Cause & FX

The yen-volatility nexus

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Lower currency vol makes carry trades appear less risky

The fall in currency volatility in many yen crosses means that yield-buying appears to be less risky for investors, even if spreads are compressing somewhat. For many yen crosses, volatility-adjusted spreads have risen during the year.

Vol-adjusted spreads track yen crosses better than non-adjusted spreads

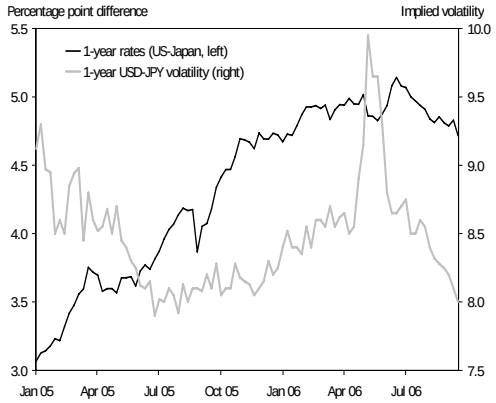
We present graphics and statistical evidence that recent moves in yen crosses are better explained by volatility-adjusted interest rate spreads than by non-adjusted spreads.

Yen crosses may tumble if currency volatility rises

Those results add another risk factor to yen selling. Current valuations incorporate both market pessimism about the Japanese business cycle and benign views of future currency volatility. An increase in risk aversion that is reflected in implied currency volatility could be enough to trigger a round of yen buying, even if unadjusted rate spreads remain steady.

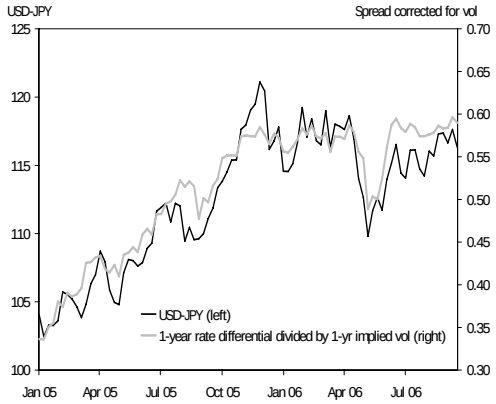
Refer to important disclosures on page 7. Analyst Certification on page 6.

Chart 1: Lower vol makes carry more attractive



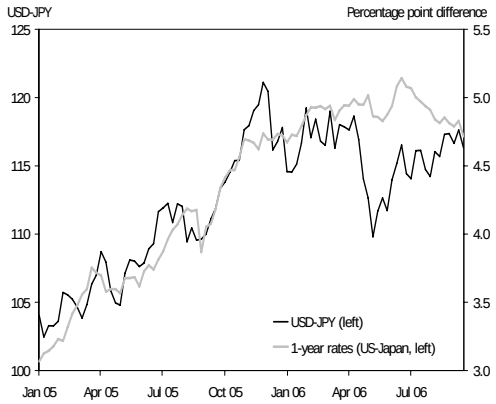
Source: Ecowin, Merrill Lynch.

Chart 2: Vol-adjusted spread tracks USD-JPY...



Source: Ecowin, Merrill Lynch.

Chart 3: ... better than does spread alone



Source: Ecowin, Merrill Lynch.

The yen-volatility nexus

The yen has hit post-1999 lows against the euro and is close to medium-to-long-term lows against other currencies such as the USD and even NZD. This note argues that it is not simply yield differentials that have driven yen weakness, but also the reduction in the implied volatility of yen crosses that makes a given interest rate spread less risky. It adds a link between the recent selling of the yen and the low volatility environment. Taken together, the results add another source of downside risk to yen crosses from an increase in implied volatility.

Lower vol has made carry trades less 'risky'

Start from the perspective of a yield buyer. If you buy a high-yielding asset on the basis of carry, the gain that is locked in is the interest rate spread and the risk is that the high-yielding currency depreciates. The ex-ante currency risk on the position can be captured by one-year currency volatility. (We use one-year interest rate spreads and assume the asset is held to maturity; thus, interim capital gains and losses from rate moves are ignored.) The current carry embedded in USD-JPY is about 450bp, which is more attractive when volatility is low than when it is high.

This may seem abstract (and obvious), but the sharp decline in implied volatility in recent months has been more dramatic than the modest decline in the US interest rate advantage (Chart 1). If we divide the US carry advantage by the implied volatility, we have a type of a Sharpe ratio that measures how high the locked-in return is in relation to the implicit currency risk.

This modified Sharpe ratio has tracked USD-JPY closely since the beginning of 2005 (Chart 2). The relationship has been particularly tight since late-2005 and helps to explain why USD-JPY has risen in recent months despite a narrowing spread advantage. It is also a more attractive explanation than positing shifting tastes for spread among investors. By many standards, a one-year carry that is almost 60% as high as one-year currency volatility represents an attractive risk-return tradeoff.

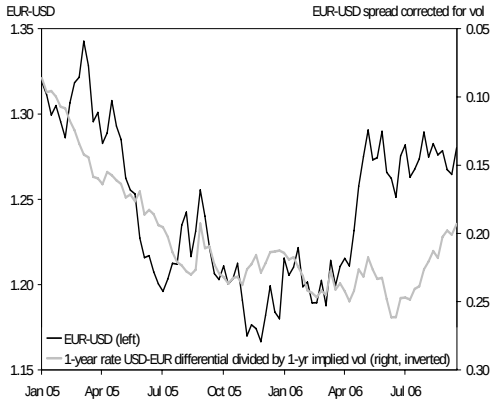
The interest rate spread alone does not track USD-JPY nearly as well, particularly for 2006 (Chart 3). Although the May 2006 USD-JPY drop is more easily explained by a combination of spread and higher volatility, the subsequent moves in USD-JPY, while less dramatic, are also more easily explained by spread combined with market perceptions of lower currency risk.

Does not work for all currency pairs ...

This approach does not work for all currency pairs. If we chart the path of EUR-USD and the same modified rate differential (i.e., the EU-US one-year interest rate differential divided by one-year EUR-USD volatility), the outcome is not as compelling (Chart 4, next page). However, the reasons it does not work are also instructive.

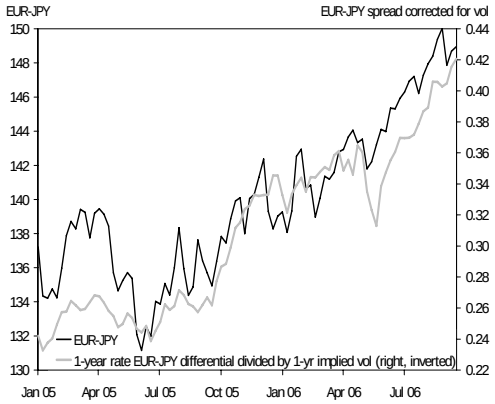
Even though EUR-USD volatility has declined, the US-EU yield spread has become very compressed in relation to volatility. For EUR-USD, our modified Sharpe ratio is no higher than 0.25%, and there is no clear link between movements in volatility and currency movements. Insofar as there is a correlation since the beginning of 2005, it is between spreads and the currency, and even that correlation has greatly diminished since the beginning of Q2 this year.

Chart 4: EUR-USD risk-return not enticing



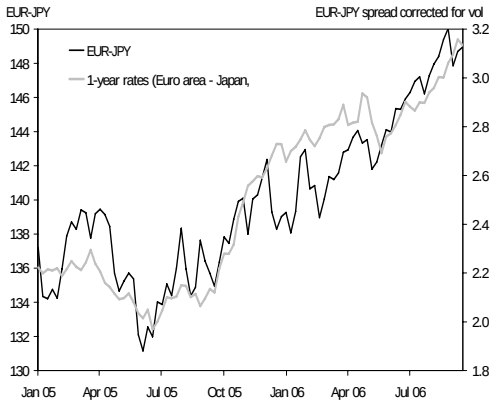
Source: Ecowin, Merrill Lynch.

Chart 5: EUR-JPY tracks vol-adjusted spread



Source: Ecowin, Merrill Lynch.

Chart 6: ... somewhat better than does spread alone



Source: Ecowin, Merrill Lynch.

... but is relevant for other yen crosses

We also consider EUR-JPY, which has hit post-1999 highs. Here, too, the volatility-adjusted one-year spread has a stronger relationship to EUR-JPY than the unadjusted one-year spread (Chart 5). The level of the volatility-adjusted spreads is somewhat lower than that for USD-JPY, with the one-year spread having hit a peak level of about 45% of one-year volatility, but it has risen sharply from earlier levels.

It is harder to see the tighter correlation of EUR-JPY with the volatility-adjusted spread than with the unadjusted spread (Chart 6), but correlation analysis indicates that the volatility-adjusted spread is more tightly linked, even over the past few months. Adding the unadjusted spread to a regression that has the adjusted spread provides virtually no additional explanation, while the adjusted spread is extremely significant (Table 1).

Similar results are obtained for NZD-JPY, but those are less compelling visually because most of the variation is from the interest rate side rather than from the moves in volatility. Even though higher volatility-adjusted spreads seem to be statistically more correlated with higher NZD-JPY overall, the outcome is less clear-cut when we look at smaller sub-periods of our sample. The unadjusted spread contributes to the explanation about changes in NZD-JPY, although with lower significance than the adjusted spread.

Table 1: Response of yen crosses to vol-adjusted- and unadjusted spreads (2005-present)

Dependent variable	Independent variables		
1-week change in	1-week change in Unadjusted spread	1-week change in Adjusted spread	R^2
USD-JPY	-0.96	8.33	0.91
	(-1.2)	-10.3	
EUR-JPY	-4.67	9.823	0.14
	(-1.00)	(3.19)	
NZD-JPY	5.15	4.11	0.43
	(2.4)	(4.6)	

Source: Merrill Lynch

Notes: t-statistics in parentheses. The vol-adjusted spreads take the spreads in one-year interest rates and divide through by one-year implied vol in the cross. To make the coefficients comparable we multiply the vol-adjusted spreads by the average value of vol over the estimation period.

Statistical issues

The major statistical issue that concerns us is causality; we have argued that lower currency volatility leads to more JPY selling (all else being equal) because it raises volatility-adjusted returns. The argument could be made that higher realized volatility in currencies causes higher implied volatility, which, in turn, makes our correlations spurious.

We do not believe that that is the case for the following reasons. First, the correlation between currency moves and volatility persists even if we allow for lagged changes in currencies and include the absolute value of the change in currencies as an explanatory variable for volatility. The volatility-currency relationship persists even when we include other proximate correlates of volatility.

Nor does the coefficient of the volatility-adjusted spread change much when those measures of volatility are introduced into the regressions. That suggests that the term is not just capturing general volatility-linked effects. That said, sharper tests are desirable.

A second issue is determining when volatility-adjusted spreads are high enough to be meaningful to investors. We have argued that spreads that are 60% as high as corresponding currency volatility are attractive in USD-JPY; a value of 45% seems to lead to EUR-JPY buying. It would be useful to confirm whether there are thresholds at which those ratios become meaningful to investors.

A third issue is that the results work well in 2005-06 and in most sub-periods of that period, but the links do not appear to be nearly as tight in prior periods. Again, more analysis is needed on why our effect can be found in some periods but not others.

Conclusion and strategy

Recent movement in yen crosses appears to be better explained when interest rate spreads are adjusted for currency volatility. This suggests that sellers of the yen are not only looking at interest rate spreads, which we believe have moved too far against JPY, but also are taking current low implied volatilities at face value as a measure of currency risk. We have frequently argued that markets are not taking enough account of the strength of the Japanese recovery. This adds another dimension to the risks attached to yen selling: any augmenting of perceived currency volatility could itself lead to unwinding of short yen positions.

Our FX VOLT model recommended shorting 3M USD-JPY volatility swaps last month. We will be watching the model carefully for any signal that USD-JPY volatility is on the rise.

Steven Englander

Traders corner

Trade	Open Date	Open Price	Target	Stop
FX DISCRETIONARY TRADES				
Long 5-week 74.30 NZD put JPY call with expiry 27 Oct 2006	22 Sep	0.46% of NZD (spot 77.05, ATMF ref vol 10.73%)	--	--
Short CAD-NOK (i.e. long USD-CAD and short USD-NOK)	22 Sep	5.8547 (USD-CAD 1.1181, USD-NOK 6.5462)	5.59	5.93
Long 1-month 2.2253 USD call BRL put with expiry 18 Oct 2006	18 Sep	0.55% of USD (spot 2.1470, ATMF ref vol 11.30%)	--	--
Long 1-month 279.62 EUR call HUF put with expiry 18 Oct 2006	18 Sep	0.52% of EUR (spot 270.53, ATMF ref vol 10.60%)	--	--
Long 3-month EUR put JPY call spread with expiry 5 Dec 2006 and a knock-out at 150.75 (strikes 147.54, 142)	5 Sep	0.80% of EUR (spot 148.61, ATMF ref vol 7.60%)	--	--
Long 3-month 950 USD put KRW call with expiry 1 Dec 2006	1 Sep	0.85% of USD (spot 960.55, ATMF ref vol 5.80%)	--	--
Short GBP vs. long basket of CHF (50%) and SEK (50%)	10 Aug	GBP-USD 1.8937 USD-CHF 1.2338, USD-SEK 7.1820	5% on the spot basket	-2.5% on the spot basket
Long 3-month 39.50 EUR call SKK put with expiry 19 Oct 2006	19 Jul	0.72% of EUR (spot 38.44, ATMF ref vol 6.60%)	--	--
Long EUR-USD	28 Jun	1.2549	1.32	1.2550
Long 4-month 108 USD-JPY one-touch with expiry 27 Oct 2006[1]	28 Jun	23.15% of notional (spot 116.42, ATMF ref vol 8.65%)	--	--
Long 1-year USD-KRW strangle with expiry 27 Jun 2007 (strikes 909, 984)	28 Jun	2.24% of USD (spot 957.80, ATMF ref vol 6.42%)	--	--
Long 9-month 1.25 AUD call NZD put with expiry 4 Jan 2007	4 Apr	1.20% of AUD (spot 1.1865, ATMF ref vol 9.43%)	--	--
FX SYSTEMATIC TRADES (ML FX AUTO, PATRIC & VOLT)				
Short USD-JPY (SPEC)	15 Sep	117.57	5% (-0.50pp per day)	-2.5% (+0.25pp per day)
Short USD-JPY, short USD-SEK, short NZD-USD, short GBP-USD 3-month forwards with expiry 8 December 2006 (spot ref JPY 116.76, SEK 7.3485, NZD 0.6374, GBP 1.8652) (PATRIC)	8 Sep	3m fwd JPY 115.30, SEK 7.2980, NZD 0.6339, GBP 1.8672	6% on the spot basket	-3% on the spot basket
Long equal-weighted AUD & NZD versus short equal-weighted CHF & JPY (G10 CARRY)	1 Sep	AUD-USD 0.7644, NZD-USD 0.6541, USD-CHF 1.2340, USD-JPY 117.36	--	--
Short 3-month USD-JPY volatility swap with expiry 1 December 2006 (VOLT)	1 Sep	8.05%	--	--
Short USD-JPY, short USD-SEK, short EUR-USD, short GBP-USD 3-month forwards with expiry 6 November 2006 (spot ref JPY 114.12, SEK 7.1414, EUR 1.2889, GBP 1.9086) (PATRIC)	4 Aug	3m fwd JPY 112.65, SEK 7.0884, EUR 1.2815, GBP 1.9109	6% on the spot basket	-3% on the spot basket
Long 3-month EUR-USD variance swap with expiry 1 Nov 2006 (VOLT)	1 Aug	8.70%	--	--
Short USD-JPY, short USD-CHF, long USD-CAD, 3-month forwards with expiry 9 October 2006 (spot ref JPY 113.97, CHF 1.2219, CAD 1.1134) (PATRIC)	7 Jul	3m fwd JPY 113.94, CHF 1.2095, CAD 1.1102	6% on the spot basket	-3% on the spot basket
Short 3-month USD-JPY variance swap with expiry 2 Oct 2006 (VOLT)	3 Jul	9.00%	--	--
LOCAL DEBT MARKET TRADES*				
Slovakia: Pay 5y swap (expiry 26 Sep 2011), receive 6m BRIBAR	26 Sep	5y swap: 4.58%, 6m BRIBAR: 4.89%	5y swap: 5.38%	5y swap: 4.38%
South Africa: Pay 1y 1y fwd swap (expiry 26 Aug 2008)	26 Sep	1y 1y fwd swap: 9.15%	1y 1y fwd swap: 9.63%	1y 1y fwd swap: 8.87%
Brazil: Long Jan'08 DI futures, pay CDI rate	21 Sep	Jan'08 DI future: 13.83%, CDI: 14.09%	Jan'08 DI future: 13.10%	Jan'08 DI future: 14.25%
Brazil: Long Jan'08 DI futures, pay CDI rate	20 Sep	Jan'08 DI future: 13.71%, CDI: 14.1%	Jan'08 DI future: 13.10%	Jan'08 DI future: 14.00%
Poland/Hungary: Pay 2y 2y forward Hungarian swap rates (expiry 29 Aug 2008), receive 2y 2y forward Polish swap rates (expiry 29 Aug 2008)	29 Aug 19 Sep	2y 2y fwd Hungarian swap: 7.80%; 2y 2y fwd Polish swap: 5.58% Spread (4y PLN rates - 2y PLN rates -4y HUF rates + 2y HUF rates): 48bp	Spread: 10bp	Spread: 70bp

Trade	Open Date	Open Price	Target	Stop
India: Pay 5y onshore swap (expiry 28 Aug 2011), receive NSE MIBOR	28 Aug	5y swap: 7.14%, NSE MIBOR: 6.10%	5y swap: 7.60%	5y swap: 6.90%
Thailand: Receive 5y onshore swap (expiry 28 Aug 2011), pay 6-month BIBOR	28 Aug	5y swap: 5.65%, 6m BIBOR: 5.49%	5y swap: 5.00%	5y swap: 6.00%
Taiwan: Pay 3y onshore swap (expiry 28 Aug 2009), receive 90-day repo rate	28 Aug	3y swap:1.93%, 90-day repo: 1.65%	3y swap: 2.20%	3y swap: 1.80%
Singapore: Receive 5y onshore swap (expiry 24 Aug 2011), pay 6-month swap offer rate (SOR)	24 Aug 19 Sep	5y swap: 3.59%, 6m SOR: 3.65%	5y swap: 3.20%	5y swap: 3.80%
Argentina: Long Nobac '08 bond (maturity 6 Aug 2008), finance with Libor+25bp	9 Aug	Nobac '08 price: 98.45	Nobac '08 price: 102.00	Nobac '08 price: 98.75
Long 1-year 3.30 USD call ARS put with expiry 28 May 2007	25 May	3.16% of USD (spot 3.0830, ATMF ref vol 11.00%)		
Israel: Long 2015 Galil bond (Series 5472, maturity 30 Apr 2015), finance at Libor+25bp	12 Jul	2015 Galil yield: 4%	2015 Galil yield: 3.25%	2015 Galil yield: 4.10%
Long 3m USD-ILS forwards with expiry 31 Oct 2006	31 Jul	4.3937 (spot ref 4.39)	--	--
South Korea: Pay 2y swap (expiry 9 Jun 2008), receive 91 Day KRW CD (expiry 6 Sep 2006)	6 Jun (15 Jun)	2y swap: 4.60%, 91D CD: 4.39%	2y swap: 4.95%	2y swap: 4.25%
Philippines: Pay 5y offshore swap (expiry 9 May 2011), receive 3m interbank reference rate	9 May (22 May)	5y swap: 8.87%, 3m interbank ref rate: 7.78%	5y swap: 9.50%	5y swap: 7.10%
Chile: Receive 10y UF swaps (expiry 15 Mar 2016), pay Camara rate (the floating overnight rate)	15 Mar	10y UF: 3.70%, Camara: 4.68%	10y UF: 3.0%	10y UF: 4.00%
US: Short 10y TIPS (expiry 1 Jan 2016), receive overnight US repo rate		10y TIPS: 2.20%, o/n repo: 4.45%	10y TIPS: 2.40%	10y TIPS: 2.05%
South Korea: Long 5y5y swaption strangle with expiry 8 March 2011 (5y receiver strike 5.15%, 5y payer strike 6.15%)	8 Mar (6 Apr) (24 Apr)	2.47% of notional (ATMF implied 5y5y volatility: 11.6%)	ATMF implied 5y5y volatility: 14.5%	ATMF implied 5y5y volatility: 9.0%
Chile: Receive 5y UF swaps (expiry 30 Nov 2010), pay Camara rate (the floating overnight rate)	28 Nov	5y UF: 4.00%, Camara: 4.53%	5y UF: 3.00%	5y UF: 3.75%

Source: Merrill Lynch.

Notes: Unless noted otherwise, PATRIC, VOLT and CARRY trades are marked at 11.00ET and all others at 15.00ET. The AUTO SPEC trading rule is open until the converging target or stop is triggered. The AUTO CARRY trading rule is open for a month when the filter supports a trade. The PATRIC trading rule is open until the target or stop is triggered or the three-month forward expires. Note that the target and stop for the PATRIC trades are for the combined spot basket.

We assume a capital base of $100 in our discretionary trades. In the G10 currency regions, each spot and forward exchange rate trade is $100 while the notional value of an option trade is $300. Emerging market trades are one-half the size of the G10 currency regions. Trades that deviate from these benchmarks are specified accordingly.

The capital base for the portfolio of AUTO trading rules is $100. We allocate $250 to AUTO SPEC trades, $200 to G10 AUTO CARRY, and $50 to E10 AUTO CARRY. With a maximum of four PATRIC trades open at any given time, the total capital base for each PATRIC trade is $60. Depending on the USD monthly rank, they may be three or four legs in the monthly PATRIC trade, each allocated $20 and $15, respectively. As the longest PATRIC monthly set of trades could last for three months, the maximum capital allocated to this trading rule any given day will be $240 (4x$60). We allocate $0.25 per vol (or $250k per vol) to the VOLT trades. With a maximum of four VOLT trades likely to be active, the maximum exposure is $1 per vol (or $1mn per vol). We compute the leverage ratios daily based on the total amount of capital allocated to trades divided by the capital base, which rises or falls with trading performance. The leverage ratio is the average of the daily observations. Performance is updated in our biweekly *Global FX Strategist*.

[1]This trade has a notional of 10 units of capital.

*Please refer to the latest issue of our *Local Debt Markets Strategist* for details on the capital allocation and leverage for the trades in this portfolio.

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