Case Study: Currency Swaps

IBM and the World Bank

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Underlying Situation

The **World Bank** borrows funds internationally and loans those funds to developing countries for construction projects. It charges its borrowers an interest rate based upon the rate it has to pay for the funds. The World Bank looks for the lowest cost borrowing.

Relevant interest rate in 1981:
U.S. rate: 17% (very high rate due to anti-inflation monetarist policy)
West Germany rate: 11%
Switzerland rate: 8% (Best Choice).

Problem for The World Bank: The Swiss government imposed a limit on **World Bank** borrowings in Switzerland. The **World Bank** had borrowed its allowed limit in Switzerland and the same was true of West Germany.

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In 1981, **IBM** had large amounts of Swiss franc (CHF) and German deutsche mark (DEM) debt and thus had debt payments to pay in Swiss francs and deutsche marks.

IBM and the **World Bank** worked out an arrangement in which the World Bank borrowed dollars in the U.S. market and swapped the USD payment obligation to **IBM** in exchange for taking over **IBM**'s CHF and DEM obligations.

The complete details of the swap have never been published in full.

The following description follows a paper published by D.R. Bock in Swap Finance, Euromoney Publications.
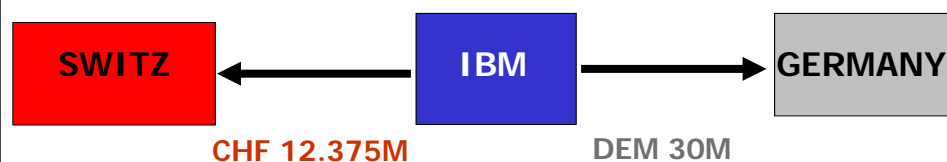
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• **Specifics**
I. IBM
In the mid 1970s, **IBM** had issued bonds in DEM and CHF.

Bonds maturity date: March 30, 1986.
Issued amounts:
- CHF 200 million, with a coupon rate of **6.1875%** (p.a.)
  ⇒ coupon payment = **CHF 12.375M** (=CHF 200M * **.061875**)

- DEM 300 million with a coupon rate of **10%** (p. a.)
  ⇒ coupon payment = **DEM 30M** (=CHF 300M * **.10**)

SWITZ	←	IBM	→	GERMANY

CHF 12.375M   **DEM 30M**

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During 1981 the USD appreciated sharply against the DEM and CHF.
Change in a DEM 100 coupon payment
- In March 1980, $S_t = .5181$ USD /DEM $\Rightarrow$ coupon = USD 51.81
- In August 1981, $S_t = .3968$ USD/DEM $\Rightarrow$ coupon= USD 39.68
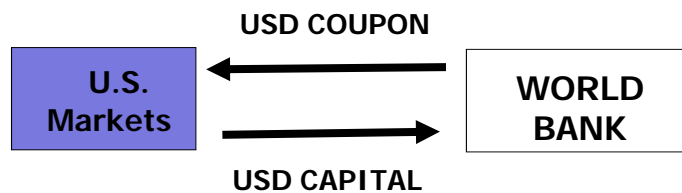$\Rightarrow$ a 24% appreciation.

Similar situation with the CHF.

IBM enjoyed a sudden, unexpected capital gain from the reduced USD value of its foreign debt liabilities.

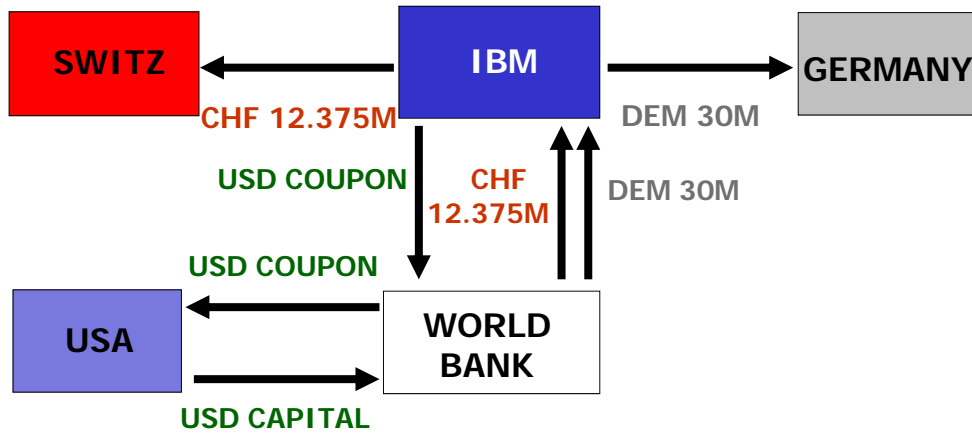Note: **IBM** was exposed to FX risk.

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II. The World Bank

The **World Bank** wanted debt in CHF and DEM. But, it was not allowed. It could issue USD debt, at an attractive USD rate.

USD COUPON

U.S. Markets ← **WORLD BANK**

USD CAPITAL →

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III. Solomon Brothers

Both parties could benefit from USD for DEM and CHF swap. Solomon Brothers proposed a simple currency swap:

Salomon Brothers needed to determine the details of USD bond:
Issue amount (USD capital), coupon, payment dates.

• Swap Details

The World Bank issued a USD bond.

Issue date: August 11, 1981, settling on August 25, 1981.
August 25, 1981 became the **settlement date** for the swap.

The first annual payment: March 30, 1982 – the next coupon date on **IBM**'s bonds -i.e., 215 days, rather than the usual 360 from the swap starting date.

The first step was to calculate the value of the CHF and DEM cash flows. At that time, the annual yields on similar bonds were at 8% and 11%, respectively.

The initial period of 215-day meant that the discount factors were calculated as follows:

$$\text{Discount Factor} = \frac{1}{(1+y)^{\frac{n}{360}}},$$

where y is the YTM of bond. That is,

y_{CHF} = 8% for the CHF

y_{DEM} = 11%

n = Number of days till payment.

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The discount factors were calculated:

Date	Days	CHF	DEM
3.30.82	215	.9550775	.9395764
3.30.83	575	.8843310	.8464652
3.30.84	935	.8188250	.7625813
3.30.85	1295	.7581813	.6870102
3.30.86	1655	.7020104	.6189281

Next, the bond values were calculated:

NPV(CHF) = **12.375M***(.9550775+.8843310+.8188250+.7581813)
       + **212.375M** * (.7020104)
       = **CHF 191,367,478**.

NPV(DEM) = **30M***(.9395764 + .8464652 + .7625813 + .6870102)
       + **330M** * (.61892811)
       = **DEM 301,315,273**.

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The terms of the swap were agreed upon on Aug 11, 1981. Thus, The **World Bank** would have been left exposed to currency risk for two weeks until AUG 25.

The **World Bank** decided to hedge the above derived NPV amounts with 14-days currency forwards:

$F_{t,14\text{-day}}$ = **.45872 USD/CHF**

$F_{t,14\text{-day}}$ = **.390625 USD/DEM**.

The **World Bank** needed a total amount of:

      USD 87,784,089.50   to buy **CHF 191,367,478**.

+   USD 117,701,278.50   to buy **DEM 301,315,273**;

Total = **USD 205,485,368.00**   (FX capital gain here!)

This amount needed to be divided in various payments.

<u>Note</u>: Calculations

   USD 87,784,089.50/ **.45872 USD/CHF** = **CHF 191,367,478**.

   USD 117,701,278.50/ **.390625 USD/DEM** = **DEM 301,315,273**

<u>Problem</u>: First coupon payment was in 215 days. The other payments were based on a period of 360 days.

Assuming that the **World Bank** bond carried a coupon rate of 16% (p.a.) with intermediary commissions and fees totaling 2.15%, the net proceeds of .9785 per USD meant that the USD amount of the bond issue had to be:

      USD 205,485,000/0.9785 = **USD 210,000,376**.

The YTM on the **World Bank** bond was 16.8%. Recall, the first coupon payment involved 215 days only. Thus, the first coupon payment was equal to:

     USD 210M * (.16) * (215/360) = USD 20,066,667.

Other coupon payments are equal to:

      USD 210M * (.16) * (360/360) = USD 33,060,000.

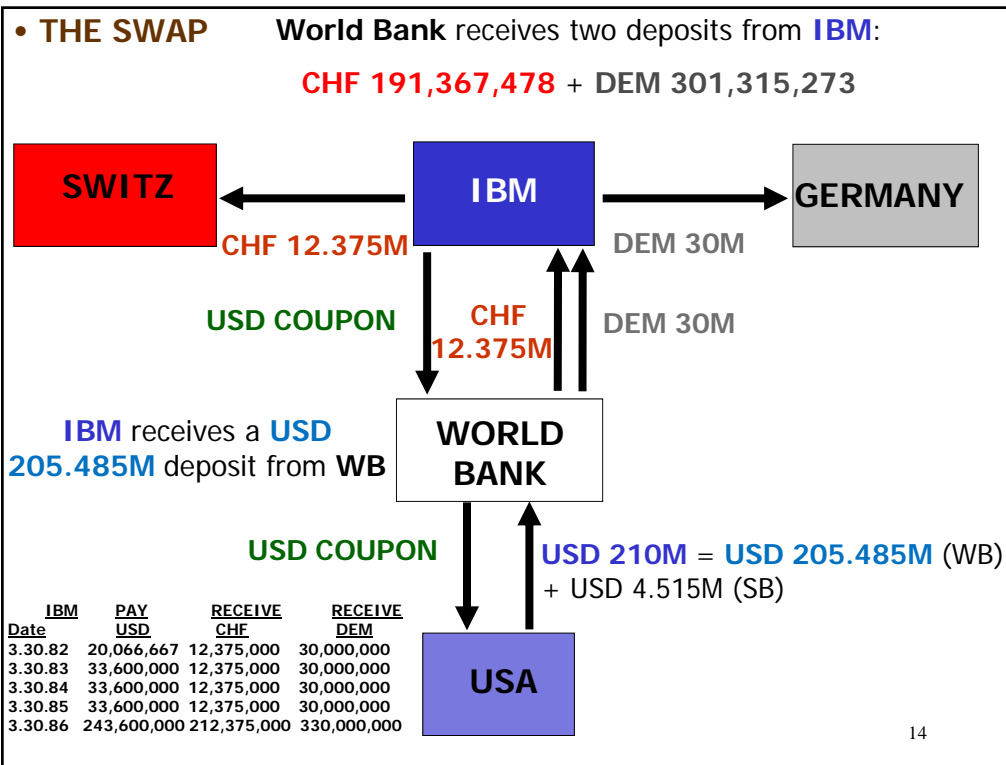The cash flows are summarized in the following table:

Date	USD	CHF	DEM
3.30.82	20,066,667	12,375,000	30,000,000
3.30.83	33,600,000	12,375,000	30,000,000
3.30.84	33,600,000	12,375,000	30,000,000
3.30.85	33,600,000	12,375,000	30,000,000
3.30.86	243,600,000	212,375,000	330,000,000
YTM	16.8%	8%	11%
CR	16%	6.1785%	10%
NPV	205,485,368	191,367,478	301,315,273

Benefit to **IBM**: No longer exposed to FX risk.
Capital gain from USD appreciation.
Lower coupon than current market rates.

Benefit to the **World Bank:** Access to CHF and DEM financing –also, at lower rates than current market rates.

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• **THE SWAP**   **World Bank** receives two deposits from **IBM**:

CHF 191,367,478 + DEM 301,315,273

SWITZ   **IBM**   **GERMANY**

CHF 12.375M   DEM 30M

USD COUPON   CHF 12.375M   DEM 30M

IBM receives a **USD 205.485M** deposit from **WB**

WORLD BANK

USD COUPON   **USD 210M** = **USD 205.485M** (WB) + USD 4.515M (SB)

IBM Date	PAY USD	RECEIVE CHF	RECEIVE DEM
3.30.82	20,066,667	12,375,000	30,000,000
3.30.83	33,600,000	12,375,000	30,000,000
3.30.84	33,600,000	12,375,000	30,000,000
3.30.85	33,600,000	12,375,000	30,000,000
3.30.86	243,600,000	212,375,000	330,000,000

USA

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