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As promised, a story about how derivatives markets work to transform risk but inevitably tend towards speculative excess. The context: popular Asian and European structured investment products, exotic derivatives dealers, and enigmatic corridor variance swaps. (1/n)

First off, I talk about some of this in two episodes of Bloomberg's Odd Lots, if you want more detail they might be worth a listen (2/n)

<https://podcasts.apple.com/us/podcast/odd-lots/id1056200096?i=1000470965473>

OK. Structured products are typically sold by wealth managers and brokers to high net worth and retail clients. They are issued and risk-managed by the exotic derivatives desks at investment banks. These products were historically much more popular in Europe and Asia. (3/n)

In the post-2008 world of low interest rates, banks invented products called reverse convertibles that create yield by selling equity market crash risk. example: 10% per year coupon, unless NKY drops -35% from initial level, upon which the note terminates at a -35% loss (4/n)

These notes have added many complicating features over the years - callable if markets rally; tied to the worst performing asset in a basket; etc. But its ok to think of the essence of it as the buyer selling long term equity market crash risk for yield. (5/n)

Banks are in the business of earning spread and fees, not taking market risk. When a bank issues a note like this, its traders will immediately hedge, selling long-term put options with strike prices 30-40% below the current index level (for example). (6/n)

if the product demand is large enough over time, this selling reduces the price of long term, deep out of the money options. Investors *love* this stuff. Hundreds of billions of dollars a year of this stuff was being sold every year by the late 2010's. (7/n)

As a result, in European and Asian equity markets, the price of indeterminate armageddon risk, left tail skew (the difference between implied volatility for far downside put strikes versus near the money or upside strikes) was crushed in long term maturities. (8/n)

This was big business for banks, but it had a problem. These complex notes required dynamic hedging. The bank positions are long volatility above the knockout levels. Their vol exposure (vega) rises initially as markets fall, but then drops as notes knock out. (9/n)

So they have to sell volatility to hedge as markets start to fall and then scramble to buy it back if they keep falling. The European and Asian markets were not that large; banks would lose money trying to manage them when liquidity conditions deteriorated in a crash. (10/n)

In 2015, in the wake of the Chinese currency devaluation, several Asian desks lost \$\$\$\$, while hedge funds that had bought variance swaps on Hong Kong equity indices in anticipation of this chaos made a killing and then sold to the banks at peak squeeze

The investor appetite for product outstripped the ability of banks to manage risk of product in these smaller derivatives markets. The bank quants' solution was an enigmatic creation called the corridor variance swap, the beginning of Alternative Risk Transfer (ART) (12/n)

A variance swap is an OTC derivative that pays out based on the realized variance of an asset price over some period. A corridor variance swap adds a twist: volatility in the underlying asset only counts towards the payoff if the asset price is in a specific range. (13/n)

A corridor variance swap with the right range mimics the banks' volatility exposure profile from reverse convertibles, rising initially as markets fall but then dropping off near the bottom of the range. (14/n)

The banks' idea was to pitch hedge funds, asset managers and sophisticated pension funds on buying corridor variance swap *spreads*, long the smaller Asian and European indices where most of the banks' structured products risk was, versus short S&P 500. (15/n)

These clients wouldn't buy variance outright - a risky bet with big directional market exposure. But their salespeople could pitch a spread trade, where the long leg was cheap because of structured products. They pitched it as clients getting paid to share risk: ART. (16/n)

Critically, this had the effect of transferring the first order risk the banks had from structured products in smaller markets like Japan, Hong Kong and Korea, into the deepest and most liquid equity derivatives underlying of all, the S&P 500. (17/n)

Now, banks' salespeople could sell corridor variance spreads, and their exotics traders could move their large hedges in short downside long-term puts into the S&P where they could dynamically manage them much more easily. Derivatives markets transforming risk. (18/n)

These trades became wildly popular with clients. The pricing looked attractive and the story sounded smart. Over time, demand grew so large they became a flow product, where clients initiated and banks were happy to do far more size than they actually had risk inventory. (19/n)

The price of long term crash risk began to inexorably decline in the US, starting around late 2016. ART clients continued sold US tail risk down, focused on static backtests and the narrative that US vol was much richer because of structured products. (20/n)

So derivatives markets first provided a novel risk transformation service, and then steadily converged towards facilitating speculative excess and tail risk. Some hedge funds took the other side, using low S&P long term skew to structure cheap left tail exposure. (21/n)

These corridor variance swap spread trades looked good in a historical backtest, especially at levels they were sold at in 2016, NKY-SPX spread trading for a credit. But those backtests also looked at a period where S&P realized vol was low on a relative basis (22/n)

As US equities kept crushing international competition, investors around the world crowded into the US. By 2018 we started to see market stress events where S&P reacted much more sharply than European and Asian markets. Corridor spreads were hit hard. (23/n)

The extensive institutional tail risk selling in US markets was tinder for a fire. March 2020 provided the spark. S&P volatility spiked massively, crushing these spread positions against the banks' ARP clients. They were also exotic and illiquid, making them hard to exit (24/n)

Today the corridor variance swap is tainted and toxic, and the market much smaller (but not gone). However, the boom in US individual investor activity accelerated the growth of structured products issued here and linked to US indices, which was already underway (25/n)

Implied volatility is generally higher than pre-COVID because markets' baseline level of volatility and risk is much higher, client option demand much firmer. But look at the shape of the 10 or 20 delta volatility term structure in the S&P... (27/n)

TL;DR End users of derivatives (here, individual investors who want yield) are the reason derivatives markets exist. Derivatives can transform risk in novel ways, but typically end up overshooting into speculative excess. (28/n)

