Economic Background.

- **Discounting:** Price S_t at time t

  discount $\downarrow$ $e^{r(T-t)}$ $\qquad r = r(T,t)$.

  At time T: $e^{r(T-t)} S_t$.

  Rmk: Distinguish nominal price and real one.

- **Market:** i) Stock Market: trade stock and share

  $\Rightarrow$ Asset and earnings realized as dividends. (and capital appreciation)

  ii) Money Market: Money is borrow and paid by rate of interests. coupons...

- Economics deal with how price are determined. Finance concerns borrowing and lending money need to be engaged in economics.

  Rmk: Small eco-agents: Price takers.

  Large eco-agents: Price makers.

- **Perfect Market:** i) No arbitrage (NA)

  ii) No transc. taxes or costs

iii) Same interest rate for borrow and lend.

iv) Unlimited liquidity. v) No limit on scale

· **History**: Before 1950s, Finance is more an art than a science, which's changed by the intro. of Portofilio theory by H. Markowitz.

2 key insights of Markowitz:

i) Think of risk and return together.

ii) Diversify by holding a balanced portoflio with lots of negative correlations.

⇒ Black. Scoholes, Merton: Option pricing in 70s.

⇒ Itô calculus. Marts after 1980s.

· **Option**: i) Call options: give right to buy

ii) Put options: give right to sell.

· **Portofolio**: A division (B_t, S_t) where investors carry riskless assets B_t and risk asset S_t.

· **Hedge**: An attempt to reduce risk by adopting opposite positions.

Rmk: In a portofolio / position:

short / long in an asset if the holding of assets is negative / positive.

We allow short-selling:

sell stock we don't own.

Big Pictures:

i) Anything important enough becomes political.

ii) Finance is the means to an end. as the nervous systems of the economy.