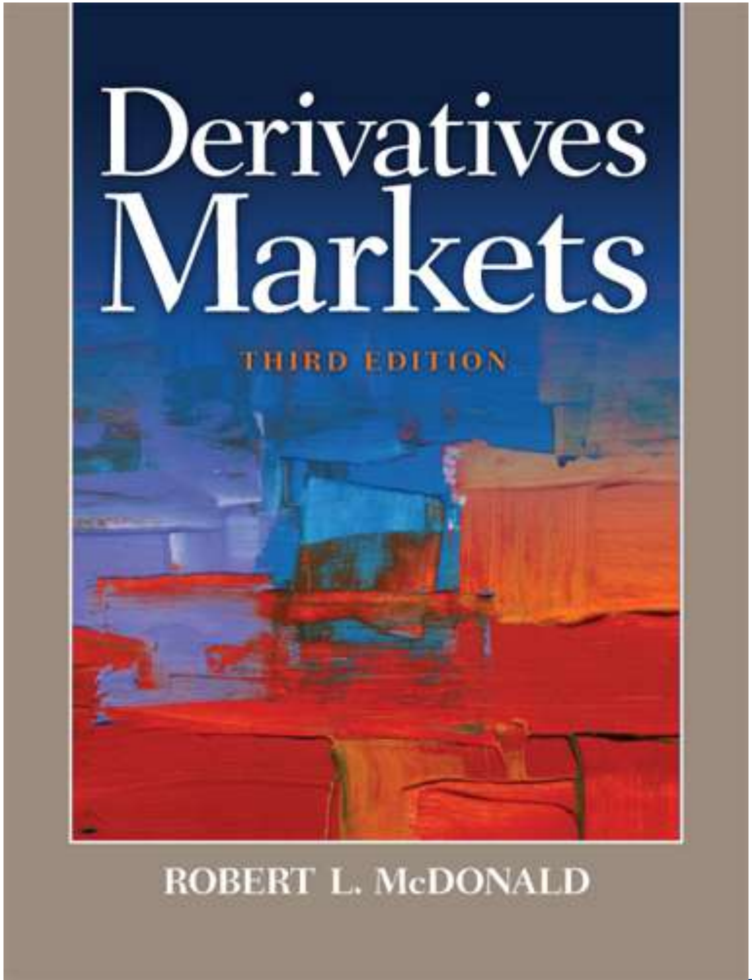

Chapter 4

(Chapter 5 in the Textbook)

Financial Forwards and Futures

Points to note

1. Alternative ways to buy a stock, see P. 4 to 5.
2. Pricing pre-paid forwards, see P. 6 to 17.
3. Pricing forwards on stock, see P. 18 to 20.
4. Creating a synthetic forward, see P. 21 to 25.
5. Synthetic forwards in market-making and arbitrage, see P. 26 – 28.
6. An interpretation of the forward pricing formula, see P. 29 – 30.
7. Future contracts, see P. 31 – 34.
8. Future contracts – marking to market, see P. 35 – 41.
9. Comparing futures and forward prices, see P. 42 – 43.
10. Quanto Index Contracts, see P. 44 – 46.

Pre-paid forward vs forward

Difference between Forward and futures

$$F_{0,T} = FV(F_{0,T}^P)$$

$$F_{0,T}^P = \begin{cases} S_0 & \text{No-dividend} \\ S_0 - \sum_{i=1}^{n} PV_{0,t_i}(D_{t_i}) & \text{, discrete dividend} \\ S_0 e^{-\delta T} & \text{continuous dividend} \end{cases}$$

within $[0,T]$

Synthetic forward

cost

1) call and put options (Chapter 3)

$\boxed{Call(K,T) - Put(K,T)} = PV(F_{0,T} - K)$

synthetic forward (delivery price = K)

K may not be "fair" (off-market forward)

2) from the payoff $(S_T - K)$

using underlying stock + zero-coupon bond

lending ⟺ Long zero-coupon bond

borrowing ⟺ Short zero-coupon bond

Synthetic forward

payoff $= S_T - K$

Non-dividend paying stock

payoff $= S_T - S_0 e^{rT}$

$$= +\underbrace{S_T}_{\text{1 unit of stock}} + \underbrace{\boxed{(-S_0 e^{rT})}}_{\text{cash}}$$

$t=0$ | T

?

Long 1 unit of stock $\longrightarrow$ 1 unit of stock

borrow \$ S_0 $\longrightarrow$ $-S_0 e^{rT}$

(short zero-coupon bond with face value $= S_0 e^{rT}$)

continuous dividend paying stock (dividend yield $= \delta$)

(cts)

$t=0$	$t=T$
Long $e^{-\delta T}$ units of stock	1 unit of stock
borrow \$ $S_0 e^{-\delta T}$	$-(S_0 e^{-\delta T}) e^{rT}$
0	$S_T - S_0 e^{(r-\delta)T}$

$F_{0,T}$