CHAPTER 5

SWAP MARKETS AND CONTRACTS

- **Identify the characteristics of swap contracts**

Agreement to exchange a series of payments
Zero value at the start of the contract
Payments made on each settlement date
IRS: net amount owed exchanged – netting
CS: Currencies exchanged, no netting

Time to maturity – tenor of swap
Termination date – final payment
OTC instrument – customized – default risk

Interest rate swaps
Fixed-rate exchanged for floating rate
Currency swaps
Currencies exchanged
Equity swaps
Returns exchanged

- **Explain how swaps are terminated**

Mutual termination
Cash payment equal to swap's market value

Offsetting contract
Pay-floating enters into receive-floating swap
Floating payments offset – fixed net out
Both swaps remain in effect – default risk

Resale
Sell to another party (with permission)
Unusual – no active secondary market

Swaption
Option to enter into an offsetting swap

- **Identify the types of currency swaps**

Payments denominated in different currencies
Actual currencies exchanged and returned

Example:
Party A pays Party B $10 million in return for €9.8 million. On each settlement date Party A (received Euros) makes payment at 6% interest in Euros on €9.8 million. Part B pays 5% interest on the $10 million received. No netting of payments (different currencies).

Motivation:
Company wants to establish operations in foreign country and finance the costs in that currency. More expensive to issue debt in foreign country. Issue debt in local currency and enter into a currency swap to exchange for foreign currency. Counterparty faces a similar situation in reverse. Intermediary facilitates swap.

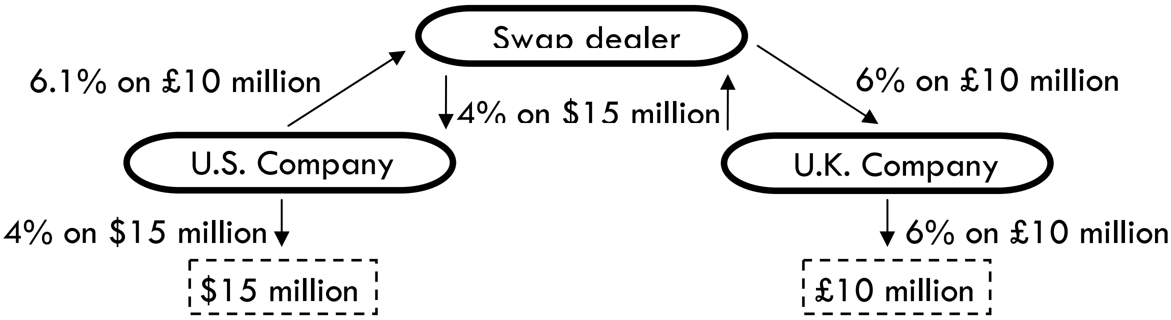
Currency swaps allows companies to gain access to foreign currency funds that might be too costly to obtain from a foreign bank. Also, a company that issued a foreign currency bond earlier may wish to convert or transform it into a domestic obligation by entering into a receive-fixed foreign currency, pay-fixed (or floating) domestic currency swap. An investment denominated in a foreign currency can likewise be transformed into a domestic investment.

Four possible types of currency swaps:

Pay fixed on foreign, receive fixed on local
Pay floating on foreign, receive fixed on local
Pay fixed on foreign, receive floating on local
Pay floating on foreign, receive floating (local)

Simplest: Fixed-for-fixed swap
Vanilla: Fixed-for-floating swap

Example:
A U.S. company has a liability of $15 million in fixed-rate bonds outstanding at 4%. A U.K. company has a liability of £10 million in fixed-rate bonds outstanding at 6%. The exchange rate is $1.50/£. The U.S. Company enters into a fixed-for-fixed currency swap with a swap dealer in which it pays 6.1% on £10 million and receives the swap rate of 4% on $15 million. The U.K. Company also enters into a fixed-for-fixed currency swap with the same dealer, in which it pays the swap rate of 4% on $15 million and receives 6% on £10 million. Calculate each party's effective borrowing rate, the principal cash flows, and the first-year net cash flows (assume annual settlement).



	U.S. Company	U.K. Company
Pay	4% on $15 million (fixed liability)	6% on £10 million (fixed liability)
Receive	4% on $15 million (swap rate)	6% on £10 million
Pay (effective rate)	6.1% on £10 million	4% on $15 million (swap rate)
Principal	£10 million (received and returned)	$15 million (received and returned)
Net cash flow	(0.061 x £10 million) = £610,000	(0.04 x $15 million) = $600,000

Swap dealer (0.01 x £10 million) = £10,000 (commission)

The U.S. Company has effectively transformed a $15 million 4% liability to a £10 million 6.1% liability. The U.K. Company transformed a £10 million 6% liability to a $15 million 4% liability by entering into a currency swap. The principals are exchanged at the beginning and at the maturity of the swap,

- **Calculate the payments on a currency swap**

	USD	AUD
Company A	10%	7%
Company B	9%	8%

A needs USD1.0 million, borrows AUD2.0 million
B needs AUD2.0 million, borrows USD1.0 million

Exchange rate is 2AUD/USD

A and B each borrow in their local currency
A pays 7% interest (AUD140,000) annually
B pays 9% interest (USD90,000) annually
A and B swap currencies
A receives USD1.0 million
B receives AUD2.0 million
A and B pay each other the annual interest
A receives AUD140,000; pays USD90,000
B receives USD90,000; pays AUD140,000
A and B return principals at termination
A gets AUD2.0 million from B and repays loan
B gets USD1.0 million from A and repays loan
Classify a plain vanilla interest rate swap

Plain vanilla swap: pay-fixed, receive-floating

Pay-fixed side (fixed rate payer)
Pay-floating side (floating rate payer)

Principal not swapped (notional amount)
Floating rate based on LIBOR ± spread
LIBOR determined at beginning of each period
Net interest payment at the end of that period

Formula:

$$\text{Net fixed pmt} = (\text{swap rate} - \text{LIBOR})\left(\frac{d}{360}\right)\text{NP}$$

Positive: fixed-rate payer makes payment
Negative: fixed-rate payer receives money

Motivation:
Bank with variable-rate deposits (liabilities) and fixed-rate loans (assets). Risk that interest rates will rise, causing payments on deposits to increase (loan repayments fixed). Hedge risk by entering into fixed-for-floating swap as the fixed-rate payer. Floating-rate payments received would offset any increase in payments on deposits.

- **Calculate the payments on an interest rate swap**

A Bank enters into a $1 million quarterly-pay vanilla swap as the fixed rate payer at 6%. The floating-rate payer agrees to pay 90-day LIBOR + 1% (currently 4%).

$L_{90}(0)$: 4.0%
$L_{90}(90)$: 4.5%
$L_{90}(180)$: 5.0%
$L_{90}(270)$: 5.5%
$L_{90}(360)$: 6.0%
Calculate the amounts paid or received 90, 270 and 360 days from now.

90 days (based on current LIBOR)

$$\left[0.06 - (0.04 + 0.01)\right]\left(\frac{90}{360}\right)\$1\,\text{million} = \$2,500$$

270 days (LIBOR 180 days from now)

$$\left[0.06 - (0.05 + 0.01)\right]\left(\frac{90}{360}\right)\$1\,\text{million} = \$0$$

360 days (LIBOR 270 days from now)

$$\left[0.06 - (0.055 + 0.01)\right]\left(\frac{90}{360}\right)\$1\,\text{million} = -\$1,250$$

- **Identify the types of equity swaps**

Return on (price or total):
Individual share
Portfolio of shares
Share index
exchanged for fixed or floating rate payment

Motivation:
Reduce equity risk (adverse move in price)
Protect the value of a position

Agree to receive a fixed rate payment

Fixed-rate payer also pays any % decline
Swap payments can be floating on both sides
Payments not known until end of period

- **Calculate the payments on an equity swap**

An investor enters into a 2-year $10 million quarterly swap as the fixed payer and will receive the index return on the S&P500. The fixed rate is 8% and the index is currently at 986. At the end of the next three quarters, the index level is: 1030, 968 and 989. Calculate the net payment for each period.

Q1	1030/986	= 4.46%
Q2	968/1030	= -6.02%
Q3	989/968	= 2.17%

The index return payer (IR) will receive 8/4 = 2% each period and pay the index return.

Q1	IR pays (4.46 – 2)% or $246,000
Q2	IR receives (6.02 + 2)% or $802,000
Q3	IR pays (2.17 – 2)% or $17,000

2% pp return on index locked in

- **Distinguish between the pricing and valuation of swaps**

At initiation of swap:
Swap (fixed) rate sets the PV of floating payments equal to the PV of fixed payments
Swap value is zero
Determining this swap rate = pricing of swap
After initiation:
As rates change over time, the PV of floating payments will either exceed or be less than the PV of fixed payments
Difference = value of swap
Interest rates increase:
Fixed-rate payer receives larger payments
Positive swap value for fixed-rate payer
Negative swap value for floating-rate payer
Interest rates decrease:
Floating-rate payer makes smaller payments
Positive swap value for floating-rate payer
Negative swap value for fixed-rate payer

- **Explain the equivalence of swaps to combinations of other instruments**

Swaps and assets
Currency swap:
Issuing fixed or floating bond in one currency
Convert proceeds to other currency
Purchase fixed or floating bond in that currency
Interest rate swap:

Issue fixed or floating rate bond and use proceeds to buy a floating or fixed rate bond
Equity swap:
Issue one type of security
Use proceeds to buy another security

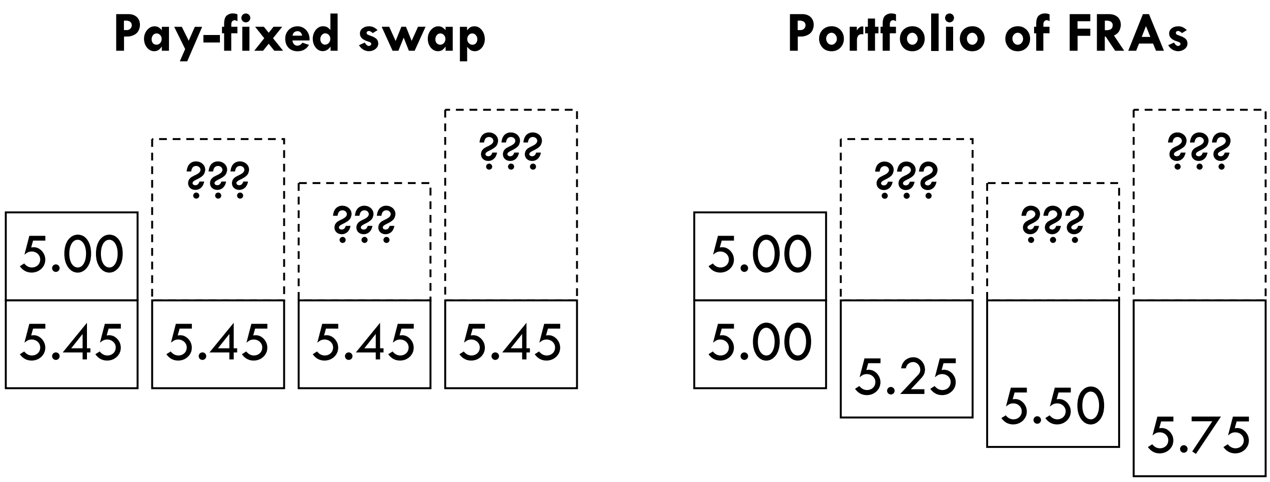
Swaps and forward contracts
Series of off-market FRAs

Swaps and futures contracts
Swaps customized; Futures standardized
Not appropriate

Swaps and options
Combinations of options
Buying a call and selling a put (long forward)

- **Explain how interest rate swaps are equivalent to a series of off-market forward rate agreements (FRAs)**

FRAs do not all have the same fixed rate
Swap (fixed) rate – average of FRA rates
Each swap payoff = off-market FRA
Positive or negative to long
Summed values add up to zero (value of swap)



- **Explain how a plain vanilla swap is equivalent to a combination of an interest rate call and put**

Fixed-rate payer (receiver swap)
Series of put/call positions with expiration dates on swap dates
Pays when floating rates increases
Requires payment when rates fall
Long IR call plus a short IR put
Same strike (equal to fixed rate on swap)

- **Determine the fixed rate on a plain vanilla interest rate swap and the market value of the swap**

Interest rate swap
Bond transaction equivalent to IR swap
Fixed-payer gains identical exposure by:

- Issuing a fixed-coupon bond
- Buying a floating-rate bond

On each payment date:
Fixed coupon is paid
Floating-rate payment is received

Used to price IR swaps

Equity swap
Borrowing at a fixed rate
Investing in a share, portfolio or index
Equity-for-fixed-rate swap

Currency swap
Issuing a bond in one currency
Exchanging proceeds for another currency
Buying a bond in that currency
Either or both bonds can have fixed or floating payments

Priced ito domestic bond and foreign bond

Formula for determining the Swap Rate

Sell a fixed-rate bond
Buy a floating-rate bond
Fixed rate set so that fixed = float (zero value)

Floating-rate bond value = face value
Change during life of bond
Rate resets to market rate at each pmt date
Value returns to par on each pmt date

Example:

4-period floating-rate note with a \$1,000 par

Fixed-rate note with payments, C:

$$\$1,000 = \frac{C}{1+R_1} + \frac{C}{1+R_2} + \frac{C}{1+R_3} + \frac{C}{1+R_4} + \frac{\$1,000}{1+R_4}$$

Discount factors $\frac{1}{1+R_n}$ are pp at current rate

Present value of $1 at different periods:

$$\$1,000 = C\left[\frac{1}{1+R_1}+\frac{1}{1+R_2}+\frac{1}{1+R_3}+\frac{1}{1+R_4}\right]+\frac{\$1,000}{1+R_4}$$

Solve for C as:

$$C = \left(\frac{1-\left(\frac{1}{1+R_4}\right)}{\frac{1}{1+R_1}+\frac{1}{1+R_2}+\frac{1}{1+R_3}+\frac{1}{1+R_4}}\right)\$1,000$$

Swap (fixed) rate as a percentage
Coupon amount per dollar of principal value

$$C = \left(\frac{1-Z_4}{Z_1+Z_2+Z_3+Z_4}\right)$$

Z = per period discount factors
Quarterly payments i.e.,
Annualized LIBOR per period (360 days)
90, 180, 270 and 360 day periods

Annualized LIBOR spot rates:

$$R_{90-day} = 0.030$$
$$R_{180-day} = 0.035$$
$$R_{270-day} = 0.040$$
$$R_{360-day} = 0.045$$

1-year swap with quarterly payments and a notional amount of $5,000,000. Calculate the:

- Fixed rate
- Quarterly fixed payments

$$Z_{90-day} = \frac{1}{1+\left(0.030\times\frac{90}{360}\right)} = 0.9926$$

$$Z_{180-day} = \frac{1}{1+\left(0.035\times\frac{180}{360}\right)} = 0.9828$$

$$Z_{270-\text{day}} = \frac{1}{1+\left(0.040\times\frac{270}{360}\right)} = 0.9709$$

$$Z_{360-\text{day}} = \frac{1}{1+\left(0.045\times\frac{360}{360}\right)} = 0.9569$$

$$C = \left(\frac{1-0.9569}{0.9926+0.9828+0.9709+0.9569}\right) = 1.10\%$$

Quarterly fixed-rate payments:

$$\$5{,}000{,}000\times 0.011 = \$55{,}000$$

Fixed rate on swap in annual terms:

$$1.10\left(\frac{360}{90}\right) = 4.4\%$$

- **Calculating the market value of an IR Swap**

MV of swap (to fixed rate payer):

$$MV_{\text{swap}} = V_{\text{floating-rate bond}} - V_{\text{fixed-rate bond}}$$

Positive value if fixed-rate bond trades at a discount to par (float = par)
Floating-rate bond valued at par on each pmt date (above or below par between pmt's)

Example: (value between payment dates)
Consider a 1-year swap with quarterly payments priced at 6.05% (swap rate) when 90-day LIBOR was 5.5%. Notional amount is $30 million. Calculate the value of the swap to the fixed-rate payer after 30 days.

LIBOR	Rate (%)	PV factor
60-day	6.0	0.9901
150-day	6.5	0.9736
240-day	7.0	0.9554
330-day	7.5	0.9357

Answer:
Quarterly payments per $1 of notional:

$$0.0605\left(\frac{90}{360}\right) = \$0.0151$$

Day	Cash flow	PV factor	PV
90	$0.0151	0.9901	0.0150
180	$0.0151	0.9736	0.0147
270	$0.0151	0.9554	0.0144
360	$1.0151	0.9357	0.9498
Total			$0.9939

Value of floating-rate bond (day 30):
On any payment date value = $1 (rate resets)
First payment (per $1) at inception:

$$0.055\left(\frac{90}{360}\right) = \$0.0138$$

Discount $1.0138 by 60-day rate (day 30):

$$\$1.0138 \times 0.9901 = \$1.0038$$
$$MV_{swap} = 1.0038 - 0.9939 = \$0.0099$$

Total value of $30 million notional swap:

$$MV_{fixed-rate\ payer} = 30,000,000 \times 0.0099 = \$297,000$$

- **Determine the fixed rate, if applicable, and the foreign notional principal for a given domestic notional principal on a currency swap, and determine the market values of each of the different types of currency swaps during their lives**

Two yield curves and two swap rates

Example:

$R^{\$}_{90-day} = 0.030$ | $R^{£}_{90-day} = 0.040$
$R^{\$}_{180-day} = 0.035$ | $R^{£}_{180-day} = 0.050$
$R^{\$}_{270-day} = 0.040$ | $R^{£}_{270-day} = 0.060$
$R^{\$}_{360-day} = 0.045$ | $R^{£}_{360-day} = 0.070$

Current exchange rate is £0.50 per $1. Determine the £ swap rate, the notional £ amount and the quarterly cash flows on a:

- Pay $ fixed, receive £ fixed currency swap
- Pay $ fixed, receive £ floating currency swap

$ Swap rate = 1.1% (q) or 4.4% (annually)

$$Z^{£}_{90-day} = \frac{1}{1+\left(0.040 \times \frac{90}{360}\right)} = 0.9901$$

$$Z^{£}_{180-day} = \frac{1}{1+\left(0.050 \times \frac{180}{360}\right)} = 0.9756$$

$$Z^{£}_{270-day} = \frac{1}{1+\left(0.060 \times \frac{270}{360}\right)} = 0.9569$$

$$Z^{£}_{360-day} = \frac{1}{1+\left(0.070 \times \frac{360}{360}\right)} = 0.9346$$

$$C_{£} = \left(\frac{1-0.9346}{0.9901+0.9756+0.9569+0.9346}\right) = 1.70\%$$

Fixed rate on £ swap in annual terms:

$$1.70\left(\frac{360}{90}\right) = 6.8\%$$

Pay $ fixed, receive £ fixed currency swap

1-year quarterly $5 million swap

Notional £ amount of swap:

$$\$5,000,000 \times 0.5 = £2,500,000$$

At initiation £2,500,000 would be swapped for $5,000,000. Pay 1.1% quarterly on the $ amount ($55,000) and receive 1.7% on the £ amount (£42,500). At the end of one year, principals returned.

Pay $ fixed, receive £ floating currency swap

Principals exchanged
Still pay 1.1% quarterly on $5 million
Receive floating British rate on £2.5 million

Similar to interest rate swap
PV (Receive) minus PV (Pay)

Four possible structures:
Receive $ fixed and pay £ fixed
Receive $ floating and pay £ fixed

Receive \$ fixed and pay £ floating
Receive \$ floating and pay £ floating

Example:
After 300 days the 60-day \$ rate is 5.4%, the 60-day £ rate is 6.6% and the exchange rate is £0.52 per \$1. The 90-day rates on the last settlement date were 5.6% and 6.4% respectively. Calculate the value of a \$5 million swap in which the counterparty receives \$ floating and pays £ fixed.

Answer:
After 300 days, the only cash flows remaining are the last interest payments and principal repayments in 60 days.

Need to find the PV of those cash flows, therefore:

$$Z^{\$}_{60-day} = \frac{1}{1+\left(0.054\times\frac{60}{360}\right)} = 0.9911$$

$$Z^{£}_{60-day} = \frac{1}{1+\left(0.066\times\frac{60}{360}\right)} = 0.9891$$

Floating rate payments (\$)
\$5 million principal plus
\$70,000 (\$5 million x 0.056/4) coupon

Discounted for 60 days at 5.4%

$$\$5,070,000\times 0.9911 = \$5,024,877$$

Fixed-rate payments (£)
£2.5 million principal plus
£42,500 (£2.5 million x 0.068/4) coupon

Discounted for 60 days at 6.6%

$$£2,542,500\times 0.9891 = £2,514,787$$

Convert to dollars (£0.52):

$$\frac{£2,514,787}{0.52} = \$4,836,129$$

$$MV_{fixed-rate\ payer} = 5,024,877 - 4,836,129 = \$188,748$$

- **Determine the fixed rate, if applicable, on an equity swap and the market values of the different types of equity swaps during their lives**

Pay-fixed equity swap
Same formula as for IR swap

$$C = \left(\frac{1 - Z_4}{Z_1 + Z_2 + Z_3 + Z_4} \right)$$

Z is the PV of $1 to be received on certain dates

Example:
A $10 million principal value equity swap has a fixed quarterly rate of 0.0151 and the other part pays the quarterly return on an index. The index is currently trading at 985. After 30 days, the index stands at 996 and the term structure is as follows:

LIBOR	Rate (%)	PV factor
60-day	6.0	0.9901
150-day	6.5	0.9736
240-day	7.0	0.9554
330-day	7.5	0.9357

Calculate the value of the swap to the fixed-rate payer on day 30.

Answer:
Value of the fixed-payer side:

Day	Cash flow	PV factor	PV
90	$0.0151	0.9901	0.0150
180	$0.0151	0.9736	0.0147
270	$0.0151	0.9554	0.0144
360	$1.0151	0.9357	0.9498
Total			$0.9939

$Value_{fixed}$ = Value per $1 notional x notional

$$0.9939 \times 10,000,000 = \$9,939,000$$

Value of $10 million invested in index:

$$10,000,000 \left(\frac{996}{985} \right) = \$10,111,675$$

$$MV_{fixed-rate\ payer} = 10,111,675 - 9,939,000 = \$172,675$$

Floating-for-equity swap

$1 (par value) plus payment discounted at appropriate rate for certain period.

Multiply by notional amount

Value = $Receive_{index}$ – Pay_{float}

Equity-for-equity swap

Value = $Receive_{return} - Pay_{return}$

Example:
An investor exchanges the return on Share A for the return on Share B in a $1 million quarterly-pay swap. After one month, Share A is up 1.3% and Share B is down 0.8%. Calculate the value of the swap to the investor.

$$V_{swap} = \left(-0.008 - 0.013\right) \times 1{,}000{,}000 = -\$21{,}000$$

- **Identify and interpret the characteristics of swaptions, including the difference between payer and receiver swaptions**

Payer swaption (call)
Right to enter swap as fixed-rate payer at rate specified (strike)
More valuable when rates increase
Exercised when market rate exceeds strike

Receiver swaption (put)
Right to enter swap as fixed-rate receiver (put) at rate specified (strike)
Put
More valuable when rates decrease
Exercised when market rate below strike

Option purchased for a premium (price)

Motivation and uses

Investor anticipates a floating rate exposure at some future date (e.g., issue bond or obtain loan). Payer swaption would lock in a fixed rate and provide floating-rate payments for the loan. Exercised if rates increase, effectively resulting in a fixed-rate loan

Used to speculate on changes in interest rates

Used to terminate a swap. A fixed-rate payer on a 5-year swap could buy a 3-year receiver swaption (strike = swap rate) expiring in two years. Right to enter into an offsetting swap at the end of two years, effectively terminating the 5-year swap at the end of the second year.

- **Identify and calculate the possible payoffs and cash flows of an interest rate swaption**

Exercising an in-the-money swaption effectively generates interest savings (call) or extra interest (put) over the term of the underlying swap.

Example:
Receiver swaption exercised on a 1-year quarterly-pay $1 million IR swap (swap rate = 5%) when market rate is 4%. Right to enter into a swap and receive a fixed rate of 5%.

Payoff each quarter (extra interest):

$$\left(0.05-0.04\right)\left(\frac{90}{360}\right)\times \$1\,\text{million}=\$2,500$$

- **Calculate the value of an interest rate swaption on the expiration day**

Value equals the PV savings or extra interest

Example:
Swaption exercised on 1-year quarterly-pay $10 million IR swap with a 5% swap rate when the market rate on a current IR swap is 6.05%. The annual rates:

LIBOR	Rate (%)	PV factor
90-day	5.5	0.9864
180-day	6.0	0.9709
270-day	6.5	0.9535
360-day	7.0	0.9346

Calculate the value of swaption at expiration.

Answer:
Swaption allows investor to take fixed-rate payer position at 5%. Investor can also enter into a current 1-year swap as the fixed-rate receiver (floating-rate payer) to get 6.05%. Floating rate received from swaption will offset floating rate payments from second swap.

The net cash flow at each payment date:

$$\left(0.0605-0.05\right)\left(\frac{90}{360}\right)\times \$10\,\text{million}=\$26,250$$

The present value of these payments:

Day	Cash flow	PV factor	PV
90	$26,250	0.9864	25,893
180	$26,250	0.9709	25,486
270	$26,250	0.9535	25,029
360	$26,250	0.9346	24,533
Total			$100,941

- **Determine how credit risk arises in a swap and distinguish between current and potential credit risk**

Credit risk
Probability that counterparty will default
Party with positive value subject to risk

Current credit risk
Default on payment currently due

Potential credit risk

Future possible defaults over remaining term

- **Identify and assess at what point in a swap's life credit risk is the greatest**

Credit risk is highest in the middle of swap term
Credit quality may have deteriorated
Significant future payments remaining

Towards end of swap
Few payments left – lower credit risk
Currency swap – principal at end -> higher risk

- **Interpret the swap spread and what it represents**

Spread between swap rate and comparable Treasury notes

A 2-year swap might have a spread of 40 basis points over the yield on 2-year T-Notes

Swap rate based on LIBOR curve. LIBOR not a risk-free rate. A default premium is reflected in the swap rate calculated from it.
Illustrate how swap credit risk is reduced by both netting and marking to market

Interest payments are typically netted
Only one party owes the net amount

A owes B $40,000
B owes A $60,000
Netted amount: B owes A $20,000

Without netting (credit risk is greater)
If B goes bankrupt and default on $60,000
A obliged to pay $40,000
Claim against B of $60,000
With netting
B's bankruptcy results in A having a claim of only $20,000
No obligation to make payment to B

Marking to market
Periodic payments equal to value of swap on settlement dates
Swap repriced by resetting swap rate
Exercise:

An investor purchased a 1-year European receiver swaption with an exercise rate of 6% that is about to expire. The underlying is a 2-year swap with semi-annual payments and the notional amount is $100,000. Annualized LIBOR rates and present value factors are:

LIBOR	Rate (%)	PV factor
180-day	4.0	0.9804
360-day	4.5	0.9569
540-day	5.0	0.9302
720-day	5.5	0.9009

Formula for determining the fixed rate is:

$$C=\left(\frac{1-Z_4}{Z_1+Z_2+Z_3+Z_4}\right)$$

i) Calculate the current swap rate and determine whether the receiver swaption is in or out of the money

$$C=\left(\frac{1-0.9009}{0.9804+0.9569+0.9302+0.9009}\right)$$
$$=0.0263$$

$$2.63\left(\frac{360}{180}\right)=5.26\%$$

Put: (X – SR) -> (6 – 5.26) -> in the money

ii) Calculate the value of the receiver swaption at maturity

$$(0.06-0.0526)\left(\frac{180}{360}\right)\times\$10\text{ million}=\$37,000$$

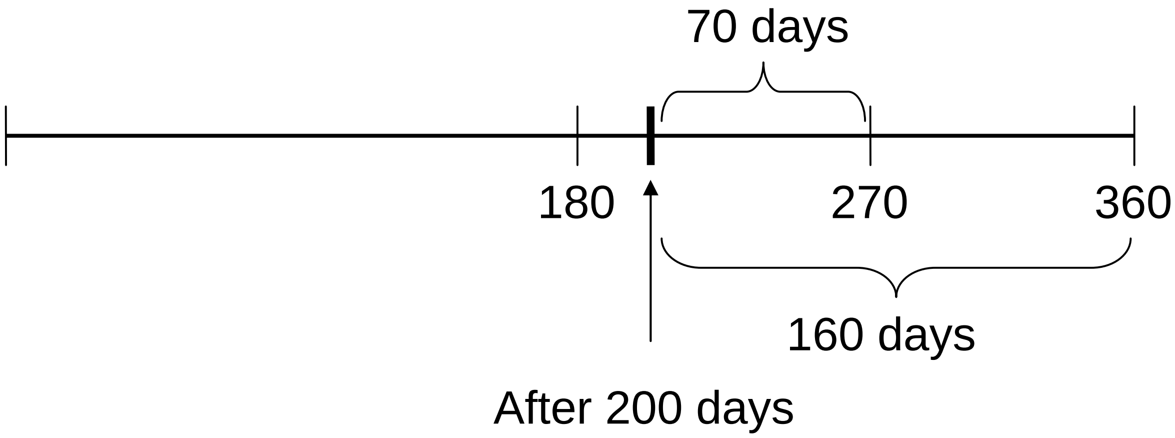
4 payments, each discounted at the appropriate rate

$$V=37,000(0.9804+0.9569+0.9302+0.9009)$$
$$=\$139,431$$

A bank entered into a 1-year currency swap with quarterly payments 200 days ago by agreeing to swap $1,000,000 for €800,000. The bank agreed to pay an annual fixed rate of 5% on the €800,000 and receive a floating rate tied to LIBOR on the $1,000,000. Current LIBOR and EURIBOR rates and present value factors are:

LIBOR	**Rate (%)**	**PV factor**
70-day	4.0	0.9923
90-day	4.4	0.9891
160-day	4.8	0.9791
180-day	5.2	0.9747
EURIBOR	**Rate (%)**	**PV factor**
70-day	5.2	0.9900
90-day	5.6	0.9862
160-day	6.1	0.9736
180-day	6.3	0.9695

The current spot exchange rate is €0.75 per $1. 90-day LIBOR at the last payment date was 4.2%. Calculate the value of the swap to the bank.



LIBOR on $1,000,000 received
5% fixed on €800,000 paid
90-day LIBOR at last payment date was 4.2%

[Pay] **Fixed**

€10,000 (€800,000 x 0.05/4) coupon

$$10,000(0.9900)+810,000(0.9736)$$
$$= €798,516$$

Convert to dollars (€0.75):

$$\frac{€798,516}{0.75}=\$1,064,688$$

[Rec] **Float**

$10,500 ($1 million x 0.042/4) coupon

$$\$1,010,500\times 0.9923=\$1,002,719$$

$$\begin{aligned} MV_{\text{fixed-rate payer}} &= 1,002,719-1,064,688 \\ &= -\$61,969 \end{aligned}$$