Im Browser öffnen



Our topics:

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Newsletter – MathFinance AG

30 April 2025

EUR-USD Risk Reversals have turned from negative to positive in the last few weeks, see the chart for the 6-month risk reversal over the last six months. This market sentiment means that the USD is considered riskier than the EUR, a sentiment we have not seen in a long time. Remarkable is also the speed at which this sentiment indicator has changed. Buckle up.



1. CONFERENCE PARTICIPATION

25th MathFinance Conference

Our annual conference will take place from 18-19 September 2025 at the Reichenstein Castle in Germany.

You can register online at the following address:

25th MathFinance Conference - MathFinance

Prof. Dr. Uwe Wystup

16 May 2025 Amsterdam - Invited to PRIME Finance Annual Conference

13-18 Nov 2025 - Invitated as a panel moderator and speaker

https://icaconferencedubai.com/

Prof. Dr. Martin Simon

MathFinance's Martin Simon Showcases New Approach to Climate Risk Quantification at Banque de France

Frankfurt/Paris, April 2025 – Prof. Dr. Martin Simon, Director at **MathFinance** and Professor of Data Science at Frankfurt University of Applied Sciences, presented a novel methodology for **quantitative climate risk management** at the invitation of the Banque de France. His presentation was featured at *"Climate Finance, Risk and Uncertainty Modelling"*, a flagship international forum co-hosted by the Banque de France and École Polytechnique.

The methodology, developed jointly with academic and industry partners, enables financial institutions to quantify the climate impact of investments with unprecedented precision—explicitly accounting for the **uncertainties inherent in climate and emissions projections**. The approach builds on the widely adopted **X-Degree Compatibility (XDC) model** and was enhanced through collaboration with the Frankfurt-based climate tech company **right**°, and researchers led by Prof. Dr. Heikki Haario (Lappeenranta-Lahti University of Technology, Finland). "Our model shows how global temperatures would respond if the entire economy mirrored the emissions profile of a given financial portfolio," explains Simon, "What's new is that we can now **quantify and communicate the uncertainty around that estimate**, enabling more transparent and scientifically robust climate risk assessments." The European Banking Authority (EBA) has already piloted the methodology to evaluate the climate alignment of European banks' credit portfolios. Results were published in an **EBA Staff Paper**, signaling the growing importance of **temperature-based risk metrics** in European regulatory practice.

As financial institutions prepare for climate transition scenarios and emerging nature-related risks, MathFinance is positioned to support sustainable finance projects that require high analytical depth and technical precision. In particular, we are expanding our focus to include **nature capital risk**, offering modeling support for biodiversity loss, ecosystem degradation, and other environmental factors increasingly recognized as material to financial performance. "Climate and nature capital risks are not only real—they're to some extent - quantifiable," says Simon, "We at MathFinance help clients integrate these dimensions into their risk models, investment decisions, and regulatory reporting."



2. EVENTS

Vienna Congress on Mathematical Finance (VCMF 2025) Starts Wed-Fri, July 9-11, 2025

https://fam.tuwien.ac.at/vcmf2025/

The third Vienna Congress on Mathematical Finance (VCMF 2025) will be held July 9-11, 2025, once again at the campus of WU Vienna. The conference will bring together leading experts from various fields of mathematical finance such as:

- Financial Economics
- Green and Sustainable Finance (Electricity, Energy, ...)
- Insurance (Climate Risk, Cyber Risk, ...)
- Mean Field Games and Stochastic Control

- New Technologies in Finance and Insurance
 (Computational Methods and Machine Learning, Cryptocurrencies, Limit Order Book and High Frequency Trading, Algorithmic Trading, ...)
- Optimal Transport (Robust Finance)
- Portfolio Optimisation
- Risk Management (Risk Allocation, Risk Aggregation, Credit Risk and Systemic Risk, ...)
- Rough Analysis in Finance and Insurance (Rough and Stochastic Volatility, ...)
- Statistics for Financial Markets and Large Language Models

The conference program will feature plenary lectures, parallel sessions with invited and contributed talks as well as poster sessions.

Moreover, there will be a panel discussion on the topic "AI in finance and insurance".

The VCMF 2025 follows the successful previous edition, VCMF 2019, with 250 attendees.

The call for contributed talks & posters will be open until February 28, 2025. Acceptance/rejection letters will be sent until April 15, 2025 at the latest.

For further information including details on plenary and invited speakers, a mailing list, as well as registration, see the conference homepage at https://fam.tuwien.ac.at/vcmf2025/

With kind regards from the VCMF 2025 organisers,

Christa Cuchiero, Julia Eisenberg, Zehra Eksi-Altay, Rüdiger Frey, Stefan Gerhold, Paul Krühner, Uwe Schmock, Josef Teichmann

Quant Bootcamp Info Session April 29, 2025 - 11:00 AM - 11:45 AM New York time

You are invited to learn more about the <u>Quant Bootcamp</u>, a full-immersion overview course in advanced Data Science with applications to Quantitative Finance, designed to clarify how all topics fit together.

Join our Info Session on Tuesday, April 29 at 11:00 AM New York time, and:

- Meet the instructors, learn about the schedule, program, delivery, benefits, and more
- Ask and get answers

Join Info Session



Meet us running in the JPM corporate challenge on 4th June 2025 in Frankfurt

3. TRAININGS

New courses by Uwe Wystup:

London

https://www.londonfs.com/course/FX-Exotic-Options

<u>Warsaw</u>

For the fifth consecutive year, we are offering a training course on FX Vanilla Options in Warsaw. Registration is still open!

NEW TRAINING IN WARSAW!

FX Vanilla Options

MAY 8-9TH, 2025

Further information at: https://ceeta.pl

https://www.mathfinance.com/derivatives-training

4. PUBLICATIONS

Uwe Wystup's FX Column "What to buy and what to sell" in <u>Wilmott Magazine</u>, May 2025 issue

https://www.wilmott.com/wilmott-magazine-may-2025-issue/

5. FX COLUMN

FX Column: What to buy and what to sell

Uwe Wystup, MathFinance AG, Frankfurt am Main

Many people ask me which structure in currency risk management trades and why. It is basically all about what one can sell. If the benefits of the client, the sales and the trader match, if a structured product feels like it is a deal for all parties involved, then it often trades. I will explain in this FX column how, given a volatility smile in AUD-JPY, one can propose currency hedge solutions for both an importer (AUD buyer = JPY seller) and an exporter (AUD seller = JPY buyer).

AUD-JPY Market

We consider the currency pair Australian Dollar ("Aussie") against Japanese Yen AUD-JPY on 3 February 2025 with market data as in Table 1.

| Spot | 94.00 | ATM volatility | 11.631% |
|----------------------|---------|-----------------------------|---------|
| AUD 6 M Money Market | 4.022% | 25-Delta Risk Reversal | -2.715% |
| JPY 6 M Money Market | 0.211% | 25-Delta Butterfly | 0.209% |
| 6 M Forward | 94.2227 | ATM bid-offer in volatility | 0.75% |

Table 1: AUD-JPY Market Data as of 3 February 2025; source: ICE Data Services.

The volatility is high and heavily skewed down, illustrated in Figure 1.



Figure 1: AUD-JPY 6-Months Volatility Smile on 3 February 2025.

The corresponding implied density for the spot in 6 months shown in Figure 2 indicates a higher probability for small up moves compared to smaller probabilities for small down moves.



Figure 2: AUD-JPY 6-Months Option-Implied Probability Density of the Spot on 3 February 2025. The blue curve is the benchmark Black-Scholes model (log-normal) without smile.

How do we cope with this market scenario?

The Forward Rate and the Risk Reversal usually drive the trade ideas. As one might expect, the general principle "**buy-low-sell-high**" can be applied. For vanilla options, we know that the higher the volatility the higher the price (monotone volatility-value relationship); this means, when composing a strategy of vanilla options, we want to buy options with low volatility and sell options with high volatility.



Figure 3: AUD-JPY Risk Reversal Strategy in ICE Data (SuperDerivatives)

A Deal for the AUD Buyer

An importer in Japan or an exporter in Australia is an AUD buyer = JPY seller. The strong volatility skew (negative Risk Reversal market quote) as shown in Figure 1 suggests a straightforward hedging strategy against rising Aussie: a Risk Reversal (RR) strategy, where the treasurer buys an AUD call = JPY put with upper strike (volatility is low) and sells an AUD put = JPY call with lower strike (volatility is high). As an example, we consider a call struck at 99 and put struck at 88 as in Figure 3.

This feels like a deal for all parties involved, because:

• For the buy-side *accountants* and *compliance* freaks: It is a zero-cost risk-free hedge with a guaranteed worst case.

- For the *treasurer*, the client, the upside 99.00 is his worst case for buying AUD, and is only 3 big figures above the spot, or 4.50 big figures above the outright forward rate (94.50 with sales margin). His best case 88.00 is 8 big figures below spot and 6.50 big figures below forward. While the forward rate should be the benchmark, and even with this benchmark the upside worst case is closer than the downside best case, the feeling one gets using the spot as the benchmark is even better.
- For the *sales* team, given the offer price is AUD -666, the sales margin is AUD +666 when sold at zero cost. For a vanilla structure, this is what one can earn in a competitive FX options market.
- For the *trading* team, the volatility bid-offer spread of 0.75% translates into a mid-offer spread in cash of about AUD 10,000. Trading could even lower this via "**buy-one-get-one-free**", i.e. apply the spread only to one of the two legs and quote the other one at choice, i.e. mid-market value. This could either generate a higher sales margin or provide even better conditions for the client.
- For the sell-side *risk controllers*, because it is vanilla based flow business with low complexity and nonexploding Greeks.

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|--------------------------|-----------------------|---------------------------|--------------|--------------|------------|--|
| Trade Date | Notes History | Option 1 | | | | |
| Tue, 04 Feb 2025 📃 | Option Class | Forward Knock Out (EKO) + | | | | |
| Currency Pair | Buy/Sell Call/Put | Buy C EKO A | AUD Put 🕑 Se | II 😝 Vanilla | AUD Call 😝 | |
| AUD + U JPY + | Strike | 96 | 5.0 | | 96.0 | |
| Spot | Trigger 1 | KO if fix Below 🕑 85 | 5.5 | | | |
| - 96 | Trigger 2 | Contractor Contractor | | | | |
| Spot Date | Notional/Payout | 10,000,000 AUD (| 0 10 | ,000,000 | AUD C | |
| Thu, 06 Feb 2025 | Expiry | Mon, 04 Aug 2025 [18 | 1 days | | | |
| Region | Delivery | Wed, 06 Aug 2025 🔄 LD | DN 4:00r 👻 | | | |
| Time | Details | | | | | |
| | ATM Volatility | 11.631 Spread 0.3 | 75 | | | |
| Data Source | Fwd Points Mid Ø | -1.777 | | | | |
| IDS USD OIS 👻 | Fwd Rate | 94.2232 | | | | |
| Portfolio ① | Depos (%) | 4.024 AUD JPY 0.2 | 214 | | | |
| i ortrono (g | 25D RR (%) Bfly (%) | -2.715 RR Bfly 0.2 | 209 | | | |
| | | | | | | |
| | | (C | - | | | |
| Results in: AUD 🕑 | Calculate F2 So | lver 🛛 Refresh Rates | F4 Amount | 3 B/A | + AUD Sp | |
| Market Volatility: | Total Per Leg | | | | | |
| Market Price: | -65.437/-3.155 | 0 .65 437/.3 155 0 | | | | |
| AUD per JPY pips: | -0.00007/0.00000 | -0.00007/0.00000 | | | | |
| Black Scholes: | 3,033 | 3,033 | | | | |
| Barrier Hit Probability: | | | 12.1 | | | |
| Underlying Vanilla: | | | | | | |
| Delta: | -6,492,288 | | -6,492,288 | | | |
| Forward Delta: | | -6,621,839 | | | | |
| Vega: | -29,575 | -29,575 | | | | |
| Gamma: | -415,347 | -415,347 | | | | |
| dVega/dVol: | -483.66 | -483.66 | | | | |
| dVega/dSpot: | 2,776 | 2,776 | | | | |
| Theta: | 325.63 | | 325.63 | | | |

Figure 4: AUD-JPY Knock-Out Forward Strategy in ICE Data (SuperDerivatives)

A Deal for the AUD Seller

An exporter in Japan or an importer in Australia is an AUD seller = JPY buyer. Selling Aussie forward feels bad, because of the forward *backwardation*: the 6-months forward rate is *below* spot, but an AUD seller ideally wants to sell at a high rate. However, we can still beat this forward by accepting some risk. We observe in Figure 1 that downside volatility is high and in Figure 2 that spot goes down with a lower probability compared to a Black-Scholes model, and compared to an up-move. Therefore, one can use a lower knock-out barrier to swing a deal: With lower volatility on the downside, the chance of knock-out is lower, and with lower down-move probability, the chance of the knock-out event will be reduced. A common strategy for this market scenario is a Knock-Out Forward (KOF). For example, we consider an AUD seller forward with forward rate 96.00 and European style knock out barrier 85.50, i.e. the forward terminates, if the spot is at or below 85.50 at maturity, see Figure 4.



Figure 5: AUD-JPY historic spot price 5 February 2020 - 4 February 2025; source: Eikon

This feels like a deal for all parties involved, because:

- For the *buy-side*: It is a zero-cost hedge and better than the usually applied do-nothing strategy.
- For the *treasurer*, the client, the contractual forward rate is 96.00, equal to the current spot, and 1.50 big figures better than the market outright forward rate (including sales margin). Considering the historic spot over the last 5 years in Figure 5, the client may take the view that the spot rather

increases, although the forward curve decreases; with this view, a spot at 85.50 or lower in 6 months is considered unlikely. Not the last person who would go for a carry-trade. (Nothing is safe here – market touch probability is around 18%, but then we don't have to tell this to the buy-side client.)

- For the *sales* team, given the offer price is AUD -3,155, the sales margin is AUD +3,155 when sold at zero cost. For a first-generation exotics structure, this is what one can earn in a competitive FX options market.
- For the *trading* team, the volatility bid-offer spread of 0.75% translates into a mid-offer spread in cash of about AUD 30,000. This could be lowered to generate a higher sales margin or provide even better conditions for the client. Traders typically argue that they need at least AUD 28,000 AUD to pay for the hedging cost s. And can even quantify the details.
- For the sell-side *risk controllers*, because it is European-payoff-based flow business with low complexity and no model risk.

This KOF is normally not used as an exclusive hedging strategy, because the treasurer might lose the hedge; therefore, many consider it as an add-on to improve the forward rate. In private banking, for clients with no underlying cash-flow it is speculation anyway, but quite common.

AUD-Seller Target Forward

Alternatively, if one wants to use the KOF-idea to trade something of similar nature, but lock in at least some profit up to a target, the treasurer can sign up for an AUD-Seller Target Forward as displayed in Figure 6. In the example, a Japanese exporter agrees to sell AUD 1 M (buy JPY) every month at a rate 98.50, considerably higher than spot (and forward), over the next 10 months, so again AUD 10 M in total. The Target Forward terminates once the accumulated profit reaches 30 big figures, or latest in 10 months.

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|--------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------|--------------------------|--|--|
| Trade Date | Notes History | Option 1 | Option 1 | | | | |
| Mon, 03 Feb 2025 📰 | Option Class | Target Redemption Forward | | | | | |
| Currency Pair | Buy/Sell Call/Put | 10. 2002 - A | | | | | |
| AUD - U IPY - | Strike | Forward rate | 98.25 | Sell AUD C Buy JPY | | | |
| Spot | Trigger 1 | | | | | | |
| · 96 ▲ | Trigger 2 | | | | | | |
| Spot Date | Notional/Payout | In the money | 1,000,000 | AUD 🕑 Out of the money | 2,000,000 AUD C | | |
| Wed. 05 Feb 2025 | Expiry | Begin date | Mon, 03 Mar 2025 | | | | |
| Region | Delivery | Expiries 10 | Monthly - | Redemption condition | | | |
| London - | Details | End date | Wed, 03 Dec 2025 | Target in units 👻 | 30 JPY per AUD | | |
| Time | ATM Volatility | Strip by | Expiry 👻 | Last payment | Capped by target - | | |
| 10:00 PM - | Fwd Points Mid Ø | Fixing | SD Rates 👻 | 1 | | | |
| Data Source | Fwd Rate | LDN 4:00r - | Expiry details | 1 | | | |
| IDS USD OIS 🚽 | Depos (%) | Land and the second sec | | 2 | | | |
| Portfolio ① | 25D RR (%) Bfly (%) | Total notional ITM | eg | Total notional OTM leg | | | |
| | | 10,000,000 AUD | | 20,000,000 AUD Buy Structure C | | | |
| | | 4.6 | | | P | | |
| Results in: AUD 🕑 | Calculate F2 So | lver 🕑 Refrest | Rates F4 Amount | Ø B/A → AUD | Spot Premium 👻 Deal Capt | | |
| Market Volatility: | 5 | 1 <u>.</u> | | | 1 | | |
| Market Price: | -53,472/-9,736 | | | 0 -53.472/-9.736 | | | |
| AUD per JPY pips: | 0.00005/0.00001 | -0.00005/-0.00001 | | | | | |
| Black Scholes: | -42,165 | | -42,165 | | | | |
| Barrier Hit Probability: | | | | | | | |
| Underlying Vanilla: | 0.001-000-000-00 | | | 281,884 | | | |
| Delta: | -8,123,934 | | -8,123,934 | | | | |
| Forward Delta: | | -8,388,553 | | | | | |
| Vega: | -46,823 | -46,823 | | | | | |
| Gamma: | -1,315,254 | -1,315,254 | | | | | |
| dVega/dVol: | -379.46 | -379.46 | | | | | |
| dVega/dSpot: | .7 55/ | 7 65 / | | | | | |

Figure 6: AUD-JPY Target Forward Strategy in ICE Data (SuperDerivatives).

Again, this can be viewed as a deal for all parties, as it is a zero-cost strategy beating the forward, with AUD 9,736 sales margin, AUD 22,000 trading profit; no wonder, it trades frequently.

Summary

- 1. For each forward curve and the volatility smile scenario, one can determine clever trading strategies using the market to the advantage of *buyers and sellers*, which is why they trade.
- 2. The general principle is betting against the forward curve (carry-trade, who would have thought?) and the "buy-low-sell-high" approach applied to volatilities.
- 3. When volatility smile and forward are against the buy-side, many common strategies include some risk and use exotics to benefit from low knock-out probabilities of barriers or the like.

References

- Wystup: FX Options and Structured Products, Second Edition, Wiley 2017.
- Wystup: FX Column "KOAMKIEU and the psychology of derivatives in private banking", Wilmott, volume 2022, issue 117, January 2022 pp. 20-21.

WE WANT TO



Do you have suggestions, questions or comments? Then contact us at: <u>info@mathfinance.com</u> We look forward to your feedback! You are welcome to forward our newsletter to colleagues, partners and other interested parties.

Not yet receiving our newsletter? Sign up <u>here</u>

April 30th, 2025 Mathfinance AG

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