Forward rate agreement

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FRA contract

Main features of an FRA contract

- Forward rate agreement (FRA) is an agreement to pay or receive the difference between a predetermined interest rate (FRA rate) and the interest rate prevailing at a specific future date (reference rate)
- Interest payments are based on an agreed upon notional principal amount
- Settlement cash flow is paid net at the beginning of the FRA period
- FRA is referred to by the beginning and end dates of the FRA period, which are expressed as a number of months from now (3v8 denotes an FRA which starts in 3 months' time and ends in 8 months' time from now)
- An FRA buyer is a party which pays the FRA rate and receives the reference rate while an FRA seller is the other party which pays the reference rate and receives the FRA rate
- A predetermined FRA rate is called the price of the FRA contract

FRA formula

- ► Value of cash flow for the FRA buyer
    - ► FRA buyer is the payer of the FRA rate and the receiver of the reference rate

$$V_{buyer} = M \cdot \frac{(L_p^t - {}_tK_{t+p}) \cdot \frac{N_{t,t+p}}{365}}{1 + L_p^t \cdot \frac{N_{t,t+p}}{365}},$$

    where

    M ... notional principal amount of the FRA contract.

    L_p^t ... p-month reference rate which will exist at time t when the FRA period starts,

    ${}_tK_{t+p}$ ... p-month FRA rate agreed now for the FRA period starting in t-months' time,

    $N_{t,t+p}$ ... number of days in the FRA period,

    365 ... number of days in year. It depends on used convention.

    - ► Interests are calculated in conformity with money market conventions
    - ► Interest payment is discounted to the beginning of the FRA period when the settlement takes place
- ► Value of cash flow for the FRA seller
    - ► FRA seller is the payer of the reference rate and the receiver of the FRA rate

$$V_{seller} = -V_{buyer}.$$

Applications of FRA

- ▶ Speculative trades
    - ▶ An FRA can be used to speculate whether the reference rate will be higher or lower than the FRA rate at the beginning of the FRA period
    - ▶ When money market interest rates are expected to rise/fall, speculators want to buy/sell FRA contracts
    - ▶ Speculative gain can be achieved without upfront investment because the FRA's principal amount is notional
- ▶ Hedging trades
    - ▶ Locking in short-term borrowing interest rates

        Money market $\xleftarrow{LIBOR+spread}$ Company $\underset{\underset{LIBOR}{\xleftarrow{\hspace{1cm}}}}{\overset{FRA\ rate}{\xrightarrow{\hspace{1cm}}}}$ FRA dealer

        A company which needs to take a three-month loan in two months' time can fix its borrowing cost by buying a 2v5 FRA
    - ▶ Locking in short-term deposit interest rate

        Money market $\xrightarrow{LIBOR+spread}$ Company $\underset{\underset{LIBOR}{\xrightarrow{\hspace{1cm}}}}{\overset{FRA\ rate}{\xleftarrow{\hspace{1cm}}}}$ FRA dealer

        A company which expects to make a six-month deposit in two weeks' time can fix its lending return by selling a 0.5v6.5 FRA

FRA strip

- ▶ FRA strip is an FRA created synthetically from a series of consecutive FRAs
  - ▶ FRA contracts 3v5, 5v8, 8v9 make up a synthetic 3v9 FRA strip
  - ▶ 3M loan and 3v5, 5v8, 8v9 FRAs make up a synthetic 9M loan

- ▶ Strip construction
  - ▶ Rules for the size of notional principals

$$NP(3v5) = M; \ NP(5v8) = M \cdot (1 + \frac{N_{3,5}}{365} {}_3K_5);$$

$$NP(8v9) = M \cdot (1 + \frac{N_{3,5}}{365} {}_3K_5) \cdot (1 + \frac{N_{5,8}}{365} {}_5K_8)$$

  - ▶ Combination of FRA settlements and refinancing the balance at reference rates can result in a cash flow identical to that of the FRA strip
  - ▶ No arbitrage between synthetic and normal FRAs is reflected in the interest rate parity condition

$$1 + \frac{N_{3,9}}{365} {}_3K_9 = (1 + \frac{N_{3,5}}{365} {}_3K_5) \cdot (1 + \frac{N_{5,8}}{365} {}_5K_8) \cdot (1 + \frac{N_{8,9}}{365} {}_8K_9)$$

$$1 + \frac{N_{0,9}}{365} {}_3L_9 = (1 + \frac{N_{0,3}}{365} L_3) \cdot (1 + \frac{N_{3,5}}{365} {}_3K_5) \cdot (1 + \frac{N_{5,8}}{365} {}_5K_8) \cdot (1 + \frac{N_{8,9}}{365} {}_8K_9)$$

Thank you for your attention