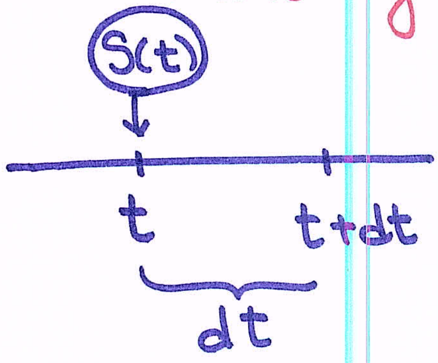
D: Feb 4th, 2019.

Continuous dividend payings stocks.

- $S(t)$, $t \geq 0$ ... stock price @ time t
- δ ... dividend yield



The shareholders receive

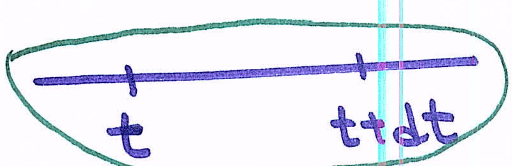
$$\delta \cdot S(t)\,dt$$

in dividends for the time interval $(t, t+dt)$ PER SHARE owned!

Convention: With continuous dividends, ALL the dividends are IMMEDIATELY & CONTINUOUSLY reinvested in the SAME ASSET!

Notation: $N(t)$, $t \geq 0$ ... the # of shares owned @ time t

At time 0: $N(0) = n_0$ ... the # of shares purchased initially



$N(t)$ $\qquad$ $N(t+dt)$

A

$$\Rightarrow \; dN(t) = N(t+dt) - N(t) = \text{\# of shares purchased for } (t, t+dt)$$

Q: What is the total dividend amt paid for $(t, t+dt)$?

$$N(t) \times (\underbrace{\delta S(t)\,dt}_{\text{PER SHARE}})$$

Q: What is the total # of shares one can buy for the above amount?

$$\frac{N(t)\,\delta\,\cancel{S(t)}\,dt}{\cancel{S(t)}} = N(t)\,\delta\,dt \qquad ☆☆$$

☆ & ☆☆ $\Rightarrow$

$$dN(t) = N(t)\,\delta\,dt$$

$$\frac{dN(t)}{N(t)} = \delta\,dt \qquad / \int$$

$$\ln(N(t)) = \delta t + \text{const}$$

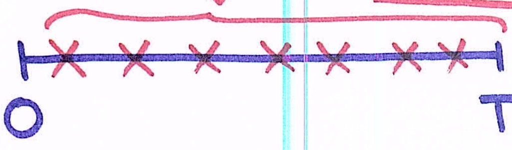
$$N(t) = e^{\delta t}\, e^{\text{const}}$$

At $t=0$: $N(0) = e^{\text{const}} = n_0$

$$\Rightarrow \boxed{N(t) = n_0 e^{\delta t}}$$

Static Portfolios.

No intermediate cashflows!



"today"

TIME HORIZON

INITIAL COST

THE PAYOFF

The time-0 cashflow from the investor's perspective.

The time-T cashflow from the investor's perspective