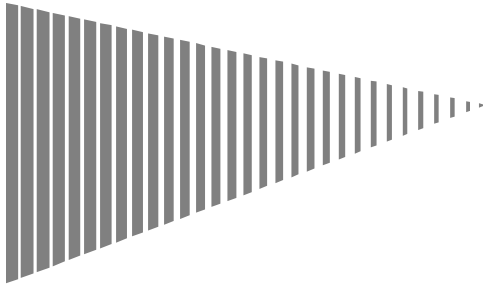


# Beyond preferred stock – valuation of complex equity and hybrid instruments

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## Executive Director, Ernst & Young (EY) Valuation

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- ▶ EY's representative to the AICPA "Cheap Stock" task force
- ▶ Co-chair for the AICPA PE/VC task force
- ▶ EY's National Audit Assist Leader for the valuation practice, directing audit assist policy and procedures
- ▶ Client-serving work focuses on fair value issues, and on valuing complex securities such as options, warrants, preferred & common stock, performance awards, convertible notes, debt and related embedded derivatives, loan portfolios and contingent considerations.
- ▶ Ph.D. and dual masters' degrees from Stanford University, and dual bachelors' degrees from the California Institute of Technology.

# Agenda

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- ▶ Why do companies use complex financings in distressed situations?
- ▶ Types of complex instruments
- ▶ Challenges in performing valuations for highly dilutive financings in public markets
- ▶ Case Study

# Why do companies use complex financings?

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- ▶ Typically, these companies either face contingencies, such as new products or projects with substantial risks of failure, or are otherwise unable to raise "normal" debt and equity.
  - ▶ Distressed companies/ restructuring
  - ▶ Development stage or expansion stage technology companies
    - ▶ Biotechnology
    - ▶ Medical devices
  - ▶ Resource-based companies

# Types of complex instruments

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- ▶ Convertible notes
- ▶ Warrants
- ▶ Preferred stock
- ▶ Licensing agreements
- ▶ Put / Call structures
- ▶ Other

# Challenges in performing valuations for highly dilutive financings in public markets

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- ▶ Understanding pertinent financial reporting guidance
- ▶ Identification of key features
  - ▶ Features that must be explicitly modeled (conversion, redemption, contingent features, etc.)
  - ▶ Features that can be combined
  - ▶ Features that can be ignored

# Challenges in performing valuations for highly dilutive financings in public markets

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- ▶ Selection/design of appropriate model(s)
- ▶ Identification of key assumptions
  - ▶ Consideration of future/uncertain events
  - ▶ Use of/reconciliation with market observations (traded prices for existing equity and debt instruments)
- ▶ Internal model consistency
- ▶ Audit issues

# Choice of models

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- ▶ Type of model
  - ▶ Scenario-based DCF
  - ▶ Decision tree
  - ▶ Lattice
  - ▶ Simulation
  - ▶ Option Pricing Model (OPM)
  - ▶ Gross yield method
  - ▶ Risk-neutral debt valuation
  
- ▶ Scope of model
  - ▶ All-inclusive
  - ▶ Focused on specific instrument(s)



# Case study



# Case Study – Key Operating Facts

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- ▶ Trucking company
  - ▶ Established business, decreasing revenue
  - ▶ \$2.7 billion losses over 5 years
  - ▶ Liquidity issues
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- ▶ DEBT RESTRUCTURING

# Capital Structure

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## Pre-restructuring

▶ Term Loan and other debt: \$600m

▶ ABS facility: \$200m

▶ Pension obligation notes: \$150m

▶ Common Stock

## Post-restructuring

▶ 1<sup>st</sup> Lien Term Loan: \$300m

▶ Series A Convertible PIK Note: \$140m

▶ Series B Preferred stock (mandatorily convertible into 75% of the fully diluted equity)

▶ Refinanced with new ABL facility

▶ Extended maturity and lowered coupon

▶ Existing holders hold 0.8% of equity on a fully diluted basis

▶ \$100m of 10% PIK New Series B Convertible in exchange for cash

### Held by employees:

▶ Series B Preferred stock (24% of the fully diluted equity)

▶ Series A Preferred Stock: "Golden Share" \$1 liquidation preference, not convertible, but allows certain voting rights and the right to elect two directors to the Board

# Capital Structure - Terms

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- ▶ **Term Loan** - 10% cash coupon, extended maturity
- ▶ **ABL facility** - two tranches backed by account receivables coupon of L+ 7% and L+9.75% (L floor of 1.5%)
- ▶ **Series A Convertible Note** - 10% PIK, prepayable at par at any time without penalty, conversion price \$0.12
- ▶ **Series B Convertible Note** - 10% PIK, conversion price \$0.06
- ▶ **Pension obligation notes** - coupon rates from 4% to 10%, prepayable at par at any time without penalty, secured by certain pension assets
- ▶ **Series B Preferred Stock** – automatically converts to common stock upon certain shareholder approval amendment. Accrues interest at a rate of 20% annually (the Contingent Dividend) until shareholder approval (99% probability of approval)



SENIORITY

# Insights into the restructuring and market data

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- ▶ Existing equity holders are effectively “wiped out” – diluted by 97.5% (99.2% on a fully diluted basis)
- ▶ Improved short-term liquidity for the company

## Market Data

- ▶ Stock price on
  - ▶ Date of restructuring announcement ( $t=0$ ): \$2.00
  - ▶ Date of restructuring approval (the Valuation Date,  $t = 0.25$ ): \$1.03
  - ▶ Date of shareholder approval of conversion ( $t=0.40$ ): \$0.05
- ▶ 1<sup>st</sup> lien Term loan on the valuation date: 102% of par

# Valuation Needs

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## Securities

- ▶ Series A and B Convertible Notes
- ▶ Series B Preferred Stock
- ▶ ABL facility
- ▶ Pre and Post restructuring pension obligation notes

## Embedded derivatives

- ▶ Series A and B Convertible Notes conversion option
- ▶ Series A redemption option
- ▶ Contingent dividend
- ▶ Pension obligation notes redemption feature

# Valuation techniques



# Valuation Models

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- ▶ (1) Enterprise value
- ▶ (2) Option pricing model
  - ▶ Series A and B Convertible Notes, Series B Preferred Stock, Common
- ▶ (3) Convertible bond model
  - ▶ Series A Convertible Note redemption option
- ▶ (4)(5) Conversion Options/Risk-neutral debt valuation
  - ▶ Conversion options
  - ▶ ABL facility, Pre and Post restructuring pension obligation notes
- ▶ (6) Stochastic interest rate models
  - ▶ Debt redemption option
- ▶ (7) Other considerations
  - ▶ Contingent dividend, Series A Preferred Stock (“Golden share”)



# Valuation (1): Total enterprise value

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- ▶ Cannot rely on the publicly traded stock price as of the Valuation Date (unrealistically high implied valuations for the Company)
  - ▶ Stock price: \$1.03
  - ▶ Total number of shares on a fully diluted basis: 6 billion
- ▶ Other methodologies
  - ▶ Income approach
  - ▶ Market approach

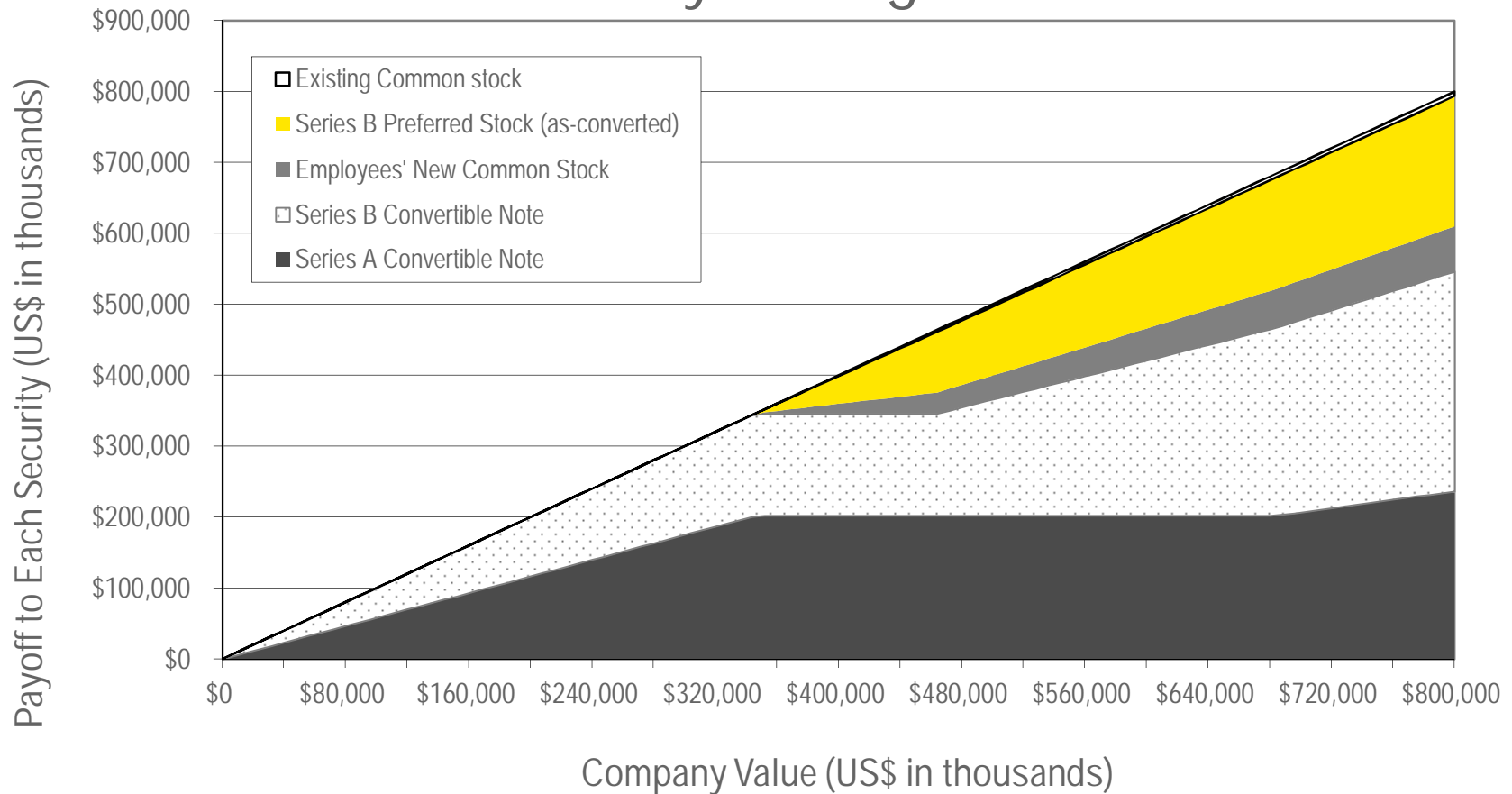
# Valuation (2): Option Pricing Method (OPM) Equity securities

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- ▶ Scope: Series A and B Convertible Notes, Series B Preferred Stock, Common Stock
- ▶ Newly issued equity security: Series B Convertible
  - ▶ Downside protection (seniority)
  - ▶ Equity upside
- ▶ Series B Convertible fair value: 100% of par (newly issued)
- ▶ Allocate equity among securities with equity like features
- ▶ OPM

# Valuation (2): Option Pricing Method (OPM) Equity securities (cont'd)

## Payoff Diagram



# Valuation (2): Option Pricing Method (OPM) Equity securities (cont'd)

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- ▶ OPM inputs
  - ▶ Equity value
    - ▶ Backsolve for the equity value such as the fair value of the newly issued Series B Convertible Note equals to 100% of par.
    - ▶ Consistency between backsolved equity and equity from market/income approach (step 1)
  - ▶ Term
    - ▶ Since using the Series B Convertible Note to backsolve for total equity value, term is equal to the time to maturity of the Series B Convertible
  - ▶ Risk-free rate
    - ▶ Term-matched government yield
  - ▶ Volatility

# Valuation (2): Option Pricing Method (OPM)

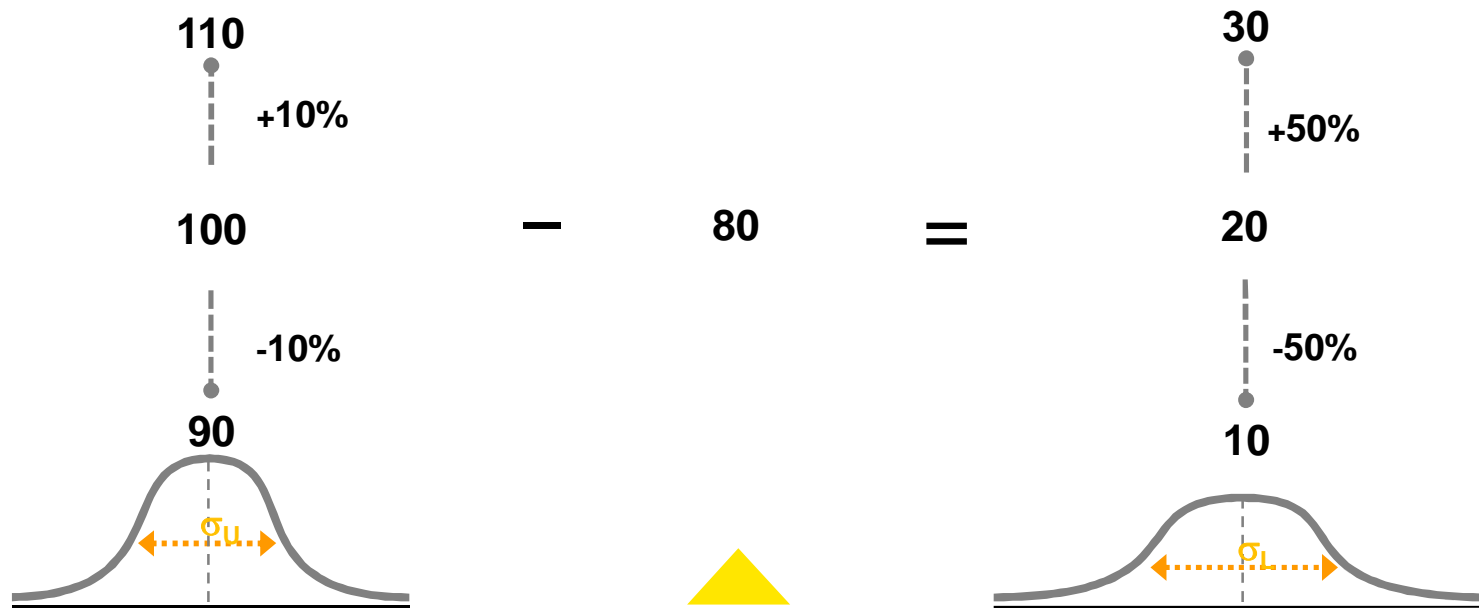
## Equity securities (cont'd)

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- ▶ Volatility
- ▶ Traded stock
  - ▶ Implied volatility from traded options
  - ▶ Historical volatility
- ▶ No traded stock (or post-restructuring)
  - ▶ Volatility of comparable companies
  - ▶ Volatility of bond values or interest rates
  - ▶ Volatility of revenues or EBITDA (or other metrics for earnouts)

# Valuation (2): Option Pricing Method (OPM) Equity securities (cont'd)

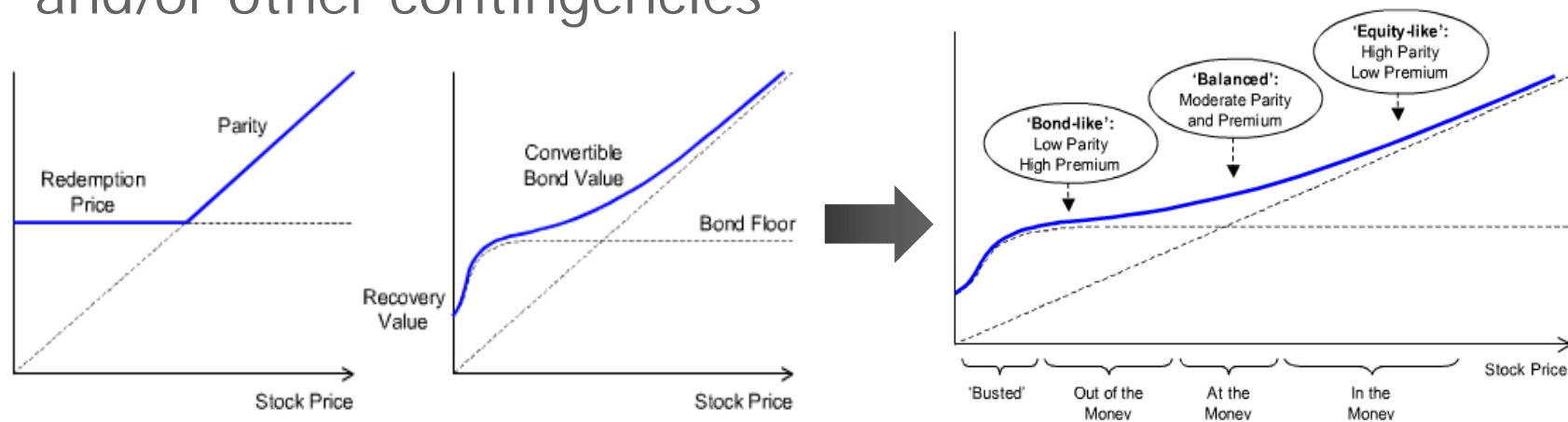
## ► Volatility – Impact of leverage



**Subtracting a constant re-scales the (\$) mean of the distribution, but does nothing to the (\$) standard deviation. The standard deviation as a % of the mean has therefore increased.**

# Valuation (3): Series A Convertible Debt – Redemption Option

- ▶ Convertible debt is a hybrid instrument that contains features of both debt and equity
- ▶ The conversion provision gives the debt holder the option to convert its principal in a predetermined number of common shares at a predetermined price
- ▶ May include early redemption features (puts and calls) and/or other contingencies



## Valuation (3): Series A Convertible Debt – Redemption Option (cont'd)

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- ▶ The OPM model does not consider the possibility of early redemption of any of the securities – value is distributed at the end of the term
- ▶ Other valuation models are needed (Goldman Sachs convertible bond model, Hull-White, etc). Required inputs:
  - ▶ Common stock
  - ▶ Volatility – Impact of additional leverage!
  - ▶ Spread
- ▶ Consistency with the OPM model
  - ▶ Common stock price input equals the value from the OPM (\$0.03)
  - ▶ Common stock volatility (110%)
  - ▶ Value “without”: The OPM gives the value “without” the redemption option - credit spread calibration (30%)



# Valuation (4): Conversion Options

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- ▶ Similar to the redemption option, the conversion option fair values are calculated using a “with” and “without” method
- ▶ Fair value “with” the conversion option is given by the OPM (62% of par for Series A and 100% for Series B)
- ▶ “Without” the conversion option, the convertible notes are subordinated straight debt.
- ▶ Yield estimate from Step 3 since the Series A and Series B are pari-passu.

# Valuation (5): Debt – Risk-neutral valuation

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- ▶ The first lien trade at 102% of par provides an “anchor” to estimate a yield for other debt in the capital structure (pension obligation notes, “without” scenario of convertible notes, etc.)
- ▶ Concept:
  - ▶ Discount expected cash flows at the risk free rate. Expected cash flows explicitly take into account default probability and recovery
- ▶ Practical use
  - ▶ Price of a certain ‘comparable debt’ is known ; looking for information on a debt security with different seniority
  - ▶ Does not incorporate any optionality (callable, putable, etc.)
- ▶ Key factors/inputs
  - ▶ Risk-free rate term structure (given)
  - ▶ Terms of the debt instrument.
  - ▶ Risk-neutral probability of default
  - ▶ Recovery rate



# Valuation (5): Debt – Risk-neutral valuation (cont'd)

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- ▶ Step 2: for any other debt, same process ; different unknown.
  - ▶ If looking for **price**, inputs are recovery rate and RN probability of default from Step 1
  - ▶ If looking for **yield**, inputs are price (set to 100% of par), recovery rate and RN probability of default from Step 1. In this case, solve for the coupon rate
- ▶ Summary



# Valuation (5): Debt – Risk-neutral valuation (cont'd)

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- ▶ The RNPD is different than “real” world probability of default!
- ▶ Intuition using Merton’s framework:
  - ▶ Firm’s assets follow GBM.
  - ▶ Zero coupon needed to be repaid at T.
  - ▶ Equity = call( $S=Assets$ ,  $K = Debt\ principal$ ).
  - ▶ Probability of default at T =  $N(-d_2)$ .
  - ▶ Only difference between risk neutral (RN) and risk adjusted (RA) is the drift: risk-free rate for RN and expected return for RA. Volatility is the same!

**Table 20.4** Seven-year average default intensities (% per annum).

<i>Rating</i>	<i>Historical default intensity</i>	<i>Default intensity from bonds</i>	<i>Ratio</i>	<i>Difference</i>
Aaa	0.04	0.67	16.8	0.63
Aa	0.06	0.78	13.0	0.72
A	0.13	1.28	9.8	1.15
Baa	0.47	2.38	5.1	1.91
Ba	2.40	5.07	2.1	2.67
B	7.49	9.02	1.2	1.53
Caa	16.90	21.30	1.3	4.40

# Valuation (5): Debt – Risk-neutral valuation (cont'd)

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- ▶ Other factors explaining the differences between the real world and RN probability of default:
  - ▶ Trader's demand extra return for illiquidity
  - ▶ Subjectivity of bond traders
  - ▶ Default on bonds are not independent of each other (higher systematic, non-diversifiable risk)
  - ▶ Bond returns are highly skewed with limited upside. Harder to diversify, thus traders may demand additional return for unsystematic risk

# Valuation (5): Debt – Risk-neutral valuation (cont'd)

- ▶ Recovery rates can be estimated based on historical data and/or specific recovery estimates for a given bond
- ▶ Since the RNP is estimated given a recovery rate, what matters is the relative difference of recovery rates estimate for the different bonds

Average Corporate Debt Recovery Rates Measured by Post-Default Trading Prices

Lien Position	Issuer-weighted			Volume-weighted		
	2011	2010	1982-2011	2011	2010	1982-2011
1st Lien Bank Loan	70.9%	70.9%	66.0%	77.8%	72.3%	59.9%
2nd Lien Bank Loan*	66.2%	18.1%	29.7%	66.2%	18.1%	28.1%
Sr. Unsecured Bank Loan*	23.1%	n.a.	47.1%	43.0%	n.a.	40.2%
Sr. Secured Bond	64.1%	62.5%	51.5%	57.8%	54.7%	50.3%
Sr. Unsecured Bond	40.4%	49.5%	36.8%	56.1%	63.8%	37.8%
Sr. Subordinated Bond	36.7%	37.5%	30.9%	31.5%	42.8%	25.6%
Subordinated Bond	35.4%	33.7%	31.5%	35.2%	32.2%	25.3%
Jr. Subordinated Bond	n.a.	n.a.	24.7%	n.a.	n.a.	17.1%

## Recovery Ratings

### Category Definition

1+	A recovery rating of '1+' denotes the highest expectation of full recovery in the event of default.
1	A recovery rating of '1' denotes an expectation of very high (i.e., 90%-100%) recovery in the event of default.
2	A recovery rating of '2' denotes an expectation of substantial (i.e., 70%-90%) recovery in the event of default.
3	A recovery rating of '3' denotes an expectation of meaningful (i.e., 50%-70%) recovery in the event of default.
4	A recovery rating of '4' denotes an expectation of average (i.e., 30%-50%) recovery in the event of default.
5	A recovery rating of '5' denotes an expectation of modest (i.e., 10%-30%) recovery in the event of default.
6	A recovery rating of '6' denotes an expectation of negligible (i.e., 0-10%) recovery in the event of default.

- ▶ 66% recovery rate for the First Lien
- ▶ 70% implied recovery for ABL facility (implied by the issuance price of issued at par) – specific collateral
- ▶ 40% selected recovery rate for Pension obligation notes (some collateral)
- ▶ 25% implied recovery rate for the Series A and Series B convertible notes – consistent with historical data for subordinated bonds

# Valuation (6): Debt Redemption Option

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- ▶ Similar to previous embedded features, a “with” and “without” methodology is used
- ▶ However, pension obligation are below par i.e. the redemption option is (deep) out-of-the-money
- ▶ Value of the redemption option is *de minimis*
- ▶ A stochastic interest rate model (such as the Black-Derman-Toy) would be needed to value the “with” case. A Discounted Cash Flow model would be needed in the “without”



# Valuation (7): Other considerations – Contingent dividend

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- ▶ Given that shareholder approval is almost certain, the value of the Contingent Dividend is deemed to be *de minimis*.
- ▶ In other instances a multimodal probability-weighted model would be used where different outcomes would be assigned different probabilities and the resulting values under each scenario would then be probability weighted.

# Questions?