LEVEL 1: FIXED INCOME

Reading 39 (1st out of 6): INTRO TO FIXED INCOME

Difficulty: **easy**

Benchmark Study Time: **2h**

2022

THIS E-BOOK:

- ❖ is a selective summary of the corresponding Reading in your CFA® Program Curriculum,
- ❖ provides place for your own notes,
- ❖ helps you structure your study and revision time!

How to use this e-book to maximize your knowledge retention:

1. **Print** the e-book in duplex and bind it to keep all important info for this Reading **in one place.**
2. **Read** this e-book, best twice, to grasp the idea of what this Reading is about.
3. **Study** the Reading from your curriculum. **Here add** your notes, examples, formulas, definitions, etc.
4. **Review** the Reading using this e-book, e.g. write your summary of key concepts or revise the formulas at the end of this e-book (if applicable).
5. **Done?** Go to your study plan and change the Reading's status to **green**:
   (it will make your Chance-to-Pass-Score™ grow ☺).
6. **Come back** to this e-book from time to time to **regularly review for knowledge retention!**

NOTE: While studying or reviewing this Reading, you can use the tables at the end of this e-book and mark your study/review sessions to hold yourself accountable.

BOND FEATURES

Bonds

issuer = entity that issues a bond

bondholder = entity that purchases a bond

A bond is a financial instrument for which the issuer agrees to pay:

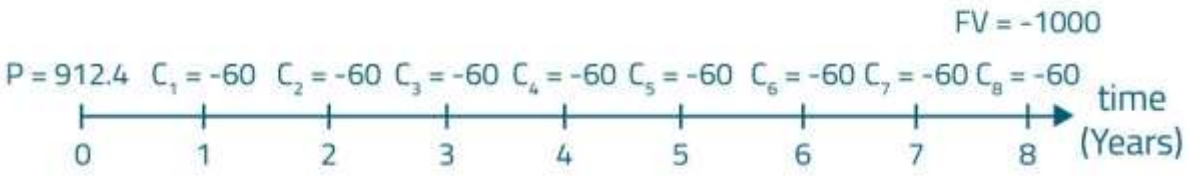
- the par value,
- coupons.

In exchange for the obligation to pay coupons and the par value in the future, the issuer receives some amount of money today (**bond price**).

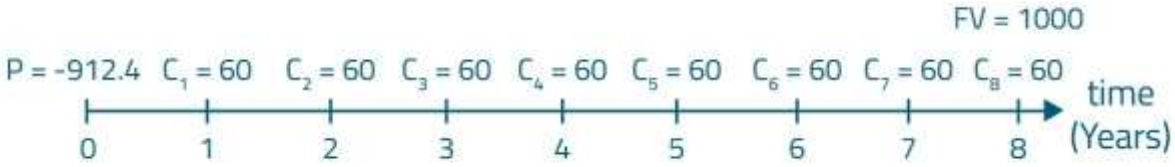
Example

It is 1 January 2019 and today Stark, Inc. is issuing an 8-year bond with a par value of USD 1,000 and coupons paid on an annual basis that amount to 6% of the par value. The price of the bond is equal to USD 912.40.

Issuer perspective:



Bondholder perspective:



HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Yield to maturity (YTM)

required rate of return = yield to maturity

To calculate the bond price and the YTM
on a TIBA II Plus Professional calculator, use:

- your knowledge about annuities,
- TVM worksheet
- Bond worksheet,
- Cash Flow worksheet.

Quotation of bonds

A bond is quoted as:

- a percentage of its par value,
- a price per 1 USD of par value,
- a fraction (decimal value in the decimal fraction is represented as a vulgar fraction whose denominator is 2 raised to a certain power).

Features of bonds

Features of bonds:

- principal value,
- term to maturity,
- coupons,
- type of the issuer,
- currency denomination.

Principal value

Principal value is the value:

- which should be repaid at maturity of the bond,
- used to calculate coupons.

Term to maturity

Term to maturity is the number of years to the maturity date.

At the **maturity date**, the issuer should fulfill all his remaining obligations towards bondholders.

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Bonds classification:

- short-term bonds (term to maturity of 1 to 5 years),
- medium-term bonds (term to maturity of over 5 to 12 years)
- long-term bonds (term to maturity of over 12 years).

Coupons

Coupons are the interest paid by the issuer at some strictly specified points in time.

Coupon payments are made:

- semi-annually (usually),
- annually,
- quarterly,
- monthly (e.g. MBS or ABS).

100 basis points = 1 percentage point

Types of bonds:

- plain vanilla bonds, which pay fixed coupons,
- floating-rate notes (FRN, floaters), for which coupon changes from period to period,
- zero-coupon bonds, which pay no coupons.

Plain vanilla bond

- The coupon payment is equal to the fixed coupon rate multiplied by the bond's par value.
- The coupon rate is given annually.

Floating-rate note (floater; FRN)

$$\text{coupon payment} = [\text{reference rate (e.g. LIBOR)} + \text{quoted margin}] \times \text{par value}$$

Generally, there is an **inverse relationship** between interest rates and the price of a bond:

- if interest rates go up, the price of the bond goes down.
- if interest rates go down, the price of the bond goes up.

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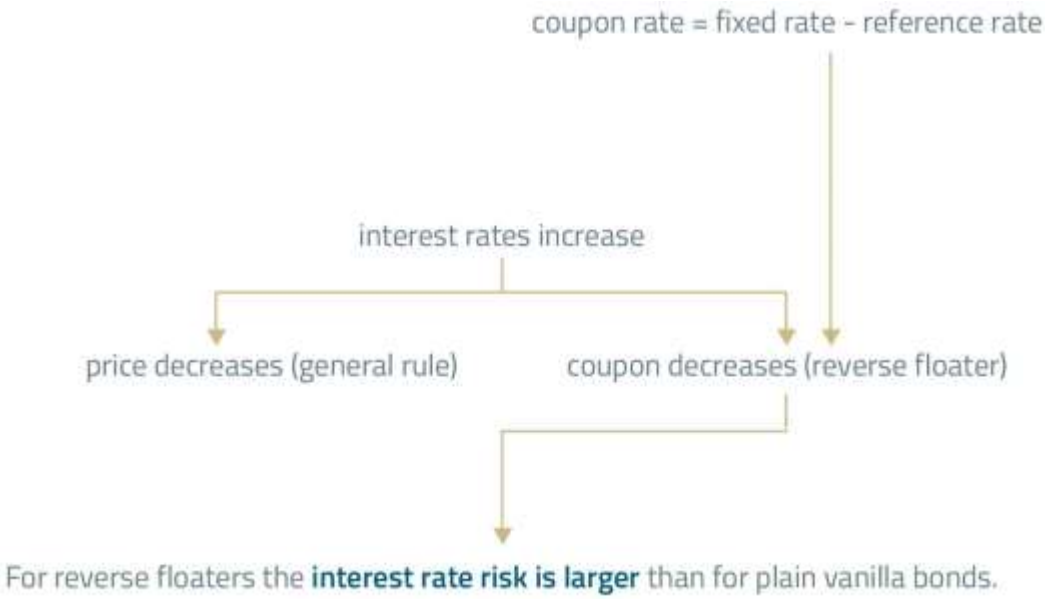
Reverse floaters

$$\text{coupon rate} = \text{fixed rate} - \text{reference rate}$$

Example:

coupon rate = 10% - LIBOR



Zero-coupon bonds

Zero-coupon bonds:

- don't pay coupons,
- profit for the bondholder comes from the fact that the bondholder buys the bond at a discount.

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Accrued interests

Accrued interests are important if the bond is purchased between interest periods. Accrued interest is the interest earned but not yet paid.

When buying the bond between interest periods, the counterparty will usually quote the so-called clean price. Clean price is the price of a bond without accrued interest.

accrued interest = interest earned but not yet paid

clean price = the price of a bond without accrued interest

full price = dirty price = the price that is actually paid for the bond

$$\textbf{full price} = \textbf{clean price} + \textbf{accrued interest}$$

 in the bond worksheet, the bond's price (PRI) is the clean price

Types of issuers

Types of issuers

- supranational organizations,
- national governments,
- local governments,
- quasi-government entities,
- companies.

Currency denomination

The majority of bonds throughout the world are denominated in **US dollar** or **euro**.

A **dual-currency bond** pays its coupons in one currency and the par value in another.

Bonds – other factors

Other factors:

- bond price,
- bond yields,
- embedded options.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Bond price

bond price = amount of money for which an investor buys the bond

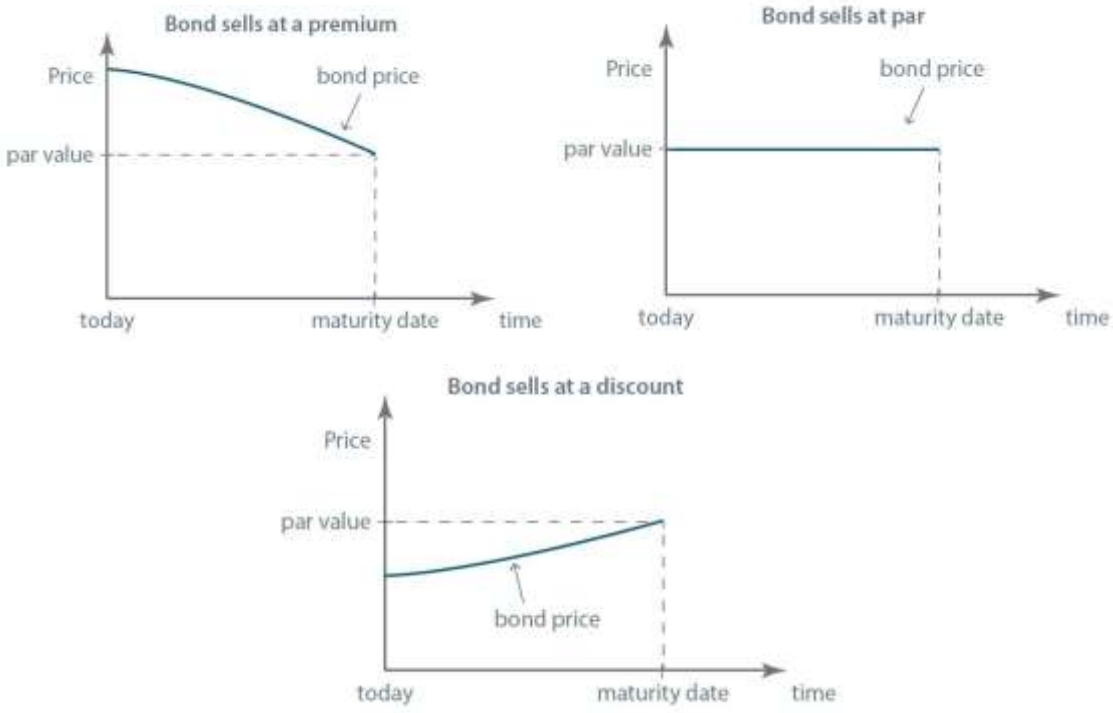
The bond price depends on:

- the par value,
- coupons,
- the required rate of return,
- term to maturity.

The bond price may be:

- higher than the par value (the bond sells **at a premium**),
- lower than the par value (the bond sells **at a discount**),
- equal to the par value (the bond sells **at par**).

Bond price vs Term to maturity (constant-yield price trajectory)



Assumption:

The required rate of return doesn't change over time (**'constant-yield'**).

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Yields

Types of yields:

- yield to maturity,
- yield to worst,
- yield to call,
- option-adjusted yield.

Embedded options

Types of embedded options:

- call options,
- put options,
- conversion privileges.

A **call option** is the right of the issuer to buy back the bond from the bondholder.

A **put option** is the right of the bondholder to sell back the bond to the issuer.

A **conversion privilege** is the right of the bondholder to convert the bond into the company's equity.

put options → putable bonds

call options → callable bonds

conversion options → convertible bonds

An **option** is a derivative instrument and its value depends on the value of some underlying asset.

Examples of underlying assets:

- a stock,
- a market index,
- an interest rate.

An **option gives**:

- one party – a right to buy or sell an underlying asset in the future, and
- the other party – an obligation to sell or buy the underlying asset in the future.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Call option vs Put option

A **call option** gives the option buyer the right to buy an underlying asset in the future at a specified price from the seller of the option.

A **put option** gives the option buyer the right to sell an underlying asset in the future at a specified price to the seller of the option.

In the case of bonds:

- a put option is the right of the bondholder to sell back the bond to the issuer,
- a call option is the right of the issuer to buy back the bond from the bondholder.

Conversion option

A conversion option gives the bondholder the right to convert the bonds into the company's equity.

Value of bonds with embedded options (option-adjusted price)

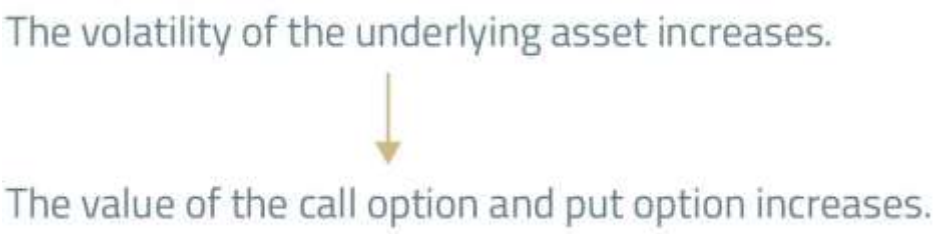
value of the callable bond = (value of the bond without an embedded option) –

– (value of the call option)

value of the putable bond = (value of the bond without an embedded option) +

+ (value of the put option)

Volatility of interest rates



HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

call value increases	callable bond value decreases	YTM increases
call value decreases	callable bond value increases	YTM decreases
put value increases	putable bond value increases	YTM decreases
put value decreases	putable bond value decreases	YTM increases
volatility increases	call value increases	
volatility increases	put value increases	
volatility decreases	call value decreases	
volatility decreases	put value decreases	

Exercising options

Exercise styles of options:

- American style,
- Bermuda style,
- European style.

American call and **American put** can be exercised anytime between the first call date or the first put date, respectively, and the bond maturity date.

Bermuda style options can be exercised only on given dates.

European style options can be exercised only on one given date.

The bond indenture includes:

- option exercise price,
- lock-out period,
- exercise style.

In the case of a **put option**, the bondholder wants to exercise the option if interest rates increase and the bond price decreases.

In the case of a **call option**, the issuer wants to exercise the option if interest rates decrease and the bond price increases.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Convertible bonds

The bondholder of a bond with a conversion provision can exchange the bond for a specified number of ordinary shares issued by the issuer.

Terms related to convertible bonds:

- the conversion price,
- the conversion ratio,
- the conversion value,
- the conversion premium,
- the conversion parity.

Example

A convertible bond issued by Black Dots, Co. has the current price of $950 and the par value of $1000. The bond can be converted into 25 shares of the company. The current share price is $37.

$$\textbf{bond can be converted into 25 shares of the company} \rightarrow \textbf{conversion ratio} = 25$$

$$\textbf{bond's par value} = \$1000 \ \& \ \textbf{conversion ratio} = 25 \rightarrow \ \textbf{conversion price} = \frac{\$1000}{25} = \$40$$

$$\textbf{conversion value} = \textbf{conversion ratio} \times \textbf{current share price} = 25 \times \$37 = \$925$$

$$\textbf{conversion premium} = \textbf{current bond price} - \textbf{conversion value} = \$950 - \$925 = \$25$$

$$\textbf{if conversion premium} = 0 \leftrightarrow \textbf{conversion parity}$$

CoCos

CoCos:

- are convertible bonds,
- convert **automatically** when a certain pre-specified condition occurs,
- convert when the share price is decreasing,
- are **not beneficial** to bondholders,
- their price is lower than the price of the option-free bond.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

LEGAL, REGULATORY & TAX REQUIREMENTS

Bond indenture

A bond indenture is a contract between the bond issuer and the bondholders that describes:

- features of the bond,
- rights of the bondholders and the issuer,
- obligations of the issuer,
- bond covenants.

Bond covenants

Bond covenants state what the issuer is obliged to do and what the issuer must not do.

Bond covenants:

- affirmative covenants,
- negative covenants.

affirmative covenant = promise to do something

negative covenant = promise not to do something

Note that in the relationship between the bond issuer and the bondholders, the bondholders' interests are represented by a trustee. The trustee makes sure that all obligations of the issuer are met.

Regulations

Regulations:

- legal and regulatory considerations,
- tax considerations.

Legal and regulatory considerations

Legal and regulatory considerations refer to:

- the issuance process,
- required covenants,
- obligations and rights of both the issuer and the bondholders,
- the redemption process.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Global bond market

Global bond market:

- national bond markets,
- Eurobond market.

National bond market

In the national bond market, investors trade with:

- domestic bonds (bonds issued by domestic entities in domestic currency),
- foreign bonds (bonds issued by foreign entities in domestic currency), e.g. matador bonds, Yankee bonds.

Eurobond market

The Eurobond market is:

- less regulated than national bond markets,
- outside of any country's jurisdiction.

Examples of Eurobonds:

- Eurodollar bonds (denominated in US dollar),
- Euroyen bonds (denominated in Yen).

Bonds that are issued at the Eurobond market and at least one national market are called **global bonds**.

Tax regulations

Tax regulations differ for different countries and different bonds.

Taxes imposed on bonds concern:

- income, that is coupons received by investors,
- capital gains, which result from the difference between the bond's sale and purchase price, and
- whether a bond was purchased at a discount, at par or at a premium.

tax-exempt bonds = bonds whose coupons are free of tax

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Principal repayment

Types of bonds:

- bullet bonds, for which the par value is paid at the maturity date,
- fully amortized bonds, for which the par value is repaid in total before the maturity date,
- partially amortized bonds, for which the par value is only partially repaid before the maturity date.

Coupon payment structure

Types of bonds:

- **floating rate notes**, whose coupons depend on the reference rate, for example LIBOR,
- **step-up coupon bonds**, which have fixed or floating coupons that increase in future periods by the specified spread,
- **credit-linked coupon bonds** with coupons that change when the credit rating of the issuer changes.
- **payment-in-kind coupon bonds**, for which there is no coupon payment made in cash. Instead, at coupon dates bondholders receive new bonds or stocks issued by the company.
- **deferred coupon bonds**, which pay no coupon in the first year after the issuance and a couple of consecutive years but pay higher coupons in yet subsequent years,
- **index-linked bonds**, for which coupons and principal repayment depend on some index, for example inflation. One of the examples of such bonds are Treasury inflation-protected securities (TIPS), which are issued by the U.S. Treasury.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Summarizing key concepts:

☐ Bonds – features: principal value, term to maturity, coupons, type of the issuer, currency denomination

My summary:

☐ Clean price vs Dirty price

My summary:

☐ Bonds – other factors: bond price, bond yields, embedded options

My summary:

☐ Callable bonds, Putable bonds, Convertible bonds

My summary:

☐ Legal, regulatory & tax requirements

My summary:

☐ Bond indenture & covenants

My summary:

☐ Global bond market: national bond markets, Eurobond market

My summary:

☐ Principal repayment: bullet bonds, fully amortized bonds, partially amortized bonds

My summary:

☐ Coupon payment structure: floating rate notes, step-up coupon bonds, credit-linked coupon bonds, payment-in-kind coupon bonds, deferred coupon bonds, index-linked bonds

My summary:

Reviewing formulas:

$$\text{coupon payment} = [\text{reference rate (e.g. LIBOR)} + \text{quoted margin}] \times \text{par value}$$

Write down the formula:

$$\text{value of the callable bond} = (\text{value of the bond without an embedded option}) - (\text{value of the call option})$$

$$\text{value of the putable bond} = (\text{value of the bond without an embedded option}) + (\text{value of the put option})$$

Write down the formulas:

Keeping myself accountable:

TABLE 1 | STUDY

When you sit down to study, you may want to **try the Pomodoro Technique** to handle your study sessions: study for 25 minutes, then take a 5-minute break. Repeat this 25+5 study-break sequence all throughout your daily study session.

✓ Tick off as you proceed.

POMODORO TIMETABLE: study-break sequences (25' + 5')													
date		date		date		date		date		date		date	
25'		25'		25'		25'		25'		25'		25'	
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TABLE 2 | REVIEW

Never ever neglect revision! Though it's not the most popular thing among CFA candidates, regular revision is what makes the difference. If you want to pass your exam, **schedule & do your review sessions.**

REVIEW TIMETABLE: When did I review this Reading?													
date		date		date		date		date		date		date	
date		date		date		date		date		date		date	