



Convertible Bonds

Course Objectives



Understand what convertible bonds (CBs) are and their various structures



Identify the buyers of CBs, as well as the benefits and risks of investing in CBs



Comprehend the math of CBs and understand various Greeks



Appreciate some methods used to trade CBs for arbitrage, hedging, and indexing



Convertible Bond Basics

CB Overview

Convertible bonds have been around for almost 150 years.



Simple Bond



CoCo Convertibles



CB Derivatives

CB Overview

Convertible bonds are a hybrid security with some of the characteristics of **both bonds and stocks**.

Convertible bonds (CBs) are corporate bonds that can be converted into a pre-determined number of shares of common stock.



An exchangeable bond is similar in concept, but the investor receives shares of another company.

General Information

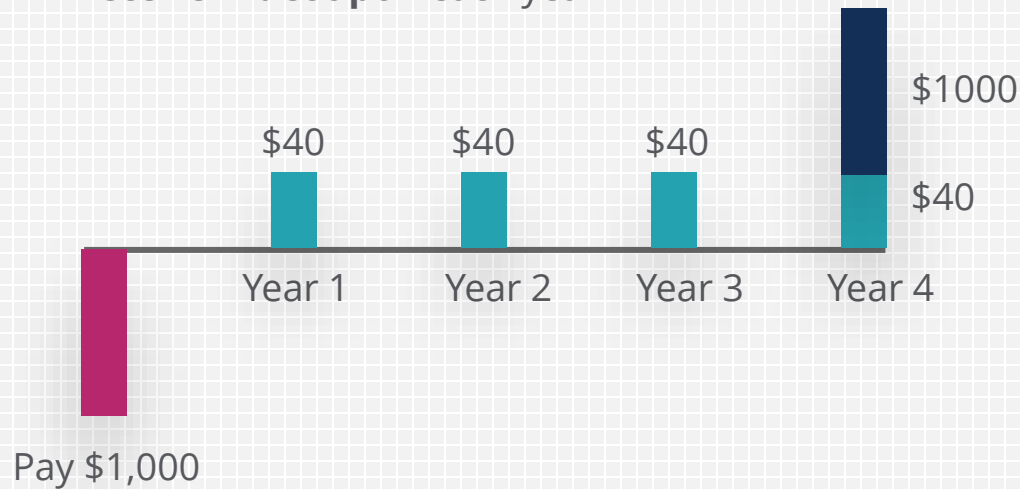
- Higher in the capital structure than common stock
- Issuers can raise funds, while minimizing share dilution, at a lower interest rate than straight debt
- Traded over-the-counter (OTC)

CB vs. Straight Bond

Convertible bonds may be easy to understand but difficult to analyze due to the embedded call option.

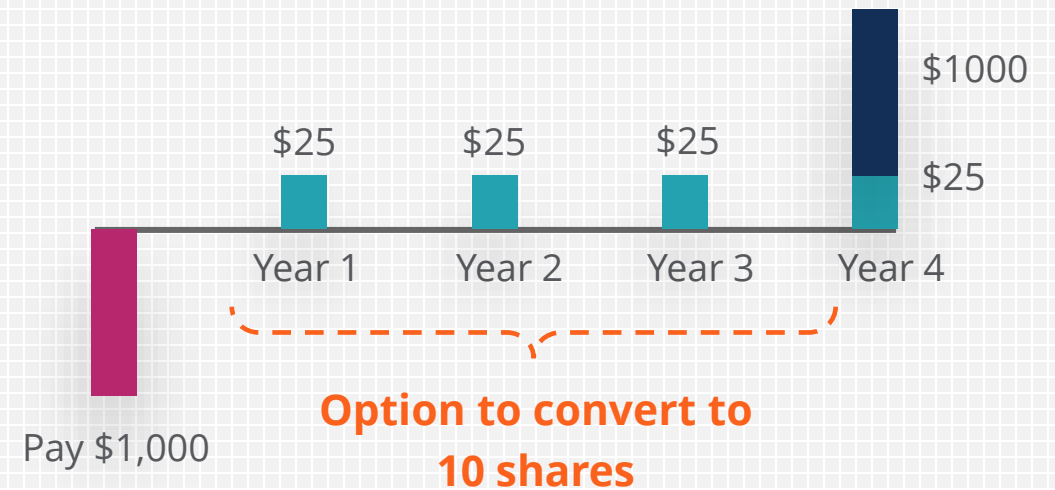
Straight Bond

Receive **4% coupon** each year



Convertible Bond

Receive **2.5% coupon** each year



CB coupon < Straight bond coupon

CB coupon > Equity dividend yield

Share price > \$100: Convert

Share price < \$100: Don't convert

CB – Bloomberg Example

TSLA 2 05/15/24

\$↑140.553

+5.948

Yld -5.915

As of 16 Dec

Vol 10.6MM

Source TRMT

TSLA 2 05/15/24 Corp

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39) OVCV Valuation

66) Send Bond

Issuer Information

Name TESLA INC

Industry Automotive (BCLASS)

Convertible Information

Mkt of Issue US Domestic

Convertible

Country US

Currency USD

Rank Sr Unsecured

Series

Conv Ratio 3.2276

Conv Price 309.8277

Stock Tkr TSLA US

Stock Price 380.334...

Parity 122.7569

Premium 14.4970

Coupon 2.000000

Init Prem 27.500

Type Fixed

Freq S/A

Calc Type (49) CONVERTIBLE

Pricing Date 05/02/2019

1st Coupon Date 11/15/2019

Convertible Until 05/13/2024

Maturity 05/15/2024

\$240MM GREENSHOE EXERCISED IN FULL EFFECTIVE 5/3/19.

Identifiers

ID Number ZS4501020

CUSIP 88160RAG6

ISIN US88160RAG65

Bond Ratings

Moody's NA

S&P B-

Composite NR

Issuance & Trading

Amt Issued/Outstanding

USD 1,840,000.00 (M) /

USD 1,840,000.00 (M)

Min Piece/Increment

1,000.00 / 1,000.00

Par Amount 1,000.00

Book Runner JOINT LEADS

Reporting TRACE

Australia 61 2 9777 8600

Brazil 5511 2395 9000

Europe 44 20 7330 7500

Germany 49 69 9204 1210

Hong Kong 852 2977 6000

Japan 81 3 4565 8900

Singapore 65 6212 1000

U.S. 1 212 318 2000

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SN 129457 EST GMT-5:00 17-Dec-2019 11:42:28

CB – Bloomberg Example

| | | | |
|---|---|-----------------------------------|-------------------------|
| TSLA 2 05/15/24 \$↑140.553 +5.948 Yld -5.915 | | | |
| As of 16 Dec Vol 10.6MM Source TRMT | | | |
| TSLA 2 05/15/24 Corp | | Settings ▾ | Actions ▾ |
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| Pages | Issuer Information | | Identifiers |
| 1) Bond Info | Name TESLA INC | | ID Number ZS4501020 |
| 12) Addtl Info | Industry Automotive (BCLASS) | | CUSIP 88160RAG6 |
| 13) Reg/Tax | Convertible Information | | ISIN US88160RAG65 |
| 14) Covenants | Mkt of Issue US Domestic | Convertible | Bond Ratings |
| 15) Guarantors | Country US | Currency USD | Moody's NA |
| 16) Bond Ratings | Rank Sr Unsecured | Series | S&P B- |
| 17) Identifiers | Conv Ratio 3.2276 | Conv Price 309.8277 | Composite NR |
| 18) Exchanges | Stock Tkr TSLA US | Stock Price 380.334... | Issuance & Trading |
| 19) Inv Parties | Parity 122.7569 | Premium 14.4970 | Amt Issued/Outstanding |
| 20) Fees, Restrict | Coupon 2.000000 | Init Prem 27.500 | USD 1,840,000.00 (M) / |
| 21) Schedules | Type Fixed | Freq S/A | USD 1,840,000.00 (M) |
| 22) Coupons | Calc Type (49) CONVERTIBLE | | Min Piece/Increment |
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CB – Bloomberg Example

A greenshoe clause is an option that allows the leads to increase a new issue by up to 15% if investor demand is stronger than anticipated.

TSLA 2 05/15/24 \$↑140.553 +5.948 Yld -5.915

As of 16 Dec Vol 10.6MM Source TRMT

TSLA 2009 Convertible Corporate Notes

90 Buy 90 Sell

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Moody's

NA

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Composite

NR

Issuance & Trading

Amt Issued/Outstanding

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1,840,000.00 (M) /

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Min Piece/Increment

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JOINT LEADS

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| 94 Notes | | | | | | 95 Buy | | 96 Sell | |
| 25 Convertible Bond | | 26 Underlying Description | | | | | | | |
| Pages | | Issuer Information | | | | Identifiers | | | |
| 1) Bond Info | | Name TESLA INC | | | | ID Number ZS4501020 | | | |
| 2) Addtl Info | | Industry Automotive (BCLASS) | | | | CUSIP 88160RAG6 | | | |
| 3) Reg/Tax | | Convertible Information | | | | ISIN US88160RAG65 | | | |
| 4) Covenants | | Mkt of Issue US Domestic Convertible | | | | Bond Ratings | | | |
| 5) Guarantors | | Country US | | Currency USD | | Moody's NA | | | |
| 6) Bond Ratings | | Rank Sr Unsecured | | Series | | S&P B- | | | |
| 7) Identifiers | | Conv Ratio 3.2276 | | Conv Price 309.8277 | | Composite NR | | | |
| 8) Exchanges | | Stock Tkr TSLA US | | Stock Price 380.334... | | Issuance & Trading | | | |
| 9) Inv Parties | | Parity 122.7569 | | Premium 14.4970 | | Amt Issued/Outstanding | | | |
| 20) Fees, Restrict | | Coupon 2.000000 | | Init Prem 27.500 | | USD 1,840,000.00 (M) / | | | |
| 21) Schedules | | Type Fixed | | Freq S/A | | USD 1,840,000.00 (M) | | | |
| 22) Coupons | | Calc Type (49) CONVERTIBLE | | | | Min Piece/Increment | | | |
| Quick Links | | Pricing Date 05/02/2019 | | | | 1,000.00 / 1,000.00 | | | |
| 32) ALLQ Pricing | | 1st Coupon Date 11/15/2019 | | | | Par Amount 1,000.00 | | | |
| 33) QRD Qt Recap | | Convertible Until 05/13/2024 | | | | Book Runner JOINT LEADS | | | |
| 34) TDH Trade Hist | | Maturity 05/15/2024 | | | | Reporting TRACE | | | |
| 35) CACS Corp Action | | \$240MM GREENSHOE EXERCISED IN FULL EFFECTIVE 5/3/19. | | | | | | | |
| 36) CF Prospectus | | | | | | | | | |
| 37) CN Sec News | | | | | | | | | |
| 38) HDS Holders | | | | | | | | | |
| 39) OVCV Valuation | | | | | | | | | |
| 66) Send Bond | | | | | | | | | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | | | | | | |
| Japan 81 3 4565 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2019 Bloomberg Finance L.P. | | | | | | | | | |
| SN 129457 EST GMT-5:00 17-Dec-2019 11:42:28 | | | | | | | | | |

CB – Bloomberg Example

| | | | |
|---|------------------------------------|----------------|---|
| TSLA 2 05/15/24 \$ ↑140.553 +5.948 Yld -5.915 | | | |
| As of 16 Dec | | Vol 10.6MM | Source TRMT |
| TSLA 2 05/15/24 Corp | Settings | Actions | Page 2/12 Security Description: Convertible |
| 94 Notes | | 95 Buy | 96 Sell |
| 25) Convertible Bond | 26) Underlying Description | | |
| Pages | Additional Information | | |
| 11) Bond Info | 51) Details | 52) CV | 53) Cpn 54) Dflt 55) Struct 57) ECB/EU 58) Wgts |
| 12) Addtl Info | Conversion Information | | Calls and Puts |
| 13) Reg/Tax | Conv Price (USD) | 309.8277 | Next Call Date None |
| 14) Covenants | Conv Ratio | 3.2276 | Next Call Price None |
| 15) Guarantors | Initial Premium | 27.50% | Next Put Date None |
| 16) Bond Ratings | Convertible From | 10/01/2019 | Next Put Price None |
| 17) Identifiers | Convertible Until | 05/13/2024 | Soft Call Start Date None |
| 18) Exchanges | Interest Accrual Date | 05/07/2019 | Soft Call Trigger None |
| 19) Inv Parties | Contingent Convertible | Yes | Provisional Price None |
| 20) Fees, Restrict | Dividend Protection | | |
| 21) Schedules | Current Threshold | 0 | |
| 22) Coupons | Threshold Units | Absolute | |
| Quick Links | 71) Conversion Ratio Refix History | | 72) Dividend Protection Schedule |
| 32) ALLQ Pricing | Reason | Effective Date | Conv Price (USD) Conv Ratio |
| 33) QRD Qt Recap | Initial | 05/07/2019 | 309.8277 3.2276 |
| 34) TDH Trade Hist | | | |
| 35) CACS Corp Action | | | |
| 36) CF Prospectus | | | |
| 37) CN Sec News | | | |
| 38) HDS Holders | | | |
| 39) OVCV Valuation | | | |
| 66) Send Bond | | | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 Japan 81 3 4565 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2019 Bloomberg Finance L.P. SN 129457 EST GMT-5:00 17-Dec-2019 11:50:32 | | | |

CB – Bloomberg Example

TSLA 2 05/15/24 \$↑140.553 +5.948 Yld -5.915

As of 16 Dec Vol 10.6MM Source TRMT

TSLA 2 05/15/24 Corp

Settings ▾

Actions ▾

Page 2/12

Security Description: Convertible

90 Notes

95 Buy

90 Sell

25 Convertible Bond

20 Underlying Description

Pages

11) Bond Info

12) Adatl Info

13) Reg/Tax

14) Covenants

15) Guarantors

16) Bond Ratings

17) Identifiers

18) Exchanges

19) Inv Parties

20) Fees, Restrict

21) Schedules

22) Coupons

Quick Links

32) ALLQ Pricing

33) QRD Qt Recap

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66) Send Bond

Additional Information

51) Details

52) CV

53) Cpn

54) Dflt

56) Struct

57) ECB/EU

58) Wgts

Conversion Information

Conv Price (USD)

309.8277

Next Call Date

None

Conv Ratio

3.2276

Next Call Price

None

Initial Premium

27.50%

Next Put Date

None

Convertible From

10/01/2019

Next Put Price

None

Convertible Until

05/13/2024

Soft Call Start Date

None

Interest Accrual Date

05/07/2019

Soft Call Trigger

None

Contingent Convertible

Yes

Provisional Price

None

Dividend Protection

Current Threshold

0

Threshold Units

Absolute

71) Conversion Ratio Refix History

72) Dividend Protection Schedule

Reason

Effective Date

Conv Price (USD)

Conv Ratio

Initial

05/07/2019

309.8277

3.2276

Australia 61 2 9777 8600

Brazil 5511 2395 9000

Europe 44 20 7330 7500

Germany 49 69 9204 1210

Hong Kong 852 2977 6000

Japan 61 3 4565 8900

Singapore 65 6212 1000

U.S. 1 212 318 2000

Copyright 2019 Bloomberg Finance L.P.

SN 129457 EST GMT-5:00 17-Dec-2019 11:50:32

CB – Bloomberg Example

| | | | | |
|---|--|---------------------------|----------------------------------|------------------|
| TSLA 2 05/15/24 \$↑140.553 +5.948 Yld -5.915 | | | | |
| As of 16 Dec Vol 10.6MM Source TRMT | | | | |
| TSLA 2 05/15/24 Corp | | Settings ▾ | Actions ▾ | Page 2/12 |
| Security Description: Convertible | | | | |
| 94 Notes | | 95 Buy | | 96 Sell |
| 25 Convertible Bond | | 26 Underlying Description | | |
| Pages | Additional Information | | | |
| 11) Bond Info | 51) Details 52) CV 53) Cpn 54) Dflt 56) Struct 57) ECB/EU 58) Wgts | | | |
| 12) Adatt. Info | Conversion Information | | Calls and Puts | |
| 13) Reg/Tax | Conv Price (USD) 309.8277 | | Next Call Date None | |
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| 15) Guarantors | Initial Premium 27.50% | | Next Put Date None | |
| 16) Bond Ratings | Convertible From 10/01/2019 | | Next Put Price None | |
| 17) Identifiers | Convertible Until 05/13/2024 | | Soft Call Start Date None | |
| 18) Exchanges | Interest Accrual Date 05/07/2019 | | Soft Call Trigger None | |
| 19) Inv Parties | Contingent Convertible Yes | | Provisional Price None | |
| 20) Fees, Restrict | Dividend Protection | | | |
| 21) Schedules | Current Threshold 0 | | | |
| 22) Coupons | Threshold Units Absolute | | | |
| Quick Links | 71) Conversion Ratio Refix History | | 72) Dividend Protection Schedule | |
| 32) ALLQ Pricing | Reason | | Effective Date | Conv Price (USD) |
| 33) QRD Qt Recap | Initial | | 05/07/2019 | 309.8277 |
| 34) TDH Trade Hist | | | | 3.2276 |
| 35) CACS Corp Action | | | | |
| 36) CF Prospectus | | | | |
| 37) CN Sec News | | | | |
| 38) HDS Holders | | | | |
| 39) OVCV Valuation | | | | |
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| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | |
| Japan 61 3 4565 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2019 Bloomberg Finance L.P. | | | | |
| SN 129457 EST GMT-5:00 17-Dec-2019 11:50:32 | | | | |

Conversion Price and Conversion Ratio

A convertible bond has the feature of being convertible into a pre-determined number of shares.

Conversion Ratio

- The number of shares the convertible exchanges into (per bond)
- Forms part of the offering terms and will not change during the life of the CB
- Based on the conversion price

Conversion Price

- The price the CB converts at

Tesla CB Example

- **Conversion Price:** \$309.8277
- **Bond Denomination:** \$1,000 (face value)

$$\begin{aligned}\text{Conversion Ratio} &= \frac{\text{Bond Denomination}}{\text{Conversion Price}} \\ &= \frac{\$1,000}{\$309.8277} \\ &= 3.2276\end{aligned}$$

Parity Value

Parity value (intrinsic value) is one of key financial terms of convertible bonds.

$$\text{Parity} = \text{Conversion Ratio} \times \text{Current Share Price}$$



- The value of your investment if you were to convert the CB into shares of stock at the current share price
- Used to determine when to convert a bond into shares

Tesla CB Example

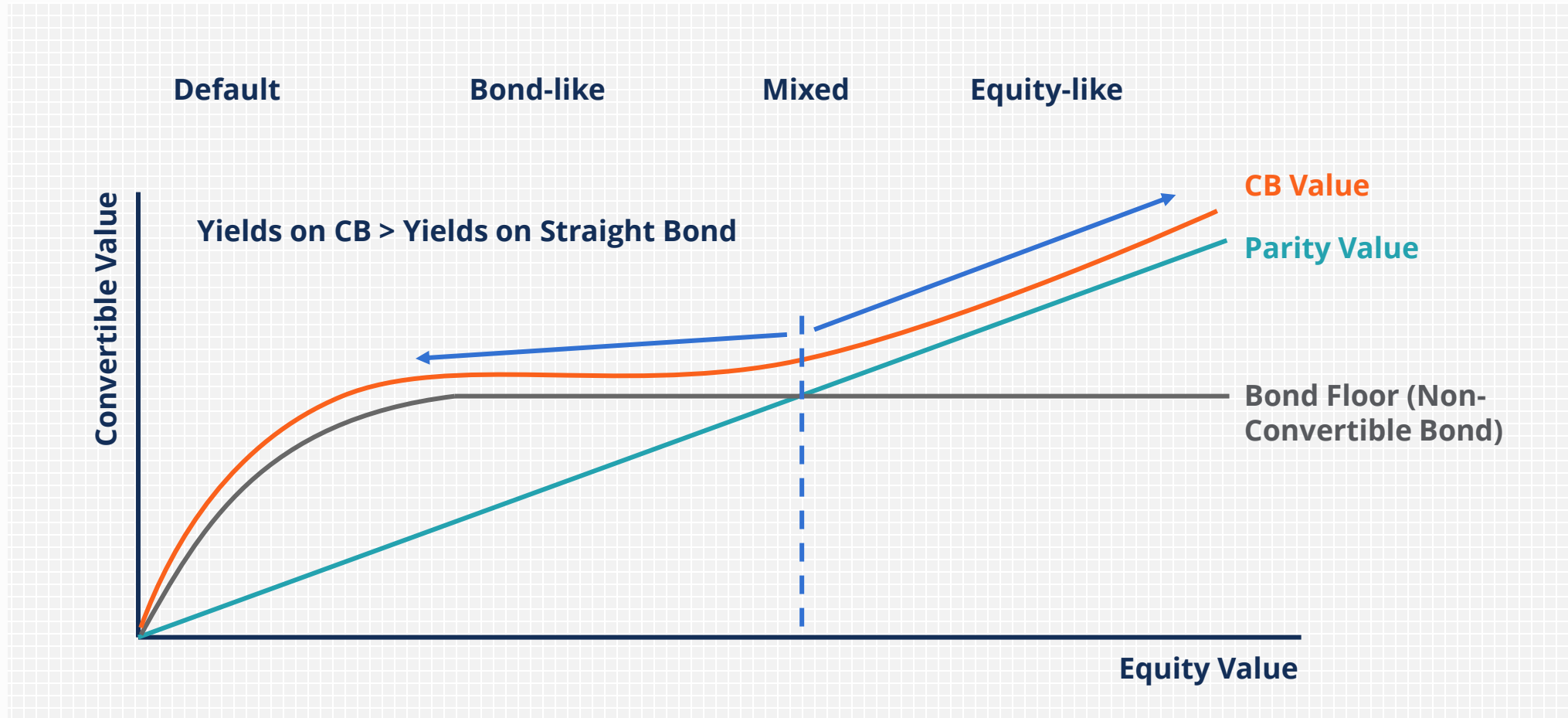
- **Current Price:** \$380.344
- **Conversion Ratio:** 3.2276

$$\text{Parity} = 3.2276 \times \$380.344 \\ = \$1,227.56$$

| | | | |
|------------|----------|-------------|------------|
| Conv Ratio | 3.2276 | Conv Price | 309.8277 |
| Stock Tkr | TSLA US | Stock Price | 380.334... |
| Parity | 122.7569 | Premium | 14.4970 |
| Coupon | 2.000000 | Init Prem | 27.500 |
| Type | Fixed | Freq | S/A |

CB Value Diagram

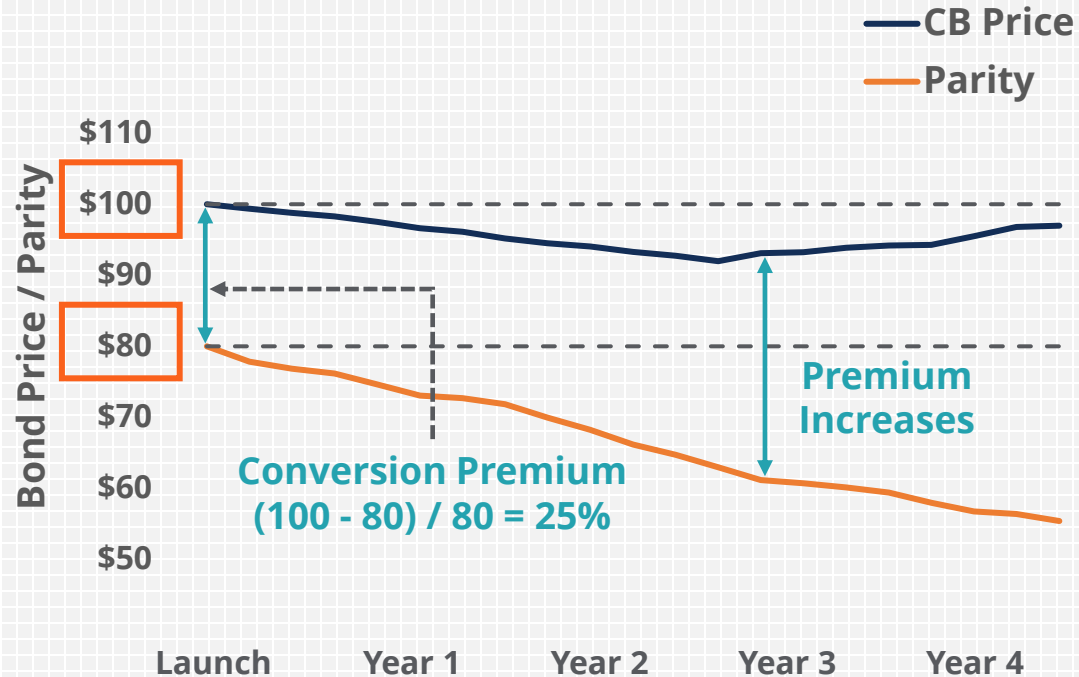
Value Diagram (CB)



CB vs. Share Price

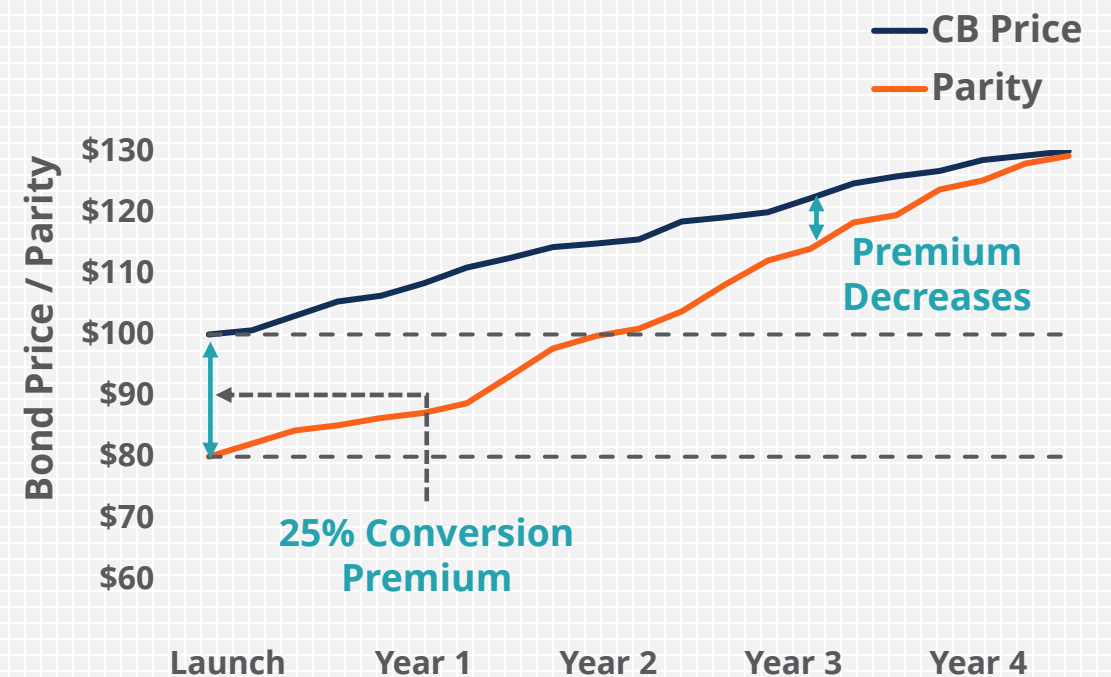
How would **the price of a CB** move with **changes in the underlying equity price** over time?

CB vs. Share Price Decrease



CB behaves more bond-like

CB vs. Share Price Increase

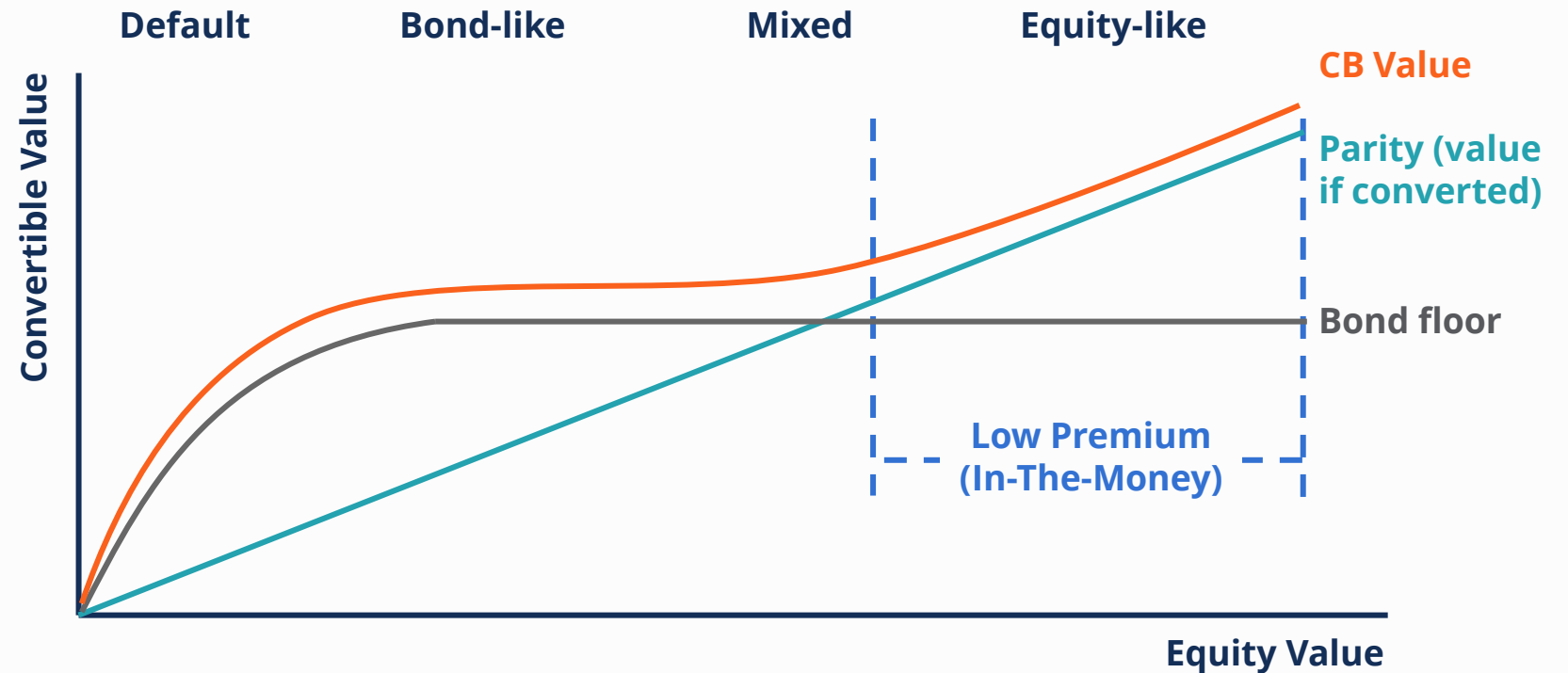


CB behaves more equity-like

Low Premium

CB investors have special terminology to describe each of the different scenarios of a CB given the premium.

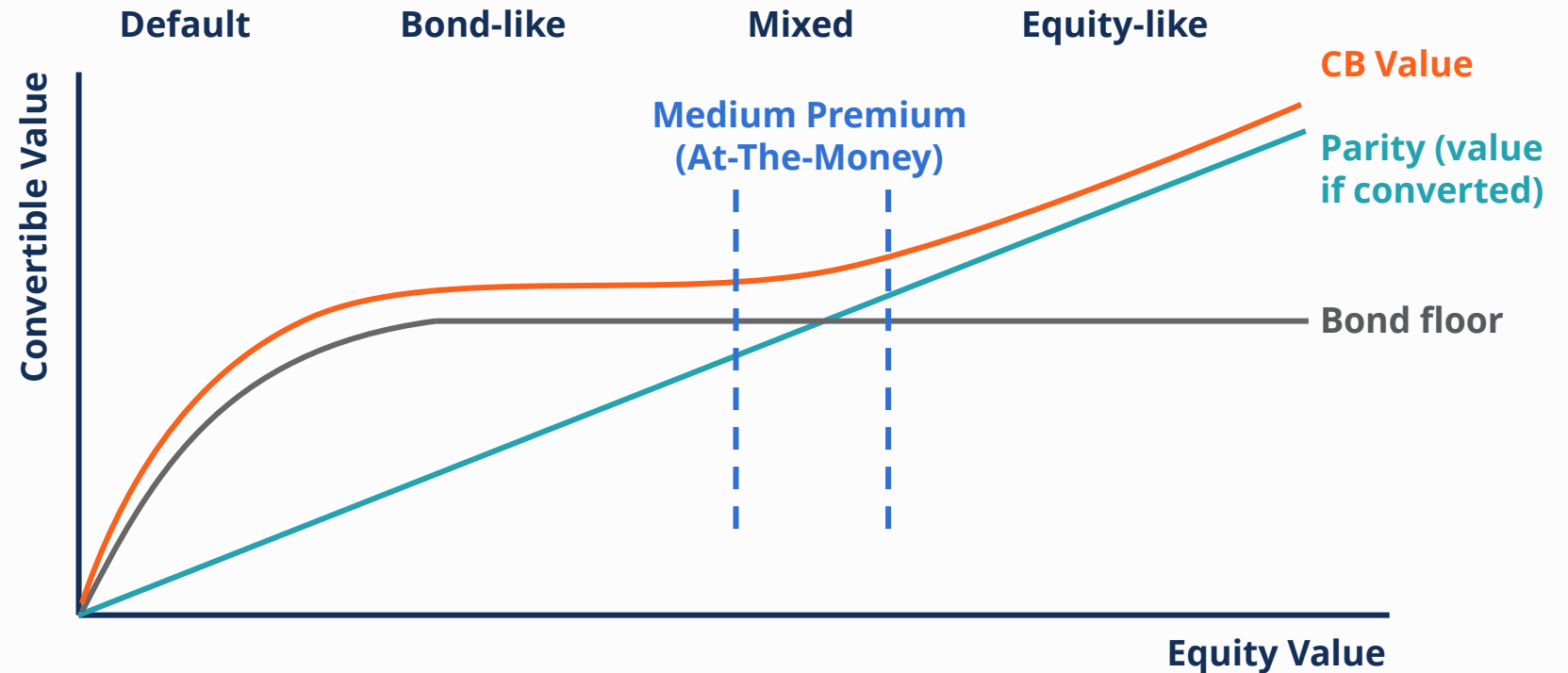
- High underlying stock price
- Value of CB reacts sharply to parity value changes and less to interest rate changes
- Also referred to as “butane”



Medium Premium

CB investors have special terminology to describe each of the different scenarios of a CB given the premium.

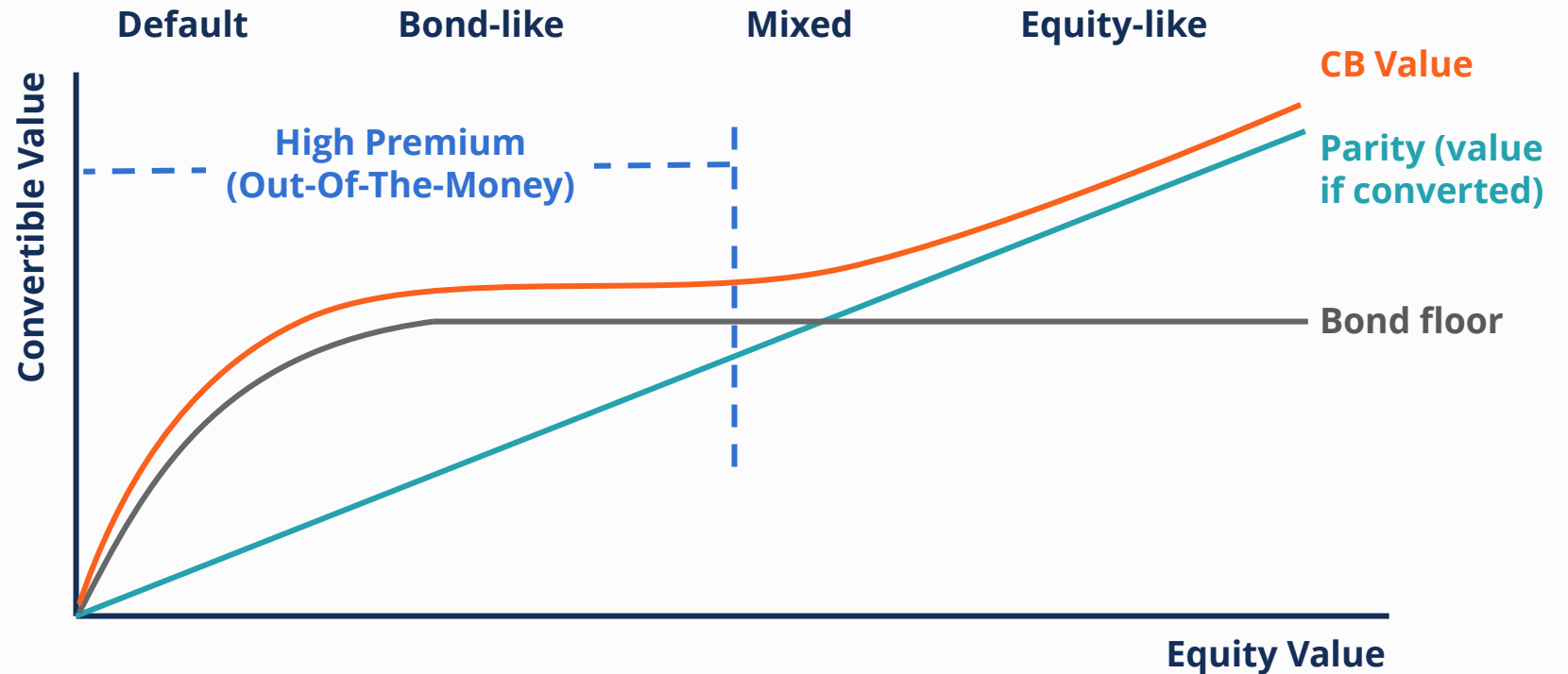
- Parity value is the main factor, but the CB is also sensitive to interest rates
- Usually where new issues come from
- Also referred to as “balanced”



High Premium

CB investors have special terminology to describe each of the different scenarios of a CB given the premium.

- The underlying stock price falls significantly
- CB acts like a straight bond as long as the issuer doesn't default
- CB isn't sensitive to changes in the underlying stock price, but reacts to changes in yield
- Also referred to as “busted”



CB Redemption

We have **redemption** when a convertible bond comes up for maturity and has not been converted.



Mandatory Basis

Issuer Redeems the CB



Voluntary Basis

Investor Redeems the CB

Conversion: CB is converted or exchanged into stocks.

Redemption: An option to receive the invested principle back in cash.

CB Redemption

We have **redemption** when a convertible bond comes up for maturity and has not been converted.



Mandatory Basis

Issuer Redeems the CB

- **Call feature:** the issuer can redeem before maturity at a prespecified price.
- The call price will be high in the earlier years and decline towards par close to maturity.
- A sinking fund establishes a schedule of redemption at preset prices.



Voluntary Basis

Investor Redeems the CB

- **Put feature:** the investor can sell the bonds back to the issuer at a predetermined price.
- It is usually continuous with few restrictions for the investor.
- It is a very uncommon feature outside of its use in a change of control scenario.

Types of CBs

**Adjustable Rate
Convertibles**

**Convertible
Preferred Stock**

**Convertible Stock
Notes**

**Exchangeable
Convertibles**

**Exchangeable
Convertible
Preferred**

**Mandatory
Convertible
Securities (MCS)**

**Puttable
Convertible Bonds**

**Zero-Coupon
Convertible Bonds**

Types of CBs

Adjustable Rate Convertibles

- May have an interest rate or dividend that is adjusted periodically
- Usually have floors and ceilings, which limit their adjustments

Convertible Preferred Stock

- Pays a fixed dividend and is convertible into the underlying common stock
- The dividend can be deferred at request without triggering default
- Ranks above common stock in dividend priority and is treated like equity

Convertible Stock Notes

- Referred to as Pay-In-Kind (PIK)
- Issuer can pay the interest and principal in either cash or stock

Exchangeable Convertibles

- Issued by one company with the shares of another company as the underlying
- Issuer can receive the stock sale proceeds while deferring capital gains

Types of CBs

Exchangeable Convertible Preferred

- Lets the issuer exchange its convertible preferred bonds for a convertible bond
- Gives issuer flexibility by substituting a non-tax-deductible item for one that is

Mandatory Convertible Securities (MCS)

- Converted into a fixed amount of equity at maturity
- Should be considered yield-enhanced common stock
- Limited downside protection other than their higher yield

Puttable Convertible Bonds

- Permits the holder to sell the bond back at par or premium above par prior to maturity
- Includes the put to shorten the maturity and raise the investment value
- Offers downside protection

Zero-Coupon Convertible Bonds

- Pays no coupon and is issued at a deep discount to par
- Positive YTM and accretes towards par over its life
- Usually issued with low conversion premiums

The CB Market



- Over **4,850** individual CBs
- **Minimum** outstanding of ~ \$10MM USD equivalent.
- **Total market** ~ \$745Bn USD

Data from Bloomberg Terminal as of March 2020



#1: EUR (~46%)

#2: USD (~35%)

#3: RMB (growing rapidly)

Issued in every major market



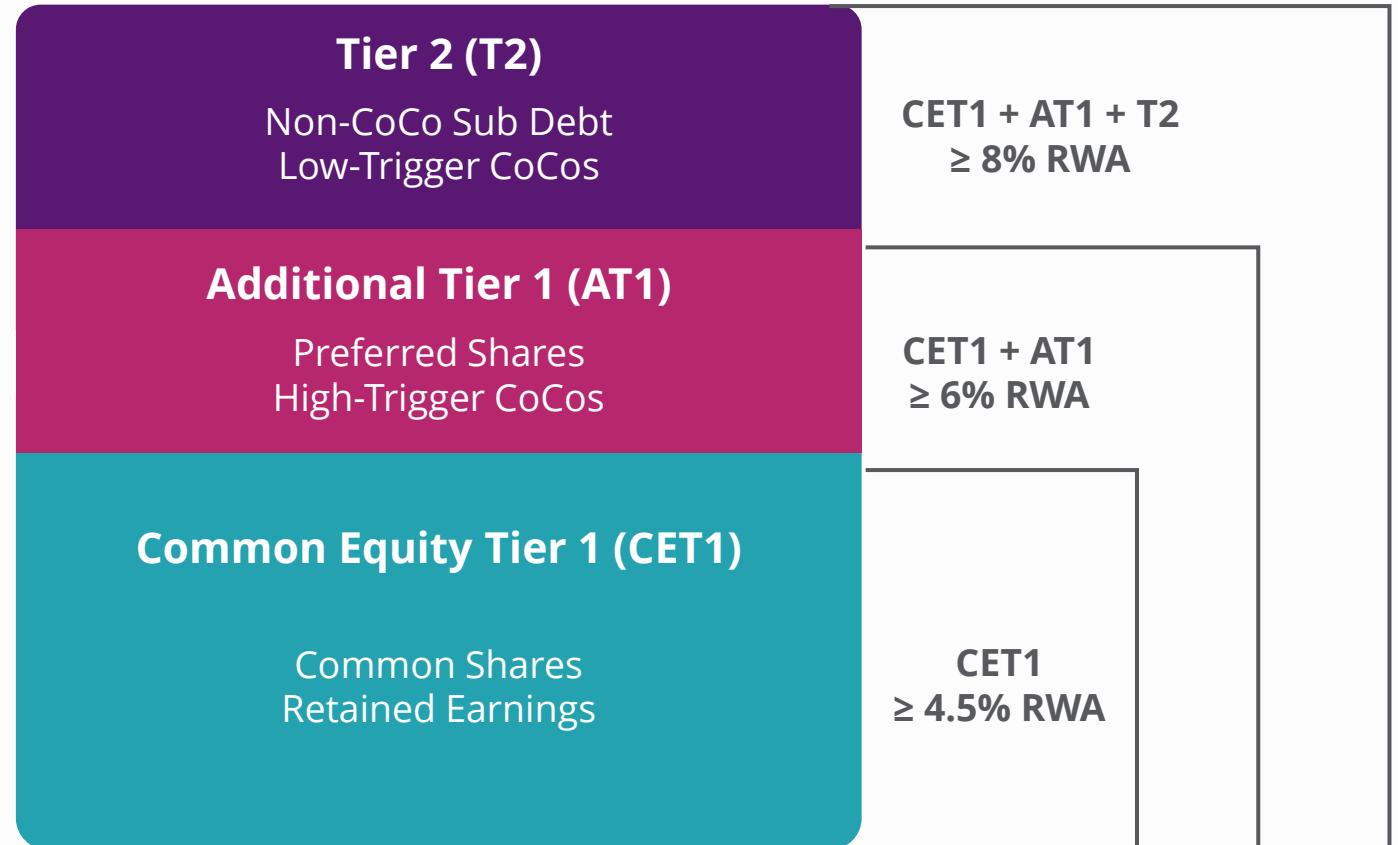
- **Average** issue size worth ~\$150MM USD
- **Largest** issues are ~\$3Bn USD

Bank Capital

Banks must issue **CoCos (contingent convertibles)** as part of the Basel III requirements by the BIS (Bank for International Settlements).

Based on the sum of the risky assets on a bank's balance sheet, the BIS has enacted guidelines for banks to follow.

CoCos absorb losses so that the losses will not have to be borne by depositors.



CoCo

01

CoCo bonds are a hybrid capital security.

02

CoCo bonds absorb losses when the issuing bank's capital falls below a certain level.

03

Converted into common equity (CE-type bonds) or principal written-down (PWD-type bonds).

04

Triggers occur if the issuing bank's capital falls below a pre-determined fraction of its risky assets.

CB Benefits

Why would a company choose to issue convertible bonds?

These are some of the **key advantages of issuing CBs** for a corporate issuer.



Low Cost of Borrowing

- Subordinated to an issuer's senior debt
- The cost of borrowing CB is lower
- Investors accept a lower yield-to-maturity (YTM) for the potential equity upside



Covenants

- Typically less restrictive covenants relative to high yield bonds
- Investors are willing to pay for the privilege of speculating on equity price appreciation



Share Price

- A firm may be able to sell common stock at a better price through a CB
- Less dilutive to earnings-per-share (EPS) in the short term

Who Issues CBs and Why?

Globally, there is significant interest for companies to issue CBs. However, a company needs to have stock outstanding to issue convertible bonds.

Sovereign, agency, or government issuers will not issue convertible bonds.



Growth Companies

- A conversion price higher than common share price
- Less stringent covenants
- Strengthen the company's balance sheet



Mature Companies

- More favorable terms
- Higher premium cheaper to their stock price
- Cheaper financing than straight bonds or loans
- Tax benefit



Declining/ Turnaround Companies

- Issue an exchangeable bond using the shares from the asset buyer
- Generate cash upfront and defer the tax on the sale of the shares



Banks

- Issue CoCos to bolster their balance sheets
- Issue exchangeable bonds as part of their structured product business and sell them to the high-net-worth clients

CB Investors

Since CBs can be viewed as hybrid securities, the investors that look at convertible bonds are also diverse.

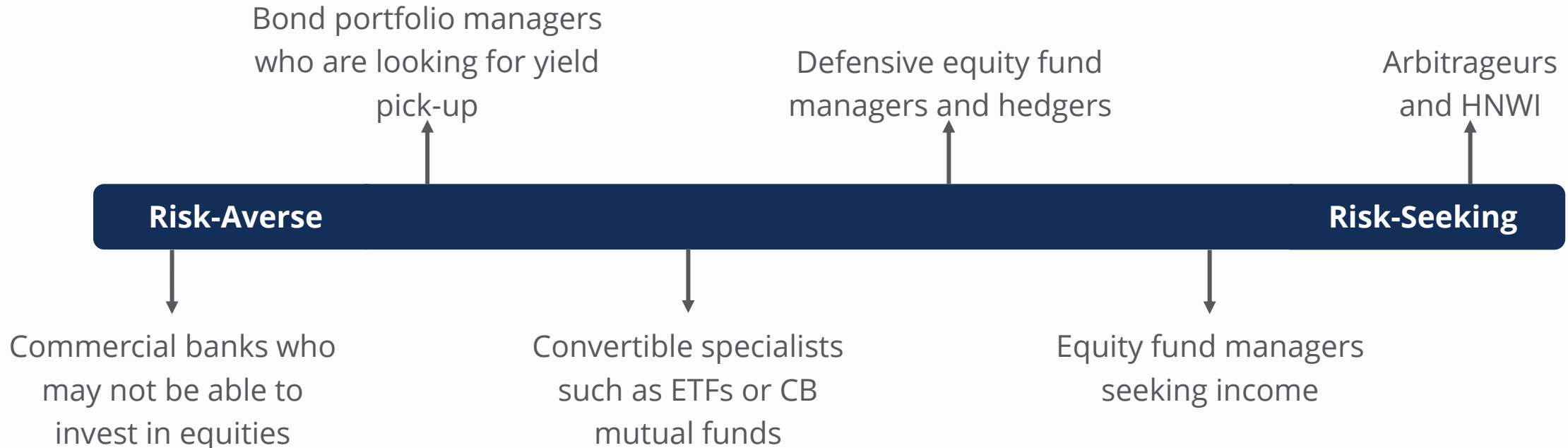
Risk-averse investors:

look at CBs as a yield enhancer

Risk-loving investors:

look at the highest yielding distressed CBs

Increasing Risk



Why Buy CBs?

There are multiple reasons to consider convertible bonds as an investment.

Equity Alternative

- Equity upside: provides returns closer to equity
- Bond downside: provides protection

Fixed-Income Alternative

- Participate in the upside for equities
- Try to outperform the index by purchasing CBs

Diversification

- Have exposure to names that don't issue straight bonds
- Return diversification

Arbitrage & Hedging

- CBs have characteristics of both
- Sell them separately to take advantage of mispricing

Currency Play

- Buy credits in certain currencies without having to hedge the FX exposure
- Buy CBs that convert or exchange into foreign equity markets

CB Key Risks

A CB can be thought of as a bond plus an equity call option. The risks in investing in CBs would be like investing in both fixed-income and equities.



Bond Value

- Creditworthiness (liquidity, leverage, debt service, asset cover, profitability)
- Yield-to-maturity or redemption
- Duration and convexity



Option Value

- Stock price movement
- Time left on the option
- Dividend of the underlying stock
- Risk-free rate
- Market movements

CB Structural Risks

Structural risks make it difficult for investors to compare one CB to another.

Forced Conversion

- The issuer may force conversion if rates fall significantly or the underlying security price exceeds the conversion price

Call Protection

- **Hard call protection:** prevent the issuer from calling the bond for a set period of time
- **Soft call protection:** prevent the issuer from calling the bond until the stock price rises to a certain percentage above the conversion price

Clean Up Calls

- Issuer may redeem the remaining CBs if a large percentage have been converted
- Sweep-up-call

Guaranteed Conversion

- CB holder gets stock at maturity guaranteed
- Low downside protection (more equity-like)

Screw Clause & Other Structures

- Upon conversion the CB holder may not receive accrued interest (e.g. conversion rights may expire before interest is paid)

How Are CBs Issued?

Most bond offerings are sold privately under SEC's rule 144a; thus, they are made via qualified and accredited investors.

01

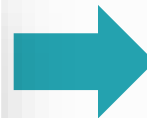
Investment bankers work with equity capital markets (ECM) to discuss the specifics of the CB issuance.

Bring in help from debt capital markets (DCM) if needed.



02

The leads start conducting the due diligence to prevent misrepresentation or fraud.



03

The leads arrange for a bond prospectus to be put together.

Rating agencies are engaged to start their rating process.

04

Large investors may be provided with price talk and if they want to participate, they may leave indications of interest (IOIs).



How Are CBs Issued?

05

Issuer's management team goes on a road show to pitch the transaction.

They may educate sales staff at the teach-ins.



06

Once the leaders are satisfied with the demand, bond terms are finalized and books are open for investors to leave orders.

Books may stay open for a few hours up to a few days.



08

The bonds are free to trade in a day or two.

Market makers may begin to buy and sell the bonds in the secondary market



07

The books are closed and the deal is priced. Price talk may be refined or tightened with demand.

How Are CBs Issued?



CB leads are well-compensated for their efforts.

- CB deal: 3% to 5%
- High-grade deal: 10 to 50 basis points



Investors like to invest in CBs via primary issuance. It allows for price appreciation in the secondary market once the deal breaks.



New issues also offer good investors a larger allocation for supporting the transaction.



When a new issue is free to trade, there tends to be a pop in prices, as under-allocated investors look to buy more in the secondary market.



The Math of Convertible Bonds

Analyzing CBs Example

$$\text{Parity} = \text{Conversion Ratio} \times \text{Current Share Price}$$

$$\text{Premium} = \text{CB Price} - \text{Parity Value}$$

$$\text{Conversion Ratio} = \frac{\text{Bond Denomination}}{\text{Conversion Price}}$$

Analyzing CBs Example

CFI Education issued a \$1Bn USD 5-year convertible bond.

- **Bond Denomination (Face Amount):** \$1,000
- **Annual Coupon:** 4% (\$40 per year)
- **Conversion Price:** \$250 per share
- **Current Stock Price:** \$200 per share
- **Current Market Price of the CB:** \$1,060 (106 bond points)
- **Present Yields:** 8%
- **Dividend Yields:** 1% ($1\% \times \$200 = \2 per share)



Analyzing CBs – Conversion Price and Conversion Ratio

Conversion Price

- The price that the CB converts at
- Set at the time when the CB is first issued
- Based on investor feedback at that time

Conversion Price = \$250

Above the current stock price of \$200

Conversion Ratio

- The number of shares the convertible exchanges into (per bond)

$$\begin{aligned}\text{Conversion Ratio} &= \frac{\text{Bond Denomination}}{\text{Conversion Price}} \\ &= \frac{\$1,000}{\$250} \\ &= \mathbf{4 \text{ shares}}\end{aligned}$$

Analyzing CBs – Parity and Conversion Premium

Parity

Conversion Ratio x **Current Share Price**



The pre-determined number of shares for which the CB may be converted

$$\text{Parity} = \$4 \times \$200 = \$800$$

The holder would be unlikely to convert the bond into shares at this time (\$800 < \$1000)

Conversion Premium

$$\frac{\text{Market Price of the CB} - \text{Parity}}{\text{Parity}}$$

$$\begin{aligned}\text{Conversion Premium} &= \frac{\$1060 - \$800}{\$800} \\ &= 32.5\%\end{aligned}$$

The investors are willing to pay a 32.5% premium in order to have the bond features available.

- Low premium: in-the-money
- Medium premium: at-the-money
- High premium: out-of-the-money

Analyzing CBs – Investment Value

Investment Value

- The price of the CB as if it were a straight bond
- Used if the underlying stock price falls far below the conversion price

$$PV = FV \times \frac{1}{(1 + i)^n}$$

$$PV1 = \$40 \times \frac{1}{(1 + 8\%)^1}$$

$$PV2 = \$40 \times \frac{1}{(1 + 8\%)^2}$$

$$PV3 = \$40 \times \frac{1}{(1 + 8\%)^3}$$

$$PV4 = \$40 \times \frac{1}{(1 + 8\%)^4}$$

$$PV5 = \$1040 \times \frac{1}{(1 + 8\%)^5}$$

Total PV = \$840.29

Analyzing CBs – Investment Premium

Investment Premium

The percentage that the buyer must pay beyond the value of the straight bond to have the privilege of being able to convert

$$\frac{\text{Market Price of the CB} - \text{Investment Value}}{\text{Investment Value}}$$

$$\begin{aligned}\text{Investment Premium} &= \frac{\$1,060 - \$840.29}{\$840.29} \\ &= 26.1\%\end{aligned}$$



Analyzing CBs – Current Yield and Yield Advantage

$$\text{Current Yield} = \frac{\text{Annual Dollar Coupon Amount}}{\text{Market Price of the CB}}$$

Yields are the potential return for holding a bond

- Interest payments
- Coupons
- Capital gains or losses
- Principal repayments or buy backs
- Income from reinvesting the coupons

$$\text{Current Yield} = \frac{\$40}{\$1,060} = 3.77\%$$

Yield Advantage

Current Yield – Dividend Yield

$$\begin{aligned}\text{Yield Advantage} &= 3.77\% - 1\% \\ &= 2.77\%\end{aligned}$$

Analyzing CBs – Break-Even Period

Break-Even Period

- How long it would take for a particular CB to be held in order to recapture the conversion premium

$$\text{Breakeven Period} = \frac{\text{Conversion Premium}}{\text{Yield Advantage}}$$

$$= \frac{32.5\%}{2.77\%}$$

$$= \mathbf{11.7 \text{ years}}$$

The CB is five years in total maturity, so this break-even period indicates that the CB is trading quite rich.



Analyzing CBs – Break-Even Cash Flow

Break-Even Cash Flow

- A more advanced payback analysis method

$$\text{Dollar Difference} = \text{Coupon Amount} - (\text{Conversion Ratio} \times \text{Dividend Amount})$$

$$= \$40 - (4 \times \$2) = \$32$$



The excess cash we get for holding the CB versus holding the shares for a year.

$$\text{Breakeven Cash Flow} = \frac{\text{Market Price} - \text{Parity Value}}{\text{Dollar Difference}}$$

$$= \frac{\$1,060 - \$800}{\$32} = 8.125 \text{ years}$$



It would take 8.125 years to recoup the premium paid for the CB based on the cash difference of \$32 a year.

Real Market Examples

CONVERTIBLE MARKET STATISTICS

10/31/19
ICE BOFAML
ALL U.S. CONV.
INDEX (VXA0)

9/30/19
ICE BOFAML
ALL U.S. CONV.
INDEX (VXA0)

| | | |
|----------------------------|-------|-------|
| Average Current Yield | 2.5% | 2.5% |
| Average Conversion Premium | 34.0% | 35.4% |
| Average Investment Premium | 31.1% | 33.0% |
| Average Quality Rating | BB2 | BB2 |

NEW ISSUES STATISTICS

10/31/19
ICE BOFAML
ALL U.S. CONV.
INDEX - NEW
ISSUES (VNEW)

9/30/19
ICE BOFAML
ALL U.S. CONV.
INDEX - NEW
ISSUES (VNEW)

| | | |
|----------------------------|-------|-------|
| Average Current Yield | 2.0% | 2.0% |
| Average Conversion Premium | 33.4% | 33.2% |
| Average Investment Premium | 32.3% | 35.0% |
| Average Quality Rating | BB2 | BB2 |

Source: BofA Merrill Lynch Global Research, ICE Data Indices, LLC; VXA0 Index, VNEW Index.



Trading Strategies

Bond Value and Price

Bond Value

The discounted value of all future cash flows generated by the bond

Technicals

Fundamentals

Market Value

The market price may not be the same as what a model predicts. It is up to the investor, trader, or speculator to determine whether a CB is underpriced, overpriced, or fairly priced.

Bond Value Inputs

Important inputs of pricing a straight bond will include:



1. Issue Price



2. Coupon Payment



3. Maturity



4. Discount Rate



5. Redemption Price

Option Value Inputs

Important inputs of pricing a CB stock option will include:



1. Underlying Price



2. Expiration Date



**3. Conversion
Premium/Price**



4. Call or Put



5. Exercise Features



6. Dividend Forecasts



7. Assumed Volatility

Option Value

Option Value or Option Premium

Intrinsic Value

Actual price of the underlying security – strike price of the option

Extrinsic (Time) Value

Time to expiration

Volatility of underlying stock

Interest rates (opportunity cost)

Dividends

Intrinsic Value vs. Extrinsic (Time) Value



Intrinsic Value

- Remains the same for an option as long as the underlying price doesn't move

VS



Extrinsic (Time) Value

- Doesn't stay the same due to time decay
- Decreasingly valuable as the option approaches expiration
- The portion of an option's price that exceeds the intrinsic value

Even when the option is out-of-the-money and the intrinsic value is zero, it never gets negative.

Extrinsic value may still have value even when intrinsic value is zero, especially if the volatility of the underlying asset is high, as the option may swing back to being in-the-money.

Implied Volatility

The inputs into valuing a CB option are all straightforward except for volatility. The reason is that volatility cannot be observed until after it happens.

Implied Volatility

- Refer to prices of longer-dated option instruments in the future
- Use these market prices from those instruments
- Work backwards to derive volatilities that are closer to the present



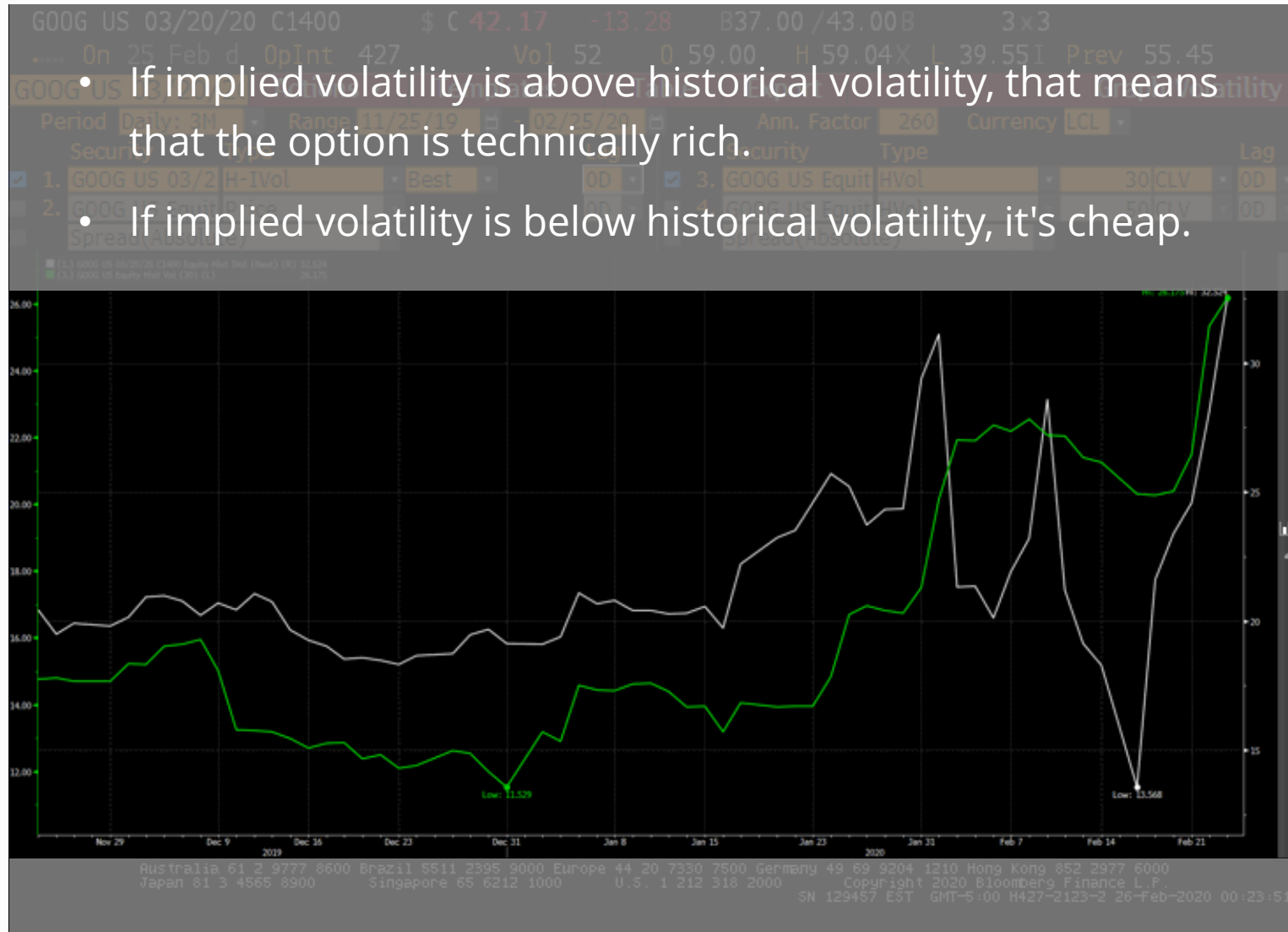
- Past volatility is not always a good predictor of future volatility
- Normally, market makers use implied volatility to price options

Implied Volatility vs. Historical Volatility



Implied Volatility vs. Historical Volatility

- If implied volatility is above historical volatility, that means that the option is technically rich.
- If implied volatility is below historical volatility, it's cheap.



How Options Are Priced

Three main categories of modeling for valuing derivatives:

Black-Scholes

Binomial/ Trinomial

Monte Carlo

Varies in the way that the probability distribution for future stock prices are generated

| Drivers (Increase) | Call | Put | Greek |
|----------------------------|------|-----|---------------|
| Strike price | ↑ | ↓ | - |
| Underlying price | ↑ | ↓ | Delta & Gamma |
| Term | ↑ | ↑ | Theta |
| Volatility | ↑ | ↑ | Vega |
| Interest rate | ↑ | ↓ | Pho |
| Credit spread/ dividend | ↓ | ↑ | Omicron/Phi |

The Greeks of CBs

| Drivers | Call | Put | Greek |
|------------------------------|------|-----|---------------|
| Increase in underlying price | ↑ | ↓ | Delta & Gamma |

Δ Delta

- Change in CFV per unit change in the underlying stock price

Γ Gamma

- How quickly the Delta changes given a change in the underlying stock price

CFV = Convertible Fair Value (The market price of the CB)

The Greeks of CBs

| Drivers | Call | Put | Greek |
|------------------|------|-----|-------|
| Increase in term | ↑ | ↑ | Theta |

⊖ Theta

- Change in CFV for a 1-day change in the number of days to expiry
- Also referred to as time decay

CFV = Convertible Fair Value (The market price of the CB)

The Greeks of CBs

| Drivers | Call | Put | Greek |
|------------------------|------|-----|-------|
| Increase in volatility | ↑ | ↑ | Vega |

V Vega

- Change in CFV for a 1% change in the underlying stock's implied volatility
- Also referred to as "Tau"

CFV = Convertible Fair Value (The market price of the CB)

The Greeks of CBs

| Drivers | Call | Put | Greek |
|---------------------------|------|-----|---------|
| Increase in interest rate | ↑ | ↓ | Pho |
| Increase in credit spread | ↓ | ↑ | Omicron |
| Increase in dividend | ↓ | ↑ | Phi |

ρ Rho

- Change in CFV for a 10 basis points (bps) change in interest rates

\mathcal{O} Omicron

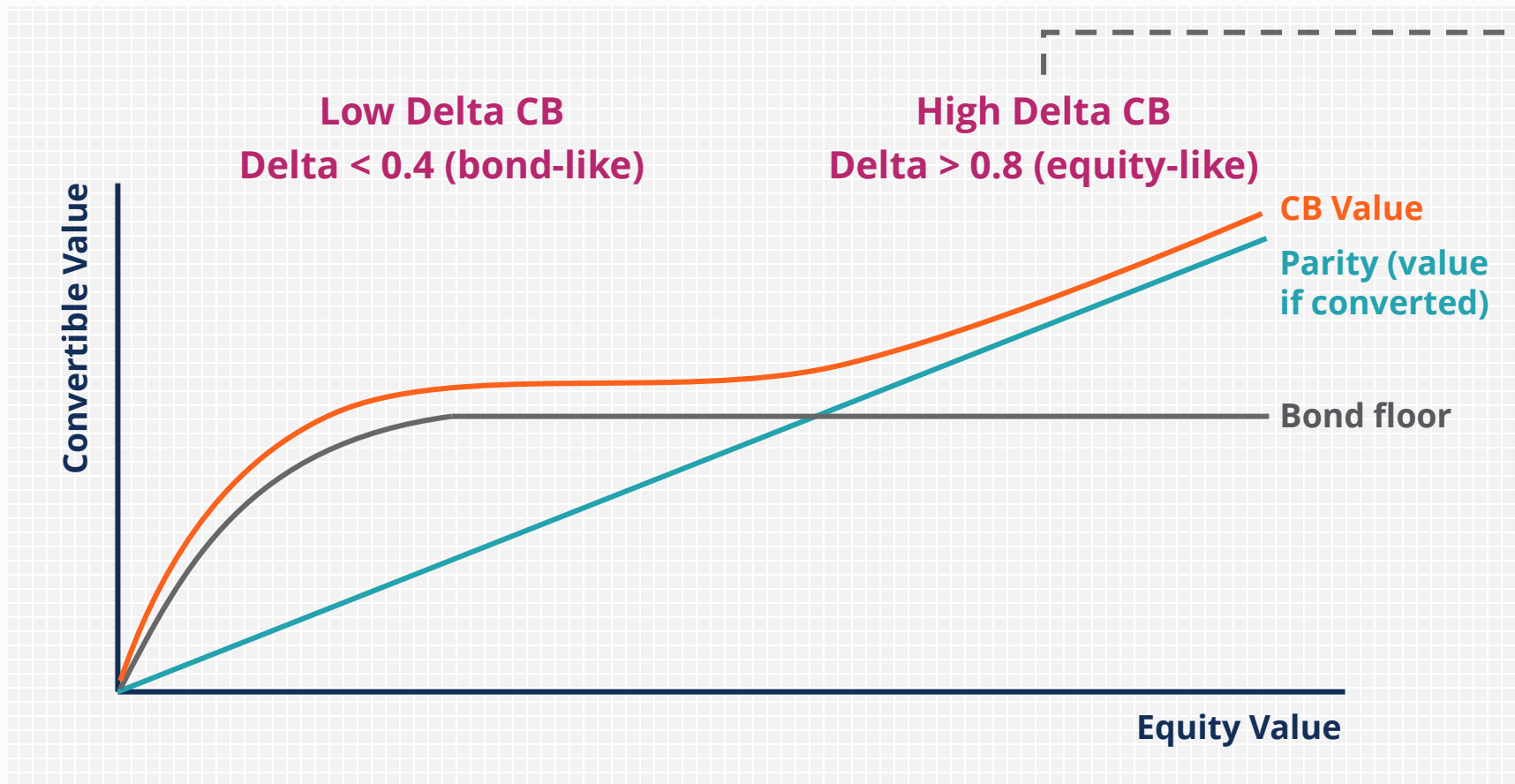
- Change in CFV for a 10 bps change in credit spread of the issuer

Φ Phi

- Change in CFV with respect to the underlying stock dividend yield

An Example of Using a Greek

The reason for using Greeks is that this allows traders and investors to have a standardized short-hand to describe changes in the price of their option based on the variables.



A \$1 increase in the underlying stock price will mean at least an \$0.80 increase in the price of the CB.

How to Value CBs

E

| | | | | | | | | | | | | | | | |
|---|--|----------------------|--|----------------------------------|--|-----------------------|--|-----------------|--|----------|--|-----------------|--|---------|--|
| TSLA 2 05/15/24 | | 91) Actions ▾ | | 92) Settings ▾ | | Convertible Valuation | | | | | | | | | |
| Bond ZS4501020 | | Stock TSLA US Equity | | | | | | | | | | | | | |
| 11) Pricing Analysis | | 12) Cash Tender | | 13) Historical Analysis | | 14) Scenario Analysis | | 15) Nuke/Hedge | | | | | | | |
| 21) Analysis | | 22) IR Curve | | 23) Credit Curve | | 24) Dividends | | 25) Volatility | | | | | | | |
| Market Price | | Spread (Credit) | | Volatility | | Stock Price | | Borrow Cost | | | | | | | |
| 189.170 ▾ | | 391.440 ▾ | | 64.46 ▾ | | 545.450 ↺ | | 0.0 % | | | | | | | |
| | | Flat 5 Year Spre... | | Flat 2Y Implied | | | | | | | | | | | |
| Trade Date | | Settle Date | | Model | | E2C | | Greeks based on | | | | | | | |
| 04/07/2020 ▾ | | 04/09/2020 ▾ | | Black-Scholes & Jump-Diffusion ▾ | | | | | | | | | | | |
| Fair Value | | 200.481 | | Bond Floor | | 90.751 | | IR Sens | | -1.764 | | Yield to Mty | | -13.541 | |
| Cheapness | | N/A | | Bond Premium | | N/A | | IR Sens | | -1.764 | | Yield to Mty | | N.A. | |
| Implied Spread | | 751.789 | | Parity | | 178.049 | | Phi | | N.A. | | Yield to Put | | N.A. | |
| Implied Vol | | 50.203 | | Premium (%) | | 7.453 | | Chi | | N.A. | | Yield to Worst | | -13.541 | |
| Delta (%) | | 89.042 | | Gamma | | 0.165 | | Upsilon | | 0.099 | | Current Yield | | 1.057 | |
| Delta (pts) | | 1.568 | | Vega | | 0.773 | | Convexity | | 0.066 | | Breakeven (Y) | | 6.560 | |
| Effective Trig | | 0%/0.000 | | Theta | | 0.007 | | Effective Dur | | 0.880 | | CF Payback (Y) | | 6.560 | |
| Unit Prc | | 2.005M | | Exp Life (Fugi... | | 3.596 | | | | | | Accrued Int | | 0.800 | |
| Hedge Ratio | | 0.287 | | | | | | | | | | | | | |
| Description ▾ | | | | | | | | | | | | ⌵ | | | |
| Bond CUR | | USD | | Conv Prc | | 309.8277 | | Issue Amt | | 1.84MMM | | Next Call Date | | None ▴ | |
| Stock CUR | | USD | | Conv Ratio | | 3.2276 | | Amt Out | | 1.84MMM | | Next Put Date | | None | |
| Stock Ticker | | TSLA US | | Proj Conv Ratio | | 3.2276 | | Issue Date | | 05/07/19 | | Next Call Price | | None | |
| Cusip | | 88160RAG6 | | Init Prm (%) | | 27.50 | | Maturity | | 05/15/24 | | Next Put Price | | None | |
| Collateral | | SR UNSECURED | | Coupon | | 2% FIXED | | Conv From | | 10/01/19 | | Prov Trig | | None | |
| Par Amount | | 1000.00 | | Cpn Freq | | Semi-Annual | | Conv Until | | 05/13/24 | | Prov Start | | None ▾ | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | | | | | | | | | | | | |
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Jump-diffusion model considers the likelihood of default of the issuer using credit default swaps, or credit spreads

How to Value CBs

E

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|---|--|----------------------|--|------------------------|--|-----------------------|--|-----------------|--|----------|--|-----------------|--|---------|--|
| TSLA 2 05/15/24 | | 91) Actions ▾ | | 92) Settings ▾ | | Convertible Valuation | | | | | | | | | |
| Bond ZS4501020 | | Stock TSLA US Equity | | | | | | | | | | | | | |
| 11 Pricing Analysis | | 12 Cash Tender | | 13 Historical Analysis | | 14 Scenario Analysis | | 15 Nuke/Hedge | | | | | | | |
| 20 Analysis | | 22 IR Curve | | 23 Credit Curve | | 24 Dividends | | 25 Volatility | | | | | | | |
| Market Price | | Spread (Credit) | | Volatility | | Stock Price | | Borrow Cost | | | | | | | |
| 189.170 ▾ | | 391.440 ▾ | | 64.46 ▾ | | 545.450 ↻ | | 0.0 % | | | | | | | |
| | | Flat 5 Year Spre... | | Flat 2Y Implied | | | | | | | | | | | |
| Trade Date | | Settle Date | | Model | | E2C | | Greeks based on | | | | | | | |
| 04/07/2020 ▾ | | 04/09/2020 ▾ | | Jump Diffusion ▾ | | 0.0 | | Spread & Vol ▾ | | | | | | | |
| Fair Value | | 200.481 | | Bond Floor | | 90.751 | | IR Sens | | -1.764 | | Yield to Mty | | -13.541 | |
| Cheapness (%) | | 5.642 | | Option Value | | 109.730 | | Spread Sens | | -3.671 | | Yield to Call | | N.A. | |
| Implied Spread | | 731.789 | | Parity | | 176.049 | | Phi | | N.A. | | Yield to Put | | N.A. | |
| Implied Vol | | 50.303 | | Premium (pts) | | 13.121 | | Psi | | -2.455 | | Yield to Worst | | -13.541 | |
| Delta (%) | | 89.042 | | Premium (%) | | 7.453 | | Chi | | N.A. | | Current Yield | | 1.057 | |
| Delta (pts) | | 1.568 | | Gamma | | 0.165 | | Upsilon | | 0.099 | | Breakeven (Y) | | 6.560 | |
| Effective Trig | | 0%/0.000 | | Vega | | 0.773 | | Convexity | | 0.066 | | CF Payback (Y) | | 6.560 | |
| Unit Prc | | 2.005M | | Theta | | 0.007 | | Effective Dur | | 0.880 | | Accrued Int | | 0.800 | |
| Hedge Ratio | | 0.287 | | Exp Life (Fugi... | | 3.596 | | | | | | | | | |
| Description ▾ | | | | | | | | | | | | ⌵ | | | |
| Bond CUR | | USD | | Conv Prc | | 309.8277 | | Issue Amt | | 1.84MMM | | Next Call Date | | None ▴ | |
| Stock CUR | | USD | | Conv Ratio | | 3.2276 | | Amt Out | | 1.84MMM | | Next Put Date | | None | |
| Stock Ticker | | TSLA US | | Proj Conv Ratio | | 3.2276 | | Issue Date | | 05/07/19 | | Next Call Price | | None | |
| Cusip | | 88160RAG6 | | Init Prc (%) | | 27.50 | | Maturity | | 05/15/24 | | Next Put Price | | None | |
| Collateral | | SR UNSECURED | | Coupon | | 2% FIXED | | Conv From | | 10/01/19 | | Prov Trig | | None | |
| Par Amount | | 1000.00 | | Cpn Freq | | Semi-Annual | | Conv Until | | 05/13/24 | | Prov Start | | None ▾ | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | | | | | | | | | | | | |
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How to Value CBs

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|---|--|----------------------|--|------------------------|--|-----------------------|--|-----------------|--|----------|--|-----------------|--|---------|--|
| TSLA 2 05/15/24 | | 91) Actions ▾ | | 92) Settings ▾ | | Convertible Valuation | | | | | | | | | |
| Bond ZS4501020 | | Stock TSLA US Equity | | | | | | | | | | | | | |
| 11 Pricing Analysis | | 12 Cash Tender | | 13 Historical Analysis | | 14 Scenario Analysis | | 15 Nuke/Hedge | | | | | | | |
| 20 Analysis | | 21 IR Curve | | 22 Credit Curve | | 23 Dividends | | 24 Volatility | | | | | | | |
| Market Price | | Spread (Credit) | | Volatility | | Stock Price | | Borrow Cost | | | | | | | |
| 189.170 ▾ | | 391.440 ▾ | | 64.46 ▾ | | 545.450 ↺ | | 0.0 % | | | | | | | |
| | | Flat 5 Year Spre... | | Flat 2Y Implied | | | | | | | | | | | |
| Trade Date | | Settle Date | | Model | | E2C | | Greeks based on | | | | | | | |
| 04/07/2020 ▾ | | 04/09/2020 ▾ | | Jump Diffusion ▾ | | 0.0 | | Spread & Vol ▾ | | | | | | | |
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| Cheapness (%) | | 5.642 | | Option Value | | 109.730 | | Spread Sens | | -3.671 | | Yield to Call | | N.A. | |
| Implied Spread | | 731.789 | | Parity | | 176.049 | | Phi | | N.A. | | Yield to Put | | N.A. | |
| Implied Vol | | 50.303 | | Premium (pts) | | 13.121 | | Psi | | -2.455 | | Yield to Worst | | -13.541 | |
| Delta (%) | | 89.042 | | Premium (%) | | 7.453 | | Chi | | N.A. | | Current Yield | | 1.057 | |
| Delta (pts) | | 1.568 | | Gamma | | 0.165 | | Upsilon | | 0.099 | | Breakeven (Y) | | 6.560 | |
| Effective Trig | | 0%/0.000 | | Vega | | 0.773 | | Convexity | | 0.066 | | CF Payback (Y) | | 6.560 | |
| Unit Prc | | 2.005M | | Theta | | 0.007 | | Effective Dur | | 0.880 | | Accrued Int | | 0.800 | |
| Hedge Ratio | | 0.287 | | Exp Life (Fugi... | | 3.596 | | | | | | | | | |
| Description ▾ | | | | | | | | | | | | ⌵ | | | |
| Bond CUR | | USD | | Conv Prc | | 309.8277 | | Issue Amt | | 1.84MMM | | Next Call Date | | None | |
| Stock CUR | | USD | | Conv Ratio | | 3.2276 | | Amt Out | | 1.84MMM | | Next Put Date | | None | |
| Stock Ticker | | TSLA US | | Proj Conv Ratio | | 3.2276 | | Issue Date | | 05/07/19 | | Next Call Price | | None | |
| Cusip | | 88160RAG6 | | Init Prm (%) | | 27.50 | | Maturity | | 05/15/24 | | Next Put Price | | None | |
| Collateral | | SR UNSECURED | | Coupon | | 2% FIXED | | Conv From | | 10/01/19 | | Prov Trig | | None | |
| Par Amount | | 1000.00 | | Cpn Freq | | Semi-Annual | | Conv Until | | 05/13/24 | | Prov Start | | None | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | | | | | | | | | | | | |
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How to Value CBs

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|---|--|----------------------|-----------------|------------------------|------------|-----------------------|-----------------|
| TSLA 2 05/15/24 | | 91) Actions ▾ | | 92) Settings ▾ | | Convertible Valuation | |
| Bond ZS4501020 | | Stock TSLA US Equity | | | | | |
| 10 Pricing Analysis | | 12 Cash Tender | | 13 Historical Analysis | | 14 Scenario Analysis | |
| 15 Nuke/Hedge | | 20 Analysis | | 22 IR Curve | | 23 Credit Curve | |
| 24 Dividends | | 25 Volatility | | | | | |
| Market Price | | Spread (Credit) | | Volatility | | Stock Price | |
| 189.170 ▾ | | 391.440 ▾ | | 64.46 ▾ | | 545.450 ↺ | |
| | | Flat 5 Year Spre... | | Flat 2Y Implied | | Borrow Cost | |
| | | | | | | 0.0 % | |
| Trade Date | | Settle Date | | Model | | E2C | |
| 04/07/2020 ▾ | | 04/09/2020 ▾ | | Jump Diffusion ▾ | | 0.0 | |
| | | | | | | Greeks based on | |
| | | | | | | Spread & Vol ▾ | |
| Bond Value | | 200.481 | | Bond Floor | | 90.751 | |
| | | | | Option Value | | 109.730 | |
| Implied Vol | | 50.303 | | Volatility | | 176.049 | |
| Delta (%) | | 89.042 | | Premium (pts) | | 13.121 | |
| Delta (pts) | | 1.568 | | Premium (%) | | 7.453 | |
| Effective Trig | | 0%/0.000 | | Gamma | | 0.165 | |
| Unit Prc | | 2.005M | | Vega | | 0.773 | |
| Hedge Ratio | | 0.287 | | Theta | | 0.007 | |
| | | | | Exp Life (Fugi... | | 3.596 | |
| Description ▾ | | | | | | | |
| Bond CUR | | USD | Conv Prc | 309.8277 | Issue Amt | 1.84MMM | Next Call Date |
| Stock CUR | | USD | Conv Ratio | 3.2276 | Amt Out | 1.84MMM | Next Put Date |
| Stock Ticker | | TSLA US | Proj Conv Ratio | 3.2276 | Issue Date | 05/07/19 | Next Call Price |
| Cusip | | 88160RAG6 | Init Prc (%) | 27.50 | Maturity | 05/15/24 | Next Put Price |
| Collateral | | SR UNSECURED | Coupon | 2% FIXED | Conv From | 10/01/19 | Prov Trig |
| Par Amount | | 1000.00 | Cpn Freq | Semi-Annual | Conv Until | 05/13/24 | Prov Start |
| | | | | | | | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | | | | |
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How to Value CBs

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| | | | | | | | | | |
|---|--------------|----------------------|-------------|------------------------|----------|-----------------------|---------|-----------------|--|
| TSLA 2 05/15/24 | | 91) Actions ▾ | | 92) Settings ▾ | | Convertible Valuation | | | |
| Bond ZS4501020 | | Stock TSLA US Equity | | | | | | | |
| 11 Pricing Analysis | | 12 Cash Tender | | 13 Historical Analysis | | 14 Scenario Analysis | | 15 Nuke/Hedge | |
| 20 Analysis | | 22 IR Curve | | 23 Credit Curve | | 24 Dividends | | 25 Volatility | |
| Market Price | | Spread (Credit) | | Volatility | | Stock Price | | Borrow Cost | |
| 189.170 ▾ | | 391.440 ▾ | | 64.46 ▾ | | 545.450 ↺ | | 0.0 % | |
| | | Flat 5 Year Spre... | | Flat 2Y Implied | | | | | |
| Trade Date | | Settle Date | | Model | | E2C | | Greeks based on | |
| 04/07/2020 ▾ | | 04/09/2020 ▾ | | Jump Diffusion ▾ | | 0.0 | | Spread & Vol ▾ | |
| Fair Value | 200.481 | Bond Floor | 90.751 | IR Sens | -1.764 | Yield to Mty | -13.541 | | |
| Cheapness (%) | 5.642 | Option Value | 109.730 | Spread Sens | -3.671 | Yield to Call | N.A. | | |
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| Effective Trig | 0%/0.000 | Vega | 0.773 | Convexity | 0.066 | CF Payback (Y) | 6.560 | | |
| Unit Prc | 2.005M | Theta | 0.007 | Effective Dur | 0.880 | Accrued Int | 0.800 | | |
| Hedge Ratio | 0.287 | Exp Life (Fugl... | 3.596 | | | | | | |
| Description ▾ | | | | | | | | | |
| Bond CUR | USD | Conv Prc | 309.8277 | Issue Amt | 1.84MMM | Next Call Date | None | | |
| Stock CUR | USD | Conv Ratio | 3.2276 | Amt Out | 1.84MMM | Next Put Date | None | | |
| Stock Ticker | TSLA US | Proj Conv Ratio | 3.2276 | Issue Date | 05/07/19 | Next Call Price | None | | |
| Cusip | 88160RAG6 | Init Prm (%) | 27.50 | Maturity | 05/15/24 | Next Put Price | None | | |
| Collateral | SR UNSECURED | Coupon | 2% FIXED | Conv From | 10/01/19 | Prov Trig | None | | |
| Par Amount | 1000.00 | Cpn Freq | Semi-Annual | Conv Until | 05/13/24 | Prov Start | None | | |
| Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 | | | | | | | | | |
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Trading CBs

How do we trade these convertible bonds?



- CBs trade differently to their investment-grade and even high-yield counterparts.
- High-yield bonds trade on swaps or cash price based on their credit. CBs have embedded equity options to consider.



- Many investors prefer investing in new issues. This allows them to gain access to new issuers, new deals, cheaper levels, and larger allocations.
- These bonds also trade in the secondary market after the deal is free to trade.

Trading CBs

CBs trade over-the-counter (OTC) between a market maker and a client.



Market makers may show a two-way price that gives the indication of how much they'd be willing to pay for a CB and how much they'd be willing to sell that same CB.



CB traders would use their salespeople to speak with the clients on buying or selling an issue. They also use inter-market brokers to help source or offload bonds.



The bid-ask or bid-offer spread in CBs tends to be much wider than investment-grade bonds and varies from issue to issue.



CBs are normally considered an equity product, so most institutional investors would have dedicated salespeople for CBs.

Trading CBs

The Bloomberg runs screen RUNZ in the way that CB traders and salespeople will be able to broadcast what they're looking to do.

TSLA 2 05/15/24

\$179.675

+ .000

Yld N.A.

As of 07 Apr

Vol 1.0MM

Source TRMT

TSLA 2 05/15/24 Corp

Settings

All Quotes

20:14:36

ALLX Mode

Overlay Axes

Split Bid/Offer

94 Switch

95 Buy

96 Sell

Spreads vs

T 0 03/31/25

@ CBBT

100-08 1/4 / 100-08+

.448 / .446

20:14

Edit Filters

Venue

BGM

Legend

| PCS | Firm Name | Bid Px / Ask Px | Bid Yld / Ask Yld | BSz(M) x ASz(M) | Time |
|----------|----------------------|--------------------|--------------------|-----------------|--------|
| 20) TRAC | FINRA - TRACE | 188.500 Last Trd | -13.458 Last Trd | 26 Last Trd | d04/07 |
| 21) BVAL | BVAL (Score: 8) | 188.544 / 188.995 | -13.464 / -13.519 | x | 16:00 |
| 22) | Last Trade | 179.675 | -12.337 | 1000 | d12:25 |
| 23) SSMB | CITIGROUP NEW YORK | 188.17 / 189.17 | -13.418 / -13.541 | x | 20:12 |
| 24) BGN | BLOOMBERG GENERIC | 188.568 / 189.168 | -13.467 / -13.541 | x | 17:00 |
| 25) TRST | FINRA TRACE (<=1MM) | 188.500 Last Trd | -13.458 Last Trd | 26 Last Trd | d15:22 |
| 26) EXCH | EXCHANGE TRADED | 188.500 / Last Trd | -13.458 / Last Trd | x Last Trd | d04/07 |
| 27) EDFA | ED&F MAN | 165.000 / 190.033 | -10.326 / -13.647 | 389 x 345 | 04/07 |
| 28) TRCM | FINRA TRAC 1MM+/5MM+ | 179.675 Last Trd | -12.337 Last Trd | 1000+ Last Trd | d04/07 |
| 29) TRL1 | FINRA TRACE (>=1MM) | 179.675 Last Trd | -12.337 Last Trd | 1000+ Last Trd | d04/07 |
| 30) TRMT | FINRA TRACE (>=250M) | 179.675 Last Trd | -12.337 Last Trd | 1000+ Last Trd | d04/07 |
| 31) TRMB | FINRA TRACE (>=500M) | 179.675 Last Trd | -12.337 Last Trd | 1000+ Last Trd | d04/07 |

Trading CBs

The Bloomberg runs screen RUNZ in the way that CB traders and salespeople will be able to broadcast what they're looking to do.

| JPM 0 1/8 01/01/23 | | \$↑103.631 | + .069 | 103.107 / 104.156 | -1.000 / -1.371 |
|-------------------------|----------------------|--------------------|---|-------------------|-----------------|
| | | At 11:15 | | -- x -- | Source BVAL |
| JPM 0 1/8 01/01/23 Corp | | Settings | All Quotes | | |
| 12:59:11 | ALLX Mode | Overlay Axes | Split Bid/Offer | 94 Switch | 99 Buy 90 Sell |
| Spreads vs | T 0 1/2 03/15/23 | @ CBBT | 100-16 / 100-17 ³ _a | .329 / .310 | 12:59 |
| Edit Filters | Venue | BGM | Legend | | |
| PCS | Firm Name | Bid Px / Ask Px | Bid Spd / Ask Spd | BSz(M) x ASz(M) | Time↓ |
| 20) TRAC | FINRA - TRACE | 104.150 Last Trd | -173.3 Last Trd | 180 Last Trd | d04/07 |
| 21) BVAL | BVAL (Score: 7) | 103.107 / 104.156 | -132.9 / -168.4 | x | 11:15 |
| 22) | Last Trade | 104.150 | -173.3 | 180 | 04/07 |
| 23) SSMB | CITIGROUP NEW YORK | 102.79 / 104.79 | -121.5 / -190.5 | x | 07:55 |
| 24) EXCH | EXCHANGE TRADED | 104.150 / Last Trd | -169.2 / | x Last Trd | d04/07 |
| 25) TRST | FINRA TRACE (<=1MM) | 104.150 Last Trd | -173.3 Last Trd | 180 Last Trd | d04/07 |
| 26) TRMT | FINRA TRACE (>=250M) | 103.405 Last Trd | -143.7 Last Trd | 790 Last Trd | d04/06 |
| 27) TRMB | FINRA TRACE (>=500M) | 103.405 Last Trd | -143.7 Last Trd | 790 Last Trd | d04/06 |
| 28) TRCM | FINRA TRAC 1MM+/5MM+ | 101.764 Last Trd | Last Trd | 1000+ Last Trd | d04/03 |
| 29) TRL1 | FINRA TRACE (>=1MM) | 101.764 Last Trd | -77.6 Last Trd | 1000+ Last Trd | d04/03 |

Trading CBs

The Bloomberg runs screen RUNZ in the way that CB traders and salespeople will be able to broadcast what they're looking to do.

CCL 5 ¾ 04/01/23 \$ ↑131.119 +15.079 -432.6 bp vs

As of 07 Apr Vol 157.0MM Source TRMT

CCL 5 ¾ 04/01/23 Corp

Settings

All Quotes

12:57:41

ALLX Mode

Overlay Axes

Split Bid/Offer

94 Switch

95 Buy

96 Sell

Spreads vs

T 0 ½ 03/15/23

@ CBBT

100-16 / 100-17¾

.329 / .310

12:57

Edit Filters

Venue

BGM

Legend

| | PCS | Firm Name | Bid Px / Ask Px | Bid Spd / Ask Spd | BSz(M) x ASz(M) | Time |
|-----|------|----------------------|--------------------|-------------------|-----------------|--------|
| 20) | TRAC | FINRA - TRACE | 131.119 Last Trd | -432.6 Last Trd | 1000 Last Trd | d04/07 |
| 21) | BVAL | BVAL (Score: 8) | 132.722 / 133.272 | -477.4 / -490.0 | x | 11:15 |
| 22) | | Last Trade | 131.119 | -432.6 | 5000 | 04/07 |
| 23) | EDFA | ED&F MAN | 126.750 / 135.250 | -315.8 / -541.3 | 500 x 500 | 02:51 |
| 24) | EXCH | EXCHANGE TRADED | 131.119 / Last Trd | -431.6 / | x Last Trd | d04/07 |
| 25) | TRWO | Tradeweb APA PostTrd | 108.287 / Last Trd | 250.3 / | .1 x Last Trd | d4/06 |
| 26) | TRL1 | FINRA TRACE (>=1MM) | 131.119 Last Trd | -432.6 Last Trd | 1000 Last Trd | d04/07 |
| 27) | TRMT | FINRA TRACE (>=250M) | 131.119 Last Trd | -432.6 Last Trd | 1000 Last Trd | d04/07 |
| 28) | TRL5 | FINRA TRACE (>5MM) | 131.119 Last Trd | -432.6 Last Trd | 5000 Last Trd | d04/07 |
| 29) | TRMB | FINRA TRACE (>=500M) | 131.119 Last Trd | -432.6 Last Trd | 5000 Last Trd | d04/07 |
| 30) | TRST | FINRA TRACE (<=1MM) | 126.262 Last Trd | -300.8 Last Trd | 500 Last Trd | d04/07 |
| 31) | TRCM | FINRA TRAC 1MM+/5MM+ | 125.735 Last Trd | Last Trd | 5000+ Last Trd | d04/07 |
| 32) | BADT | BBG APA Post-Trade | 101.700 / Last Trd | 480.0 / | x Last Trd | d4/03 |

Trading CBs



Liquidity in CBs will not be as good given the market is much smaller.

- CB: \$750Bn
- High-yield: \$1.2Trn
- Investment-grade: \$7Trn



Many CBs are called away before they actually mature, which has the effect of reducing liquidity in any given bond.



Many CBs are bought for hedging and arbitrage purposes, these bonds don't trade as often since they're locked up in structure trades.

CB Indexes

An index is a basket of representative financial instruments. They can be as broad as a global aggregate index with thousands of securities down to very small subsets.

Indexes are looked after primarily either by or in conjunction with a global investment bank.



CB Indexes

The purpose of indexes is generally the following:

Performance Target

- Fund managers can be benchmarked against the index that's similar or consistent with their investment mandate.
- The fund manager's performance will be directly tied to their relative performance to these indexes.

Informational Measures For the Asset Class

- Indexes give investors a quick and easy way of measuring the risk and return of an asset class.
- They can compare returns and use the data in developing, back testing, and evaluating their investment models and strategies.

References for Index-Linked Products

- Exchange-traded funds (ETFs)
- Exchange-traded notes (ETNs)
- Other structured notes

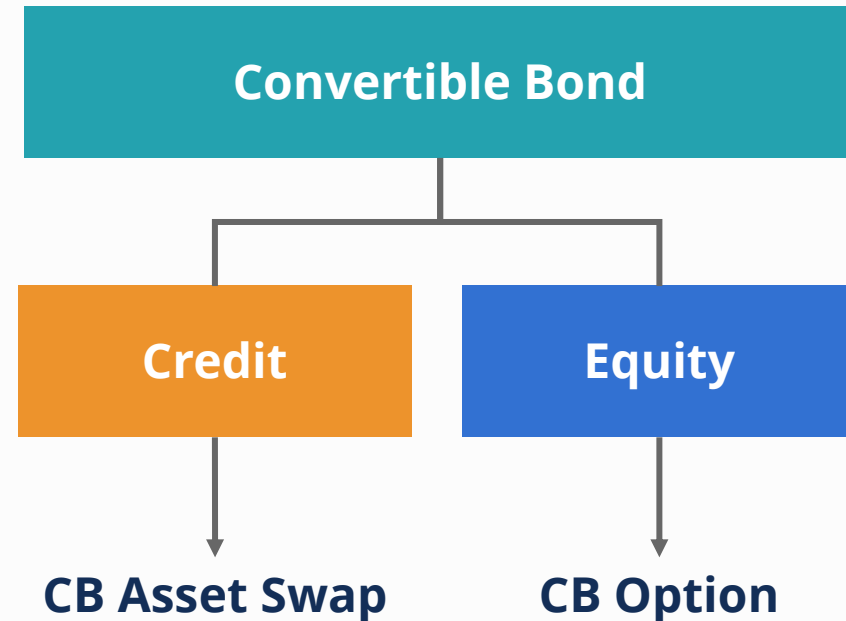
CB Trading Strategy #1 – Asset Swap

Investors can profit by taking advantage of mispricing between convertible bonds and the **underlying cash bond, underlying equity**, and the **equity derivative**.

Arbitrage: riskless profit from mispricing in the market

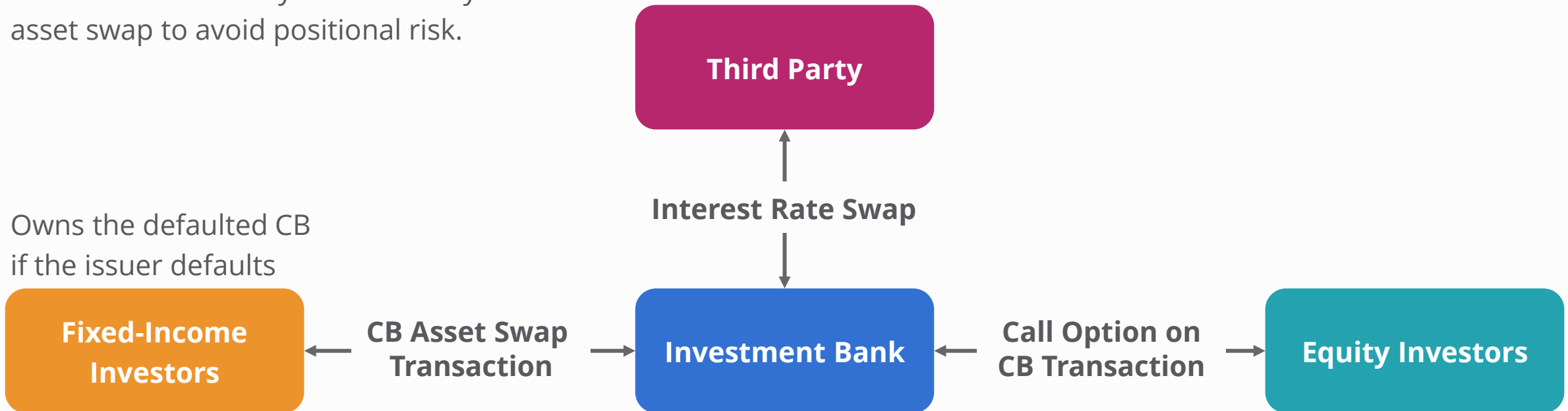
CB Asset Swaps

Arbitrage the preferences between fixed-income and equity investors



CB Asset Swap Diagram

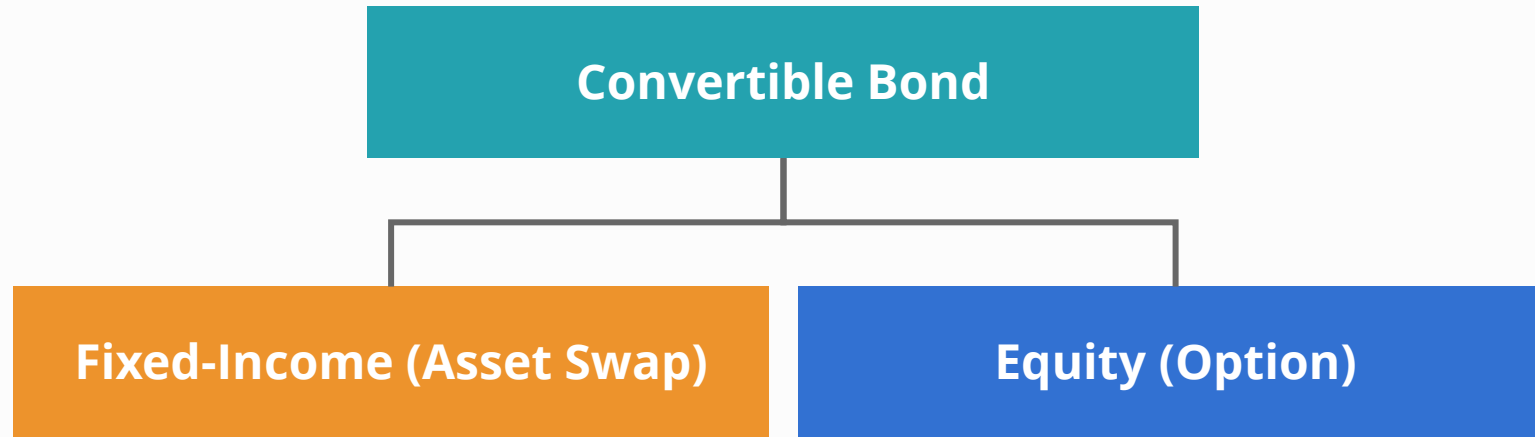
The CB asset swap has call dates so that if and when the CB option is exercised, the investment bank may also call away the CB asset swap to avoid positional risk.



- Sells the CB at par value
- Spreads over floating rate index (LIBOR) in exchange for the fixed-rate coupon

- Sells the CB option as an OTC derivative
- Gives a bit of the premium to the CB asset swap buyer

CB Asset Swap



- Opportunity to buy a fixed-income exposure
- Receive more spread than a straight bond
- Reduce duration

- Opportunity to purchase the same equity call option
- Cheaper than the equity market or equity derivative market

CB Trading Strategy #2 – Arbitrage

Because CBs offer efficient arbitrage mechanisms, there's much demand by hedge funds.

Hedge funds arbitrage the value of CBs in different ways depending on **where the CB is relative to its stock and bond valuations.**

Low Premium (In-The-Money) Equity-Like – Butane

- Sell the stock and buy the CB with no net exposure to the share price
- Receive the coupon and the interest earned from the short stock position
- Pay the cost of borrowing the stock and the cost of dividends forgone
- Highly risky, such as increased dividends from the shorted stock, the CBs being called, or changes to the market

CB Trading Strategy #3 – Arbitrage

Because CBs offer efficient arbitrage mechanisms, there's much demand by hedge funds.

Hedge funds arbitrage the value of CBs in different ways depending on **where the CB is relative to its stock and bond valuations.**

Medium Premium (At-The-Money)

- Option-like features are at their maximum
- Volatility trade: buy the CB and sell the stock to create a delta neutral position
- The position needs to be actively managed by selling more stock when shares rise, and bought when shares fall (delta hedging)
- Profit from the carry (CB interest – dividends and stock borrow costs)
- Bigger profit comes from the cost in hedging and re-hedging the stock

CB Trading Strategy #4 – Arbitrage

Because CBs offer efficient arbitrage mechanisms, there's much demand by hedge funds.

Hedge funds arbitrage the value of CBs in different ways depending on **where the CB is relative to its stock and bond valuations.**

High Premium (Out-Of-The-Money)

Bond-Like – Busted

- Bonds combined with out-of-the-money options, low delta
- Sell the bonds as the CB falls to the valley region
- The optionality is small but any significant rise in the stock will benefit the BC holders
- Requires intense credit analysis, as the company may default