RANDOM WALK IN STOCK-MARKET PRICES

What is the theory of Random Walk?

How to invest in stocks due to Random Walk theory?

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What exactly is Random Walk?

RANDOM WALK

Random walk theory suggests that changes in stock prices have the same distribution and are independent of each other. Therefore, it assumes the past movement or trend of a stock price or market cannot be used to predict its future movement.

RANDOM WALK - MAIN ASSUMPTIONS

1

No pattern in Randomness

2

History does NOT repeat itsefl

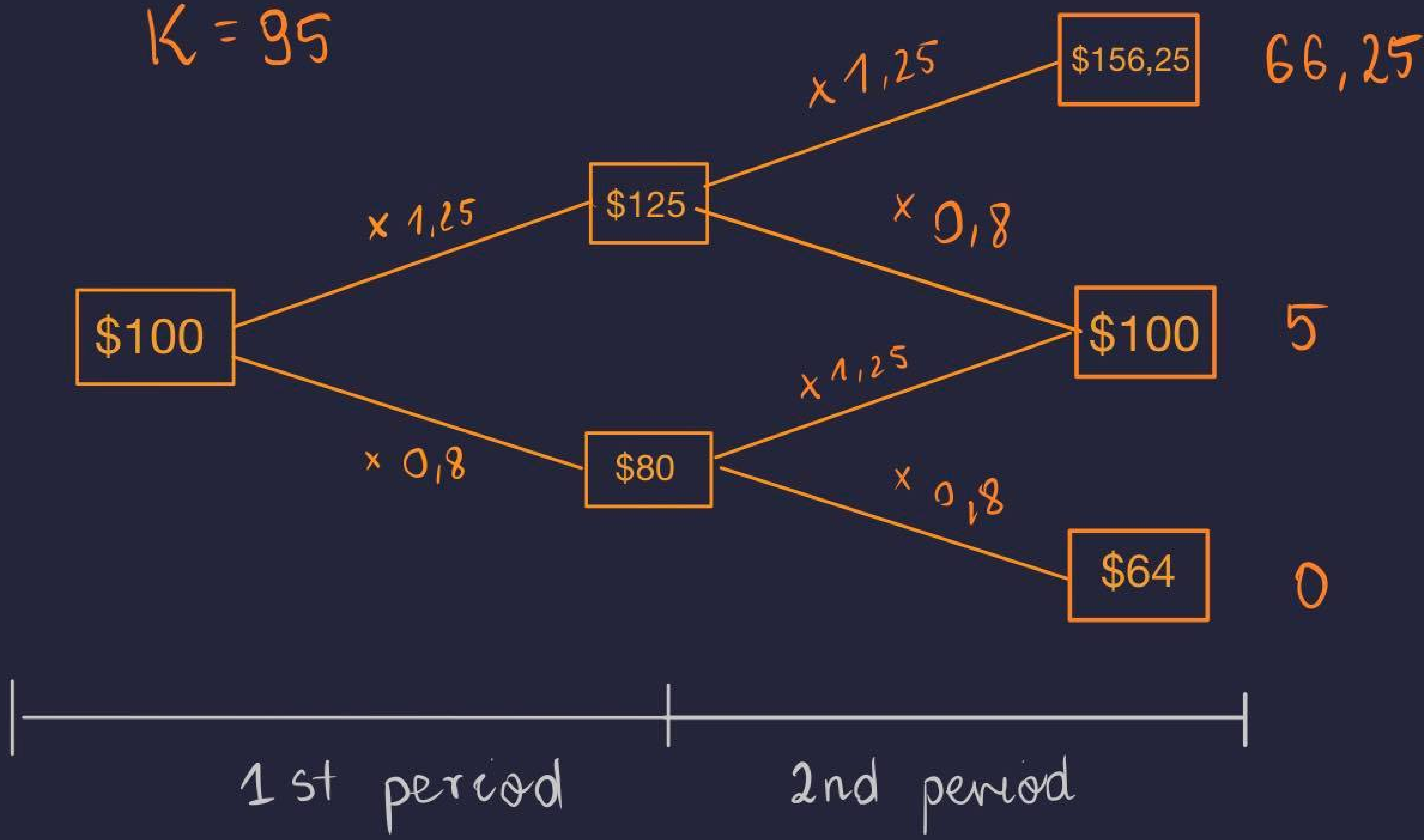
3

Requires taking risks

BINOMIAL TREE

1. share price, S_0 = \$100
2. strike price, K = 95
3. risk free rate, r=7%
4. size of up move u=1,25
5. size of down move d= 1/u = 0,8

next slide



K = 95
$100
x 1,25
$125
x 0,8
$80
x 1,25
$156,25
66,25
x 0,8
$100
5
x 1,25
x 0,8
$64
0
1st period
2nd period

WHAT IS NEXT?

How to estimate a probality of an up or a down move?

1. Probability of an up move P(u)=
2. Probability of a down move P(d)=)

$$\pi_U = \frac{1 + R_f - D}{U - D}$$

$$\pi_D = 1 - \pi_U$$

EQUATIONS

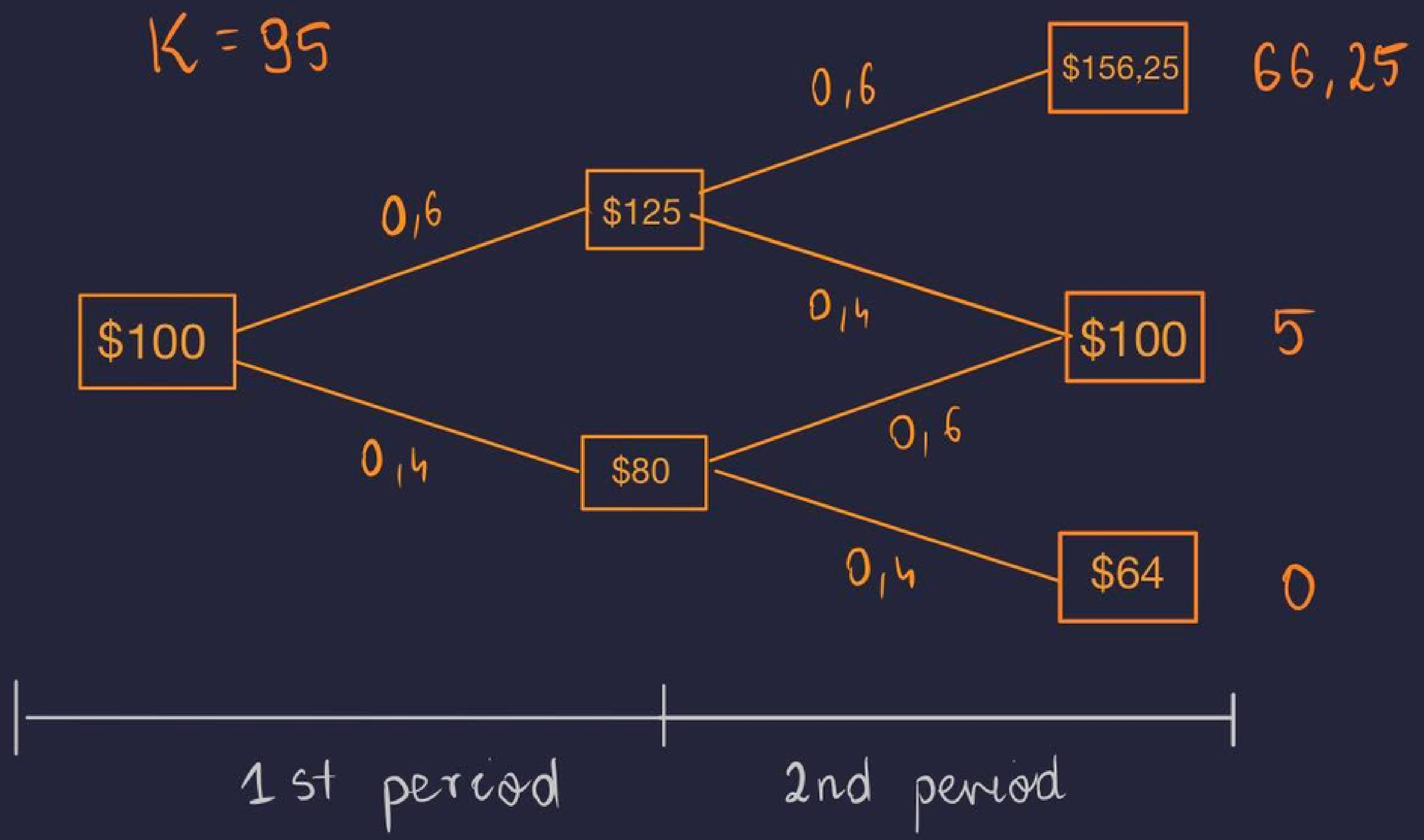
$$p_u = \frac{1 + r - D}{U - D} = \frac{1{,}07 - 0{,}8}{1{,}25 - 0{,}8} = 0{,}6$$

$$p_d = 1 - p_u = 0{,}4$$

HOW TO ESTIMATE THE PRICE OF OPTION AFTER EACH STEP?

1. Probability of an up move P(u) = 0,6
2. Probability of a down move P(d) = 0,4

When we have given the probability of an up and down move we can estimate the expected value of an option



Given that r=7% calculate the value of 2-years option with a strike price $95, we can get an expected value by multyplying the payoff prices and adding them to each, then dividing it by 1+r

Estimating the option prices

$\$\,66{,}25 \;-\; P(u) = 0{,}6$

$\$\,5 \;-\; P(d) = 0{,}4$

1 $\quad 66{,}25 \cdot 0{,}6 + 5 \cdot 0{,}4 = 39{,}75 + 2 = 41{,}75$

$$\$125 \;\rightarrow\; \frac{41{,}75}{1+r} = \frac{41{,}75}{1{,}07} \simeq \$\,39$$

2 $\quad 5 \cdot 0{,}4 = 2$

$$\$\,80 \;\rightarrow\; \frac{2}{1{,}07} = 1{,}87$$

3 $\quad \$\,100 =$

$$\rightarrow \; = \frac{41{,}75 \cdot 0{,}6 + 2 \cdot 0{,}4}{(1{,}07)^2}$$

$$= 22{,}58$$

EQUATIONS

terms related to the valuation of the call option

After estimating the price of an option call we are dealing with few terms of this method

1. ITM

PROFIT OPPORTUNITY

2. OTM

OVERPAYING OR BEING UNDERPAID

3. ATM

STRIKE PRICE IS IDENTICAL TO THE CURRENT PRICE

THE END

THANK YOU FOR YOUR ATTENTION