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# Convertible Bond Pricing

WEBINAR | 9TH NOVEMBER 2017 | 10AM EST

# Agenda



| Welcome | Ian Blance \| Voltaire Advisors |
|---|---|
| 1005 - 1015 | Introduction: Convertible Bonds in Funds\| Ian Blance, Voltaire Advisors |
| 1015 - 1030 | Separation Anxiety: Valuing Convertible Bonds \| Harris Antoniades, Stout |
| 1030 - 1045 | Evaluating Convertible Bonds \| Moti Konak, Thomson Reuters |
| 1045 - 1100 | Audience Q&A |
| 1100 | Close of Webinar |

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# Introduction: Convertible Bond Funds

Ian Blance
Managing Director
Voltaire Advisors

# Introduction



- Valuation of convertible bonds of special interest to our audience.
- Over 100 convertible bond public mutual funds, and widely held in private equity and hedge funds.
- Some dissatisfaction with the quality and transparency of some of the pricing coming from vendors.
- Not always clear how the valuations are produced, and the price levels are frequently wide of trading marks.
- This webinar looks at the theory and methodology for pricing convertible bonds and how this should be deployed in practice.

# Convertible Bond Mutual Funds



- Morningstar reports that there are over 100 public mutual funds specializing in convertible bonds
- Includes offerings from major fund management groups such as Columbia, Fidelity, Invesco and Putnam
- Convertible bonds have historically outperformed other fixed income classes in periods of rising interest rates
- Challenge – 40 Act funds need to value all their positions daily in a very timely fashion to strike a NAV

# Hedge Fund Convertible Arbitrage



- Convertible Bond Arbitrage a very popular strategy with hedge funds
- Depends on exploiting the inefficient pricing of the convertible bond in relation to the underlying stock
- Involves purchasing the bond and shorting the stock
- Popularity of the strategy diminishes in effectiveness as arb opportunities are reduced
- Challenge – Will fair valuing the position compromize the strategy?

# Private Equity & Convertible Bonds



- Convertible Bonds are also a very popular method of financing by private companies
- These converts often have PIK interest features which reduce the tax burden
- They also allow investors to avoid the 5% holdings reporting requirements (the so-called 4.9% Clause)
- Converts into common stock when it is publicly listed
- Challenge – how to value the convertible when there is no trading information for the stock?

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# Separation Anxiety: Valuing Convertible Bonds

Harris Antoniades

Managing Director, Valuation Advisory

Stout

# Convertible Bond Pricing

Harris Antoniades, PhD, CFA
Thursday 9th November 2017

STOUT

# The Basics of Convertible Bonds

- Convertible Bonds (CB) are complex and innovative financial instruments
- Their properties can be tailored to give flexibility to the issuer's funding and specific risk/return profile to the investor
- Additionally these structures can be efficient in tax and regulatory terms for the borrower, while investors enjoy the downside protection of a bond like instrument with significant equity upside exposure
- CBs are typically referred to as "hybrid securities" as they combine the characteristics of debt and equity
- A CB can be defined as a corporate bond that can be converted into a predetermined amount of the company's share at certain times during its life
- At maturity, CBs are worth the greater of their cash redemption value or the market value of the shares into which they are converted

# Basic Terminology of Convertible Bonds

- **Maturity Date:** Date on which the CB expires
- **Face Value:** The notional amount of a CB
- **Redemption:** The amount paid out to the investor at the maturity date if the CB has not been converted prior to maturity
- **Coupon Payment:** The annual interest payment of the bond expressed as a percentage of the face value. The frequency (fc) of the coupon is also important, which determines the number of the payment periods per annum
- **Conversion Ratio:** The number of shares the bond holder gets when converting the CB into shares

# Illustration of Convertibles in the Secondary Market

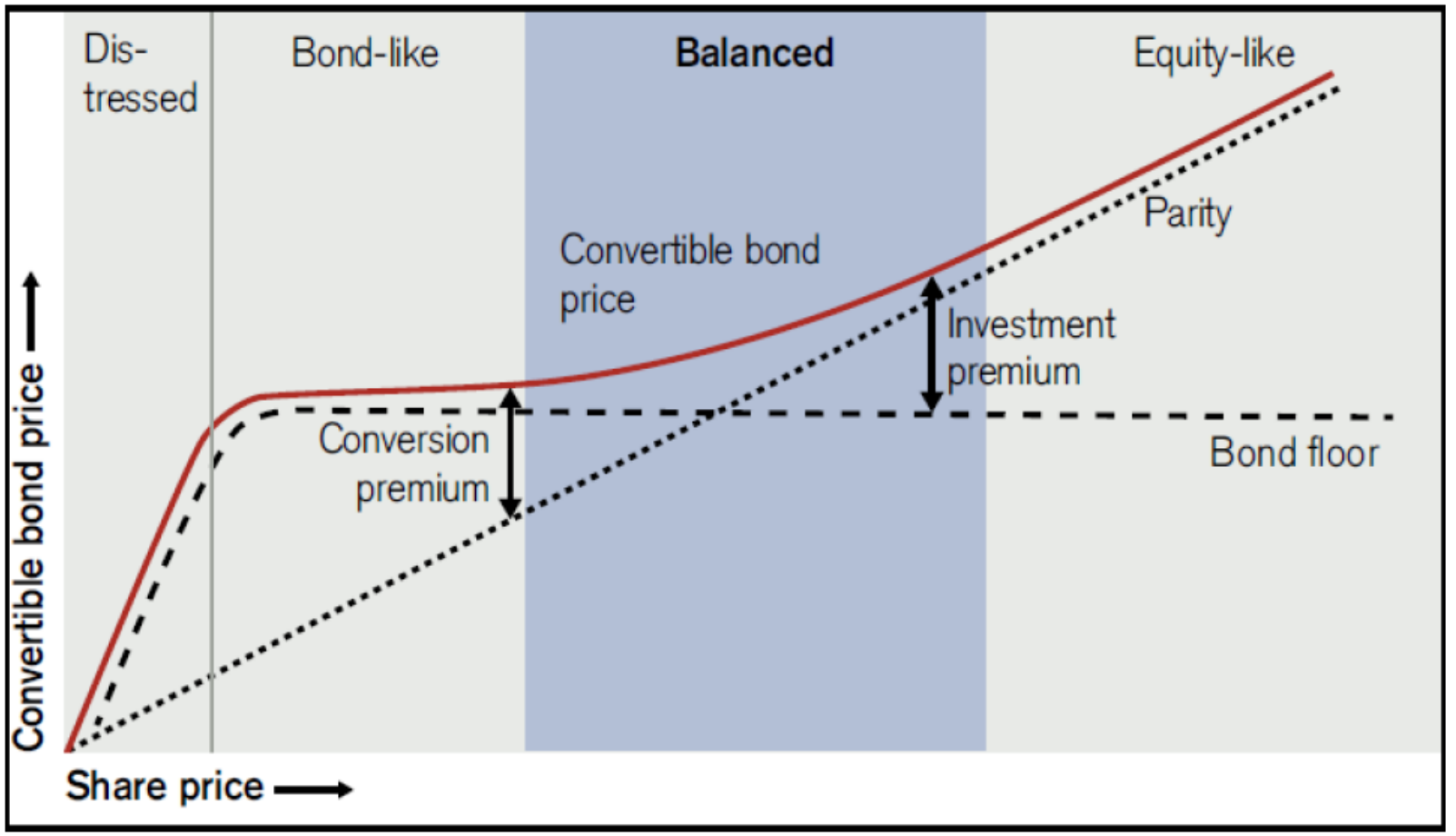


**Figure 1:** Convertible bond price, parity and bond floor - Source: Credit Suisse (2014)

# Main Convertible Bond Features

- **Callability:** The issuer can force the call of the CB by paying the early redemption amount (Kc: call price). The bond holder has the right to convert the CB into shares and will do so conversion value is more than Kc (forced conversion)

- **Putability:** The bond holder can give the convertible bond back to the issuer at a predetermined amount called the put price, under certain conditions

- **Contingent Conversion:** The bond holder cannot convert the bond unless the equity price is higher than a contingent conversion threshold

- **Soft Callability:** The issuer can only call the bond if the underlying equity trades above a certain threshold

- These features must be captured and reflected in the CB pricing model

# Possible Exit Scenarios of Convertible Bonds

- **Default:** In case of default, the bond holders will get an amount based on the ranking of the bond in the company's capital structure (recovery value). Time until settlement though bankruptcy courts is typically considerable
- **Put:** The bondholder can put the bond back to the issuer at the put price in the predetermined put periods or under certain events occurring
- **Call:** The issuer calls the bond back from the bond holder and the bond holder is not converting the bond
- **Forced Conversion:** The issuer calls the bond back from the bond holder but the bond holder chooses to convert the CB into shares
- **Optional Conversion:** The investor decides to convert the CB into shares prior to maturity (and without a call notice)
- **Redemption at Maturity:** The bond has not been called, put or converted before maturity and at maturity the conversion value is below the payout of the redemption amount plus the final coupon payment
- **Conversion at Maturity:** The bond has not been called, put or converted before maturity and at maturity the investor chooses to convert the CB into shares

# Convertible Bond Pricing Models

- **Component Model:** The CB is comprised of a straight bond component and a call option component
- **Brennan and Schwartz [1977]:** Use finite difference methods to solve the partial differential equation for the price of a convertible bond with call provisions, coupons and dividends
- **Goldman Sachs (1994):** Considered the issue of which discount rate to use when valuing a convertible bond and make use of the theory of options to value and hedge convertibles
- **Tsiveriotis and Fernandes (1998):** Relative simple to implement and able to provide accurate and practical valuation of CB consistent with the market values
- **Ho and Pfeffer (1996):** Two-factor, arbitrage-free framework that uses lattice approach snd where the two factors are the stock price process andinterest rate risk
- **Ayache, Forsyth, Vetzel (2002; 2003):** Extension of the Tsiveriotis and Fernandes model
- **PDE method, Tavella and Randall (2000):** Using finite difference techniques they solve the partial differential equations that define the valuation problem
- **John C. Hull (1988):** Binomial tree method, can deal with path dependent features and stochastic interest rates
- **Longstaff and Schwartz [2001]:** A Monte Carlo algorithm for pricing convertibles based on the least-squares approach

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# Evaluating Convertible Bonds

Moti Konak

Head of Derivative and Convertibles Evaluations

Thomson Reuters

# THOMSON REUTERS PRICING SERVICE

## CONVERTIBLE BONDS

Moti Konak
November 9, 2017

THOMSON REUTERS

# TRPS Convertibles

- Globally, we price 1,390 convertible bonds with 5 evaluators
  - 38 in Asia; 419 in Europe; 847 in the US and 86 in Canada
  - Additional convertible bonds trade on exchanges
    - Canadian debentures and some Asian Markets
- TRPS client base is mostly consistent of 1940 Act Funds who use our independent prices to strike an NAV
  - Other clients include hedge funds, pension funds, and the Thomson Reuters index
- The US Models use a delta based approach
  - The analyst will use their judgment in re-calibrating the delta based on trades, market information and client and broker feedback
- The European and Asian models are contributor based
  - We have the luxury of getting live quotes from our broker sources on a pre-determined periodicity throughout the day
- The TRPS Convertible team maintains a robust list of contacts at all of the major broker/dealers
  - We are able to leverage these contacts to procure pricing levels through our buy-side clients who are in the market for buying and selling these bonds

# TRPS Pricing Methodology

- Terms and Conditions
- Market Data Inputs
  - Broker / Dealer Quotes
  - TRACE activity on FINRA
  - Spot Price on the Underlying Shares
  - Delta Sensitivity
  - Comparable Securities
  - Theoretical Pricing
    - Inputs include: Bond Floor, Volatility of Exchange based options, risk free rates, yields on comparables, and credit spreads

# Quality Control Checks

- Pre production checks
  - Maturity Check
  - Delta Check
  - Spread Check
  - New Issue Check
  - Broker Check
  - Trace Check
  - Large Mover Alert (only applicable on significant movements)
  - 2PM Movers Alert
  - 3% Tolerance Check
- Post production checks
  - 3PM & 4PM Tolerance Check
  - Movement Check
  - Unchanged Price Check

# Thomson Reuters Global Indices

- Thomson Reuters bought the UBS Convertible Index three years ago
  - TRPS is the sole provider for pricing the index
  - ETF at State Street that relies on TR Index & TRPS pricing
  - TR Index is a widely used benchmark by buy-side clients, particularly out of Europe
  - The Index has exposed us to clients who may not subscribe to our pricing but have a vested interest due to their following the index
- There are a number of index styles offered to our clients
  - Based on region, issue size, liquidity, and a number of other attributes
  - Main index is the Global Index which has 421 constituents
  - One of the more popular sub-indices is the Global Focus with 210 constituents
    - This index contains Balanced issues, which is determined through a mechanical process of comparing the issue size, conversion premium, and price percentage

# Questions/Comments?

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# Audience Q&A

# Thank You!



- Participants will receive a copy of the slide deck and a recording of the Webinar tomorrow.
- Webinar and associated Guide is part of our Current Issues in Valuation Series looking at topical pricing challenges
- This is a component of our VIVA program of fund valuation initiatives throughout 2017 – more details can be found here:

http://www.voltaireadvisors.com/viva.html

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