

Currency swaps

What is a swap?

A swap is a contract between two counter-parties who agree to exchange a stream of payments over an agreed period of several years.

Types of swap

- equity swaps (or equity-index-linked swap)
- commodity swaps
- credit swaps

Equity swap

One party pays the return on a stock index, and the other party pays at a benchmark rate of interest. The cashflows can be in the same currency or different currencies.

Uses as asset allocation tools

“A pension fund has its asset portfolio invested in floating rate notes based on LIBOR. The manager would like to convert some debt based cashflows into equity based receipts.”

Advantage

Allow exposure to the equity market of another country without directly owning the equity securities.

Commodity swap

The two counterparties exchange cash flows based on the price of a commodity, such as oil.

- One party pays a fixed price on an underlying quantity of the commodity and the other pays a floating price, usually based on the commodity's average price over a period.

Hedge against price fluctuations

For example, an oil producer decides for an agreed length of time to lock into the fixed price of \$20 per barrel with a financial institution. In exchange for receiving a fixed price for the oil, the producer agrees to pay the counterparty a floating rate (linked to an index associated with the commodity price).

Credit swaps

Two main types

- currency swaps;
- interest rate swaps.

A credit swap involves an exchange of interest payments based on an amount of principal. In the case of currency swaps, there is usually also an exchange of principal amounts at initiation and maturity.

Further classification to distinguish the purpose.

- Liability swaps - exchange of payments on one debt (liability) for payment on another debt.
- Asset swaps - exchange a stream of income from one investment (asset) for income from an alternative source.

Origins of currency swaps

Currency swaps originally were developed by banks in the UK to help large clients circumvent UK exchange controls in the 1970s.

- UK companies were required to pay an exchange equalization premium when obtaining dollar loans from their banks.

How to avoid having to pay this premium?

An agreement would then be negotiated whereby

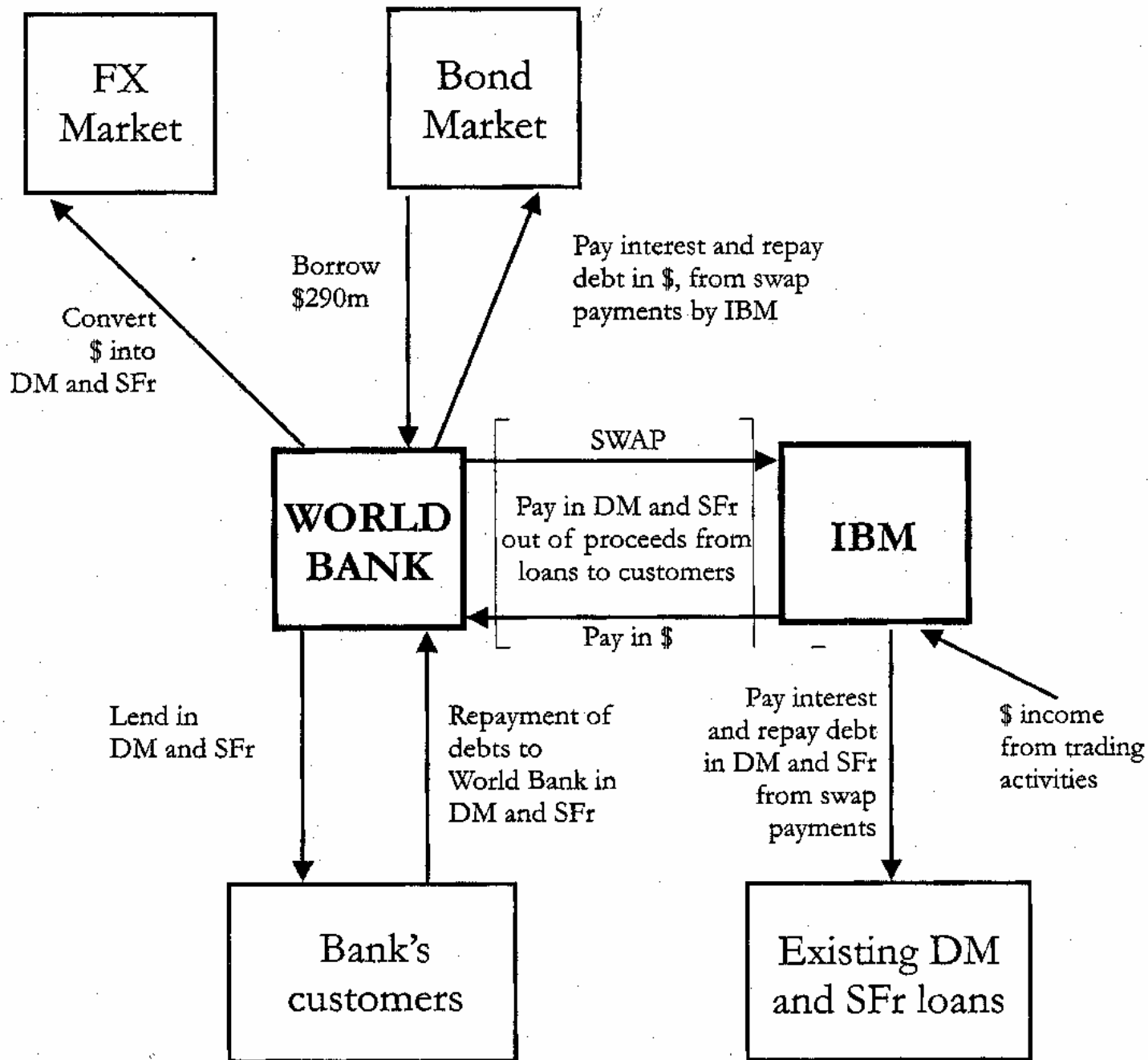
- The UK organization borrowed sterling and lent it to the US company's UK subsidiary.
- The US organization borrowed dollars and lent it to the UK company's US subsidiary.

These arrangements were called back-to-back loans or parallel loans.

IBM / World Bank with Salomon Brothers as intermediary

- IBM had existing debts in DM and Swiss francs. Due to a depreciation of the DM and Swiss franc against the dollar, IBM could realize a large foreign exchange gain, but only if it could eliminate its DM and Swiss franc liabilities and “lock in” the gain.
- The World Bank was raising most of its funds in DM (interest rate = 12%) and Swiss francs (interest rate = 8%). It did not borrow in dollars, for which the interest rate cost was about 17%. Though it wanted to lend out in DM and Swiss francs, the bank was concerned that saturation in the bond markets could make it difficult to borrow more in these two currencies at a favorable rate.

World Bank/IBM Currency Swap, 1981



IBM / World Bank

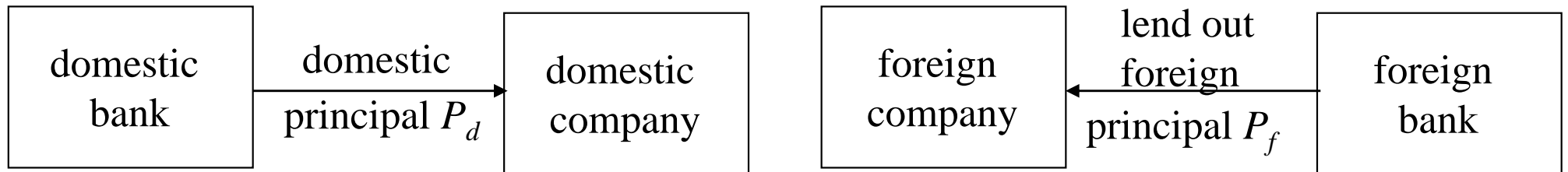
- IBM was willing to take on dollar liabilities and made dollar payments to the World Bank since it could generate dollar income from normal trading activities.
- The World Bank could borrow dollars, convert them into DM and SFr in FX market, and through the swap take on payment obligations in DM and SFr.

Remark

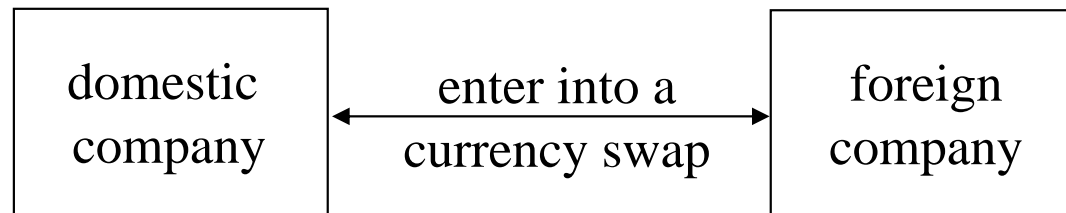
1. The swap payments by the World Bank to IBM were scheduled so as to allow IBM to meet its debt obligations in DM and SFr.
2. IBM and the World Bank had AAA-ratings; therefore, the counterparty risk was low.

Exploiting comparative advantages

A domestic company has comparative advantage in domestic loan but it wants to raise foreign capital. The situation for a foreign company happens to be reversed.

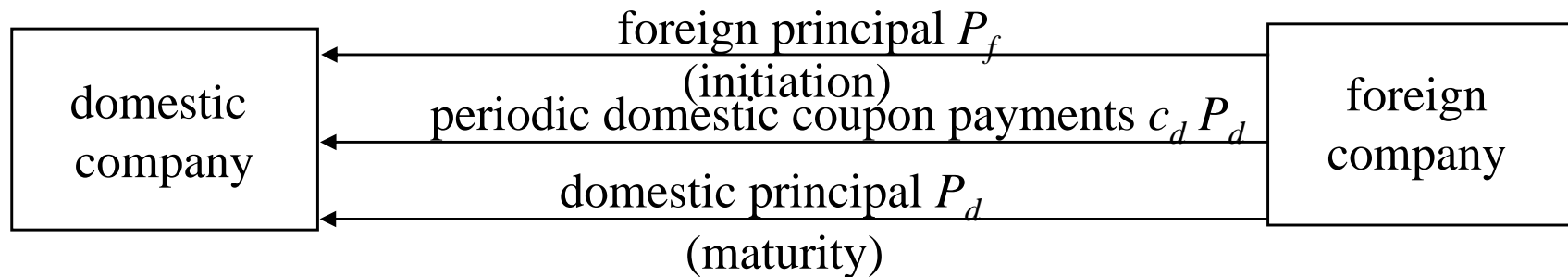
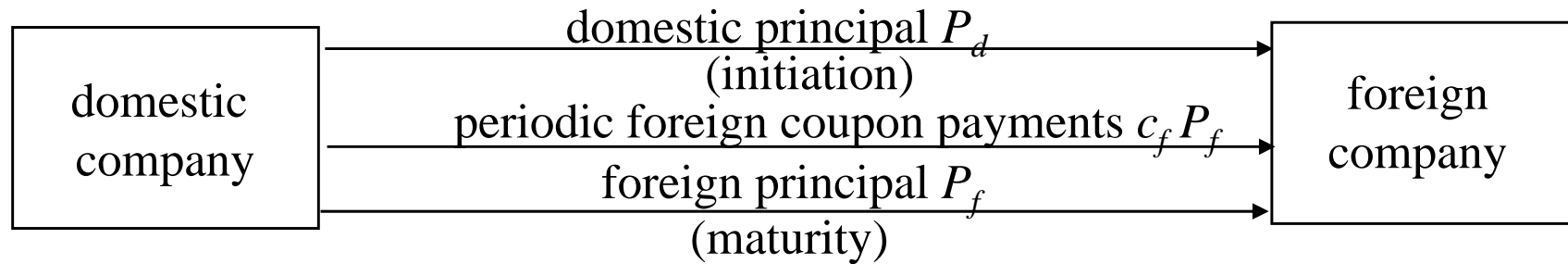


$$P_d = F_0 P_f$$



Goal: To exploit the comparative advantages in borrowing rates for both companies in their domestic currencies.

*Cashflows between the two currency swap counterparties
(assuming no intertemporal default)*



Settlement rules

Under the full (limited) two-way payment clause, the non-defaulting counterparty is required (not required) to pay if the final net amount is favorable to the defaulting party.

Cross currency transactions

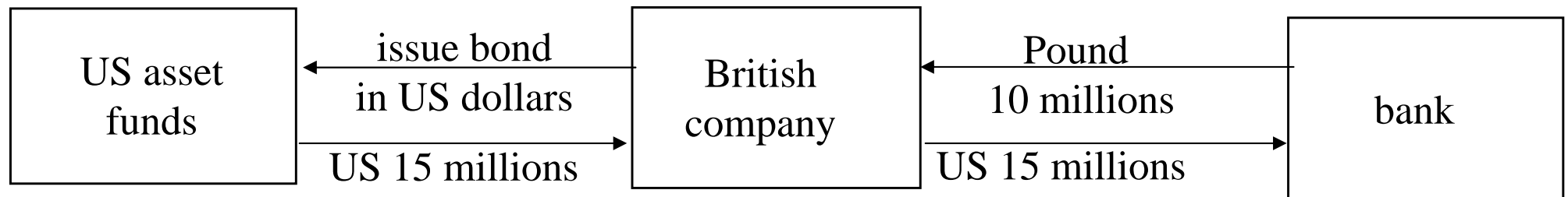
- The associated cash flows are denominated in different monetary units, the principal amounts are usually exchanged at the origination and maturity dates. The exchange rate used can be either fixed or floating at the prevailing rate at the time of transaction.
- The two interest rates can be either fixed or floating.

Asset currency swaps

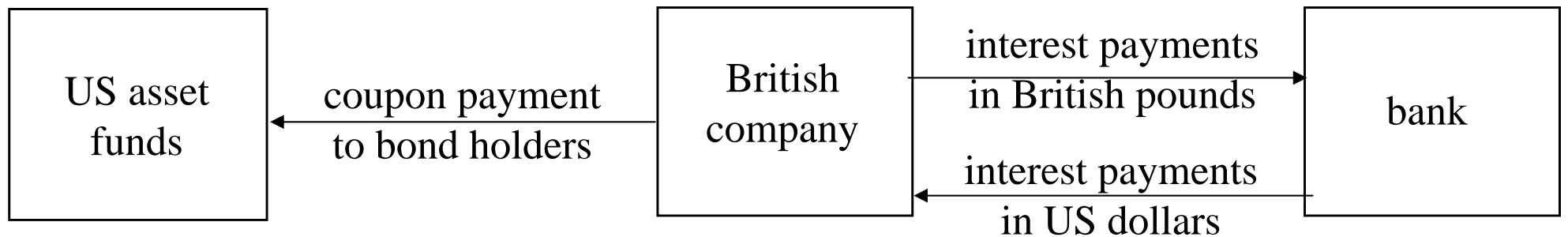
A British company has difficulties to raise capital in Pounds, but there exist US asset fund managers who are willing to buy bonds in US dollars issued by the British company.

- By entering into a currency swap with a bank, the British company can raise the Pounds that it wants.

Initiation:



Intermediate interest payments:



Maturity of bond and swap:



Comparison with forward contracts

Forward exchange contract – involves an agreement now for the sale or purchase of a quantity of one currency in exchange for another currency at a specified future date. The rate of exchange is the spot adjusted for the interest rate differential between the two currencies over the period of the forward contract – interest rate parity relation.

How currency swaps differ from outright forward contracts?

- There is often an exchange of principal at initiation.
- Interest usually is exchanged at regular intervals during the swap period.
- The regular exchange of interest means that the re-exchange of principal at maturity can be at today's spot rate.
- The period of a swap is longer than that for most forward contracts.

Primary functions of currency swaps

Swaps are not a method of borrowing money, but rather a means of managing debt and funding requirements.

- Create cheaper funds/debt: a swap can reduce the overall cost of borrowing (liability swap).
- Improve income from investments (asset swap).
- Hedge longer-term currency exposures and reduce an organization's financial risk.

Arranging finance in different currencies

The company issuing the bonds can use a currency swap to issue debt in one currency and then swap the proceeds into the currency it desires.

Three specific purposes

- To obtain lower cost funds.

Suppose there is a strong demand for investments in currency A, a company seeking to borrow in currency B could issue bonds in currency A at a low rate of interest and swap them into the desired currency B.

- To gain access to a restricted capital market.
- To obtain funding in a form not otherwise available.
Market conditions might preclude the issuance of long term debt bearing a fixed interest rate in Yen.

Hedging currency exposures

- Long term investment (liability) in a currency that generates (pays) a stream of cashflows – exposure to a fall (rise) in the value of the currency.
- To gain access to a restricted capital market.
- To obtain funding in a form not otherwise available.
Market conditions might preclude the issuance of long term debt bearing a fixed interest rate in Yen.

Locking in a forward rate

Currency swaps can be used to lock in a forward rate for a future foreign currency receipt or payment, either as an alternative to a forward exchange contract, or when a forward contract is unobtainable.

Pricing issues of currency swaps

Quoting prices

Example

The following rates are quoted for 3-year cross currency interest rate swap against the dollar.

Canadian dollars 6.50 – 6.75% (dealing spread of 25 bps)

Sterling 7.74 – 7.94% (dealing spread of 20 bps)

The quoted rates are the fixed rates that the bank will pay (lower rate) or receive (higher rate) in a cross-currency interest rate swap where the counterparty will receive or pay interest at 6-month dollar LIBOR.

Quoting prices for different maturities

Example

Fixed rate sterling against 6-month dollar LIBOR

Term (years)	pay rate	receive rate
3	8.15%	8.40%
5	8.50%	8.85%
7	8.75%	9.15%
10	9.00%	9.50%

With longer maturity, the dealing spread is wider.

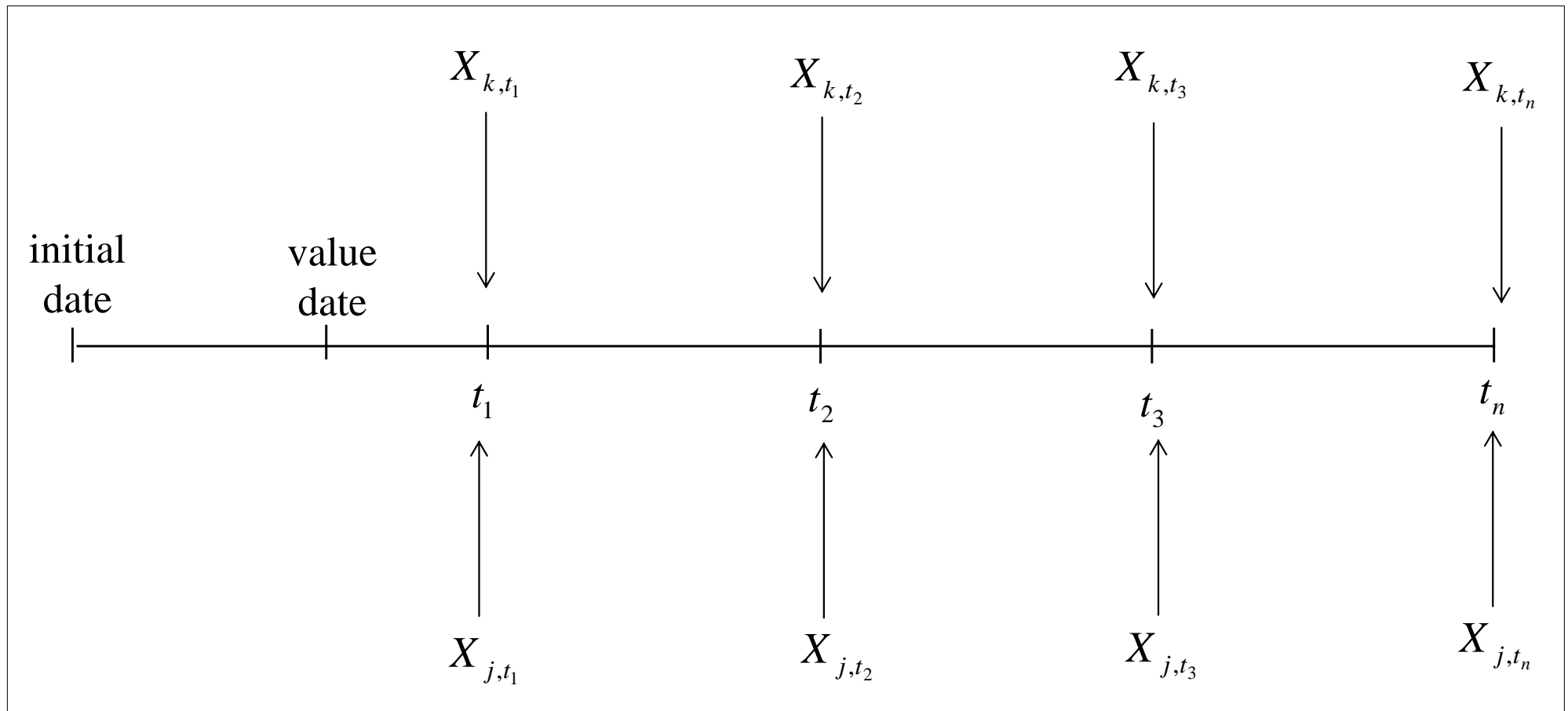
Representative quotes for plain vanilla currency swaps bases on 6-month U.S. Dollar LIBOR for different maturities

Currency	2-year	3-year	4-year
Yen	3.27%	3.78%	4.12%
Sterling	8.13%	8.55%	8.65%
Swiss franc	5.07%	5.24%	5.38%
Deutschemark	6.43%	6.92%	8.08%
U.S. dollars	7.79%	7.97%	8.08%

The last row contains quotes for plain vanilla US dollar interest rate swaps for comparison.

Pricing of currency swaps

The swap rates are set such that the value of currency swap at initiation is zero. The swap value at a future date depends on the interest rates in the two currencies, r_d and r_f , and the foreign exchange rate F .



The payment dates for the swap cash flows are t_1, t_2, \dots, t_n .

Let $V_{j,t}$ be the swap value in currency j at time t , B_{h,t,t_i} is the discount factor at time t for maturity t_i in currency h , $h = j, k$.

$F_{j,k,t}$ is the spot exchange rate, the price in terms of currency j of currency k at time t .

$$V_{j,t} = \left[X_{k,t_1} B_{k,t,t_1} + X_{k,t_2} B_{k,t,t_2} + \cdots + X_{k,t_n} B_{k,t,t_n} \right] F_{j,k,t} - \left[X_{j,t_1} B_{j,t,t_1} + X_{j,t_2} B_{j,t,t_2} + \cdots + X_{j,t_n} B_{j,t,t_n} \right]$$

The valuation involves discounting the future cash flow streams in the two currencies.