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Volume At Price (VAP)

Not all prices are equal!

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Why Volume At Price?

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VAP: Why VAP?

Why use it?

- Quick Visual Indication of where the Share (Instrument) price is in relation to a historical distribution.
- Easily displays
  - Support and Resistance levels without the noise
  - areas where the price is likely to gap through
  - areas where strike prices are likely to be pertinent

Why teach it?

- Very little has been taught on the subject, green fields
- Has varying levels of Technical Analysis complexity
  - Basic - Support and Resistance, Gaps (Subjective, Visual methods)
  - Advance – Expected Monetary Value (Objective, Quantitative methods)

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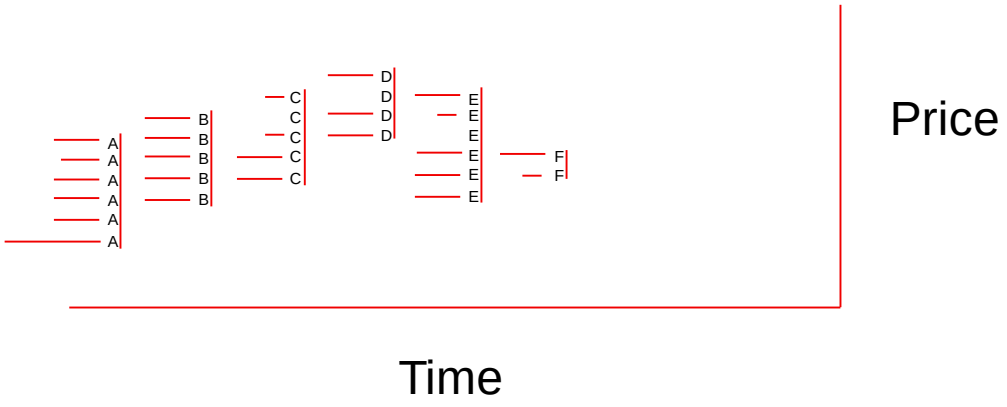
VAP: VAP versus Steidlmayer Distribution?

	Bar Charts	Steidlmayer Distribution	Volume At Price
Displays	Price at a certain time	Time spent at a certain price (?)	Volume traded at a certain price



BA
Bar Chart:
Price at a certain time
Time
Price
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
2017
Apr
Jul
Oct
2018
Apr
Jul
Oct
2019

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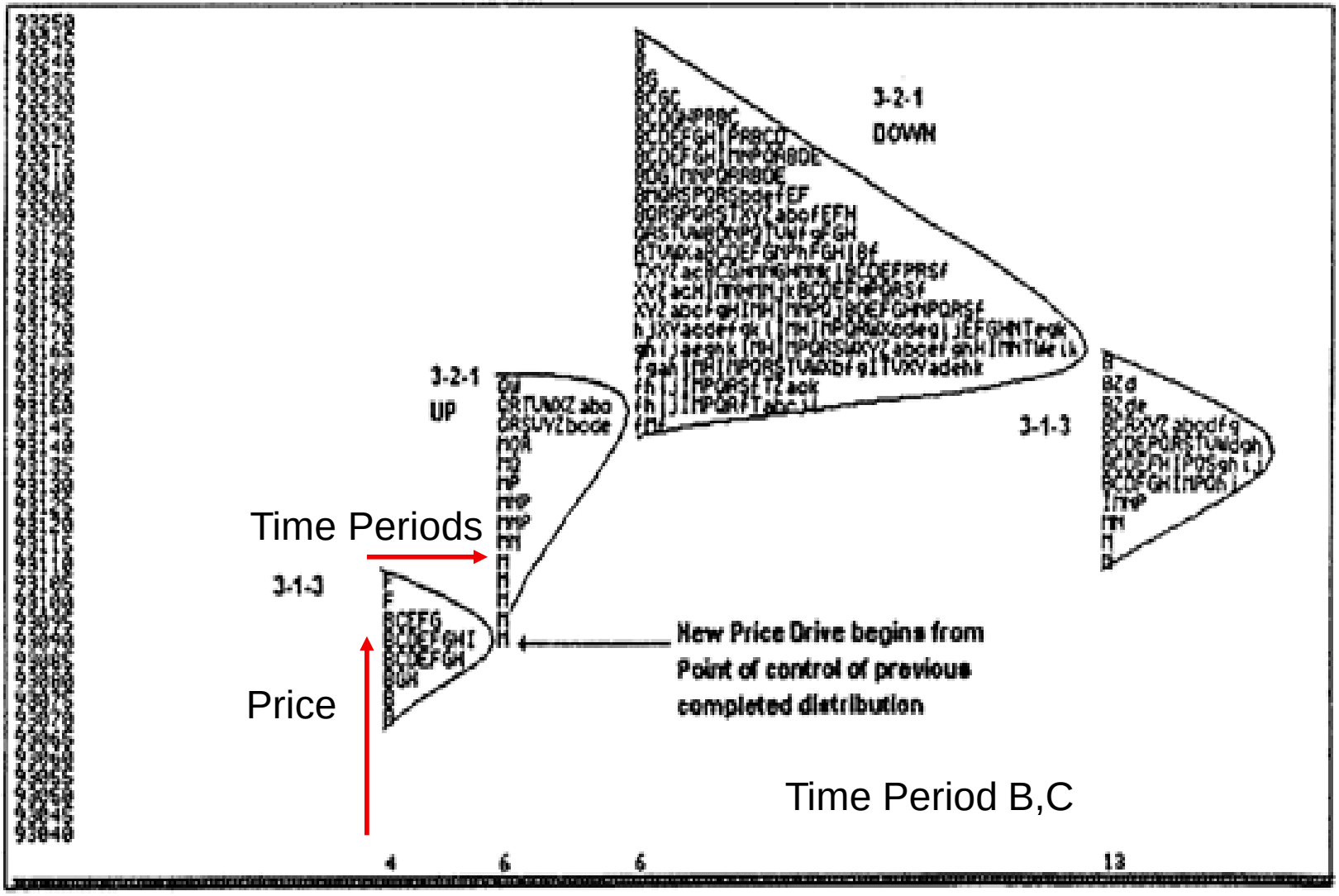
Steidlmayer Distribution:
Time (periods) spent at a certain price



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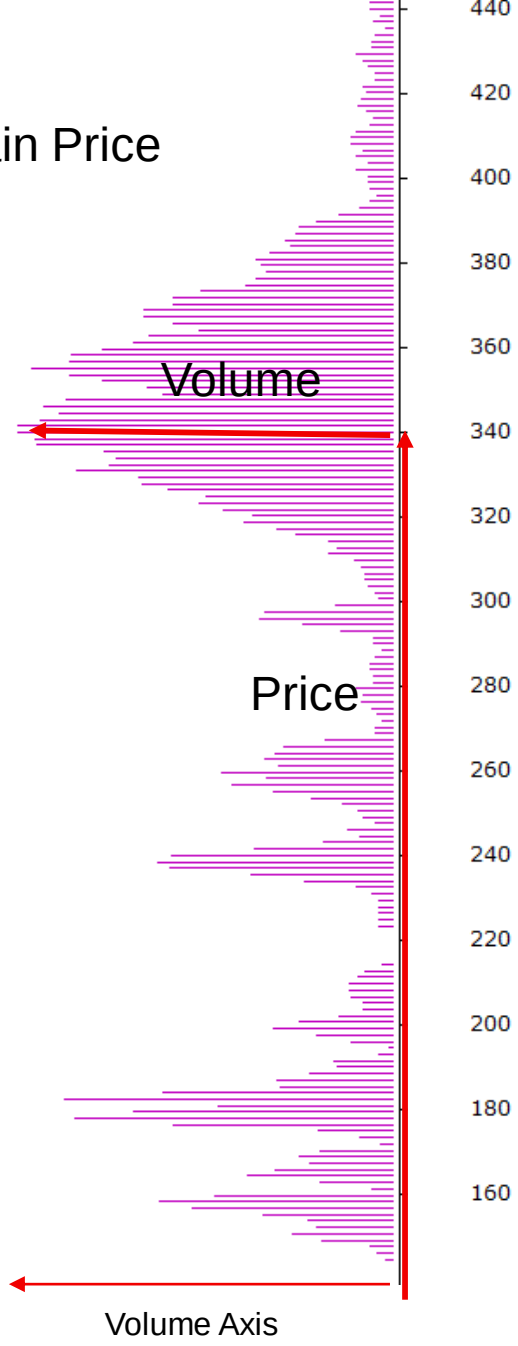
VAP:
Volume Traded at a Certain Price



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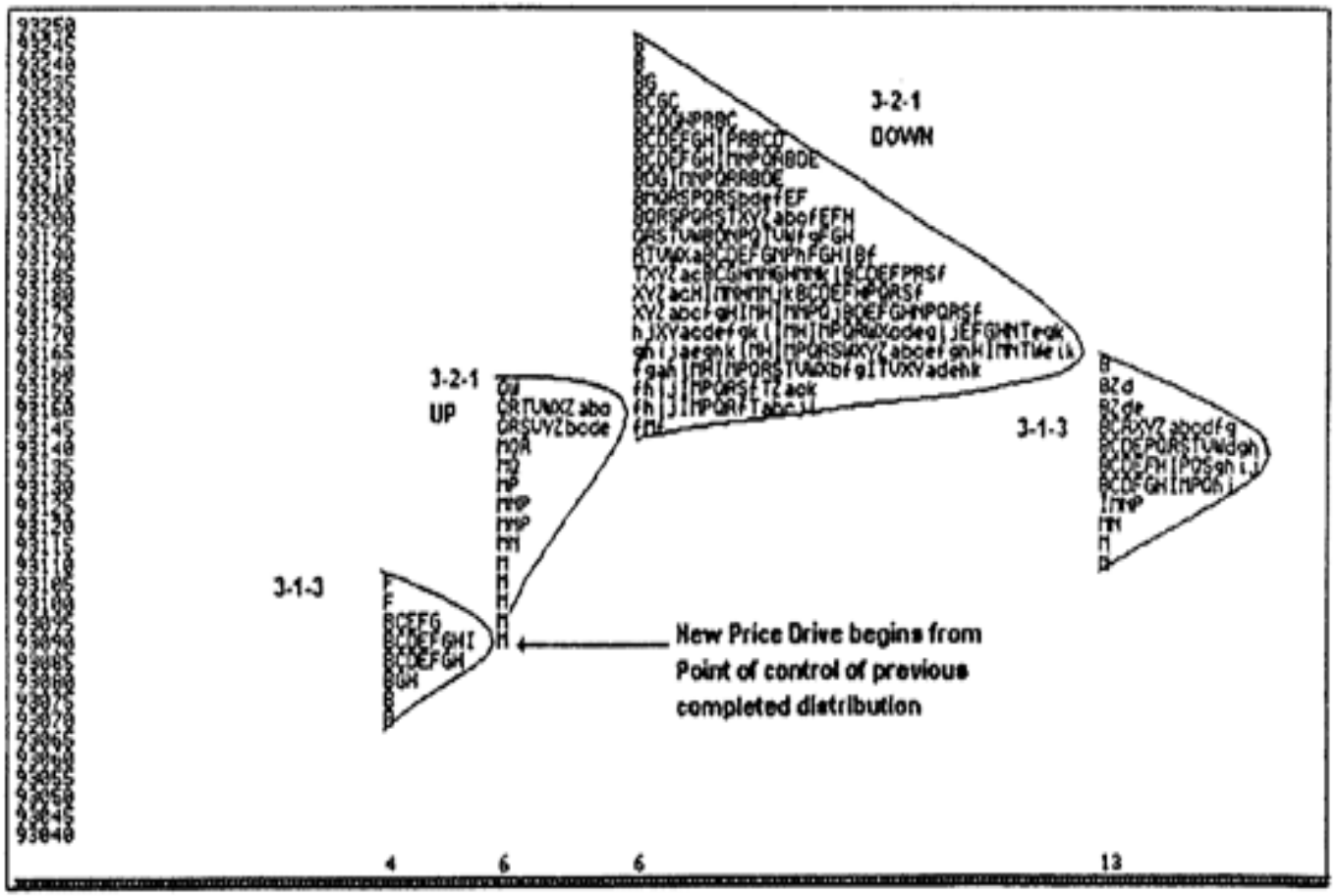
Steidlmayer Distribution: Vertical Arrangement Of Data (VAD)



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SteidImayer Distribution: Timelessness

- The first basic principle of the Distribution Theory is referred to as timelessness.
- Timelessness also means that when considering the shape of a distribution, the order of the price bars which made up the distribution is irrelevant.

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Steidlmayer Distribution: Limitations on Market Profile

1. The primary condition for a valid profile is a normal, equilibrium distribution.

2. All prices, even non-traded prices are treated equally.

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Volume At Price

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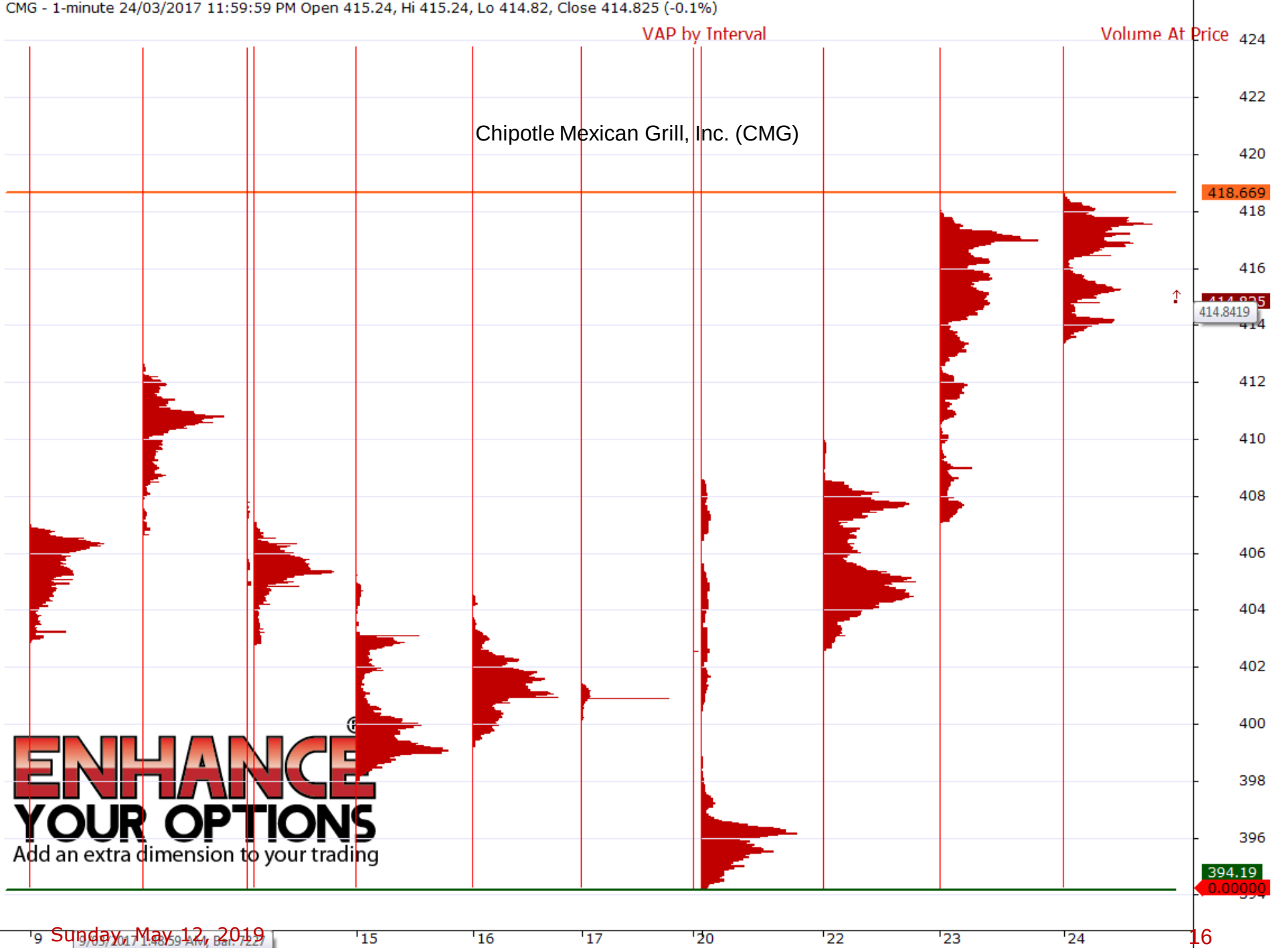
Volume At Price: Introduction

- Volume at Price is an indicator that shows the amount of volume for a particular price range, which is based on closing prices.
- A Volume At Price chart is simply the standard volume histogram reapplied to price instead of time.
- The Volume at Price bars are horizontal and shown on the left or right side of the chart to correspond with these price ranges.
- VAP bars are used for support and resistance levels, trading bases and gap areas.
- Also known as
  - Volume by Price
  - (Market)Volume Profile
  - Price by Volume


CMG - 1-minute 24/03/2017 11:59:59 PM Open 415.24, Hi 415.24, Lo 414.82, Close 414.825 (-0.1%)
VAP by Interval
Volume At Price
Chipotle Mexican Grill, Inc. (CMG)
418.669
414.8419
394.19
0.00000
424
422
420
418
416
414
412
410
408
406
404
402
400
398
396
9
15
16
17
20
22
23
24
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Volume At Price: HVN (Consolidation)

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Volume At Price: High Volume Nodes (HVN)

- HVN are peaks in volume at or around a price level.
- HVN can be seen as an indicator of a period of consolidation.
- Usually there is a great deal of activity on both the buy and sell side and the market oscillates at that price level for a great deal of time compared to other levels in the profile.
- This can imply a "fair value area" for the asset.
- When price approaches a previous HVN (or fair value area) a sustained period of sideways movement is expected.
- The market is less likely to immediately break through that price.

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CMG - Daily 11/08/2015 Open 742.62, Hi 749.88, Lo 737.69, Close 745.66 (0.2%) Price = 745.66
Candlesticks
Volume At Price
Chipotle Mexican Grill, Inc. (CMG)
High Volume Nodes
Consolidation
Consolidation
Consolidation
Consolidation
758.61
745.66
745.66
696.6975
800
650
600
550
500
450
400
350
300
250
212.58
200
2011
2012
2013
3/09/2014, Bar: 2166
2015
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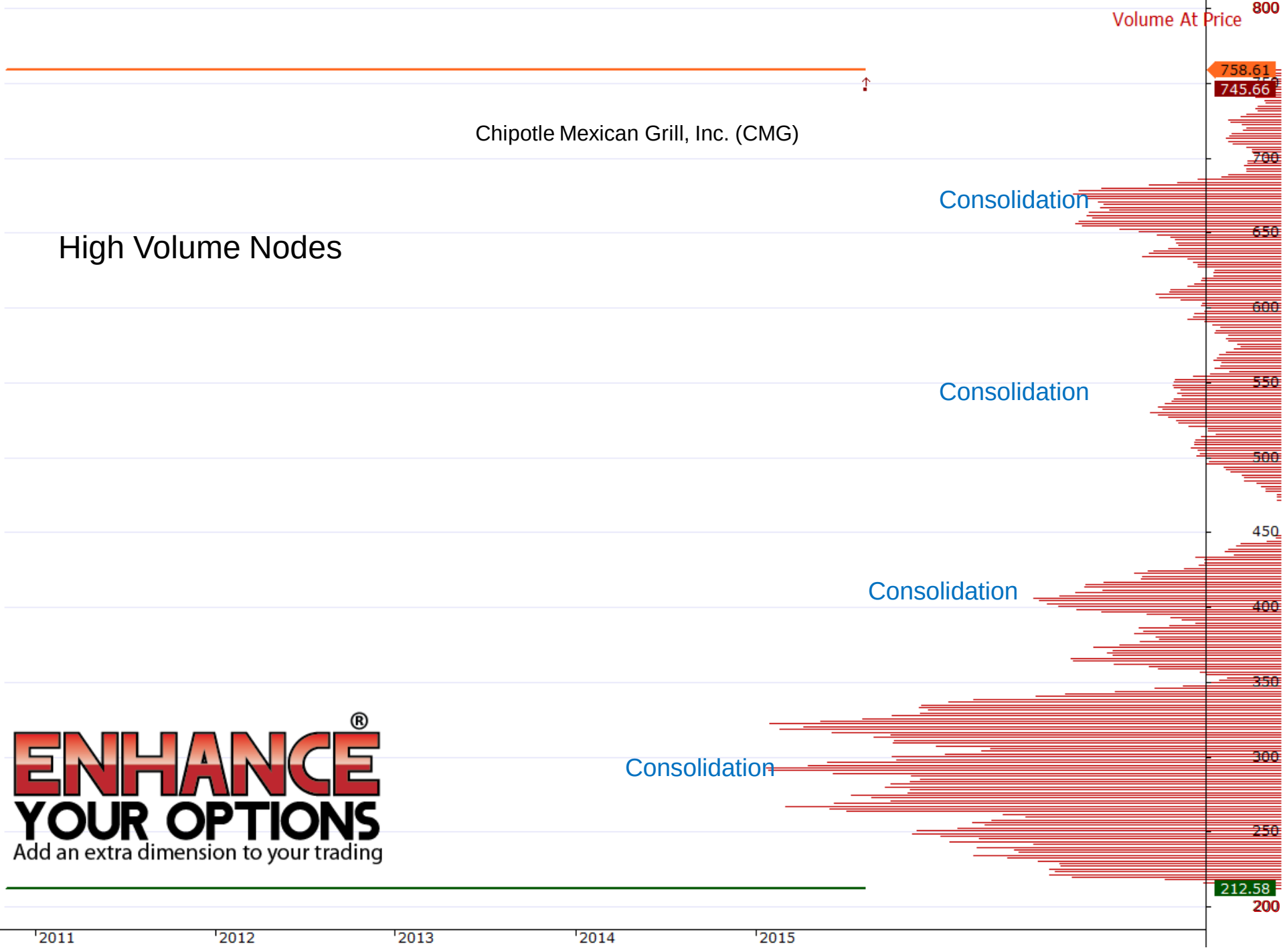

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Volume At Price: (LVN) Support and Resistance and Gaps

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Volume At Price: Low Volume Nodes (LVN)

- LVN are the opposite.
- They are valleys (or significant drops) in volume at or around a price level.
- Low Volume Nodes are usually a result of a breakout rally or a breakdown.
- During a rally or a breakdown, there will typically be an initial burst of volume and then a significant drop off.
- The drop off can imply an "unfair value area" for the asset.
- When price approaches a previous LVN (or unfair value area), the market is much more likely to rally through or bounce off of that price level.
- Because it is seen as an unfair value area, the market will not spend as much time there compared to some other levels in the profile.

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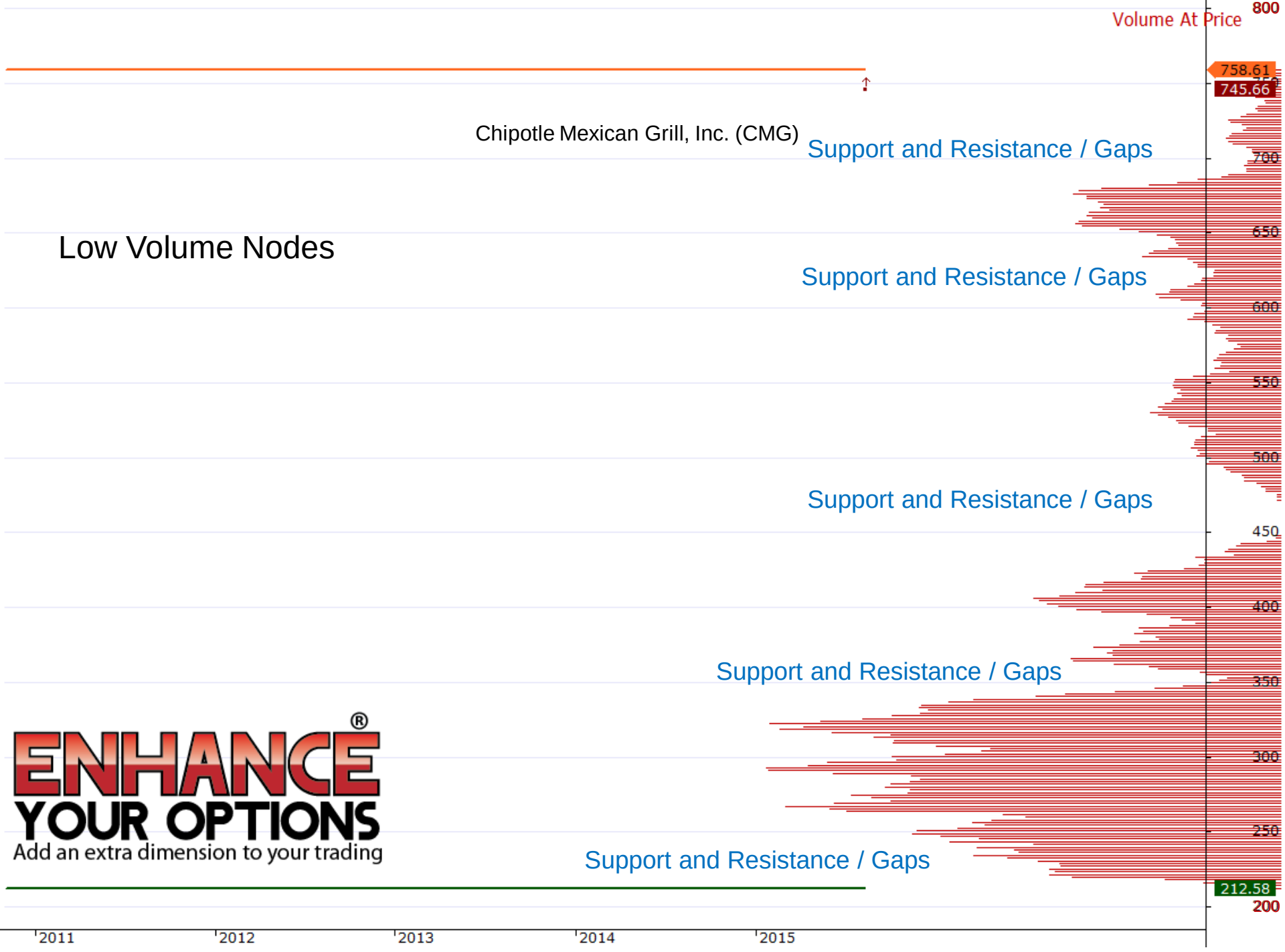

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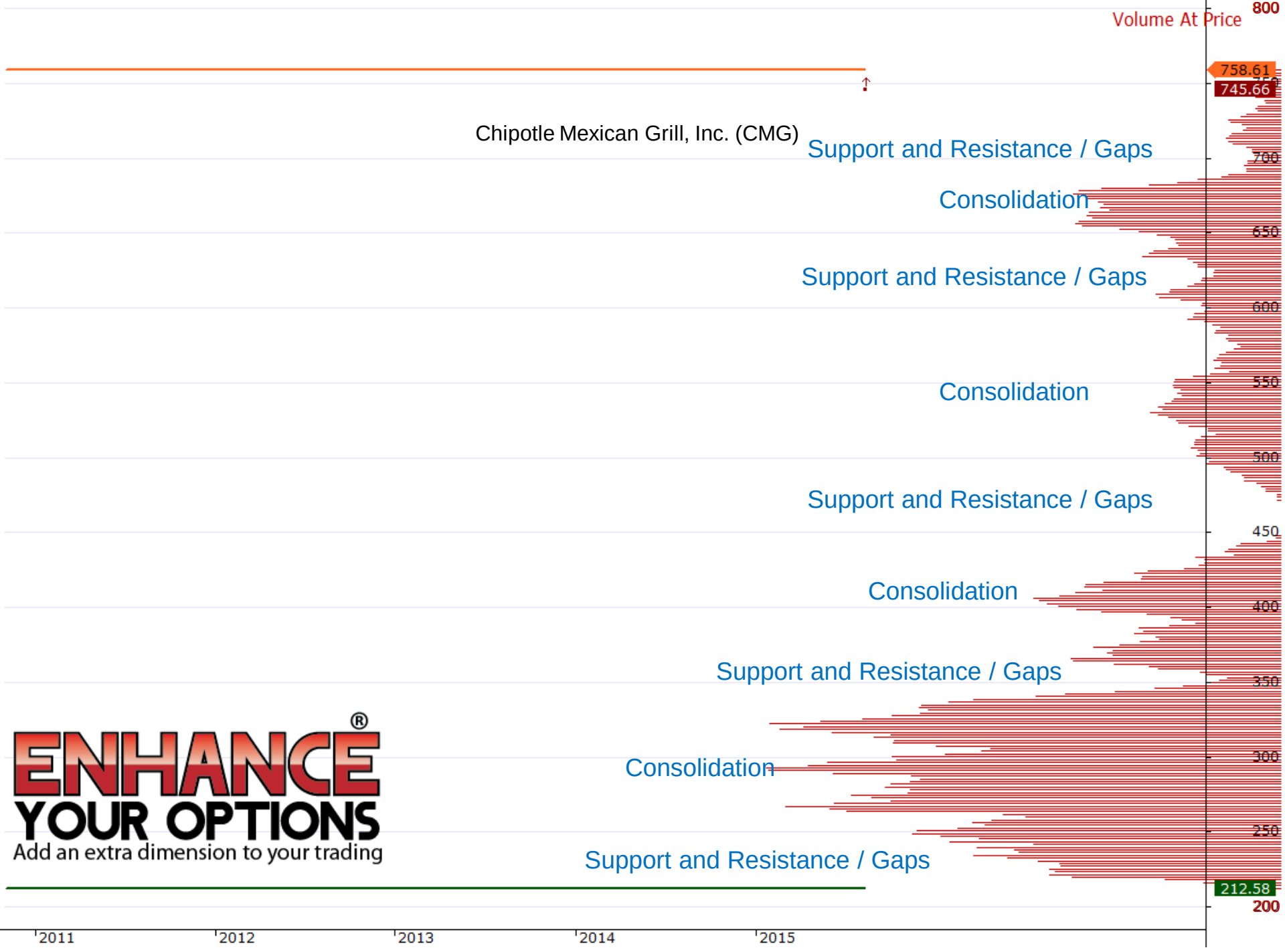

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Volume At Price: Playing Gaps

- Gaps occur when an asset's price rapidly moves from one point to another, creating a visible gap or break between prices in the chart.
- VAP charts to help predict when a gapping stock will find stabilisation by looking for an area where there was a lot of prior interest.
- Gaps themselves can produce areas of future support and/or resistance, which can be visible by the VAP histogram.

1. Common / Trading / Area Gaps – Within Range
2. Breakaway Gaps – Breaking out of Range, New Trend
3. Runaway / Measuring Gaps / Continuation – Within Trend
4. Exhaustion – End of Trend
5. Island Reversal – Exhaustion followed by Breakaway / Runaway

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Volume At Price: A Worked Example

CMG - Daily 24/03/2017 Open 415, Hi 418.669, Lo 413.38, Close 414.825 (-0.0%) Price = 414.83
Candlesticks
Chipotle Mexican Grill, Inc. (CMG)
760.4374
800
700
650
600
550
500
450
414.825
414.825
350
300
250
212.58
200
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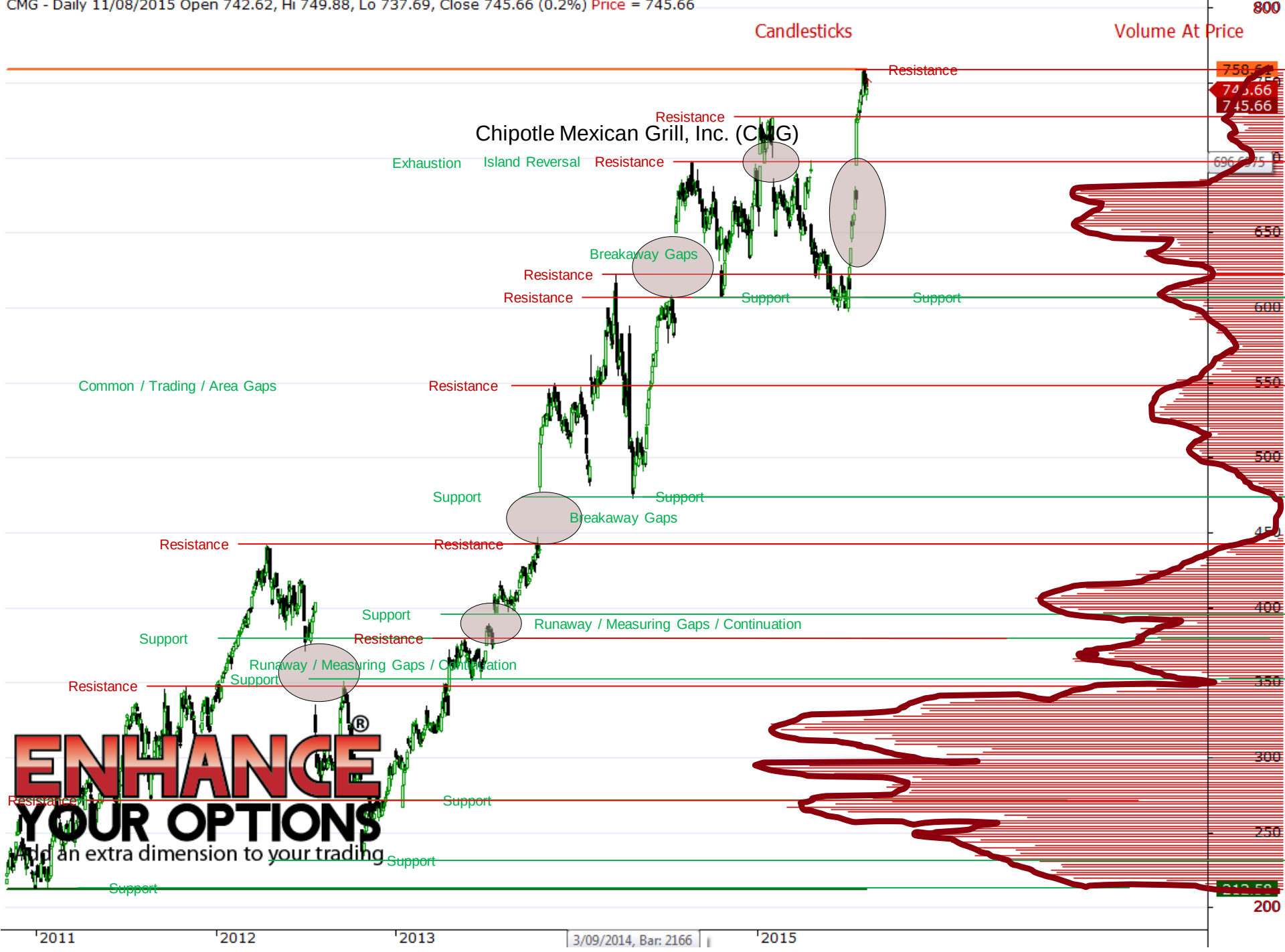
11/11/2010, Bar: 1209
2012
2013
2014
2015
2016
2017



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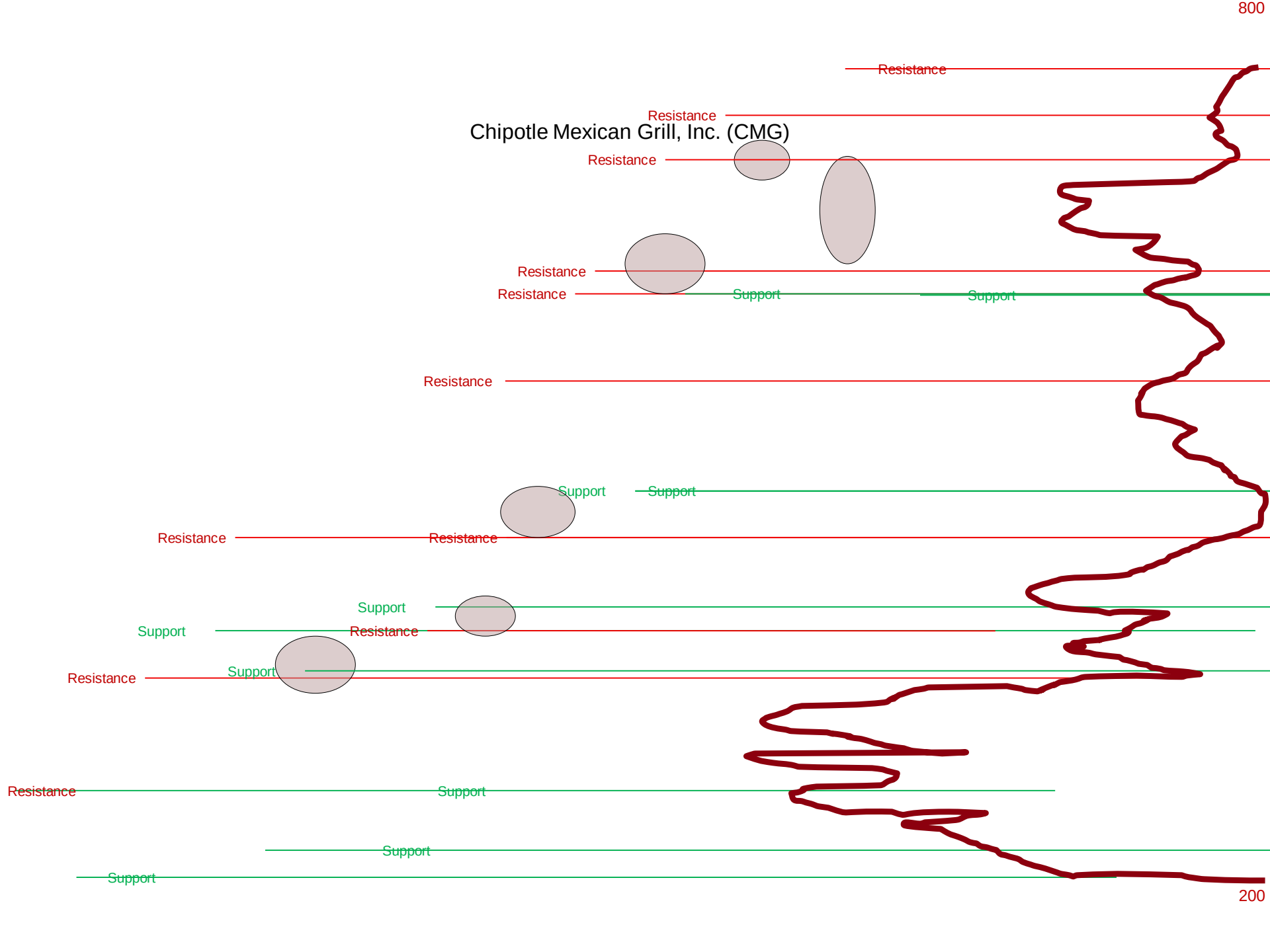
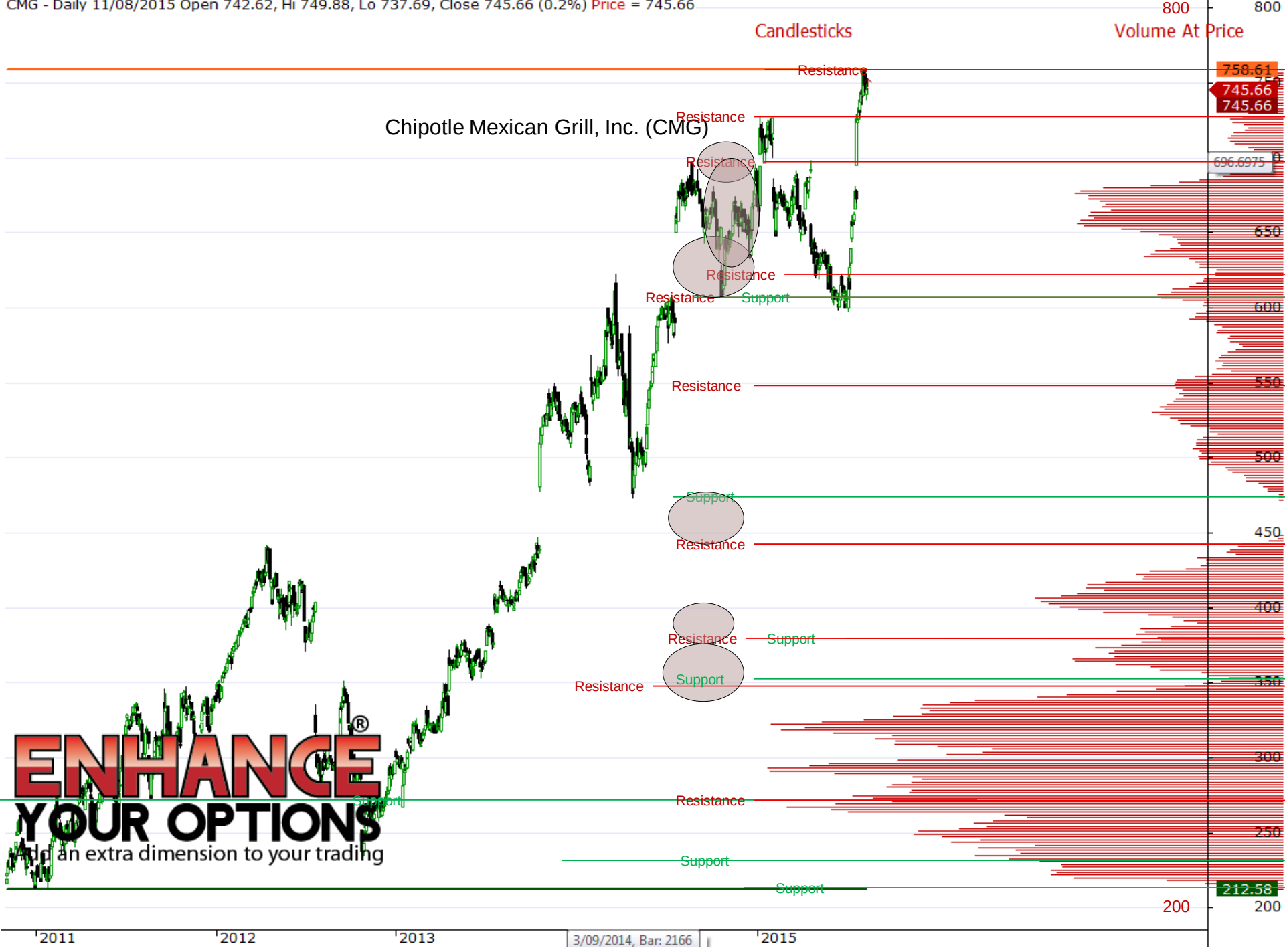

800
Resistance
Resistance
Chipotle Mexican Grill, Inc. (CMG)
Resistance
Resistance
Resistance
Support
Support
Resistance
Support
Support
Resistance
Resistance
Support
Support
Resistance
Support
Resistance
Support
Resistance
Support
Support
200


CMG - Daily 11/08/2015 Open 742.62, Hi 749.88, Lo 737.69, Close 745.66 (0.2%) Price = 745.66
Candlesticks
Volume At Price
Chipotle Mexican Grill, Inc. (CMG)
Resistance
Support
758.61
745.66
745.66
696.6975
212.58
800
650
600
550
500
450
400
350
300
250
200
2011
2012
2013
3/09/2014, Bar: 2166
2015
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CMG - Daily 24/03/2017 Open 415, Hi 418.669, Lo 413.38, Close 414.825 (-0.0%) Price = 414.83
Candlesticks
Volume At Price
Chipotle Mexican Grill, Inc. (CMG)
758.61
800
750
700
650
600
550
500
450
414.825
414.825
350
300
250
200
2011
2012
2013
2014
2015
2016
2017
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CMG - Daily 24/03/2017 Open 415, Hi 418.669, Lo 413.38, Close 414.825 (-0.0%) Price = 414.83
Candlesticks
Volume At Price
Chipotle Mexican Grill, Inc. (CMG)
758.61
800
700
650
600
550
500
450
414.825
414.825
350
300
250
200
2011
2012
2013
2014
2015
2016
2017
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Volume At Price: Issues

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Volume At Price: Issues

- Used for range trading (mean reversionary trading)
- Does not identify trends, or when an entry should be made, just where it should be made.

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Probability – Subjective or Objective?

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Probabilities

- Probability is the measure of the likelihood that an event will occur.
- *Webster's Revised Unabridged Dictionary*. G & C Merriam, 1913;

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Subjective vs Objective Probability

Subjective Probability	Objective Probability
• probability derived from an individual's personal judgment about whether a specific outcome is likely to occur.	• probability based upon an analysis in which each **measure** is based on a recorded, **repeatable** observation
• contains no formal calculations and only reflects the subject's opinions and past experience.	• more accurate way to determine probabilities than observations based on subjective measures, such as personal estimates.
• can change over time according to any number of factors	• Should **not change over time**, provided **circumstances remain identical**
• differ from person to person, and they contain a high degree of personal bias.	

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EMV

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Expected Monetary Value (EMV)

- Expected Monetary Value, Expected Value or Expectancy
- Probability of Outcome (Pr) multiplied by the outcome (X), summed for all possible outcomes.
- Win $1 for heads, lose a dollar for tails. (Fair die)

Probability	Result	Outcome	Expectancy
50%	Heads	+ $1.00	= 50% x + $1.00 = +0.50
50%	Tails	- $1.00	= 50% x - $1.00 = - 0.50
100%			= +0.50 - 0.50 = 0

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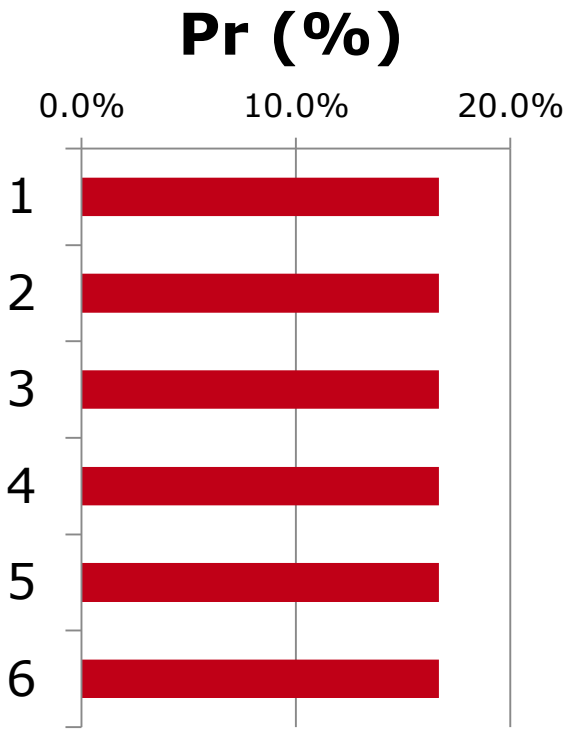
Distributions

Uniform Distribution

- Uniform Distribution
  - Fair Dice

Probability	Result
1 / 6 = 16.67%	1
1 / 6 = 16.67%	2
1 / 6 = 16.67%	3
1 / 6 = 16.67%	4
1 / 6 = 16.67%	5
1 / 6 = 16.67%	6
100%	



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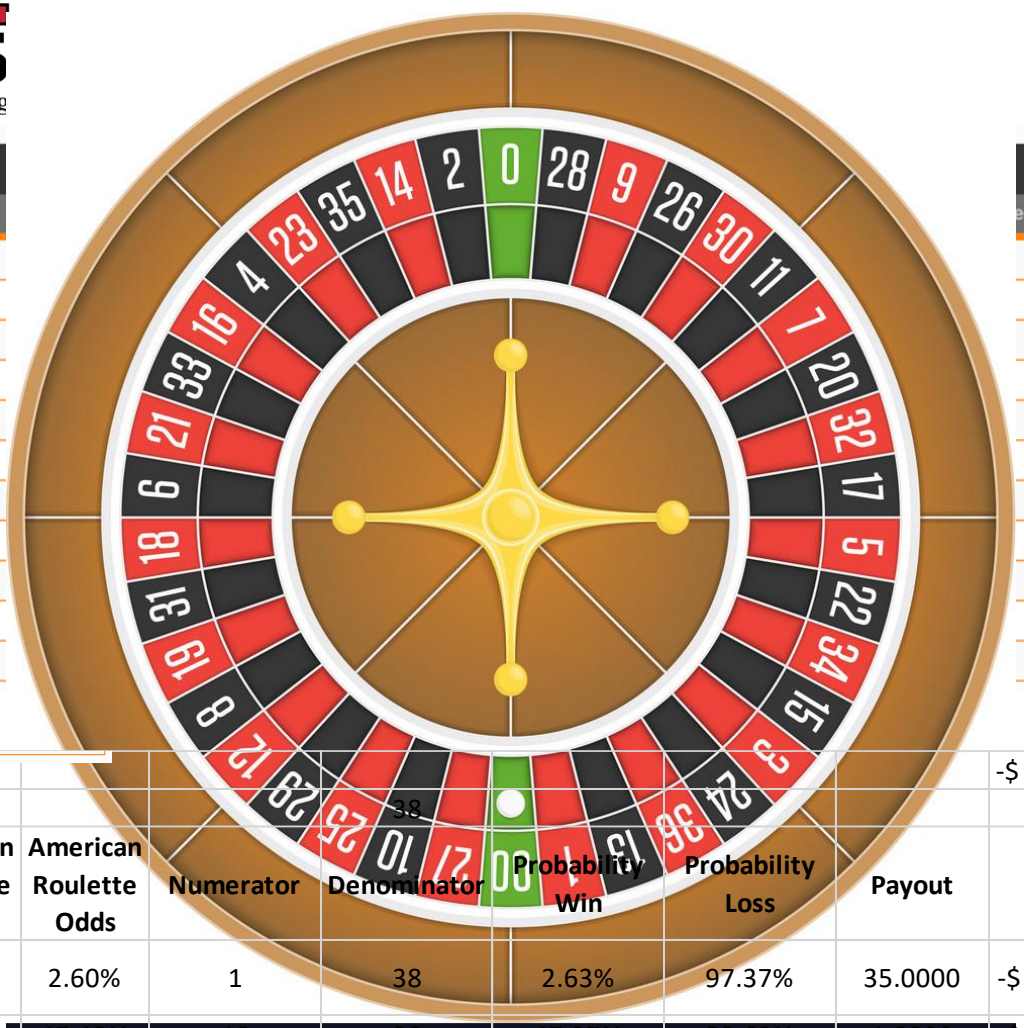
Roulette Bet	erican Roulette Odds
Single Number	2.60%
2 Number Combination	5.3%
3 Number Combination	7.9%
4 Number Combination	10.5%
5 Number Combination	13.2%
6 Number Combination	15.8%
Column	31.6%
Dozen	31.6%
Even/Odd	47.4%
Red/Black	47.4%
Low/High	47.4%



								-$ 1.00	$ 1.00		
								Outcome			
Roulette Bet	**Payout**	**European Roulette Odds**	**American Roulette Odds**	**Numerator**	**Denominator**	**Probability Win**	**Probability Loss**	**Payout**	**Lose**	**Gain**	**EMV**
Single Number	35 to 1	2.70%	2.60%	1	38	2.63%	97.37%	35.0000	-$ 1.00	$ 35.00	-5.26%
Even/Odd	1 to 1	48.60%	47.40%	18	38	47.37%	52.63%	1.0000	-$ 1.00	$ 1.00	-5.26%
Red/Black	1 to 1	48.60%	47.40%	18	38	47.37%	52.63%	1.0000	-$ 1.00	$ 1.00	-5.26%
Low/High	1 to 1	48.60%	47.40%	18	38	47.37%	52.63%	1.0000	-$ 1.00	$ 1.00	-5.26%

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Distributions

Normal Distribution

- Normal Distribution
  - Heights of people
  - Size of things produced by machines
  - Errors in measurements
  - Blood pressure
  - Marks on a test
  - Superannuation fund returns?

- Lognormal Distribution
  - Possible Share Prices around current price (Black Scholes Model)

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Expected Monetary Value (EMV)

I use the VAP as a Probability Distribution Function for the Price moving forward to calculate an EMV for an Options Trade

EMV (Options Trade) = $\sum$ Pr. Outcome x Outcome

Even though the Probability is **objectively measured**, it is historical information **projected to the future**, therefore it is **subjective**.

History tends to repeat itself!

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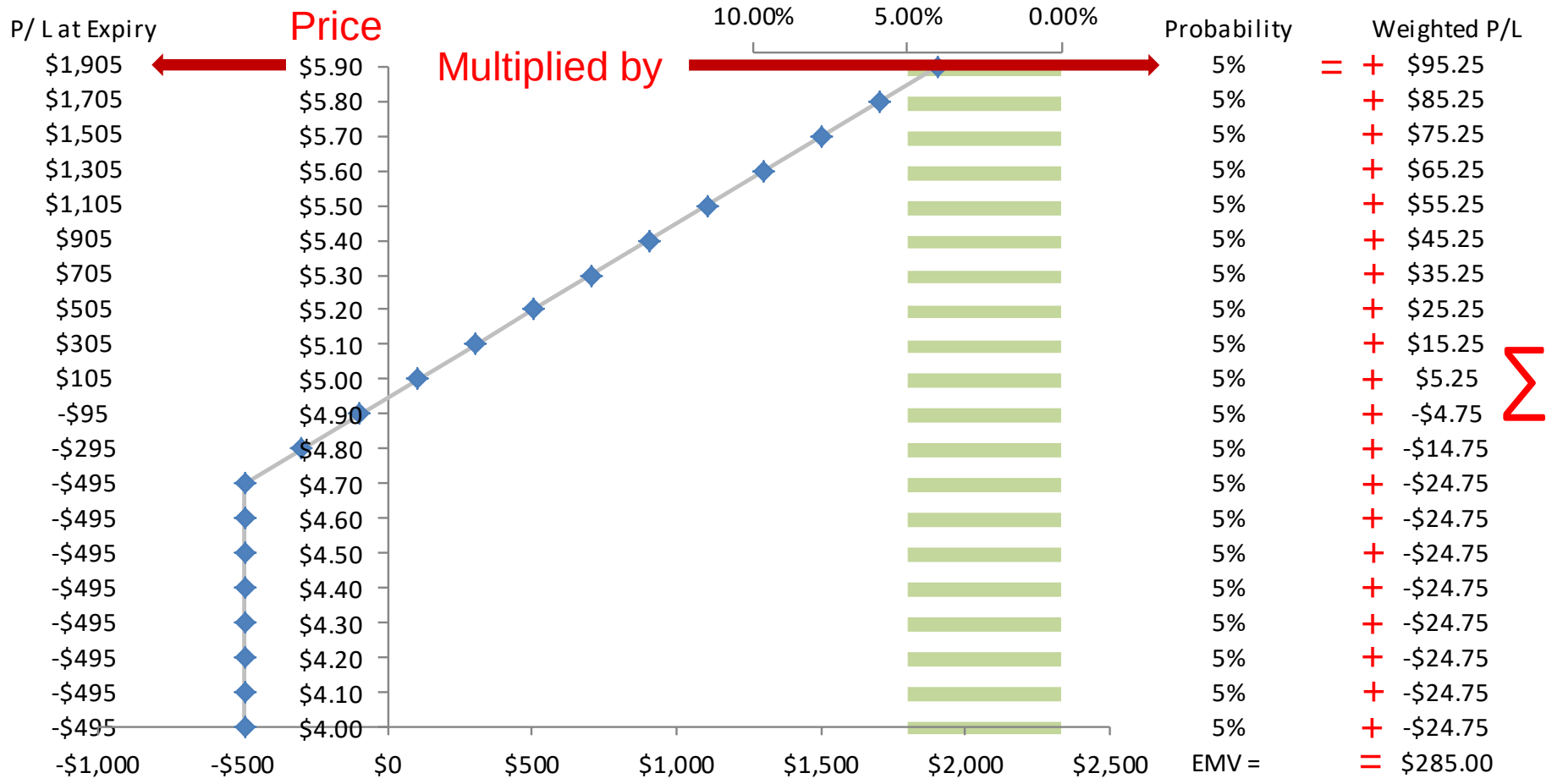
Strike Price	$ 4.70	Shares Per Contract	100	Total Premium Paid	$ 495.00
Premium	$ 0.23	Contracts	20		
Brokerage	$ 35.00				



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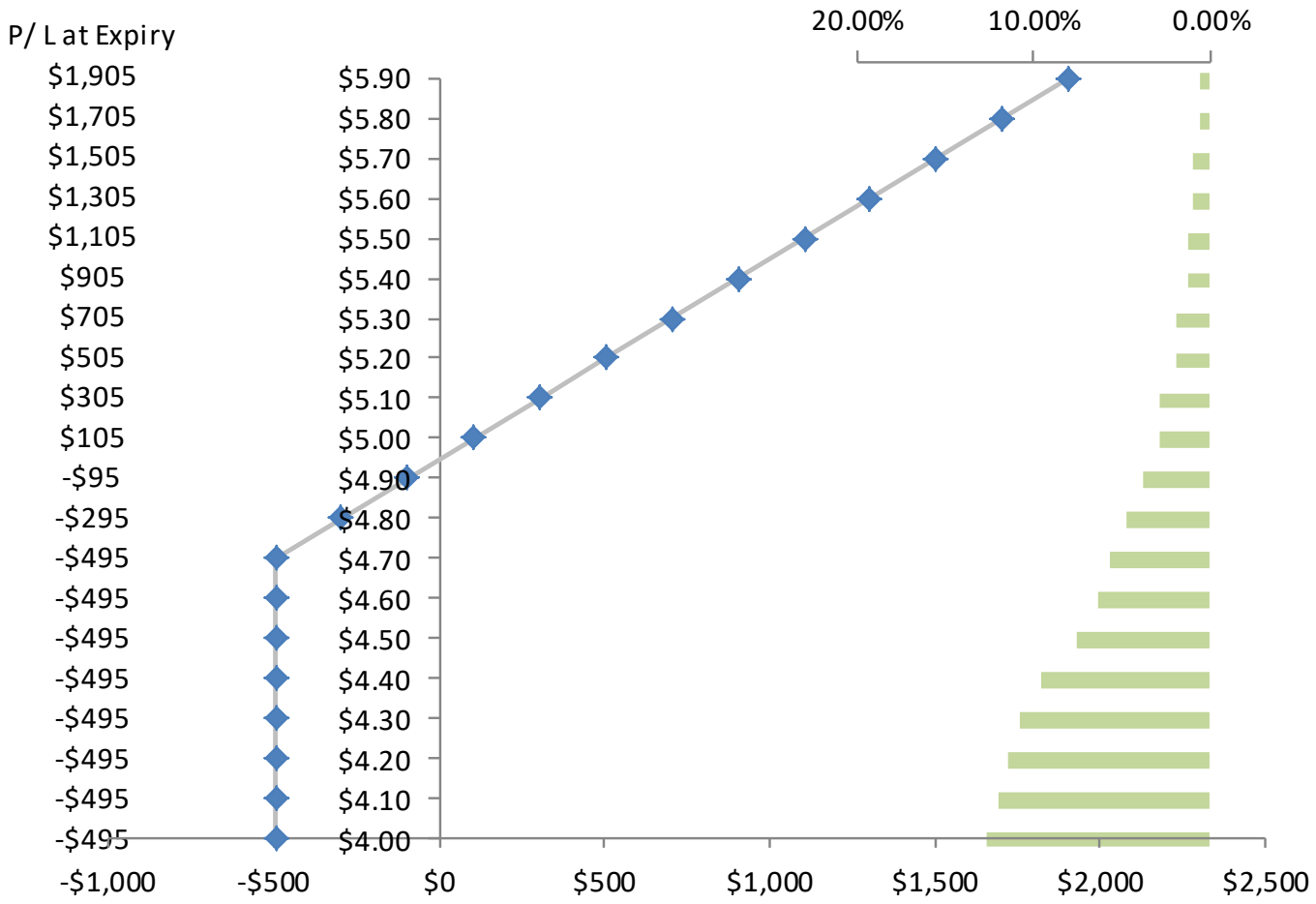
Strike Price	$ 4.70	Shares Per Contract	100	Total Premium Paid	$ 495.00
Premium	$ 0.23	Contracts	20		
Brokerage	$ 35.00				



P/ L at Expiry	Probability	Weighted P/L
$1,905	1%	$12.10
$1,705	1%	$10.83
$1,505	1%	$14.33
$1,305	1%	$12.43
$1,105	1%	$14.03
$905	1%	$11.49
$705	2%	$13.43
$505	2%	$9.62
$305	3%	$8.71
$105	3%	$3.00
-$95	4%	-$3.62
-$295	5%	-$14.05
-$495	6%	-$28.29
-$495	6%	-$31.43
-$495	8%	-$37.71
-$495	10%	-$47.14
-$495	11%	-$53.43
-$495	11%	-$56.57
-$495	12%	-$59.71
-$495	13%	-$62.86
	EMV =	-$284.84

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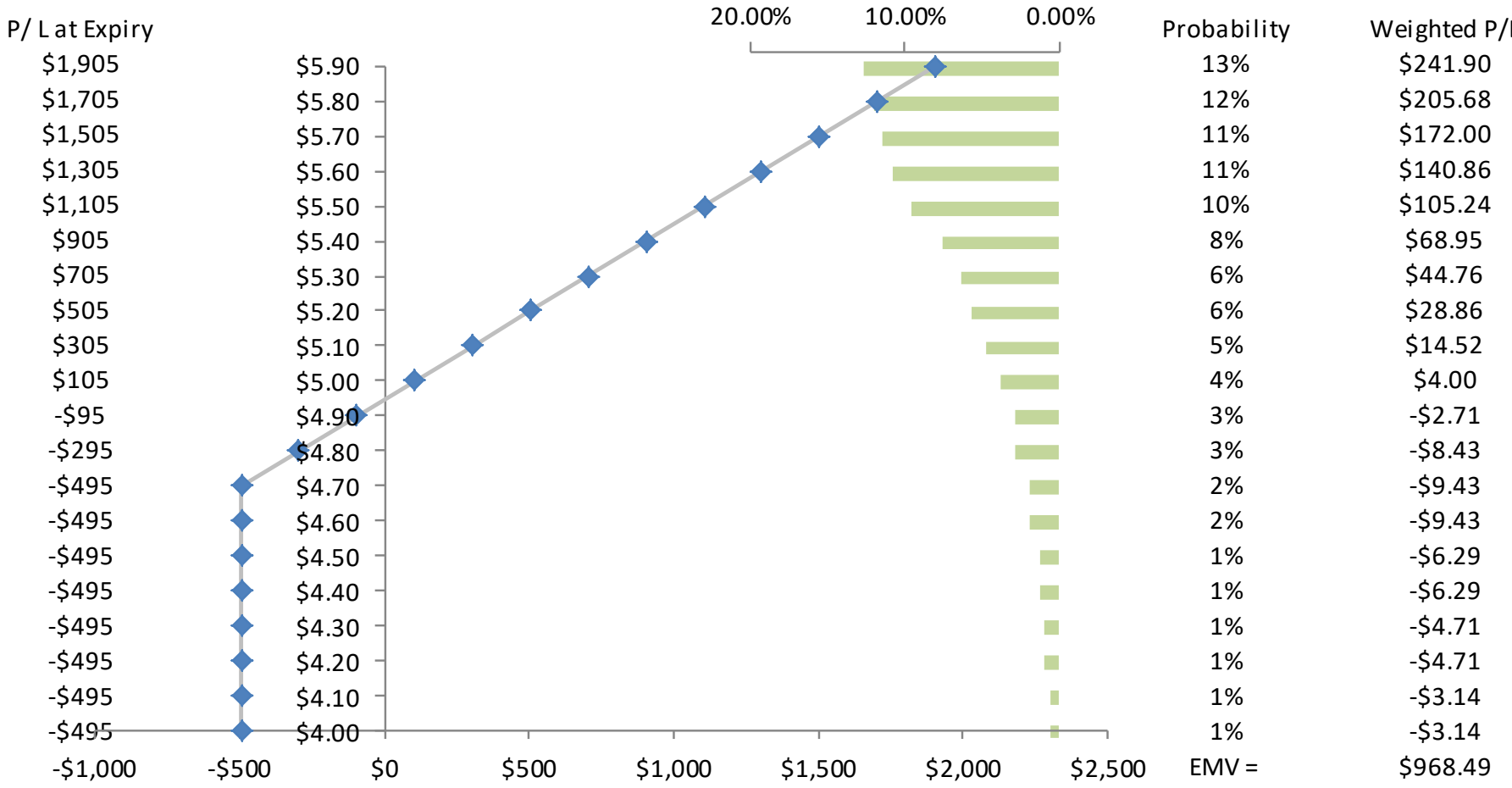
Strike Price	$ 4.70	Shares Per Contract	100	Total Premium Paid	$ 495.00
Premium	$ 0.23	Contracts	20		
Brokerage	$ 35.00				



Probability	Weighted P/L
13%	$241.90
12%	$205.68
11%	$172.00
11%	$140.86
10%	$105.24
8%	$68.95
6%	$44.76
6%	$28.86
5%	$14.52
4%	$4.00
3%	-$2.71
3%	-$8.43
2%	-$9.43
2%	-$9.43
1%	-$6.29
1%	-$6.29
1%	-$4.71
1%	-$4.71
1%	-$3.14
1%	-$3.14
EMV =	$968.49

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VAP and Options Strike Prices

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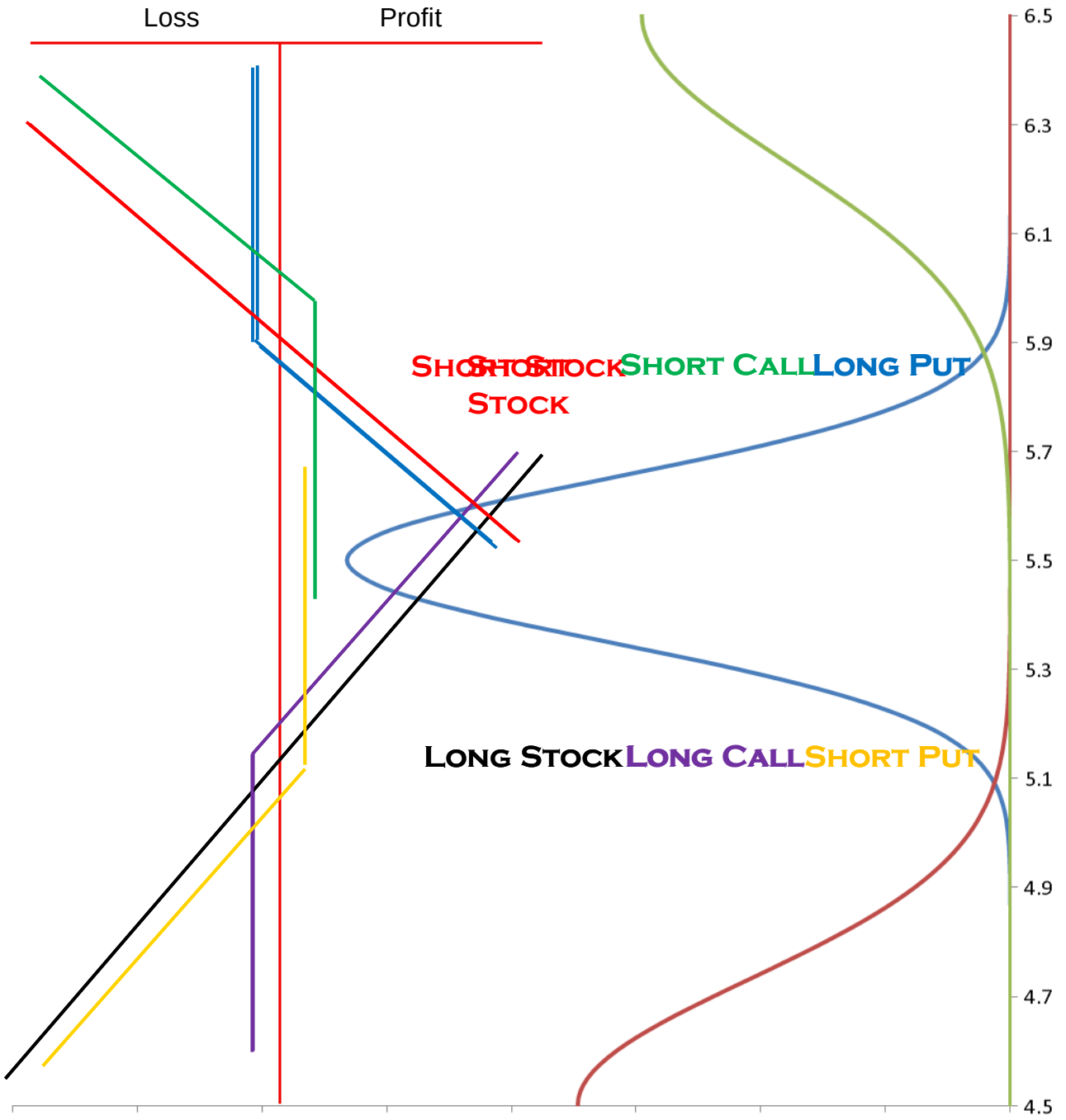
RoToR Payoff Diagram - Primary Strategies



RoToR PAYOFF DIAGRAMS

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Research: Using VAP to predict future price levels

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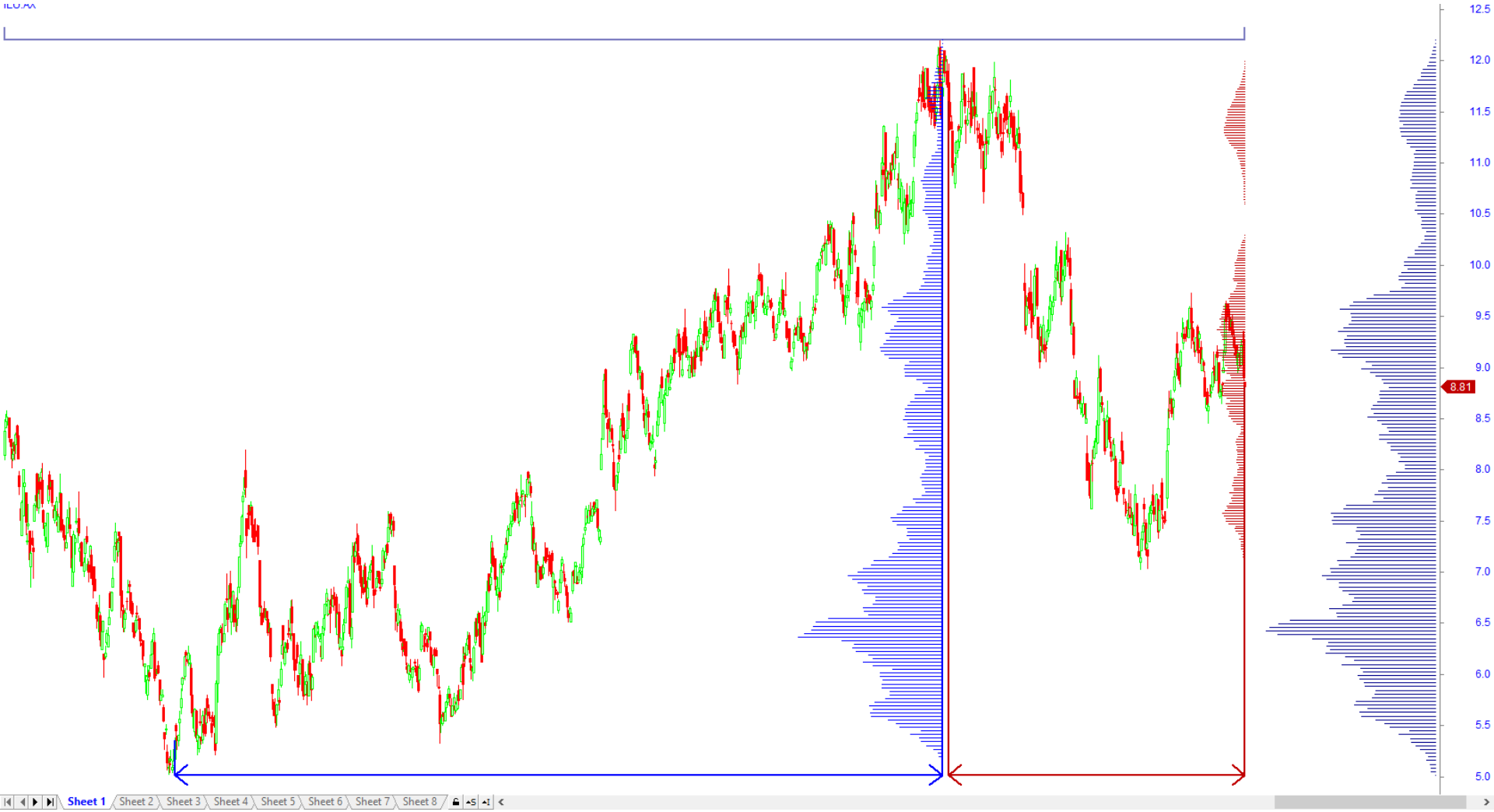

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Research: Using VAP for Strategy Selection

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Instrument: Citigroup Inc.
Date / Price Selection: Last Date / Last Price
Selected Strategy: Long Underlying
EMV: $ 1,431
Net Cr/Db (Incl Comm): $ -66,790 Debit
Net Cr/Db/Cntrct (Ex Comm): $ -66.780 Debit
Volatility (Historical) 24.8 %
Maximum At Risk: $ -11,560
Maximum Gain: $ 13,910
Expiry Date (Nearest): 24/08/2018
BreakEven: $ 66.790
Expiry Date (Furthest): 24/08/2018
Selected Date: 19/06/2018
ROTOR PAYOFF DIAGRAMS
82
80
78
76
74
72
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Instrument: Citigroup Inc.
Date / Price Selection: Last Date / Last Price
Selected Strategy: Long Underlying
EMV: $ 1,431
Net Cr/Db (Incl Comm): $ -66,790 Debit
Net Cr/Db/Cntrct (Ex Comm): $ -66.780 Debit
Volatility (Historical) 24.8 %
Maximum At Risk: $ -11,560
Maximum Gain: $ 13,910
Expiry Date (Nearest): 24/08/2018
BreakEven: $ 66.790
Expiry Date (Furthest): 24/08/2018
Selected Date: 19/06/2018
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PAYOFF DIAGRAMS
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YOUR OPTIONS
Add an extra dimension to your trading
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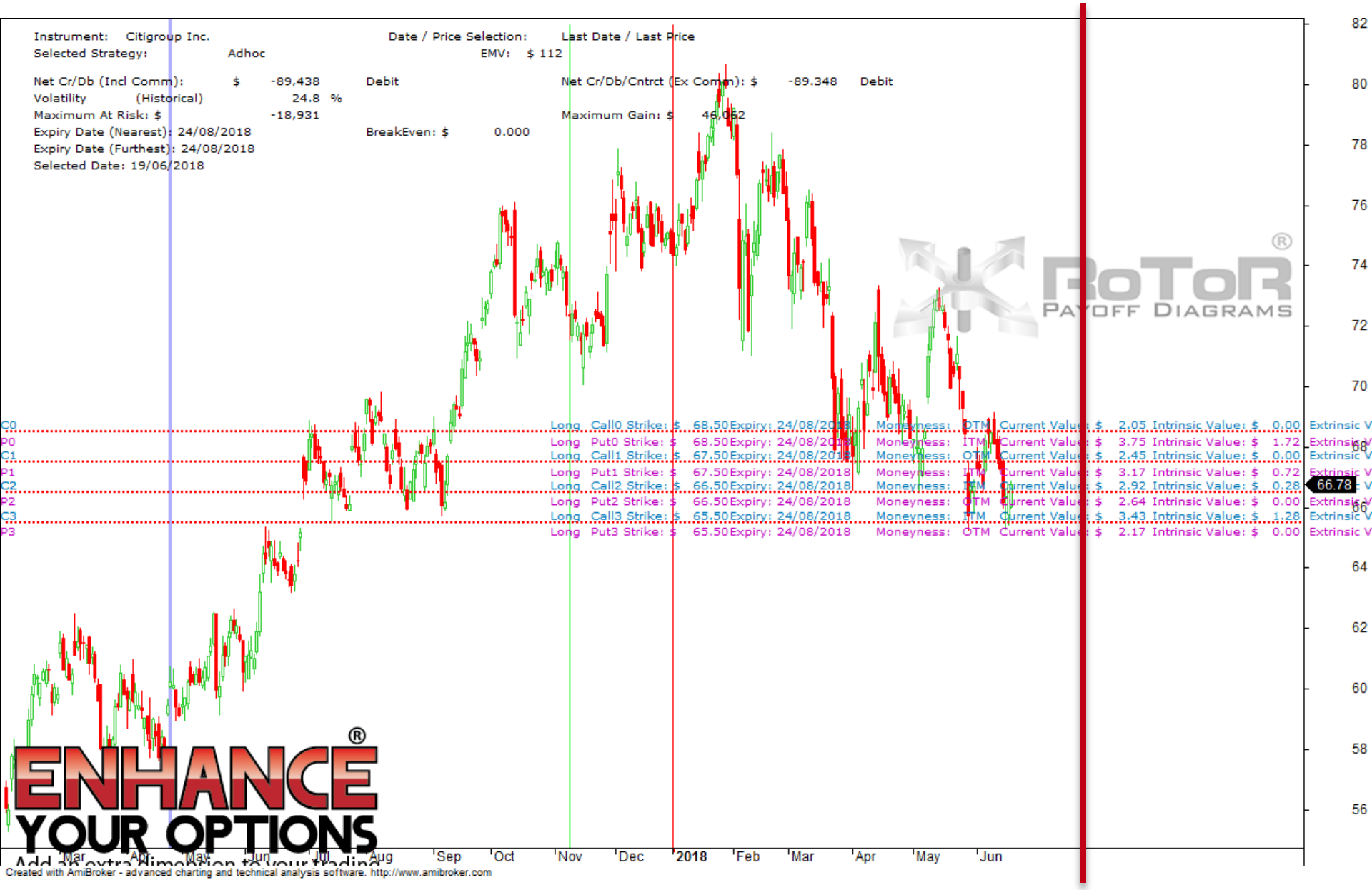
Instrument: Citigroup Inc.
Date / Price Selection: Last Date / Last Price
Selected Strategy: Adhoc
EMV: $ 112
Net Cr/Db (Incl Comm): $ -89,438 Debit
Net Cr/Db/Cntrct (Ex Comm): $ -89.348 Debit
Volatility (Historical) 24.8 %
Maximum At Risk: $ -18,931
Maximum Gain: $ 46,062
Expiry Date (Nearest): 24/08/2018
BreakEven: $ 0.000
Expiry Date (Furthest): 24/08/2018
Selected Date: 19/06/2018
C0 Long Call0 Strike: $ 68.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.05 Intrinsic Value: $ 0.00 Extrinsic V
P0 Long Put0 Strike: $ 68.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 3.75 Intrinsic Value: $ 1.72 Extrinsic V
C1 Long Call1 Strike: $ 67.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.45 Intrinsic Value: $ 0.00 Extrinsic V
P1 Long Put1 Strike: $ 67.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 3.17 Intrinsic Value: $ 0.72 Extrinsic V
C2 Long Call2 Strike: $ 66.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 2.92 Intrinsic Value: $ 0.28 Extrinsic V
P2 Long Put2 Strike: $ 66.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.64 Intrinsic Value: $ 0.00 Extrinsic V
C3 Long Call3 Strike: $ 65.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 3.43 Intrinsic Value: $ 1.28 Extrinsic V
P3 Long Put3 Strike: $ 65.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.17 Intrinsic Value: $ 0.00 Extrinsic V
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Instrument: Citigroup Inc.
Date / Price Selection: Last Date / Last Price
Selected Strategy: Adhoc
EMV: $ 112
Net Cr/Db (Incl Comm): $ -89,438 Debit
Net Cr/Db/Cntrct (Ex Comm): $ -89.348 Debit
Volatility (Historical) 24.8 %
Maximum At Risk: $ -18,931
Maximum Gain: $ 46,062
Expiry Date (Nearest): 24/08/2018
BreakEven: $ 0.000
Expiry Date (Furthest): 24/08/2018
Selected Date: 19/06/2018
Strategy EMV Max. Gain Profit / Loss %P/L At Expiry
Long Underlying: $ 1,431 $ 13,910 $ -10 100 %
Stock Repair: $ 1,097 $ 3,682 $ -30 1 %
Short Put (ITM): $ 1,073 $ 3,738 $ -10 0 %
Covered Call: $ 945 $ 3,154 $ -20 1 %
Short Put (ATM): $ 795 $ 2,628 $ -10 -0 %
Long Call (ITM): $ 793 $ 11,757 $ -10 0 %
Short Put (OTM): $ 642 $ 2,157 $ -10 -0 %
Ratio Put Spread: $ 634 $ 3,091 $ -20 -1 %
Protective Put: $ 616 $ 11,262 $ -20 1 %
Bear Put Ladder: $ 470 $ 2,669 $ -30 -1 %
Long Call (ATM): $ 466 $ 10,736 $ -10 0 %
Long Call (OTM): $ 330 $ 10,143 $ -10 0 %
Short Straddle / Strangle: $ 309 $ 5,072 $ -20 -0 %
Ratio Call Backspread: $ 294 $ 10,188 $ -20 1 %
Bear Call Ladder: $ 147 $ 9,745 $ -30 2 %
Bull Call Spread: $ 142 $ 318 $ -20 10 %
Bull Put Spread: $ 132 $ 508 $ -20 9 %
Collar: $ 129 $ 505 $ -30 14 %
Long Put Butterfly/Condor: $ -12 $ 849 $ -40 -5 %
Long Call Butterfly/Condor: $ -12 $ 849 $ -40 -5 %
Long Iron Butterfly / Condor: $ -23 $ 838 $ -40 -5 %
Short Iron Butterfly / Condor: $ -[illegible] $ 82 $ -40 4 %
Short Call Butterfly/Condor: $ -68 $ 71 $ -40 4 %
Short Put Butterfly/Condor: $ -68 $ 71 $ -40 4 %
Bear Put Spread: $ -172 $ 452 $ -20 -12 %
Bear Call Spread: $ -182 $ 442 $ -20 -12 %
Bull Put Ladder: $ -207 $ 2,555 $ -30 -2 %
Ratio Call Spread: $ -334 $ 2,972 $ -20 -1 %
Long Straddle / Strangle: $ -349 $ 8,088 $ -20 0 %
Short Call (OTM): $ -350 $ 2,037 $ -10 -0 %
Short Call (ATM): $ -486 $ 2,444 $ -10 -0 %
Bull Put Ladder: $ -530 $ 7,[illegible] $ -30 1 %
Long Put (OTM): $ -[illegible] $ [illegible] $ -10 0 %
Ratio Put Backspread: $ -674 $ 8,139 $ -20 1 %
Short [illegible] $ -[illegible] $ [illegible] $ -10 -0 %
Long Put (ATM): $ -815 $ 9,622 $ -10 0 %
Long Put (ITM): $ -993 $ 9,642 $ -10 0 %
Short Underlying: $ -1,[illegible] $ [illegible] $ -10 100 %
C0 Long Call0 Strike: $ 68.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.05 Intrinsic Value: $ 0.00 Extrinsic V
P0 Long Put0 Strike: $ 68.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 3.75 Intrinsic Value: $ 1.72 Extrinsic V
C1 Long Call1 Strike: $ 67.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.45 Intrinsic Value: $ 0.00 Extrinsic V
P1 Long Put1 Strike: $ 67.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 3.17 Intrinsic Value: $ 0.72 Extrinsic V
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C3 Long Call3 Strike: $ 65.50 Expiry: 24/08/2018 Moneyness: ITM Current Value: $ 3.43 Intrinsic Value: $ 1.28 Extrinsic V
P3 Long Put3 Strike: $ 65.50 Expiry: 24/08/2018 Moneyness: OTM Current Value: $ 2.17 Intrinsic Value: $ 0.00 Extrinsic V
RoTor Payoff Diagrams
ENHANCE YOUR OPTIONS
Add Bearish Strategies
Add Neutral Strategies
Add Extra Dimension to your Trading
Mar Apr May Jun Jul Aug Sep Oct Nov Dec 2018 Feb Mar Apr May Jun
82 80 78 76 74 72 70 66.78 66 64 62 60 58 56
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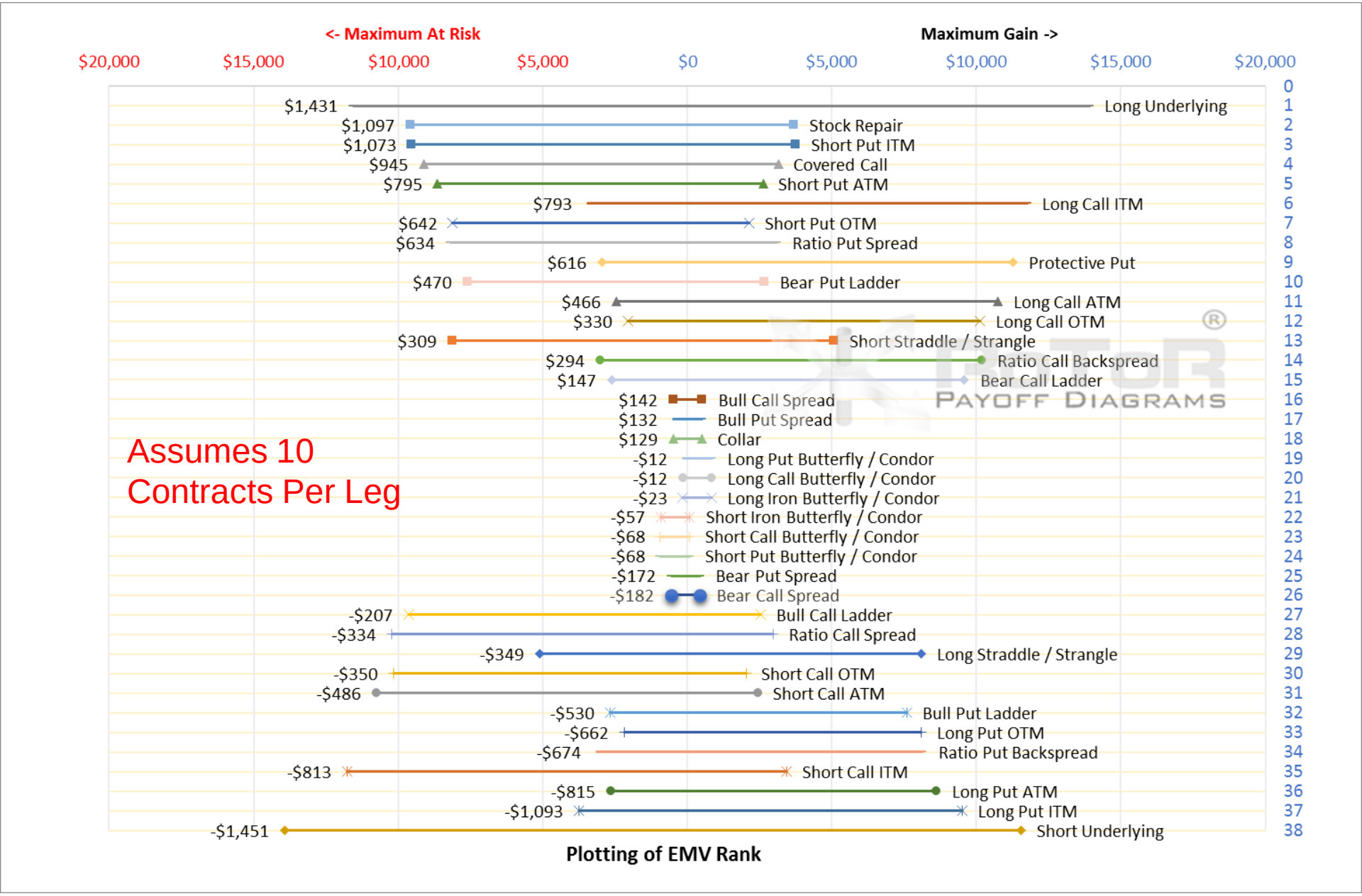
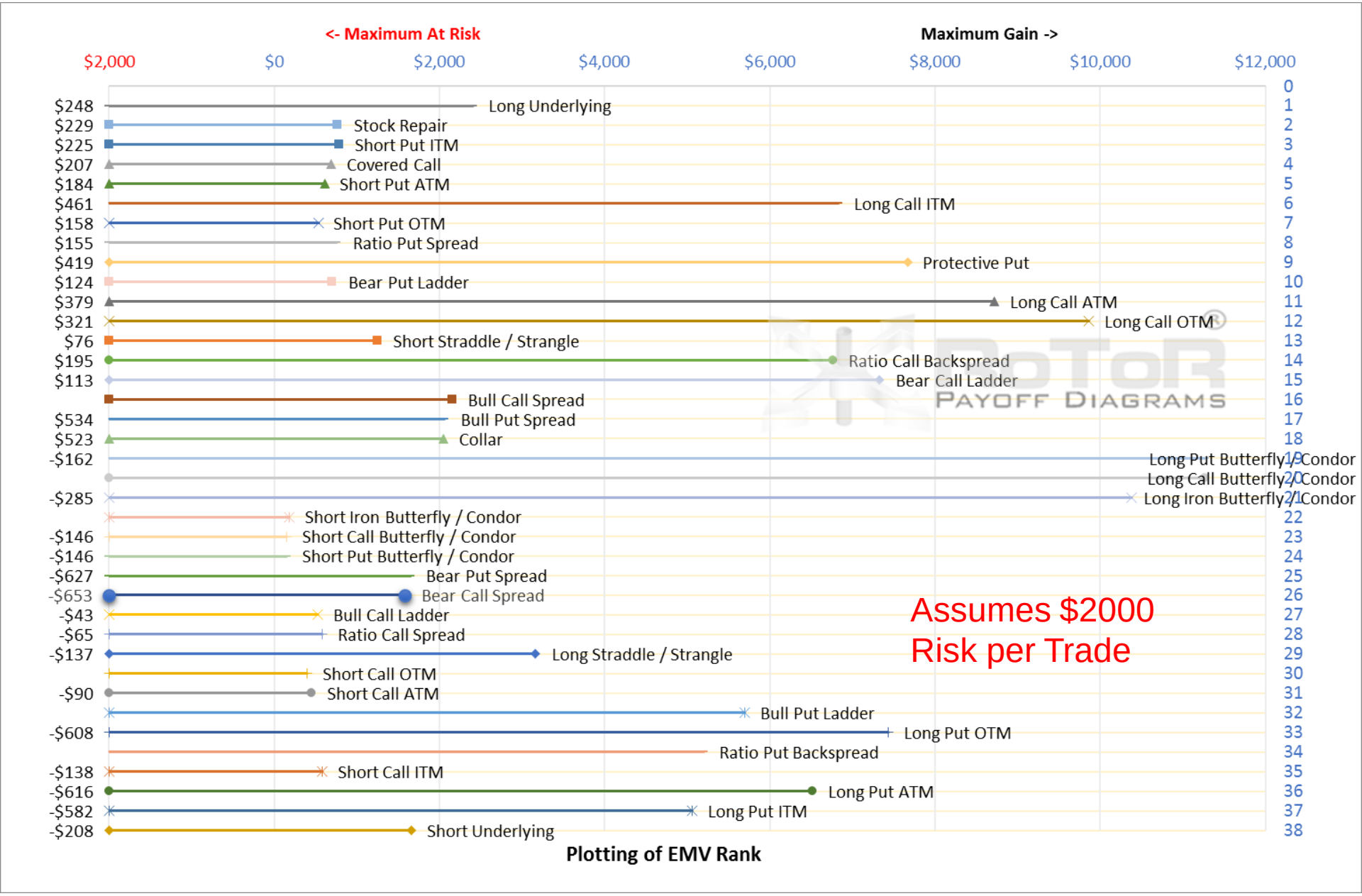
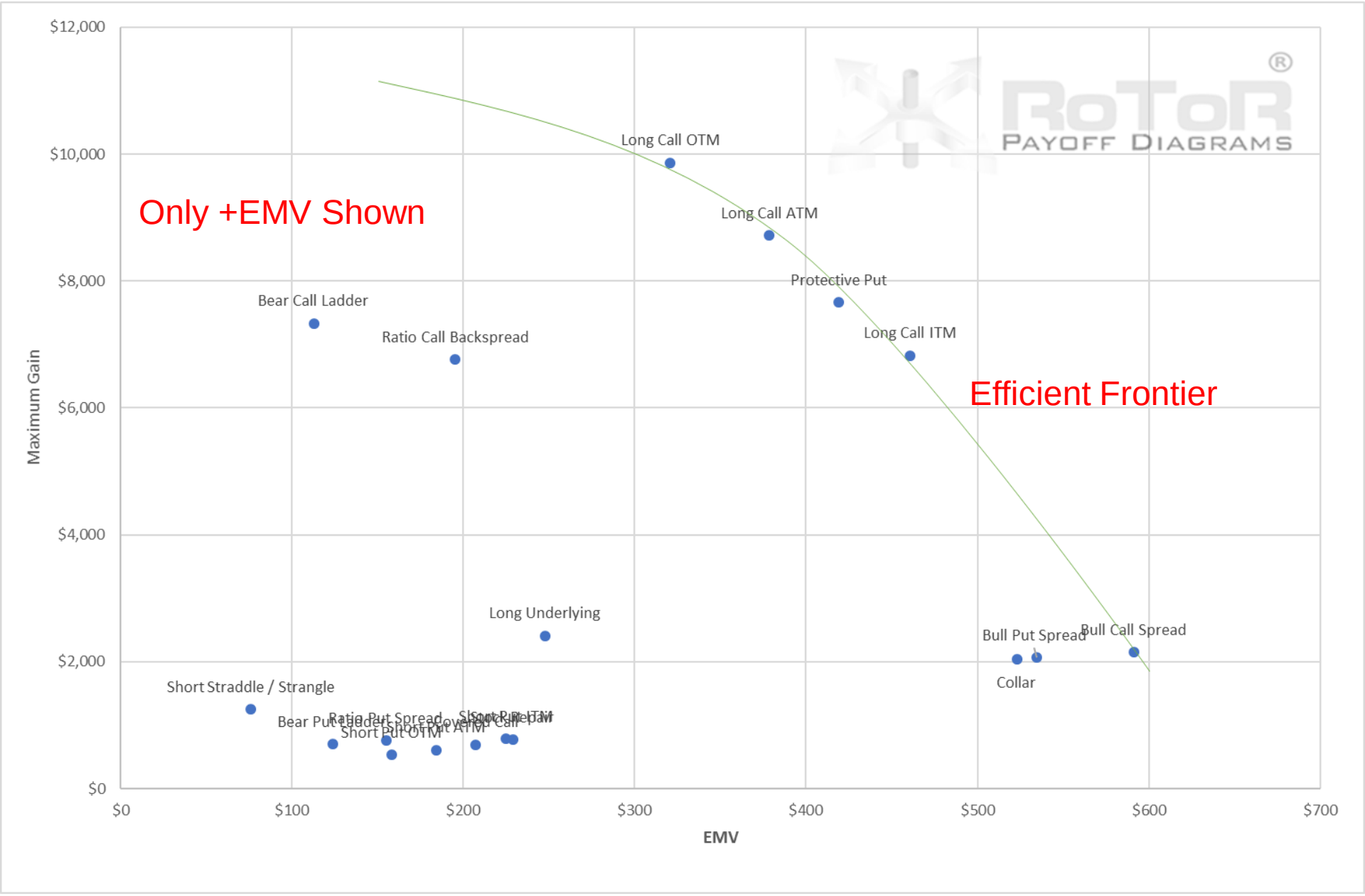
BOTTOM OF THE RANGE: EMV RANK



BOTTOM OF THE RANGE: EMV RANK (Standardised)



BOTTOM OF THE RANGE: Maximum Gain vs EMV



Instrument: Citigroup, Inc.
Selected Strategy: Long Underlying
Date / Price Selection: Last Date / Last Price
EMV: $ -979
Expiry Date (Nearest): 24/08/2018
Expiry Date (Furthest): 24/08/2018
Net Cr/Db (Incl Comm): $ -141,350 Debit
Volatility (Historical) 20.4 %
Maximum At Risk: $ -23,150
BreakEven: $ 70.675
Net Cr/Db/Cntrct (Ex Comm): $ -70.670 Debit
Maximum Gain: $ 20,050
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At Expiry 70.67
Enter 19th June 66.78
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Summary

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VAP: Summary

Visual

- Displays Support and Resistance levels without the noise
- Displays areas where the price is likely to gap through

Trading

- A price near a low volume node has a low probability of staying there

Advanced

- Using VAP as a pdf in strategy selection
- Testing the hypothesis that VAP distributions predict future distributions

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Thank You