Structured Finance: Equity

Prof. Ian Giddy
New York University

Structured Finance

- Asset-backed securitization
- Corporate financial restructuring
- Structured financing techniques
When Debt and Equity are Not Enough

**Assets**

- Value of future cash flows

**Liabilities**

**Debt**
- Contractual int. & principal
- No upside
- Senior claims
- Control via restrictions

**Equity**
- Residual payments
- Upside and downside
- Residual claims
- Voting control rights

**Alternatives**
- Collateralized
- Asset-securitized
- Project financing
- Preferred
- Warrants
- Convertible
Case Studies

- Ban Pu Convertible Bond;
- Keppel T&T Convertible;
- Singapore Warrant Bonds;
- Lyons;
- Endesa

A Day in the Life of the Eurobond Market

- Examine the deals
  - Which were structured financing?
  - Why were each done in that particular form?
  - What determines the pricing?
- Can you break the hybrids into their component parts?
Equity-Linked Bonds

- Bonds with warrants
- Convertible Bonds
- Index-linked Bonds

These are all examples of hybrid bonds and should be priced by decomposition.
Convertibles

- Market Value
- Market Premium
- Straight Bond Value
- Conversion Value

Warrants

- Market Value
- Market Premium
- Theoretical Value

Price Per Share of Common Stock ($) 0

Value of Convertible Bond ($) 0

Value of Warrant ($) 0
**Index-Linked**

**Stock-Purchase Warrants**

- Warrants are usually detachable and trade on the securities exchanges
- Warrants are often added to a large debt issue as “sweeteners” to enhance the marketability of the issue
- Exercise price
- Warrants usually have a limited life of about 10 years or less
- Warrants differ from rights and convertibles
The Implied Price of an Attached Warrant

- To determine the implied price of an attached warrant, the implied price of all warrants attached to a bond must be determined.
- Implied price of all warrants = price of bond with warrants attached - the straight bond value (of similar-risk bonds).
- The implied price of a single warrant is the implied price of all warrants divided by the number of warrants attached to each bond.

The Value of Warrants

- A warrant has a “theoretical value” at any point in time prior to its expiration date.
- The theoretical value can be calculated as:
  \[ TVW = (P_o - E) \times N \]
  WHERE:
  - \( TVW \) = Theoretical value of a warrant
  - \( P_o \) = Current market price of one share of common stock
  - \( E \) = Exercise price of the warrant
  - \( N \) = Number of shares of common stock obtainable with one warrant.
Sony Warrants

- Sony Electronics has outstanding warrants exercisable at Yen400/share that entitle holders to purchase three shares of common stock per warrant. If Sony’s common stock is currently selling for Y45/share, the TVW =

\[ TVW = (Y45 - Y40) \times 3 = Y15 \]

- The market value of a warrant is generally greater than its theoretical value; the difference, known as the warrant premium is due to investor expectations and opportunities for further gain before expiration.

Values and Warrant Premium

![Graph showing the relationship between the price per share of common stock and the value of warrants, with a market premium and market value highlighted.](image-url)
Option Pricing

Option Price

= Intrinsic value + Time value

Time value depends on
- Time
- Volatility
- Distance from the strike price

Option Pricing Model

ENTER THESE DATA:

FUTURES PRICE 94.75
STRIKE PRICE 94.5
TIME IN DAYS 300
INTEREST RATE 7
STD DEVIATION 15

CALL PRICE IS...... 0.40
PUT PRICE IS...... 0.17
**Value of Call Option**

- **FUTURES PRICE**
- **STRIKE**
- **INTRINSIC VALUE**
- **TIME VALUE**
- **EXPECTED VALUE OF PROFIT GIVEN EXERCISE**

**SHADE AREA:** Probability distribution of the log of the futures price on the expiration date for values above the strike.

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**Black-Scholes Option Valuation**

\[
C_0 = S_0 N(d_1) - X e^{-rT} N(d_2) \\
\]

\[
d_1 = \left[ \ln \left( \frac{S_0}{X} \right) + (r + \sigma^2/2)T \right] / (\sigma T^{1/2}) \\
\]

\[
d_2 = d_1 - (\sigma T^{1/2}) \\
\]

**where**

- \(C_0\) = Current call option value.
- \(S_0\) = Current stock price
- \(N(d)\) = probability that a random draw from a normal dist. will be less than \(d\).
Convertible Bonds

- Bond may be converted into stock
- The Conversion Ratio is the number of shares of common stock that can be received in exchange for each convertible security
- The Conversion Price is the per share common stock price at which the exchange effectively takes place

Convertibles

- The Conversion Period is a limited time within which a security may be exchanged for common stock
- The Conversion Value is the market value of the security based upon the conversion ratio times the current market price of the firm's common stock
- Earnings effects:
  - Firms must report Primary EPS treating all contingent securities that derive their value from their conversion privileges or common stock characteristics as common stock
  - Firms must report Fully Diluted EPS treating all contingent securities as common stock
Example: Hyundai Euroconvertible

- If Hyundai issues a Eurobond with a $1,000 par value that is convertible at $40 per share of common stock, the conversion ratio = $1,000 = 25
  $40
- If Hyundai had stated the conversion ratio at 20, the conversion price = $1,000 = $50
  20

Financing With Convertibles

- Motives for using convertibles include:
  ◆ It is a deferred sale of common stock that decreases the dilution of both ownership and earnings
  ◆ They can be used as a “sweetener” for financing
  ◆ They can be sold at a lower interest rate than nonconvertibles
  ◆ They have far fewer restrictive covenants than nonconvertibles
  ◆ It provides a temporarily cheap source of funds (assuming bonds) for financing projects
- Most convertibles have a call feature that enables the issuer to force conversion when the price of the common stock rises above the conversion price
**Determining the Value of a Convertible Bond**

There are three values associated with a convertible bond:

- **Straight Bond Value** is the price at which the bond would sell in the market without the conversion feature.

- The **Conversion Value** is the product of the current market price of stock times the conversion ratio of the bond.

- The **Market Value** is the straight or conversion value plus a market premium based upon future (expected) stock price movements that will enhance the value of the conversion feature.

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**Siam Cement**

- Siam Cement sold a $1,000 par value, 20-year convertible bond with a 12% coupon. A straight bond would have been sold with a 14% coupon. The conversion ratio is 20.

- **Straight Bond Value**

\[
\text{Straight Bond Value} = 120 \times (\text{PVIFA}_{14\%,20}) + 1,000 \times (\text{PVIF}_{14\%,20}) = 120 \times (6.623) + 1,000 \times (.073) = \$867.76
\]

- Conversion Value at various market prices of stock:

<table>
<thead>
<tr>
<th>Stock Price</th>
<th>Conversion Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$30</td>
<td>$800</td>
</tr>
<tr>
<td>40</td>
<td>800</td>
</tr>
<tr>
<td>50 (Conversion Price)</td>
<td>1,000 (Par Value)</td>
</tr>
<tr>
<td>60</td>
<td>1,200</td>
</tr>
<tr>
<td>70</td>
<td>1,400</td>
</tr>
<tr>
<td>80</td>
<td>1,600</td>
</tr>
</tbody>
</table>

- The straight bond value is the minimum price at which the convertible bond would be traded.
### Values and Market Premium

<table>
<thead>
<tr>
<th>Value of Convertible Bond ($)</th>
<th>Market Value</th>
<th>Market Premium</th>
<th>Conversion Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Breaking Down a Convertible: Kodak

- At the end of 2001, Kodak (EK) had a 5.25% convertible bond, coming due in 2009, trading at $1300. The face value was $1000. It also had straight bonds, with the same maturity, trading in December 2001 at a yield of 8.4%.
  - What's the straight bond component worth?
  - What's the convertible option worth?
  - Assume the conversion ratio is 24, and Kodak stock is priced at $51. How would you determine whether the investor is overpaying?
Breaking Down a Convertible

- **Coupon rate on Convertible Bond =** 8.25%
- **Market Interest Rate on Straight Bond of same Risk =** 8.40%
- **Price of Convertible Bond =** 1400
- **Maturity of Convertible Bond =** 8

| Value of Straight Bond Portion = | $991.51 |
| Value of Conversion Option =     | $408.49 |

Case Study: Banpu Convertible

- **How did this work?**
- **Why did Banpu use this technique?**
- **Why did investors buy it?**
Banpu Convertible

Huh?

Thai Time

1994  1997  1999  2004
Motivations for Issuing Hybrid Bonds

- Company has a view
- There are constraints on what the company can issue
- The company can arbitrage to save money
- Always ask: given my goal, is there an alternative way of achieving the same effect (e.g., using derivatives?)

Why Use a Hybrid?

Motivations for Hybrids

- Linked to business risk
- Linked to market risk
- Cannot hedge with derivatives

Driven by investor needs

- Company hedges
- Company does not hedge

Debt or equity are not good enough
Contact Info

Ian H. Giddy
NYU Stern School of Business
Tel 212-998-0426; Fax 212-995-4233
ian.giddy@nyu.edu
http://giddy.org