Introduction to Options I:
Basic Option Concepts

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Presentation Outline

- Option Terminology

- Payoff Structure of Puts and Calls

- Components of the Option Premium

- Buying Puts to Place a Floor on Sales Price

- Buying Calls to Place a Ceiling on Purchase Price

Option Terminology

- <u>Option</u> – a financial contract that gives the holder the *right,* but not the obligation, to establish a long (buy) or short (sell) position in an *underlying market* at a fixed *strike price.*

- <u>Holder</u> – the individual who owns the right granted by the option.

- <u>Grantor</u> – the individual who provides the right granted by the option.

Option Terminology (continued)

- <u>Put Option</u> – an option that grants the holder the right to establish a *short* (sell) position in the underlying market.

- <u>Call Option</u> – an option that grants the holder the right to establish a *long* (buy) position in the underlying market.

- <u>Strike Price</u> – the price at which the holder receives the long or short position upon *exercise* of the option.

Option Terminology (continued)

- <u>Premium</u> – the price paid by the holder to the grantor for the right contained in the option. Is the only negotiable item in the contract.

- <u>Exercise</u> – when the holder decides to assume the underlying position granted by the option.

- <u>Expiry</u> – date by which the option must be exercised. Otherwise, it expires worthless to the holder.

Option Terminology (continued)

- <u>European Option</u> – option that can only be exercised at expiry.

- <u>American Option</u> – option that can be exercised any time prior to expiry. All U.S. traded commodity options are of this type.

- <u>Underlying Market</u> – holder receives long or short position in this market instrument upon exercise. Could be a futures, security, price index, or physical market.

- <u>Derivative Instrument</u> – a general class of financial instruments whose final payoff is determined by the payoff(s) in another financial instrument. Options are considered a derivative instrument.

Payoff Structure of Put and Call Options

- "In-the-Money" – where exercise and immediate offset of the futures position will result in a profit on the price spread.
  - Puts: Strike Price > Futures Price
  - Calls: Strike Price < Futures Price

- "Out-of-the-Money" – where exercise and immediate offset of the futures position will result in a loss on the price spread.
  - Puts: Strike Price < Futures Price
  - Calls: Strike Price > Futures Price

- "At-the-Money" – where exercise will just result in breaking even on the price spread.
 - Puts and Calls: Strike Price = Futures Price

Offsetting a Purchased Option Position (Holder)

- Sell the same option (underlying, put or call, strike) as was originally purchased.
  - Profit/Loss = Current Premium – Premium Originally Paid

- Exercise the option.
  - Profit if option is "in-the-money" enough to cover original premium paid.

- Let expire worthless.
 - Loss = full amount of original premium paid.

Offsetting a Sold Option Position (Grantor)

- Buy back same option (underlying, put or call, strike) as originally sold.
  - Profit/Loss = Premium Originally Sold – Current Premium

- Assigned exercise by clearinghouse (no control over).
  - Profit if option is out-of-the-money or if option is in-the-money less than original premium received.

- Expire worthless (no control over).
  - Profit = original premium on sold option.

- NOTE THAT THE GRANTOR'S PROFIT/LOSS POSITION IS THE EXACT OPPOSITE OF THE HOLDER'S. THIS IS INDICATIVE OF THE ZERO-SUM NATURE OF THE OPTION MARKET.

Profit/Loss Diagram for Call Option
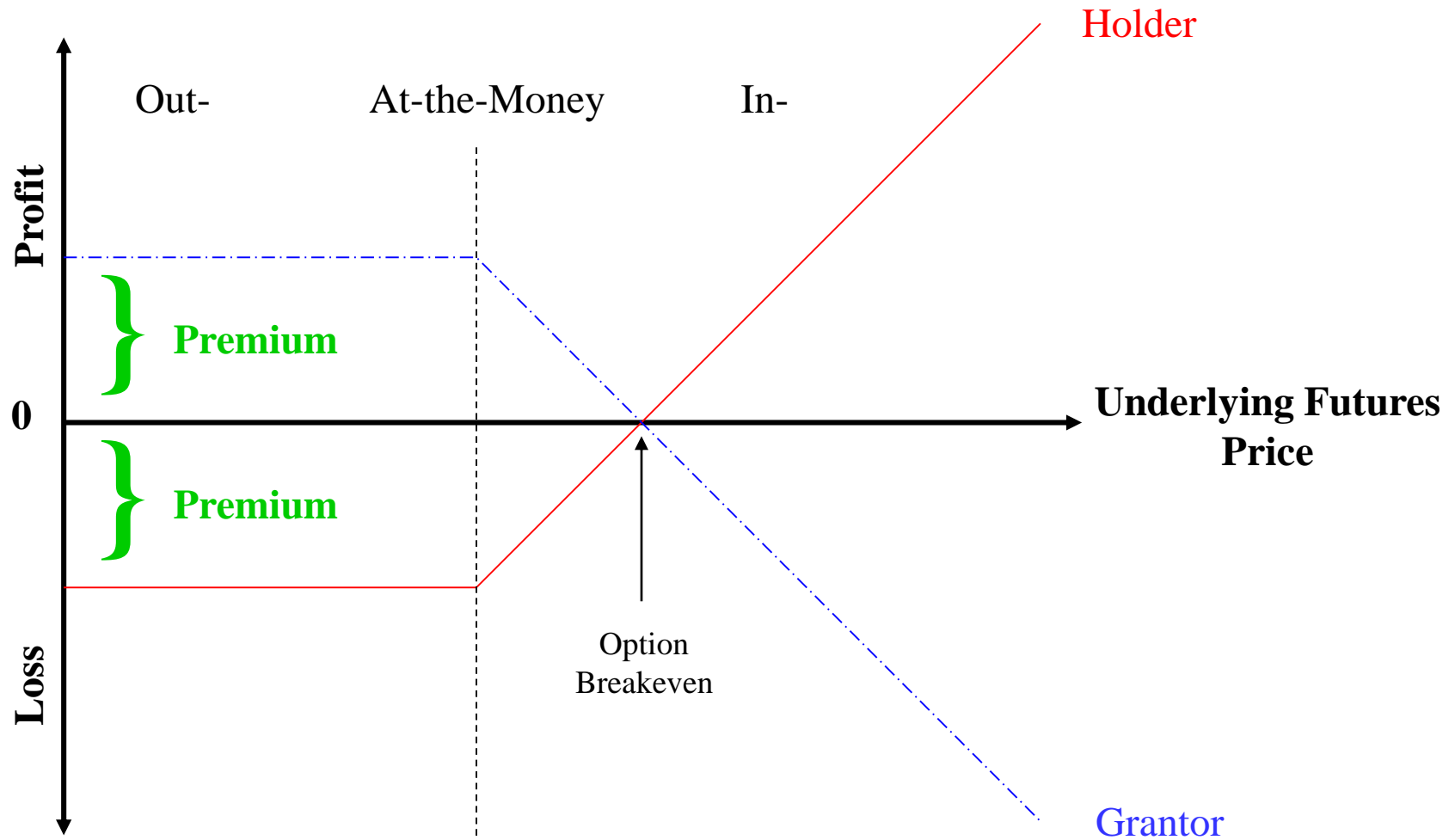
Profit/Loss Diagram for Put Option

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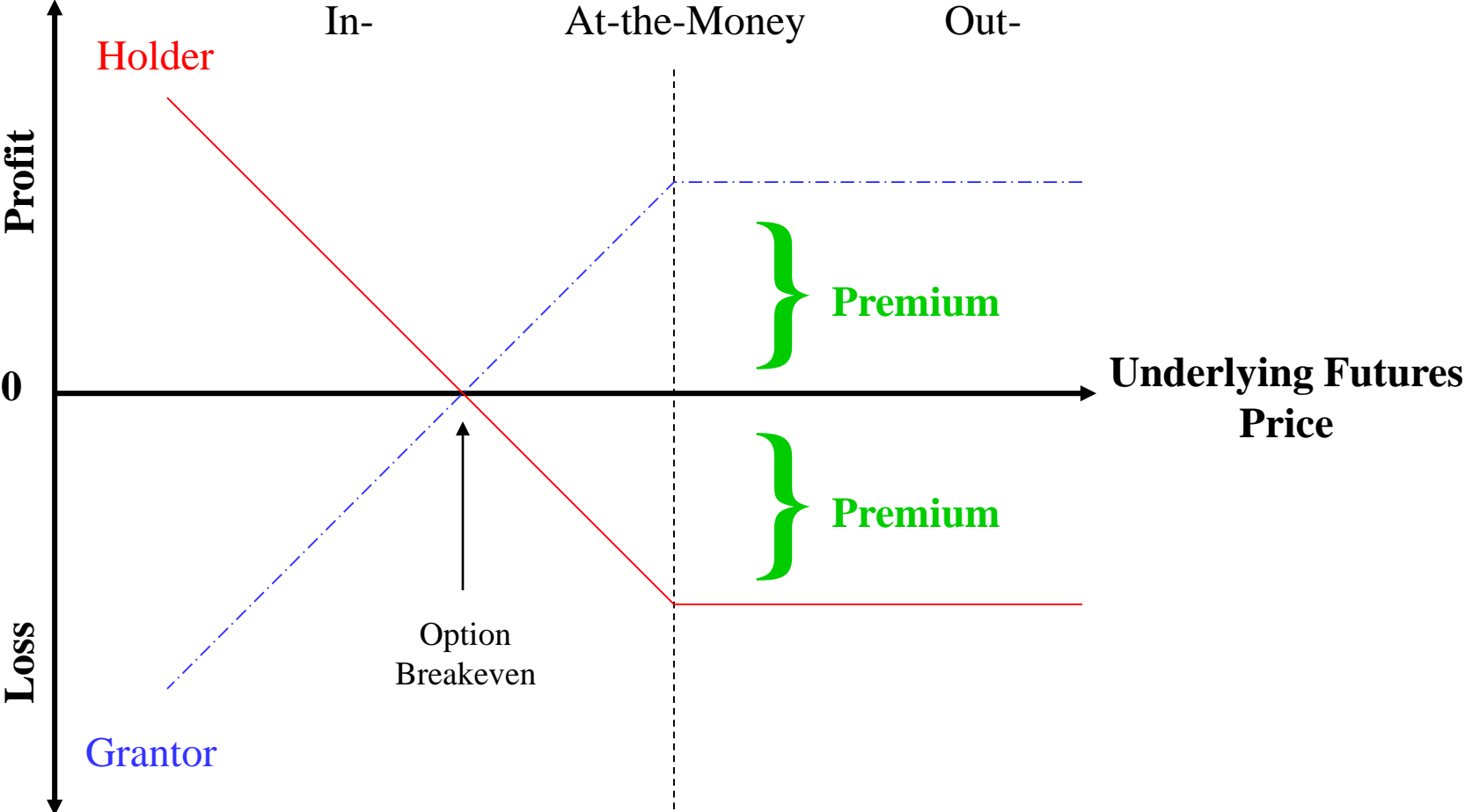
Components of Option Premium
Two Main Categories

- <u>Intrinsic Value</u> – is equal to difference between strike and futures if option is in-the-money, and zero otherwise. Is the *current exercise* value of the option.

- <u>Insurance (Time) Value</u> – is the value required by the grantor to compensate for the added risks of writing an option contract. There are three market factors that affect time value, they are:
  - <u>Underlying Price Volatility</u> – the more volatile the underlying market, the greater the premium demanded.
  - <u>Time Until Expiry</u> – the more time remaining until expiry, the greater the premium demanded.
  - <u>Risk-Free Interest Rate</u> – converts future value of option payoff into a present value. The higher the rate, the lower the premium.

Premium Breakdown
March 8, 2021 CME May Soybean Options

Strikes	Calls Price	Calls Change	Puts Price	Puts Change
13300	112' 5s	2' 0	8' 7s	-1' 6
13400	104' 2s	1' 5	10' 4s	-2' 1
13500	96' 3s	1' 4	12' 5s	-2' 2
13600	88' 6s	1' 1	15' 0s	-2' 5
13700	81' 5s	0' 6	17' 7s	-3' 0
13800	75' 0s	0' 4	21' 2s	-3' 2
13900	68' 6s	0' 2	25' 0s	-3' 4
14000	62' 7s	-0' 1	29' 1s	-3' 7
14100	57' 4s	-0' 3	33' 6s	-4' 1
14200	52' 6s	-0' 4	39' 0s	-4' 2
14300	48' 2s	-0' 5	44' 4s	-4' 3
14400	44' 0s	-0' 5	50' 2s	-4' 3
14500	40' 0s	-1' 0	56' 2s	-4' 6
14600	36' 3s	-1' 0	62' 5s	-4' 6
14700	33' 2s	-0' 7	69' 4s	-4' 5
14800	30' 1s	-1' 0	76' 3s	-4' 6
14900	27' 2s	-1' 1	83' 4s	-4' 7
15000	24' 6s	-1' 0	91' 0s	-4' 6
15100	22' 3s	-1' 0	98' 5s	-4' 6
15200	20' 1s	-1' 1	106' 3s	-4' 7
15300	18' 1s	-1' 1	114' 3s	-4' 7

Futures Price = $14.3375

Strike	Calls Premium	Calls Intrinsic	Calls Time	Puts Premium	Puts Intrinsic	Puts Time
$14.1000	$ 0.5750	$ 0.2375	$ 0.3375	$ 0.3375	$ -	$ 0.3375
$14.2000	$ 0.5275	$ 0.1375	$ 0.3900	$ 0.3900	$ -	$ 0.3900
$14.3000	$ 0.4825	$ 0.0375	$ 0.4450	$ 0.4450	$ -	$ 0.4450
$14.4000	$ 0.4400	$ -	$ 0.4400	$ 0.5025	$ 0.0625	$ 0.4400
$14.5000	$ 0.4000	$ -	$ 0.4000	$ 0.5625	$ 0.1625	$ 0.4000

Hedging with Options
Options versus Futures

- Futures contracts are a *forward pricing* mechanism. With a hedge, the futures component of the cash price is fixed and the only variability is in the basis (cash – futures spread).

- Option contracts are a *price insurance* mechanism. Hedgers pay a premium to place a floor (puts) on a sale price or a ceiling (calls) on a purchase price.

- Grantors of options are essentially providers of price insurance. They receive the premium, and in exchange, must pay out any indemnities (intrinsic value) on the contract.

- Since the option holder's risk is limited to the premium, they do <u>not</u> need to post margin on their position nor have their position marked-to-market daily.

- Since the option grantor's risk is not capped by the premium, they have to post margin and have their positions marked-to-market.

Choosing a Strike Price for an Option Hedge

- Choosing a strike price for an option hedge is similar to choosing a deductible on an insurance policy:
  - At-the-Money → zero deductible.
  - More Out-of-the-Money → Greater Deductible
  - More In-the-Money → Inverse Deductible (over-insured)

- Just like with regular insurance, the greater the deductible, the lower the coverage level, and the lower the premium required.

- There is a tradeoff between level of coverage and the cost of the insurance.

Role of Basis and Hedge Costs

- Since an option is a derivative instrument, it inherits the standardized characteristics of the underlying futures contract market. Therefore, there is basis risk with option hedging.

- Basis on option and futures hedges is the same.

- Hedge costs for option hedges are composed of:
  - Brokerage Fee → is usually less than futures.
  - Interest Cost → on margin deposit if selling options, on premium if financing purchase of option.

Buying Puts to Place Floor on Sale Price

P/L

Buy OTM Put

OTM   ATM

Long Cash

Floor Hedge

0

Settlement
Price
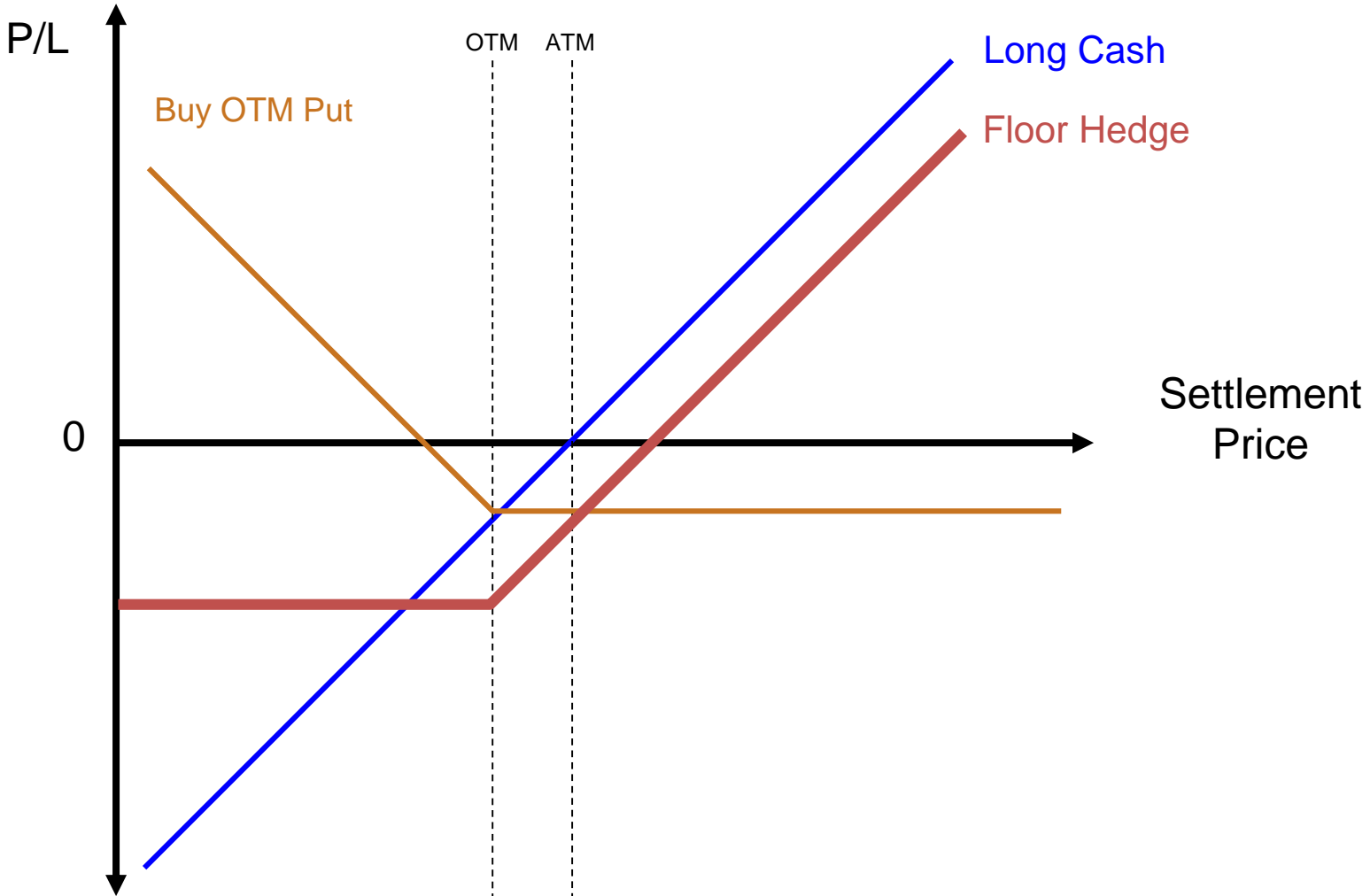
Calculating the Floor Price on a Put Option Purchase

- The *expected floor price* (EFP) is the minimum sale price given a basis forecast. It is established by purchasing put options against the long cash position.

- The formula for EFP is:

$$EFP = Strike\ Price + Basis\ Forecast - Put\ Premium - Hedge\ Cost$$

Put Hedge Example

- On March 8 2021, a ND soybean producer would like to examine his hedging options for new crop soybeans.

- The crop is expected to be harvested by October 15, 2021.

- Underlying futures is CME November 2021 soybeans.

- Price Information:
  - Futures = $12.54 / bushel
  - Basis Forecast = -$1.25 / bushel
  - Brokerage = $70 / contract = $0.01 / bushel
  - Other Hedging Costs = zero

Put Hedge Example (cont)

Strike Price	Put Option Premium
$12.20	$0.7650
$12.40	$0.8750
$12.60	$0.9938
$12.80	$1.1163
$13.00	$1.2475

Put Hedge Example (cont)

- If producer uses short futures hedge:
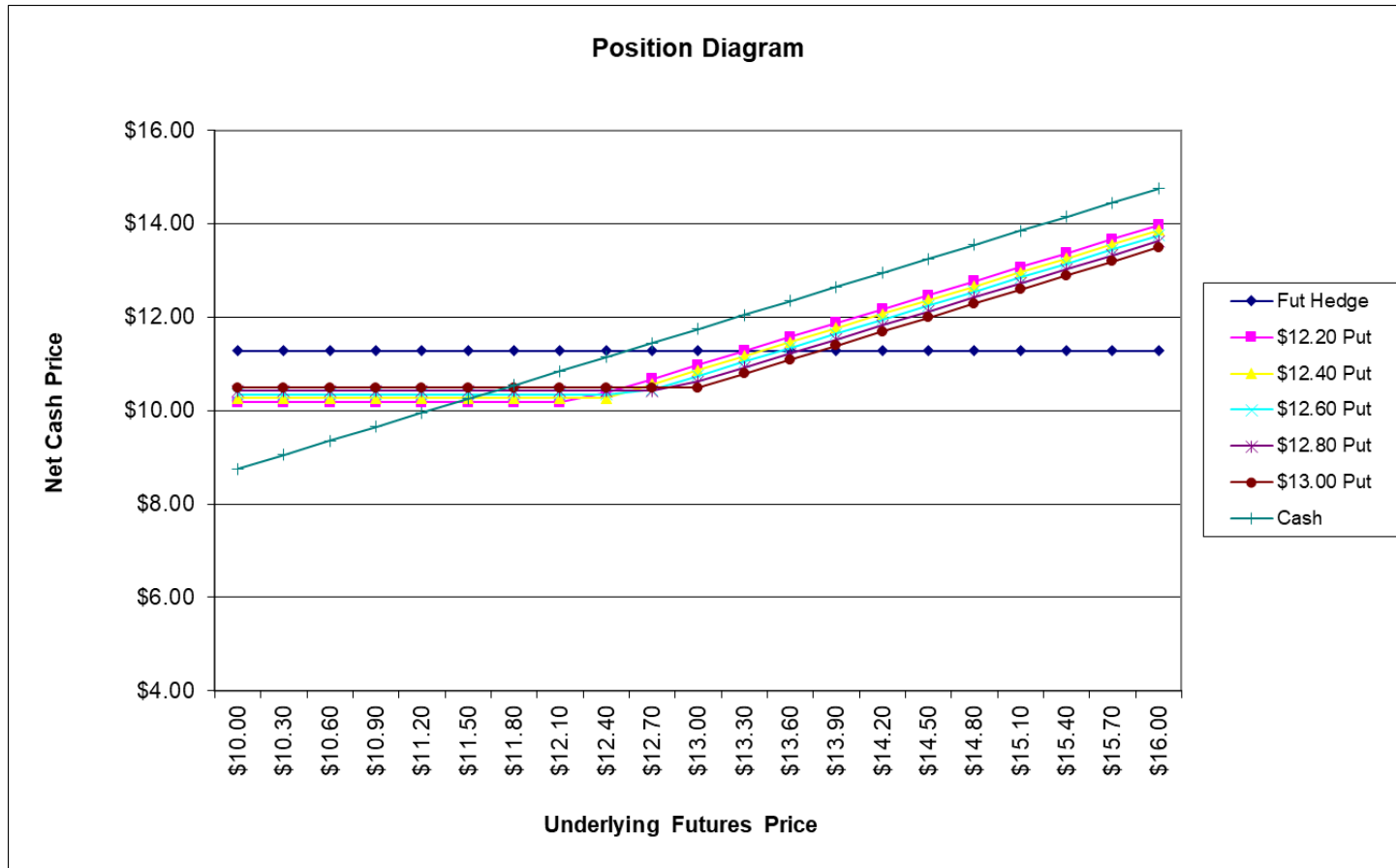
  Futures Hedge Expected Sale Price:

$ 12.5400	+	$ (1.25)	-	$ 0.010	=	**$ 11.2800**	per bushel
Futures		Basis		Hdg Cost			

- If producer uses put option hedge (results by strike price):

  Put Option Expected Floor Prices

Strike	+	Basis	-	Premium	-	Cost	=	Floor
$ 12.20		$ (1.25)		$ 0.7650		$ 0.010		$ 10.1750
$ 12.40		$ (1.25)		$ 0.8750		$ 0.010		$ 10.2650
$ 12.60		$ (1.25)		$ 0.9938		$ 0.010		$ 10.3462
$ 12.80		$ (1.25)		$ 1.1163		$ 0.010		$ 10.4237
$ 13.00		$ (1.25)		$ 1.2475		$ 0.010		$ 10.4925

Put Hedge Example (cont)

Position Diagram

Legend: Fut Hedge, $12.20 Put, $12.40 Put, $12.60 Put, $12.80 Put, $13.00 Put, Cash

Y-axis: Net Cash Price
X-axis: Underlying Futures Price

Buying Calls to Place Ceiling on Purchase Price
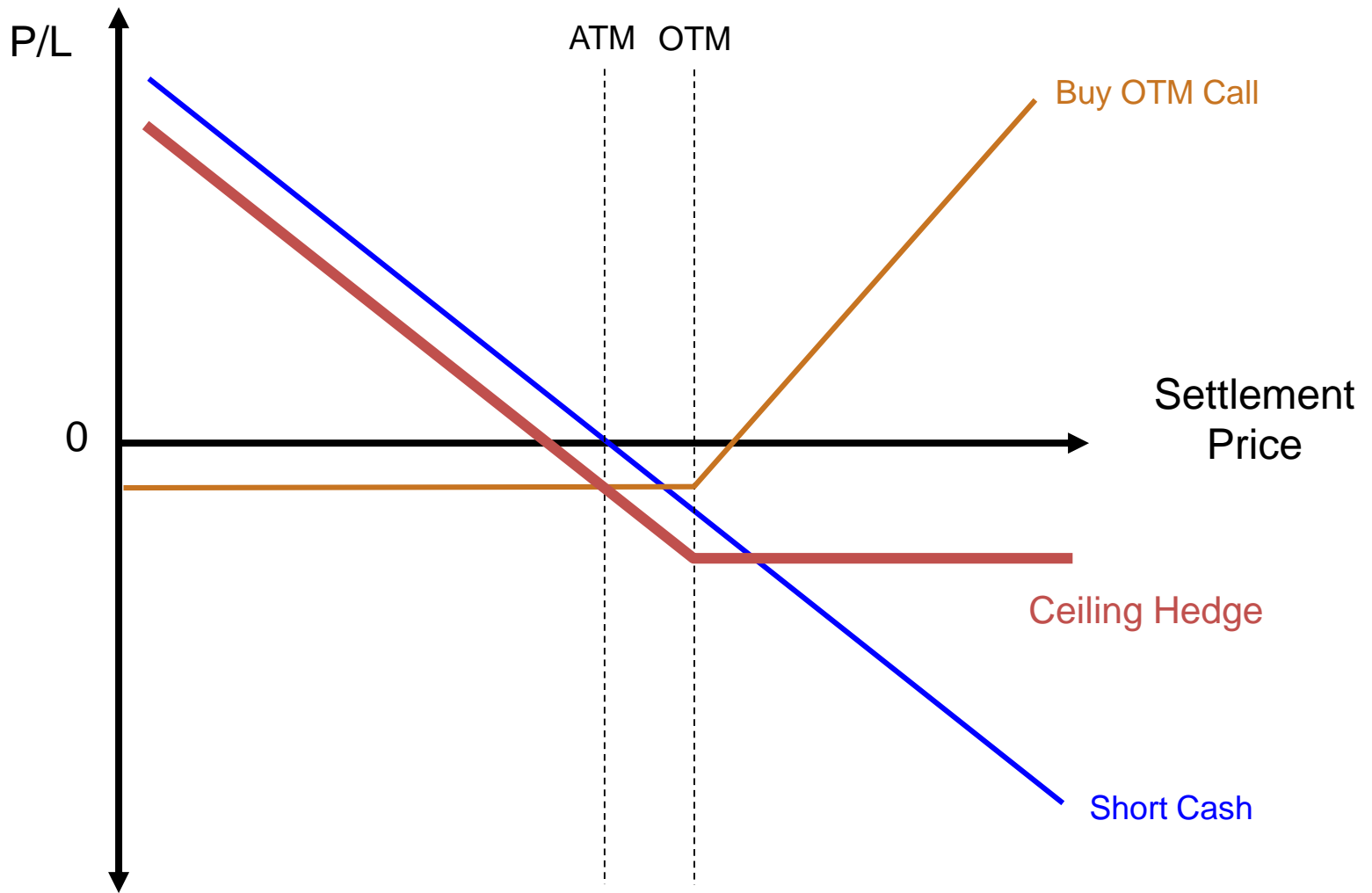
Calculating the Ceiling Price on a Call Option Purchase

- The *expected ceiling price* (ECP) is the maximum purchase price given a basis forecast. It is established by purchasing call options against the short cash position.

- The formula for ECP is:

$$ECP = Strike\ Price + Basis\ Forecast +$$
$$Call\ Premium + Hedge\ Cost$$

Call Hedge Example

- On March 8 2021, an importer of U.S. soybeans has uncovered forward sale commitments for delivery at the PNW at the middle of the next month (April 15th).

- Underlying futures is CBOT May 2021 soybeans.

- Price Information:
  - Futures = $14.3375 / bushel
  - Basis = -$0.25 / bushel
  - Brokerage = $50 / contract = $0.01 / bushel
  - Other Hedging Costs = zero

Call Hedge Example (cont)

Strike Price	Call Option Premium
$13.90	$0.6875
$14.10	$0.5750
$14.30	$0.4825
$14.50	$0.4000
$14.70	$0.3325

Call Hedge Example (cont)

- If importer uses long futures hedge only:

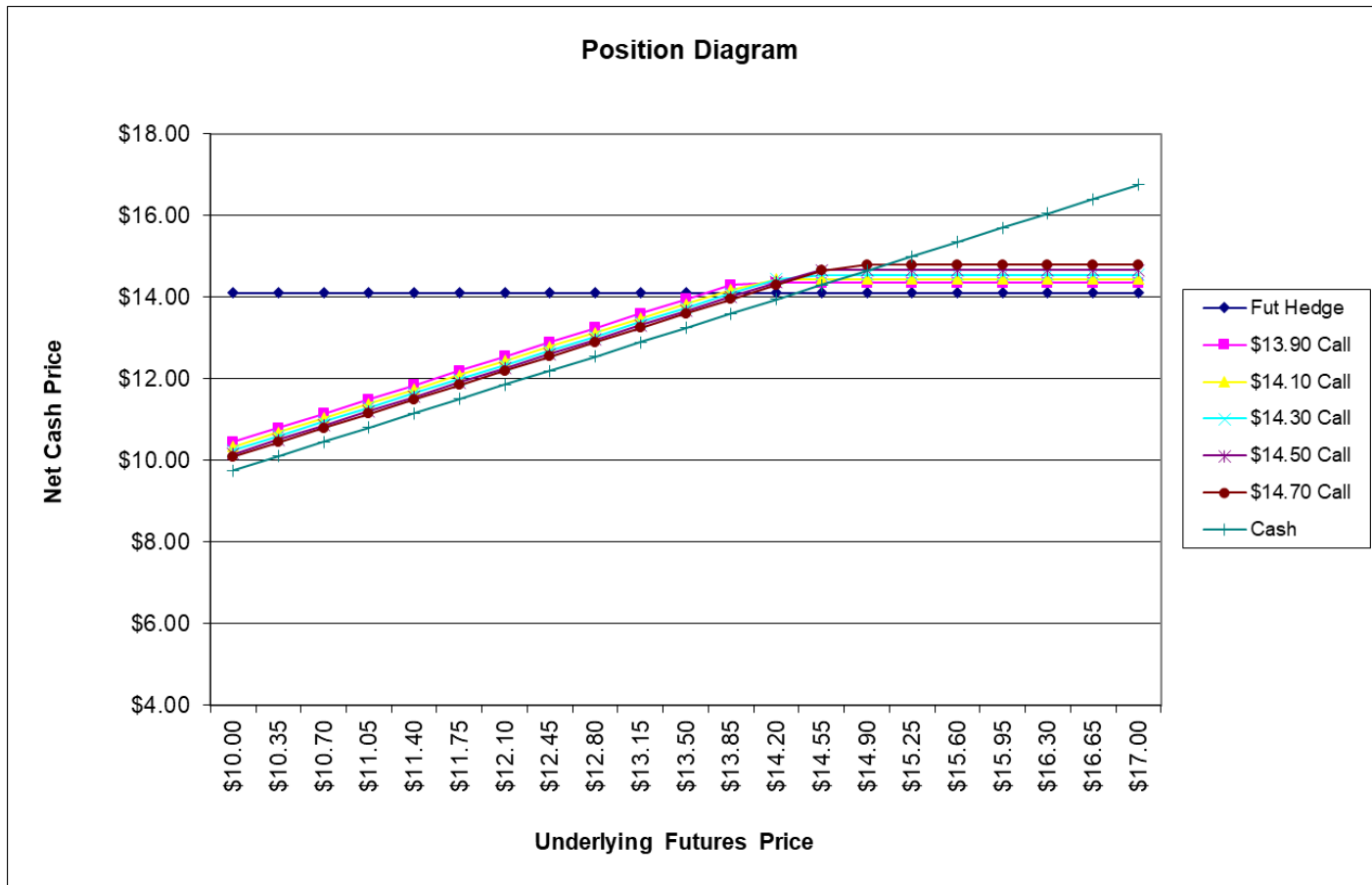 **Futures Hedge Expected Purchase Price:**

$ 14.3375	+	$ (0.2500)	+	$ 0.0100	=	**$14.0975**	per bushel
Futures		Basis		Hdg Cost			

- If importer uses call option hedge (results by strike price chosen):

  Call Option Expected Ceiling Prices

Strike	+	Basis	+	Premium	+	Cost	=	Ceiling
$ 13.9000		$ (0.2500)		$ 0.6875		$ 0.0100		**$ 14.3475**
$ 14.1000		$ (0.2500)		$ 0.5750		$ 0.0100		**$ 14.4350**
$ 14.3000		$ (0.2500)		$ 0.4825		$ 0.0100		**$ 14.5425**
$ 14.5000		$ (0.2500)		$ 0.4000		$ 0.0100		**$ 14.6600**
$ 14.7000		$ (0.2500)		$ 0.3325		$ 0.0100		**$ 14.7925**

Call Hedge Example (cont)

Conclusion

Thank You