



Bond Market Fundamentals

Bonds Overview



Debt instruments



Typically fixed maturity



Typically regular
interest payments



Tradeable

Term	Meaning
Issuer	The entity borrowing the money
Maturity date	The date at which the bond will be redeemed
Coupon	The rate of interest paid to the bondholder (per annum)
Par value/face value	The amount repaid to the bondholder at maturity
Price	The current market price of the bond (percentage of face value)

Bond Redemption

Fixed Maturity

Bond is redeemed at a date set at **issuance**

Bullet Bonds

Redemption as a **one-off payment at maturity**

No interim **amortisation features**

Variations

Amortising bonds

Callable bonds

Extendable bonds

Fixed Coupon Bonds

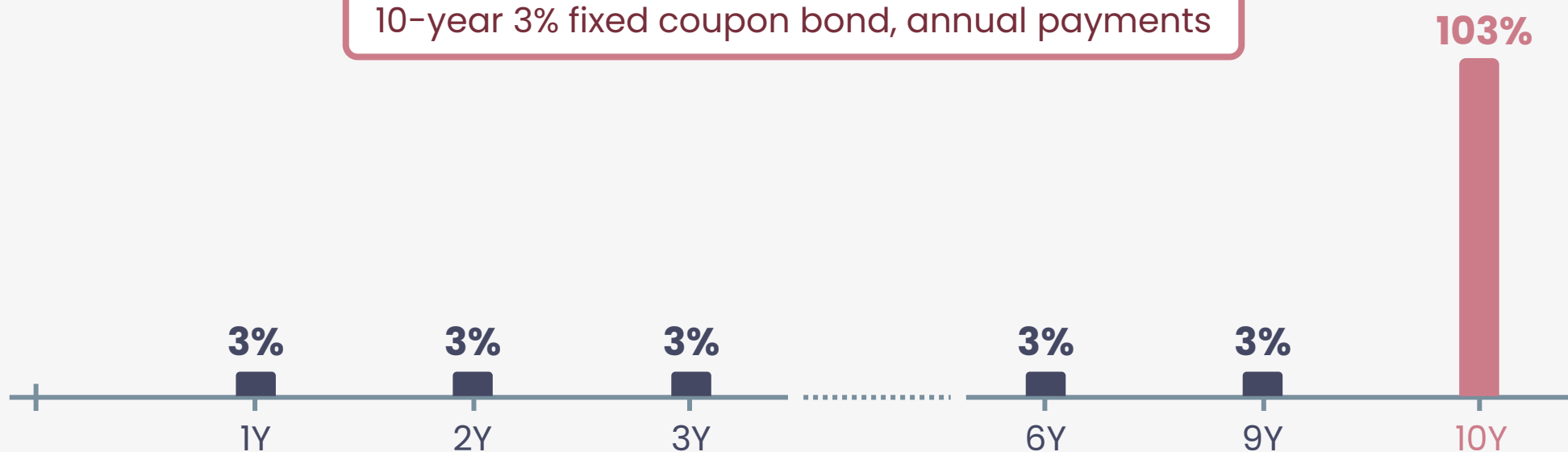
Coupon is set at
bond issuance

Remains unchanged
over **the life of the bond**

Reflects general **interest rate level**
and perceived creditworthiness of the
issuer at the **point of issuance**

Example:

10-year 3% fixed coupon bond, annual payments



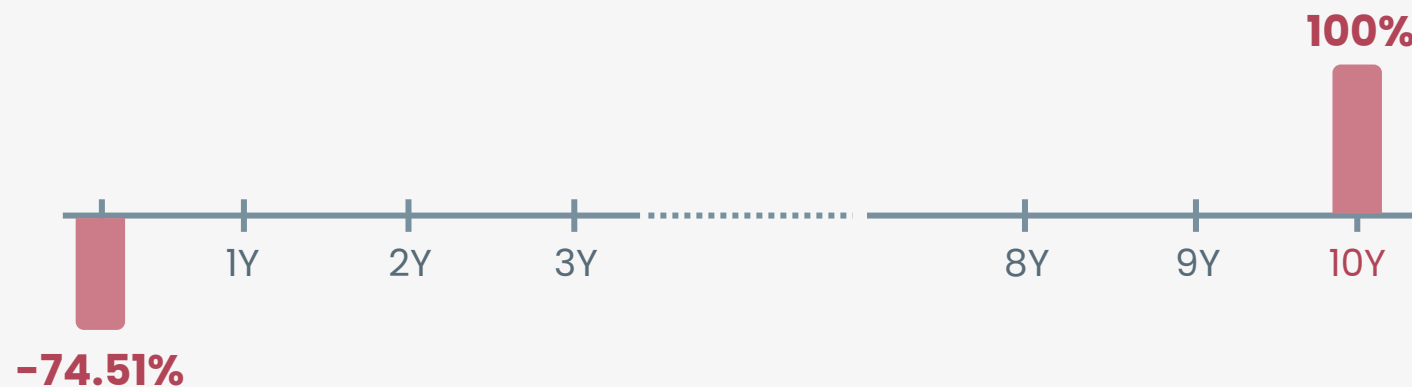
Zero Coupon Bonds

No interest payment between **issuance and maturity**

Issued at a **discounted price, repaid at 100%**

Example

10-year zero bond, issued at **74.51%, repaid at 100%**



Floating Rate Notes (FRNs)

Coupon formula is set at
bond issuance

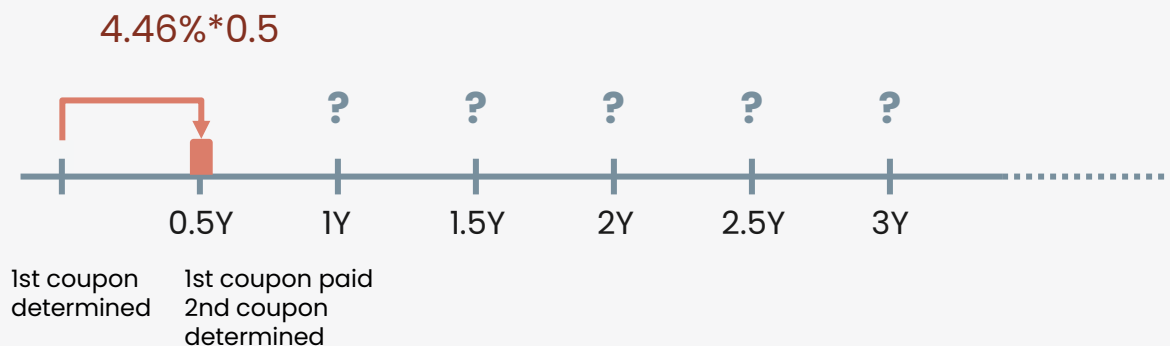
Coupons depend on
future development of
reference rate

Depending on the **reference rate**
coupons will be known at the
beginning of the coupon period
(IBORs) or at the end **(RFRs)**

Example

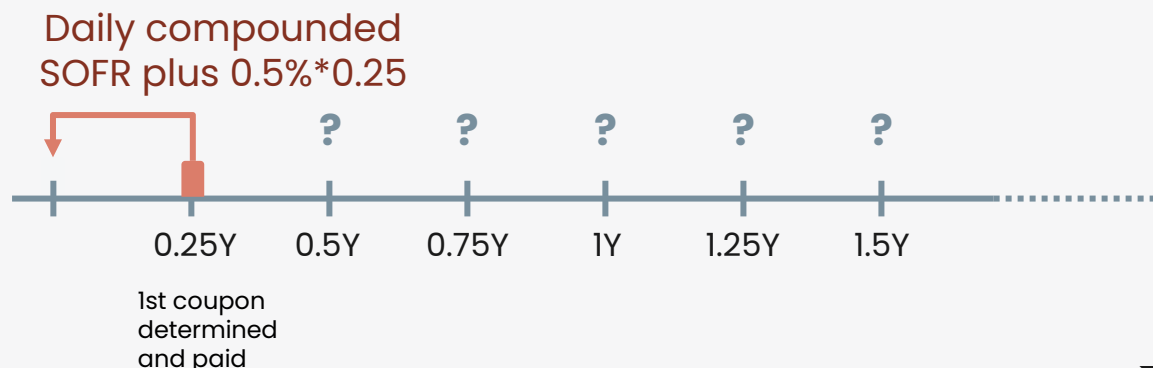
10-year FRN, 6M EURIBOR + 0.50%, semi-annual payments

6M EURIBOR fixing for issue date : 3.96%



10-year FRN, SOFR + 0.50%, quarterly payments

SOFR fixing for issue date: ???



Pricing a Fixed Coupon Bond – The General Approach

The price of a bond is the **sum of the present values** of all **outstanding coupon payments** and the **redemption payment**



Coupon Bond Price = $\frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_n + FV_n}{(1+r)^n}$	
C	Coupon amount per period
FV	Face value
r	Required rate of return, per period
n	Number of periods to maturity

Pricing a Fixed Coupon Bond - Examples

10-year 3% fixed coupon bond, annual payments, required rate of return 4% per annum

$$\text{Price} = \frac{3\%}{(1 + 4\%)^1} + \frac{3\%}{(1 + 4\%)^2} + \dots + \frac{(3\% + 100\%)}{(1 + 4\%)^{10}}$$

10-year 3% fixed coupon bond, semi-annual payments, required rate of return 4% per annum

$$\text{Price} = \frac{1.5\%}{(1 + 2\%)^1} + \frac{1.5\%}{(1 + 2\%)^2} + \dots + \frac{(1.5\% + 100\%)}{(1 + 2\%)^{20}}$$

Government Bond Issuance - Overview

Government bonds are often issued via **public auctions** – the issuer places **securities** directly with **investors**

Issuer determines **maturity** and **size** of the issuance and **makes announcement**

5Y bond, 10 bn USD

Investor bids are **collected**, and **bond** is **priced**

Yield	Demand	Aggregated demand
4.522%	3.4 bn USD	3.4 bn USD
4.523%	4.9	8.3
4.524%	2.5	10.8
4.525%	1.3	12.1
4.526%	1.1	13.2
4.527%	0.5	13.7

**Highest
accepted yield**

Yield to Maturity

In practice, the bond price is often given and **investors want to know the return they would realise**

Solve for **r** so that: $\frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_n + FV_n}{(1+r)^n} = \text{market price of bond}$

This is referred to as **the yield to maturity (YTM)**

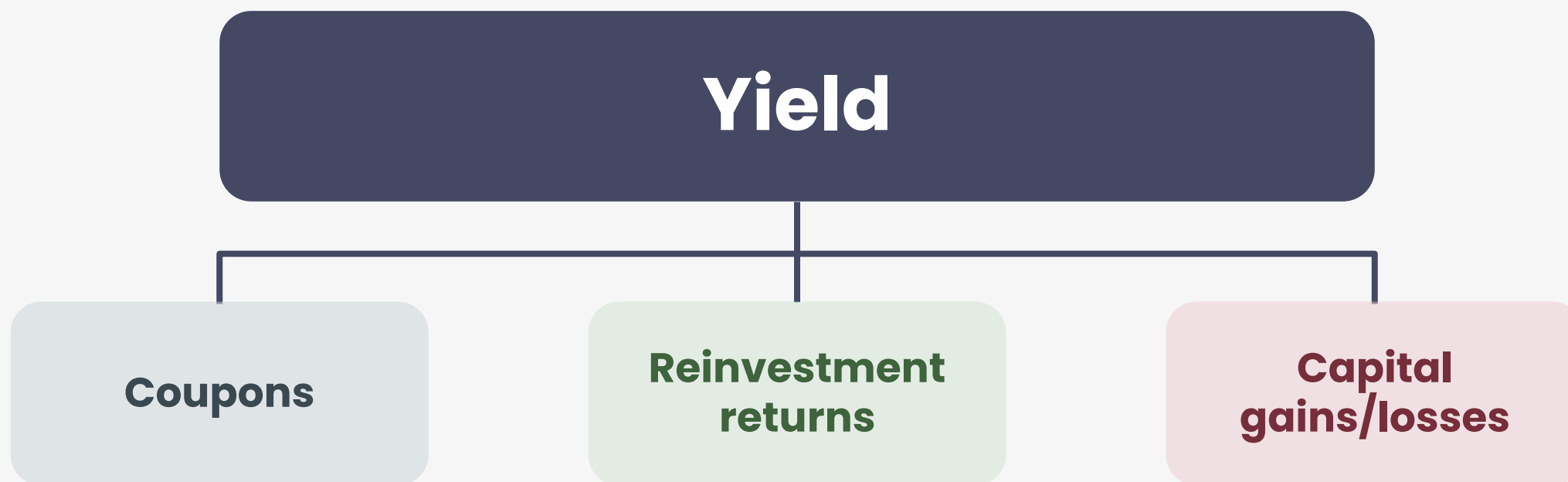
Based on the following assumptions:

Bond is purchased at the
current market price

Bond is held
to **maturity**

All coupons are **reinvested**, and
the reinvestment rate achieved is
equal to the yield to maturity

Yield to Maturity Components

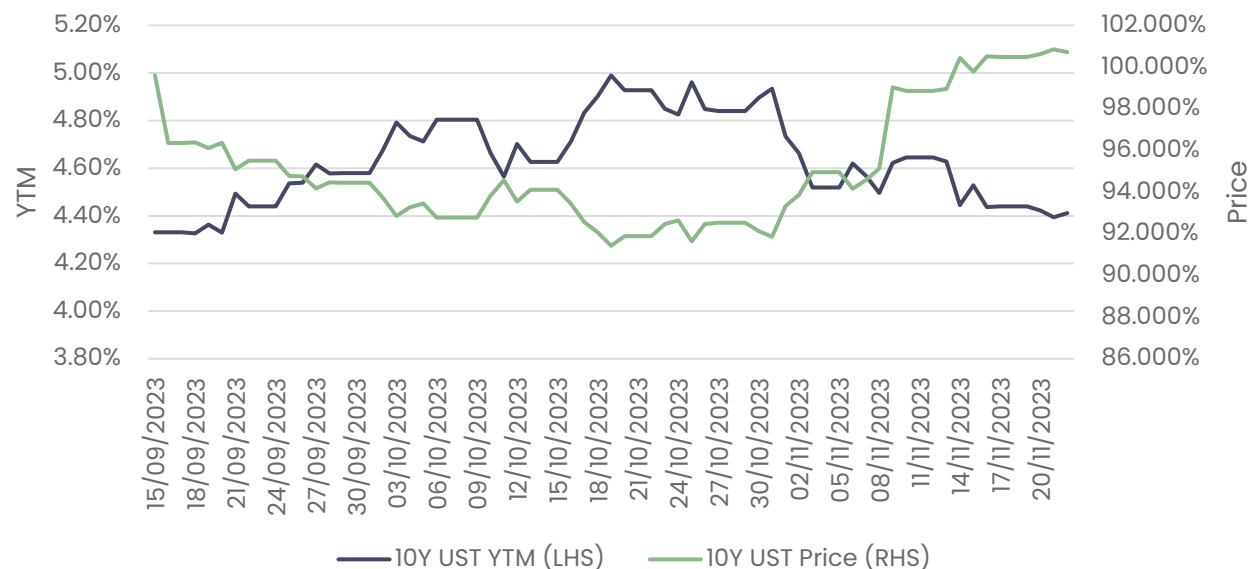


The Bond Price/Yield Relationship

Bond price



Bond yield



Bond yield



Bond price



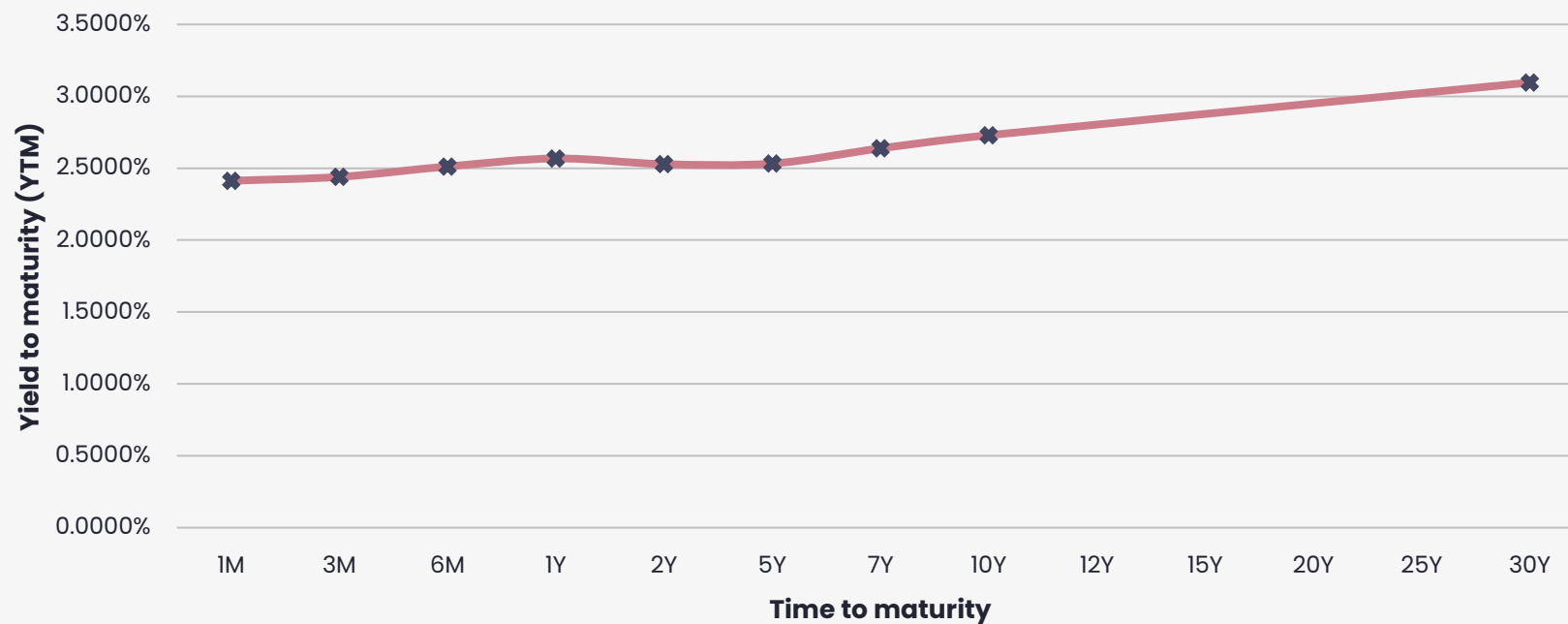
Source: Infront

Yield Curve

Yield curve

Plot of **bond yields**
against maturities

All bonds used must
have **same issuer** and
credit quality



YTM Formula

YTM Formula

The **YTM formula** discounts all **cash flows** of a **bond** with the **same discount rate**

$$P_d = \sum_{t=1}^n \frac{C_t}{(1+YTM)^t} + \frac{FV}{(1+YTM)^n}$$

Dirty vs. Clean Price

Dirty price (P_d) is the **price that has to be paid**

Clean price is the **dirty price minus accrued interest**

Bond prices are quoted on a **clean price basis**

Please note: For the purpose of simplification annual coupon payments are assumed in the formulas and calculations shown on this and the following slides.

Dirty vs. Clean Price

5Y bond

Annual coupon: 2.4%

YTM: 2.43%

Year (t):	Cash flow:	PV:
1	2.4%	2.3431%
2	2.4%	2.2875%
3	2.4%	2.2332%
4	2.4%	2.1802%
5	102.4%	90.8164%
	Total:	99.8603%

**Sum of PVs =
 $P_d = 99.8603\%$**

Dirty vs. Clean Price

5Y bond one day later

Annual coupon: 2.4%

YTM: 2.43%

Year (t):	Cash flow:	PV:
0.9973	2.4%	2.3432%
1.9973	2.4%	2.2876%
2.9973	2.4%	2.2334%
3.9973	2.4%	2.1804%
4.9973	102.4%	90.8223%
	Total:	99.8669%

Sum of PVs =
 $P_d = 99.8669\%$

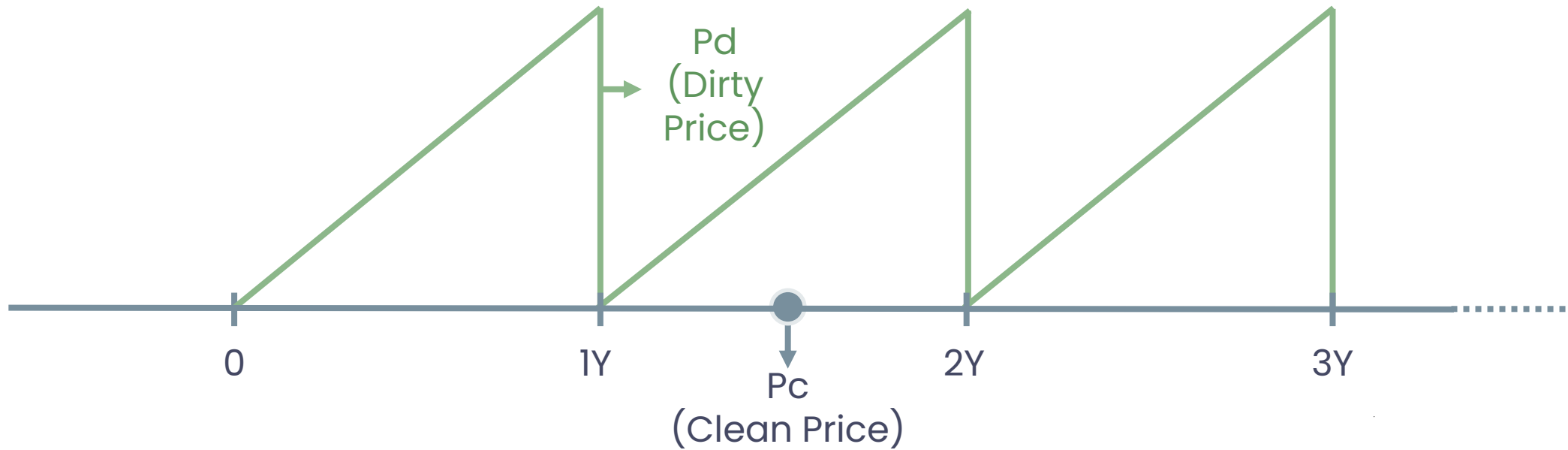
P_d includes 1 day of
accrued interest:
0.0066%

$P_c = P_d - \text{accrued}$
interest = 99.8603%

Clean vs. Dirty Price

5Y bond 2.4%

Clean vs Dirty Price assuming constant YTM



The background of the entire slide is a grayscale photograph of a city skyline, featuring several prominent skyscrapers. The One World Trade Center is the most prominent building on the right side, reaching towards the top of the frame. Other buildings of varying heights and architectural styles fill the rest of the skyline. The sky is a uniform light gray.

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