Analysis of convertible bonds

A. Basic features of convertible bonds

- Conversion privilege
- Conversion ratio:
  \[ \text{n shares for N bonds} = \frac{n}{N} \]
- Conversion price
- Callable
- Putable: “hard” or “soft” puts

Example 6

- Convertible bond issued by ABC Corp.
- Issue price = par value (100)
- Current market price = 105
- Coupon rate = 5%
- 9-year maturity
- Callable: in year 4 at 104, in years 5 to 7 at 102, in years 8 and 9 at 101.
- Conversion ratio = 2 shares for 1 convertible bond
- Rating A3/A–
- ABC common stock
  - Expected volatility = 18%
  - Current dividend yield = 2.5%
  - Dividend per share = 1 per year
  - Current stock price = 42
  - Stock price at issuance = 40

B. Minimum value

- Conversion value or parity value of the bond
  \[ \text{Conversion value} = \text{market price of the stock} \times \text{conversion ratio} \]
- Minimum value
  \[ \text{MAX ( conversion value ; straight value or investment value )} \]
Example 6 – cont’d

- ABC bond’s conversion value
  \[ 40 \times 2 = 80 \]
- Suppose straight value = 98
- ABC bond’s minimum value
  \[ \max(80, 98) = 98 \]

C. Conversion price of the stock

- Market conversion price at issuance
  \[ \text{market price of convertible bond} \div \text{conversion ratio} \]
- Market conversion premium per share
  \[ \text{market conversion price} - \text{current market price of common stock} \]
- Market conversion premium ratio
  \[ \frac{\text{market conversion premium per share}}{\text{market price of common stock}} \]

Example 6 – cont’d

- Market conversion price
  \[ \frac{105}{2} = 52.50 \]
- Market conversion premium per share
  \[ 52.50 \div 42 = 10.50 \]
- Market conversion premium ratio
  \[ \frac{10.50}{42} = 25\% \]
Example 6 – cont’d

- Conversion price at issuance
  \[ \frac{100}{2} = 50 \]

- Conversion premium per share at issuance
  \[ \frac{50 - 40}{40} = 0.25 \]

- Market conversion premium ratio at issuance
  \[ \frac{10}{40} = 0.25 \]

D. Current income of convertible bond vs common stock

Premium payback period = \( \frac{\text{market conversion premium per share}}{\text{favourable income differential per share}} \)

Favourable income differential per share
= \( \frac{\text{coupon interest} - (\text{conversion ratio} \times \text{stock dividend})}{\text{conversion ratio}} \)

Example 6 – cont’d

ABC convertible bond

- Favourable income differential
  \( (5 - 2 \times 1) / 2 = 1.5 \)

- Premium payback period
  \( 10.50 / 1.5 = 7 \text{ years} \)
E. Downside risk with a convertible bond

- Premium over straight value

\[
\frac{\text{market price of convertible bond}}{\text{straight value}} - 1
\]

For ABC convertible bond

\[
\frac{105}{98} - 1 = 7.14\%
\]

F. Investment characteristics of a convertible bond

- Stock price low: straight value >> conversion value => fixed income equivalent or busted convertible
- Stock price high: conversion value >> straight value => common stock equivalent
- Hybrid security

G. Valuation

- \( V(\text{convertible}) = \text{straight value} + V(\text{call/stock}) \)
- If callable,
  \[
  V(\text{convertible}) = \text{straight value} + V(\text{call/stock}) - V(\text{call/bond})
  \]
- If callable and putable,
  \[
  V(\text{convertible}) = \text{straight value} + V(\text{call/stock}) - V(\text{call/bond}) + V(\text{put/bond})
  \]
Practice question

- Convertible bond
- Issue price = par value (1,000)
- Current market price = 1,025
- Coupon rate = 6.5%
- 5-year maturity
- Callable in 2 years at 105% / non putable
- Conversion ratio = 10 shares for 1 convertible bond
- Rating A3/A–
- Estimated straight value = 850
- Common stock
  - Expected volatility = 22%
  - Dividend yield at issuance = 1.8%
  - Dividend per share = 1.35 per year
  - Stock price at issuance = 75
  - Current stock price = 81

Practice question – cont’d

- Calculate
  - the parity value
  - the minimum value
  - the market conversion premium per share
  - the market conversion premium ratio
  - the premium payback period
- Propose a measure of the downside risk of the convertible bond

Practice question – cont’d

- Suppose stock price increases to 124
  - Approximate return realised from investing in the CB if it was purchased for 1,025?
  - Return realised from investing in the stock?
  - Why return higher by investing in the stock directly?
- Suppose stock price decreases to 39 and bond’s straight value unchanged
  - Approximate return realised from investing in the CB if it was purchased for 1,025?
  - Return realised from investing in the stock?
  - Why return higher by investing in the CB?
Downside risk

Stock price increases from 81 to 124

Stock price decreases from 81 to 39