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North America Fixed Income Strategy
20 October 2017

The future ain't what it used to be

Onshore funding in Taiwan, systematic risk, and USD interest rate volatility

- For most of the past several years, and particularly since the introduction of Formosa bonds, Taiwanese life insurers have dominated the callable bond market that drives longer-dated USD interest rate volatility supply.
- The rapid growth in their holdings of foreign currency assets is comparable to the cumulative inflow of USD from the current account over the past few years.
- Less than a third of their foreign assets are term-funded by writing USD policies. The remainder is primarily hedged with rolling short-dated onshore FX swaps, in effect financing 20+ year maturity bonds by rolling 1- to 3-month FX forwards.
- This exposes the life insurance industry in Taiwan to the risk of an onshore USD funding shock, and we are already seeing signs of stress.
- The implications for callable demand and volatility markets are less about whether a systemic event occurs, but rather local regulators' willingness to accommodate increased risk.
- In this sense, we see an increasing likelihood of regulatory intervention that significantly reduces the attractiveness of foreign investment to life insurance companies in Taiwan.
- In the meantime, more tactical considerations, including valuations, seasonals, and vega dynamics all favor owning the bottom right of the grid.
- We recommend buying long-dated volatility, specifically 2-year 3Yx30Y FVAs.

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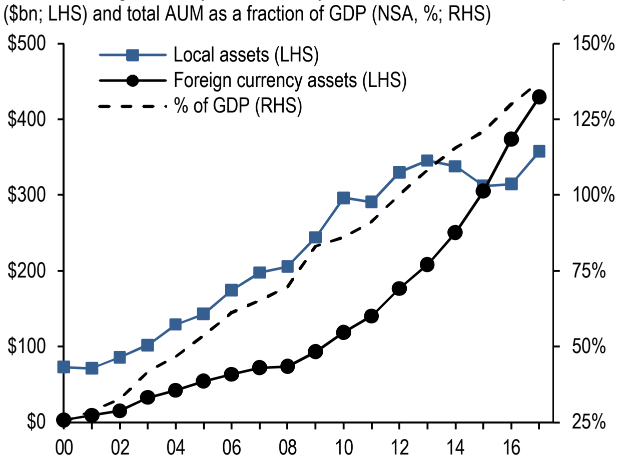
Onshore funding in Taiwan, systematic risk, and USD interest rate volatility

For the better part of a decade, the long-dated U.S. interest rate volatility market has been dominated by callable bond supply. The primary driver of this issuance is demand from Asian real money investors chasing higher returns offshore to better match their liabilities amidst low local yields. Though a number of regions and institutions have been involved to varying degrees, Taiwanese life insurance companies have consistently dominated this flow. And their role has only grown larger in recent months: by our estimates, roughly 93% of long-dated callables that have printed so far this year went to these investors, compared with 85% in 2016[1]. **In this sense, the shape of the USD volatility surface in longer expiries is largely driven by the shifting incentives—both economic and regulatory—for Taiwanese life insurance companies to continue adding overseas assets**.

Exhibit 1: Recent growth in Taiwanese life insurance balance sheets, which are now approaching 140% of GDP, was driven primarily by the acquisition of foreign currency assets…

Local and foreign currency assets held by Taiwanese life insurance companies ($bn; LHS) and total AUM as a fraction of GDP (NSA, %; RHS)



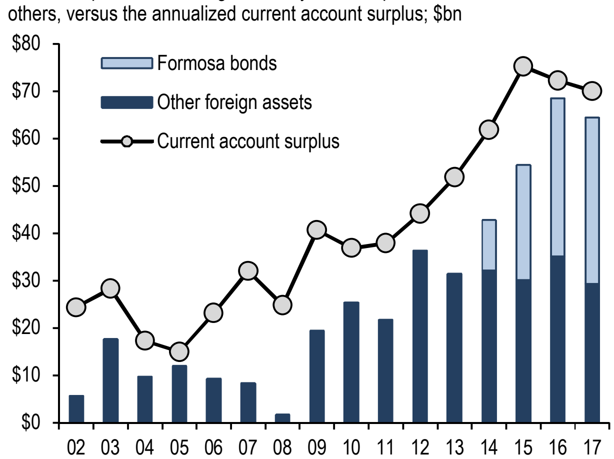
Note: Converted to USD as of the end of the period. Annual data except for this year, for which we have data through August 2017.

Source: J.P. Morgan, Taiwan FSC (Insurance Bureau), Taiwan Life Insurance Institute, Central bank of China (Taiwan), Bloomberg

The resilience of this demand reflects the combination of strong asset growth as well as attractive returns net of FX hedging costs. This was further incentivized by regulatory changes implemented in the second half of 2014, which created Formosa bonds. Though these securities are USD-denominated securities predominantly from offshore issuers, they do not count against foreign investment caps provided they are registered locally and some other conditions are met (see *New regulations in Taiwan are bearish for USD vega*, J. Younger et al., 8/14/17). This helped fuel an acceleration in holdings of offshore assets among Taiwan life insurers that pushed total AUM towards 140% of GDP. **In fact, the accumulation of foreign currency assets accounts for much of the growth in life insurance portfolios over the past few years (Exhibit 1)**. And at present overseas investments represent the majority of their holdings.

Exhibit 2: … and annual life insurance acquisitions of foreign assets are comparable to the entire current account surplus

Annual acquisitions of foreign currency assets, split into Formosa bonds and others, versus the annualized current account surplus; $bn



Note: Taiwanese foreign currency life insurance assets (reported in local currency) converted to USD as of the end of the period using spot USD/TWD exchange rates. Anecdotally roughly 90% of these assets are USD-denominated. For this year we annualize using current account data through 2Q and life insurance holdings through August 2017.

Source: J.P. Morgan, Central Bank of China (Taiwan), Taiwan Life Insurance Institute, Taiwan FSC (Insurance Bureau), Bloomberg

Simply observing the magnitude of this flow suggests it may not be sustainable over the long run. For example, in aggregate the accumulation of foreign assets by life insurance companies since 2010 is comparable to the cumulative current account surplus over the same period (**Exhibit 2**). **In fact, just net issuance of Formosa bonds—not to mention other USD callables and hard currency corporates—has increased from 32% of USD inflows from the current account in 2015 to more than 50% this year**. This has helped keep FX reserves relatively steady for the past several years despite a persistently wide surplus (10-14% of GDP since 2015).

[1] Korean investor involvement in the callable market and in foreign currency assets more generally was increasing until this year, when a range of factors conspired to reduce their demand (see Interest Rate Derivatives, *US Fixed Income Markets Weekly*, 5/19/17).

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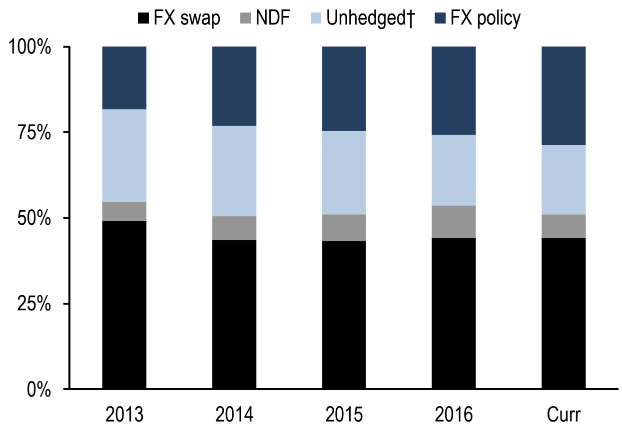
Exhibit 3: Though they have some funding from writing USD-denominated policies, the vast majority of growth in overseas assets relies on a steady source of onshore foreign currency…

Fraction of foreign currency assets* by hedge type; %



* Notional balance-weighted across overseas assets held by Cathay, Fubon, Shinkong and China Life.

† Proxy/unhedged includes securities in AFS.

Note: FX policy refers to predominantly (~95%) USD-denominated insurance policies, which acts as a natural FX hedge. All as of year-end except current as of 2Q 2017.

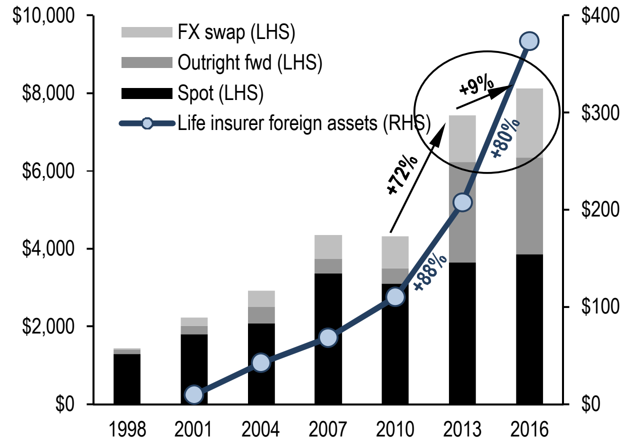
Source: J.P. Morgan, company filings

That said, a key consideration is how those U.S. dollar inflows find their way to life insurers for investment overseas. We can get a sense of this by examining corporate filings and disclosures related to FX risk management. Doing so reveals that they in fact have a non-trivial amount of long-term U.S. dollar funding from writing policies denominated in foreign currencies[2]: roughly 30% on an asset-weighted basis across Cathay, Fubon, Shinkong and China Life (though this can vary between companies; **Exhibit 3**). This has increased over the past few years, from 18% in 2013 for example, but since 2015 the rate of growth in this market segment has slowed substantially, and at this point they still make up less than 20% of the overall funding mix (i.e., including onshore and offshore assets). The remainder—covering the vast majority of their holdings of overseas assets—remains reliant on a steady source of onshore U.S. dollars[3]. **And much of this can be thought of as financed through a combination of onshore FX swaps (44%) and to a lesser extent outright offshore NDFs with foreign banks (7%), the use of which has been relatively steady over the past few years**.

In other words, we believe Taiwanese life insurance companies rely predominantly on U.S. dollars financed over 1- to 3-month maturities to fund roughly half of their large and growing portfolios of 20- to 30-year maturity foreign currency bonds. And a decent fraction of the remainder is left unhedged, which exposes their balance sheets to fluctuations in spot FX rates.

Exhibit 4: … but turnover in FX markets has not picked up much since 2013 despite a substantial increase in hedging demand as their foreign currency assets grew

Daily average turnover in USD/TWD FX spot, outright forwards, and FX swaps with Taiwanese counterparties (all in $mn; LHS) versus total life insurance holdings of foreign assets ($bn; RHS)



Note: Turnover data from the most recent BIS Triennial Central Bank Survey of foreign exchange and OTC derivatives markets, published December 2016. Life insurance data as of April of each year to match the survey period.

Source: J.P. Morgan, BIS, Taiwan FSC (Insurance Bureau), Bloomberg

This exposes their portfolios to both currency fluctuation and—perhaps more importantly—broader onshore U.S. dollar funding costs. And on the latter point, there are signs that the pool of liquidity taking the other side of the trade has come under some stress. For example, though turnover in onshore USD/TWD trading picked up substantially in 2013—driven by the FX swaps and outright forwards—it remained rather stable over the subsequent three years (up 9%) compared with the rise in overall demand for hedges over the same three-year period (up 80%; **Exhibit 4**). **That the activity in FX derivatives dominated by insurance hedging flows has not kept pace with the growth of the total stock of foreign assets held by these investors is suggestive of liquidity constraints related to the availability of lendable onshore dollars**.

We can see more explicit signs of local U.S. dollar funding stress in the pricing of FX forward curves. The 3-month cross-currency basis, for example, though rather volatile has been biased more negative in recent

[2] Currency breakouts are not disclosed, but we believe 90-95% of these policies are USD-denominated, with a decent fraction of the remainder mostly in AUD, which is easily transferable.

[3] Though currency breakouts are not disclosed, anecdotally we believe roughly 90% of offshore holdings among Taiwanese life insurers are USD-denominated.

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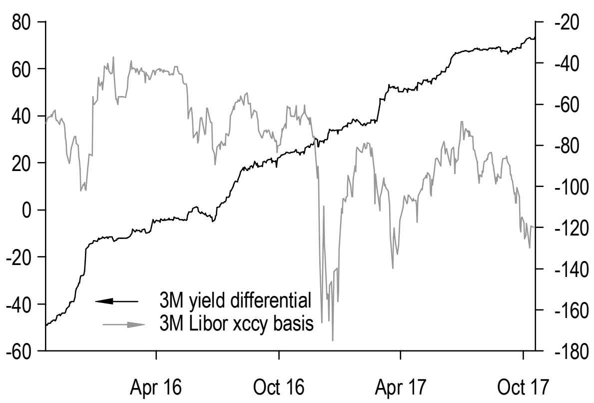
months (**Exhibit 5**). That this comes just when the Fed has picked up the pace of rate hikes, has exacerbated the impact of wider front-end USD/TWD yield differentials on hedging costs (**Exhibit 5**). **Reflecting this, large life insurance companies reported material losses associated with FX hedges in the first half of this year** (see *Taiwan insurance*, J. Huang et al., 9/27/17).

Exhibit 5: Signs of local U.S. dollar scarcity are apparent in the onshore TWD cross-currency basis, which has exacerbated the impact of Fed hikes on life insurer FX hedging costs…

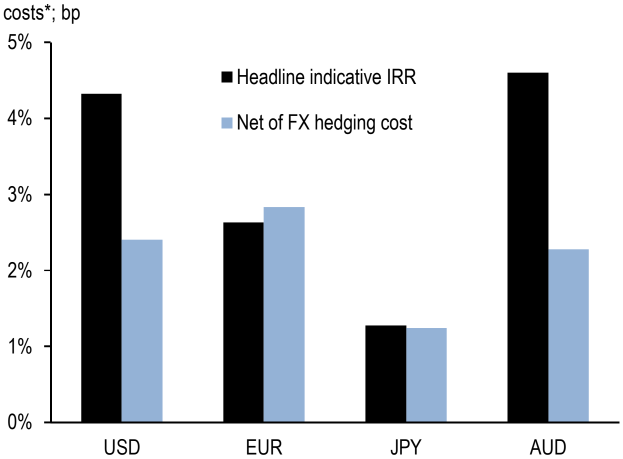
3-month USD-TWD swap yield differential (LHS) and 3-month Libor/Libor cross-currency basis (RHS); both axes in bp



Source: J.P. Morgan

Exhibit 6: … which has significantly reduced the economic incentive for Taiwanese investors to add USD callables compared with other major currencies

Indicative IRR of 30nc5 financial callables, including and excluding FX hedging costs*; bp



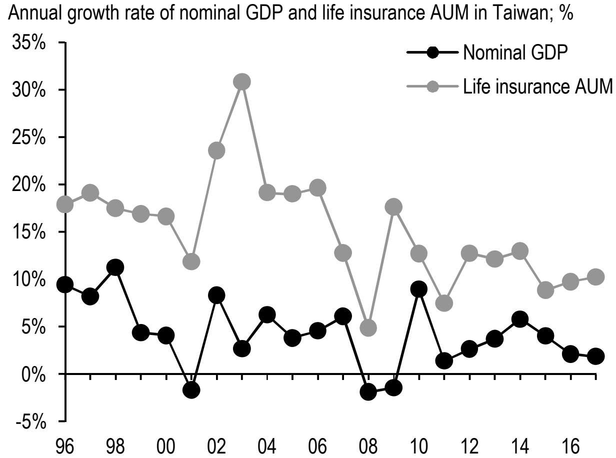
* Assumes onshore 3-month FX swap hedges, and indicative funding spreads for HoldCo issuance, as of 10/17/17.

Source: J.P. Morgan

Over the near term, this raises the prospect that the economics of adding USD-denominated assets, including callables, deteriorates further. In fact, at this point, indicative IRRs net of FX hedging costs in other major currencies are more attractive (**Exhibit 6**). We would not expect a wholesale shift quickly for a number of reasons, but generally speaking this setup does shift the incentives for callable buyers in the region.

Exhibit 7: Life insurance assets have consistently grown much faster than GDP for the past twenty years, including the Asian financial crisis and two recessions

Annual growth rate of nominal GDP and life insurance AUM in Taiwan; %



Source: J.P. Morgan, Taiwan FSC (Insurance Bureau), Central Bank of China (Taiwan)

An important caveat worth mentioning here is this is a rather idiosyncratic story. Globally, USD funding if anything is more abundant than years past, particularly as debt ceiling technicals have increased the overall supply with little risk of a true supply shock over the medium term (see *The Fed giveth, and the Fed taketh away*, J. Younger et al., 9/7/17 and *Still a dribble, not a flood*, J. Younger & D. Hui, 8/25/17). Even amongst economies in the region, this is not a particular concern: Korean life insurance companies, for example, are smaller relative to GDP and trade flows and more importantly have much lower foreign asset allocations. And we see little risk of insurers in other Asian countries adding callables in large size (see *The way ahead for vega supply in 2016 and beyond*, J. Younger et al., 9/16/17). **Rather, this relates to the peculiar case of Taiwan, and the implications of rapid large-scale accumulation of onshore USD assets in a tightly managed FX regime**.

Looking further out, more structural and arguably systemic risks emerge. For example, the experience of the past two decades suggests that life insurance balance sheets would continue growing at a double-digit pace through a sharp decline in growth (**Exhibit 7**). In the event global trade slows sharply, one could easily imagine this setup precipitating a shortage of onshore U.S. dollars. **Were that to occur, onshore USD funding could become substantially tighter, which**

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could cause the short-dated cross-currency basis to move much more negative. This would come at a particularly inopportune time: should the Fed get a few more hikes in over the next year—which is both our[4] and the Fed's base case, particularly in the event the new Fed Chair is more hawkish than Yellen—we would expect front-end USD/TWD yield differentials to widen further. **Combined with a growing scarcity of onshore U.S. dollars, this could substantially exacerbate the rise in FX hedging costs for onshore Taiwanese investors.**

In this way, though the ongoing accumulation of USD assets by insurers appears sustainable for the moment, its continuation potentially creates and increases systemic risk. This is because were onshore dollars to become substantially more scarce—either due to a shift in trade flows and/or a risk-off event—one could easily see FX forward curves becoming extremely distorted. **Because life insurers are running a very large duration gap, financing roughly half of their long-dated (~20- to 30-year maturities) nearly $450bn foreign asset portfolio primarily with 1- to 3-month FX swaps, they are increasingly exposed to short-term fluctuations in the availability of onshore U.S. dollars**. And given a significant fraction of those holdings are relatively illiquid—e.g., long-dated callables and structured notes—asset sales are unlikely to be a viable solution in the event of a funding squeeze.

In our view, the implications for callable demand and volatility markets are not principally about whether or not a systemic event occurs, but rather local regulators' willingness to accommodate increased risk. To date, the FSC, CBC and others have not expressed a high level of urgency regarding this build-up of risk in the system. Formosa bonds, for example, were introduced in 2014 specifically to incentivize offshore investment. **However, there are signs that there is more active discussion and concern around a continuation of this flow—at least at its current pace**. Earlier this year, for example, new local rules came into effect requiring minimum lockout periods for long-dated callables to reduce reinvestment risk and establishing concentration limits (see e.g., Interest Rate Derivatives, *US Fixed Income Markets Weekly*, 1/20/17, 6/23/17, 9/29/17). More recently, the newly installed FSC Chair commented on this desire to consider the issue of Formosa bonds and life insurance portfolios more generally, including a study to be completed next month. **This all suggests that the risks of regulatory intervention are rising as well**.

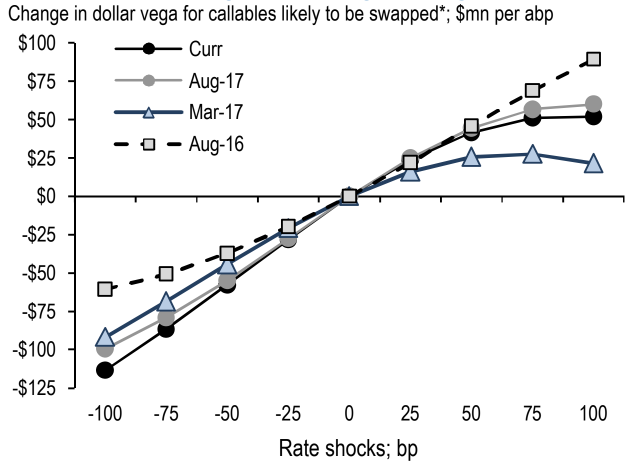
[4] Our economists expect a hike at the December FOMC meeting followed by three more in 2018.

Exhibit 8: Long-dated vols across spot and FVA structures are near decade lows…
10-year percentile of spot and FVA implied volatility for 30-year tails; %

	Forward Term					
Structure	Spot	1Y	2Y	3Y	5Y	10Y
1Yx30Y	0%	0%	1%	3%	18%	10%
2Yx30Y	0%	0%	1%	5%	18%	11%
3Yx30Y	0%	0%	2%	8%	20%	12%
5Yx30Y	0%	1%	6%	14%	26%	17%
10Yx30Y	1%	11%	16%	20%	28%	14%

Note: Levels as of 10/18/17.
Source: J.P. Morgan

Exhibit 9: … and the dVega/dRate curve is once again relatively skewed towards owning the bottom right of the grid
Change in dollar vega for callables likely to be swapped*; $mn per abp



* Includes all financials and SSAs, as well as corporates with a match in SDR or otherwise likely to be swapped. We model the underlying Bermudan call options as struck at par as off the announcement date using lockout/maturity information from Bloomberg data. Current as of 10/17/17.
Source: J.P. Morgan, Bloomberg

The potential for rising onshore U.S. dollar scarcity and the (arguably correlated) role of enhanced regulatory scrutiny are both potentially substantial headwinds to callable issuance, and by extension volatility supply, going forward. In the meantime, long-dated volatility is plumbing all-time lows across a range of tenors and forward points (**Exhibit 8**). **Further, in addition to the above structural considerations, there are two strong tactical reasons to own the bottom right of the grid**. **First**, callable supply tends to dry up into November as life insurers go into year-end planning mode. **Second**, with the rise in yields dealer hedging flows are once again biased towards owning volatility (**Exhibit 9**).

Taken together, we see a compelling structural as well as tactical case for owning the bottom right of the

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volatility grid. Granted, this is not a particularly attractive carry trade as the surface is not particularly inverted at this point. **Rather, we look to position for the risk that Taiwanese regulators recognize growing systemic risks arising from the explosive growth of offshore life insurance investments, with some near-term relative value as a kicker. Specifically, we recommend buying 2-year forward 3Yx30Y FVAs** (see Trade recommendations).

Trade recommendations

- **Buy 2-year forward 3Yx30Y FVAs**
  With the accumulation of foreign assets, including Formosa bonds, among Taiwanese life insurance companies comparable to the current account surplus at this point, the risk of an onshore USD funding squeeze is increasing. Should regulators recognize this, USD volatility supply could slow substantially. In the meantime relative value and seasonal arguments as well as vega dynamics also favor owning the bottom right of the vol grid.
  – Buy 2-year forward 3Yx30Y FVAs @ a forward premium of 1895bp (forward implied volatility 67.85 abp).

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