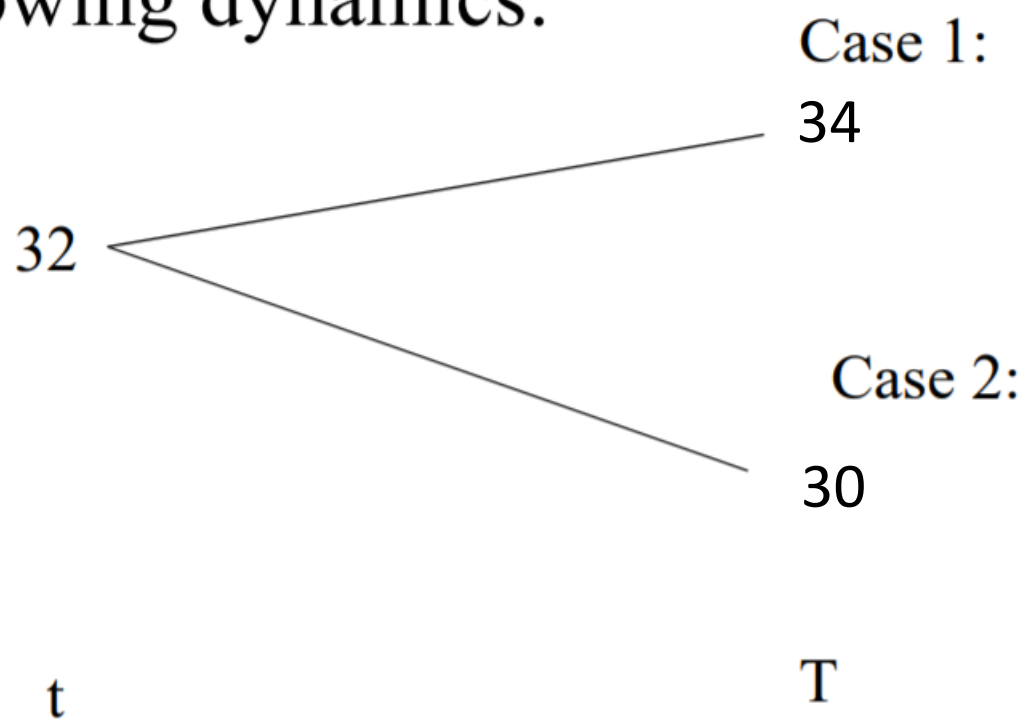
財務工程導論

HW1

How to Determine the Option Price (Arbitrage-Base Pricing Theorem)

- Assume that the exchange rate follows the following dynamics:



Arbitrage-Base Pricing Theorem

Replicate the Option

- Replication: Construct a portfolio that has the same payoff as the option at maturity.
- This call option can be replicated as follows:
  - We buy x TWDs and y USDs at time t
  - We hope that this portfolio generates the same payoff as the option at time T.
  - At case 1: _____
  - At case 2: _____
  - Solve the equations, we have x=____ , y=____

Arbitrage-Base Pricing Theorem

Replicate the Option and Determine the Option Price

- A foreign exchange option can be constructed as follows:
  - Borrow _____
  - Buy _____
  - The total cost= _____
- At case 1:
  - The value of portfolio= _____
- At case 2:
  - The Value of portfolio= _____
- The Value of the option is _____

Arbitrage-Based Pricing Theorem

Condition of Arbitrage Opportunity

- Arbitrage opportunity exists if the option value is ***not*** ____ TWDs.
- Let the option value P> ____
  - Sell a call option for P dollars.
  - Construct a replication portfolio
    - Borrow _____ and buy _____
    - Benefit at time t = P – ___ >0.
    - No loss will be introduced at either case.

	TWDs	USDs	Option	Total
Case 1	____	____	____	____
Case 2	____	____	____	____

Arbitrage-Based Pricing Theorem

Determine the Option Value by No Arbitrage Assumption

- Similar case is applied for the case option value P<____
  - Buy a call option for P dollars.
  - Construct a replication portfolio
    - Borrow _____ and buy _____
    - Benefit at time t = ____ -P>0.
    - No loss will be introduced at either case.

	TWDs	USDs	Option	Total
Case 1	____	____	____	____
Case 2	____	____	____	____