to avoid the registration requirements of the Securities Act. In a public offering, the SEC requires detailed information about the issuer and the offering. Although most issuers tend to disclose a similar amount of information in Rule 144A offerings as in a public offering, there are no firm rules governing disclosure. As a result, there is more flexibility for issuers in choosing what information to disclose. Secondly, a Rule 144A offering provides the non-U.S. issuer with greater control over timing of the offering and potentially quicker access to the U.S. capital markets.

Any bond investment carries with it the uncertainty as to whether the issuer will make timely payments of interest and principal as prescribed by the bond's indenture. This risk is termed *credit default risk* and is the risk that a bond issuer will be unable to meet its financial obligations. Most individual bond investors and some institutional bond investors do not perform any elaborate credit analysis. Instead, they rely largely on bond ratings published by the major rating agencies that perform the credit analysis and publish their conclusions in the form of ratings. The three major nationally recognized statistical rating organizations (NRSROs) in the United States

are Fitch Ratings, Moody's, and Standard & Poor's. These ratings are used by market participants as a factor in the valuation of securities on account of their independent and unbiased nature. The ratings systems use similar symbols, as shown in Table 2. High-yield bonds are those rated below investment grade by the ratings agencies. These issues are also known as *junk bonds*. Despite the negative connotation of the term junk, not all bonds in the high-yield sector are on the verge of default or bankruptcy.

4.4 The Eurobond market

There is no uniform system for classifying the sectors of the bond markets throughout the world. The one presented here is just a possible variation. From the perspective of a given country, the bond market can be classified into two markets: an *internal bond market* and an *external bond market* (see Figure 1). The internal bond market of a country is also called the *national bond market*. It is divided into two parts: the *domestic bond market* and the *foreign bond market*. The domestic bond market is where issuers domiciled in the country issue bonds and where those bonds are subsequently traded. The foreign bond market of a country is where bonds of issuers not domiciled in the country are issued and traded. For example, in the United States, the foreign bond market is the market where bonds are issued by nonU.S. entities and then subsequently traded in the United States. In the U.K., a sterling-denominated bond issued by a Japanese corporation and subsequently traded in the U.K. bond market is part of the U.K. foreign bond market. Foreign bonds can be denominated in any currency. For example, a foreign bond issued by an Australian corporation in the United States can be denominated in U.S. dollars, Australian dollars, or euros.

The external bond market includes bonds with the following distinguishing features:

1. They are underwritten by an international syndicate,
2. At issuance, they are offered simultaneously to investors in a number of countries,
3. They are issued outside the jurisdiction of any single country,
4. They are in unregistered form.

The external bond market is referred to as the *international bond market*, the *offshore bond market*, or, more popularly, the *Eurobond market*. Eurobonds are classified based on the currency in which the issue is denominated. For example, when Eurobonds are denominated in U.S. dollars, they are referred to as Eurodollar bonds. Eurobonds denominated in Japanese yen are referred to as Euroyen bonds.

Fitch	Moody's	S&P	Summary Description
Investment Grade			
AAA	Aaa	AAA	Gilt edged, prime, maximum safety, lowest risk, and when sovereign borrower considered "default-free"
AA+	Aa1	AA+	High-grade, high credit quality
AA	Aa2	AA	
AA−	Aa3	AA−	
A+	A1	A+	
A	A2	A	Upper-medium grade
A−	A3	A−	
BBB+	Baa1	BBB+	Lower-medium grade
BBB	Baa2	BBB	
BBB−	Baa3	BBB−	
Speculative Grade			
BB+	Ba1	BB+	Low grade, speculative
BB	Ba2	BB	
BB−	Ba3	BB−	
B+	B1	B	Highly speculative
B	B		
B−	B3		
Predominantly Speculative, Substantial Risk or in Default			
CCC+	Caa	CCC+	Substantial risk, in poor standing
CCC		CCC	
CC	Ca	CC	May be in default, very speculative
C	C	C	Extremely speculative
		CI	Income bonds – no interest being paid
DDD			
DD	D		Default
D			

Table 2: Corporate Bond Credit Ratings

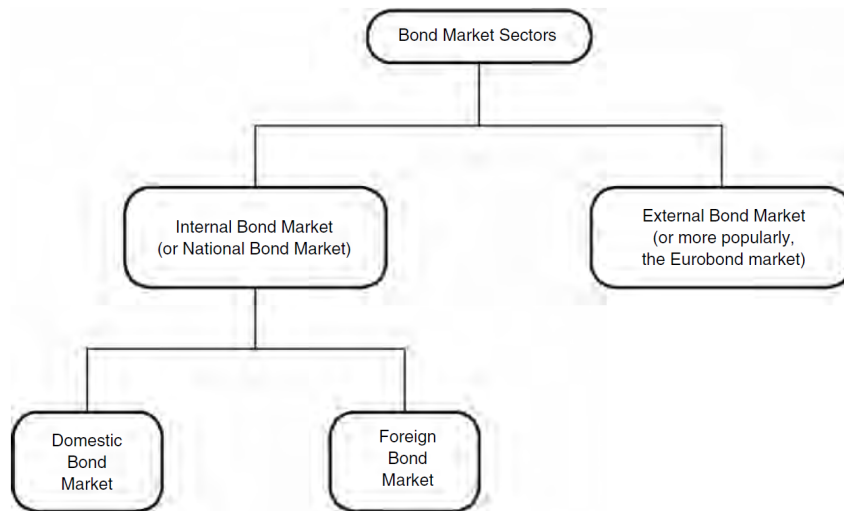


Figure 1: Overview of the Sectors of the Bond Market

5 Risks Associated with Debt Securities

5.1 Interest rate risk

Debt securities, which pay fixed coupon rates, suffer a price decline when interest rates go up unexpectedly, because the stated coupon is inadequate to compensate for the prevailing higher levels of interest rates. Likewise, reinvestment of fixed contractual coupons becomes risky when market interest rates decline.

Consider the price of Treasury bonds over the period shown in Figure 2. The bond was issued near par value of 100 in the middle of January 2007. But the price of the bond started to decline and reached a low of 92 in July 2007. Such a decline may be due to 1. an increase in interest rates in the market, 2. an increase in unanticipated inflation rate. Subsequently, the price of this bond dramatically increased, reaching a peak of nearly 110. Since the T-note carried a fixed dollar coupon of 4.75%, its price must respond to changes in the interest rates to compensate potential buyers for the prevailing market conditions. This example shows that in a span of a little over one year, the price of this bond fluctuated from a low of about 91 to a high of 110, subjecting the investor to a significant amount of price risk.

5.2 Credit risk

Treasury securities do not carry credit risk, since we do not expect the U.S. Government to default on its promised payments of coupons and the principal amount. However, there are corporate bonds that carry a significant

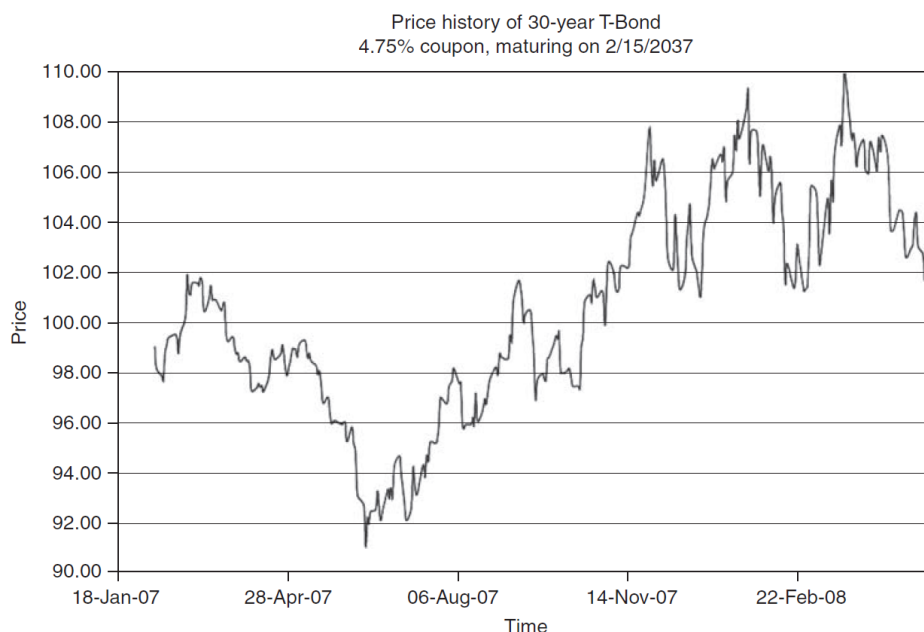


Figure 2: Interest Rate Risk of Fixed Income Securities (2007 – 2008)

amount of credit risk: corporate debt securities carry a risk that the issuer may be unable to service all or some of the promised obligations due to financial distress, reorganization, workouts, or bankruptcy. Since Treasury bonds have no credit risk, it is convenient to examine the spread between the yields (IRR) on GM debt and the yields on a Treasury benchmark to gauge the extra compensation that investors demand for holding GM debt instead of Treasury debt. During the period 2003 to 2005, GM's rating fell from A3 to lower and lower levels until, in May 2005, it was downgraded from investment grade to non-investment grade and its rating fell to B2. The spreads on GM debt dramatically increased during this period in response to the company's deteriorating credit quality as shown in Figure 3.

5.3 Liquidity risk

Some debt securities may trade in illiquid markets (few dealers, wide bid-offer spreads, low depth, and so on). Emerging market debt and some high-yield debt fall into this category. Liquidity refers to the ease with which a reasonable size of a security can be transacted in the market within a short notice, without adverse price reaction. The seller or the buyer will face the following:

1. Transaction costs such as fees and commissions,
2. Bid-offer spreads,

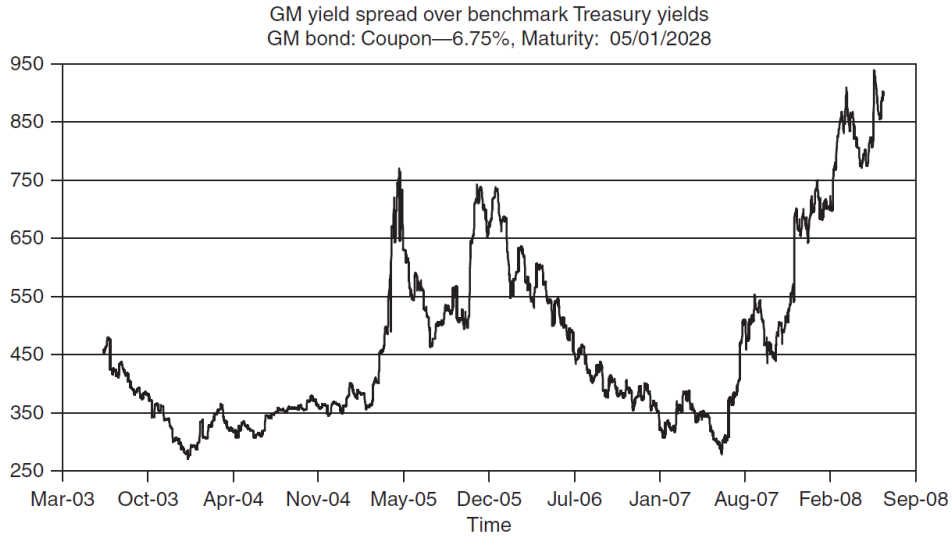


Figure 3: Credit Risk of GM Bond March 2003 – September 2008

3. Market impact costs.⁷

One measure of liquidity risk in the Treasury debt market is the difference between the volume of trading of newly issued Treasury security (referred to as on-the-run issue) and the volume of trading when the issue becomes old or off the run, when a new Treasury bond of very similar maturity is issued. This type of liquidity risk is presented in Figure 4.

5.4 Contractual risk

Debt securities may be callable by the issuer at the issuer's option. Holders of mortgage loans have the right to prepay their loans. Homeowners will be more likely to prepay their old mortgages if they can refinance them at a cheaper rate. This implies that prepayments should increase when mortgage rates in the market drop. The lending bank has given the borrowing homeowner the right to call away the loan. The presence of a call feature introduces a timing risk to investors: When interest rates fall on similar debt instruments, the probability that the issue may be called increases. In the early 1990s, many of the mortgages experienced high speeds of prepayments, which significantly shortened their effective lives. Banks originating mortgage loans must price this risk at the time that loans are extended: The lender will want to charge a higher interest rate to account for the fact that he or she is giving the borrower a valuable option to call away the loans when interest rates fall in the market. This is the call risk in mortgages. Hence

⁷The possibility that following the placement of a buy/sell order the market makers may increase/decrease the prices at which they are willing to trade.

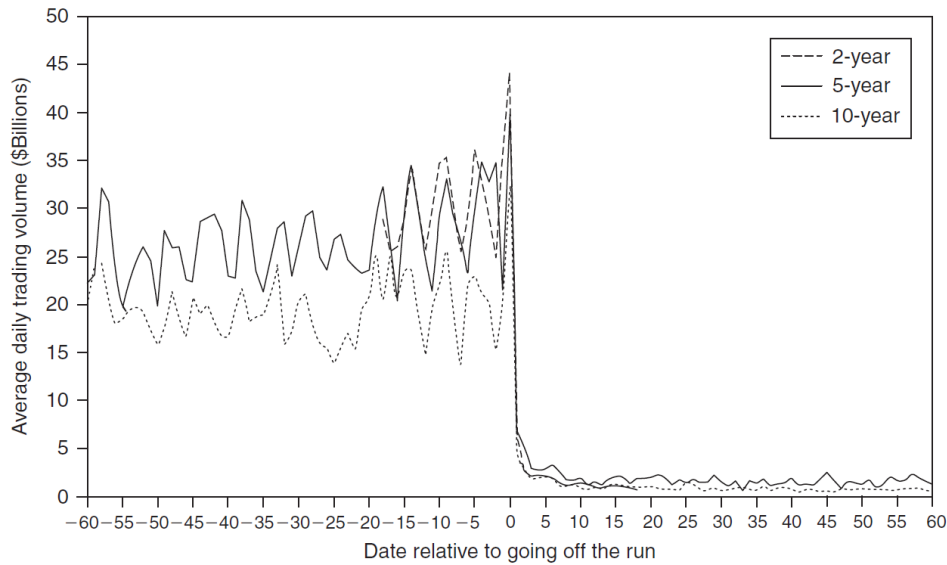


Figure 4: Liquidity Risk of Fixed Income Securities

mortgages must trade at a yield higher than similar non-callable Treasury debt securities.

5.5 Inflation risk

Most debt securities carry the risk of inflation. If the debt security is indexed to inflation, the risk could be lower, depending on the effectiveness of indexing. For example, the U.S. Treasury has issued indexed 10- and 5-year securities during the past several years. The difference between the promised yield of nominal Treasury debt securities and the promised yield of indexed debt security is a good measure of the expected inflation and inflation risk premium, with one caveat: nominal debt securities are more actively traded than indexed Treasury debt. This implies that part of the spread may also be due to liquidity differences.

5.6 Event risk

Some debt securities may be sensitive to events such as hostile reorganizations or leveraged buyouts (LBOs). Such events can lead to a significant price loss. In October 1988 RJR Nabisco was taken over through an LBO. The resulting company took on heavy debt to finance the takeover. As a result, Moody's rating of RJR Nabisco's debt went from A1 to B3. The prices of RJR bonds dropped about 15%, and the yield spread went from about 100 basis points over Treasury to about 350 basis points over Treasury.

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