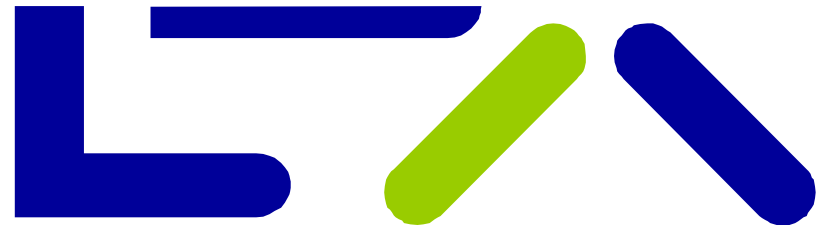


X-pand into the Future



Understanding and Trading with EUREX Interest Rate Derivatives

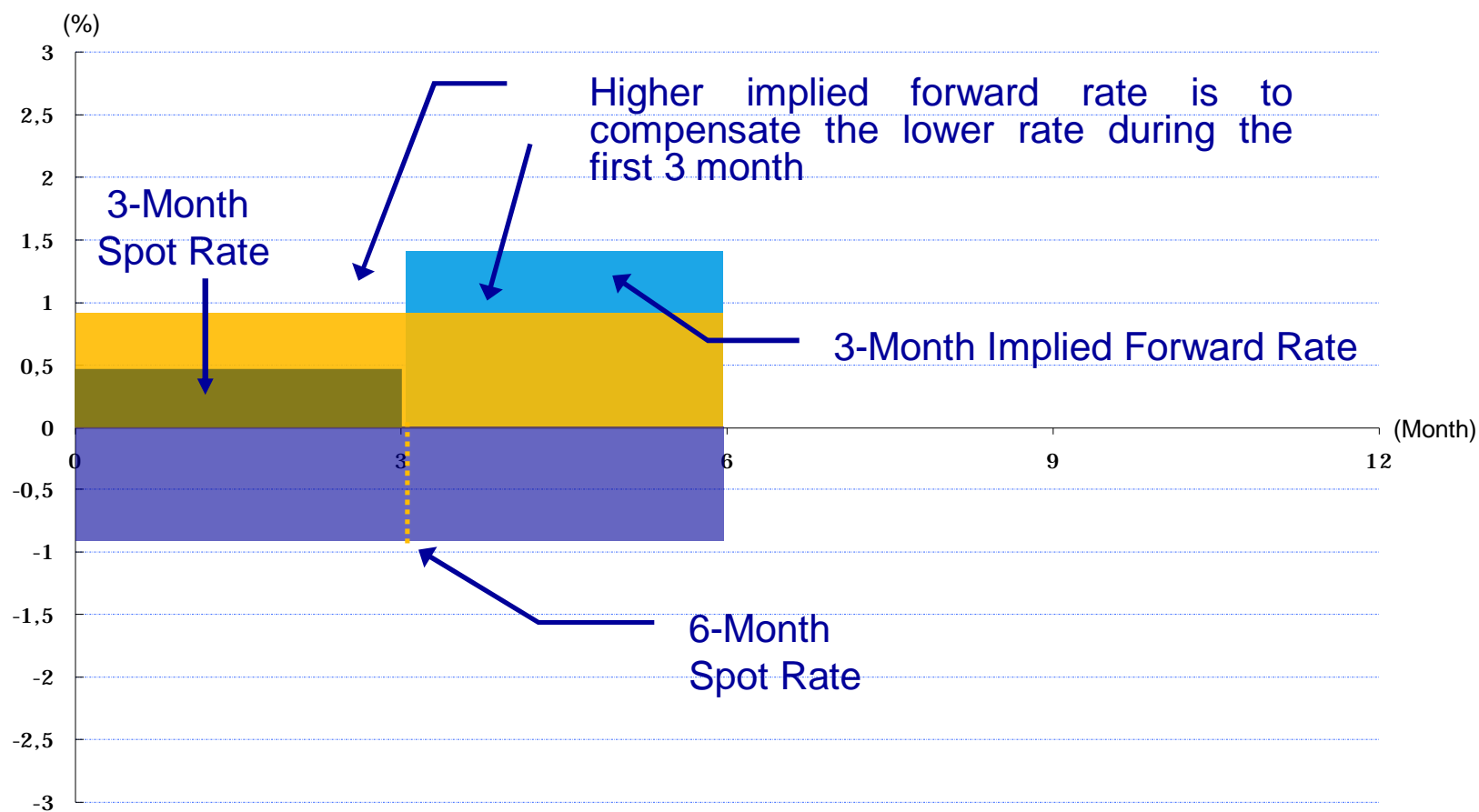
EUREX/Hong Kong Securities Institute
Simon Ting

Trading and Hedging Techniques With Interest Rate Futures

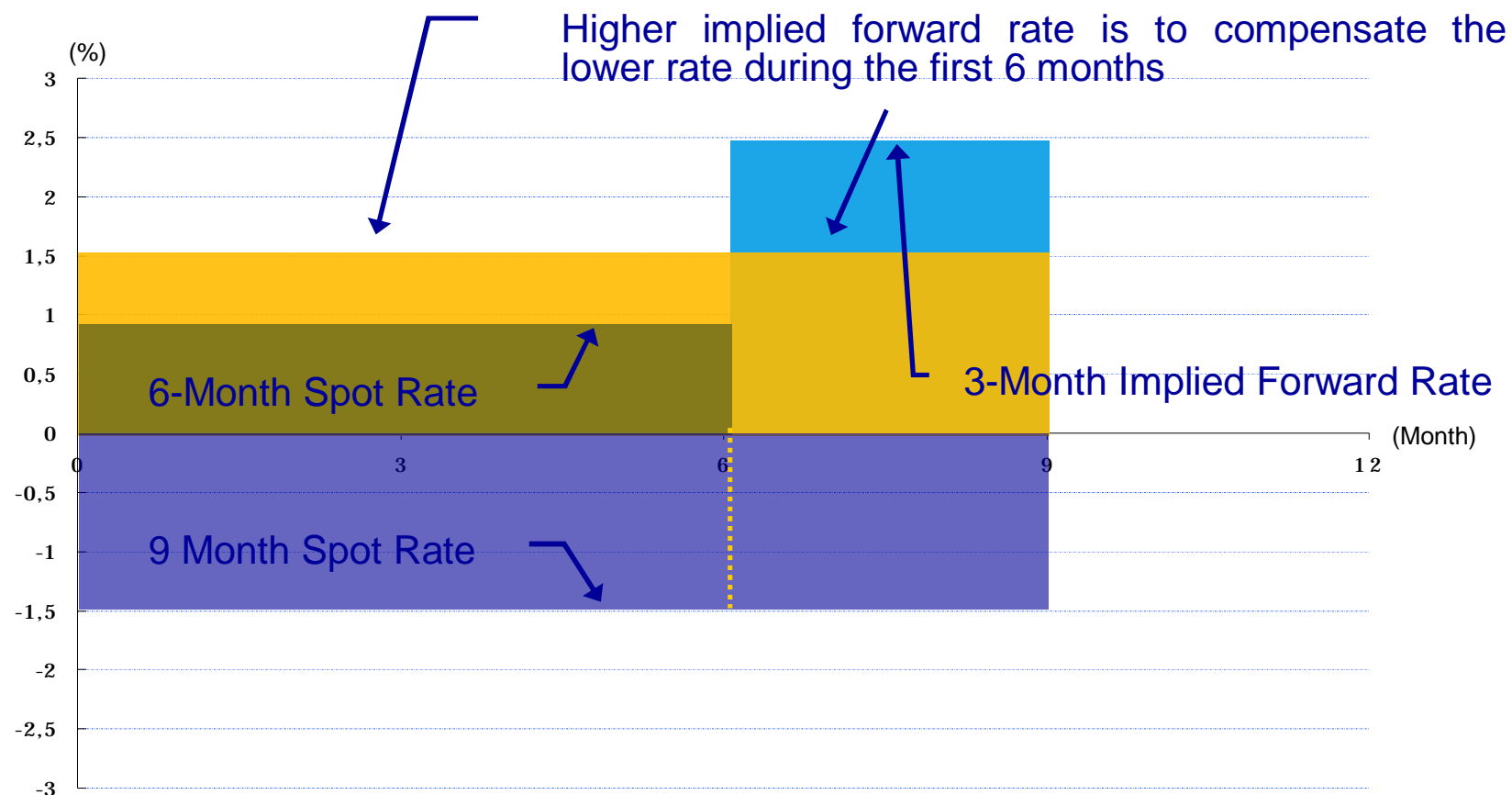
- n Advantages of trading Fixed Income Futures in comparison to trading cash bonds
 - Higher market liquidity and transparency
 - Simple handling of short positions
 - Low cash liquidity requirements because only initial margin must be deposited

- n Short-term interest rate futures Contract
 - Euribor futures (available in Euronext-LIFFE too)
 - One month EONIA futures

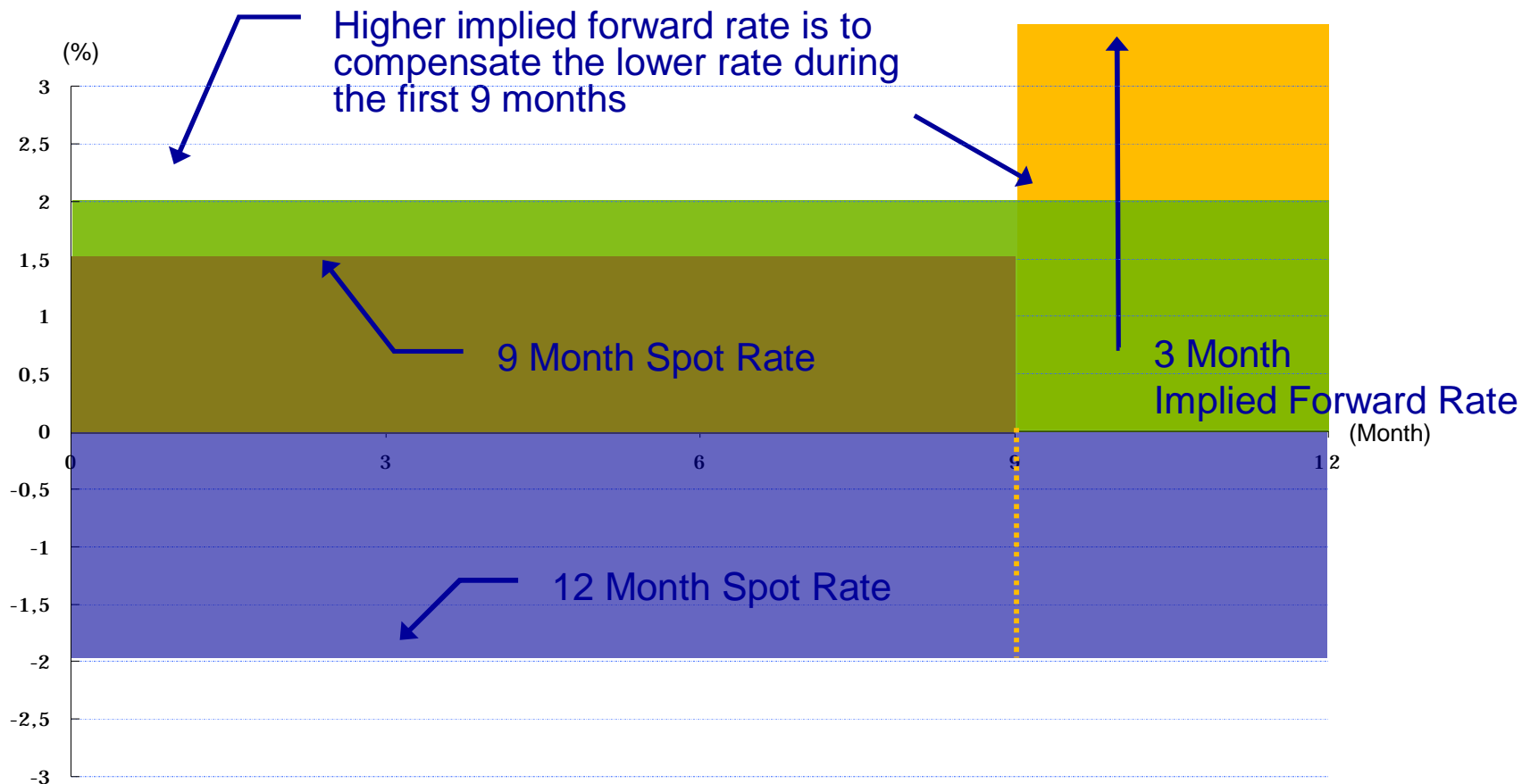
Implied Forward Rate



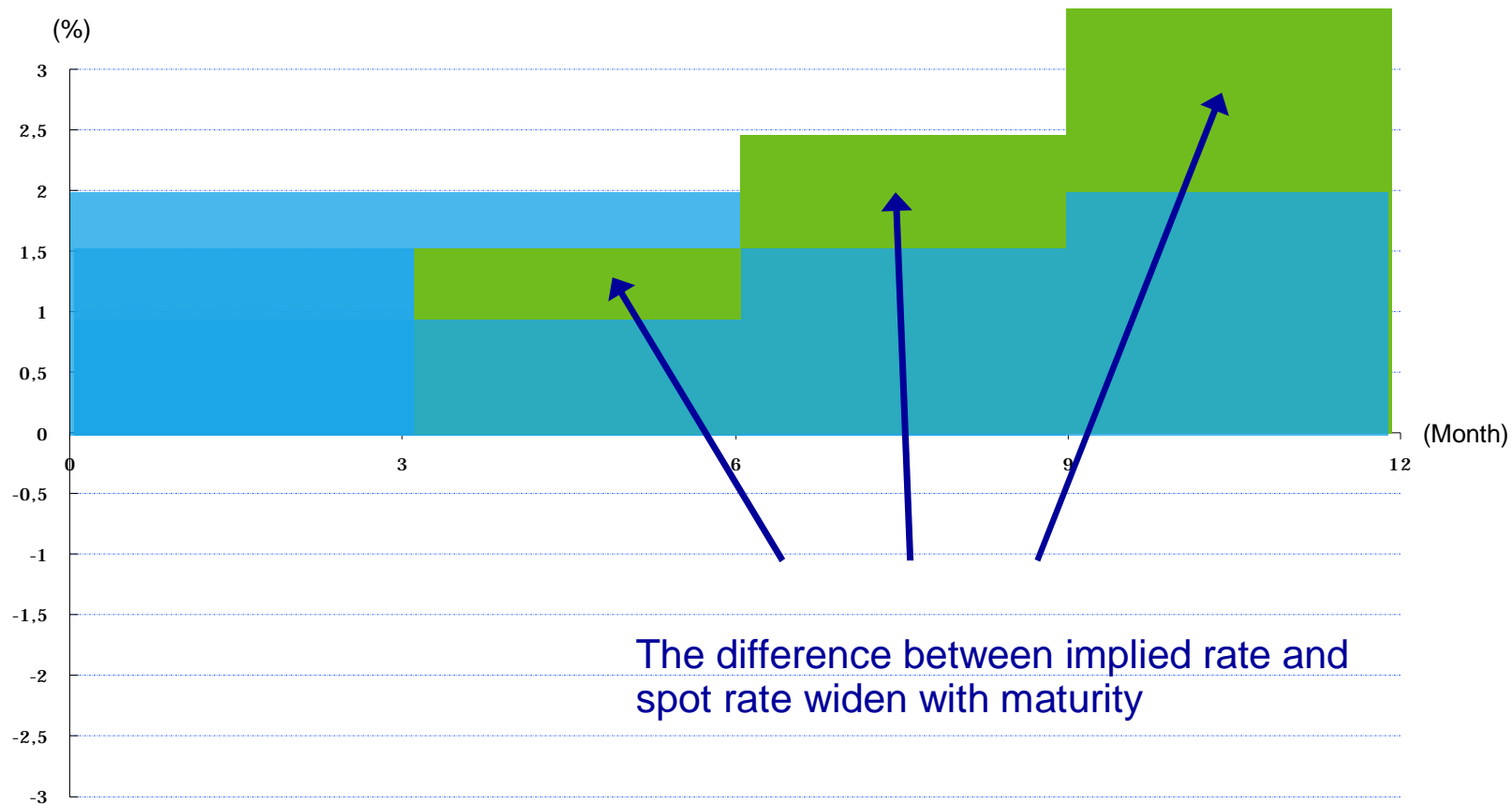
Implied Forward Rate



Implied Forward Rate



Implied Forward Rate



Application of Interest Rate Management Tools

n Fixed Income Securities

- Coupon Rate
- Yield-to-maturity

n German Government Issues

- 2's, Euro Schatz (FGBSc1)
- 5's, Euro Bobl (FGBMc1)
- 10's, Euro Bund (FGBLc1) actual/actual annual

n Accrued Interest

- The buyer pays accrued interest to the seller for the period between the last coupon date and the value date of the trade.

n Yield Curve

- Normal yield curve: bonds with longer remaining lifetime yield more than bonds with shorter remaining lifetime.
- Vice versa is an inverted yield curve.

Application of Interest Rate Management Tools

n Macaulay Duration

- a measure of how coupon and remaining lifetime of a bond influence its interest rate sensitivity. Usually defines as the weighted average of the periods of time until the individual yield and redemption payments fall due, with the present value of the payments being used as weighting factor.

n Modified Duration

- calculates the percentage change in the present value (PV) of bonds if the level of capital market interest rate changes by one unit (1 percentage point)

n Convexity – the tracking error of Duration

- Modified Duration assumes a linear relationship between the bond's PV and the market interest rate. In fact, the relationship between PV and the market interest rate is convex.

Trading and Hedging Techniques with Interest Rate Futures

- n Fixed income securities futures price (fair value)
 - $\text{Futures} = \text{Cash market price} + \text{Financing costs} - \text{income on the cash market position}$
- n Accrued interest reduces the price of a futures
 - S/T refinancing rates, which are usually paid in interbank transactions for deposits with a term equivalent to the lifetime of the futures (so-called repo rates).
- n Conversion Factor (Price Factor)
 - comparison of the value of the different deliverable bonds in case of a physical delivery.
 - the lower the coupon of a deliverable bond, the lower the conversion factor and, consequently, the delivery price of this bond.

Trading and Hedging Techniques With Interest Rate Futures

n Cheapest-to-Deliver (CTD) Bond

- e.g. Which bond is the CTD?
- Bond A: Proceeds from a sale of the bond on the cash market, EUR104,930; delivery price of the bond: EUR105,117
- Bond B: Proceeds from a sale of the bond on the cash market, EUR105,090; delivery price of the bond: EUR104,992

n Answer: Bond A is the CTD !!

- It offers a price profit of EUR 187 ($105,117 - 104,930$) in case of physical delivery. Bond B implies a loss of EUR98 ($104,992 - 105,090$) compared to its market value in case of physical delivery. Therefore, Bond A has an overall price advantage of EUR285 ($187 + 98$) over Bond B.

Trading and Hedging Techniques With Interest Rate Futures

- n Federal Notes/Bonds Spread (Yield Curve Trading)
 - i.e. Schatze, Bobls, Bunds long/short trades
 - DV01 (Dollar Value Basis Point)
 - the change in price of federal bonds/ treasury if yield changes by one basis point
 - average the upside and downside dollar price change to generate the result
- n Example: Consider a 6% 5-year Federal Notes (Bobls) with actual/actual annual interest payment (Month)
 - When Yield = 4%, bond price = 108.90365
 - When Yield = 3.99%, bond price = 108.95068
 - When Yield = 4.01%, bond price = 108.85664
 - $DV01 = (0.04703 + 0.04701) / 2 = 0.04702$

Trading and Hedging Techniques With Interest Rate Futures

n Example: Consider a 6% 10-year Federal Bonds (Bunds) with actual/actual annual interest payment

When Yield = 4%, bond price = 116.22179

When Yield = 3.99%, bond price = 116.31102

When Yield = 4.01%, bond price = 116.13265

$DV01 = (0.08923 + 0.08914) / 2 = 0.089185$

Therefore, 10-yr DV01 / 5-yr DV01 = $0.089185 / 0.047020$

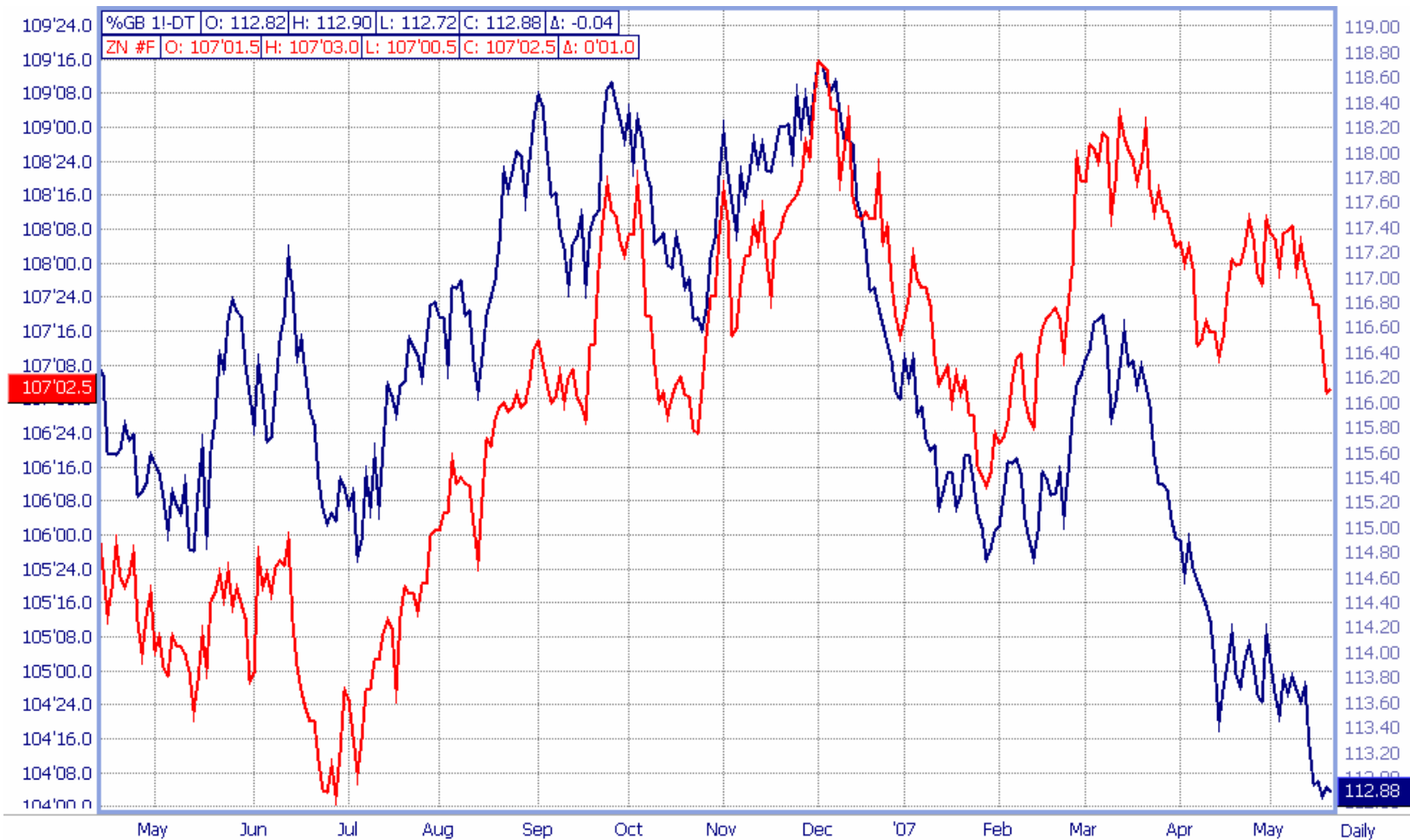
= 1.8967

Or, 100 Bunds = 189 Bobls

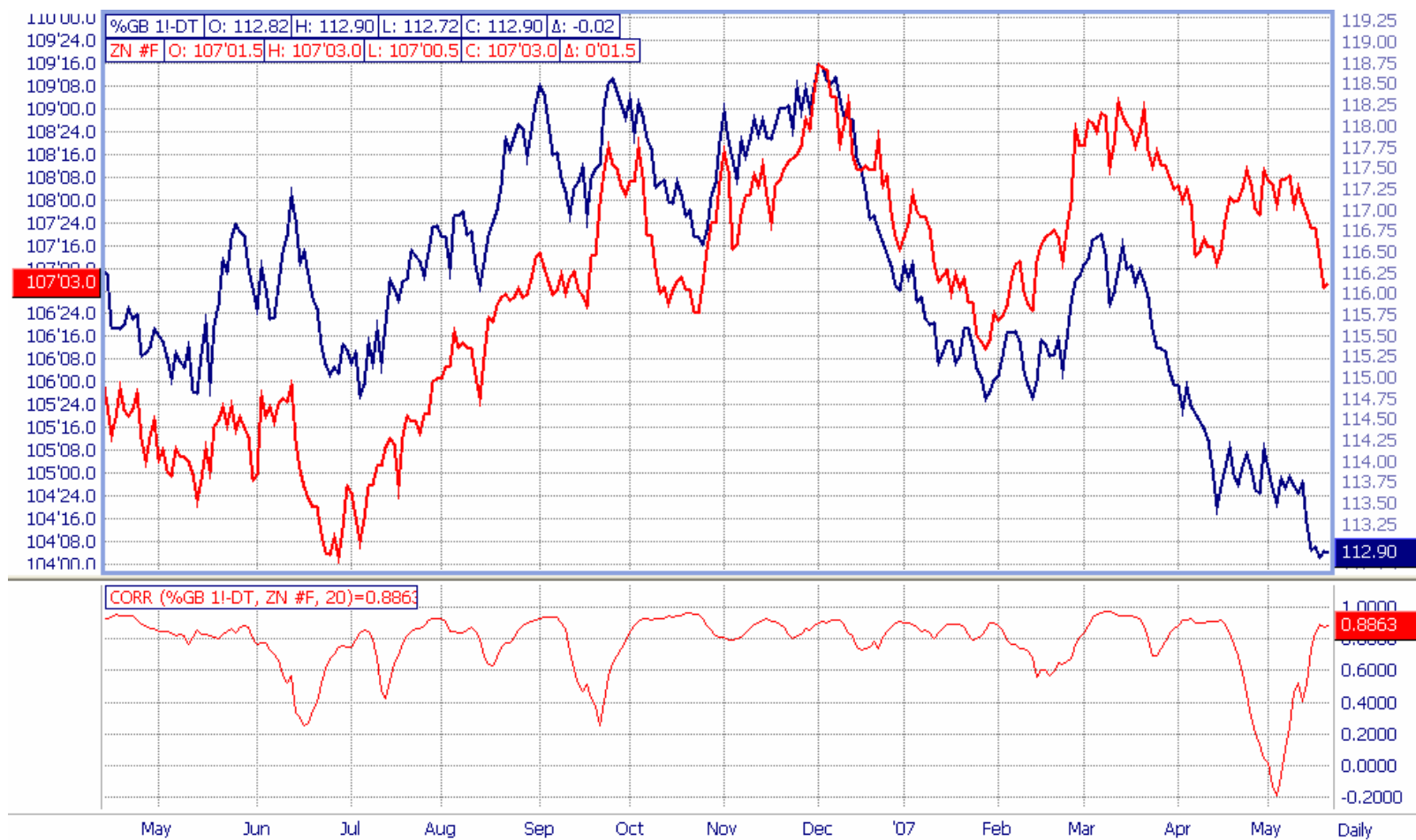
Trading and Hedging Techniques With Interest Rate Futures

- n Outright Trading (Same as Equity/ Equity Index)
 - Based on Fundamental or technical
 - Greater market risk
- n Inter-market
 - Cross index trading
 - Inter-commodity trading
 - Depends on correlation coefficient, usually smaller risk
- n Intra-market
 - Intra-commodity trading
 - The simultaneous long and short different contract months
 - Generally speaking , the smallest risk

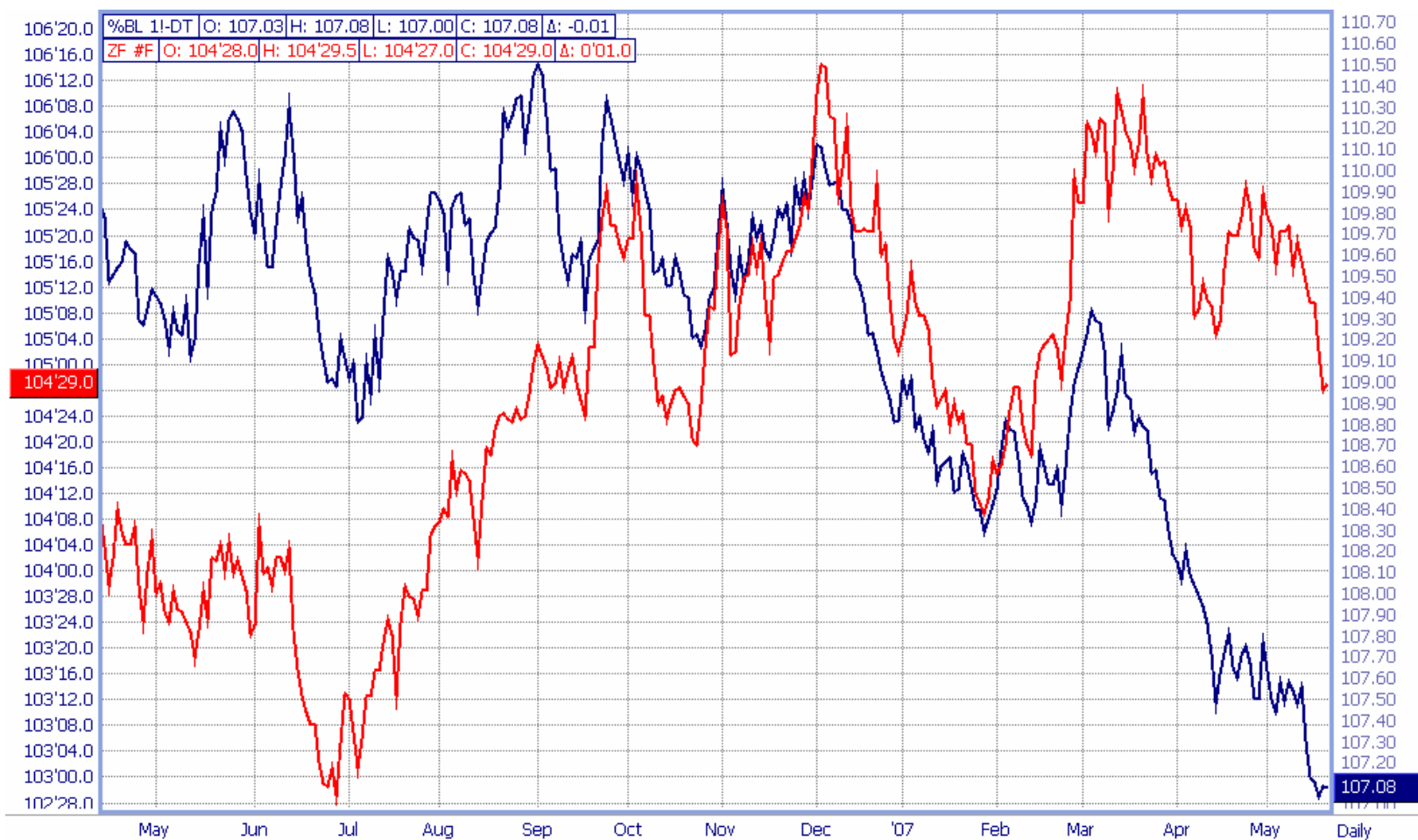
Correlation (Bund vs 10-year Treasury Note)



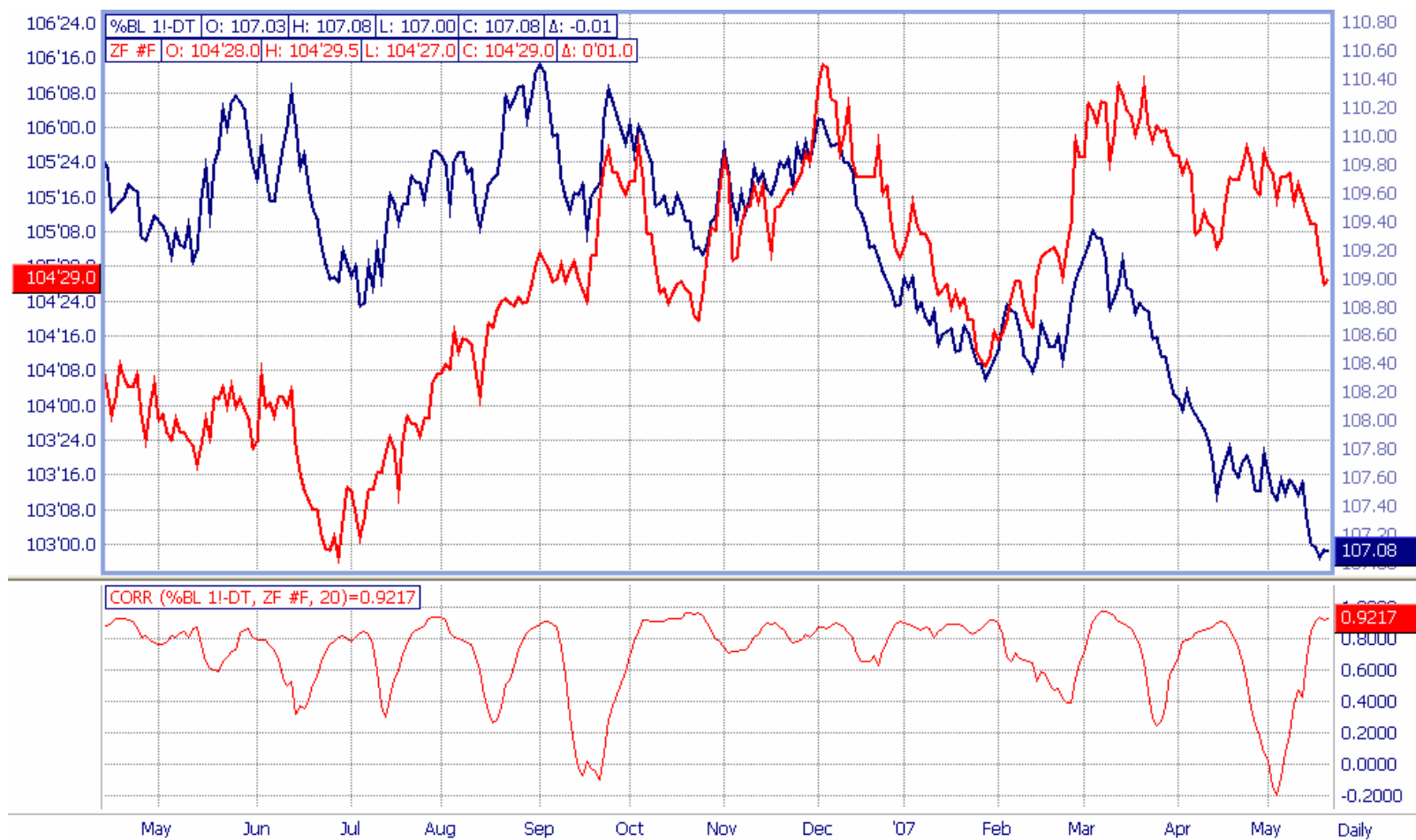
Correlation (Bund vs 10-year Treasury Note)



Correlation (Bobl vs 5-year Treasury Note)

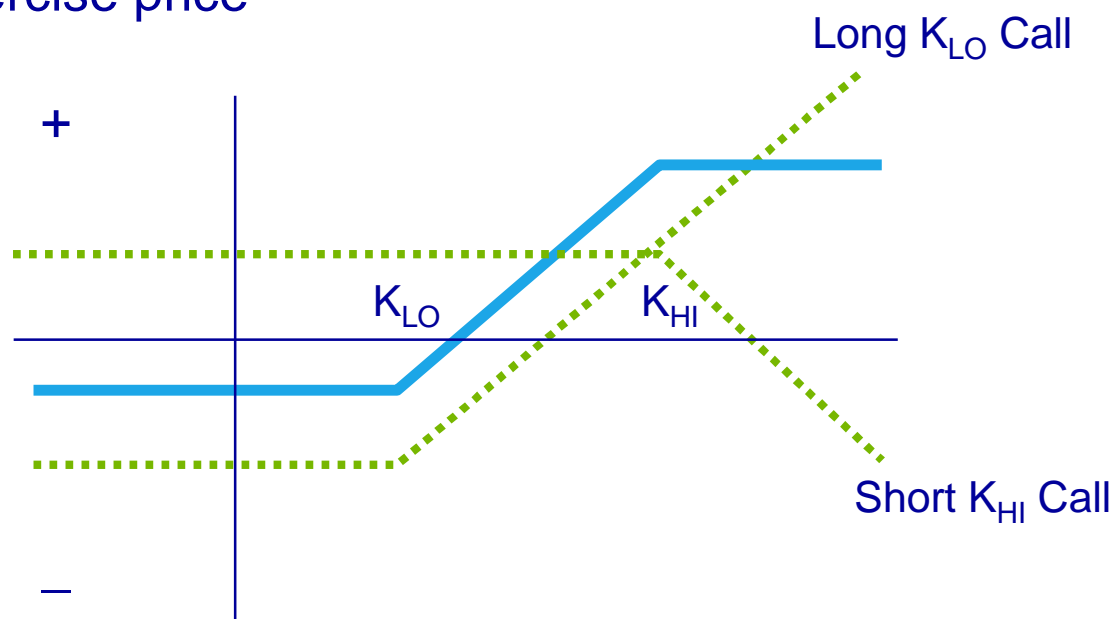


Correlation (Bobl vs 5-year Treasury Note)



Bull Call Spread

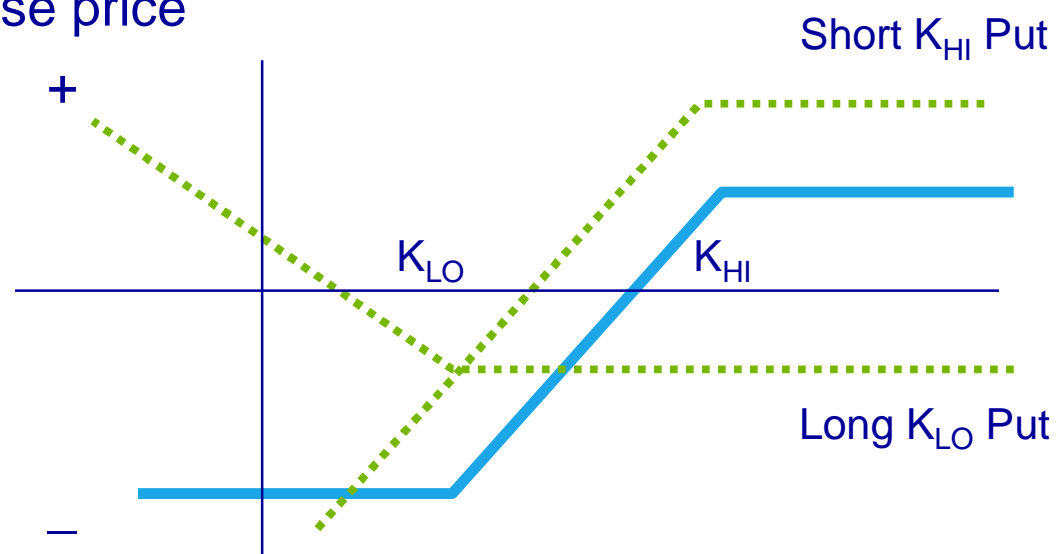
- Buy one call options, and sell one call options with a higher exercise price



- Expectation : Trend upward
- Return : Limited largest gain if expectation correct
- Risk : Limited loss if expectation fail

Bull Put Spread

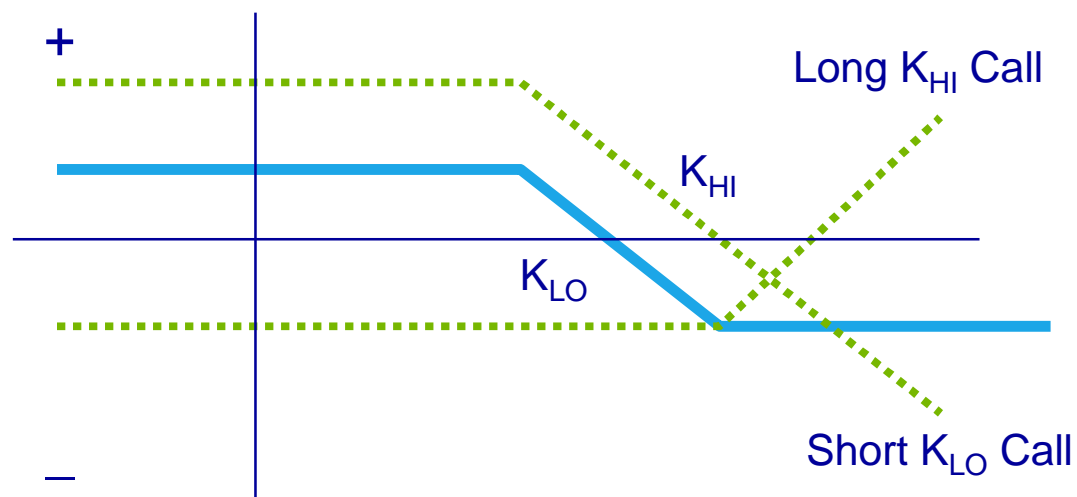
- Buy one call options, and sell one call options with a higher exercise price



- Expectation : Neutral to Trend upward
- Return : Limited gain if expectation correct, receive premium if unchanged
- Risk : Limited loss if expectation fail

Bear Call Spread

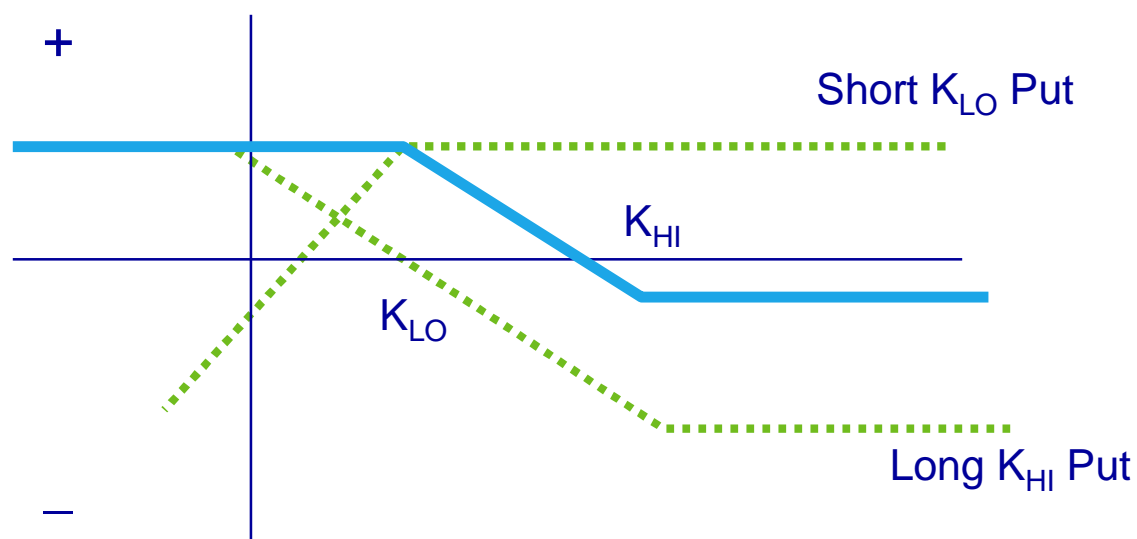
- Buy one call options, and sell one call options with a lower exercise price



- Expectation : Neutral to Trend downward
- Return : Limited gain if expectation correct, receive premium if unchanged
- Risk : Limited loss if expectation fail

Bear Put Spread

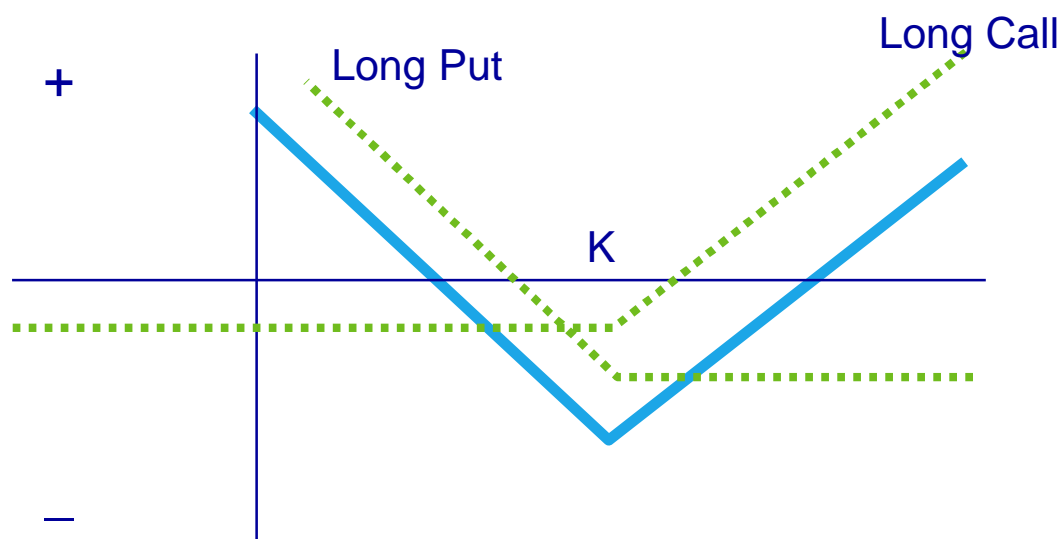
- n Buy one put options, and sell one put options with a lower exercise price



- Expectation : Trend downward
- Return : Limited gain if expectation correct
- Risk : Limited loss if expectation fail

Straddle

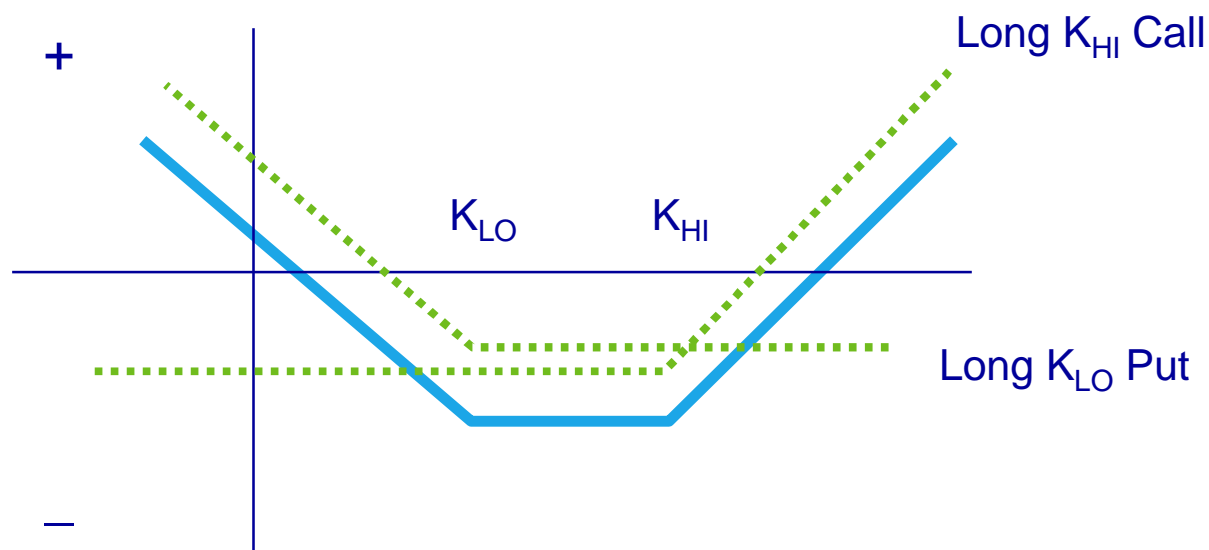
- n Buy one put and one call options at same exercise price



- Expectation : Volatile, but unsure about direction
- Return : Full capture of price rise or fall if expectation correct
- Risk : Limited loss if expectation fail

Strangle

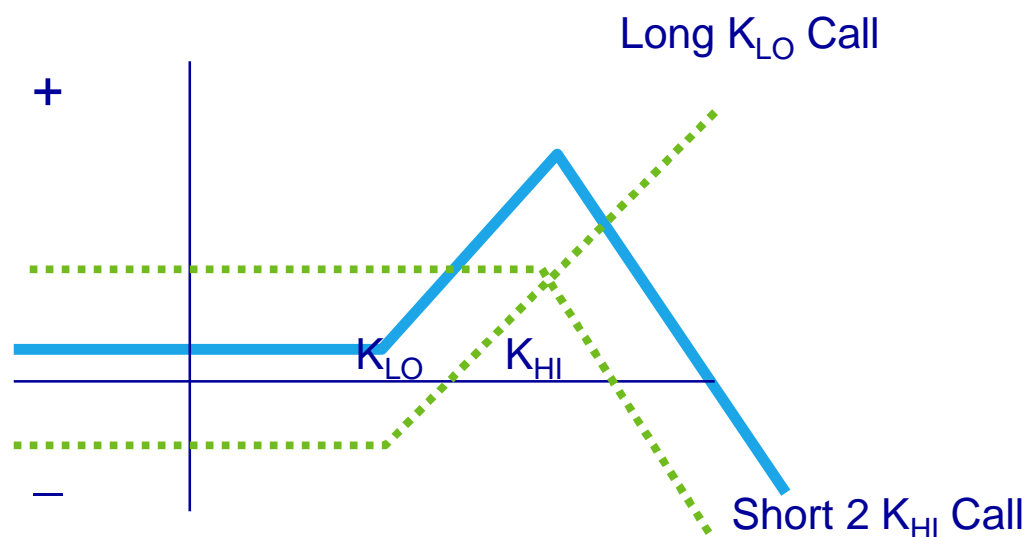
- Buy one call options and buy another one put options at lower exercise price



- Expectation : Very volatile, but unsure about direction
- Return : Full capture of price rise or fall if expectation correct
- Risk : Limited loss if expectation fail

Ratio Bull Call Spread

- Buy one call options and sell another two call options at higher exercise price



- Expectation : Limited uptrend, small chance of downtrend
- Return : Highest for limited uptrend, receive premium if downtrend occur
- Risk : Serve loss if uptrend is directional

Breakeven Point

n Bull Spread

- Bull Call Spread
 - = Exercise price of lower strike call option + Net premium
- Bull Put Spread
 - = Exercise price of higher strike put option - Net premium

n Put Spread

- Bear Put Spread
 - = Exercise price of higher strike put option - Net premium
- Bear Call Spread
 - = Exercise price of lower strike call option + Net premium

Breakeven Point

n Straddle

- Long Straddle
 - = Exercise price of call options + net premium /
 - = Exercise price of put options - net premium
- Short Straddle
 - = Exercise price of call options + net premium /
 - = Exercise price of put options - net premium

n Strangle

- Long Strangle
 - = Exercise price of call options + net premium /
 - = Exercise price of put options - net premium
- Short Strangle
 - = Exercise price of call options + net premium /
 - = Exercise price of put options - net premium

Breakeven Point

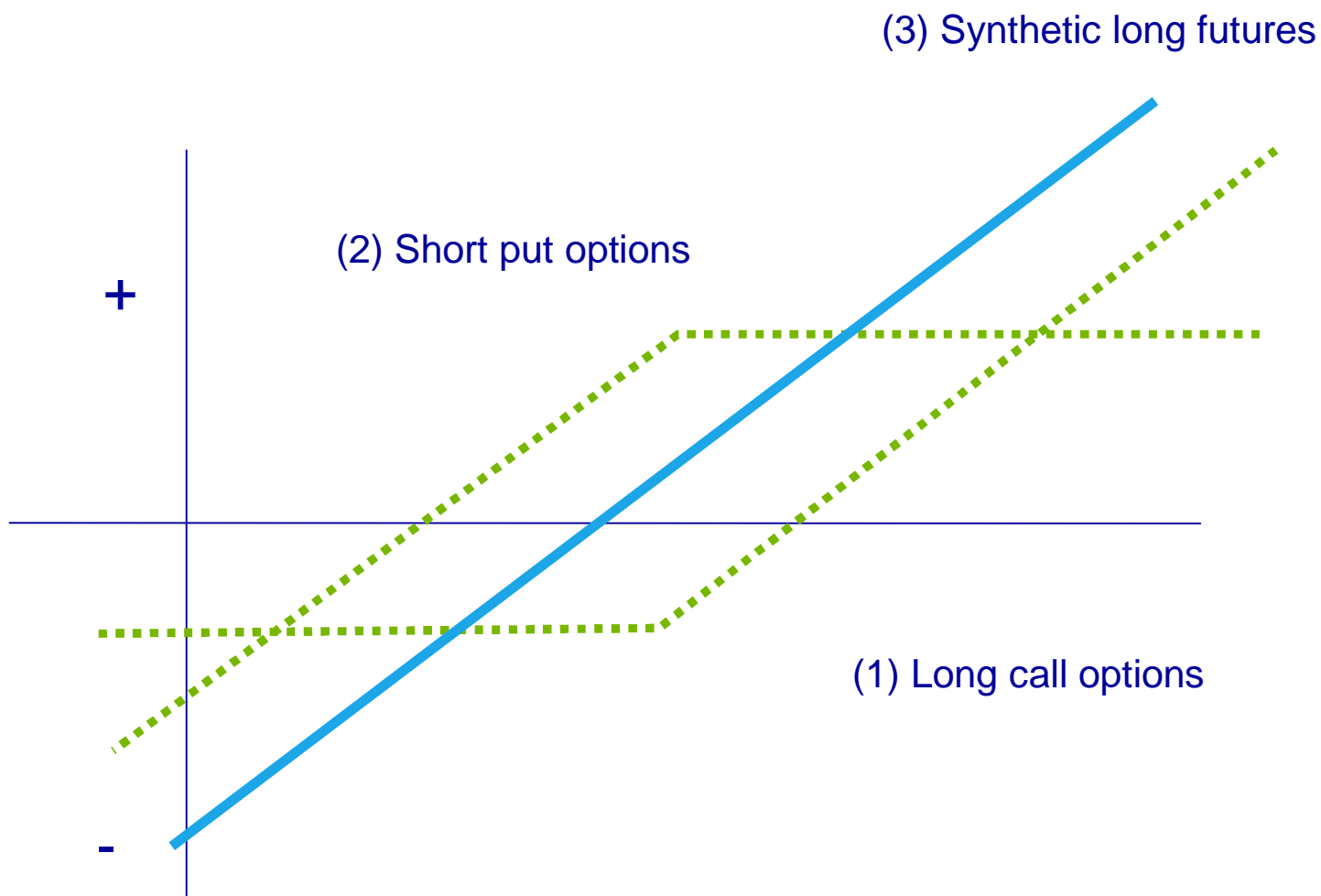
n Ratio Call Spread

= Exercise price of call options short side + difference between exercise price of two options + net premium

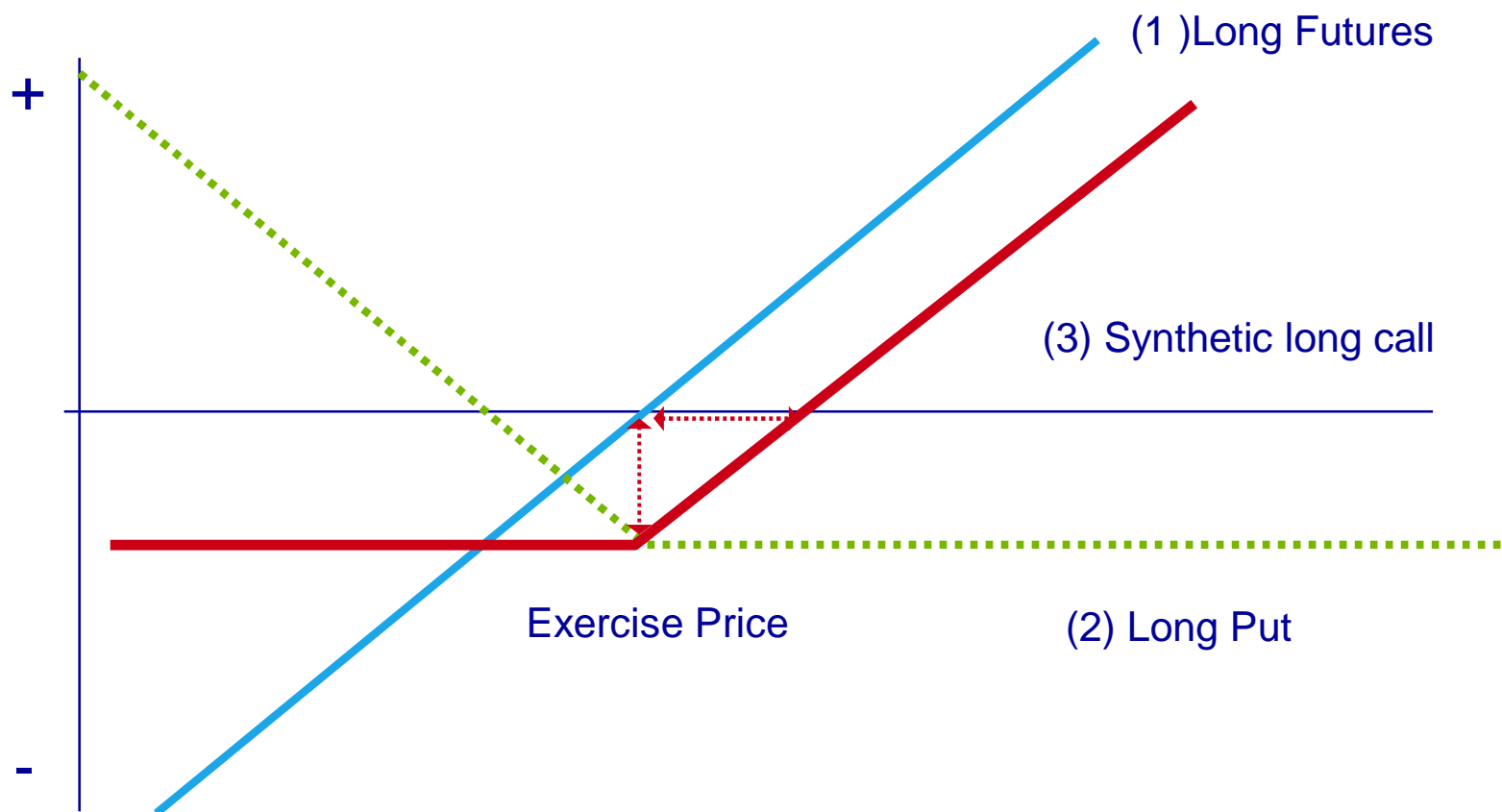
n Ration Put Spread

= Exercise price of put options short side + difference between exercise price of two options - net premium

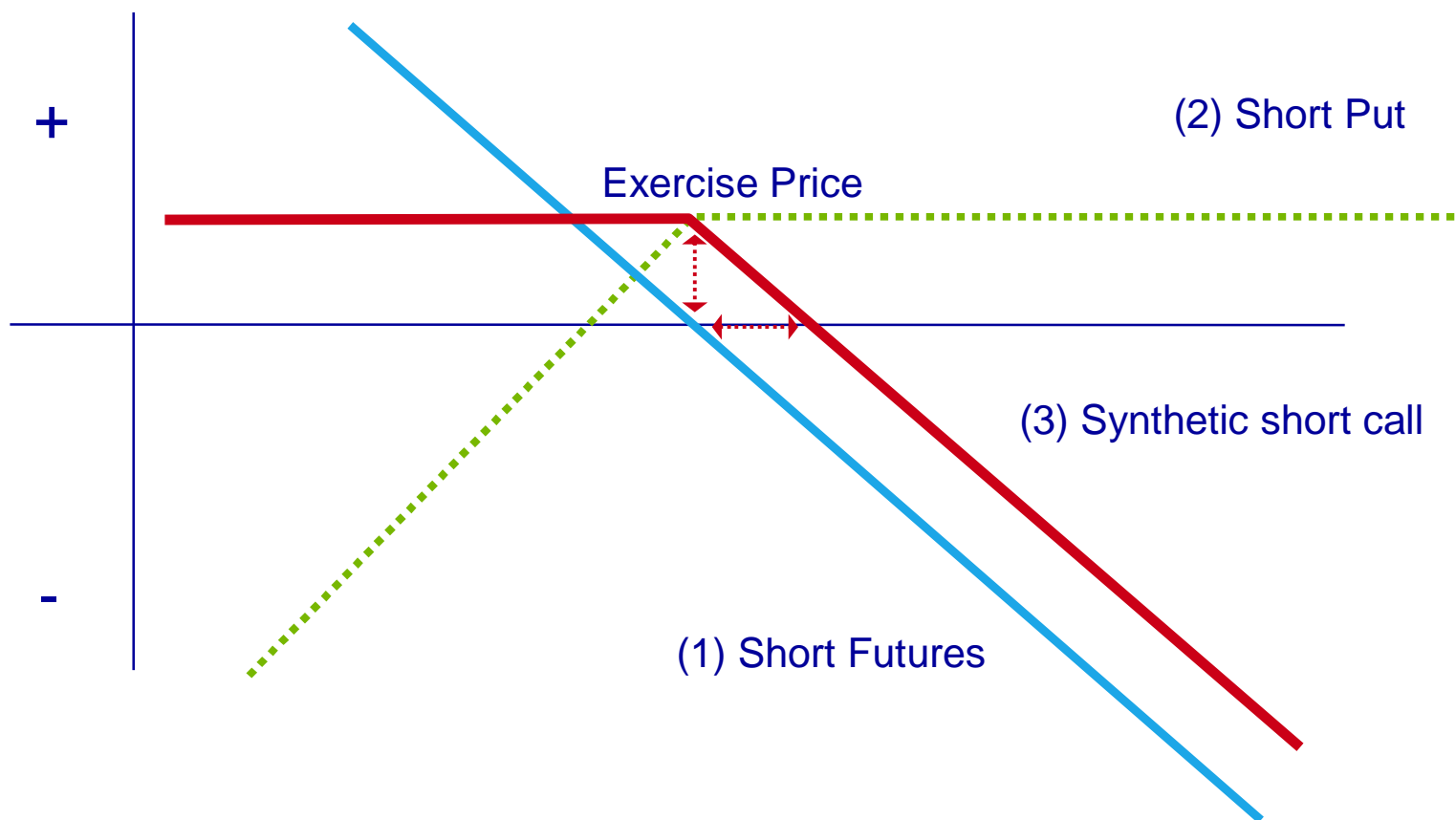
Synthetic Long Futures



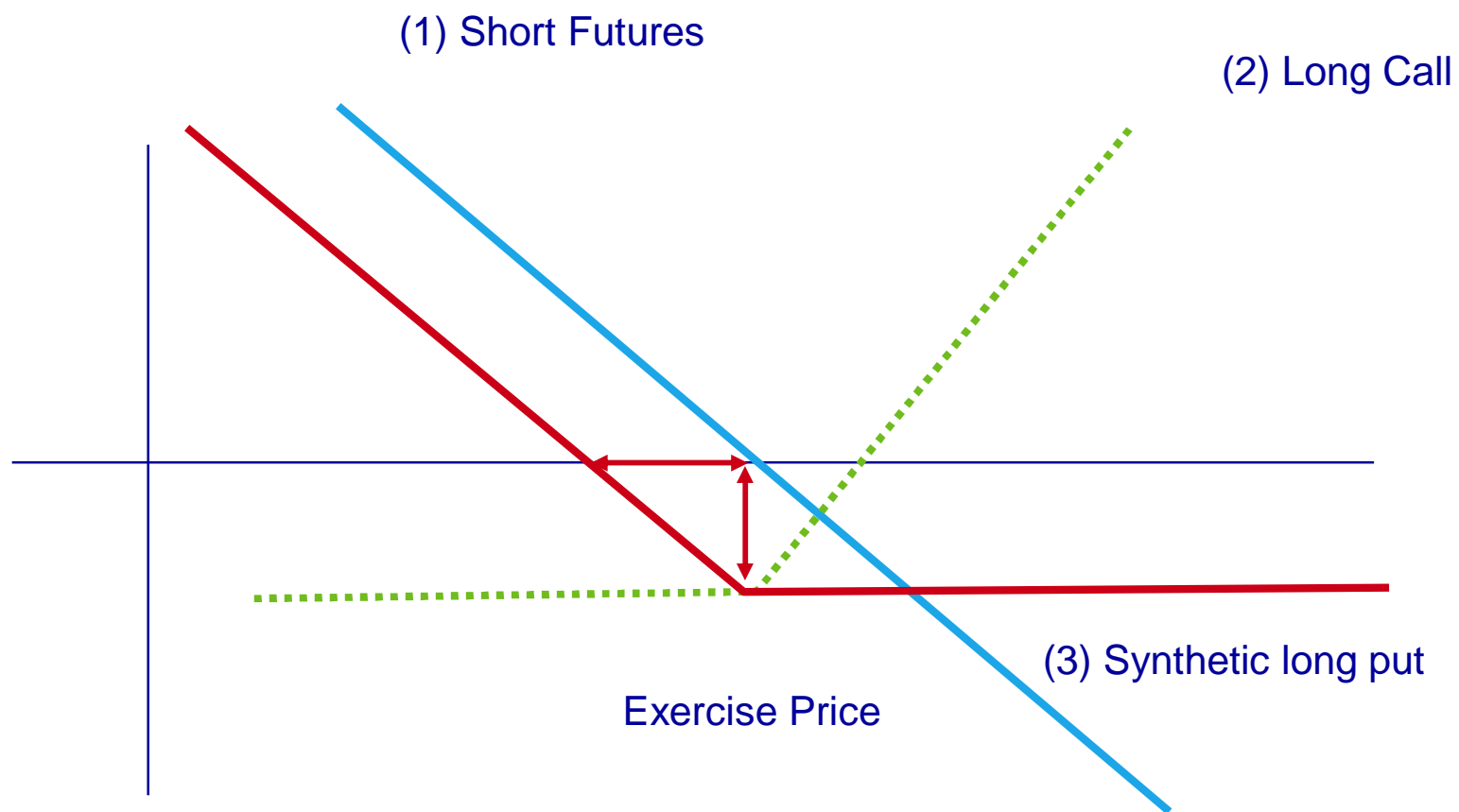
Synthetic Long Call Options



Synthetic Short Call Options



Synthetic Long Put Options



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