

CHAPTER #1

FORWARDS (PART 1)

SUMMARY

A **forward contract** is an agreement between two parties, a buyer and a seller, to exchange an asset on a specified date and at a specified price.

The asset which is exchanged is the **underlying asset** in the forward contract, the specified date is called the **expiration date** of the forward contract, and the specified price is called the **forward price**.

LONG AND SHORT

Long forward	Short forward
Obligated to Buy	Obligated to Sell

PAYOFF AND PROFIT

x Payoff of a Forward

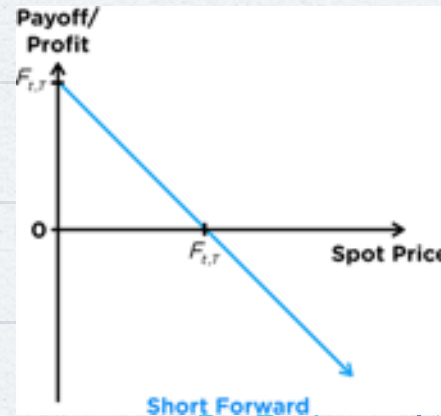
Payoff (long forward) = Spot price at expiration – Forward price

Payoff (short forward) = Forward price – Spot price at expiration

Note: Because **profit** is the accumulated value of all cash flows at the risk-free rate, and it costs nothing to enter into a forward, **then the profit of a forward contract equals its payoff.**



PAYOFF AND PROFIT



EXAMPLES



X Which of the following positions will benefit from an increase in the price of the underlying asset?

A long position in the forward contract on the underlying asset

A short position in the forward contract on the underlying asset

A long position in the underlying asset

A short position in the underlying asset

A III only

B I and III only

C I and IV only

D II and III only

E II and IV only



X Which of the following positions will benefit if the price of a stock declines over the next year?

Enter into a one-year long forward contract on the stock.

Enter into a one-year short forward contract on the stock.

Short-sell the stock and close your position in one year.

A II only

B I and II only

C I and III only

D II and III only

E I, II, and III





X For a non-dividend-paying stock index, the current price is 1100 and the 6-month forward price is 1150. Assume the price of the stock index in 6 months will be 1210.

Which of the following is true regarding forward positions in the stock index?

- A** Long position gains 50
B Long position gains 60
C Long position gains 110
D Short position gains 60
E Short position gains 110

X Jason longs a 6-month forward contract for a commodity with a forward price of \$100. The effective interest rate for a 6-month period is 4%.

Determine the maximum gain and maximum loss for his forward contract.

- A Maximum gain is 100; Maximum loss is 0.
- B Maximum gain is 100; Maximum loss is ∞ .
- C Maximum gain is ∞ ; Maximum loss is 0.
- D Maximum gain is ∞ ; Maximum loss is 100.
- E Maximum gain is ∞ ; Maximum loss is ∞ .



FOUR WAYS OF BUYING A STOCK

Method	Payment Time	Time Stock is Received	Payment Amount
Outright Purchase	0	0	S_0
Forward	T	T	$F_{0,T}$
Prepaid Forward	0	T	$F_{0,T}^P$
Fully Leveraged Purchase	T	0	$S(0)e^{rt}$



EXAMPLE



X A non-dividend-paying stock currently sells for 100. One year from now the stock sells for 110. The annual risk-free rate, compounded continuously, is 6%.

A trader purchases the stock in the following manner:

The trader pays 100 today

The trader takes possession of the stock in one year

Determine which of the following describes this arrangement.

A Outright purchase

B Fully leveraged purchase

C Prepaid forward contract

D Forward contract

E This arrangement is not possible due to arbitrage opportunities



PRICING A FORWARD & PREPAID FORWARD

Dividends	Prepaid Forward Price	Forward Price
No Dividends	$S(0)$	$S(0) \cdot e^{rt}$
Continuous Dividends	$S(0) \cdot e^{(-\delta)t}$	$S(0) \cdot e^{(r-\delta)t}$
Discrete Dividends	$S(0) - \text{PV}(\text{Divs})$	$S(0) \cdot e^{rt} - \text{AV}(\text{Divs})$

EXAMPLES



X Suppose Stock ABC costs \$125 today and pays dividends continuously at a rate proportional to its price. The dividend yield is δ . The continuously compounded risk-free interest rate is 5%.

If a one-year prepaid forward contract for Stock ABC costs \$121.306, what is δ ?

A 2.00%

B 3.00%

C 5.00%

D 6.00%

E 8.00%



X The following table shows two methods to buy a stock and the total payment needed for each method. Payments that do not take place immediately take place at time T , $T > 0$. The payment amounts are as of the time of payment and have not been discounted to the present date.

Method	Total Payment
Forward Contract	X
Fully leveraged Purchase	Y

Which of the following statements is correct?

A $X < Y$

B $X = Y$

C $X > Y$

D If the underlying stock does not pay dividends, then $X = Y$.

E If the underlying stock does not pay dividends, then $X < Y$.

X The dividend yield on a stock and the interest rate used to discount the stock's cash flows are both continuously compounded. The dividend yield is less than the interest rate, but both are positive.

Consider the following four methods to buy the stock:

Outright purchase

Fully leveraged purchase

Prepaid forward contract

Forward contract

Determine which method requires the most cash outlay and which requires the least cash outlay. The cash outlays are as of the time of payment and have not been discounted to the present date.

A Most: Forward contract; Least: Prepaid forward contract

B Most: Forward contract; Least: Outright purchase

C Most: Fully leveraged purchase; Least: Prepaid forward contract

D Most: Fully leveraged purchase; Least: Outright purchase

E Most: Outright purchase; Least: Prepaid forward contract

X The dividend yield on a stock and the interest rate used to discount the stock's cash flows are both continuously compounded. The dividend yield is less than the interest rate, but both are positive.

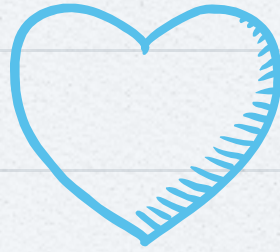
The following table shows four methods to buy the stock and the total payment needed for each method. The payment amounts are as of the time of payment and have not been discounted to the present date.

METHOD	TOTAL PAYMENT
Outright purchase	A
Fully leveraged purchase	B
Prepaid forward contract	C
Forward contract	D

Determine which of the following is the correct ranking, from smallest to largest, for the amount of payment needed to acquire the stock.

(A) $C < A < D < B$ **(B)** $A < C < D < B$ **(C)** $D < C < A < B$ **(D)** $C < A < B < D$ **(E)** $A < C < B < D$





THANKS!

Any questions?