



Equity Derivatives

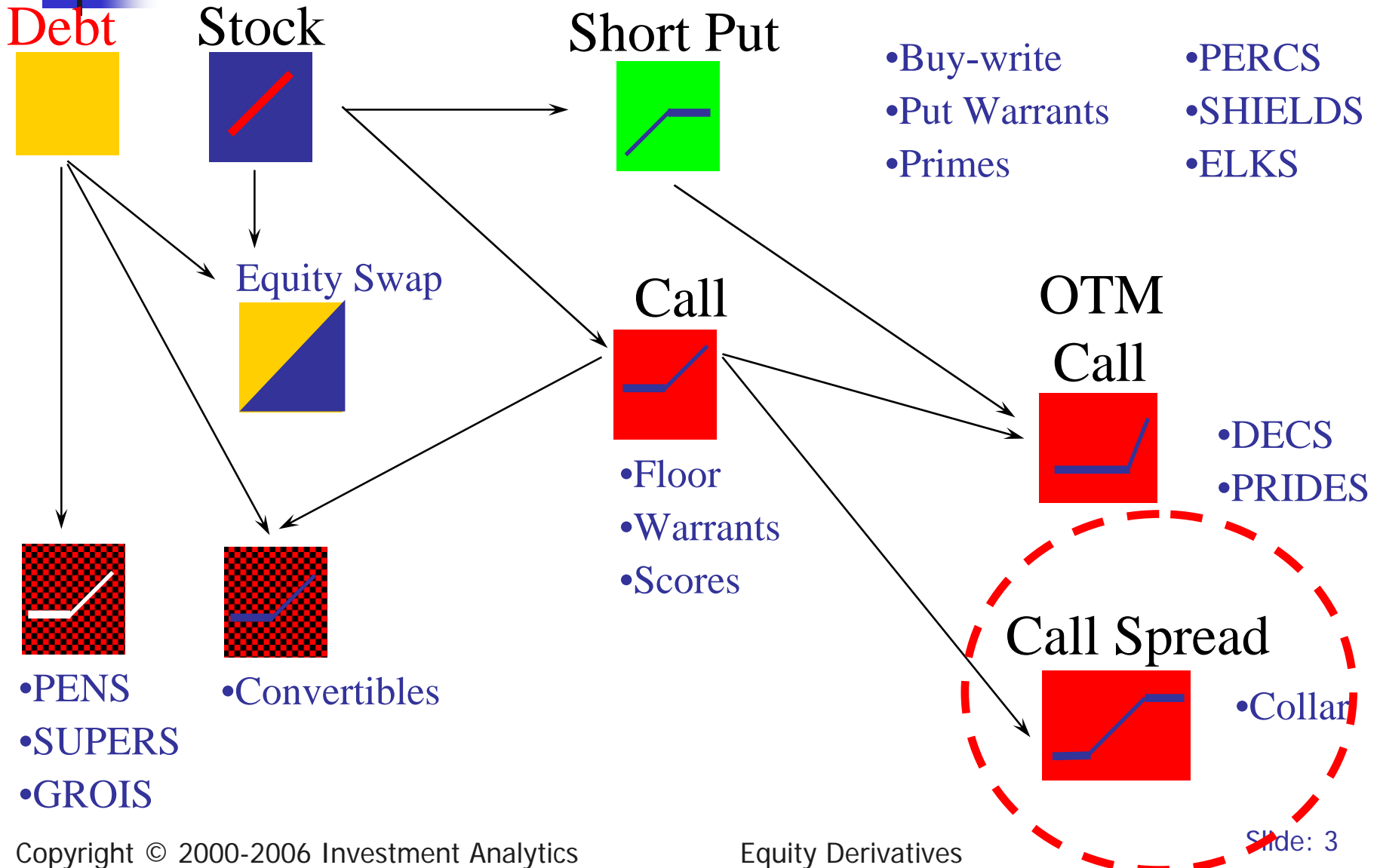
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Investment Analytics



Agenda

- Equity Caps, Floors & Collars
- PRIMES & SCORES
- PERCS
- SHIELDS & ELKS
- DECS & PRIDES

Roadmap: Caps, Floors & Collars





Caps, Floors & Collars

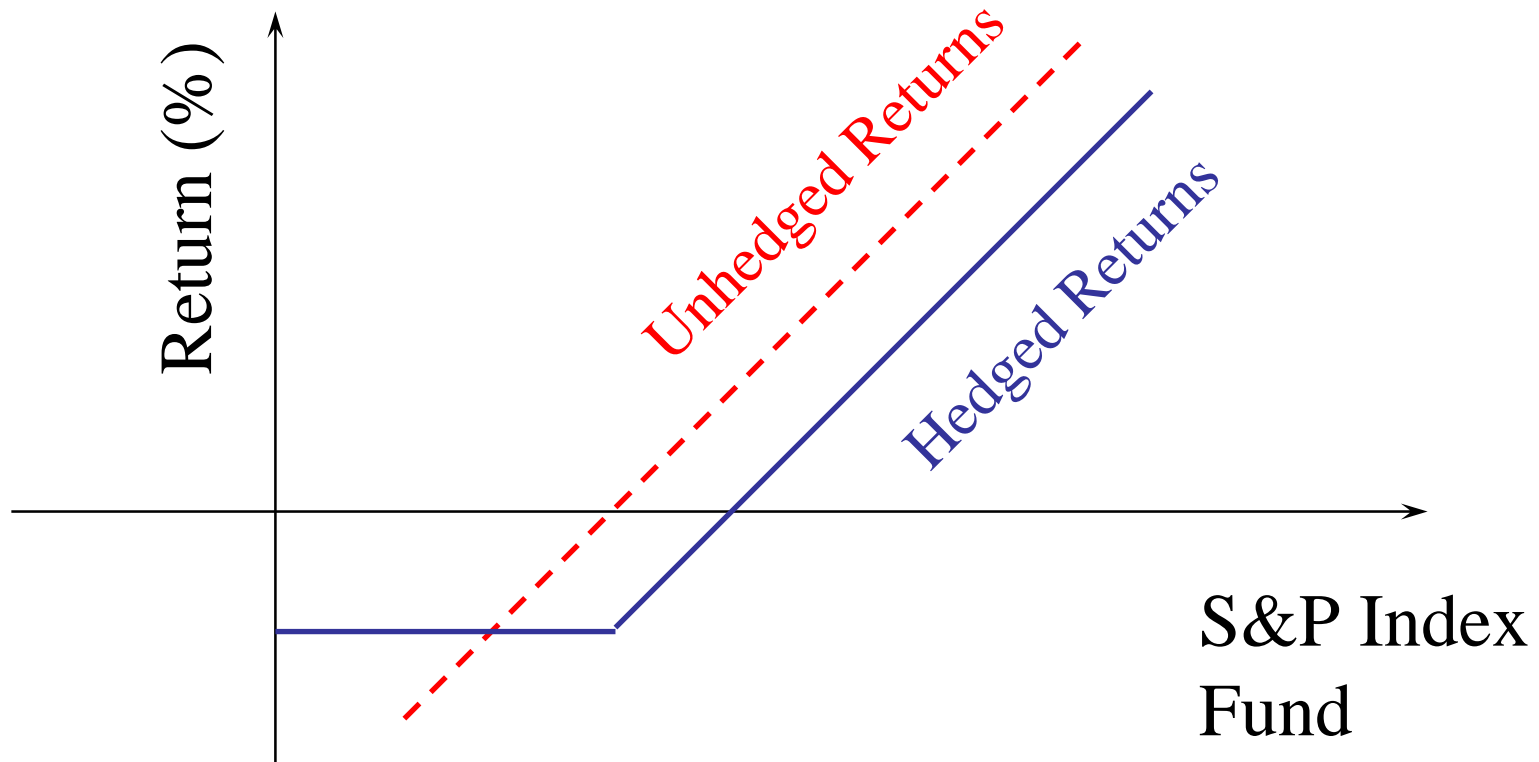
- Caps:
 - Limits Upside Risk / Gain
- Floor:
 - Limits Downside Risk / Gain
- Collar
 - Combines Cap & Floor



Floor

- Limits the downside exposure
- Typical Portfolio Application:
 - User: stock portfolio manager
 - Hedge against market retracement after rally
 - Mechanism: Purchase S&P put option
- Swap Application
 - User: S&P receiver in equity swap
 - Set minimum return from the swap
 - Mechanism: Purchase series of European put options maturing on reset dates

Floor Example: S&P Index Fund



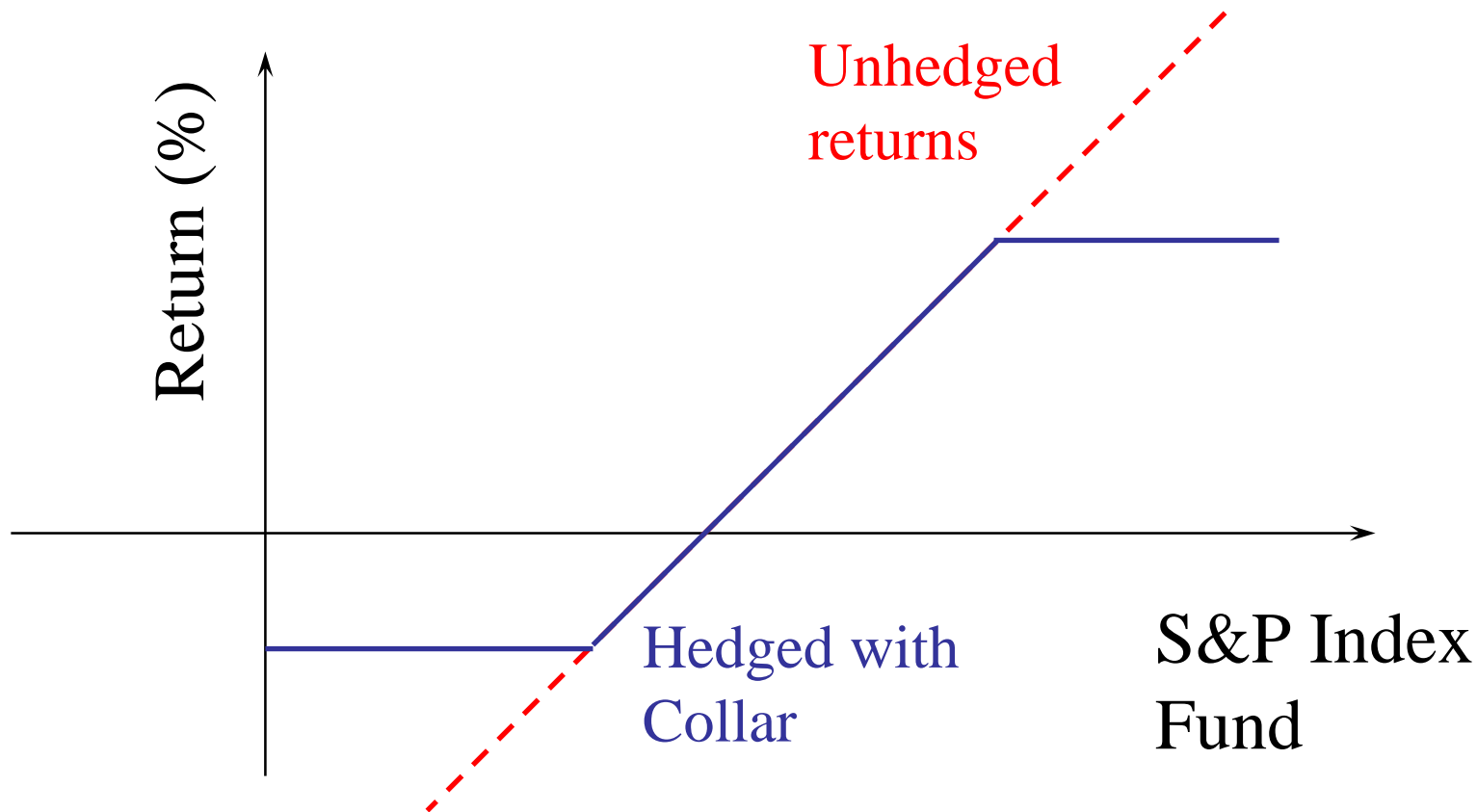
- $\text{Stock} + \text{Floor} = \text{Stock} + \text{Put} = \text{Call}$



Collar

- Combines Floor(s) and Cap(s)
 - Limits upside potential and downside risk
 - Sale of call(s) & purchase of put(s)
 - Premium from calls offsets cost of puts
- Zero Cost Collar:
 - Special case where Put Premium = Call Premium
 - Net cost is zero
- Typically used to lock in gains after market rally

Example: S&P Index Fund





Lab: Collar Hedging

- Scenario 20/June/96 S&P500 just rallied to 670.60
 - Want to lock in majority of gains over next qtr
 - Fund will stand a max loss of 4%
 - Minimize hedging cost
 - What is the maximum upside potential?
 - Assume:
 - Dividend yield of 2.3%
 - Volatility 15.74%
 - Strikes at 5 point intervals from 700
 - Sept options expire 19/9/96



Lab: Collar Hedging S&P Index Fund

- Worksheet: Zero Cost Collar
- Procedure:
 - Work out S&P level producing - 4% return
 - Don't forget dividends
 - Price put at this strike
 - Price highest strike call which has premium just greater than put premium
 - Work out fund return (upside potential)
 - NB. There is a small net premium surplus



Combining Caps, Floors, & Swaps

- Equity Receiver (fixed payer):
 - Wants a floor on equity leg cash flows
 - Example: Minimum income 0% per annum
 - Cost: Put option on index
 - Offset cost of floor by selling cap
 - Benefit: Premium on call option on index
 - Result: zero cost collar
 - Swap Value = NPV of Vanilla Swap + Call - Put
 - Compute cap which resets Swap value to zero



Lab: Caps, Floors & Swaps

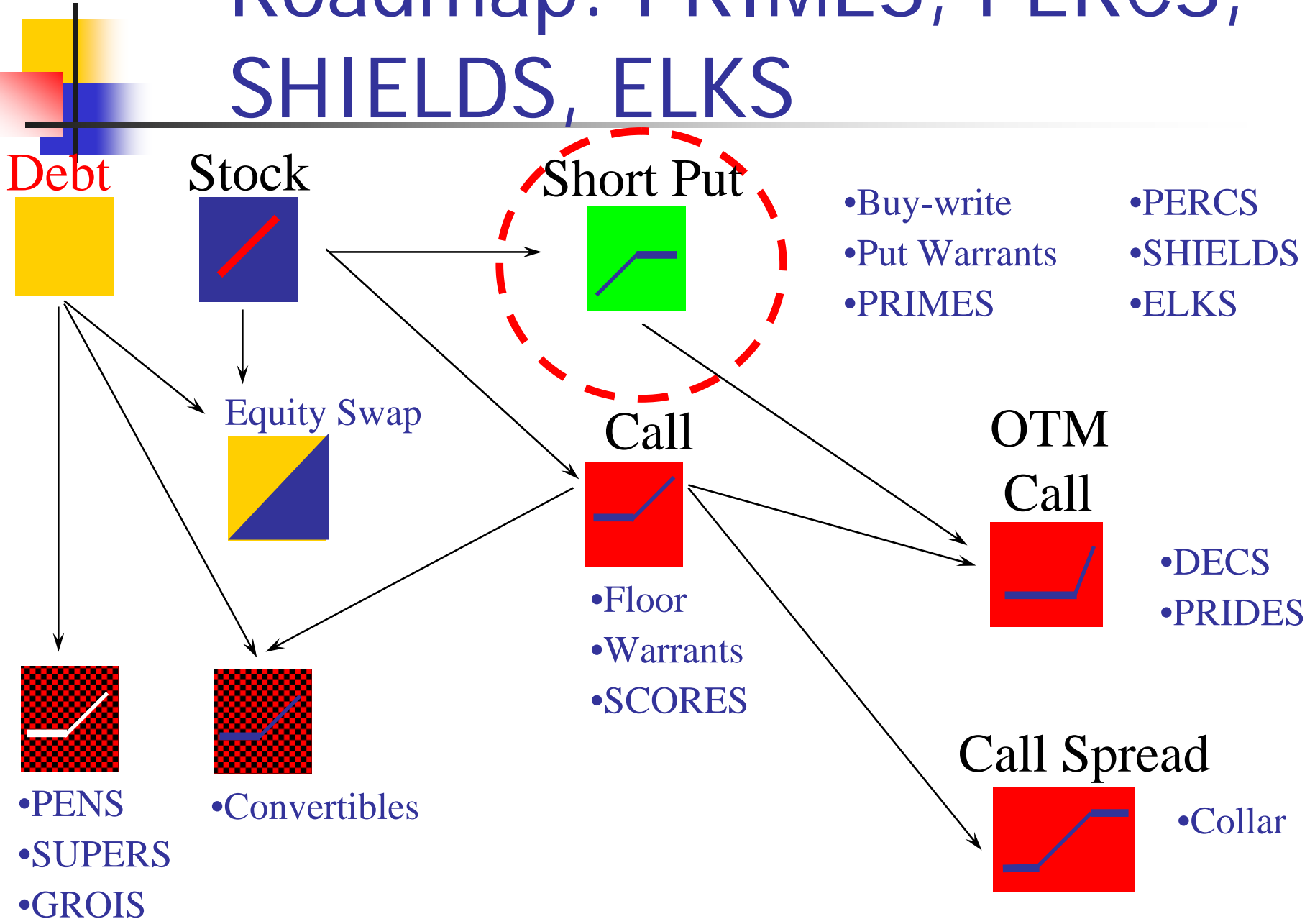
- Worksheet - Equity Swap
- Pricing a zero cost Collar
 - Set floor to 0%
 - Use Goal Seek to find cap which sets NPV to zero
 - Note: set strikes as follows:
 - $S = S_0 [1 + (\text{floor}\% - \text{dividend yield}\%) \times t]$
 - $S = S_0 [1 + (\text{cap}\% - \text{dividend yield}\%) \times t]$



Solution: Caps, Floors & Swaps

- Zero Cost Collar
 - Cap is 11.8532 %
 - Zero cost collar means equity payer will:
 - Pay fixed coupon 6.2334% (as for vanilla)
 - Min return on equity leg of 0%
 - Max upside gain of 11.8532%

Roadmap: PRIMES, PERCS, SHIELDS, ELKS





PRIMES, PERCS, SHIELDS, ELKS

- Key Feature:
 - Long position in stock, short a call
 - Equivalently:
 - “Buy-write”
 - A Short Put
- Origins: Americus Trust PRIMES & SCORES
 - Joe Debe, 1972(!)
 - August 1985 (!) cleared by SEC
 - PRIMES:
 - “Prescribed Right to Income & Maximum Equity securities”
 - SCORES:
 - “Special Claims on Residual Equity securities”

Americus Trust PRIMES & SCORES

Stocks

Trusts

•Closed end funds expiring after 5 years

UNITS - traded on AMEX

PRIMES

units can be recombined

SCORES

- Marketed as income generating security
- Received all ordinary dividends, less fees 5c p.a.
- Carried full vote of common

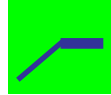
- Marketed as warrant / capital gain security, not an option
- No dilution effect
- OTM call option



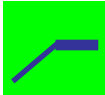
Finis for PRIMES & SCORES

- Tax killed PRIMES & SCORES
 - IRS revoked “grantor” status of Trusts
 - Hence subject to corporation tax *and* personal income tax
 - Lawsuit by investors obtained “grandfathered” status
 - Americus Trust continued, but no followers

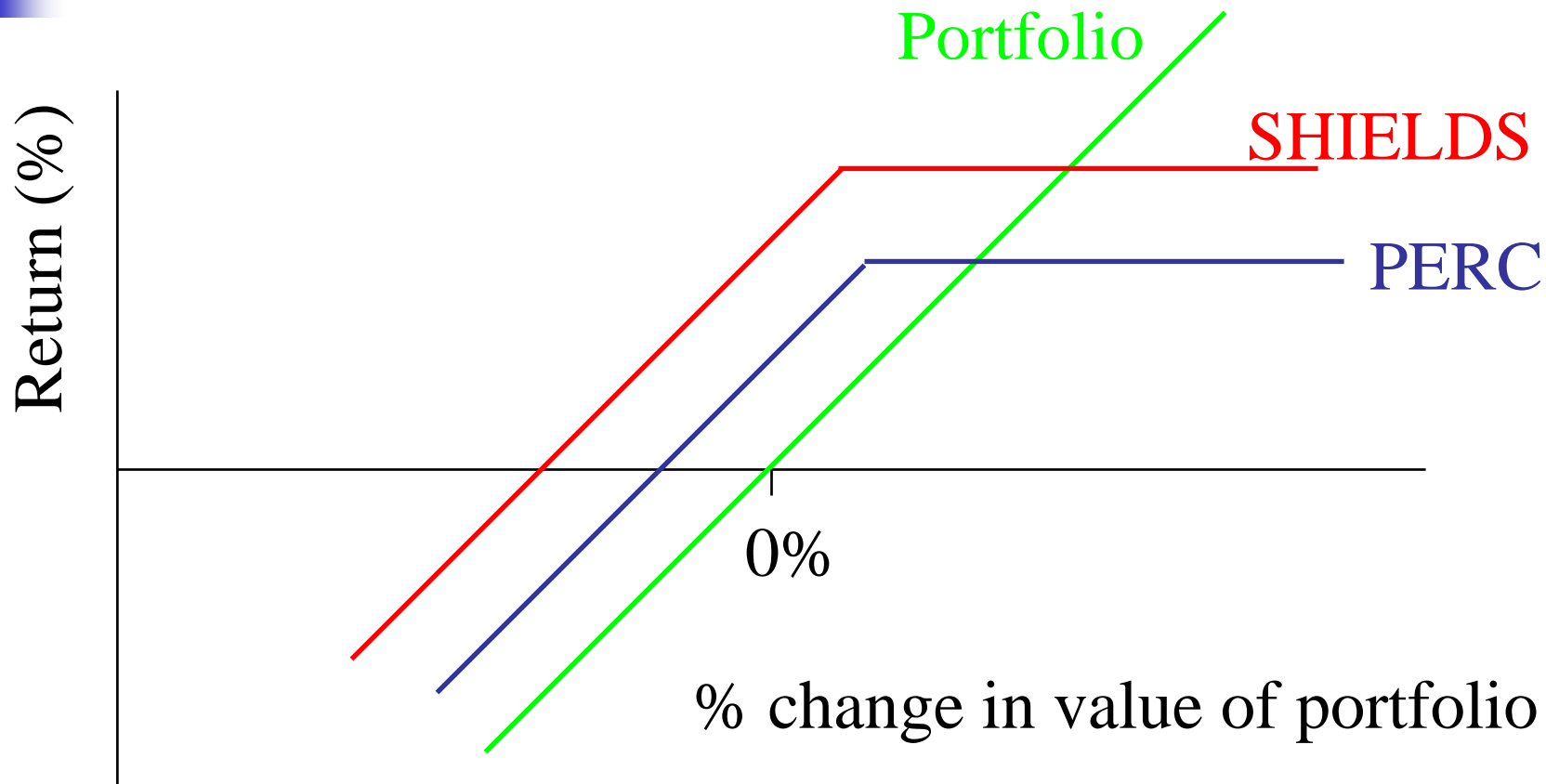
Legacy of PRIMES & SCORES - PERCS

- PERCS - (Morgan Stanley, 1990) 
- “Preferred Equity Redemption Cumulative Stock”
- Like PRIME, but issued directly by company
 - Marketed as “enhanced dividend preferred stock”
 - Dividend is cumulative, & senior to dividend on common
 - Enhanced dividend comes from short put premium
 - Typically 3% - 4% yield advantage over common stock
 - Mandatory conversion into common at maturity (3 years)
 - Traded OTC and on exchange where common is traded
 - May or may not have voting rights
 - Callable at declining price payable in shares
- Widely used: RJR, GM, TI

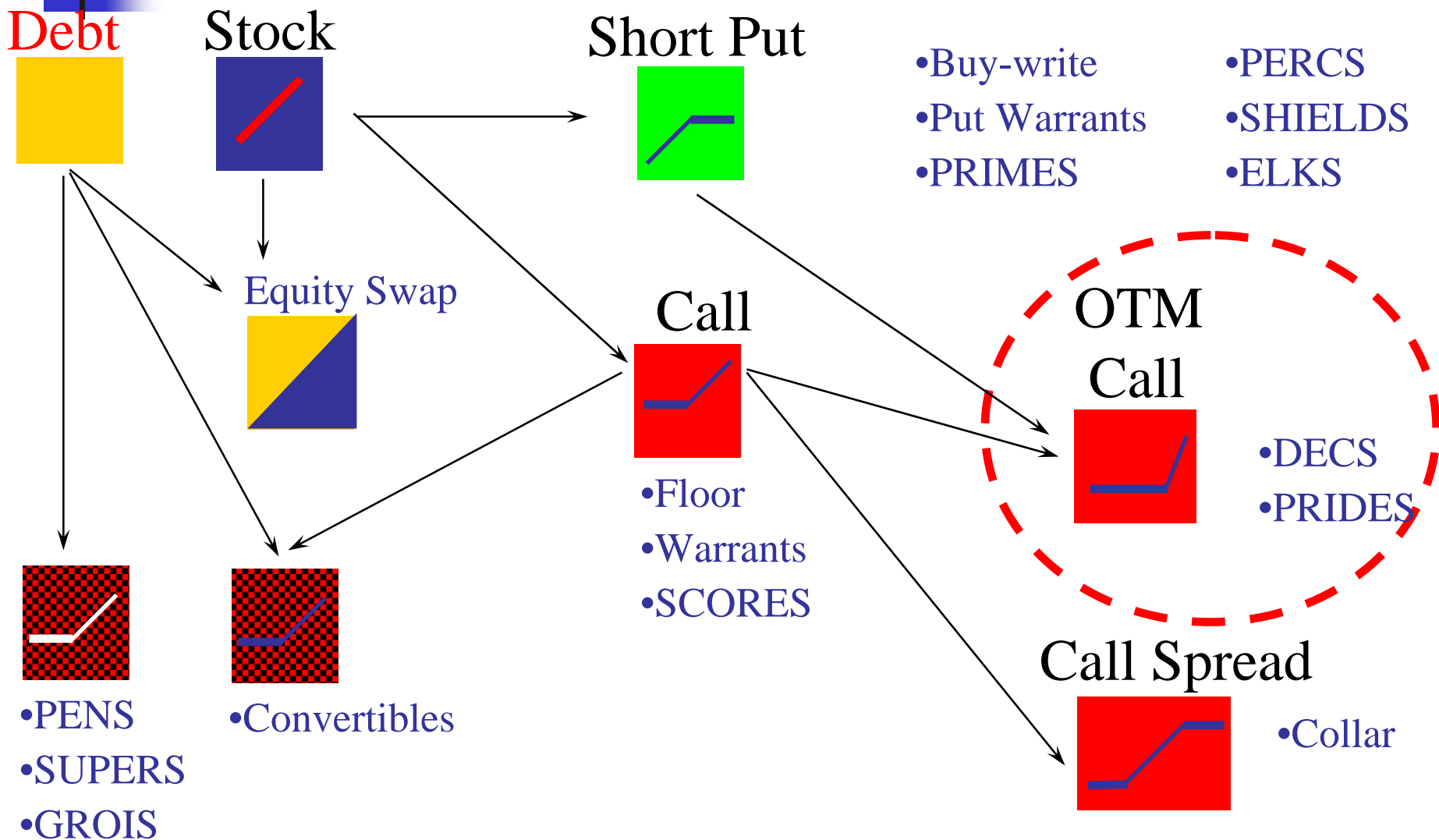
The Legacy of PRIMES & SCORES - SHIELDS & ELKS

- SHIELDS (synthetic PERC) 
 - "Structured High Income Equity Linked Security"
 - Like PERC, except:
 - Issued by 3rd party
 - Can be any equity, including foreign stock or indices
 - Tax advantage of foreign dividends:
 - Exemption from withholding taxes
 - Hence typically higher yield than PERC
- ELKS (Salomon Bros) - similar to SHIELDS
- Also: EYES, PERQS, YEELDS

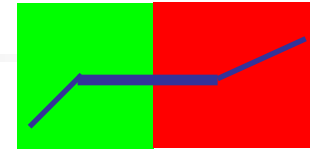
PERCS vs. SHIELDS



Roadmap: DECS & PRIDES



DECS & PRIDES



■ Next Variants of PERCS (1994)

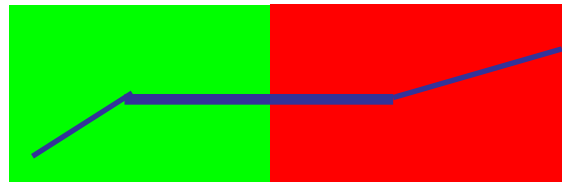
- DECS: "Debt Exchangeable for Common Stock" - Salomon
- PRIDES: "Preferred Redeemable Increased Dividend Securities" - Merrill Lynch
- Also: ACES, MARCS, PEPS, SAILS

■ Typical Structure

- Mandatory conversion to common stock at maturity
- 2-4 year maturity
- Conversion premium 20% - 25%
- Income advantage 5% - 6% over common stock, 2% - 3% over comparable convertible preferred
- Quarterly coupon payment

Synthetic Structure of DECS & PRIDES

- Combination of Put (PERC) & OTM Call
- Equivalently: Stock & Short Call Spread
 - $STOCK = -P + C_{ATM} = -P + [C_{ATM} - C_{OTM}] + C_{OTM}$
 - $DEC = -P + C_{OTM} = STOCK - [C_{ATM} - C_{OTM}]$
- Payoff Structure:





DECS & PRIDES

- Marketing: “PERCS with some upside potential”
 - Enhanced dividend (compared to common)
 - But now with upside potential
- How it works:
 - Sell ATM Put:
 - Produces “enhanced dividend”, i.e. put premium
 - Buy OTM Call: Provides upside potential
 - Result = DEC:
 - Reduces enhanced dividend, but still +ve since cost of OTM Call is less than premium from ATM Put



Reset PRIDES

- First issue by Amway Japan late 1995
- PRIDE that converts into more than one share at maturity
 - Up to some specified maximum
- Offers investor more downside protection
 - Sheltered from, say, first 20% decline in stock
- Lower yield than vanilla PRIDE
 - 3% - 4% over common stock
- Synthetic Structure:
 - Stock + Put Spread – Call Spread



DECS Example: Nextell Communications

- Salomon \$300MM DECS issue for Nextell in Feb 94 (First Chicago):
 - DECS offered at current share price of \$41
 - 5.5% enhanced coupon
 - DECS outstanding 3 years
 - Investor receives Nextell stock after 3 years, but loses first 20% of stock's appreciation



Lab: Nextell Communications

DECS Issue

- Worksheet: Nextell DECS Issue
- Question 1:
 - Assume Nextell stock rises to \$61.50 by Feb 97
 - How many shares would each DECS holder receive per DEC?
- Question 2: Is the issue rich or cheap?
 - Assume Nextell stock has beta 1.1
 - Historical correlation with market = 0.94
 - Expected return on market is 16%
 - Market volatility is 21%
 - Yield on 3yr Notes is 6%
 - Dividend yield projected to be 4.5%



Nextell Lab: How to Proceed

- Value DECS:
 - Estimate required return on equity
 - Compute NPV of enhanced dividends
- Value Synthetic DECS:
 - Estimate stock volatility
 - Compute price of relevant put and call
- Compare:
 - DECS (NPV of dividends)
 - Synthetic DECS: Put premium - Call premium



Solution: Nextell DECS Issue

- Feb 97 Stock Price \$61.50
- % Appreciation 50%
- % Appreciation to DECS (50% - 20%) 30%
- Dollar Value of DECS (\$41 x 1.3) \$53.30
- Shares received per DECS (\$53.3/\$61.5) 0.87

- $ROE = 6\% + 1.1 \times (16\% - 6\%)$ 17%

- Volatility $(\text{Beta} \times \sigma_m / \rho) = 1.1 \times 21\% / 0.94 = 24.57\%$



Solution: Nextell DECS Issue

■ DECS ISSUE

■ Yield Enhancement (5.5% - 4.5%)	1.0%
■ \$ value of yield enhancement (\$41 x 1%)	<u>\$0.41</u>
■ Value of DECS (NPV of enhancement)	<u><u>\$0.91</u></u>

■ SYNTHETIC DECS

■ Short Put (\$41 strike)	\$5.15
■ Long OTM call (strike = $1.2 \times \$41 = \49.2)	- <u>\$4.17</u>
■ Value of Synthetic DECS	<u><u>\$0.97</u></u>

■ **CONCLUSION:** DECS Issue is 6 cents rich



Summary: Equity Derivatives

- Caps, Floors & Collars
 - Combining with swaps
- “Buy-Write” Securities
 - PRIMES, SCORES, SHIELDS, DECS & PRIMES