



CBOE[®]

**Focusing on Theta and Vega
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Instructor – The Options Institute**

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- Pricing Factor Review
- Time Value and Theta
- Implied Volatility and Vega
- Summary / Q&A

Pricing Factors –

- Underlying (Stock or Index)
- Strike Price
- Time to Expiration
- Dividends
- Interest Rate
- Implied Volatility

Pricing Calculator Example –

Inputs		Output	Call	Put
Price	51.00	Option Value	1.90	1.10
Strike	50.00	Delta	0.60	-0.40
Days to Exp.	30	Gamma	0.12	0.11
Dividends	1.95%	Theta	-0.02	-0.02
Interest Rate	1%	Vega	0.05	0.06
Volatility	25%	Rho	0.01	-0.01

Categories –

Underlying Price

Delta / Gamma

Time to Expiration

Theta

Implied Volatility

Vega

Interest Rates

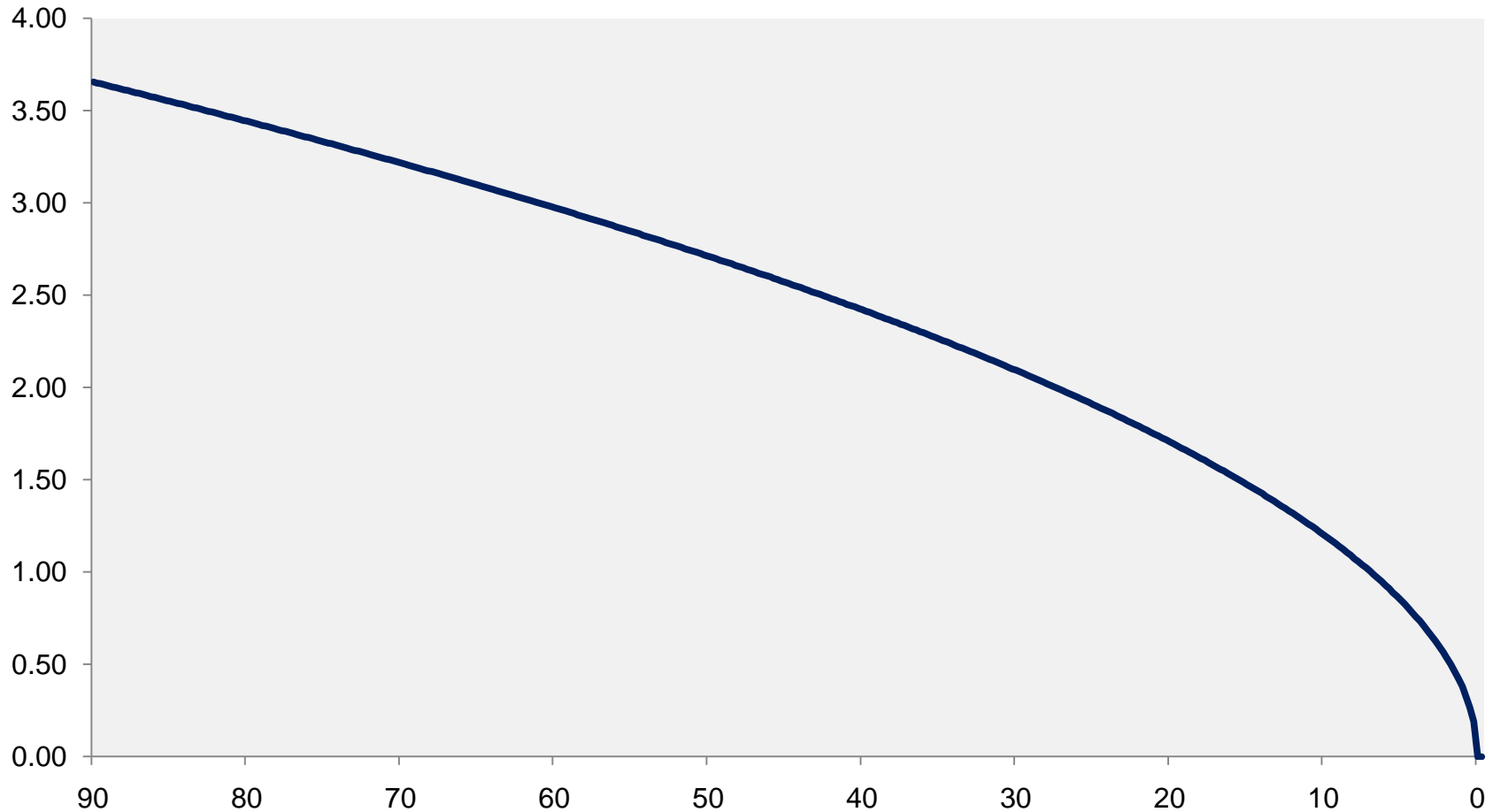
Rho

What we are talking about today

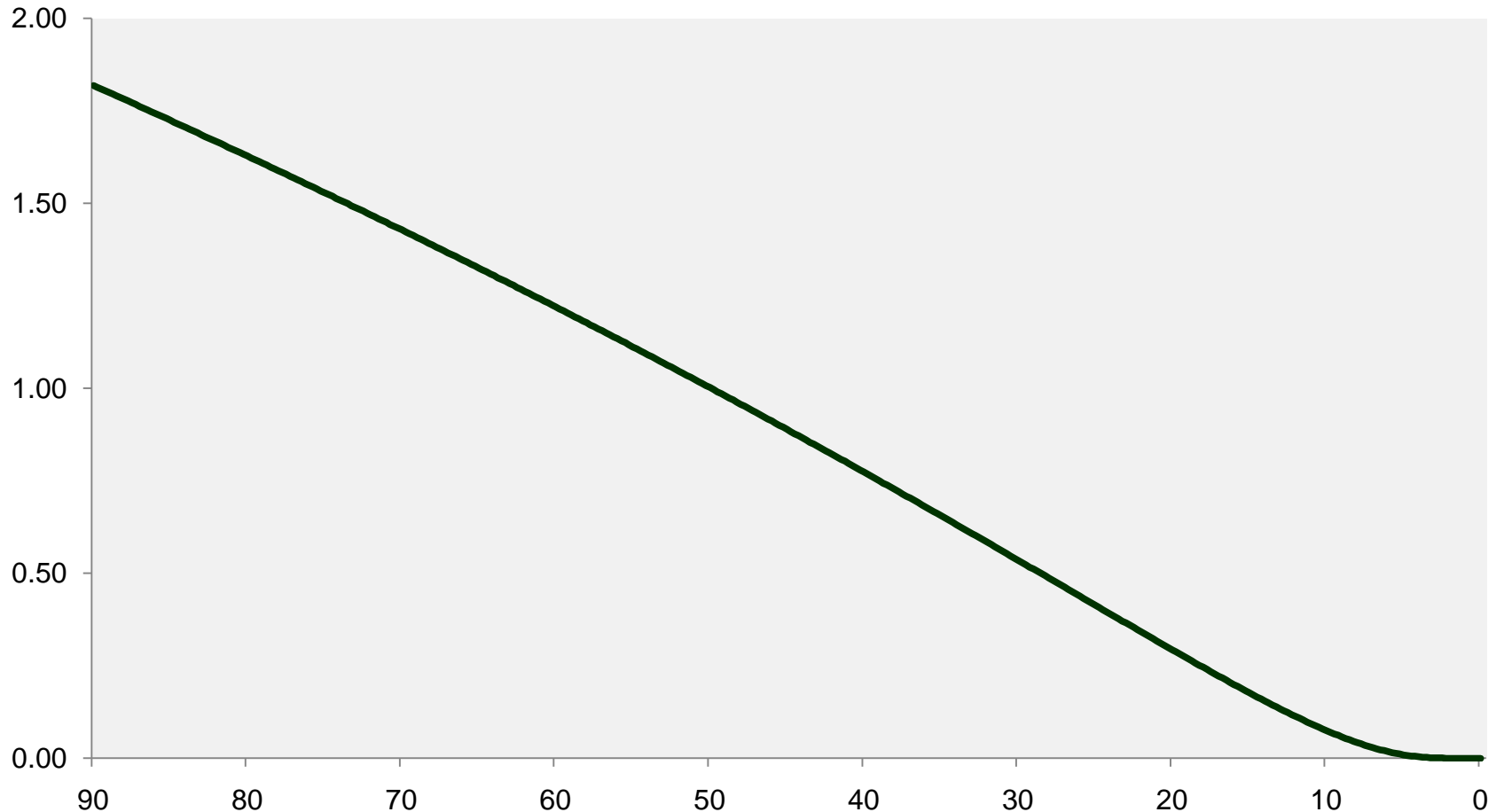
Things to know –

- The passage of time (often) has a negative impact on the price of options
- The rate that an option loses value based on the passage of time can vary

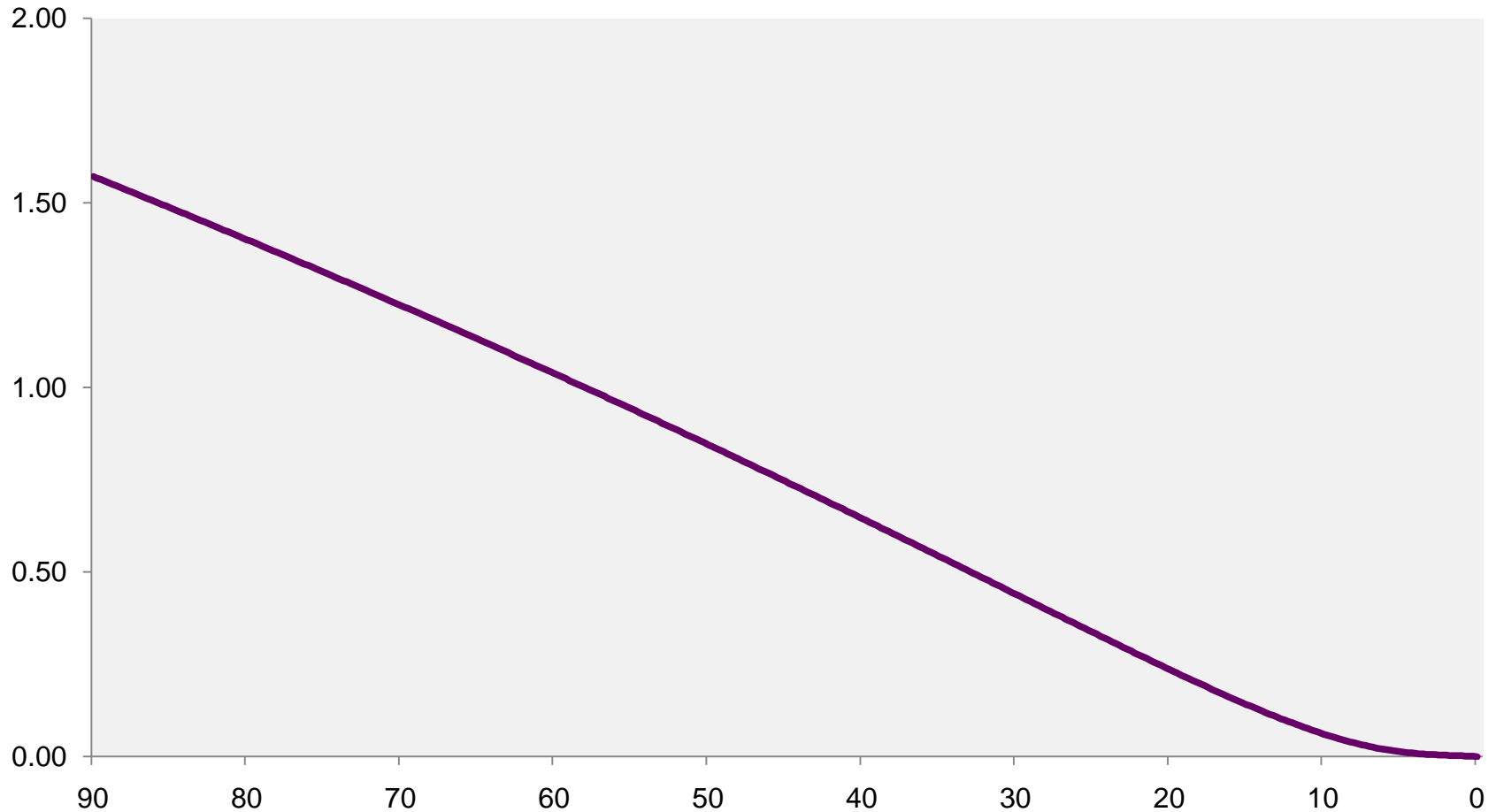
At the money time decay –



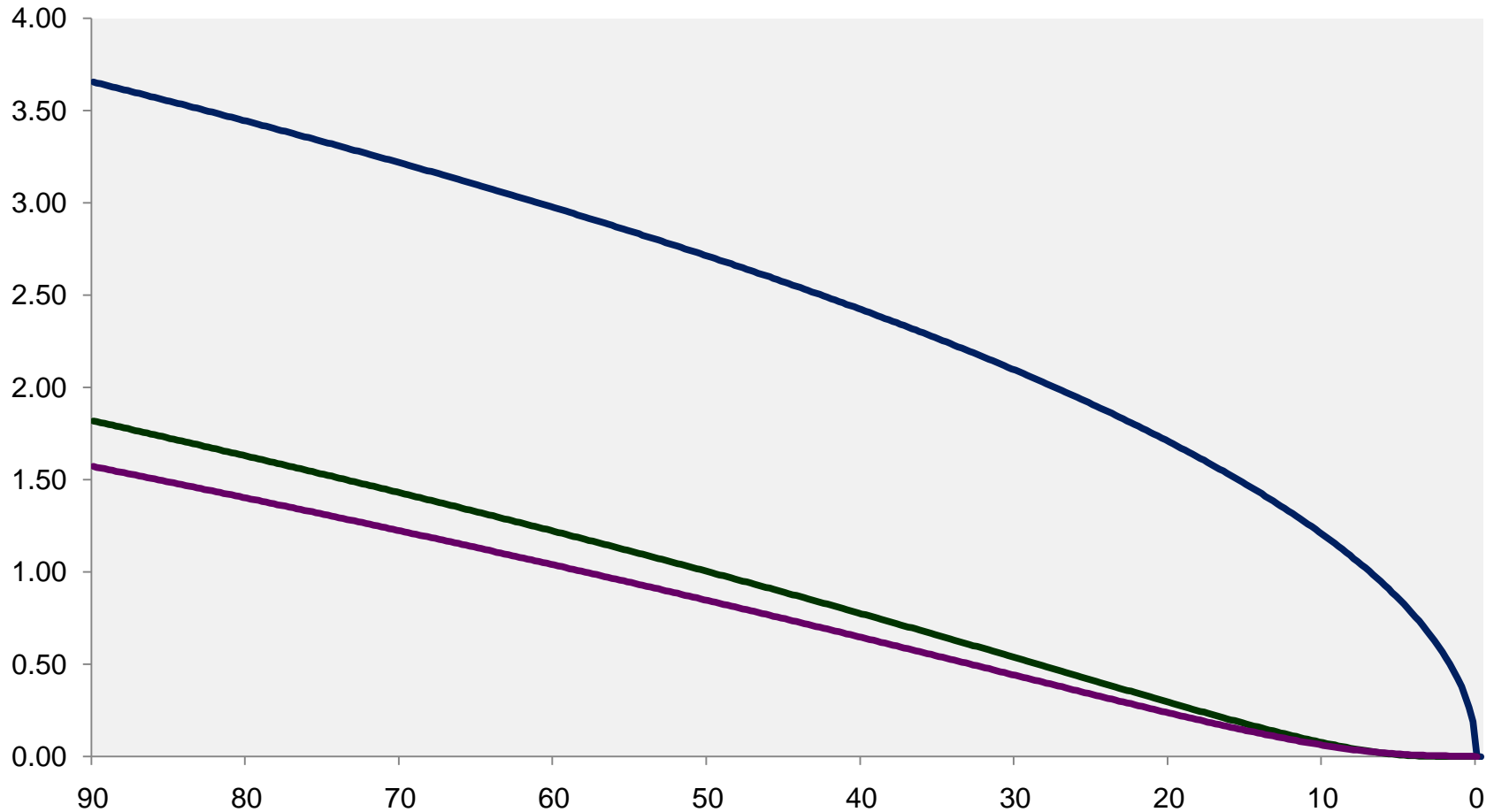
Out of the money time decay –



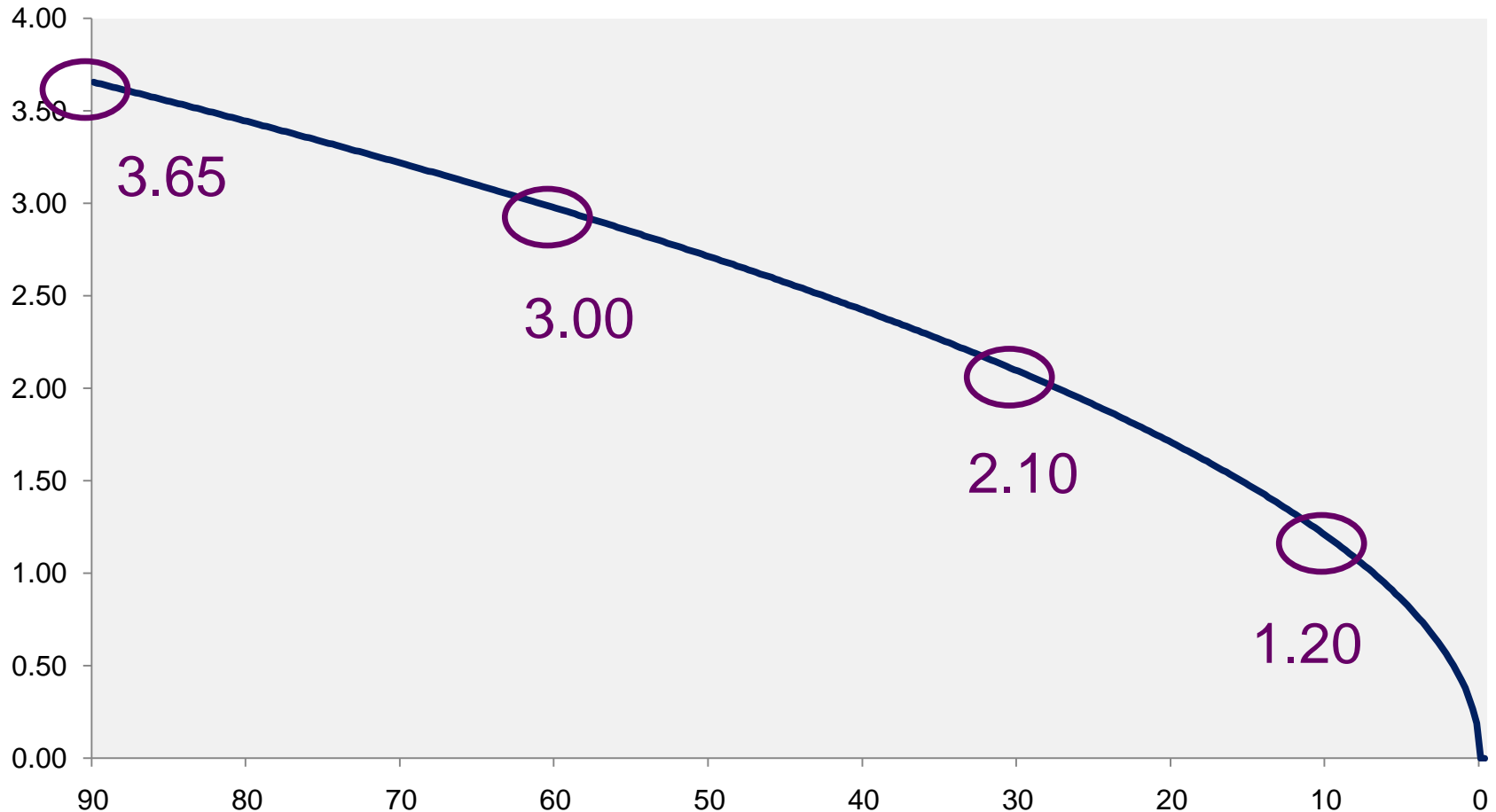
In the money time decay –



Comparison –



At the money time decay –



Calendar Spread –

- VRM @ 40.00
- Neutral outlook for 30 days
- April expiration in 30 days
- June expiration in 90 days

Sell 1 VRM Apr 40 Call @ 1.60

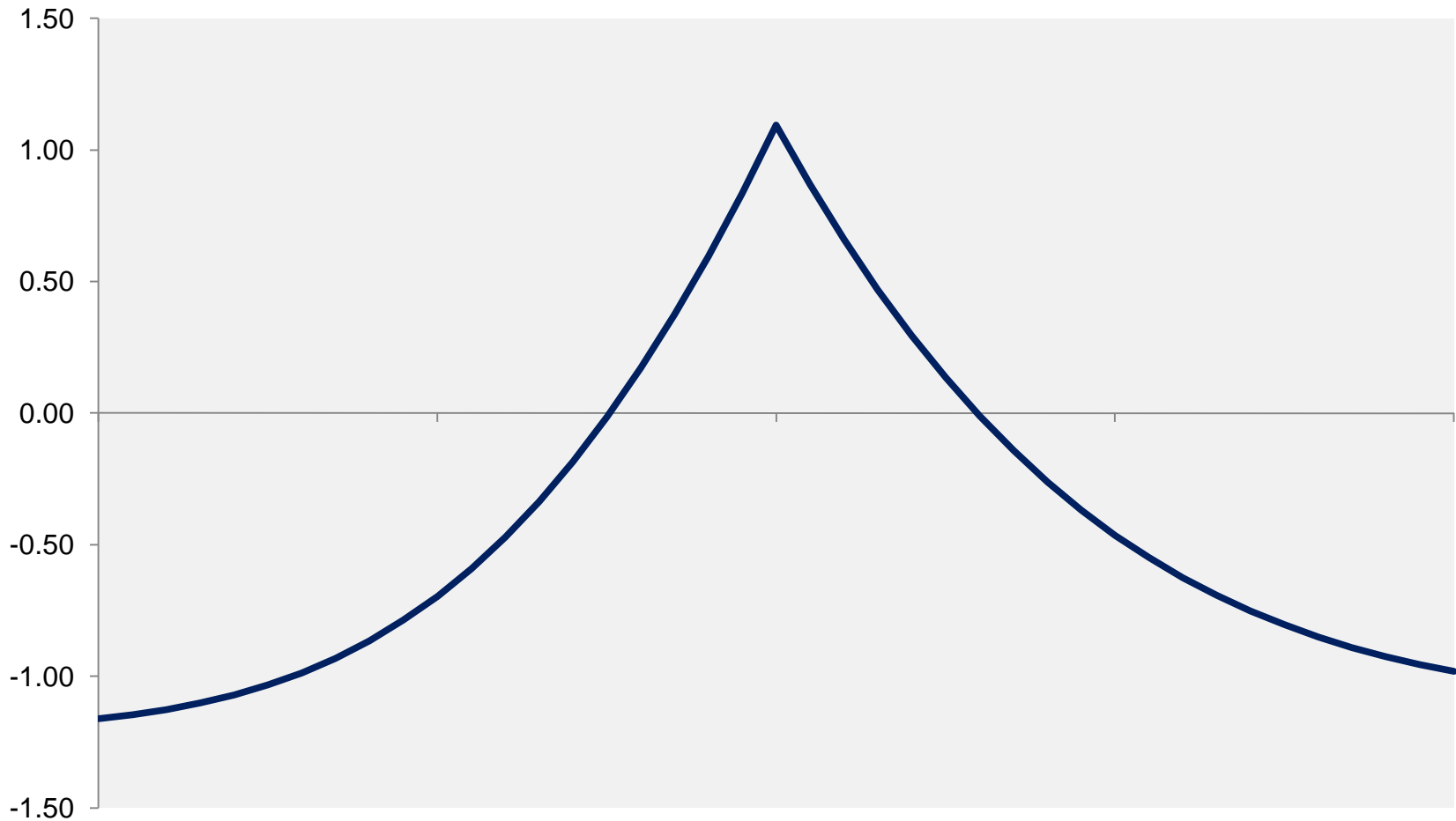
Buy 1 VRM Jun 40 Call @ 2.80

Net Cost (Debit) = 1.20

Payout at April Expiration –

VRM	Short 1 VRM Apr 40 Call	Long 1 VRM Jun 40 Call	Debit	P/L
30.00	0.00	0.10	(1.20)	(1.10)
35.00	0.00	0.50	(1.20)	(0.70)
40.00	0.00	2.30	(1.20)	1.10
45.00	(5.00)	5.75	(1.20)	(0.45)
50.00	(10.00)	10.20	(1.20)	(1.00)

Payoff Diagram –



Diagonal Spread –

- VRM @ 40.00
- Neutral to slightly bullish outlook for 30 days
- April expiration in 30 days
- June expiration in 90 days

Sell 1 VRM Apr 40 Call @ 1.60

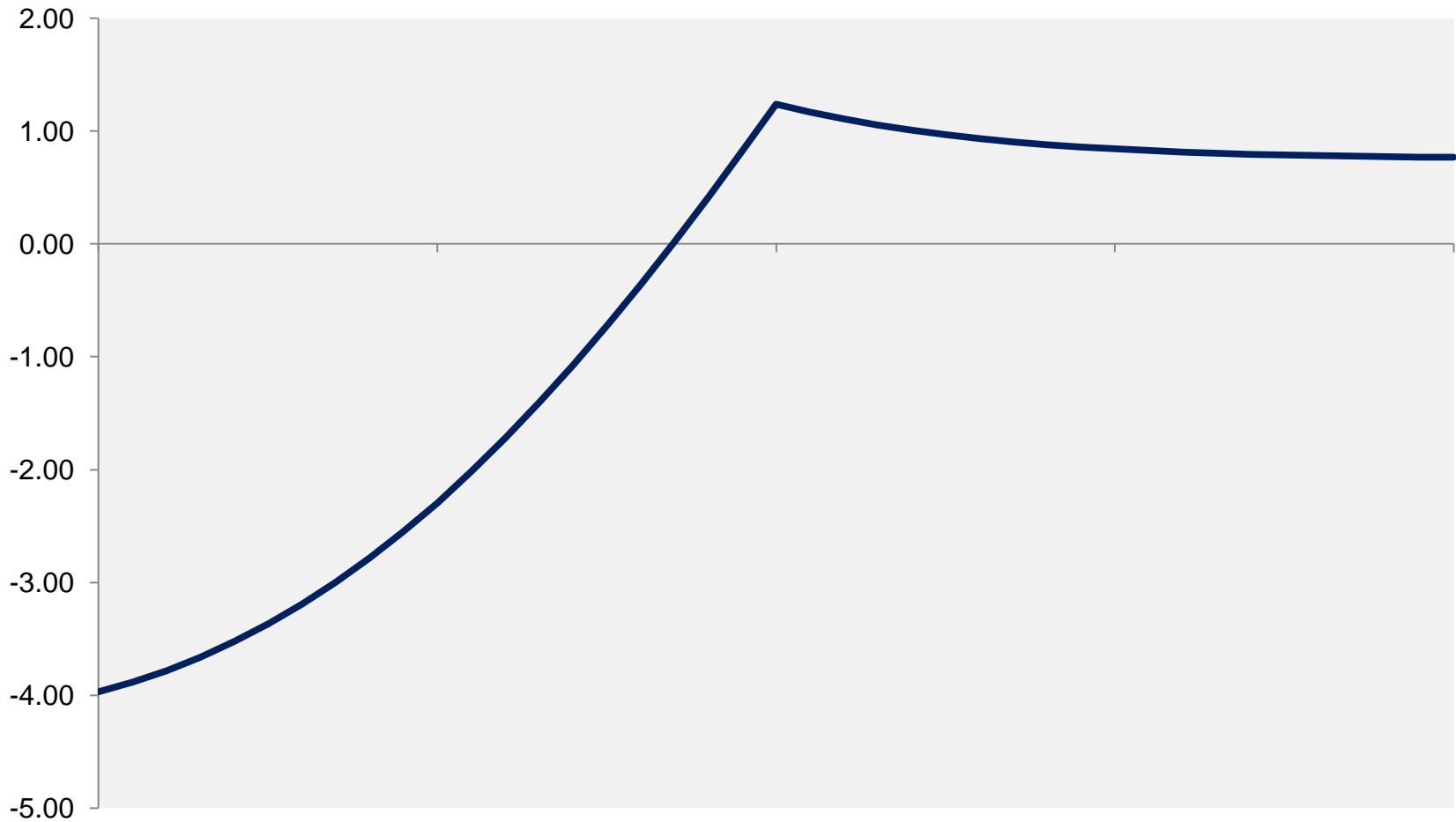
Buy 1 VRM Jun 35 Call @ 5.90

Net Cost (Debit) = 4.30

Payout at April Expiration –

VRM	Short 1 VRM Apr 40 Call	Long 1 VRM Jun 35 Call	Debit	P/L
30.00	0.00	0.30	(4.30)	(4.00)
35.00	0.00	2.00	(4.30)	(2.30)
40.00	0.00	5.55	(4.30)	1.25
45.00	(5.00)	10.15	(4.30)	0.85
50.00	(10.00)	15.05	(4.30)	0.75

Payoff Diagram –



LEAPS® Diagonal Spread –

- VRM @ 40.00
- Neutral to slightly bullish outlook for 30 days
- Long term bullish
- April expiration in 30 days
- January expiration in 300 days

Sell 1 VRM Apr 40 Call @ 1.60

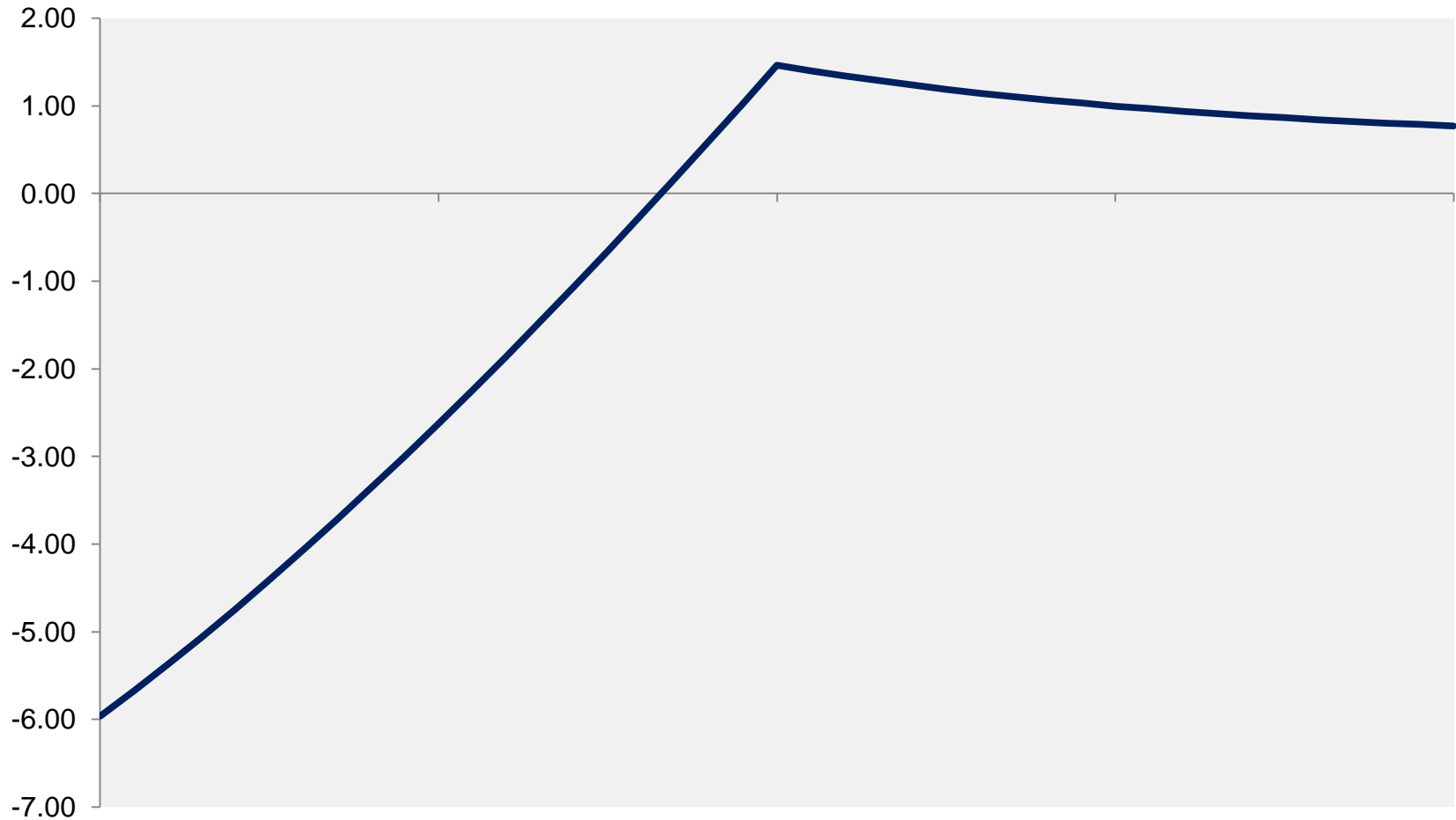
Buy 1 VRM Jan 30 Call @ 11.25

Net Cost (Debit) = 9.65

Payout at April Expiration –

VRM	Short 1 VRM Apr 40 Call	Long 1 VRM Jan 30 Call	Debit	P/L
30.00	0.00	3.70	(9.65)	(5.95)
35.00	0.00	7.05	(9.65)	(2.60)
40.00	0.00	11.10	(9.65)	1.45
45.00	(5.00)	15.65	(9.65)	1.00
50.00	(10.00)	20.40	(9.65)	0.75

Payoff Diagram –



Things to know –

- Option prices rise with higher implied volatility
- Lower implied volatility results in lower option premiums
- Implied volatility is often used to define whether options are expensive or cheap

Impact of changes –

Stock @ 50 –

	15%	25%	35%	45%
50 Call	1.50	2.50	3.50	4.50
50 Put	1.40	2.40	3.40	4.40

Historical Implied Volatility S&P 500 –



Historical Implied Volatility GOOG –



What can happen –

VRM @ 50.00

Buy 1 VRM 50 Call @ 2.30

One Day Later

VRM @ 51.00

Long 1 VRM 50 Call @ 2.05

Implied Volatility dropped from 40% to 25%

Long Volatility –

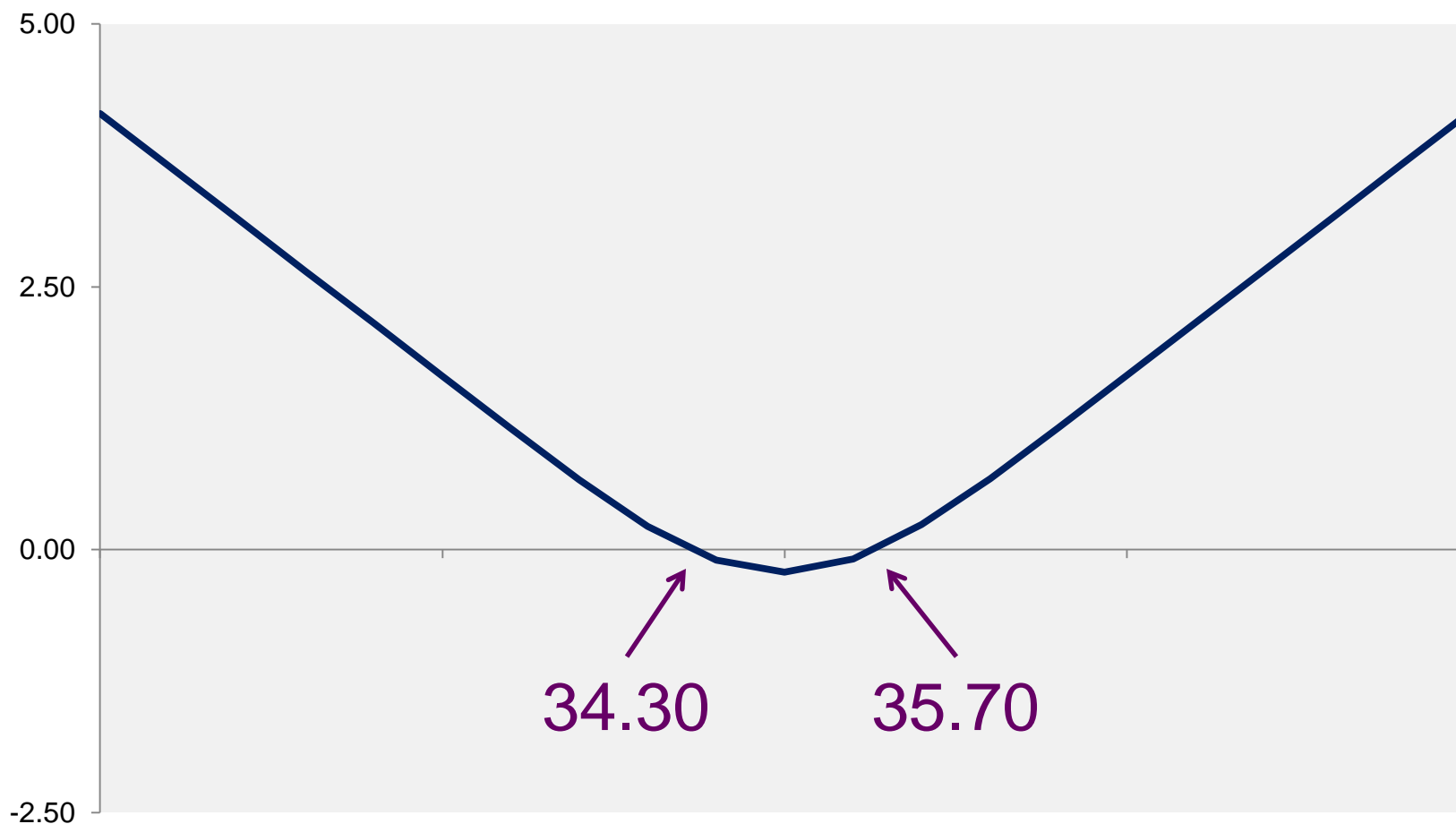
- Pure long volatility trade would be long straddle
- VRM at 35.00
- Believe implied volatility is too low and should rise quickly (25% to 35%)
- July expiration is in 4 days

Buy 1 VRM Jul 35 Call @ 0.42

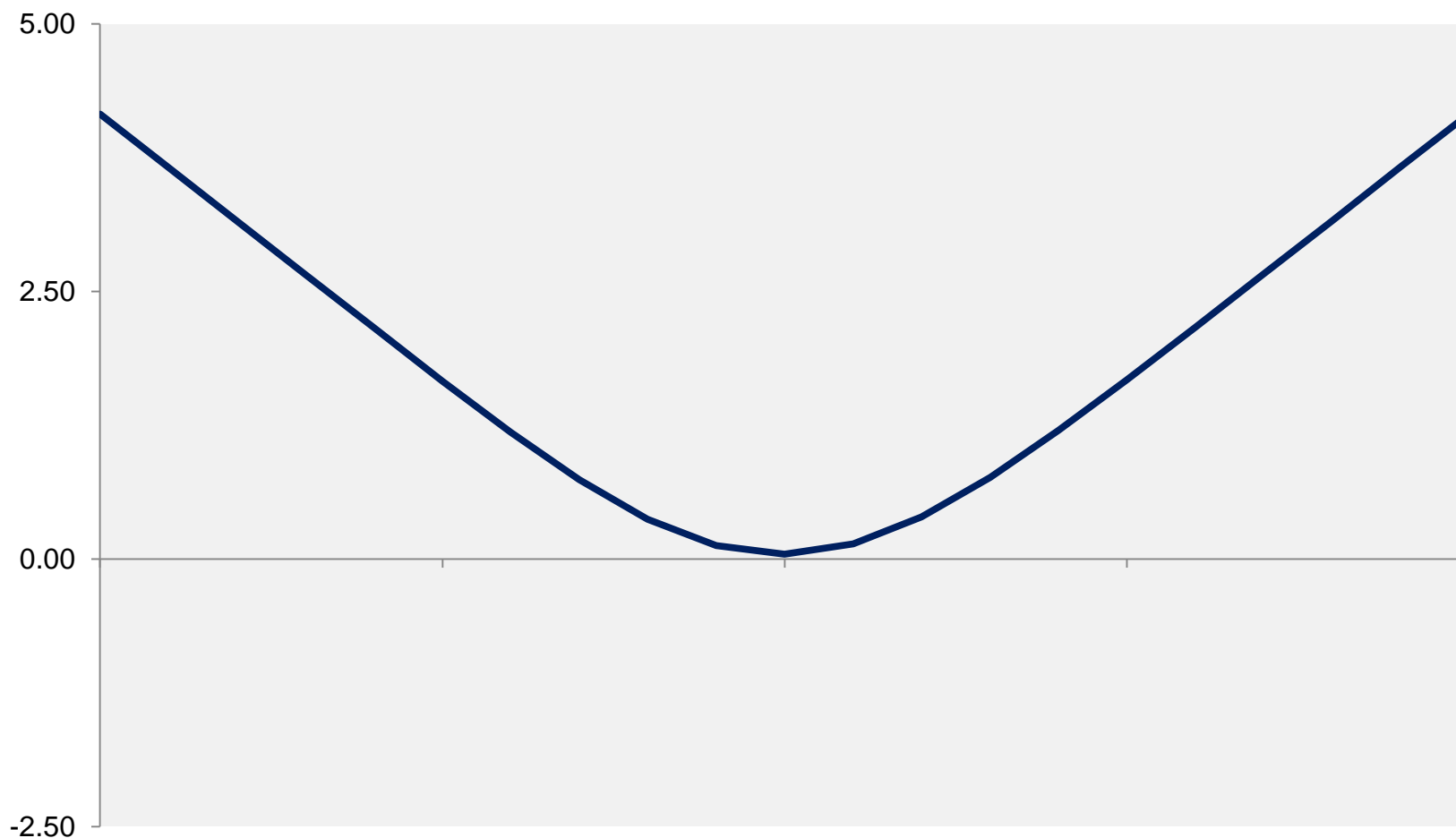
Buy 1 VRM Jul 35 Put @ 0.42

Net Cost (Debit) = 0.84

Next Day (3 Days to Exp.) – No Volatility Change –



Next Day (3 Days to Exp.) – 10% Volatility Increase



Quick Quiz –

- S&P 500 @ 1325
- Expect 2.5% rally over the next five days
- Which is the best 10-day call to purchase?

1325 Call @ 18.00

1350 Call @ 8.00

1375 Call @ 3.00

Correct Outcomes –

1325 Call	18.00	to	34.75	(+93%)
1350 Call	8.00	to	15.50	(+93%)
1375 Call	3.00	to	4.50	(+50%)

Tie between 1325 and 1350 Calls

Quick Quiz #2 –

- S&P 500 @ 1325
- Expect 2.5% drop over the next five days
- Which is the best 10-day put to purchase?

1325 Put @ 17.30

1300 Put @ 7.50

1275 Put @ 2.55

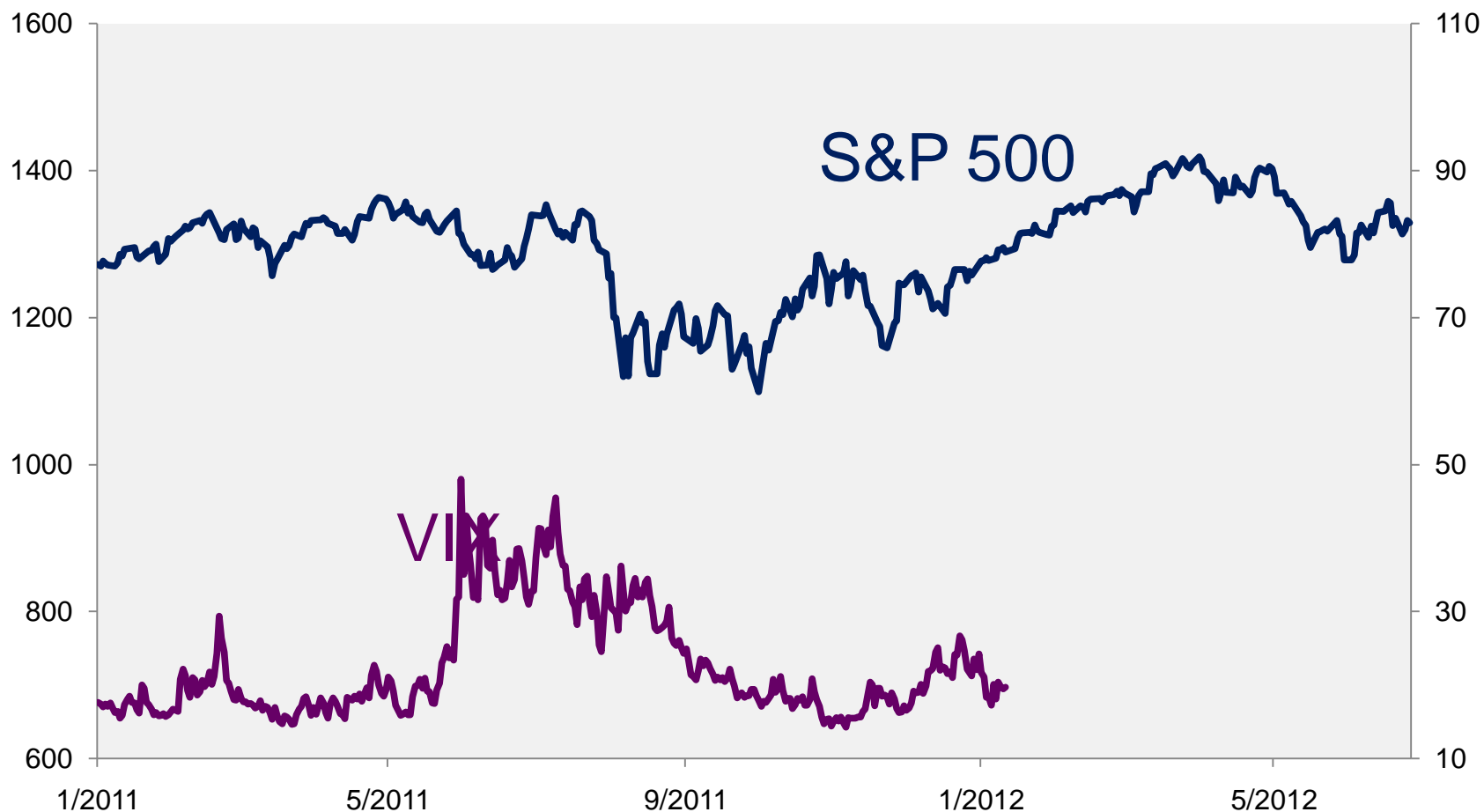
Correct Outcomes –

1325 Put	17.30	to	37.05	(+114%)
1300 Put	7.50	to	19.40	(+158%)
1275 Put	2.55	to	8.00	(+213%)

Out of the Money 1275 Put

Why the difference?

S&P 500 vs. VIX –



Summary –

- Implied volatility for options on equities tends to be forward looking
- With respect to index options, implied volatility tends to be more reactive

Questions?

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