

Characteristics of Forward Contracts and Futures Contracts

Forward

A forward contract is an agreement in which the seller is obliged to deliver an underlying asset or to make a cash settlement at a future maturity (expiration) date at a forward price agreed at the start of the contract. The buyer agrees to pay for the underlying asset or to make settlement at a future date.

Any asset may be an underlying asset for a forward contract (bond, stock, currency, commodity).

Cash-settled forward contracts are called NDFs (nondelivery forwards). The future delivery date or settlement date is usually the same as the expiration date.

The value of the forward contract is equal to zero at the initiation and no money changes hands.

The global market for forward contracts is a network of financial institutions, mostly banks, that make market in these transactions. Forward contracts are not traded on exchanges. They are over-the-counter (OTC) contracts.

Forward contracts are flexible. Forward contracts may be privately negotiated between two parties. The terms of the contract, such as identity and amount of the underlying asset, expiration date and settlements are directly negotiated between two parties.

In practice forward contracts offered by banks are not negotiated. Banks (dealers) offer standardized transactions, which may be accepted by a second party and transaction is concluded. The second party of a forward contract may be one of two types: end user or other dealer. An end user is typically a corporation, government or an individual.

A dealer quotes a bid and ask price or rate. The bid is the price at which the dealer is willing to pay and the ask price is the price at which the dealer is willing to sell. The competition makes bid-ask spreads low. Dealers make a profit from the market making activity. They do not hold the exposure. They offset the exposure with other derivative or spot transactions.

The terms of the contract, such as identity and amount of the underlying asset, expiration date, settlements) are directly negotiated between two parties.

A forward contract can be either purchased or sold. The buyer is called the long and the seller is called the short.

The negotiated forward price for future delivery of the asset is different from the current cash price (spot price). The forward price is fixed.

It is possible to terminate the position prior to expiration by entering a new forward contract expiring at the same time as the original contract. To completely offset the original

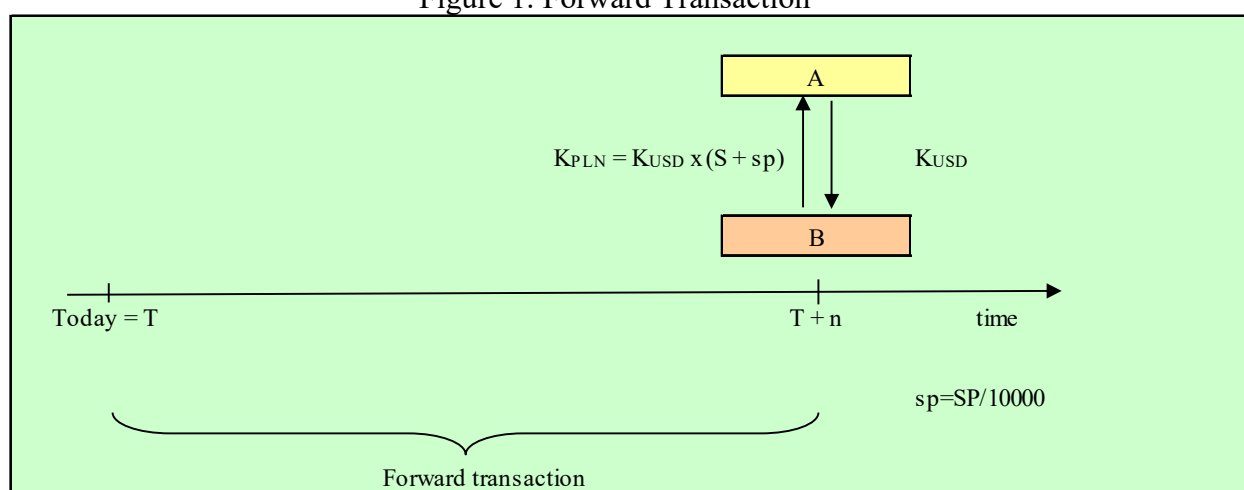
forward position the second transaction must be with the same counterparty. The termination of the original forward position with the other counterparty does not eliminate credit risk.

With the sophisticated terms of forward contract it may be difficult or more costly to terminate the contract before it matures. Illiquidity is a by-product of the contract's flexibility.

FX Forward

FX forward contracts are transactions that call for the exchange of some quantity of a foreign currency at a future date. Sometimes it is called outright forward to emphasize that there is no corresponding spot transaction. Transactions are mostly executed between banks. Maturities range from 1 week to 20 years.

Figure 1. Forward Transaction



Source: author.

Problem 1. Swap Points and Forward Exchange Rates

EUR/USD Swap Points on Friday, 13 October 2017.

| Maturity | Spot Date | Maturity | Bid | Ask |
|----------|------------|------------|-----------|-----------|
| SPOT | | | 1,1857 | 1,1859 |
| ON | 13-10-2017 | 16-10-2017 | 1,6440 | 1,7000 |
| TN | 16-10-2017 | 17-10-2017 | 0,6050 | 0,6200 |
| SW | 17-10-2017 | 24-10-2017 | 4,2200 | 4,2900 |
| 1M | 17-10-2017 | 17-11-2017 | 18,9800 | 19,1000 |
| 3M | 17-10-2017 | 17-01-2018 | 63,2800 | 63,5500 |
| 6M | 17-10-2017 | 17-04-2018 | 127,5500 | 128,3000 |
| 1Y | 17-10-2017 | 17-10-2018 | 267,9100 | 269,3400 |
| 2Y | 17-10-2017 | 17-10-2019 | 564,2000 | 569,2000 |
| 5Y | 17-10-2017 | 17-10-2022 | 1376,5000 | 1400,0000 |
| 10Y | 17-10-2017 | 18-10-2027 | 2354,0000 | 2394,0000 |
| 20Y | 17-10-2017 | 19-10-2037 | 3834,0000 | 3984,0000 |

Calculate forward exchange rates for EUR/USD.

Solution

$$(1) \quad F_{bid} = S_{bid} + \frac{SP_{bid}}{10000}$$

$$(2) \quad F_{ask} = S_{ask} + \frac{SP_{ask}}{10000}$$

F – forward exchange rate,
 S – spot exchange rate,
 SP – swap points.

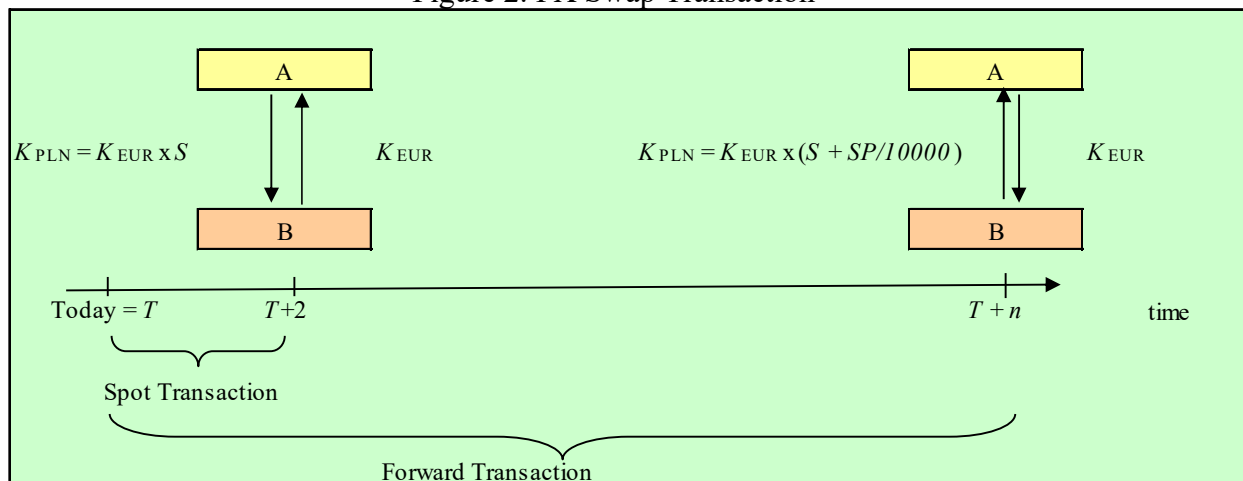
| Maturity | Spot Date | Maturity | Forward Bid | Forward Ask | Spread |
|----------|------------|------------|-------------|-------------|--------|
| SPOT | | | 1,185700 | 1,185900 | 0,0002 |
| ON | 13-10-2017 | 16-10-2017 | 1,185864 | 1,186070 | 0,0002 |
| TN | 16-10-2017 | 17-10-2017 | 1,185761 | 1,185962 | 0,0002 |
| SW | 17-10-2017 | 24-10-2017 | 1,186122 | 1,186329 | 0,0002 |
| 1M | 17-10-2017 | 17-11-2017 | 1,187598 | 1,187810 | 0,0002 |
| 3M | 17-10-2017 | 17-01-2018 | 1,192028 | 1,192255 | 0,0002 |
| 6M | 17-10-2017 | 17-04-2018 | 1,198455 | 1,198730 | 0,0003 |
| 1Y | 17-10-2017 | 17-10-2018 | 1,212491 | 1,212834 | 0,0003 |
| 2Y | 17-10-2017 | 17-10-2019 | 1,242120 | 1,242820 | 0,0007 |
| 5Y | 17-10-2017 | 17-10-2022 | 1,323350 | 1,325900 | 0,0025 |
| 10Y | 17-10-2017 | 18-10-2027 | 1,421100 | 1,425300 | 0,0042 |
| 20Y | 17-10-2017 | 19-10-2037 | 1,569100 | 1,584300 | 0,0152 |

FX Swap

FX swap is a transaction in which one (foreign) bank makes a foreign currency deposit in a second (domestic) bank and simultaneously the second (domestic) bank makes a domestic currency deposit in the first (foreign) bank. The typical size of transaction is USD 10 million. Such transaction is a real financial transaction (just two real deposits). This transaction developed enormously from 1999 as it offered short-term zloty financing for foreign traders investing in Polish government bonds and T-bills offering extremely high real interest rates.

An FX swap transaction is just a combination of spot and forward.

Figure 2. FX Swap Transaction



Problem 2. EUR/PLN 1W FX Swap between Bank A (in Poland) and Bank B (in Germany)

Bank in Poland asks for 1W FX swap buys forward PLN/EUR, sells spot PLN/EUR
 Notional principal is 1 000 000 EUR (base currency).

| | 2017-10-12 | Maturity: | 2017-10-23 | | |
|-------------------------------|------------|-----------|------------|----------|----------|
| | Date | Time | Bid | Ask | Mid |
| EUR/PLN Spot Exchange Rate | 2017-10-12 | 17:46:29 | 4,2660 | 4,2691 | 4,267550 |
| EUR/PLN Swap Points | 2017-10-12 | 17:45:59 | 15,92 | 16,89 | |
| PLN Depo Rate | 2017-10-12 | 17:00:04 | 1,2900 | 1,8900 | |
| EUR Depo Rate | 2017-10-12 | 17:45:49 | -0,4900 | -0,3500 | |
| Spot Exchange Rate + SP/10000 | | | 4,267592 | 4,270789 | |

Required

- (a) Calculate cash flows at value date and maturity date. What is the result for a bank in Poland.
- (b) Calculate implied interest rates in PLN and EUR with EUR as a base rate. Compare them with market depo rates.

Solution

(a)

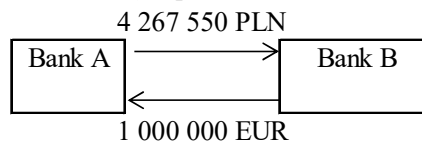
Value Date

Bank A delivers to bank B
Bank A receives from Bank B

2017-10-16
4 267 550 PLN
1 000 000 EUR

2 working days later

In FX Swap mid spot exchange rate is used.
(In spot transaction bid exchange rate is used.)



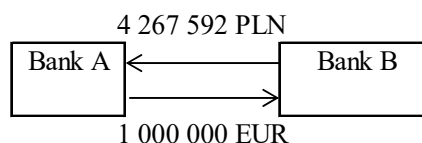
Maturity Day

Bank A receives from Bank B
Bank A delivers to bank B

2017-10-23
4 267 592 PLN
1 000 000 EUR

7 days later

Bid Spot + SPbid/10000 is used.
Bank in Poland sells EUR forward.



Result for a Bank in Poland

42 PLN

(b)

Implied interest rates in PLN

Fisher Formula

$$F = S_0 \frac{(1 + i_d^N T)}{(1 + i_r^N T)}$$

and

$$F_{bid} = S_{bid} + \frac{SP_{bid}}{10000}$$

$$F_{ask} = S_{ask} + \frac{SP_{ask}}{10000}$$

Implied PLN interest rates

Market PLN interest rates

$$i_{bid,imp}^{PLN} = \frac{365}{d} \left[\frac{S_{mid}^{EURPLN} + \frac{SP_{bid}^{EURPLN}}{10000}}{S_{mid}^{EURPLN}} \left(1 + i_{bid}^{EUR} \frac{d}{360} \right) - 1 \right]$$

$$i_{ask,imp}^{PLN} = \frac{365}{d} \left[\frac{S_{mid}^{EURPLN} + \frac{SP_{ask}^{EURPLN}}{10000}}{S_{mid}^{EURPLN}} \left(1 + i_{ask}^{EUR} \frac{d}{360} \right) - 1 \right]$$

| Bid | Ask |
|---------|---------|
| 1,4482% | 1,7087% |
| 1,2900% | 1,8900% |

Implied interest rates in EUR

$$i_{bid,imp}^{EUR} = \frac{360}{d} \left[\frac{S_{mid}^{EURPLN}}{S_{mid}^{EURPLN} + \frac{SP_{ask}^{EURPLN}}{10000}} \left(1 + i_{bid}^{PLN} \frac{d}{365} \right) - 1 \right]$$

$$i_{ask,imp}^{EUR} = \frac{360}{d} \left[\frac{S_{mid}^{EURPLN}}{S_{mid}^{EURPLN} + \frac{SP_{bid}^{EURPLN}}{10000}} \left(1 + i_{ask}^{PLN} \frac{d}{365} \right) - 1 \right]$$

Implied EUR interest rates

Market EUR interest rates

| Bid | Ask |
|----------|----------|
| -0,7628% | -0,0544% |
| -0,4900% | -0,3500% |

Commodity Forward Contracts

For example, Mr. Smith wants to buy a car (yellow, with some special equipment). He goes to a car dealer and negotiates all transaction terms. The delivery will be in 30 days. This is a commodity forward contract.

Futures Contracts

Futures contracts are created and traded on organized futures exchanges. A futures contract obliges its purchaser to buy a given amount of a specified asset at some stated time in the future (known as the delivery date) at the futures price. Similarly, the seller of the contract is obliged to deliver the asset at the futures price. In the futures market less than 2% of the contracts traded involve the actual delivery of the underlying asset. Rather, the buyers of futures contracts usually sell their contracts before the delivery date, thus offsetting („unwinding’) their positions.

The exchange clearinghouse is responsible for settling daily gains and losses (marking to market), guaranteeing the transactions and deliveries. A major advantage of organized exchanges is their ability to manage credit risk. Credit risk is the risk that a holder of an unprofitable futures contract will default.

An investor wishing to buy or sell in the futures market is required to post an initial margin in the form of cash or government securities, a portion of the full price. In marking-to-market, the contract is revalued at the end of each day’s trading, and gains or losses are computed. Gains increase the value of the margin account and may be withdrawn. If the margin account drops below a certain level, called the maintenance margin, the holder of the futures contract receives a margin call and is required to restore the account to its initial level. If the holder fails to do so, the contract is closed by the broker.

Like most assets, the profit or loss on a futures contract is determined by the difference between the selling and buying price. Profits and losses on future contracts are realized daily.

Eurodollar Futures

Differences Between Forward Contracts and Futures Contracts

| Forward Contracts | Futures Contracts |
|--|---|
| (-) Unregulated market | (+) Regulated and highly controlled market |
| (+) Customized sizes and maturities. It creates a „perfect” hedge that exactly matches underlying exposure | (-) Standardized sizes and expiration periods. Hedge position may not provide an exact dollar-for dollar offset to underlying exposure. |
| (-) Participants must negotiate rates and prices. | (+) Pricing is extremely efficient. No negotiations |
| (-) Prices depend on credit risk and relationship. | (+) Prices are the same for all. |
| (-) Custom made product may be difficult to exit. | (+) Liquidity and flexibility. Hedge position may be entered and exited when needed. |
| (+) One delivery date | (-) Delivery is realized several days after maturity. |
| (-) Credit risk of counterparty may be huge | (+) There is no credit risk. |
| (+) There is no margin system. | (-) Margin system may be expensive |