

OUTRIGHTS AND FX SWAPS

	page
1. Outrights	2
1.1 Conventions and terminology	2
1.2 Computing outright rates	3
1.3 Quotation of outright rates	8
1.4 Cross rates of outright	14
2. FX swaps	16
2.1 Forward/ Forward Swap	22
2.2 Short dated FX swaps - FX deals with value prior to spot	25
3. Application of FX outright and FX swaps	29
3.1 Using FX swaps for hedging an outright deal	29
3.2 Arbitrage between deposits and FW swaps	30
3.3 Computing the interest rate from Spot- and Forward-rate Synthetic Eurocurrencies	31

OUTRIGHTS AND FX SWAPS

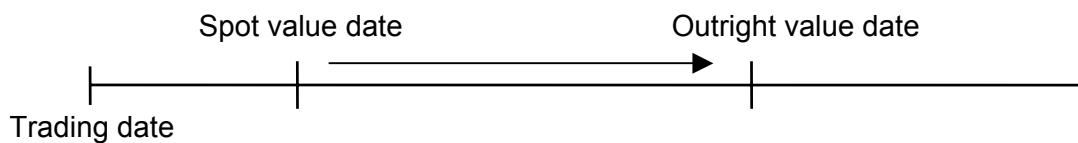
1. Outrights

An outright is an agreement between two counterparts to exchange currencies on a future date at a fixed rate.

1.1 Conventions and terminology

Value date

The regular terms for outright are the straight months (resp. weeks) up to 1 year e.g.: 1w, 2w, 3w, 1m, 2m, 3m, 4m...12m. For the major currencies terms of up to 5 years are possible. The term of an outright deal is measured starting with the spot value date.



If the theoretical value date of an outright is a Saturday, Sunday or a bank holiday, the value date is deferred to the next working day.

The value date of a 1-month outright, traded on Wednesday, the 22nd of October, would be the 24th of November. If the 24th of November is a Sunday, the value date will be the 25th of November.

For the so-called **end / end deals** (outright with spot value dates on the last working day of a month), the value date of the outright is the last working day.

Example

The trading day of a one-month outright deal is Wednesday, the 29th of October. Value date of the spot deal would be Friday, the 31st of October. The value date of the outright deal is in this case Friday the 28th of November (last bank day in November).

1.2 Computing outright rates

Example

The table shows some examples of spot 12-month outright rates:

	EUR/USD	USD/CHF	EUR/GBP
Spot	1.0980	1.5000	0.6975
12 mth	1.0870	1.4720	0.7033

These examples demonstrate that the outright rates usually differ from the spot rate, but they are not a forecast for the spot rate at the end of the term. If, for example, the rate for a 12-month outright USD/CHF is 1.4720, this does not mean that the market expects a rate of 1.4720 in 12 month time.

The difference between the outright rate and the spot rate only reflects the interest differential between the two currencies involved. Would the outright rates not conform to the interest differential, arbitrage between the foreign exchange market and the euro deposit market would be possible.

Example

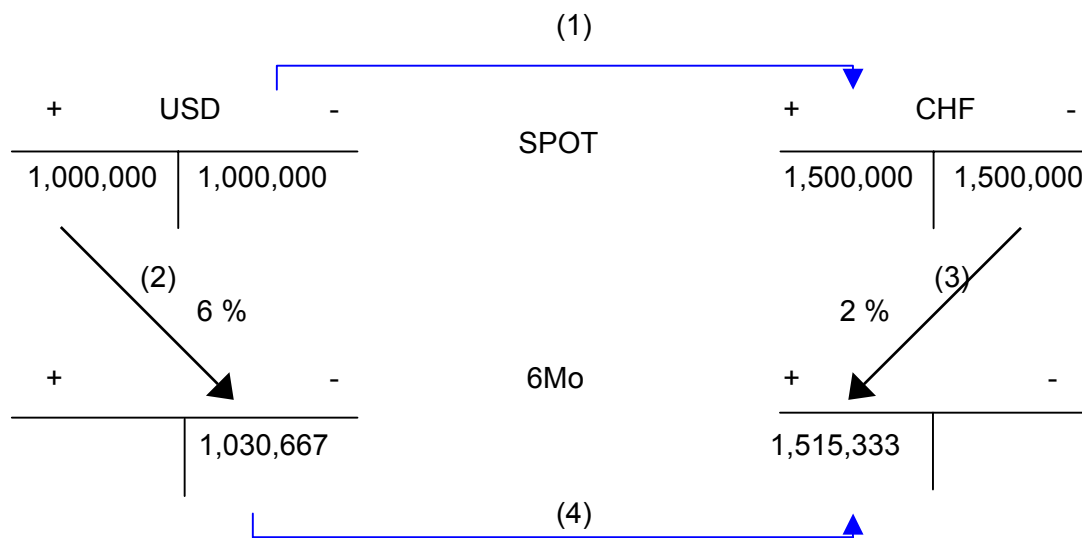
USD/CHF spot: 1.5000
 USD 6-mth deposit rate: 6 %
 CHF 6-mth deposit rate: 2 % (184 days).

A company is long USD/CHF value date 6 months and wants to hedge the FX-risk. There are two alternatives:

1. Sell USD outright against CHF or
2. Sell USD spot against CHF and refinance USD for 6 months by means of an interbank deposit and invest CHF for 6 months by means of an interbank deposit

The results of both alternatives must be the same. Otherwise the market participants would do arbitrage that means they would buy the cheaper alternative and close the position by selling the other one. Hence the difference would disappear very quickly.

If both alternatives produce the same result, the 6 months outright rate can be computed as shown below:



- Sell spot USD 1,000,000 against CHF at a rate of 1.5000 (1)
- Take 184 days USD deposit 1,000,000 at 6 % (2)
- Give 184 days CHF deposit 1,500,000 at 2 % (3)
- Computing the outright rate: $1,515,333 / 1,030,667 = 1.4702$ (4)

The outright rate can be computed by using the stated formula, too.

$$O = SPOT \times \frac{1 + \left(i_V \times \frac{D}{B_V} \right)}{1 + \left(i_B \times \frac{D}{B_B} \right)}$$

D = number of days

O = outright rate

SPOT = spot rate

i_B = interest rate p.a. in decimals, base currency

i_V = interest rate p.a. in decimals, variable currency

B_B = basis of term calculation for the base currency (360 or 365)

B_V = basis of term calculation for the variable currency (360 or 365)

Example

What is the 6-month outright rate of USD/CHF (184 days)?

USD/CHF spot: 1.5000

interest rates:	USD (base currency)	6 %
	CHF (variable currency)	2 %

In order to compute the outright rate, you need

- the spot rate
- the number of days
- the interest rates for both currencies.

$$O = 1.50 \times \frac{1 + \left(0.02 \times \frac{184}{360} \right)}{1 + \left(0.06 \times \frac{184}{360} \right)} = 1.4702$$

Compare the result with the rate, which was derived from the cash flows on the previous page. Both rates are **1.4702**.

Premium/Discount

If the outright rate is lower than the spot rate, the base currency is at a discount.

If the outright rate is higher than the spot rate, the base currency is at a premium.

Rules for premium/discount

If a currency is at a premium or discount depends on the interest rates

interest rate quoted currency < interest rate variable currency → premium
 interest rate quoted currency > interest rate variable currency → discount

Computing outright rate in consideration of bid/offer rates

Since deposit rates are usually quoted with a spread the bid and the offer rate has to be taken into account when computing the bid resp. the offer rate of an outright

$$O_{\text{Bid}} = \text{SPOT}_{\text{Bid}} \cdot \frac{1 + \left(i_{\text{Bid V}} \cdot \frac{D}{B_{\text{V}}} \right)}{1 + \left(i_{\text{Offer B}} \cdot \frac{D}{B_{\text{B}}} \right)}$$

$$O_{\text{Offer}} = \text{SPOT}_{\text{Offer}} \cdot \frac{1 + \left(i_{\text{Offer V}} \cdot \frac{D}{B_{\text{V}}} \right)}{1 + \left(i_{\text{Bid B}} \cdot \frac{D}{B_{\text{B}}} \right)}$$

- D = number of days
- O = outright rate
- SPOT = spot rate
- i_B = interest rate p.a. in decimals, base currency
- i_V = interest rate p.a. in decimals, variable currency
- B_B = day basis of the base currency (360 or 365)
- B_V = day basis of the variable currency (360 or 365)

Example

You receive the following quotes:

USD/CHF	1.5000-10
interest rate USD, 184 days	$5\frac{7}{8}\%$
interest rate CHF, 184 days	$2 - 2\frac{1}{8}\%$

What is the quotation of a 6-month (184 days) outright USD/CHF?

Using these prices the quotation for a 6-month outright rate (USD/CHF) can be computed as follows:

$$\text{Outright rate}_{\text{Bid}} = 1.5000 \cdot \frac{1 + \left(0.02 \cdot \frac{184}{360}\right)}{1 + \left(0.06 \cdot \frac{184}{360}\right)} = \mathbf{1.4702}$$

$$\text{Outright rate}_{\text{Offer}} = 1.5010 \cdot \frac{1 + \left(0.02125 \cdot \frac{184}{360}\right)}{1 + \left(0.05875 \cdot \frac{184}{360}\right)} = \mathbf{1.4731}$$

The 6-month USD/CHF outright rate is 1.4702 –31.

1.3 Quotation of outright rates

In day-to-day business, outright rates are quoted in **swap points**. By adding (premium) or subtracting (discount) these swap points from the spot rate, you get the full outright rate. The swap points are also called forward points.

Two examples of Reuters pages are shown below:

EUR/USD swaps:			USD/CAD swap		
RIC	Bid	Ask	RIC	Bid	Ask
EUR0M=	-0.385	-0.335	CAD0M=	2.96	3.01
EUR1M=	-1.25	-1.21	CAD1M=	2.70	2.80
EUR2M=	-0.41	-0.38	CAD2M=	0.73	0.78
EUR3M=	-3.29	-3.24	CAD3M=	5.25	5.55
EUR4M=	-5.8	-5.7	CAD4M=	23.30	23.70
EUR5M=	-12.67	-12.42	CAD5M=	48.70	49.50
EUR6M=	-23.66	-22.66	CAD6M=	74.00	75.00
EUR7M=	-33.05	-32.55	CAD7M=	154.50	157.00
EUR8M=	-43.01	-42.61	CAD8M=	239.00	243.00
EUR9M=	-53.04	-52.54	CAD9M=	317.00	322.00
EUR10M=	-62.05	-61.65	CAD10M=	580	605
EUR11M=	-71.2	-70.2	CAD11M=	790	830
EUR12M=	-80.6	-79.6	CAD12M=	900	950
EUR13M=	-89.20	-88.00	CAD13M=	1056	1093
EUR14M=	-97.62	-96.37			
EUR15M=	-105.63	-104.38			
EUR16M=	-112.60	-111.40			
EUR17M=	-177.5	-172.5			
EUR18M=	-215	-195			
EUR19M=	-219	-189			
EUR20M=	-214	-174			
EUR21M=	-191	-91			

Premium / Discount

Usually, traders do not state the algebraic sign when quoting swap points. There are two ways to find out whether the swap points are at a premium or at a discount.

- Analysis of the interest rates

interest rate quoted currency < interest rate variable currency → premium
 interest rate quoted currency > interest rate variable currency → discount



interest rates:

USD: 1.50% EUR: 2.50% CAD: 3,50%

Are the swap points of EUR/USD and USD/CAD at a premium or discount?

EUR/USD: EUR rate > USD rate → discount

USD/CAD: USD rate < CAD rate → premium



- Analysis of the quotation

Forward points are quoted with bid and offer rates, just like spot rates. The market user sells at the bid rate and buys at the offer rate.

Bid > Offer → Discount
 Bid < Offer → Premium

Note: Quotes near parity (+/-0) are usually quoted with plus and minus.

Example

The table shows the spot rates and swap points for several terms

	<i>GBP/USD</i>	<i>EUR/USD</i>
Spot	1.5930 - 1.5935	1.1805 - 1.1810
1 month	40 - 39	20 - 21
3 months	120 - 118	35 - 37
12 months	280 - 275	65 - 70

What are the outright rates of GBP/USD and EUR/USD?

GBP/USD: the bid rate is higher than the offer (e.g. 40 - 39 for 1 month).

This means:

- GBP/USD is at a discount
- The forward points have to be subtracted.

<i>GBP/USD rate</i>	<i>1-month</i>	<i>3-month</i>	<i>12-month</i>
Spot rate	1.5930 - 1.5935	1.5930 -1.5935	1.5930 -1.5935
Forward points (discount)	40 - 39	120 - 118	280 - 275
Outright rate	1.5890 - 1.5896	1.5810 -1.5817	1.5650 - 1.5660

EUR/USD: the bid rate is lower than the offer rate (e.g. 20 – 21 for the 1-month term).

This means:

- EUR/USD is at a premium
- the forward points have to be added to the spot rate.

<i>EUR/USD rate</i>	<i>1-month</i>	<i>3-month</i>	<i>12-month</i>
Spot rate	1.1005 - 1.1010	1.1005 - 1.1010	1.1005 - 1.1010
Forward points (premium)	20 - 21	35 - 37	65 - 70
Outright forward rate	1.1025 - 1.1031	1.1040 - 1.1047	1.1070 - 1.1080

Which factors do influence the outright rate?

Since the outright rate consists of the spot rate plus or minus the swap points it changes if:

- the spot rate changes, or
- the interest differential changes (i.e. the swap points change).

 **Example**

The quotation for 3-month outright EUR/USD is 35/37 and changes to 50/52.

Knowing this we can conclude that:

- The interest rates in USD are higher than the interest rates in EUR (bid < offer → EUR is at a premium).
- The forward points increased as the interest differential increased. This could mean that either the interest rates for USD rose or that the EUR interest rates fell. Just by knowing the change in forward points we cannot conclude which of the two things actually happened.

Computing discount / premium

The swap points can be computed by means of the swap formula, which is derived from the outright formula.

$$\text{Premium/discount} = SPOT \times \left(\frac{1 + \left(i_V \times \frac{D}{B_V} \right)}{1 + \left(i_B \times \frac{D}{B_B} \right)} - 1 \right)$$

- D = number of days
- SPOT = spot rate
- i_B = interest rate p.a. in decimals, base currency
- i_V = interest rate p.a. in decimals, variable currency
- B_B = basis of the base currency (360 or 365)
- B_V = basis of the variable currency (360 or 365)

Example

Premium/discount

interest rates:	USD (base currency)	6 %
	CHF (variable currency)	2 %
Spot rate:	USD/CHF	1.5000

What are the 6-month swap points?

$$\text{Premium/discount} = 1.50 \times \left(\frac{1 + \left(0.02 \times \frac{184}{360} \right)}{1 + \left(0.06 \times \frac{184}{360} \right)} - 1 \right) = -298$$

6-months USD/CHF swap points are – 298.

Taking bid / offer rates into account when computing swap points

bid

$$\text{Premium/discount}_{Bid} = SPOT_{Mean} \times \left(\frac{1 + \left(i_{BidV} \times \frac{D}{B_V} \right)}{1 + \left(i_{OfferB} \times \frac{D}{B_B} \right)} - 1 \right)$$

offer

$$\text{Premium/discount}_{Offer} = SPOT_{Mean} \times \left(\frac{1 + \left(i_{OfferV} \times \frac{D}{B_V} \right)}{1 + \left(i_{BidB} \times \frac{D}{B_B} \right)} - 1 \right)$$

- D = number of days
- B = basis of the term calculation (360 or 365)
- r = interest rate p.a. in decimals

Note: As only the premium/discount has to be computed, the calculation may be done with the mean quotation of the spot rate. Bid and offer for spot has almost no impact on the fair price.

Example

USD/CHF 1.5000-10
 USD interest rate, 184 days 5^{7/8} - 6 %
 CHF interest rate, 184 days 2 - 2^{1/8} %

What are the 6-month swap points and outright rates?

$$\text{BID} = 1.5005 \times \left(\frac{1 + \left(0.02 \times \frac{184}{360} \right)}{1 + \left(0.06 \times \frac{184}{360} \right)} - 1 \right) = -298 \quad \text{Offer} = 1.5005 \times \left(\frac{1 + \left(0.02125 \times \frac{184}{360} \right)}{1 + \left(0.05875 \times \frac{184}{360} \right)} - 1 \right) = -279$$

Spot	1.5000 - 1.5010
swap (discount)	298 - 279
<hr style="border: 0.5px solid black;"/>	
= outright rate	1.4702 - 1.4731

Why premium / discount is quoted?

There are a lot of reasons why outright rates are quoted in terms of forward points:

- Forward points are mainly influenced by interest rates. Interest rates are not that volatile than spot rates. If outright rates would be quoted, they would have to be updated for every move in the spot rate.
- Customers, or market users, compare the quotes of different market makers and look at the spot rate only when they are ready to deal.
- In practical dealing the FX-forward trading book is separated from the FX-spot trading book. Thus forward points (FX swaps) are not quoted at the spot desk. Usually the FX-forward desk belongs to the money market department.
- Forward deals are most frequently used as a part of FX-swap transactions in the interbank market. FX-swaps are dominated by the interest rate differential rather than the spot rate.

1.4 Cross rates of outright

Forward cross rates are outright rates of two currencies, where none of these two is USD. Like spot transactions most of the outright deals are done against the USD. This means that liquidity in crosses is lower and the spreads are usually higher. Thus cross rates are frequently derived from quotes against the USD. If for example a bank likes to sell outright CHF against GBP, it would usually do the following transactions

- sell CHF outright against USD
- sell USD outright against CHF

The result of these transactions represents the GBP/CHF outright cross rate.

Example

	<i>USD/CHF</i>	<i>USD/AUD</i>
Spot rate	1.3757/62	1.5930/35
3-month	125/120	115/110

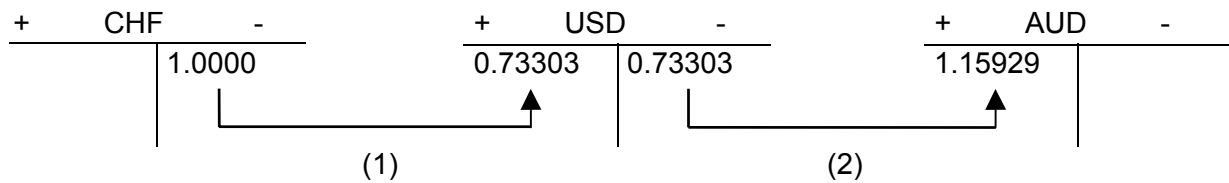
What are the forward cross rates for CHF/AUD?

Step 1: determine the USD outright rates

	<i>USD/CHF</i>	<i>USD/AUD</i>
Spot	1.3757/62	1.5930/35
Swap points	-125/-120	-115/-110
Outright rate	1.3632/42	1.5815/25

Knowing the outright rates, the same rules as used for spot crosses may be used.

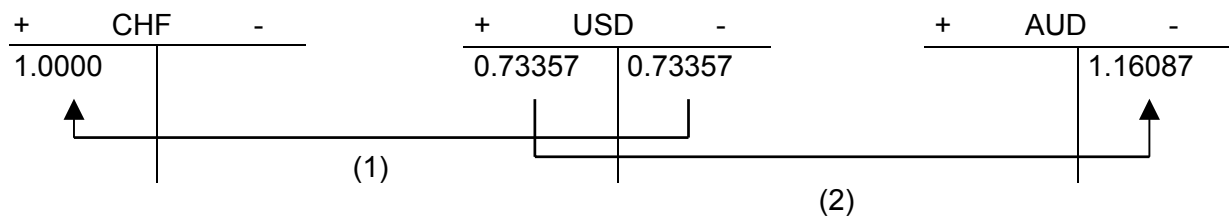
Bid



- Sell CHF 1 against USD 0.73303 (1.3642) (1)
- Sell USD 0.73303 against AUD 1.15929 (1.5815) (2)

By selling 1 CHF you receive AUD 1.15929. Thus the **CHF/AUD bid rate is 1.1593** (rounded).

Offer



- Buy CHF 1 against USD 0.73357 (1.3632) (1)
- Buy USD 0.73357 against AUD 1.16087 (1.5825) (2)


By buying 1 CHF you receive AUD 1.16087. Thus the **CHF/AUD offer rate is 1.1609** (rounded).



2. FX swaps

An FX swap is a contract to buy an amount of currency at an agreed rate, and simultaneously resell the same amount of currency for a later value date to the same counterpart, also at an agreed rate (or vice versa).

Technically an FX swap is a combination of a spot deal and a reverse outright deal.

 Example	EUR/USD Spot	1.1548 – 52
	12 mth swap:	112 – 110

A dealer wants to sell an FX swap for EUR 10 m.
Which transactions does he conclude?

Terminology: buy-and-sell; sell-and-buy

In FX swaps the term “**sell**” refers to the forward leg. Since the dealer acts here as a market user he sells at the bid rate i.e. 112 (bid > ask → discount!).

In order to avoid misunderstandings it is advisable to say “**buy-and-sell**” instead of sell (and sell-and-buy instead of buy).

Buy-and-sell here refers both to the EUR, which are bought spot and sold forward (it does not mean you buy EUR and sell USD!)

Spot basis:

Both spot and forward transaction are agreed on the same spot basis, usually the current mid rate i.e. 1.1550.

If the mid rate is an uneven figure it is usually rounded to the nearest round lot, which lies within the current quote. E.g.: spot 1.1547 – 52 → spot basis: 1.1550

Volume:

In a regular FX swap the base currencies volume both for the spot and the forward transaction is the same, in the example EUR 10 m.

(However in the last years it became common to do FX swaps with uneven volumes as well.

The reason is to avoid the residual FX risk)

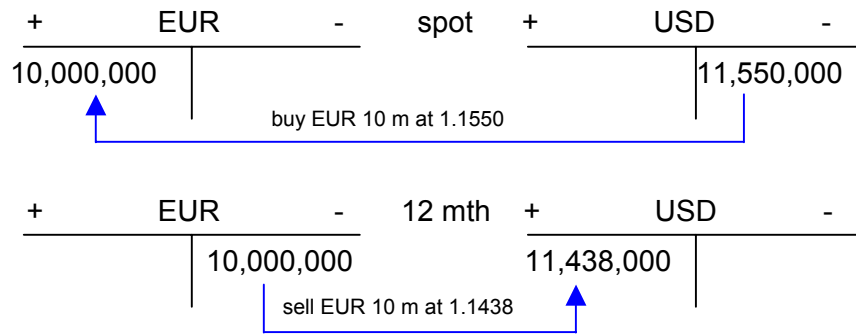
Transactions:

- the dealer buys spot EUR 10 m at 1.1550 and
- sells forward 12 month EUR 10 m at 1.1438 (1.1550 – 0.0112)

Cash flows

The dealer buys-and-sells EUR 10 m spot against 12 month at – 112, thus he

- buys spot EUR 10 m at 1.1550 and
- sells forward 12 month EUR 10 m at 1.1438



This figure can be interpreted in two ways:

- ▶ A pair of offsetting FX transactions for different value dates, concluded at the same time and on the same deal ticket with the same counterpart.
- ▶ Looked at vertically over time you are actually borrowing EUR for 12-month time and lending USD over the same period.

The FX swap is a pair of money market deals effected by means of FX transactions!

Distinction between FX outright and FX swaps

An FX outright contract is exposed to an FX risk for the full nominal amount.

In an FX swap contract the FX risk of the spot transaction is offset by the forward transaction (except a small residual risk). Thus FX swaps are exposed to an interest rate risk rather to an FX-risk.

The difference between an outright and a FX swap is shown in the table below:

<i>Outright</i>	<i>FX swap</i>
	sell-and-buy (S/B)
buy outright	(=sell spot and buy outright)
or	or
	Buy-and-sell (B/S)
sell outright	(=buy spot and sell outright)

Quotation of FX swaps

FX swaps are quoted in swap points (or forward points).

An example of an Reuters page is shown below:

EUR/USD swaps:

RIC	Bid	Ask
EUROM=	-0.385	-0.335
EURTN=	-1.25	-1.21
EURSN=	-0.41	-0.38
EURSW=	-3.29	-3.24
EUR2W=	-5.8	-5.7
EUR1M=	-12.67	-12.42
EUR2M=	-23.66	-22.66
EUR3M=	-33.05	-32.55
EUR4M=	-43.01	-42.61
EUR5M=	-53.04	-52.54
EUR6M=	-62.05	-61.65
EUR7M=	-71.2	-70.2
EUR8M=	-80.6	-79.6
EUR9M=	-89.20	-88.00
EUR10M=	-97.62	-96.37
EUR11M=	-105.63	-104.38
EUR1Y=	-112.60	-111.40
EUR2Y=	-177.5	-172.5
EUR3Y=	-215	-195
EUR4Y=	-219	-189
EUR5Y=	-214	-174
EUR10Y=	-191	-91

At the bid rate the market user sells the swap i.e. he buys spot and sells forward.

At the ask rate the market user buys the swap i.e. he sells spot and buys forward.

Example

EUR/USD spot: 1.1548 – 52

You ask a bank for the 6 mths EUR/USD swap and get the following quote:

6 month swap: 62.05 – 61.65

You buy-and-sell EUR 10 m. What are the transactions?

- you buy spot EUR 10 m against USD at 1.1550 (mid rate) and
- you sell 6 month forward EUR 10 m at 1.148795 against USD (=1.1550 – 0.006205)

Mark to Market of FX swaps

The mark to market value of an FX swap is the sum of the present values of all cash flows which would occur if the swap were closed at the current market rate.

Example

EUR/USD spot: 1.1550
 1 year swap: 112 – 110 (365 days)
 1 year USD: 6.00 %
 1 year EUR: 7.00 %

You speculate that EUR rates will fall today. Since this would lead to a fall in the swap points you sell/buy EUR 10 m spot against 1 year at – 110 points.

Some hours later interest rates are still unchanged but EUR/USD surged to 1.2000 from 1.1550. This leads to an increase in the swap rate to – 114.30. Since you bought at –110 you expect a loss of 4.3 pips i.e. USD 4,300 (10,000,000 x 0.00043).

The example illustrates the mark to market at the current swap of –114.30:

+ EUR		- spot		+ USD		- P/L USD		EUR
10,000,000	10,000,000			11,550,000	12,000,000	- 450,000	0	
↑		↓						
↑		↓						
+ EUR		- 12 mth		+ USD		- P/L USD		EUR
10,000,000	10,000,000			11,885,700	11,440,00	+ 445,700	0	
↓		↑						
↓		↑						
						- 4,300		
						↑		

“pretended loss”

When closing the swap at the current rates you lose USD 450,000 spot and gain USD 445,700 forward. If the position is marked to market we are interested in the present value. Thus we have to discount the profit in 1 years time by the current USD rate of 6%.

$$present\ value = \frac{future\ value}{1 + rate \times \frac{days}{basis}}$$

$$present\ value = \frac{445,700}{1 + 0.06 \times \frac{365}{360}} = 420,141.40$$

The profits present value is just USD 420,141.40. Thus the total loss amounts to **USD 29,858.60** (420,141.40 – 450,000) instead of the expected loss of USD 4,300.

Residual FX risk of FX swaps (FX tail)

The example above illustrates that the mark to market of FX swaps may change solely due to a change in the spot rate even if interest rates remain unchanged. This may be surprising as we figured out earlier that FX swaps are actually comparable to two money market operations and that the FX risk of the spot leg is offset by the reverse forward leg. Strictly speaking this is not quite true.

Changes in the spot rate have two effects on an FX swap position:

- A change in the spot rate leads to profits and reverse losses at different points in time. Since future cash flows have to be funded this may lead to additional profits or losses which is demonstrated in the example above.
- Since the spot rate is a part of the swap formula a change in the spot rate will also cause a change in the forward points, even if interest rates do not change. You can check this by applying the same interest rates to different spot rates in the swap formula.

General Rule for the residual FX risk

The FX position is the sum of the present value of all future cash flows in the foreign currency

The following example illustrates how the residual FX risk of FX swap can be identified.

Example

Follow-on of the mark-to-market example:

- EUR/USD spot: 1.1550
- 1 year swap: 112 – 110 (365 days)
- 1 year USD: 6.00 %
- 1 year EUR: 7.00 %

You sold-and-bought EUR 10 m at – 110.

What is the residual FX risk (FX tail)?

In order to identify the spot risk we have to discount all cash flows of the foreign currency (USD). Afterwards we sum up the present values.

+	EUR	-	spot	+	USD	-	present value in USD
	10,000,000				11,550,000		+ 11,550,000

							+ 11,550,000
+	EUR	-	12 m	+	USD	-	
	10,000,000				11,440,00 / [1+(0.06x365/360)]		= - 10,783,975

							spot exposure: + 766,025

The given FX swap leads to an FX risk of USD + 766,025 i.e. EUR – 663,225. In order to hedge against to risk you should buy EUR 663,225 spot. The profit / loss on this hedge position offsets the profit / loss on the FX swap due to a spot change.

Check:

You bought EUR/USD 663,225 at 1.1550 (hedge of the residual spot risk)

EUR/USD goes up to 1.2000.

Profit on the hedge: 663,225 x (1.2000 – 1.1550) = **USD 29,845**

This profit offsets the loss suffered on the FX swap (see example above)

2.1 Forward / Forward Swap

A forward/forward swap is an FX swap that starts in the future.

Contrary to a plain FX–swap where a spot and reverse forward transaction are combined, both FX–transactions in the forward/forward swap are forward transactions.

Example

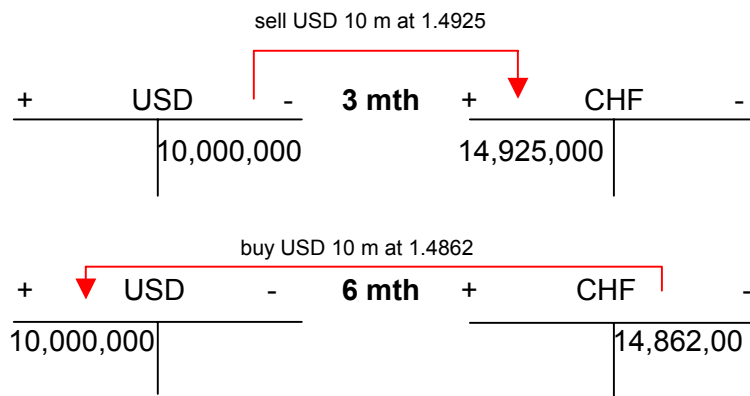
USD/CHF spot: 1.5000

3 month forward: 1.4925

6 month forward: 1.4862

You sell-and-buy USD 10 m 3 month against 6 month.

Cash flows:



Construction of forward/forward swaps

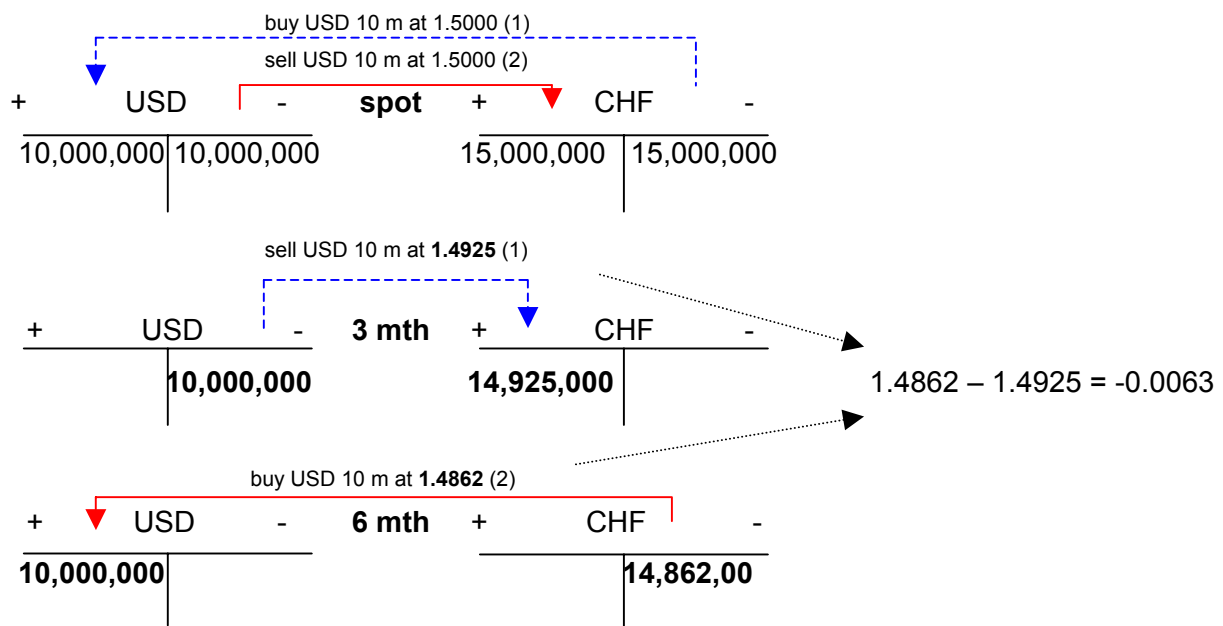
Like spot start swaps fwd/fwd swaps are quoted in forward points rather than in FX forward rates. The fwd/fwd swap points are the margin between the near forward transaction and the far forward transaction. The price can be derived by combining two reverse spot start swaps.

Example

USD/CHF spot: 1.5000
 3 month swap: 75 - 73
 6 month swap: 140 -138
 Construct the following fwd/fwd swap:
 sell-and-buy (S/B) USD 10 m 3 against 6 month

The fwd/fwd can be produced by effecting two reverse spot start FX swaps.

- (1) buy-and-sell (B/S) 3 month at – 75
- (2) sell-and-buy (S/B) 6 month at –138



The spot transaction of the 3 month swap is offset by the spot transaction of the 6 month swap. The remaining forward transactions represent the 3/6 fwd/fwd swap: You sold 3 month at 1.4925 and bought 6 month at 1.4862.

The forward points are the margin between these two rates:

$$\text{3/6 fwd/fwd points} = - 63 (=1.4862 - 1.4925)$$



Calculation rule for forward / forward swaps

Since you can construct fwd/fwd swaps from spot start swaps the price of fwd/fwd swaps can be derived from the spot start swaps as well.

The stated rules can be applied in order to compute fwd/fwd prices:

bid rate: bid long term
- ask short term

ask rate: ask long term
- bid short term



USD/CHF spot: 1.5000
3 month swap: 75 - 73
6 month swap: 140 -138

What is the price of the 3/6 fwd/fwd swap?

bid rate: bid long term:	-140	ask rate: ask long term:	-138
- ask short term:	- - 73	- bid short term:	- -75
3/6 fwd/fwd bid:	- 67	3/6 fwd/fwd ask:	- 63

The 3/6 fwd/fwd swap points are 67 – 63.

“Spot Basis” of forward/forward swaps

In a forward / forward swap, the agreed rate for the short leg is not the current spot rate but the appropriate forward rate for the start date of the fwd/fwd swap.



USD/CHF spot: 1.5000
3 month swap: -75
3/6 fwd/fwd: 67 – 63

You sell-and-buy USD/CHF 3 against 6 month fwd/fwd.
Which rates do you agree?

As a market user you S/B on the ask rate (- 63)

- You sell 3 month at 1.4925 (1.5000 – 0.0075) and
- You buy 6 month at 1.4862 (1.4925 – 0.0063)

2.2 Short dated FX swaps – FX deals for value prior to spot

Usually FX swaps start value date spot (e.g. spot against 1 week, 1 month etc.). However, there are also swaps which start prior to value spot. There are two regular terms:

- O/N: starts today and ends tomorrow
- Tom/Next: starts tomorrow and ends the day after tomorrow (i.e. spot)

The figure below shows an example of a Reuters page for EUR/USD swaps:

RIC	Bid	Ask	Src	Time
EURON=	-0.385	-0.335	BAFX	12:46
EURTN=	-1.25	-1.21	ABSL	13:03
EURSN=	-0.41	-0.38	BOAF	12:46
EURSW=	-3.29	-3.24	ABSL	13:03
EUR2W=	-5.8	-5.7	DRE4	12:59
EUR1M=	-12.67	-12.42	INGX	13:03
EUR2M=	-23.66	-22.66	PBGR	13:03
EUR3M=	-33.05	-32.55	INGX	13:03
EUR4M=	-43.01	-42.61	ABRN	13:02

Using this short dated swaps you can produce “forward” FX deals for value date prior to spot e.g. value tomorrow or even value today.

Producing an FX transaction value tomorrow

Example

Market data:

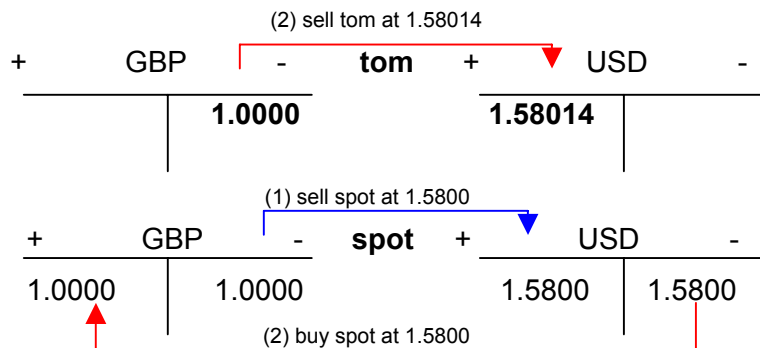
GBP/USD 1.5800 – 1.5805

Tom/Next 1.5 – 1.4

You want to sell GBP/USD value tomorrow. Which rate can you produce?

In order to produce an FX deal value tomorrow you do the following deals:

- Sell GBP/USD spot at 1.5800 and (1)
- Sell-and-buy GBP/USD tom/next at -1.4 (2)



The long leg of the tom/next swap offsets the spot transaction. The rate of the resulting sale of GBP/USD value tomorrow is **1.58014** (=1.5800 – (-)0.00014).

Rule for computing FX rates for value tomorrow

In order to compute the price of FX-deals for value tomorrow apply the following rule:

- reverse side and sign of tom/next swap points and
- add them to the spot rate (value spot)



Follow-on:

Market data

GBP/USD 1.5800 – 1.5805

Tom/Next 1.5 – 1.4 (discount)

What is the rate of GBP/USD value tomorrow?

Spot:	1.5800 – 1.5805
<u>Reversed swap:</u>	<u> +1.4 +1.5</u>
GBP/USD value tom	1.58014 – 1.58065

Producing an FX transaction value today

Example

Market data:

GBP/USD 1.5800 – 1.5805

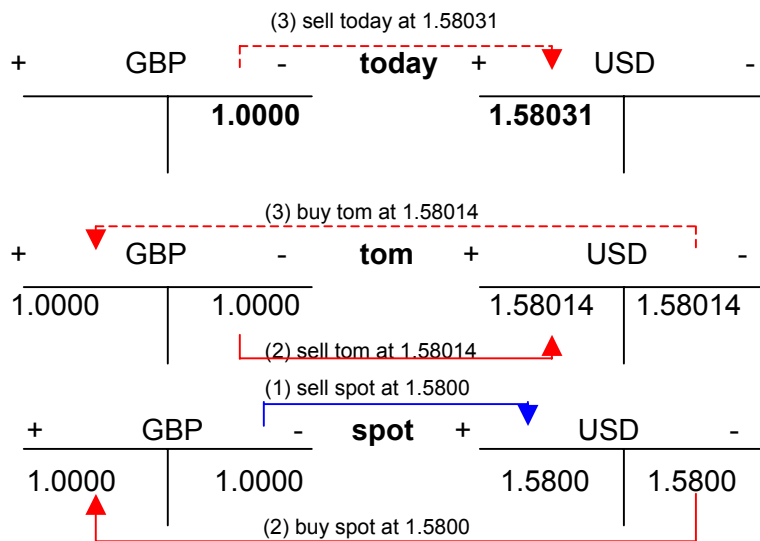
O/N 1.8 – 1.7

Tom/Next 1.5 – 1.4

You want to sell GBP/USD value today. Which rate can you produce?

In order to produce an FX deal value today you do the following deals:

- sell GBP/USD spot at 1.5800 and (1)
- sell-and-buy GBP/USD tom/next at –1.4 (2)
- sell-and-buy GBP/USD O/N at –1.7 (3)



The long leg of the tom/next swap offsets the spot transaction. The long leg of the O/N swap offsets the short leg of the tom/next swap. The rate of the resulting sale of GBP/USD value today is **1.58031** (=1.5800 – (-)0.00014 – (-)0.00017).

Rule for computing FX rates for value today

In order to compute the price of FX-deals for value today apply the following rule:

- reverse side and sign of tom/next and O/N swap points and
- add them to the spot rate (value spot)

Example

Follow-on:

Market data

GBP/USD 1.5800 – 1.5805

O/N 1.8 – 1.7

Tom/Next 1.5 – 1.4

What is the rate of GBP/USD value today?

Spot:	1.5800	–	1.5805
Reversed swap O/N:	+1.7		+1.8
<u>Reversed swap T/N:</u>	<u>+1.4</u>		<u>+1.5</u>
GBP/USD value today	1.58031	–	1.58083

3. Applications of FX outright and FX swaps

3.1 Using FX swaps for hedging an outright deal

FX swaps can be used to transfer the value date of FX transaction to a later or an earlier date. By that means a spot deals value date may be postponed to a future date or an outright trades value date may be brought forward towards the spot date.

FX outright concluded with customers are usually hedged by a combination of a spot deal and an FX swap rather than by means of a single interbank FX outright. The advantage of this practice (compared to a single outright deal) is the higher liquidity in the markets for FX swaps and spot compared to the outright markets.

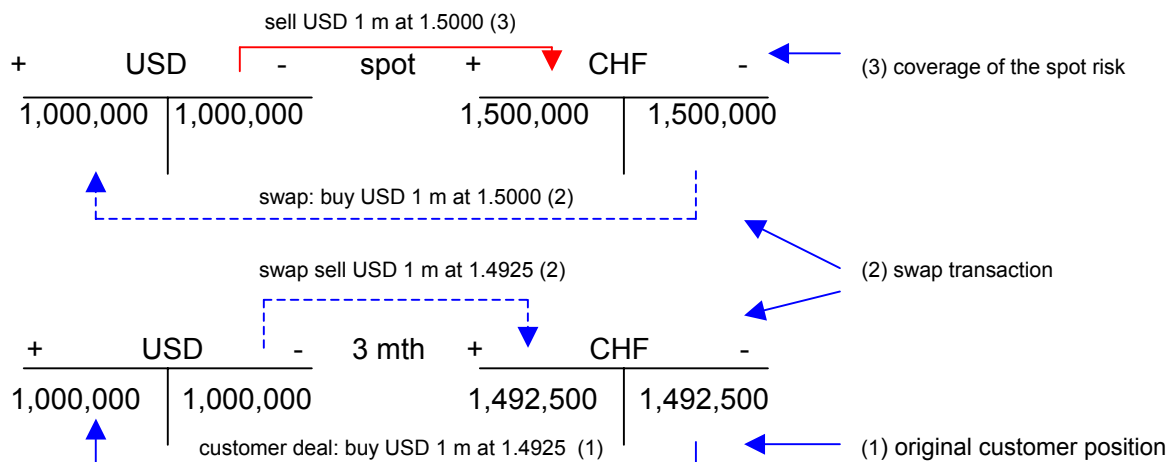
Example

USD/CHF spot: 1.5000

3 month swap: - 75

You bought from a customer USD/CHF 1 m outright 3 month at 1.4925.

How can you cover the risk?



- 1) original position: you bought USD 1 m from the customer
- 2) transfer the value date to the spot date by means of an FX swap
you buy-and-sell USD/CHF spot against 3 month
- 3) cover the FX risk by selling USD 1 m spot

3.2 Arbitrage between deposits and FX swaps

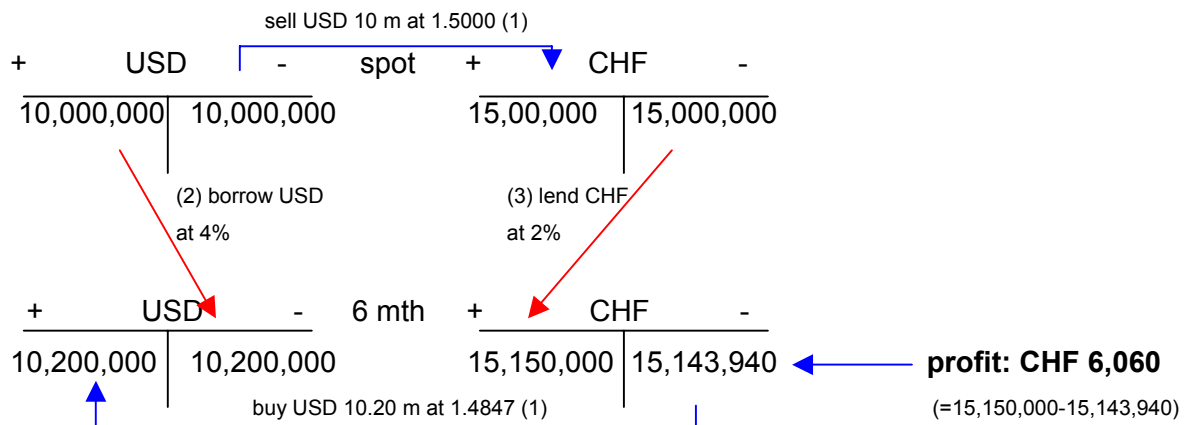
The FX swap rate of two currencies has to correspond to the actual spot rate and the interest differential of the two currencies. If this is not the case, arbitrage between spot, outright and deposit markets is possible.

Example

Spot rate	USD/CHF	1.5000	
Interest rates	USD	4.00%	180 days
	CHF	2.00%	180 days
FX swap:	USD/CHF	155 – 153	180 days

The 'fair' outright rate should be: $-147 = 1.50 \times \left(\frac{1 + \left(0.02 \times \frac{180}{360} \right)}{1 + \left(0.04 \times \frac{180}{360} \right)} - 1 \right)$

As the quoted discount is higher than the theoretical value we decide to buy the swap (i.e. sell-and-buy) at – 153 and to close the position with deposit transactions (i.e. at –147).



Result: The FX swap (1) is hedged by means of interbank deposits (2) + (3). The remaining profit is CHF 6,060.

Note: In practice, bid / offer spreads, equity costs and limits have to be taken into account.

3.3 Synthetic Eurocurrencies - Computing the interest rate from spot and forward rate

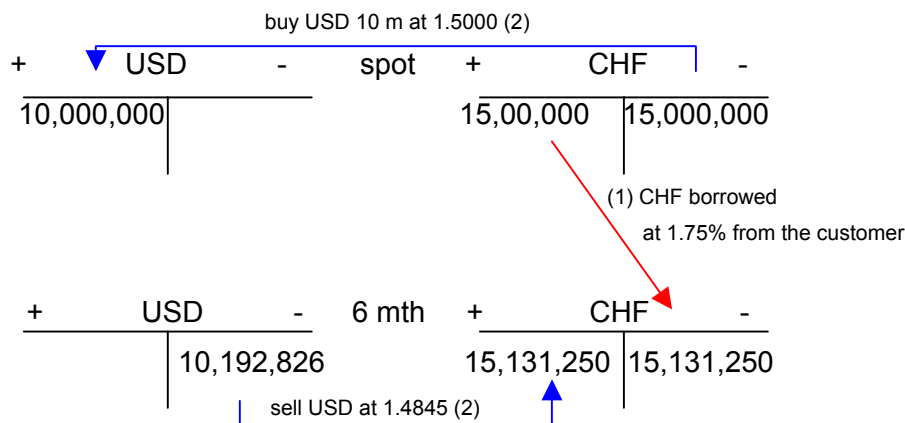
FX swaps are often employed if an existing asset (liability) in one currency shall be transformed into an asset (liability) in another currency for a specified period. As FX swaps are off balance products a banks cash liquidity position can be managed very efficiently.

Example

A customer placed CHF 15,000,000 at the given terms with you.

Interest rate CHF 1.75%
 Term: 180 days
 Spot rate USD/CHF 1.5000
 FX swap: USD/CHF 155 – 153 (180 days)

You do need USD liquidity rather than CHF.
 How can you transform CHF into USD?



Transactions:

- (1) customer placement CHF 15 m at 1.75%
- (2) FX swap: buy-and-sell at –155 (1.5000 and 1.4845)

Result :

You produced a synthetic USD borrowing operation by using the FX swap. The CHF liquidity is transformed into USD liquidity, i.e. you receive USD 10,000,000 value spot and have to pay back 10,192,826 in 180 days time.

A trader might be interested in, which effective rate arises for the synthetic USD borrowing from these transactions. You can use the following formulas to compute the rate.



Interest rate calculation out of FX swaps:

rate of the quoted currency

$$i_Q = \left\{ \frac{\left(1 + \left(i_V \times \frac{D}{B_V} \right) \right) \times S}{O} - 1 \right\} \times \frac{B_Q}{D}$$

rate of the variable currency

$$i_V = \left\{ \frac{\left(1 + \left(i_Q \times \frac{D}{B_Q} \right) \right) \times O}{S} - 1 \right\} \times \frac{B_V}{D}$$

- i_Q interest rate of quoted currency
- i_V interest rate of variable currency
- O outright
- S spot rate
- D days
- B_Q day basis of quoted currency for calculation
- B_V day basis of variable currency for calculation

Example

Follow-on:

A customer placed CHF 15,000,000 at the given terms with you.

Interest rate	CHF	1.75%
Term:	180 days	
Spot rate	USD/CHF	1.5000
FX swap:	USD/CHF	155 – 153 (180 days)

You do need USD liquidity rather than CHF.

Which synthetic USD rate can you produce?

In order to swap the CHF deposit into a synthetic USD deposit you have to buy-and-sell USD/CHF at –155. Thus you buy USD/CHF spot at 1.50 and sell forward at 1.4845.

Computing the rate of the quoted currency (USD)

$$i_Q = \left\{ \frac{\left(1 + \left(0.0175 \times \frac{180}{360} \right) \right) \times 1.5000}{1.4845} - 1 \right\} \times \frac{360}{180} = 3.8565\%$$

By swapping CHF into USD you get a synthetic USD deposit at **3.8565%**.