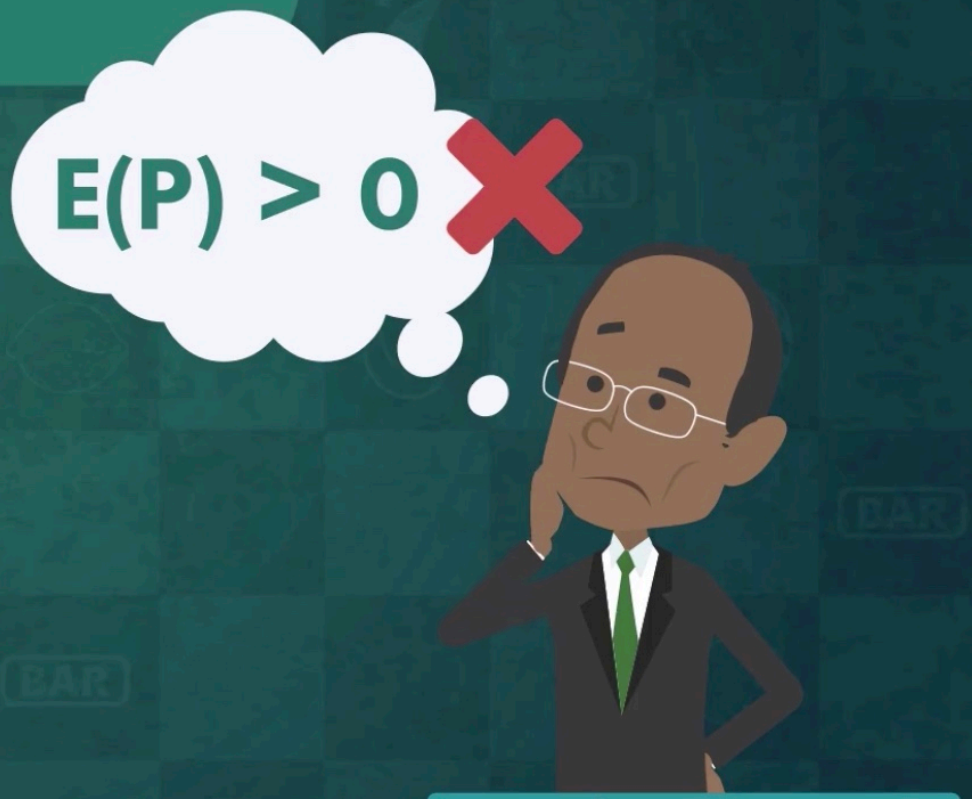
Tie-ins to Finance

Probability in finance

Probability in Finance

Many of the assigned probabilities are ballpark figures

Values are NOT a 100% certain!



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Option pricing

Option:

An agreement between two parties for the price of a stock or item at a future point in time

It allows one of the sides to decide

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Option pricing

How much we are willing to pay to receive that pact?
(Highest premium)

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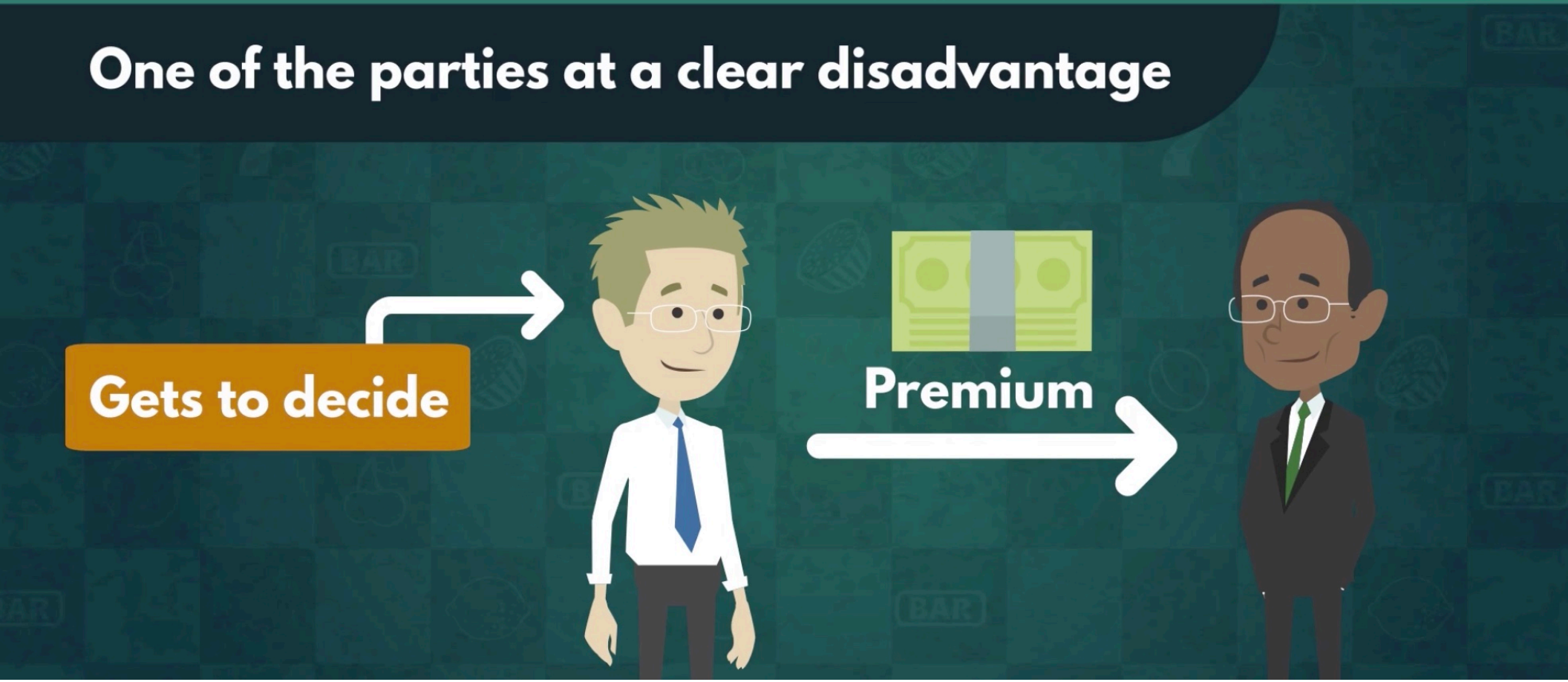
Option pricing

One of the parties at a clear disadvantage



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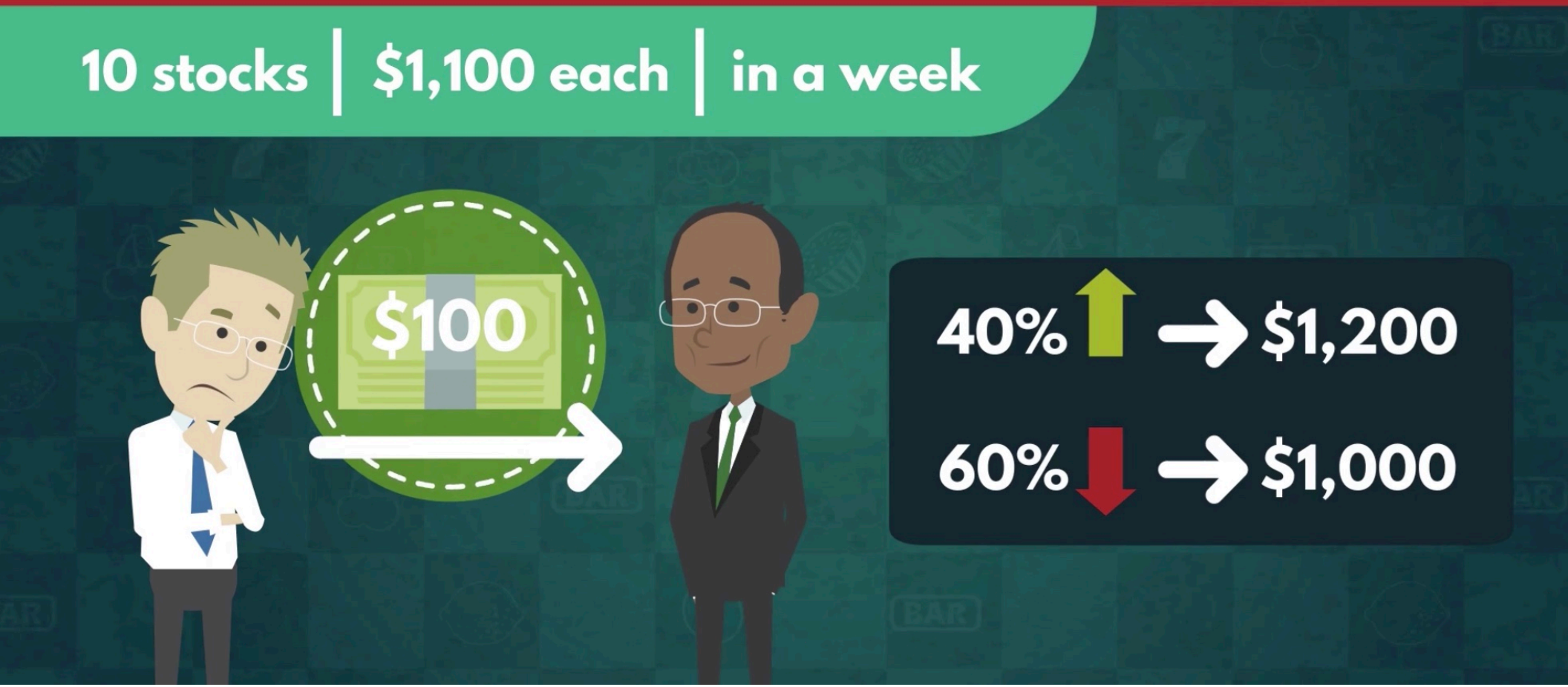
Google Example

$1,100 x 10 = $11,000

1.60

Google Example

10 stocks | $1,100 each | in a week



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Google Example

Better off buying the 10 stocks at the market price

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Google Example

You would take advantage of the deal you struck

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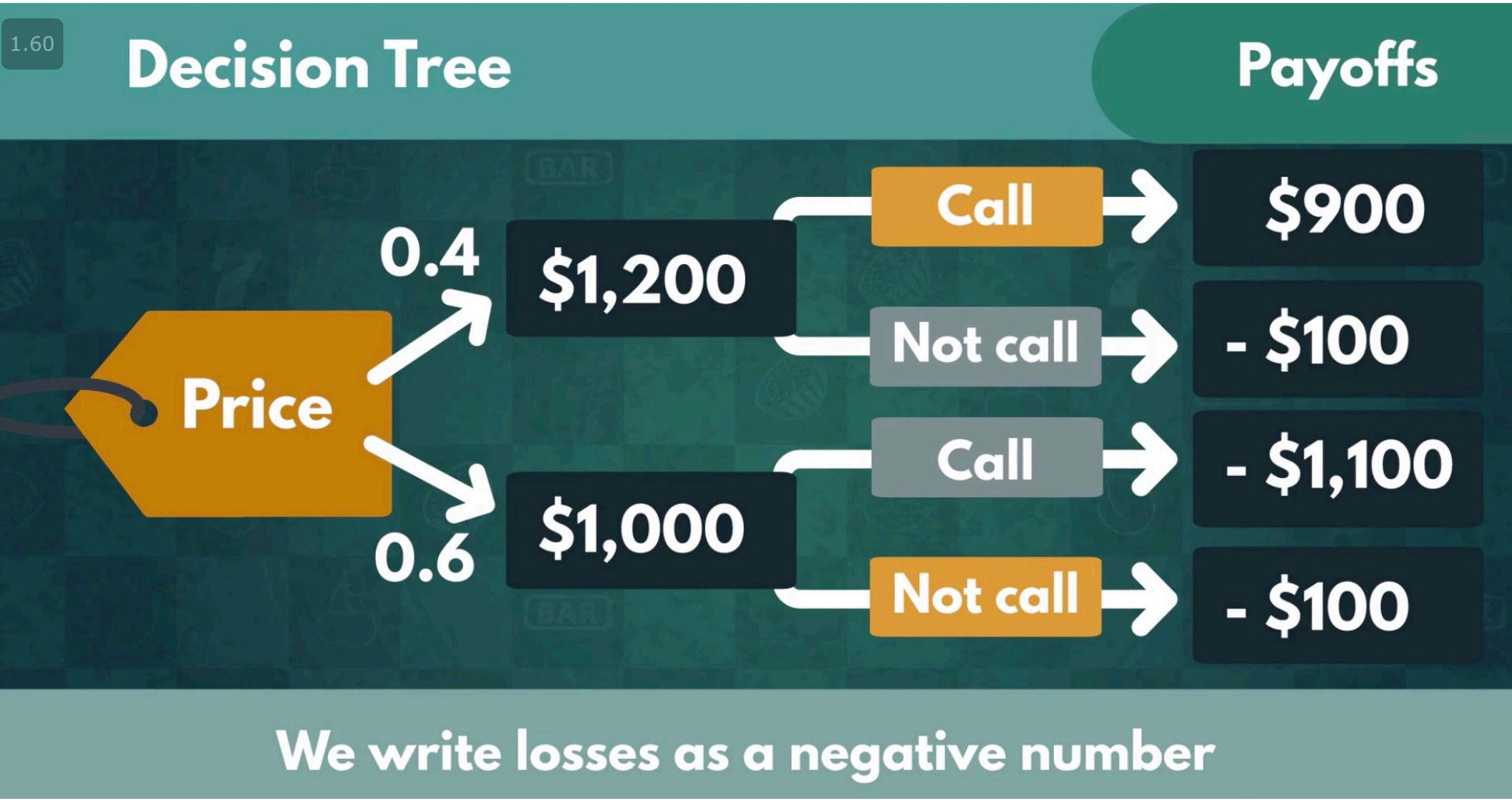
Google Example

1.60

Decision Tree



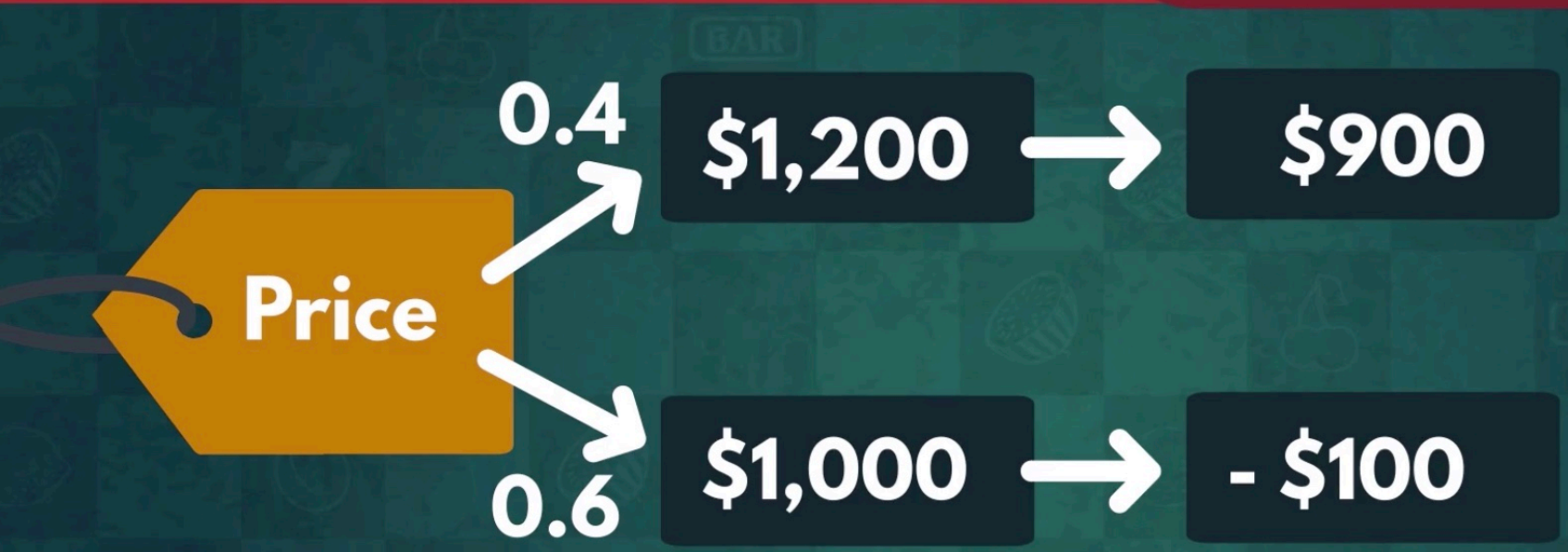
We write losses as a negative number

Expected Payoffs

$E(P) < 0$	**Disadvantageous** (Avoid buying this option)
$E(P) = 0$	**"Fair deal"** (You expect to make as much as you paid)
$E(P) > 0$	**Favourable** (Go through with the deal)

Google Example

Payoffs



$$E(P) = 0.6 \times (-100) + 0.4 \times 900 =$$
$$= -60 + 360 = \$300$$

Fullscreen

Google Example

$E(P) = \$300 > 0$

Favourable → Buy the option


1.60
Pricing an Option
If the investor has the same information as you:
Fullscreen
Unfavourable deal for you
"Fair deal" (Usually)
E(P) ≤ 0

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Pricing an Option

Investors can charge a higher premium to make a "fair deal"

Premium ↑ $300

E(P) ↓ $300

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Pricing an Option

Payoffs

Calculating E(P) if there is no premium

$$E(P_1) = 0 \times 0.6 + 1{,}000 \times 0.4 = \$400$$

Pricing an Option

$E(P_1) = \$400$

Maximum price

matches highest premium estimation from before

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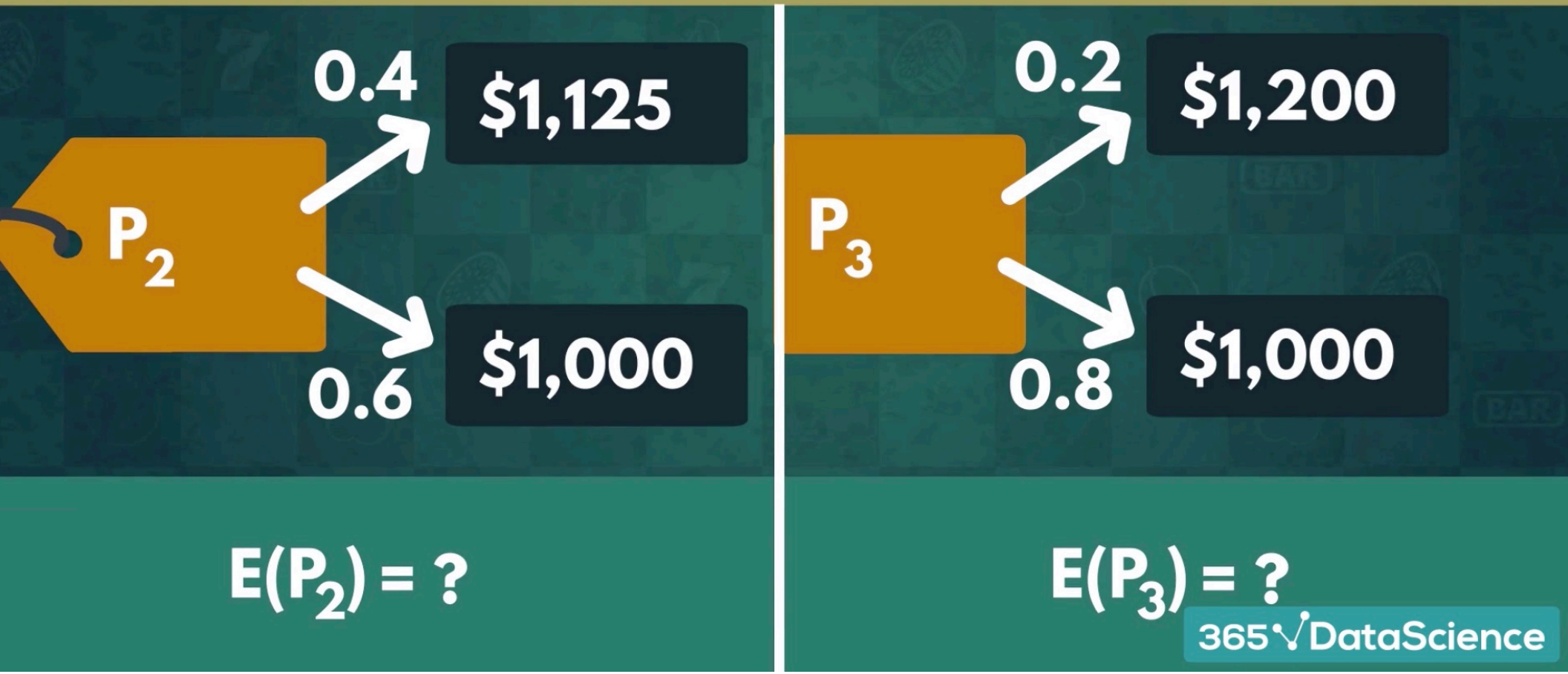
Pricing an Option

What if the stock value only increases to $1125?



$E(P_2) = ?$

$E(P_3) = ?$

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