Our topics:

- 26th MathFinance Conference - Early bird discount until 30th June 2026
- Publications
- Trainings, Talks, Podcasts
- FX-Column

Newsletter - MathFinance AG

May 2026

Have you registered for the 26th MathFinance Conference yet?

We are delighted to announce that Vladimir Lucic (Marex), Quant of the Year, will be joining us as a keynote speaker.

Please be advised that our early bird discount is **valid until 30 June 2026**.

Should you require further information, please visit our website.

www.mathfinance.com

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2. PUBLICATIONS

Uwe Wystup's FX Column ***Accumulator Pricing - Structurers' Approach***
in Wilmott Magazine, May Issue is available for subscribers!

WILMOTT Magazine: May 2026 issue - Wilmott

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3. TRAININGS, TALKS, PODCASTS

WARSAW

Prof. Wystup offers following course in Warsaw on May 28 + 29, 2026

https://ceeta.pl

BOLOGNA

XIII Bachelier Finance Society - Minisymposium on Recent Developments in Interest Rate Markets from 29 June to 3 July 2026

In this minisymposium, amongst others, Damir Filipovic and Thorsten Schmidt are invited speakers. Thorsten will talk about the latest model developments in this field, taking scheduled jumps (stochastic discontinuties) into account. Specifically, a number of tractable models will be presented along with associated hedging formulas.

https://eventi.unibo.it/bachelier

LONDON

Prof. Uwe Wystup offers following course in London on July 13-15, 2026.

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

PODCAST

Don't miss this LFS-Podcast episode!
David Cox interviews Uwe Wystup on
Models in FX Derivatives Markets.

Available on:
Apple: https://apple.co/47nv999
Spotify: https://open.spotify.com/episode/3ZJfzfWgs2HqvMgMApmHa7?si=a9f223e6241a4f34

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4. FX COLUMN

Accumulator Pricing - Structurers' Approach

Uwe Wystup, MathFinance AG, Frankfurt am Main

One of the popular FX structured products in corporate and private banking is the accumulator where the client buys the underlying below the market price (*BBM*=buy below market, *accumulator*) or sells above the market price (*SAM* = sell above market, *decumulator*). I prefer calling all accumulators accumulators. The client beats the market at zero cost (sales pitch). In FX markets, accumulators have been popular since the early first decade, especially in the UK, in France and South-east Asia. We consider a buy-side client selling AUD 1M weekly during the next 12 months (AUD seller = JPY buyer, importer in Australia or exporter in Japan).

AUD-JPY Market

We consider the currency pair AUD-JPY on 27 February 2026 with assumed market data as in Table 1.

Spot¤	111.00¤	ATM·volatility¤	5.75%¤	¤
AUD·12·M·Money·Market¤	4.265%¤	25-Delta·Risk·Reversal¤	-2.265%¤	¤
12·M·Forward¤	107.28¤	25-Delta·Butterfly¤	0.316%¤	¤

Table·1:·AUD-JPY·Market·Data·as·of·27·February·2026¶

Accumulator Example

Client sells AUD 1M every week at K=114.50 if spot fixing is at 114.50 or lower.
Client sells AUD 2M every week at K=114.50 if spot fixing is above 114.50; a standard leverage factor 2 is applied, but generally free to choose.
The maximum total AUD notional to sell is therefore 52 x 2 x 1M = 104M.
If the spot ever touches or crosses the lower barrier B=102, then the accumulator stops, but the client keeps the accumulated amount.

Client price is zero (zero cost product), can you believe it?
The structure is illustrated in Figure 1.

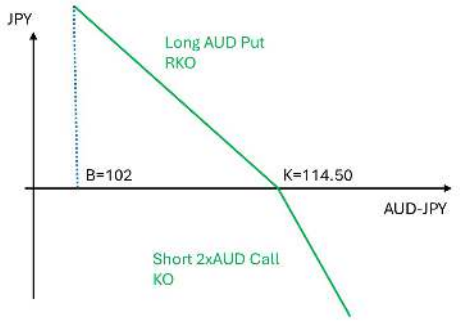

Figure 1: AUD-JPY Accumulator: Payoff with Leverage 2 on the Spot Space

Observations

The client beats the forward by more than 7 big figures at zero cost. What is the risk?
The treasurer selling AUD 1M every week at a price more than 7 big figures higher than

the forward (or 3.5 big figures above the spot price) considers this usually a strategy better than the do-nothing strategy. If the spot fixing stays below K=114.50 it is a good deal anyway. If the fixing is above, then assuming there is the underlying cashflow, the selling AUD at a rate higher than in a forward contract, which one would have agreed on at inception, is still a good deal. We need to just be careful about the leverage. The treasurer is advised not to commit to selling more AUD than he will get. The deal turns bad if the spot rises high and the underlying cashflow ceases to come in (or was never there in the case of an investor in private banking).

If the spot goes down and hits the lower barrier B=102, then the accumulator stops. The treasurer can keep the accumulated profit, lost the hedge for the remaining time of the year, but can always tell himself, that he made a good profit at no cost and is facing worse market conditions now as the spot is lower (AUD seller!), in which he would also be if he hadn't traded the accumulator. The remedy is – guess what – trading another accumulator to beat the market forward again. Frequent new structured trades are also in the interest of the sell side, so the show is likely to go on.

Private banking clients without the underlying cashflow would be required to maintain a margin account to prevent large losses.

There is a tipping point, where the accumulators MTM (marked to market value) turns heavily negative, as a rule of thumb between barrier and strike, so around 108.25 AUD-JPY. At this spot level, it is a good idea to restructure the accumulator before it goes too much underwater. This is the important key to success the buy side shouldn't ignore.

How to Find Strike and Barrier

The strongly skewed volatility with a Risk Reversal of -2.265% is illustrated in Figure 2.

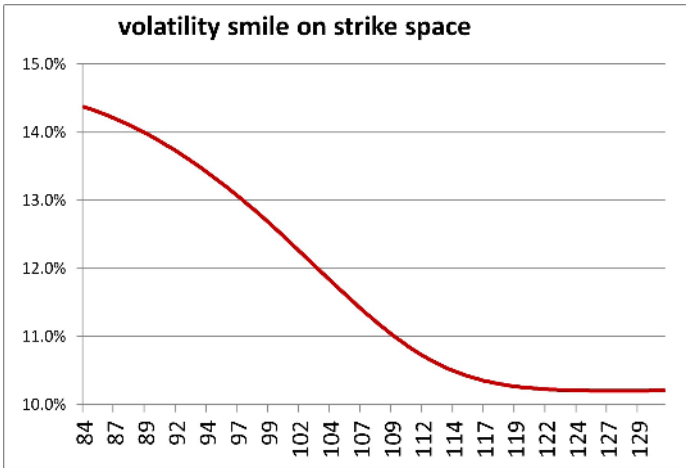

Figure 2: AUD-JPY 12-Months Implied Volatility as of 27 February 2026 (Source: ICE Data Services and MathFinance Educational Interpolation)

The AUD buyer would face very attractive conditions trading a zero-cost Risk Reversal: Buying AUD call with higher strike (buy low) and selling an AUD put with a lower strike (sell high).

For the AUD seller, it is harder to find an attractive deal. We need exotic options or structured products. Buying a stand-alone 25-Detla AUD put (strike around 98) will be expensive. High volatility around 13% yields a high price of 2% AUD (including sales margin and trader's bid-offer), which is a showstopper for a treasurer who is only ready to spend maximum 1% of the AUD notional for currency risk management. For in-the-money AUD put options, the volatility is lower (10.75% for the 114.50 strike), but the price would be 8.25% AUD. Clearly, we won't swing a deal with vanilla options.

We can use strike K=114.50 with its low volatility and a lower barrier B. The idea comes from the density of the spot price in 12 months exhibited in Figure 3. Compared to a log-normal Black-Scholes density the market density is leptokurtic and much lower for spot levels between 94 and 104. Therefore, placing a knock-out barrier at B=102 is less likely to be hit and the price will feel good. In fact, I spotted a **windmill adjustment** for the 102 European digital put of **more than 6%**, which means that the market mid-price of 23% AUD compare to a Black-Scholes TV of 29.34% AUD, which is mainly driven by the maximum down slope at level 102, see Figure 2.

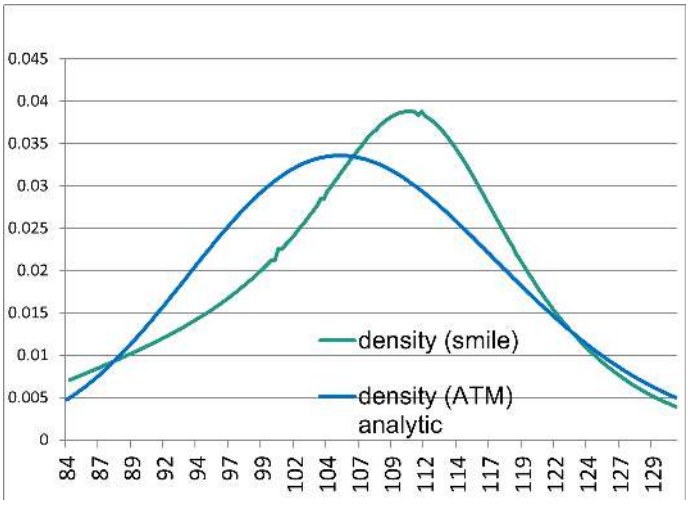

Figure 3: AUD-JPY Probability Density for the Spot Distribution in 12-Months Implied from the Vanilla Options Market. Black-Scholes Model in Blue, Market Density in Green.

Having determined B=102, I then solved the strike by assuming zero cost and obtained 114.50.

Pricing and Hedging

The market standard for pricing is nowadays a stochastic-local volatility (SLV) model. For example, SuperDerivatives' SLV price is AUD -14,244 (see Figure 4). As an alternative to finding a price, I now go through a traders' step-by-step thought process to identify the major hedging cost factors. The so-called *overhedge* (OH) is the difference between the market price and the Black-Scholes TV, which is based on the Black-Scholes model with flat ATM volatility and constant rates. We start with the Black-Scholes TV and then compose an approximate hedge using first generation exotics, whose overhedge is known. The sum of these overhedge costs serves as a proxy for the overhedge of the accumulator.

1. The client sells a total of 52 million AUD at an improved rate of 114.50.
2. For each AUD/JPY fixing between 102.00 and 114.50 the client accumulates 52 million AUD divided by the number of fixing weeks.
3. For each AUD/JPY fixing above 102.00 the client accumulates twice this weekly amount, such that in the extreme case of all fixing above 102.00 the total amount accumulated would be 104 million AUD.
4. If the non-resurrecting knock out level of 102.00 is ever traded, then the accumulation stops, but the client keeps 100% of the accumulated amount.
5. TV: client receives 208,000 AUD.
6. For the 114.50 AUD puts RKO at 102.00 we determine the overhedge as the average of the maturities 3 to 12 months.
7. We do the same for the 114.50 AUD calls knock out at 102.00.
8. Tenor Basis Points (in AUD) RKO puts Basis Points (in AUD) KO calls

3 months	+35	-14
6 months	+35	-19
9 months	+02	-24
12 months	-06	-28
average	+16.50	-21.25

9. On 52 million AUD 16.50 basis points (bps) are 85,800 AUD, which is the overhedge for buying the RKO puts in the hedge. We account for only 40% of that, see below.
10. Similarly, on 104 million AUD -21.25 bps are 221,000 AUD, which is the overhedge for selling the KO calls. The overhedge is positive as the trader sells the knock-out calls. We account for only 60% of that, see below. Both are priced at mid-market, so a trader might argue, fairly aggressive.
11. Cost of knock out: If the knockout level of 102.00 is reached, the client has the right to sell the accumulated AUD amount at 114.50 (with the pre-determined value date), even though the spot is then at 102.00.
12. For the bank selling the accumulator this is substantial risk, which can be hedged by buying a 102.00 one-touch with 12 months maturity.
13. The notional of this one-touch contract must be approximated. First, the amount at risk, called the parity risk is 114.50 – 120.00 = 12.50 JPY per AUD = 12.25 % AUD.
14. We approximate the time it takes to reach the parity level of 114.50 by 6 months (half of 12 months) and take from the market that the price of a 6-month 114.50 one-touch is 60%.

15. Hence, say 60% chance above 114.50, accumulating 104 x 60% = 62.4 million AUD;
16. And 40% chance below 114.50, accumulating 52 *40% = 20.8 million AUD.
17. The sum of these two amounts may be the total of 83.2 million AUD accumulated.
18. The 12 months 102.00 one-touch would cost 48.9%
19. The parity risk amount equals 83.2 million * 48.9% * 12.25% = 5 million AUD.
20. The one-touch overhedge would be 5 million * -2.5% (mid-market) = -125,000 AUD
21. To hedge the vega of 322,000 AUD, we take the bid-offer spread of the price in volatility and arrive at 322,000 * 0.15 vols (bid-offer) = 48,000 AUD.
22. The total overhedge is 34,400 + 132,600 - 125,000 + 48,000 = 91,000 AUD.
23. This reduces the TV to -117,000 AUD.
24. Applying a 20 basis points traders' mid-offer on the non-leveraged notional yields 104,000 AUD.
25. As a result, the MTM is estimated to be -13,000 AUD. SuperDerivatives shows 14,000, so the approximation is remarkably good (or arguably tuned to match by choosing the 20 basis point traders' mid-offer spread, however, SuperDerivatives applies a similar spread).
26. The client facing an offer price of zero (zero-cost product) leaves sales with a margin of 13,000 AUD.
27. The profit between sales and trading desks might be split differently, which is a management decision.
28. We assume the trader does not execute the hedge and hence does not need to apply bid-offer spreads on the exotics. The hedge serves as a thought-experiment to quantify the cost of hedging and there the price of the accumulator. Only *vega* hedge costs are explicit. Hedging first generation exotics requires hedging changes of Risk Reversals (*rega, revga*) and Butterflies (*sega*, *flega, bufga*), or traditionally vanna and volga. These costs will occur when calculating the Greeks of the accumulator.

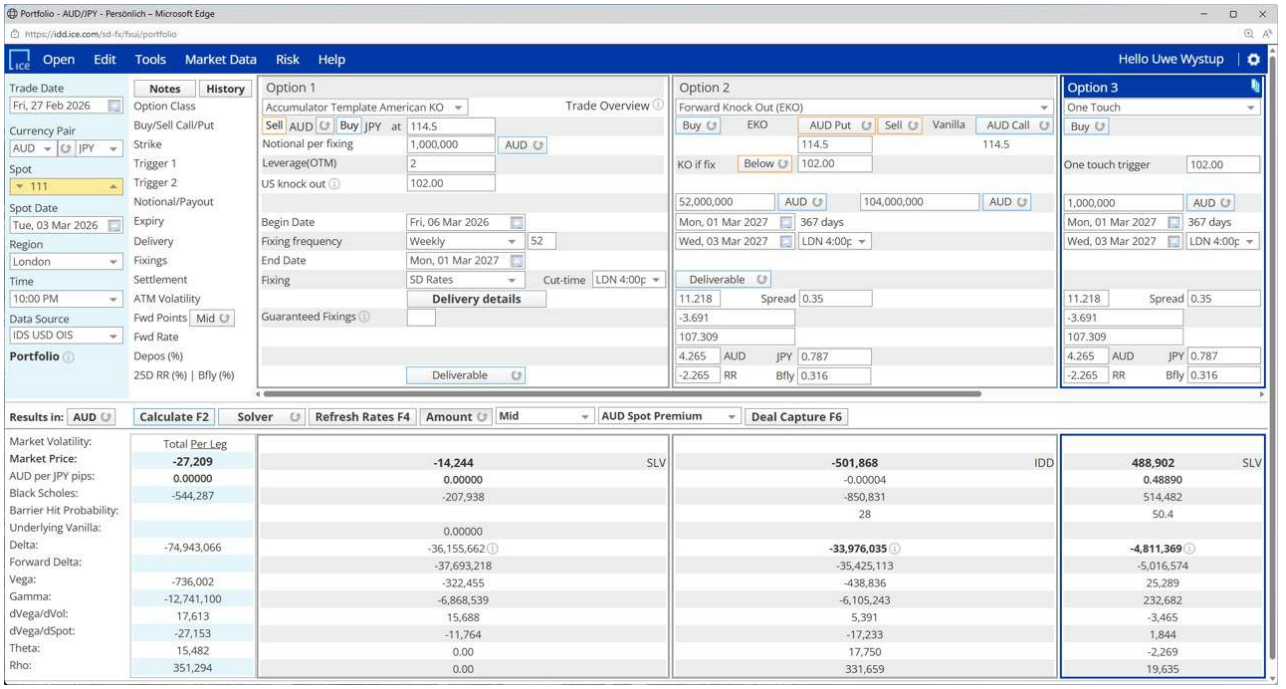

Figure 4: AUD-JPY 12-Months Accumulator AUD Seller in ICE Data Services, also Showing a Knock-Out Forward and One-Touch

Summary

- Attractive levels for accumulators can be derived from the volatility smile curve and the market density of the future spot.
- The market price can be quickly approximated with overhedge information from first generation exotics and used as a sanity check for a model price (vanna-volga or SLV)
- Repeated trading of accumulators (and similar structured products) can be explained by attractive conditions of levels, repeated sales margin and traders' bid-offer spread for the sell-side and the possibility of trading accumulators on multi dealer platforms (e.g. FinIQ).

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21 May 2026
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