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The Options Industry Council (OIC)

The Rule Of 16 – Deriving Daily Meaning From An Annual Volatility Metric

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OIC The Options Industry Council®

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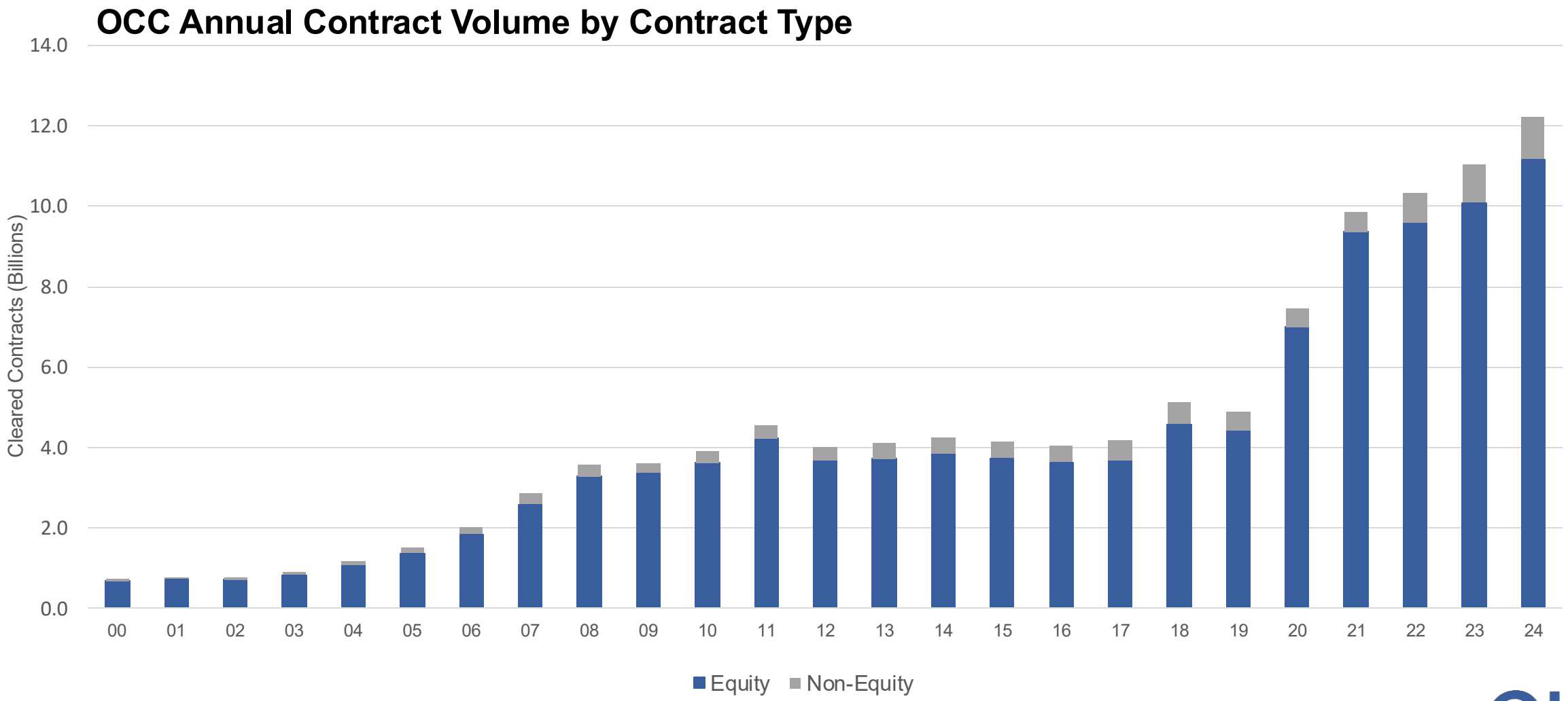
Annual Options Volume 2000-2024



Presentation Outline

- What is the Rule of 16?
- The Formula
- Annual Variance
- Breaking down Annual Variance
- Real World Applications
- Solve for the Standard Deviation
- Q & A

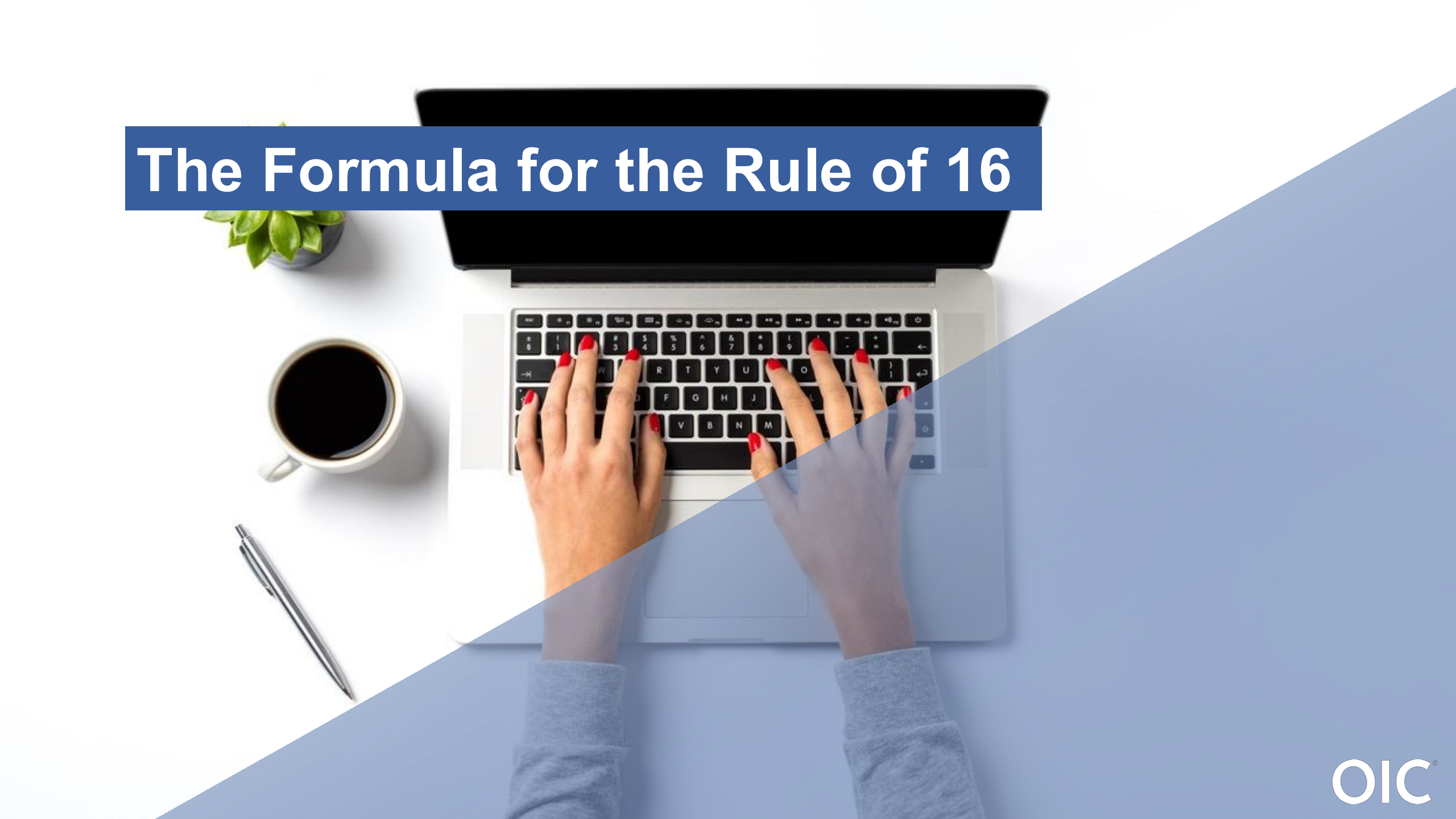
What is The Rule of 16?

What is the Rule of 16?

- The Rule of 16 is a way to convert annual implied volatility metrics into a daily expectation for underlying movement in smaller chunks.
- It can simplify risk calculations by creating a daily standard deviation framework.
- You can think of a daily standard deviation as how much you might expect something to move on any normal trading day, based on the given Implied Volatility level - Here's the math:

$$\textbf{Daily Standard Deviation} = \frac{\boldsymbol{Implied\ Volatility} \times \boldsymbol{Stock\ Price}}{\sqrt{\boldsymbol{Trading\ days}}}$$

The Formula for the Rule of 16



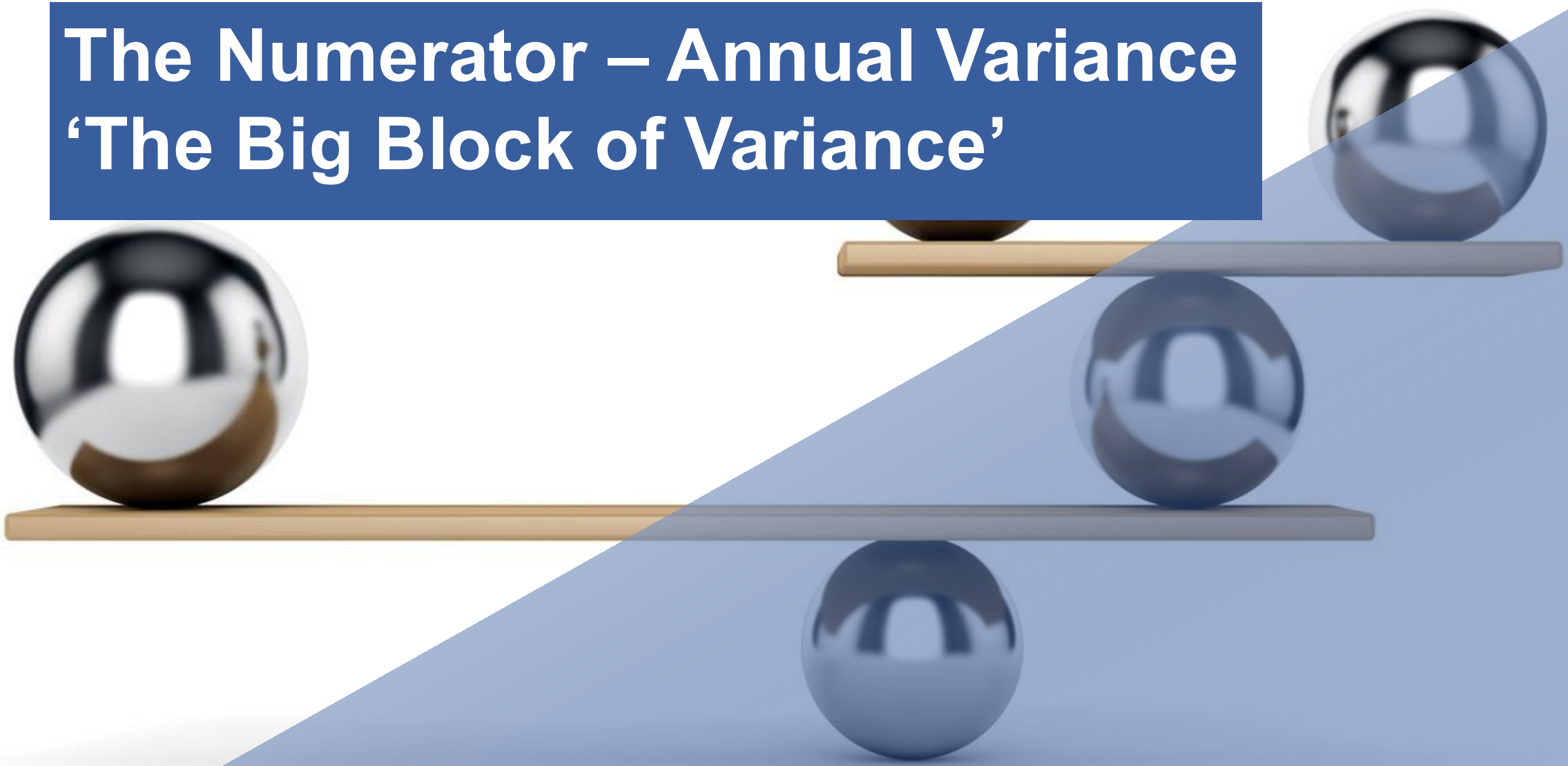
The Formula for the Rule of 16

$$\text{Daily Standard Deviation} = \frac{\boldsymbol{Implied\ Volatility} \times \boldsymbol{Stock\ Price}}{\sqrt{\boldsymbol{Trading\ days}}}$$

For simplicity, the square root of 252 trading days in a year is rounded to 16, which is why we refer to this as The Rule of 16.

Now, Let's talk about the Numerator and the Denominator separately….

The Numerator – Annual Variance
'The Big Block of Variance'



The Numerator of the Equation ‘The Big Block of Variance’

$$\text{Daily Standard Deviation} = \frac{Implied\ Volatility\ \times\ Stock\ Price}{\sqrt{Trading\ Days}}$$

- Think of the Numerator as the ‘Big Block of Variance’ – or how much you expect this underlying to move ***for the entire year.***
- Some refer to it as Annual Variance:

$$\boldsymbol{Annual\ Variance = Implied\ Volatility\ x\ Stock\ Price}$$

The Numerator of the Equation ‘The Big Block of Variance’

$$Annual\ Variance = Implied\ Volatility\ x\ Stock\ Price$$

- This is the starting point for expected movement – given an IV level you can estimate how much a stock might move over the course of a year – then this expectation can be sliced into smaller pieces of expectation for movement – days, weeks, or months.
- **Example: If Implied Vol is 20% and the stock price is $100, Annual Variance = $20**

Now that we have that expectation for an annual amount of movement, let’s slice it into more manageable pieces….

Breaking Down Annual Variance Using the Denominator

Annual Variance into What?

Slicing this annual variance amount into smaller pieces can yield more useful and ‘localized’ expectations of movement. Some commonly used standard deviations to calculate are:

Daily Standard Deviation - An estimate of how much you might expect something to move on any given trading day in the year

Weekly Standard Deviation – An estimate of how much you might expect something to move on any given week of the year

Monthly Standard Deviation – An estimate of how much you might expect something to move on any given month of the year

**all assumptions based on current Implied Volatility levels*

Breaking Down Annual Variance

•Because Variance is the expected value of the squared deviation from the mean, to remove the squared nature of the total Annual variance calculation, you must also divide by a square root of some fixed amount of time.

•Standard Deviation (SD) is the ***Square Root*** of the Variance.

•This is needed to slice the 'Big Block of Variance' – the Numerator from our equation - into many equal smaller blocks like daily, weekly, or monthly expectations for movement – smaller, and possibly more useful metrics

Converting to a Daily Standard Deviation

Converting to a Daily Standard Deviation

To slice this annual variance into a daily standard deviation expectation, use $\sqrt{Trading\ days}$ as your denominator:

Daily Standard Deviation

- Use square root of Trading Days in the denominator
- 252 Trading days in an average year
- $\sqrt{252} = 15.8745$
- For simplicity, we round to **16** for this denominator

But what does this look like in practice?

Converting to a Daily Standard Deviation

Assume a $100 dollar stock with a 20% Implied Volatility for a 30 DTE option, Let's find how much movement this Implied Volatility level forecasts for any average trading day during that 30 day duration:

$$\text{Daily Standard Deviation} = \frac{\boldsymbol{Implied\ Volatility} \times \boldsymbol{Stock\ Price}}{\sqrt{\boldsymbol{Trading\ days}}}$$

$$\text{Daily Standard Deviation} = \frac{.20 \times 100}{\sqrt{252}} = \frac{20}{16} = \$1.25$$

Daily Standard Deviation is $1.25 per trading day

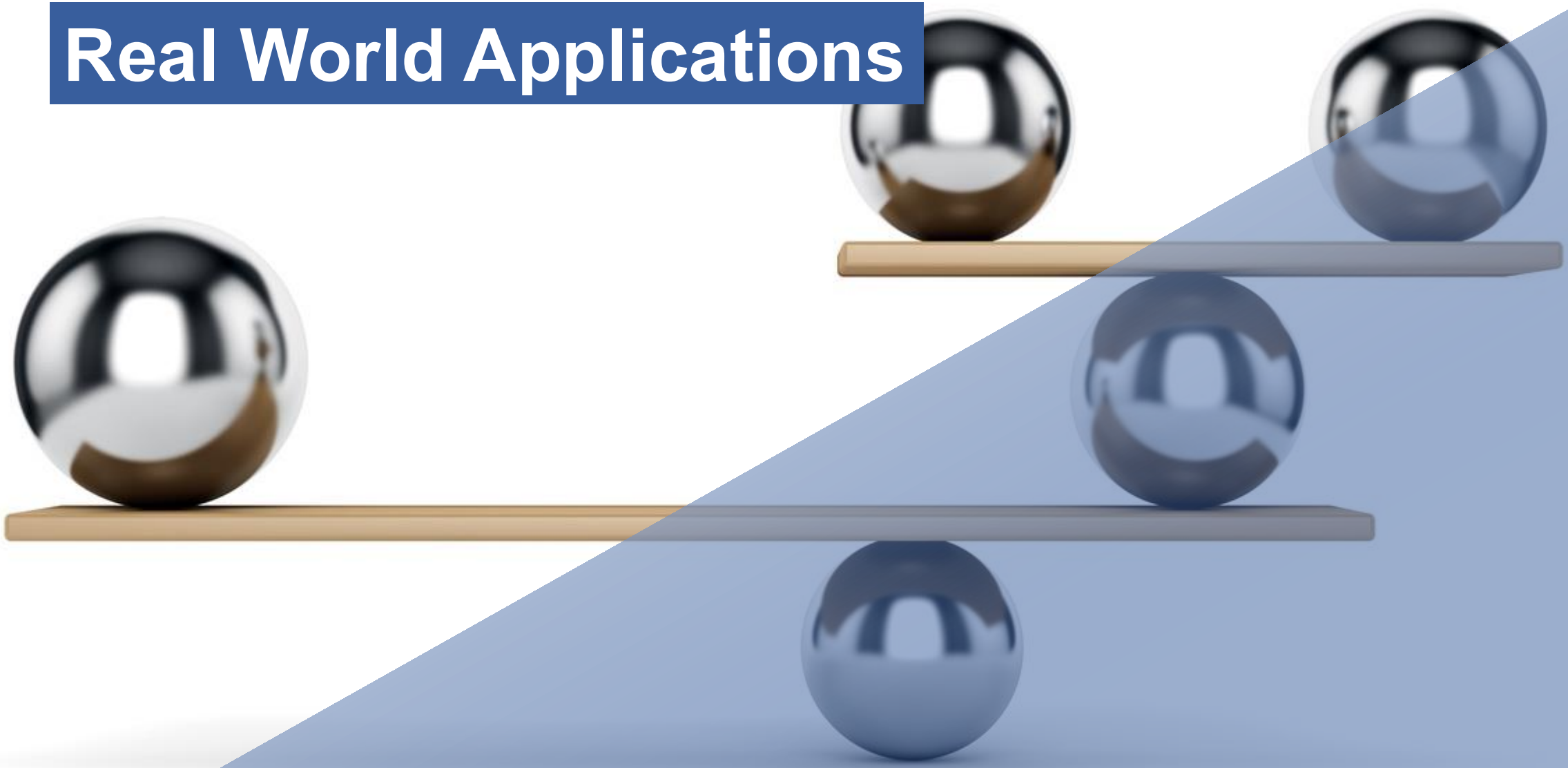
Annual Variance into a Daily Standard Deviation in Practice

$$\text{Daily Standard Deviation} = \frac{.20 \times 100}{\sqrt{252}} = \frac{20}{16} = \$1.25$$

This means a $100 dollar stock with a 20% Implied Volatility option is implying the average daily underlying stock movement over the lifetime of the option at its current price is $1.25 for any trading day.

The standard deviation does not denote direction – only movement away from the mean.

Real World Applications



Real World Applications

Using Daily Standard Deviation expectations can provide a way to contextualize underlying movement when it happens – a framework for evaluation. Consider our previous example:

$100 Dollar stock
20% Implied Volatility
30 DTE Options
$1.25 Implied Daily Standard Deviation

One random day, the stock moves up $7.00 dollars on positive corporate news, such as a potential buyout, and is now trading $107.

Real World Applications

From this previous example, the stock is trading up 7% on the day – a large move by all accounts. In terms of raw movement, the stock moved $7.00 dollars – but in terms of the forecasted movement from the option prices and Implied Volatility, there's 5.6x days worth of movement in one day of price action. You just witnessed a 5.6 Standard Deviation Move.

Does this change the way you think about the options going forward?

If you were long options in this situation, does it change your opinion?

How about if you were short options?

Real World Applications

Now let's suppose that during this move, the Implied Volatility of the options increases to 40%, as there are many more options bought than sold over the course of the move. Now we have:

$107 Dollar stock
40% Implied Volatility
29 DTE Options
$2.67 Implied Daily Standard Deviation

Is this reflective of your expectations for daily underlying movement going forward? **These options are very different from the previous day's options.**

Solve for the Daily Standard Deviation

$$\text{Daily Standard Deviation} = \frac{Implied\ Volatility \times Stock\ Price}{\sqrt{Trading\ days}}$$

Example #1

Stock Price: **$256.00**

Implied Volatility: **38%**

$$SD = \frac{.38 \times 256}{16}$$

Standard Deviation

$6.08

Example #2

Stock Price: **$35.00**

Implied Volatility **76%**

$$SD = \frac{.76 \times 35}{16}$$

Standard Deviation

$1.66

Example #3

Stock Price: **$84.00**

Implied Volatility **110%**

$$SD = \frac{1.10 \times 84}{16}$$

Standard Deviation

$5.78

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