

Spot FX Markets

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Lesson II: A Deeper Insight into Everyday FX Market Practice

March 6, 2016

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Getting Started

Some useful trading jargon:

- ▶ **Bid:** rate at which a certain market player is willing to buy
- ▶ **Ask:** rate at which a certain market player is willing to sell

Watch out: Bid < Ask



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The Bid/Ask Spread

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$$\text{Bid/Ask Spread} = \text{Ask} - \text{Bid}$$

The bid-ask spread can be conceived as a **transaction cost**
(step back to Lesson I)



The Bid/Ask Spread in Practice I

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Apart from two notable exceptions (GBP and EUR), all the other major currencies are quoted in **European terms**, that is **foreign currency per USD** (Lesson I).

$S_{\frac{F}{USD}}$ \Rightarrow think of these exchange rates as the **buying and selling prices of USD**

The Bid/Ask Spread in Practice II

For instance,

- ▶ $S_{\text{bidUSD}}^{\text{CHF}}$ \Rightarrow rate at which a certain mkt player is willing to

buy USD against CHF

- ▶ $S_{\text{askUSD}}^{\text{CHF}}$ \Rightarrow rate at which the same mkt player

sells USD against CHF

- ▶ **Watch out:** $S_{\text{bidUSD}}^{\text{CHF}} < S_{\text{askUSD}}^{\text{CHF}}$



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The Bid/Ask Spread in Practice III

Conversely, EUR and GBP are quoted in **USD equivalent**

$S_{\frac{USD}{F}}$ \Rightarrow think of these exchange rates as the **buying and selling prices of EUR or GBP**



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The Bid/Ask Spread in Practice IV

For instance,

- ▶ $S_{\text{bid GBP}}^{\text{USD}}$ \Rightarrow rate at which a certain mkt player is willing to
buy GBP against USD
- ▶ $S_{\text{ask GBP}}^{\text{USD}}$ \Rightarrow rate at which the same mkt player
sells GBP against USD
- ▶ **Watch out:** $S_{\text{bid GBP}}^{\text{USD}} < S_{\text{ask GBP}}^{\text{USD}}$



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USD/EUR				JPY/USD			
1.17	72 s	75 s	1.17	119.	80 s	83 s	119.
1.17630		1.18475		119.185		119.960	
1.18020	1.18020	1.18965	1.18975	118.450	118.480	119.650	119.650

Source: Bloomberg, 8th January 2015

- ▶ $S_{\frac{USD}{bidEUR}} = 1.17725 \Rightarrow$ the price provider is willing to
buy EUR at 1.17725 USD
- ▶ $S_{\frac{USD}{askEUR}} = 1.17755 \Rightarrow$ the price provider is willing to
sell EUR at 1.17755 USD

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1.18020	1.18020	1.18965	1.18975	118.450	118.480	119.650	119.650

Source: Bloomberg, 8th January 2015

- ▶ $S_{\frac{JPY}{bidUSD}} = 119.805 \Rightarrow$ the price provider is willing to
buy USD at 119.805 JPY
- ▶ $S_{\frac{JPY}{askUSD}} = 119.835 \Rightarrow$ the price provider is willing to
sell USD at 119.835 JPY

Equivalent Notations I

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$$S_{\text{bidGBP}}^{\text{USD}} = S_{\text{bidGBP}}^{\text{askUSD}}$$

Rate at which the price provider is willing to **buy GBP against (selling) USD** (i.e. the buying rate for GBP and the selling rate for USD)



Equivalent Notations II

$$S_{\frac{USD}{askGBP}} = S_{\frac{bidUSD}{askGBP}}$$

Rate at which the price provider is willing to **sell GBP against (buying) USD** (i.e. the buying rate for USD and the selling rate for GBP)



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Watch Out!

Given

$$S_{\text{bid}GBP}^{\text{USD}} \text{ and } S_{\text{ask}GBP}^{\text{USD}},$$

what if **YOU** were to sell/buy GBP?

- ▶ $S_{\text{bid}GBP}^{\text{USD}} \Rightarrow$ number of USD **YOU** will receive from the bank from the sale of GBP per USD
- ▶ $S_{\text{ask}GBP}^{\text{USD}} \Rightarrow$ the price that **YOU** must pay to buy GBP from USD



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Evidence on the bid-ask spread

The **bid ask spread** tends to:

- ▶ **vary** throughout the day \Rightarrow in particular, the spread is higher:
 - ▶ at the start/end of the trading day;
 - ▶ on Fridays (at closing), on Mondays (at opening) as well as on the last trading day of the month;
 - ▶ on market holidays (for big financial centres)
- ▶ **increase with the volatility** of the spot rate
- ▶ **decrease when more dealers** are in the market \Rightarrow the larger the number of dealers, the thinner the spread

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Reciprocal Rates and Bid/Ask Spread

When bid-ask prices are taken into account:

$$S_{\frac{i}{askj}} = S_{\frac{1}{bidj}}$$

and

$$S_{\frac{i}{bidj}} = S_{\frac{1}{aski}}$$



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Cross Rates and Triangular Arbitrages I

Suppose you were to buy GBP from EUR and assume that:

	Bid	Ask
$S \frac{USD}{EUR}$	1.102	1.105
$S \frac{USD}{GBP}$	1.5775	1.581
$S \frac{GBP}{EUR}$	0.696	0.6965

In principle, you could **either** choose a **direct** transaction (you sell EUR to buy GBP) or an **indirect** transaction via USD (you first sell EUR to buy USD and then you sell USD to buy GBP)...



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Indirect Transaction (via USD)

	Bid	Ask
$S \frac{USD}{EUR}$	1.102	1.105
$S \frac{USD}{GBP}$	1.5775	1.581

- ▶ Step 1: **sell EUR to buy USD** $\Rightarrow S \frac{USD}{bidEUR}$
- ▶ Step 2: **sell USD to buy GBP** $\Rightarrow S \frac{USD}{askGBP}$

The **indirect** FX rate $S \frac{GBP}{bidEUR}$ is thus

$$\frac{S \frac{USD}{bidEUR}}{S \frac{USD}{askGBP}} = \frac{1.1020}{1.581} = 0.6970$$



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Direct Transaction

	Bid	Ask
$S_{\frac{GBP}{EUR}}$	0.696	0.6965

In this case, you only have to **sell EUR to buy GBP** ⇒

$$S_{\frac{GBP}{bidEUR}} = 0.696$$



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Some Profit to Cash In...

Notice that, if you choose the **indirect transaction**, you would get 0.6970 GBP. If you conversely go for the **direct transaction**, you would only get 0.696: are there profit opportunities? If so, how would you exploit them?



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In More General Terms...

- ▶ As long as $S_{\frac{GBP}{bidEUR}} \geq \frac{S_{USD}}{S_{\frac{USD}{askGBP}}}$, you are better off choosing the **direct** transaction
- ▶ Conversely, if $S_{\frac{GBP}{bidEUR}} \leq \frac{S_{USD}}{S_{\frac{USD}{askGBP}}}$, the **indirect** transaction will offer you a better return



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The Empirical Evidence

In practice, however, **triangular arbitrage opportunities are very unlikely to materialize.**

An **increasing number of people will try to profit** from the price differential and will consequently sell EUR \Rightarrow buy USD \Rightarrow sell USD \Rightarrow buy GBP, thus driving EUR down and GBP up, until equilibrium is finally restored (**No free lunch principle**)

$$S_{\frac{GBP}{bidEUR}} = \frac{S_{\frac{USD}{bidEUR}}}{S_{\frac{USD}{askGBP}}}$$



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To Rust Off - Lesson I

- ▶ **Spot exchange rate:** FX rate that is contracted today for **immediate** delivery (generally, $t+1$ or $t+2$)
- ▶ **Forward exchange rate:** rate that is contracted today for the exchange of currencies on a specific date in the **future** (1m, 3m, 6m).



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FX Fwd Markets: an Overview

Exactly **like the spot** market:

- ▶ **No central location**
- ▶ **24h** trading
- ▶ Direct **interbank market** (decentralized, continuous, open-bid, double-auction) and indirect **broker-based** market (quasi-centralized, continuous, limit-book, single-auction market) [Step back to Lesson I]
- ▶ **Bid/Ask** quotation

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Adopted Notation

Forward exchange rate: rate that is contracted today for the exchange of currencies on a specific date in the future.

$F_n(\frac{i}{j})$ is the n-year forward exchange rate of currency i per unit of currency j



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Quoting Conventions

Forward rates are generally quoted in terms of the corresponding **spot rate** \pm a suitable number of **swap points**, depending on the forward maturity taken into consideration.

Swap points will be **added to (subtracted from) the spot bid-ask** quotes whenever they are ascending (descending).



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Quoting Conventions: an Example

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Given the spot rates and the swap points below, how to find the corresponding fwd bid-ask quotation?

Spot Bid/Ask	Swap Points
1.3965/1.3970	27/23

Descending swap points \Rightarrow to be **subtracted**

$$F_{bid} = 1.3965 - .0027 = 1.3938$$

and

$$F_{ask} = 1.3970 - .0023 = 1.3947$$

A Closer Mkt Insight

The **bid-ask spread for forward quotations** is wider as time to maturity increases: this is mostly due to market “**thinness**”



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When it is necessary to pay more (less) for forward delivery than for spot delivery of a currency, we say that the currency is at a **forward premium (discount)**.

$$\text{N-year forward premium/discount} = \frac{F_{n_j}^i - S_j^i}{n \cdot S_j^i}$$

Fwd Premium and Discount:an Exmple

Given $S_{\frac{JPY}{USD}} = 76.89$ and $F_{0.5 \frac{JPY}{USD}} = 76.65$,

$$\text{Fwd Premium/Discount} = \frac{76.65 - 76.89}{0.5 \cdot 76.89} = 0.00624$$

Fwd **discount** of the Dollar versus the Yen (or, equivalently, fwd **premium** of the Yen versus the Dollar)



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- ▶ **Outright fwd contract:** agreement to exchange currencies at a pre-determined price on a future date
- ▶ **FX Swap:** agreement to buy and sell foreign exchange at pre-specified exchange rates, where the buying and selling are separated in time (two major components: a spot transaction plus a forward transaction in the reverse direction). A **swap-in (swap-out)** EUR consists of an agreement to buy (sell) EUR spot and to sell (buy) them forward
- ▶ **Currency Swap:** agreement involving two parties in the exchange of principal and interest payments on a loan in one currency for principal and interest payments in another currency.
- ▶ **Options:** derivative contracts that give the buyer the opportunity to buy (call) or to sell (put) the underlying asset at a given price sometime in the future

Some Trading Jargon

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1.17630		1.18475		119.185		119.960	
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Source: Bloomberg, 8th January 2015

BIG FIGURE

PIPS (1 pip = $\frac{1}{100}$ of a percentage point)

The Trading Book

MMID	Bid	Size	Time	MMID	Ask	Size	Time
NSDQ	617.77	1	10:54:04	baty	617.87	1	10:54:05
baty	617.60	1	10:54:04	edga	617.87	1	10:54:05
edga	617.60	1	10:54:01	NSDQ	617.88	1	10:54:04
edgx	617.51	1	10:53:52	bats	617.92	4	10:54:04
cinn	617.50	3	10:53:51	edgx	618.05	1	10:53:28
UBSS	617.50	1	10:51:39	arck	618.36	1	10:54:04
bats	617.50	1	10:54:04	UBSS	618.40	1	10:49:20
arck	617.43	2	10:54:02	amex	618.40	1	10:54:00
amex	616.93	1	10:53:59	WCHV	618.50	1	10:16:10
boxx	616.60	1	10:54:05	cinn	618.50	1	10:53:51
HDSN	616.59	1	10:53:52	HDSN	618.81	1	10:54:04
NITE	616.32	1	08:30:36	boxx	618.87	1	10:54:05
SBSH	615.37	1	10:53:52	NITE	620.13	1	08:30:36
cbxk	611.51	1	06:56:46	cbxk	624.02	1	06:56:46
NMRA	611.49	1	08:33:23	NMRA	624.93	1	08:33:23
BOOK	611.00	1	05:29:01	SBSH	625.00	1	10:36:17
SUSQ	603.61	1	07:24:09	SUSQ	631.05	1	07:24:09
SURG	603.00	1	07:02:27	MSCO	633.21	1	10:53:18

- ▶ **Bid Section:** buying proposals, **ascending** prices
- ▶ **Ask Section:** selling proposals, **descending** prices
- ▶ **Ranking criteria:** Price priority and **Time** priority
- ▶ **Mkt Depth:** Ability to **sustain large mkt orders without impacting the price** of a security \Rightarrow a very large order will **not** significantly move the price of a security
- ▶ **Mkt Width:** it refers to the **cost of executing a trade** of a given size

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No Free Lunch Principle

Free Lunch: situation where a good or a service is received at **NO** cost. In strict financial terms, **No Free Lunch** means that an investor will not be able to make **large and riskless** profits on a continuous, consistent basis.



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To put it into practice I

2.1: Based on the table below, answer the following questions:

	Bid	Ask
$S \frac{USD}{Currency_1}$	1.35135	1.35227
$S \frac{Currency_2}{USD}$	83.365	83.3925

- ▶ How much would you lose if you converted USD 1000 into $Currency_1$ and then back into USD?
- ▶ What is the bid-ask spread for $S \frac{Currency_2}{USD}$?
- ▶ What is the bid-ask spread for $S \frac{Currency_2}{Currency_1}$?
- ▶ How much would you lose if you converted USD 1000 into $Currency_1$, then into $Currency_2$ and finally back into USD?

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2.2: Fill in the table below and answer the following questions:

	Bid	Ask
$S_{\frac{CZJ}{GBP}}$	42.7512	42.7983
$S_{\frac{DKK}{GBP}}$	11.3065	11.3235
$S_{\frac{EUR}{GBP}}$	1.2439	1.2501
$S_{\frac{NOK}{GBP}}$	12.3363	12.3479
$S_{\frac{DKK}{EUR}}$		
$S_{\frac{EUR}{NOK}}$		
$S_{\frac{GBP}{CZJ}}$		

- ▶ Find the bid-ask spread for the $S_{\frac{EUR}{CZJ}}$ quote.
- ▶ How much would you lose if you converted 1500 DKK into GBP, then into EUR, further into NOK and finally back into DKK?

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