



## Swap Markets

P. Sercu,  
*International  
Finance: Theory into  
Practice*

Overview

# Chapter 7

# Swap Markets

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# Overview

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## How the Modern Swap Came About The IBM-WB Swap Subsequent Evolution

Why Currency Swaps?

Spreads—have your cake and eat it  
Other reasons for swapping



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# The IBM-WB Swap

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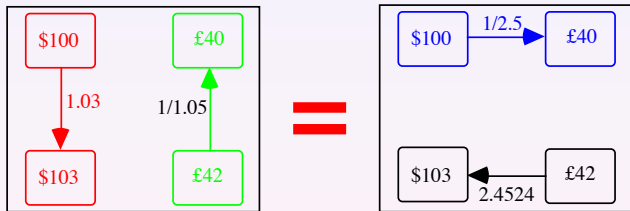
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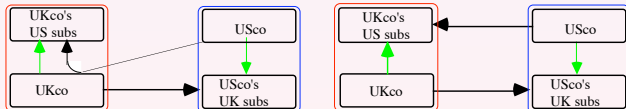
Why Currency  
Swaps?

## ◇ Early antecedents

### ▷ Spot-Forward Swap



### ▷ Parallel/Bk2Bk loans



Arrows show direction of loans (initial principals). Black = actual; green = original purpose.

### ▷ Often a bit shady—occasionally very shady



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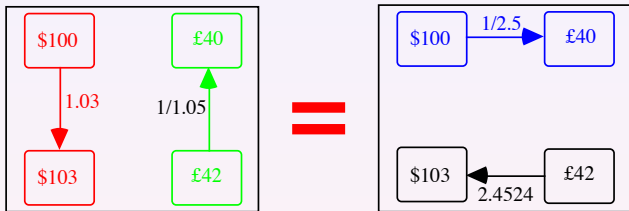
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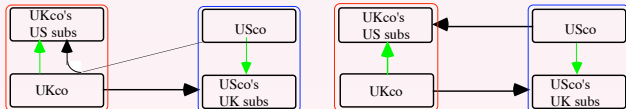
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### ◇ The intentions

#### ▷ IBM's plans

- IBM had DEM-CHF (henceforth “DEM”) debt outstanding
- latent capital gain: interest rates had gone up (so  $v_{\text{bonds}}^{\text{DEM}} < 100\%$ ) and the DEM down
- So IBM wanted to lock in the gain: *retire* the DEM debt, replace it by USD debt
- Costs: issue costs & spread USD debt, conversion costs, call premium(!) on DEM bonds, capgains tax on gain

#### ▷ WB's plans

- WB wanted to *issue* DEM (and CHF) debt to finance its own DEM etc lending
- costs: issue costs & spread new debt

### ◇ The deal

- ▷ IBM leaves DEM debt outstanding, let WB service it
- ▷ WB issues USD debt not DEM, and lets IBM service it



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# IBM & WB—the Movie

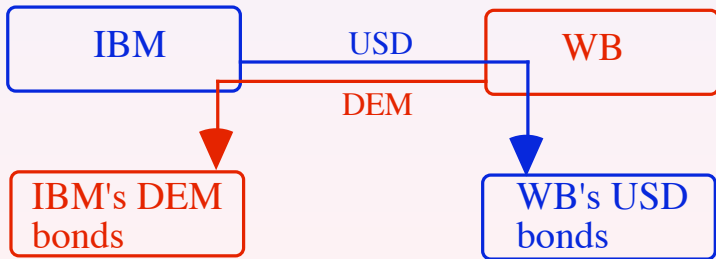
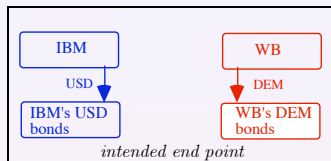
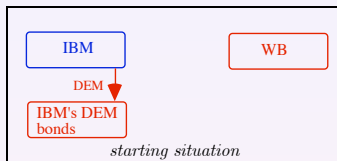
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### ◇ Initial Equivalence

- ▷ Fairness: at  $t_0$ ,  $PV(\text{DEM flows}) = PV(\text{USD flows})$

### ◇ Gains

- ▷ Costs of IBM retiring DEM bonds avoided
- ▷ Costs of WB issuing DEM bonds avoided
- ▷ WB can borrow USD at lower risk spread than IBM
- ▷ IBM's capital gain is postponed  $\Rightarrow$  tax advantage

(These gains were split equally via a side payment)

### ◇ Seminal deal

- ▷ clever & innovative deal
- ▷ highly regarded companies
- ▷ made the swap hip, cool & trendy

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- ◇ Idea was soon applied to **interest swaps**,  
(the “loans” differ not in currency of denomination but in type of interest paid—typically fixed  $\nu$  floating)
- ◇ The **interest-rate swap market grew** very fast:
  - ▷ banks could easily take one side of the swap,
  - ▷ hedge it in the bond/loan market ...
  - ▷ until a customer arrives with opposite wants

This way, swaps became commoditized—as standard & boring as forwards.

- ◇ **LIBOR is the key rate**: swap dealers define the swap rates as the rates they accept if the other side is LIBOR.
- ◇ **Secondary market** has emerged

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- ◇ Swap dealer and customer agree to “lend” each other initially equivalent amounts, with a right of offset.

But words like “loan”, “security”, “interest” are studiously avoided, and there is just one contract.

- ◇ The interest paid to/received from the dealer is (close to) the riskfree rate ...

(riskfree? :

- ▷ the customer has, initially, a good record; or security is posted
- ▷ right of offset limits the risk
- ▷ credit trigger allows swap dealer to get out in time)

... plus or minus a small commission (e.g. 5 bp p.a.).

- ◇ Early termination? Let life =  $n - f$ , swap rates  $s_t$  and  $s_t^*$ , coupons  $c$  and  $c^*$ ; then, for bullet loans:

$$\text{Value} = V_t - V_t^* S_t,$$

$$\text{where } V_t = V_{\text{nom}} [1 + (c - s_t) a(n, s_t)] \times (1 + s_t)^f,$$

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# Non-bullet Legs?

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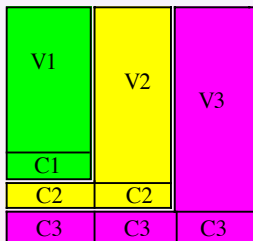
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If the legs are not of the bullet type—e.g. constant annuities, instead—then the leg is constructed out of bullet loans (each with its own swap rate).



$$V_3 + C_3 = 1000$$

$$V_3 (1+s_3) = 1000 \Rightarrow V_3$$

$$V_2 + C_2 + C_3 = 1000$$

$$V_2 (1+s_2) + V_3 s_3 = 1000 \Rightarrow V_2$$

$$V_1 + C_1 + C_2 + C_3 = 1000$$

$$V_1 (1+s_1) + V_2 s_2 + V_3 s_3 = 1000 \Rightarrow V_1$$

$$V_3 = 934.58 \quad V_2 = 881.68, \quad V_1 = 839.69$$

## Corollary:

$$PV = 934.58 + 881.68 + 839.69 = 2,655.95;$$

$$\Rightarrow IRR = 6.347\%,$$

$$= \text{swap rate for 3-year constant-annuity loan.}$$

This way one can generate a term structure for any type of loans, fully consistent with that of bullet loans.



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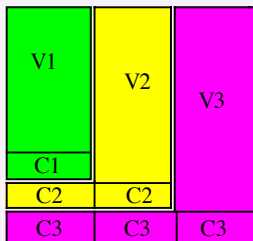
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# Spreads—have your cake *and* eat it

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- ◇ **Rule:** if the **risk spread** favors currency A (e.g. asymmetric info; subsidies), but you **otherwise** prefer currency B, then cheaply borrow A and swap.

## Example

A French Cy can borrow

- EUR at 6% = EUR swap rate:5%, plus spread: 1%
- USD at 6% = USD swap rate:4%, plus spread: 2%

... but prefers USD borrowing. One possible solution:

(spot rate 1.25 USD/EUR; 125m USD needed; **outflows red**)

	loan	swap		total
		"lend"	"borrow"	
	€100 6%	€100 5%	\$ 125 4%	
<i>t</i> : principals	€ 100	€ 100	\$ 125	\$ 125
interest <i>p.a.</i>	€ 6	€ 5	\$ 5	\$ 5 + €1
<i>T</i> : principal	€ 100	€ 100	\$ 125	\$ 125

- ◇ So you borrow at the USD swap rate (5%) plus the best spread (EUR 1%).



# Spreads—have your cake *and* eat it

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Other reasons for swapping

- ◇ **Rule:** if the **risk spread** favors currency A (e.g. asymmetric info; subsidies), but you **otherwise** prefer currency B, then cheaply borrow A and swap.

## Example

A French Cy can borrow

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# Cosmetic improvements to the solution

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One blemish remains: interest is party in EUR. So you can **replace the spread, EUR 1**, by some equivalent:

- an **upfront payment** of  $\text{EUR } 1\text{m} \times a(7\text{y}, 5\%) = \text{EUR } 5,786,373.4$ , or
- a **USD annuity**,  $A$  s.t.  $A \times a(7\text{y}, 4\%) \stackrel{\text{equiv}}{=} 5,786,373.40 \times 1.25$ :

$$A = \frac{5,786,373.40 \times 1.25}{6.002,055} = \text{USD } 1,205,081.8.$$

*i.e.* 0.964% of USD 125m. (Why is this below the 1% EUR spread?)

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		"lend"	"borrow"	
	€100 6%	€100	\$ 125	
$r$ : principals	€ 100	€ 100	\$ 125	\$ 125
interest <i>p.a.</i>	€ 6	€ 5+1	\$ 5+1.205	\$ 6.205
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# Two useful corollaries

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Other reasons for swapping

## ◇ When is swapping useful?

- ▷ If the French Cy had been able to borrow USD at  $4+0.964\%$ , there would be neither gain nor loss from swapping
- ▷ You can check that  $0.964\% = 1\% \times \frac{5,786,373}{6,002,054} = 1\% \times \frac{a(n,s)}{a(n,s^*)}$
- ▷ Rule: swap iff

$$\rho^* > \rho \frac{a(n,s)}{a(n,s^*)} \Leftrightarrow \underbrace{\rho^* \times a(n,s^*)}_{\text{PV of FC spread}} > \underbrace{\rho \times a(n,s)}_{\text{PV of HC spread}}$$

## ◇ Bank's translation rule for risk spreads:

- ▷ to consistently translate the normal (HC) spread into FC if customer wants a FC loan, use

$$\rho^* \stackrel{\text{equiv}}{=} \rho \frac{a(n,s)}{a(n,s^*)}$$

## ◇ Recall that all this is for bullet loans



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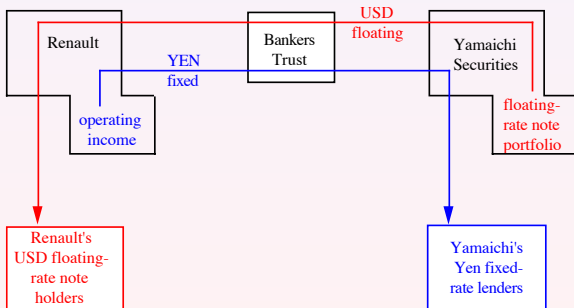
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Other reasons for swapping

## ◇ Getting access to a closed market: use local strawman

- ▷ E.g. Renault wanted to replace USD FRNs by JPY fixed-rate bonds but found the JPY bond market closed (early 80s!).
- ▷ So Yamaichi issued JPY bonds which Renault promised to service;
- ▷ In return, Yamaichi promised to service the USD FRNs, and in fact used the JPY it had borrowed to buy such assets.



arrows show direction of service flows

# Other reasons for swapping—cont'd



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Other reasons for swapping

### ◇ Avoiding transaction costs.

- IBM/WB example: avoid costs of withdrawing(IBM)/reissuing(WB) CHF & DEM debt.
- General: synthetic alternative involves three transactions: borrow currency 1, convert, reinvest currency 2.

### ◇ Possible advantages of off-balance-sheet reporting:

- Ratios
- Reduce Basel-1 capital requirement (relative to synthetic swap)

$T - t$	pure currency swap	pure interest swap	fixed-for- floating
< 1 year	1%	0%	1%
> 1 year	5%	.5%	5%

### ◇ Favorable tax treatment: postponing realization of gain (e.g. IBM/WB).

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Other reasons for swapping

- ◇ A **spot-forward swap** can be viewed as a way to arrange mutually secured and initially equivalents loans, with minimal legal complications. As we saw before, they can also be used to exploit tax asymmetries or avoid excessive risk spreads.
- ◇ **Parallel or back-to-back loans** are similar in spirit. They are used e.g. to avoid exchange controls. Other motivations, e.g. in the IBM/WB swap, were avoidance of **transaction costs**, **risk spreads**, and **postponement of capital gains taxes**.
- ◇ Modern currency swaps use a **near risk-free rate**. The main purpose is to **save on risk spreads**, and the gain from swapping is seen by comparing PVs, at the swap rate, of any interest paid over and above the swap rate.
- ◇ The modern swap is **cheaper** than an synthetic swap (borrow and re-invest) in terms of transaction costs and capital-adequacy requirements.



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