FX and FXO markets

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Market Convention - spot

USDJPY rate: 150.134 means.. 1mio USD = 150.134 mio JPY, deliver on 6 mar 2024 (today is 4 Mar)

150.133: bid (where I can sell USD)
150.135: offer (where I can buy USD)

Now if I go ask a bank: USDJPY in 1mio, bank trader will quote: 150.133/135... he means..
-If I want to buy 1mio USD agst JPY, I need to pay 150.135 * 1 mio of JPY;

-if I want to sell 1mio USD agst JPY, I can receive 150.133* 1mio of JPY

Currency	Nicknames
EURUSD	Euro
GBPUSD	Cable
AUDUSD	Aussie
NZDUSD	Kiwi
USDJPY	Dollar Yen
USDCHF	Dollar Swiss
USDCAD	Dollar CAD / Loonie
USDHKD	Dollar Hongki / TT
USDCNH	Dollar China/CNH
USDSGD	Dollar Sin
USDTHB	Dollar Baht

Question: if I buy 10mio USDJPY when trader quotes 149/149.01, and sell at 150/150.01, what is my pnl in USD?
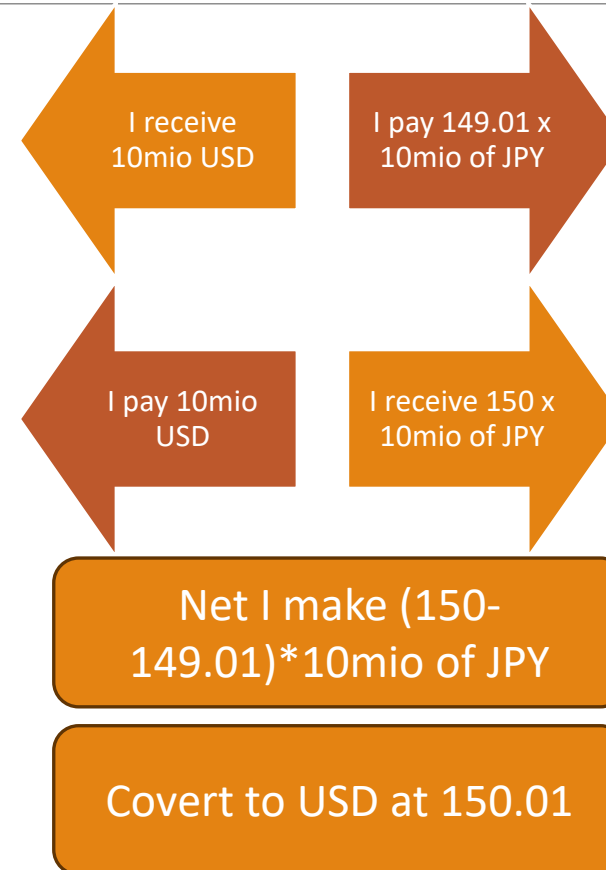
Market Conventions - spot

Question:

if I buy 10mio USDJPY when trader quotes 149/149.01, and sell at 150/150.01 on the same day, what is my pnl in USD?

Answer:
10mio x (150-149.01) / 150.01 = 65,995.60 USD

I receive 10mio USD

I pay 149.01 x 10mio of JPY

I pay 10mio USD

I receive 150 x 10mio of JPY

Net I make (150-149.01)*10mio of JPY

Covert to USD at 150.01

Market Conventions – Forward / FX Swap

Question, I have 10mio USD, I want to buy a property in Japan in 3month, but I want to lock in the FX rates today at 150.193/150.195
(USD IR ~5.3%, JPY IR ~0%), can I ask bank that we trade today but deliver 3month later?

Answer is .. Yes, but we need to adjust for IR differential, because.. You are receiving USD IR for 3 month..

Spot price

Forward price

Swap points (Adjustment)

FWD	USDJPY	
SELL USD		BUY USD
150.193		150.195
148.07193		148.07890
-212.107	0.697	-211.610
3M 06 Jun 24	USD	1m
BUY ORDER		SELL ORDER

Spot	Swap	✕	Custom		Forward		··· +		
EURUSD	**USDJPY**	USD	GBPUSD	USDCNH	AUDUSD	USDCAD	USDCHF	EURGBP	
Nr. Tenor	Far Tenor ↑	Amount			Bid		Ask		
SP	--	1m	BID	150.**18**5		150.**18**7	ASK		
TD	TOM	1m	BID	START RFS		START RFS	ASK		⋮
TOM	SP	1m	BID	-2.312		-2.301	ASK		⋮
SP	S+1	1m	BID	-2.315		-2.309	ASK		⋮
SP	IMM1	1m	BID	-34.870		-34.683	ASK		⋮
SP	1M	1m	BID	-77.691		-77.514	ASK		⋮
SP	2M	1m	BID	-144.483		-144.149	ASK		⋮
SP	3M	1m	BID	-212.106		-211.609	ASK		⋮
SP	6M	1m	BID	-411.147		-409.986	ASK		⋮
SP	9M	1m	BID	-593.680		-591.417	ASK		⋮
SP	1Y	1m	BID	-766.660		-762.867	ASK		⋮

Trading Strategies – Carry trade

Question: I buy 3month USDJPY forward at 148.07890. If 3mth later spot doesn't move (spot 150.193/195), do I make money?

Yes.. But remember that your assumption is that spot market doesn't move..

It's great idea but can be improved:

1. RV (short USDMXN, long USDJPY both 3month forward?)

2. Diversification (short USDMXN/ZAR/HUF, long USDJPY/TWD/CNH with suitable risk allocation)

Both discretionary / quant portfolio managers are looking at this strategy. Idea is to find a portfolio with stable spot risk + positive carry

Goldman Sachs FX Carry Strategy Index
Source: Bloomberg

Risk Management – by trade

Plan your trade with take profit / stop loss levels before you can enter a trade

-Take profit order: I want to sell higher than / buy lower than current market

-Stop loss orders: I want to buy when market goes higher to certain level/sell when market goes to lower level

With pnl calculation, you can plan how much $ you want to risk for a trade (and expected risk/reward)

Risk Management – by portfolio (VaR)

VaR – Value at Risk, a useful method to manage your portfolio risk

In practice, 95% VaR roughly means what can be loss for my worst day of a month

Currency	Exposure (in mio)
USDJPY	0
AUDUSD	10
EURUSD	10
USDCNH	20
USDMXN	0
VaR (kUSD, 100d 95%)	121

- Now back to carry strategies we mentioned earlier.. Which portfolio to do prefer as a carry trade?

For same amount of spot risk, carry for..

portfolio 1: 2.12/150.38* 10mio =140,98 USD

portfolio 2: 2.12/150.38* 7mio + 0.2454/17.0086 *4mio = 156,395 USD

	Potfolio 1	Portfolio 2
Currency	Exposure (in mio)	Exposure (in mio)
USDJPY	10	7
AUDUSD	0	0
EURUSD	0	0
USDCNH	0	0
USDMXN	0	-4
VaR (kUSD, 100d 95%)	37	37

FX Options markets

3mth USDJPY implied vol

RR

BF

x=152.03, y=7.546%

25 delta put   ATM   25 delta call

strike
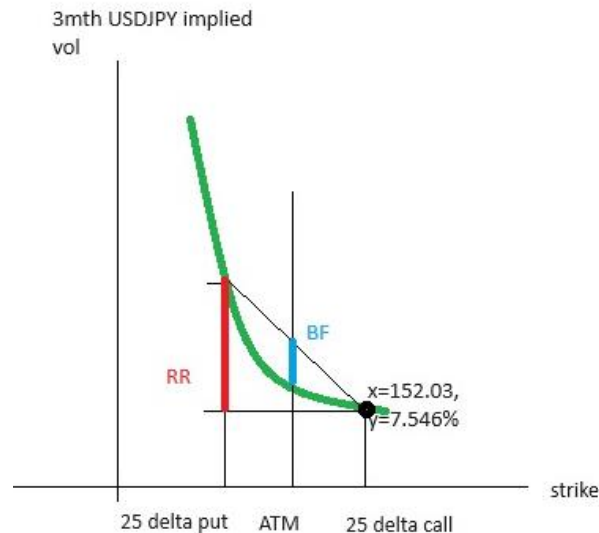
- $RR\,x = \text{Call}\,x - \text{Put}\,x$
- $Fly\,x = 0.5(\text{Call}\,x + \text{Put}\,x) - \text{ATM}$

$\text{Call}\,x = \text{ATM} + 0.5\,RR\,x + Fly\,x$

$\text{Put}\,x = \text{ATM} - 0.5\,RR\,x + Fly\,x$

I want to price a 25 delta call, what is market implied vol? 7.915 + 0.5 * (-1.293) + 0.292 = 7.56

$$C = N(d_1)S_t - N(d_2)Ke^{-rt}$$

where $d_1 = \dfrac{\ln \frac{S_t}{K} + (r + \frac{\sigma^2}{2})t}{\sigma\sqrt{t}}$

and $d_2 = d_1 - \sigma\sqrt{t}$

C = call option price

N = CDF of the normal distribution

S_t = spot price of an asset

K = strike price

USDJPY Curncy	90) Asset ▾	91) Actions ▾	92) Settings ▾	

Bloomberg BGN   Offshore   Weekdays

1) Vol Table   2) 3D Surface   3) Term   4) Smile   5) Dep and Fwd Rates   6) Contribution Met

Format   O RR/BF   ● Put/Call   Side   ● Bid/Ask   O Mid/Spread

Exp	ATM Mid	ATM Spread	25D RR Mid	25D RR Spread	25D BF Mid	25D BF Spread	10D RR Mid	10D RR Spread	10D BF Mid	10D BF Spread
1D	6.750	3.200	-1.705	2.240	0.655	1.600	-3.155	3.840	0.885	2.560
1W	6.605	1.150	-1.127	0.805	0.268	0.575	-2.115	1.380	0.835	0.920
2W	6.745	0.800	-1.235	0.560	0.240	0.400	-2.350	0.960	0.865	0.640
3W	7.280	0.550	-1.335	0.380	0.265	0.270	-2.522	0.655	0.845	0.440
1M	7.783	0.325	-1.550	0.230	0.283	0.165	-2.975	0.390	0.910	0.260
2M	8.067	0.325	-1.468	0.225	0.278	0.165	-2.750	0.390	0.910	0.260
3M	7.915	0.240	-1.293	0.165	0.292	0.115	-2.472	0.285	0.930	0.190
4M	8.112	0.255	-1.110	0.180	0.292	0.125	-2.120	0.300	0.925	0.200
5M	8.214	0.269	-0.987	0.189	0.294	0.133	-1.932	0.319	0.967	0.213
6M	8.262	0.285	-0.900	0.200	0.297	0.145	-1.783	0.345	0.980	0.230
9M	8.597	0.385	-0.620	0.270	0.313	0.195	-1.167	0.465	1.070	0.310
1Y	8.560	0.300	-0.475	0.210	0.350	0.150	-0.865	0.360	1.160	0.240

FX Options markets

3mth USDJPY implied vol

BF

RR

x=152.03, y=7.546%

25 delta put   ATM   25 delta call

strike
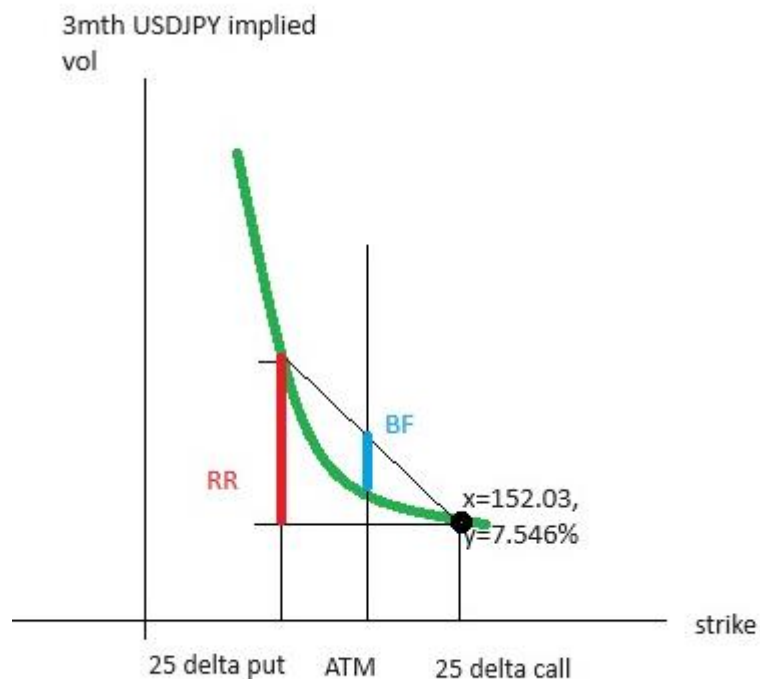
	OVML USDJPY EU 143.95P 06/04/24 N1M	U 148.25C 06/04/24 N1M	EU 152.03C 06/04/24 N1M
	Strategy 1	Strategy 1	Strategy 1
	Leg 1	Leg 1	Leg 1
Price Date	03/04/24 15:42	03/04/24 15:42	03/04/24 15:42
Asset	USDJPY	USDJPY	USDJPY
Spot	Mid 150.37	Mid 150.37	Mid 150.37
Style	European Vanilla	European Vanilla	European Vanilla
Direction	Client buys Physical	Client buys Physical	Client buys Physical
Call/Put	USD Put	USD Call	USD Call
Expiry	3 months 06/04/24	3 months 06/04/24	3 months 06/04/24
Delivery	NY 10:00 06/06/24	NY 10:00 06/06/24	NY 10:00 06/06/24
Strike	143.95 2.90% OTMF	148.25 ATMF	152.03 2.55% OTMF
Notional	USD 1,000,000.00	USD 1,000,000.00	USD 1,000,000.00
Model	Black-Scholes	Black-Scholes	Black-Scholes
More Market Data			
Vol BGN	8.839%/8.839%	7.882%/7.882%	7.546%/7.546%
Vol Spread	0.000%	0.000%	0.000%
Points BGN	Mid -212.15	Mid -212.15	Mid -212.15
Forward	Mid 148.25...	Mid 148.25...	Mid 148.25...
USD Depo USD SOFR	Mid 5.323...%	Mid 5.323...%	Mid 5.323...%
JPY Depo Implied	Mid -0.273...%	Mid -0.273...%	Mid -0.273...%
Greeks			
Gamma	USD 70,159.33	USD 99,446.96	USD 84,335.67
Vega	1,563.04	1,975.63	1,604.12
Results			
Price % USD	0.6563% P	1.5573% P	0.5738% P
Premium USD	6,563.23 P	15,573.27 P	5,738.25 P
Prem Date	03/06/24	03/06/24	03/06/24
Delta Spot	-25.0000%	48.5503%	25.0000%
Hedge	250,000.42	-485,503.29	-249,999.67

25 delta put is more expensive than 25 delta call, because RR is towards downside

FX Options markets – Delta and Vega

Implied vol by 1%, option price higher by around 1685 x 1 = 1685 USD

Spot higher by 0.1%, option price higher by around 250k delta x 0.1% = 250 USD

FX Options markets – Evaluate an option

Shall I buy an USDJPY option with 7.561 vol?

Last but not least.. Both above are past price action, while implied vol is price for future. View is most important

1. Breakeven

2. Realized vol
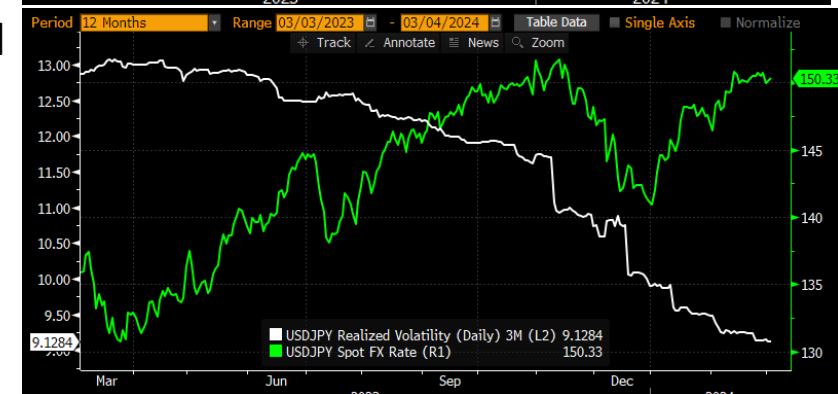
FX Options markets – Some interview tricks

$$V_C = V_P \approx \frac{1}{\sqrt{2\pi}} S \times \sigma\sqrt{T}.$$

Straddle price above USDJPY = Vc + Vp
= 2 x 1/(2/3.14)^0.5 x 150.37 x 7.561%
x 0.25^0.5 = 4.54 JPY per USD
notional = 3.02%

FX Options markets – Some interview tricks

A trader is short a one touch option, but there is only digital trading in the market. How can he hedge this One Touch short?

Assume flat vol surface (RR=BF=0), IR for both ccy is 0.

He is short 1mio$ of 3mth USDJPY 160, if market touches 160 within next 3month, he will have to pay 1mio $ to client..

Questions

Thank you!