



April 14, 2022

OCC

Put/Call Parity, Synthetics, and the Effect of Interest Rates on Options Prices

Mathew Cashman

Principal, OCC Investor
Education
OCC

Exchange and Industry Sponsored Webinars are presented by unaffiliated third parties. Interactive Brokers LLC is not responsible for the content of these presentations. You should review the contents of each presentation and make your own judgment as to whether the content is appropriate for you.

Interactive Brokers LLC does not provide recommendations or advice. This presentation is not an advertisement or solicitation for new customers. It is intended only as an educational presentation.



Disclosure:

Options involve risk and are not suitable for all investors. For information on the uses and risks of options, you can obtain a copy of the Options Clearing Corporation risk disclosure document titled [Characteristics and Risks of Standardized Options](#) by calling (312) 542-6901.

Futures are not suitable for all investors. The amount you may lose may be greater than your initial investment. Before trading futures, please read the [CFTC Risk Disclosure](#). For a copy visit interactivebrokers.com.

There is a substantial risk of loss in foreign exchange trading. The settlement date of foreign exchange trades can vary due to time zone differences and bank holidays. When trading across foreign exchange markets, this may necessitate borrowing funds to settle foreign exchange trades. The interest rate on borrowed funds must be considered when computing the cost of trades across multiple markets.

The Order types available through Interactive Brokers LLC's Trader Workstation are designed to help you limit your loss and/or lock in a profit. Market conditions and other factors may affect execution. In general, orders guarantee a fill or guarantee a price, but not both. In extreme market conditions, an order may either be executed at a different price than anticipated or may not be filled in the marketplace.

There is a substantial risk of loss in trading futures and options. Past performance is not indicative of future results.

Any stock, options or futures symbols displayed are for illustrative purposes only and are not intended to portray recommendations.

- IRS Circular 230 Notice: These statements are provided for information purposes only, are not intended to constitute tax advice which may be relied upon to avoid penalties under any federal, state, local or other tax statutes or regulations, and do not resolve any tax issues in your favor.
- Interactive Brokers LLC is a member of [NYSE](#) [FINRA](#) [SIPC](#)

Put / Call Parity and Synthetics

Mat Cashman

Principal / Investor Education / OCC

Instructor / The Options Industry Council (OIC)



Disclaimer

Options involve risks and are not suitable for everyone. Individuals should not enter into options transactions until they have read and understood the risk disclosure document, Characteristics and Risks of Standardized Options, available by visiting OptionsEducation.org or by contacting your broker, any exchange on which options are traded, or The Options Clearing Corporation at 125 S. Franklin St., #1200, Chicago, IL 60606.

In order to simplify the calculations used in the examples in these materials, commissions, fees, margin, interest and taxes have not been included. These costs will impact the outcome of any stock and options transactions and must be considered prior to entering into any transactions. Investors should consult their tax advisor about any potential tax consequences.

Any strategies discussed, including examples using actual securities and price data, are strictly for illustrative and educational purposes and should not be construed as an endorsement, recommendation, or solicitation to buy or sell securities. Past performance is not a guarantee of future results.

All content in this document is owned, or licensed, by The Options Clearing Corporation ('OCC'). Unauthorized use is prohibited without written permission of OCC. While reasonable efforts have been made to ensure that the contents of this document are accurate, the document is provided strictly "as is", and no warranties of accuracy are given concerning the contents of the information contained in this document, including any warranty that the document will be kept up to date. OCC reserves the right to change details in this document without notice. To the extent permitted by law no liability (including liability to any person by reason of negligence) will be accepted by OCC or its employees for any direct or indirect loss or damage caused by omissions from or inaccuracies in this document.

Trademarks

The following trademarks, logos, and service marks displayed are owned by The Options Clearing Corporation:

OCC®



Presentation Outline

- Cost of carry
- The definition of parity
- Arbitrage
- Parity in theory – and in practice
- Synthetic Stocks, synthetic calls, and synthetic puts



Cost of Carry



Option Pricing Models

Mathematical formulas that can be a useful tool in establishing a trading plan

- **Option Pricing Model Inputs**
 - Stock price
 - Strike price
 - DTE (Days to Expiration)
 - Implied Volatility
 - Cost of money (interest rates less dividends)
- **Option Pricing Model Outputs**
 - Call and put premiums (theoretical values)



In addition to pricing factors there is the always unpredictable ***supply and demand***

Cost of Carry

- Cost of carry is the cost of holding a particular position over a given period
- Cost of carry affects all types of options strategies and asset classes
- Difference between the spot price (today) and the future price
- Factors to consider
 - Risk-free interest rate
 - Dividends
 - Borrowing Rate

Change	Call Premium Change	Put Premium Change
Interest ↑	Calls ↑	Puts ↓
Interest ↓	Calls ↓	Puts ↑
Dividend ↑	Calls ↓	Puts ↑
Dividend ↓	Calls ↑	Puts ↓
HTB ↑	Calls ↓	Puts ↑
HTB ↓	Call ↑	Puts ↓

Rho – A definition

P Rho: Option value's sensitivity to interest rates

Expected change in option value

- With a 1%-point change in the risk-free interest rate
- Expressed in decimal form (.080)
- Represents cash amount per option
- All other pricing factors constant

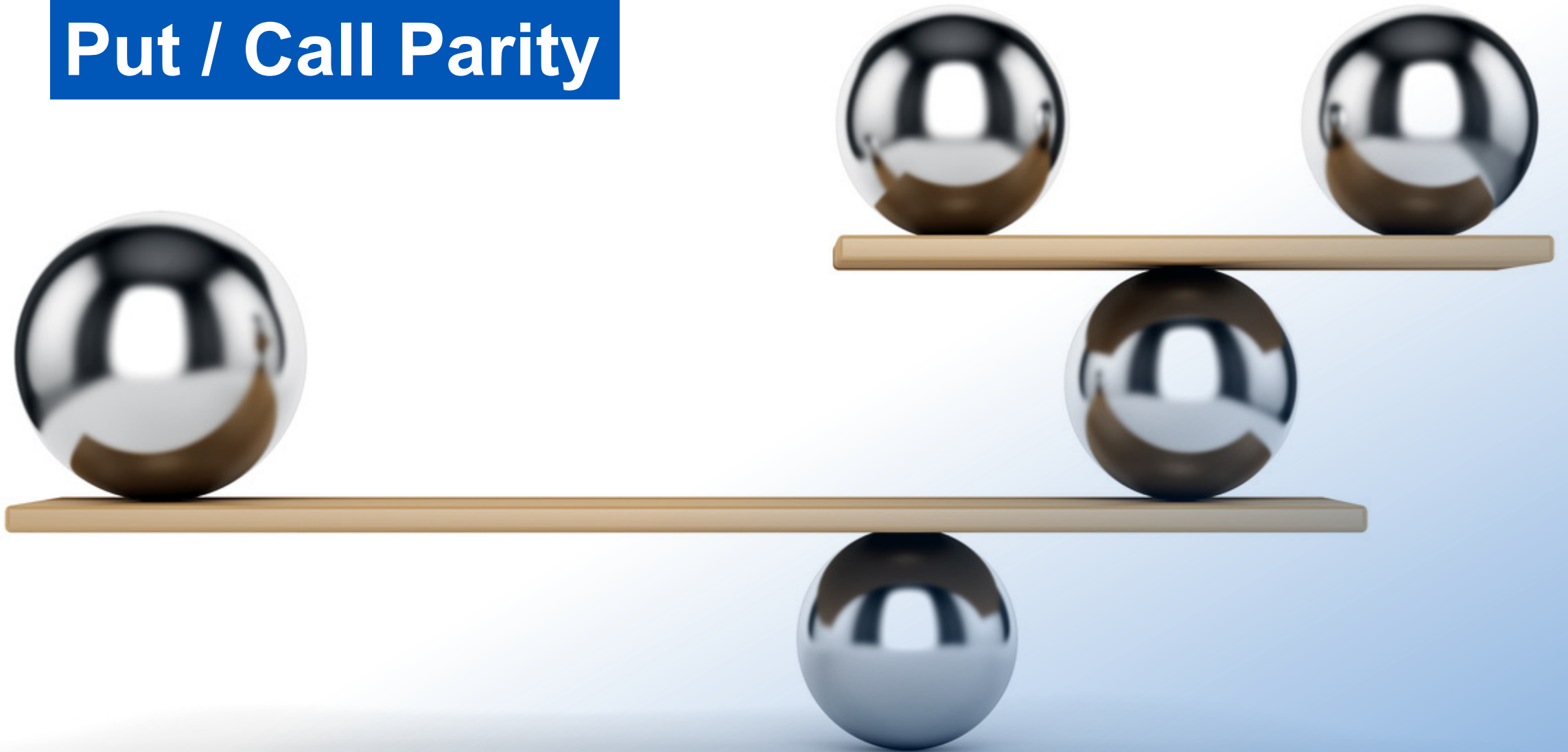
Considered the least significant of all pricing factors

- Component of “cost of carry”—time/LEAPS
- Small portion of any option's total premium

P

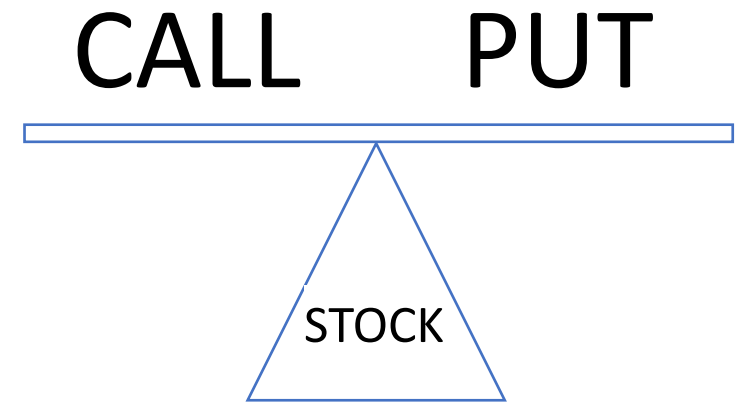
Rho

Put / Call Parity



Put / Call Parity

- **Put / Call Parity** is a concept that describes the relationship between call and put prices that share a strike price and expiration
 - Knowing value of call can imply value of put, and vice versa
- Holds prices of various financial instruments (incl. options) in check
 - Tighter bid/ask spreads
 - Minimal pricing irregularities



Put / Call Parity

Pricing irregularities lead to **arbitrage** opportunities

Opportunity to profit from price differences in identical or similar instruments in different markets

- Buy an apple in Market A for \$1 and sell in Market B for \$1.50
- Result is demand in Market A increases (increases price) and supply in Market B increases (decreases price) until equilibrium is reached and arbitrage opportunity disappears

Most opportunities for arbitrage in today's markets disappear in microseconds with HFT (high frequency trading) algorithms

Put / Call Parity Example 1

Stock trading for \$49

50 strike call trading \$1.00

50 strike put trading \$2.00

Investor can buy call (long deltas) and sell put (long deltas) for \$1.00 credit

- If assigned on short put, investor is long shares from \$49 (50 strike minus \$1 credit)
- If exercise long call, investor is long shares from \$49 (50 strike minus \$1 credit)

Put / Call Parity Example 2

Stock trading for \$49.50

50 strike call trading \$1.00

50 strike put trading \$2.00

Investor can buy call (long deltas) and sell put (long deltas) for \$1.00 credit

- If assigned on short put, investor is long shares from \$49 (lock in \$.50 profit)
- If exercise long call, investor is long shares from \$49 (lock in \$.50 profit)

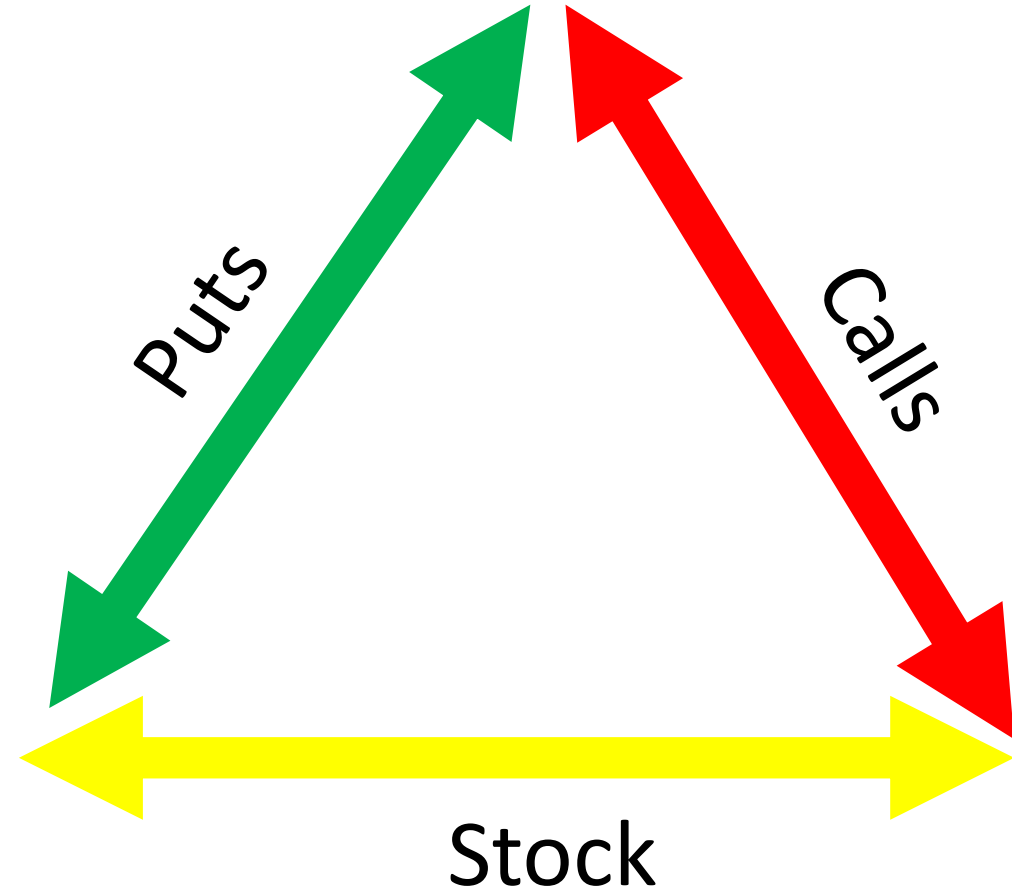
The above scenario would likely cause call prices to rise and/or puts to drop thus eliminating arbitrage and restoring equilibrium

Synthetics



Put / Call Parity

Synthetics: It's possible to recreate the P/L and risk profile of an option using a combination of other options and/or stock



Conversion / Reverse Conversion

Conversion

A Conversion is the purchase of stock combined with an equivalent short stock synthetic (long put + short call) position.

Example: Long 100 shares @ \$50
Long 1 Dec 50 put + short 1 Dec 50 call

Risk Factors:

Hike in interest rates and the decrease or elimination of dividends.

Reverse Conversion

A Reverse Conversion is the sale of stock combined with an equivalent long stock synthetic (long call + short put) position.

Example: Short 100 shares @ \$50
Long 1 XYZ Dec 50 call + short 1 Dec 50 put

Risk Factors:

Decrease in interest rates and the addition or increase of dividends.

Synthetics

Long stock = 100 deltas
Long calls have + deltas
Long puts have - deltas

Original Position		Synthetic Position		
Long Stock	=	Long Call	+	Short Put
Short Stock	=	Short Call	+	Long Put
Long Call	=	Long Stock	+	Long Put
Short Call	=	Short Stock	+	Short Put
Long Put	=	Short Stock	+	Long Call
Short Put	=	Long Stock	+	Short Call

Put Call Parity

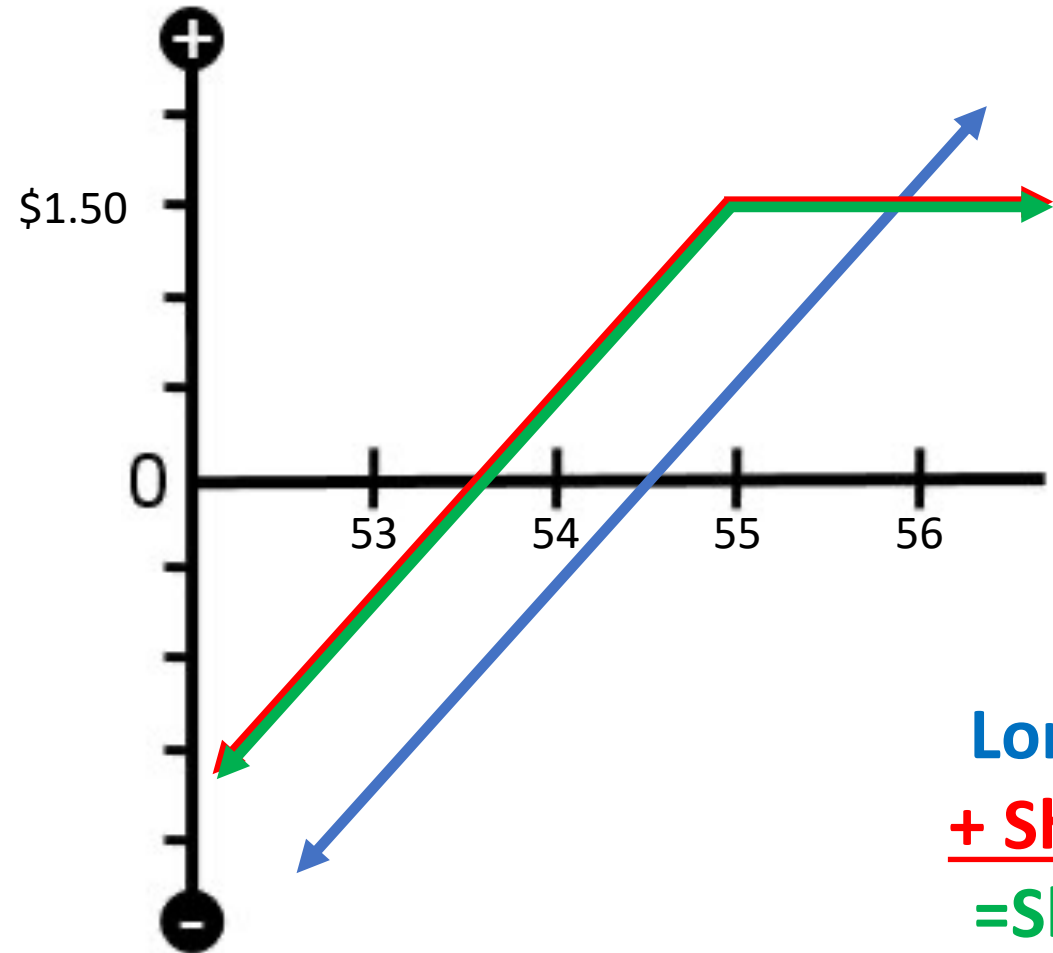
Covered Call = Synthetic Short Put

Long Stock: \$54.50

Long Stock + Short 55 Call
for \$1.00

Short 55 put at \$1.50

Identical Risk Profiles of Covered
Call and Short Put



Long Stock
+ Short Call
= Short Put

Put Call Parity

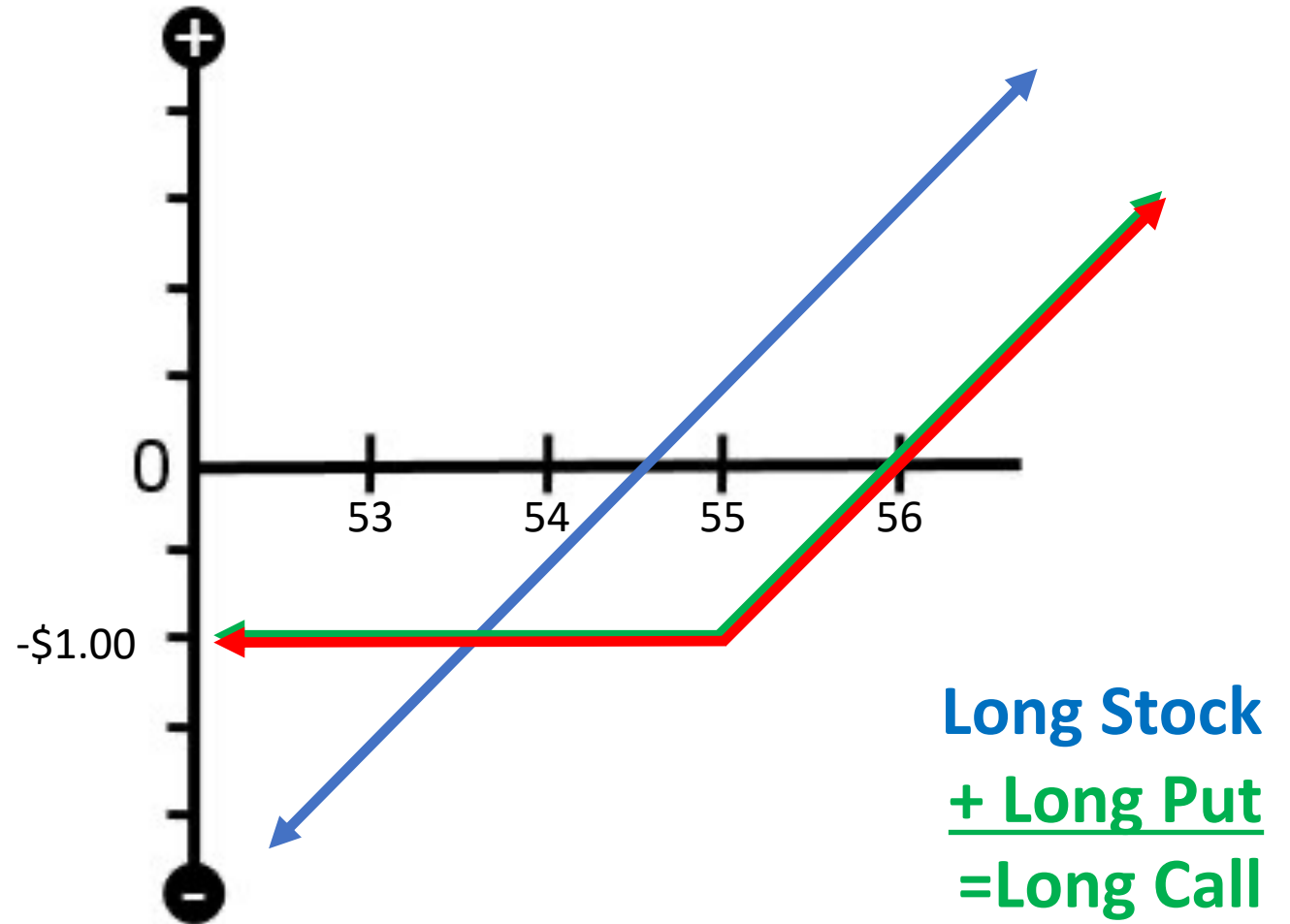
Married Put = Synthetic Long Call

Long Stock: \$54.50

Long Stock + Long 55 Put for \$1.50

Long 55 Call at \$1.00

Identical Risk Profiles of Married Put and Long Call



Things to Know:

- ❑ Cost of carry is the cost of holding a particular position over a given period
- ❑ Put/Call Parity is the relationship between call and put prices at the strike and expiration
- ❑ Pricing irregularities lead to arbitrage opportunities however most opportunities for arbitrage in today's markets disappear in microseconds with HFT (high frequency trading) algorithm
- ❑ It's possible to recreate the P/L and risk profile of an option using a combination of other options and/or stock (synthetics)



The Options Industry Council

OIC is dedicated to increasing the awareness, knowledge and responsible use of exchange-listed options.



OCC Learning - a self-guided eLearning destination with coursework tailored to a variety of learning styles and experiences levels.



Download our podcasts and videos.



Attend webinars and learn from the pros.



Live options help from industry professionals with Investor Services.

OptionsEducation.org

For More Information

www.OptionsEducation.org

Investor Education: options@theooc.com

OIC YouTube Channel

LIKE us on Facebook

Follow us on Twitter @Options_Edu!

