

The Formosa callable

Taiwan's life insurers, the world's largest single supply of long-dated dollar receiver volatility — and what happens when it stops

Research note — 29 July 2026 · companion to the TEC10 and US CMT notes

Executive summary

A Formosa bond is a plain USD corporate or bank bond that happens to be listed in Taipei, and almost every one of them is a 30-year callable sold to a Taiwanese life insurer. The market's whole existence is a regulatory arbitrage that became a structural dependency: from 2014, foreign-currency bonds listed on the Taipei Exchange sat *outside* the insurers' 45% overseas-investment ceiling, so a sector desperate for long-dated dollar yield could buy them without limit. Issuance ran at **US\$25-37bn a year through 2017-19**, and the outstanding stock reached roughly **US\$187-191bn equivalent by end-2024**, of which about **US\$129bn is USD callables** — a segment reported to be more than 90% insurer-held.

The chain that makes this a volatility story runs through a cancellable swap. The issuer does not want thirty-year fixed-rate debt; it wants cheap floating. So it swaps, and the swap is cancellable by the dealer on the bond's call dates. Net of the chain: **the insurer is short a Bermudan receiver swaption, the issuer is flat and keeps sub-SOFR funding, and the dealer is long the option** — which it then sells into the street. On my model the embedded Bermudan in the archetypal 30NC5 is worth **6.9 points**, and each US\$1bn of USD callable issuance hands the dealer community roughly **US\$1.3m per basis point** of long vega. In 2020, on about US\$42bn of USD callables, that is of the order of **US\$55m per basis point of 30-year normal volatility supplied in a single year**.

The documented effect is on skew, not on the level. Dealer research describes Formosa callable issuance as "the biggest structural flow in the USD vega market over the past decade or so" and says that "vega skew was kept under check for years" by it, followed after 2021 by "a skew squeeze for the ages." No public source quantifies the flow; the numbers above are my arithmetic and are labelled as such.

Four authorities routinely cited for this channel do not say what they are cited as saying. The Treasury Borrowing Advisory Committee's April 2024 charge never discusses Formosa hedging — its one cancellable-swap sentence is about *US Treasury* callables. I could find no BIS publication on the channel. There is **no IMF Article IV for Taiwan**, because Taiwan is not an IMF member. And the standard academic account of negative USD swap spreads is pension duration demand, with no reference to Formosa at all. The channel is real and dealers describe it in their own words; the scholarly and official citation trail behind it is thinner than the confidence with which it is usually asserted.

The canonical "corporate plus cancellable swap" picture covers about an eighth of the market. 86.9% of the USD callable stock is issued by financial institutions, which

means that for most of it the issuer is a dealer and the option never leaves the firm. That is why the P&L shows up inside banks' structured rates businesses rather than in a hedging market — and it is why exercise depends on the issuer's own funding spread rather than on rates alone. That is the basis banks learned about the hard way in March 2020, in the same episode that took 10-year swaption volatility from 28 to 117.

Nothing is being called, and that is the whole of the current problem. The size-weighted coupon of the live register is **4.26%** against a **5.09%** thirty-year Treasury; **88.4% of live USD fixed callables carry a coupon at or below the thirty-year yield before any credit spread.** My model puts the first-call exercise boundary at about **1.80%, some 290bp below today's rate.** Priced to maturity instead of to call, the archetype is worth **88.4 with a modified duration of 14.5 years, against 0.95 years if it were called next year.** Thirteen and a half years of duration arrived at once, across a whole sector, in the state of the world where it was least wanted.

The FX side is where it becomes a solvency question. In May 2025 the Taiwan dollar set every short-horizon appreciation record in the 43-year series: **+4.16% in a day, +7.15% in two sessions, +10.36% in a month, +14.99% to the July low.** The sector's response has been to hedge *less*: the ratio fell from **61.5% in March 2025 to 50.23% in January 2026**, with the industry openly projecting 40% or 20%. The standing driver is cost — the sector has spent more on FX hedging since 2019 than it has earned in profit — and most of that decline predates the accounting change of 1 January 2026, which permits straight-line amortisation of unrealised FX differences **only on unhedged positions.** But that rule now pays insurers to keep going. On the FSC's own numbers — NT\$15.2tn of FX risk exposure, about US\$469bn — a 10% TWD appreciation at that hedge ratio is **US\$23bn, or 26-33% of sector capital**, against an FX volatility reserve of **US\$5.6bn**, 1.2% of the exposure, already drawn down heavily in May and June 2025. A repeat of the *actual* 2025 move is **US\$35bn, or 39-50% of capital.** Under the new accounting rule that loss would be reported at roughly a fourteenth of the rate at which it is incurred. The currency has since retraced — USD/TWD 32.39 on 24 July 2026, the Taiwan dollar down 3.2% year-to-date — so the sector is not currently losing on this. The position is simply larger, and the buffer smaller, than it was before the shock.

Part 1 — What a Formosa bond is, and why it exists

A Formosa bond is a bond denominated in a currency other than the New Taiwan dollar, listed on the **Taipei Exchange**. There is nothing structurally exotic about the definition. What makes the market is who buys them and why.

Taiwan's life insurance sector spent the 1990s and early 2000s selling TWD policies with guaranteed rates of 6–8%. Those liabilities are still on the books. Domestic yields collapsed and never recovered, and the domestic bond market is far too small to fund a sector of this size at long duration. The result is a permanent, structural need for **long-dated dollar assets with a yield pickup**, held by an investor base whose accounting rewards book yield and whose regulator caps foreign investment.

The arbitrage that created the market was simple: **from 2014, TPEx-listed foreign-currency bonds sat outside the 45% overseas-investment ceiling.** An insurer could buy

a bond issued by Apple, listed in Taipei, denominated in dollars, and it did not count as a foreign investment. Issuers were happy to oblige — the bid was enormous, the pricing was through their curves, and the format cost them nothing they cared about.

What the insurer gave up, and probably did not price, was the call. The overwhelming majority of the stock is callable at par on an annual grid after a non-call period. In the TBAC's characterisation of the universe: **57.1% is thirty-year, 40.4% is NC10, 73.9% is NC5 or longer, and 86.9% is bank-issued.** The insurer is therefore short a long-dated Bermudan option on rates, in size, across an entire sector, as a by-product of a hunt for book yield.

1.1 The register

I can document **60 bonds, 57 of them with an ISIN**, nearly all verified against primary documents — SEC 424B2 and FWP filings, arranger listing prospectuses, and TPEx's own listing pages. The register is bottom-up from offering documents and is accurate but not exhaustive; TPEx's complete professional-investor register sits behind an API that returned HTTP 403 on every attempt.

Structure	Share of the register
Fixed-rate callable	80%
Zero-coupon callable	9%
Floating-rate note	7%
Bullet (non-callable)	4%

Tenor	Share
26–35 years	73%
36 years and over	18%

The largest deals in the register: Mexico US\$3.0bn 3.75% 2071 (XS2280637039) · AT&T US\$2.995bn 4.00% 2049 (XS2121367192) · Verizon US\$2.385bn 3.60% 2060 (XS2116430997) · Chile US\$1.5bn 2053 · QNB US\$1.5bn FRN 2021. By issuer across the register: Verizon US\$9.9bn, AT&T US\$6.7bn, Comcast US\$4.7bn, Mexico US\$3.0bn, Intel US\$2.6bn, Apple US\$2.4bn. Across the *whole* USD callable universe the TBAC's league table is different and more bank-heavy: Citigroup US\$8.3bn, JPMorgan US\$6.6bn, Barclays US\$6.3bn.

The zero-coupon callables deserve their own line, because they are the purest form of the trade: no periodic cash flow at all, an accretion yield, and a Bermudan call. NBAD US\$885m, QNB US\$630m, FAB US\$610m, Goldman Sachs US\$522m, Bank of Nova Scotia US\$400m, Emirates NBD US\$285m, plus CACIB, ADCB and Morgan Stanley Finance. A Gulf bank accreting at 4.7% for thirty years, callable annually, sold to a Taipei insurer, is a genuinely strange object and there are billions of them.

Three call families run through the register: an annual par call, whole-only, used by the US corporates, some with a 50% partial at the first call date; a zero-coupon accreting Bermudan on an annual or five-year grid; and non-callable three-to-five-year bank floaters plus, after 2019, sovereign bullets.

1.2 The rule that made it, the rule that broke it, the rule that saved it

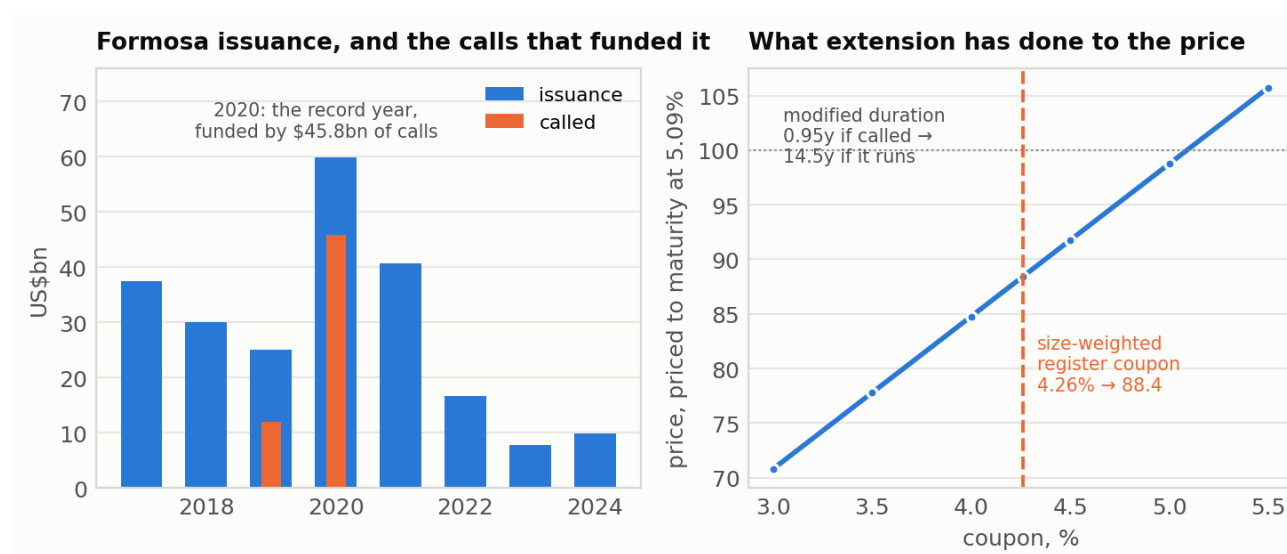
March 2017 — the minimum non-call period. The FSC imposed a minimum NC5 on new Formosa issues. The intent was explicitly protective: the regulator was worried about insurers being *called out* of their assets early and having to reinvest at lower yields. It wanted six years and settled for five. The register shows the rule taking effect exactly as written — NC0.5 to NC3 structures run through the first quarter of 2017 and NC5 takes over from the third quarter, then holds universally to 2022. (Strictly the rule bound insurers' *purchases* of callable international bonds rather than issuance, but the effect on what got printed was the same.)

It is worth pausing on that, because it is the single most consequential piece of drafting in this market. **A rule designed to stop insurers being called early turned a five-year floor into a twenty-five-year reality.** The protection worked in the direction the regulator feared and did nothing about the direction that actually materialised.

November 2018 — the ceiling closes. Article 10 ¶2 of the *Regulations Governing Foreign Investments by Insurance Companies*, inserted on 21 November 2018 and published on 8 January 2019, caps "*the total investment amount plus the foreign investment amount included in the limit for foreign investments*" at **145% of the insurer's approved foreign investment limit**. With a base limit of 45%, that is the widely-quoted **65.25%** — the product of two provisions, the 45% statutory base and this 145% multiplier, and applying only to insurers on the top approval tier (a 40% base gives 58.0%, a 35% base 50.75%). Formosa bonds get no separate allowance; they share a single bucket with everything else foreign.

But the arithmetic left a door open, and it is why the market survived. The residual **20.25 percentage points** of headroom above the base 45% is usable *only* on TPEx-listed foreign-currency paper. So the 2018 amendment did not close the arbitrage; it converted an unlimited allowance into a large, capped, Formosa-only allowance. The same amendment raised the FX-policy-reserve exclusion under Article 15-2 from 25% to 35%.

1.3 The issuance record, and the correction it forces



Issuance, calls, and what extension has done to the price

Year	US\$bn issued	Year	US\$bn issued
2017	37.4	2021	40.7
2018	30.0	2022	16.6
2019	25.1	2023	7.8
2020	59.9	2024	9.8

Source: Central Bank of the Republic of China (Taiwan) Annual Reports, "Bond Market" chapter, converted at contemporaneous rates. All TPEx-listed international bonds.

The standard story — that the 2018-19 rule change killed the market — is wrong. 2019 was a dip — 14.3% in New Taiwan dollars, 16% in the converted USD table above — consistent with the ceiling arithmetic biting. But **2020 was the largest year in the market's history.** The reason is mechanical and it is the key to the whole thing: the Fed's 2020 cuts made the calls economic, **US\$45.8bn was called in a single year**, and 80-90% of the investors who were called rolled straight back into new Formosa issues. Most of 2020's issuance was therefore recycled rather than new: US\$59.9bn issued against US\$45.8bn called leaves about US\$14bn of genuinely net new money.

Which is why the collapse from 2022 is not a regulatory story either. It is a rates story: **no calls means no refinancing supply.** Issuance fell to US\$7.8bn in 2023 — an eighth of the 2020 peak — and recovered only to US\$9.8bn in 2024, not because the rules changed or the demand went away but because the existing stock stopped turning over. The market's supply is its own redemption flow, and that flow has been switched off since 2022.

Outstanding, year-end: NT\$4,859bn (2019) → NT\$5,262bn (2020) → NT\$5,922bn (2022) → **NT\$6,130bn (2024), roughly US\$187-191bn.**

The call record. US\$11.9bn redeemed in 2019; US\$22.7bn in January-April 2020 alone; **US\$45.8bn across full-year 2020.** Verizon's 4.95% of 2047 (XS1558510829, US\$1,475m) was called at par on 11 February 2020 and delisted from TPEx — the one call I can evidence to the issuer's own announcement rather than to press. Since 2021: essentially nothing. Everything struck between 2015 and 2022 is deep out of the money.

Part 2 — The hedging chain

This is the analytical core, and it is worth being precise about who ends up holding what, because the market shorthand gets the direction wrong about half the time.

2.1 Who is long what

An issuer — say a US corporate — sells a 30NC5 USD fixed-rate bond into Taipei at a coupon of c . It does not want thirty-year fixed-rate debt. It enters a **cancellable swap** with a dealer: the issuer receives fixed at c , pays SOFR minus a spread, and the *dealer* holds the right to cancel the swap on each of the bond's call dates. If the dealer cancels, the issuer calls the bond, and both legs disappear together.

Work through the positions:

	Position	Net exposure
Insurer	owns the callable bond	short a Bermudan receiver swaption struck at c
Issuer	short the bond, receives fixed on the swap, holds the bond call, sold the swap cancellation	flat — and keeps sub-SOFR funding as its fee
Dealer	pays fixed on the swap, holds the cancellation right	long the Bermudan receiver

The dealer's option is a *receiver* because cancelling a pay-fixed swap is economically the same as entering a receive-fixed one, and it is worth doing when rates have fallen. The dealer paid for it by giving the issuer sub-SOFR funding, and it monetises it by selling volatility into the street.

A check on the direction. Dealer research observes that Formosa flow makes dealers "get longer vega in a sell-off and shorter vega in a rally," and separately puts the strike at roughly **atmf+75 to atmf+125**. The vanna signature on its own does not settle the question — a *short* option struck *below* the forward has the same sign — but taken together with the strike it does: an option struck above the forward whose vega grows in a sell-off is one you are long. That is consistent with the chain above and inconsistent with the dealer being short, which is how the flow is often described.

A note on the strike, because two figures in this note appear to contradict each other. The atmf+75/+125 characterisation is the moneyness **at inception**, from research published in 2023 when the bonds had been struck against a much lower forward. Today the archetype's 4.26% coupon sits **44bp below** a 4.70% thirty-year forward, so the dealer's long option is now well out of the money. Both are true of the same position at different dates, and the second is the one that matters for Part 3: it is precisely because the option has moved so far out of the money that nothing is being called.

2.2 How much volatility that is

On the archetypal 30NC5 with the register's size-weighted 4.26% coupon, priced at a 4.70% thirty-year swap rate and 90bp of normal volatility:

Bullet value, if it had no call	88.45
Callable value	81.51
The embedded Bermudan	6.94 points
Across US\$129bn of USD callables	≈ US\$9.0bn of optionality ‡
The option's vega	+0.132 points per basis point of normal vol
Long vega handed to dealers, per US\$1bn issued	≈ US\$1.3m per basis point

‡ That figure applies a *new-issue* option value to a *seasoned* stock, which overstates it: the archetype here is a fresh 30NC5 with five years of call protection left, while the outstanding book is 2015–2022 vintage with its non-call period mostly expired and around 24 years to run. Part 3 treats the same archetype as five years old. The two halves of this note price the same bond at different ages, deliberately, and the US\$9bn should be read as an upper bound.

One numerical caveat, because it is easy to get wrong and I got it wrong first time. The *callable bond's* sensitivity to volatility in this model is **−0.030 pts/bp**, but that is not the vega: the model's process is uncalibrated, so raising volatility mechanically raises every bond PV through Jensen's inequality, and the bullet leg alone shows **+0.102 pts/bp**. What the dealer owns is the difference — the **option's vega, +0.132 pts/bp**. Using the callable's sensitivity understates the flow by a factor of more than four.

Applying that to **USD callable** issuance — not to total TPEx issuance, which includes floaters, bullets and other currencies:

Year	US\$bn of USD callables	Vega supplied that year
2020	~42	≈ US\$55m per basis point
2022	~11	≈ US\$15m per bp
2024	~6	≈ US\$8m per bp
On the whole US\$129bn stock		≈ US\$170m per basis point

Those figures are **my arithmetic, not a published measurement** — no public source quantifies Formosa vega, and I could not find one. They do reconcile with an independent estimate made a different way in the underlying research, which puts the flow at US\$1.0–1.5m per basis point per US\$1bn and a central US\$150m per basis point on the stock. Treat them as an order of magnitude. What they are consistent with is the qualitative description dealers give of the flow: "the biggest structural flow in the USD vega market over the past decade or so."

2.3 What the flow actually did, and what it did not do

The evidence supports a **skew** story rather than a **level** story. The characterisation from dealer research is that "vega skew was kept under check for years by Formosa callable issuance," and that after issuance dried up in 2021 what followed was "a skew squeeze for the ages." That makes sense given the structure: the supply is of receivers struck well above the forward, so it is a supply of a particular part of the surface, not of volatility in general.

Four things that are commonly asserted about this channel and that I could not evidence:

- **The TBAC's April 2024 charge does not discuss Formosa hedging.** It is a useful source on the *structure* of the universe — the 57.1%/40.4%/86.9% figures above are its —

but its single sentence about cancellable swaps is about *US Treasury* callables, not Formosa.

- **I could find no BIS publication on this channel.** Its 2023 and 2024 Quarterly Review articles on life insurers do not mention Taiwan.
- **There is no IMF Article IV for Taiwan.** Taiwan is not an IMF member. Any citation to one is to something that does not exist.
- **The standard academic account of negative USD swap spreads** — Klingler and Sundaresan — is about pension duration demand against constrained intermediation, and contains no reference to Formosa.

The channel is real, and dealers describe it in their own words. The scholarly and official citation trail behind it is thinner than the confidence with which it is usually asserted.

2.4 The complication: the issuer usually *is* the dealer

86.9% of the USD callable stock is issued by financial institutions — against 12.4% corporates and 0.7% supranationals. For most of that 87%, the clean three-party chain above does not happen. The bank issues the bond, keeps the option inside its own structured rates desk, and never faces an external dealer at all. Which is why the P&L from this flow shows up as a line inside banks' structured rates businesses rather than as observable interdealer volume — and why the "Formosa vega supply" is much harder to see in market data than the folklore implies.

It also introduces a risk that is not a rates risk. **A bank's decision to call its own Formosa bond depends on its own funding spread**, not only on the level of rates: calling means refinancing, and refinancing at a wider spread can make an otherwise-economic call uneconomic. So the exercise boundary moves with bank credit. That is the basis banks were left examining after **March 2020** — an episode in which the vol move itself, 28 to 117 on 10-year swaptions, came from the market-wide rally and dealers' vanna on hedges they had sold, and in which every model of Formosa call behaviour was simultaneously wrong about both rates and funding.

Part 3 — Extension

3.1 Nothing is being called, and nothing will be

The size-weighted coupon of the live register is **4.26%**. The thirty-year Treasury on 28 July 2026 is **5.09%**. **88.4% of live USD fixed-rate bonds in the register carry a coupon at or below the thirty-year yield** before adding any credit spread at all. That base includes a handful of make-whole-only and effectively non-callable lines; restricting it to genuinely callable paper gives 31 deals, US\$32.5bn, an average coupon of 4.28% and **89.6%** below the yield — the same conclusion, slightly sharper.

My model's exercise boundary for the archetype:

Year	Issuer calls if the 30-year rate is at or below
5 (first call)	1.80%
7	1.85%
10	1.93%
12	2.00%

The boundary sits far below the coupon because it is *option-adjusted*: the issuer does not call as soon as the bond trades above par, it calls when calling beats waiting, and with slow mean reversion and 90bp of annual volatility the value of waiting is large. On pure intrinsic economics the call is in the money once the thirty-year rate is below about **3.66%** — the 4.26% coupon less the 60bp issuer spread — which is 104bp away. The extra 186bp is entirely the time value of waiting, and it is the number most sensitive to the model's mean-reversion assumption: a faster-reverting process would put the boundary materially higher. Take **104bp as the floor and 290bp as the model's central case**. Either way, these bonds are not being called on any path that does not involve a large and durable rally.

3.2 What the holder therefore owns

	Price	Modified duration
If called at the next call date	99.21	0.95 years
If it runs to maturity (25 years left)	88.41	14.49 years

Thirteen and a half years of duration, delivered at once, to an entire sector. And the loss is worst where the coupon is lowest — that is, on the paper bought at the peak of the boom:

Coupon	Price to maturity at 5.09%	Modified duration	Loss against par
3.00%	70.81	15.61y	−29.2
3.50%	77.79	15.11y	−22.2
4.26% (register average)	88.41	14.49y	−11.6
4.50%	91.76	14.33y	−8.2
5.00%	98.74	14.02y	−1.3

Coupon	Price to maturity at 5.09%	Modified duration	Loss against par
5.50%	105.73	13.75y	+5.7

The same calculation run across the actual live register rather than the archetype gives 88.06 and 13.95 years — close enough that the archetype can stand for the book, though it is the same method on the same data rather than an independent check.

3.3 And the rally is not the mirror image

The obvious hope is that a rally fixes this. It does not, and the reason is the short Bermudan:

30-year swap rate	Bullet value	Callable value	Value of the call
5.70%	75.37	72.12	3.25
4.70% (today)	88.45	81.51	6.94
3.70%	104.49	90.89	13.60
2.70%	123.75	99.53	24.21

A 200bp rally takes the bullet from 88 to 124 and the callable from 82 to 100. **The holder captures 18 points of the 35.** The rest is the call, and the call is what hands back a reinvestment problem: par in cash, at the bottom of the market, exactly as happened in 2020 when US\$45.8bn came back at once and had to be redeployed at lower yields. **The insurer's asset duration collapses in a rally and extends in a sell-off** — negative convexity, and the wrong way round for a book whose liabilities stay long in both states — and it is a structural feature of the product rather than an accident of timing.

Part 4 — The current stress

4.1 May 2025

The Taiwan dollar's appreciation in early May 2025 set every short-horizon record in the 43-year series. From the Federal Reserve's daily USD/TWD series:

Horizon	Move	
One day (1→2 May 2025)	+4.16%	record since 1983
Two sessions	+7.15%	record
One week	+8.42%	record
One month	+10.36%	record
To the 28.88 low on 3 July 2025	+14.99%	record

For a sector carrying roughly **US\$469bn of net FX risk exposure** — the FSC's NT\$15.2tn, which is already net of the NT\$7.1tn natural hedge from FX-denominated policies, and well below the US\$688bn of gross foreign investments — that is not a market move; it is a capital event.

One thing to hold in mind before the arithmetic, because the note would otherwise mislead. The currency has since retraced: USD/TWD was **32.39 on 24 July 2026**, with the Taiwan dollar **down about 3.2% year-to-date in 2026**, having given back most of the 2025 spike. The sector's unrealised FX losses have reversed substantially, and the hedge-ratio cut has so far looked like a winning trade. The problem is not that the position is currently losing. It is that the position is now **larger**, and the buffer against the next move is smaller.

4.2 The response was to hedge less

This is the part that is hard to believe until you look at the incentive.

The FSC's own figures: **NT\$22.3tn of foreign investments, NT\$15.2tn of FX risk exposure, and cumulative hedging cost of NT\$1.6tn from 2019 to October 2025 against NT\$1.4tn of cumulative sector profit.** Over roughly seven years the sector has spent more on FX hedging than it has earned. Hedging a 30-year USD asset back into TWD costs several percent a year, and it consumes the entire pickup that justified buying the asset in the first place.

Then, effective **1 January 2026**, the FSC permitted straight-line amortisation of unrealised FX differences on amortised-cost bonds — **but only where the FX risk is not hedged.** The accounting relief is conditional on running the exposure open.

The hedge ratio has moved accordingly — though note the sequence, because the causation is not as clean as it is usually told:

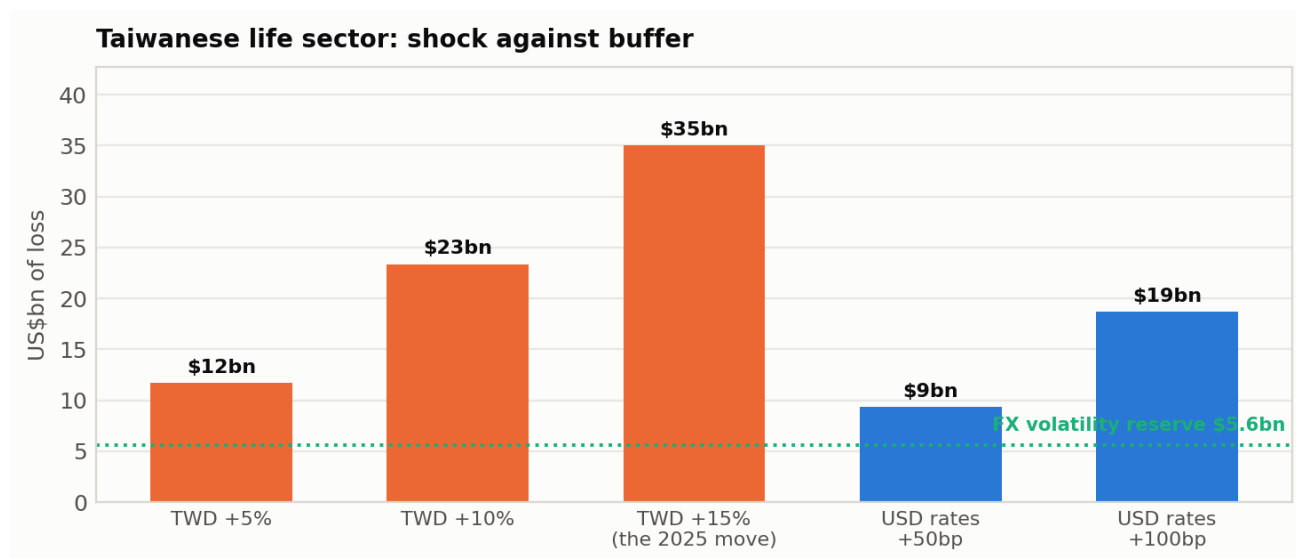
	Hedge ratio	
March 2025	61.5%	
June 2025	55.8%	<i>before the rule was proposed</i>
September 2025	52.3%	<i>before the rule was proposed</i>
January 2026	50.23%	rule effective 1 Jan 2026

Hedge ratio

Industry projections 40%, and in places 20%

The rule was proposed on 23 December 2025. Most of the decline had already happened, driven by cost. What the rule did was remove the accounting penalty for continuing.

4.3 The stress test



Shock against buffer

Inputs: FX risk exposure **US\$469bn** (FSC, NT\$15.2tn at 32.39); hedge ratio **50.23%**, hence **US\$234bn unhedged**; FX volatility reserve **US\$5.6bn** (press); sector capital **US\$70-90bn** (rating-agency and think-tank estimates); USD callable stock **US\$129bn** (TBAC) at a modified duration of 14.5 years. The sources are not all official and are named individually in the research file.

Shock	Loss	As % of sector capital
TWD +5%	US\$11.7bn	13-17%
TWD +10%	US\$23.4bn	26-33%
TWD +15% — the actual 2025 move	US\$35.0bn	39-50%
USD rates +50bp, on the callables alone	US\$9.3bn	10-13%
USD rates +100bp, on the callables alone	US\$18.7bn	21-27%

The hedge ratio is the weakest input, and it moves the answer a lot. 50.23% is a market-data figure whose base is not stated. The FSC's own ratio *on the NT\$15.2tn base used here* was **58.55% in October 2025**, which gives **US\$19.5bn** for a 10% move rather than US\$23.4bn. The two are not reconcilable on the face of the sources — they use different denominators — so treat the *trend* as solid and any single level as base-dependent. On the matching-base figure, an independent estimate of about US\$18bn per 10% appreciation agrees to within 8%; against the 50.23% figure used in the table it is 26% lower.

Three observations.

The buffer is a rounding error. The FX volatility reserve is **1.1% of the exposure** and absorbs the first **2.3%** of TWD appreciation on the unhedged book. It was already drawn down heavily in May and June 2025.

The rates line is not additive with the FX line, but it is not independent of it either. The US\$18.7bn for +100bp applies the archetype's 14.5-year duration to the whole US\$129bn callable stock, where the register-weighted 13.95 years gives about US\$18bn, and TBAC's split says only 57% of that stock is thirty-year in the first place. It is the mark on the Formosa callables alone, not the whole foreign portfolio, and it is a mark rather than a realised loss for assets held at amortised cost. But a sector that is simultaneously extended in duration and unhedged in currency is exposed to the two shocks arriving together, which is what a dollar-funding stress looks like.

And the accounting now separates the reported number from the economic one by design. Under the January 2026 rule, the US\$24bn loss from a 10% appreciation would be reported at roughly **US\$1.7bn a year** — a ratio of about **14 to 1** between what is incurred and what is shown. That is the intended effect of the rule. It is also the reason the sector's published capital ratios will not tell you when this becomes a problem.

4.4 What the sector is actually doing about it

One structural fix exists and is being used: **Cathay and Fubon now write 60-62% of first-year premiums in USD.** A dollar liability against a dollar asset removes the FX problem entirely. It works only on new business, and it will take a decade or more to move the stock. Everything else — the reserve, the accounting change, the hedge-ratio reduction — is timing, not solvency.

TW-ICS and IFRS 17 took effect on 1 January 2026 with a transition period. In principle a market-consistent capital regime should penalise a book that is thirteen years longer than it thought and half-unhedged in currency. In practice the transition arrangements and the FX amortisation rule are running in the opposite direction, and the two together are why the sector's reported position through 2026 will look considerably calmer than its economic one.

Part 5 — What to watch

1. **Whether the vol supply comes back, and what happens to skew if it does not.** Formosa issuance is running at about a sixth of its 2020 peak because the calls have stopped. Long-dated USD receiver skew lost its structural seller in 2021 and dealer research describes the consequence in unusually vivid terms. The supply only returns if rates fall enough to restart the call-and-refinance cycle — which is the same condition that would relieve the extension problem. **The two problems have the same solution and neither has arrived.**
2. **The hedge ratio.** 61.5% to 50.23% in ten months, with the industry talking about 40% and 20%, driven by hedging cost and now underwritten by an accounting rule, rather than by a view on the currency. Each ten points off the hedge ratio adds roughly US\$4.7bn to the loss from a 10% TWD move. This is the single most trackable number in the whole story.
3. **The reported-versus-economic gap.** Straight-line amortisation of unrealised FX differences at a 14:1 ratio means the sector's published numbers will lag reality by years. Watch the FX volatility reserve balance and the disclosed unrealised positions rather than the headline capital ratios.
4. **Whether the FSC re-tightens.** The 2017 non-call rule and the 2018 ceiling were both drafted for the previous problem. The current problem — a sector that is extended, unhedged and encouraged by its own accounting to stay that way — has no rule addressing it.
5. **Bank issuer call behaviour if rates do fall.** Because 87% of the USD callable stock is issued by financial institutions and their calls depend on the issuer's own funding spread, a rally that is accompanied by credit widening will produce far fewer calls than a rates model predicts. March 2020 is the precedent, and it is the scenario in which both the insurers and the dealers' models are wrong at the same time.

Sources and reproducibility

Issuance and outstanding come from the Central Bank of the Republic of China (Taiwan) Annual Reports, "Bond Market" chapter, and its Financial Stability Reports of May 2020 and May 2021 for the call figures. The universe characterisation (57.1% thirty-year, 40.4% NC10, 86.9% financial, and the issuer league table) is from the TBAC charge of 30 April 2024. The deal register is bottom-up from SEC filings, arranger listing prospectuses and TPEX listing pages; every row in `formosa_deals.csv` carries its source and a VERIFIED / REPORTED tag. Regulatory text is from the *Regulations Governing Foreign Investments by Insurance Companies*. FX data is the Federal Reserve H.10 daily USD/TWD series. Sector figures are the FSC's. The full source-by-source record, with tags, is in `formosa_context.md` and `formosa_deals.md`.

```
python3 formosa_model.py # Parts 2.2, 3 and 4.3; the rest is from the research files
python3 charts_usd.py    # the figures
```

Caveats

- **The model is illustrative.** A one-factor normal process on the thirty-year swap rate, solved by backward induction on a 641-point grid with annual call dates, discounting at the grid rate plus a flat issuer spread. No smile, no two-factor curve dynamics, no issuer credit dynamics — which matters more here than usual, because §2.4 argues issuer credit is a first-order driver of exercise. Order of magnitude, signs, comparative statics.
- **The vega figures are mine, not a measurement.** No public source quantifies Formosa vega supply. The US\$1.3m per basis point per US\$1bn, the US\$170m per basis point on the stock, and the annual supply figures are all derived from the archetype and are labelled INFERRED in the underlying research, which reaches US\$1.0-1.5m and a central US\$150m by a different route. The annual figures also rest on estimates of the USD-callable share of each year's issuance, which is published only for 2020.
- **The register is not exhaustive.** 60 bonds against a universe of roughly US\$187bn. TPEx's complete professional-investor register, its factbook and its download endpoints all returned HTTP 403; the register is therefore built from offering documents and is biased toward issuers with public documentation — which means US corporates are over-represented and the bank-issued 87% is under-represented. 2013-16 and 2025 issuance figures could not be closed, nor could deal-level detail for the three largest bank issuers, whose paper is Reg S with no public final terms.
- **The stress test is arithmetic on published aggregates, not a balance-sheet model.** It uses a single sector-wide hedge ratio, a single duration, and no diversification, correlation or management action. The FX and rates lines are computed on different bases — the FX line on the whole foreign-currency exposure, the rates line on the US\$129bn Formosa callable stock alone — and should not be added.
- **Sector capital is a range, not a number.** The 26-33% and 39-50% bands reflect a US\$70-90bn range for sector equity, which is itself sensitive to the accounting treatment the note argues is now obscuring the position.