Hi, everyone! Thank you for coming to my final presentation today. I am Jienan coming from the trading desk of Global FICC. So, today I would like to make an introduction of Cross-Currency basis. As Many of our peers and clients are very interested in the arbitrage opportunities brought by the widening of Cross-Currency Basis on USDCNY So I think it’s a good idea to have some discussions today. **(Next Page)** So basically, today my presentation would consist of three parts. The first part is Xccy Basis Arbitrage, and then Basis Trading and last but not least, the analysis of recent basis trend. **(Next Page)**

Actually Basis Arbitrage and Trading are quite common in FX trading. But still, before I introduce the arbitrage strategy, I will first go through the definition of Cross-Currency basis just in case some of you are not that familiar with it. So under the assumption of Covered interest parity, the forward exchange rate of a currency pair can be derived from the spot rate and the rate spread between these two currencies, as shown by the formula on the slide. But usually, covered interest parity does not hold. So we introduce a variable added to the rates spread to make the left side of the equation equals to the right side. And we called this variable cross-currency basis. **(Next Page)**

This is the plot of USDCNY 1 year cross-currency basis time series. The difference of the red line and the blue line is the selection of CNY rates. The former one uses the 1year IRS rate of 7D Fixing Repo rate. And the latter uses the 1 year CGB rate. And Both of them use the 1 year SOFR OIS rate as the benchmark of USD. This plot shows that basis is in a positive or negative range at different times, but always fluctuates up and down around 0. Also, you can find that the basis has turned negative since last march, which is actually the background of our basis arbitrage strategy. **(Next Page)**

As there are no actively traded cross-currency basis products in the onshore market. So how to carry basis arbitrage with USDCNY swap? Here are the steps of arbitrage. So at the beginning of the arbitrage, the arbitrager first borrows USD in the offshore market by, for example, making an overnight repo and then rolling over the repo till the end of the whole arbitrage period. Let’s assume it as one year. At the same time, in order to fix the funding cost, the arbitrager needs to pay an 1 year SOFR OIS. The next step is to sell-buy an 1y USDCNY swap, selling the dollar just borrowed to obtain the CNY. Moreover, if the arbitrager wants to settle the arbitrage profits in USD at the end, it needs to buy an additional 1 year USD forward at the beginning. For the last step, here I provide two approaches. So basically, the first approach is the mirror of step1. In step1, the arbitrager makes a USD repo and pays a 1year SOFR OIS. In step3 the arbitrager would make a reverse repo in CNY and receive a 1year CNY IRS to get a fixed lending yield. But also, there is another way which is much simpler. The arbitrager can just buy 1-year zero-coupon CGB directly through Bond Connect or CIBM. **(Next Page)**

However, in practice, the basis arbitrage cannot be conducted by onshore institutions because we don’t have direct access to USD funding for the arbitrage purpose. But still we can bet on the basis narrowing or widening by conducting basis trading.

So what’s the difference of basis arbitrage and basis trading? For arbitrage, the profit doesn’t count on the narrowing or widening of Basis in the future, but the absolute value of basis at the beginning of the period. In short, as long as the basis is not zero, basis arbitrage can be implemented.

However, the profit of basis trading can only be made if the direction of the basis moves in line with the direction of the basis trading. And the risk exposure and rates cannot be perfectly hedged. For this conclusion, you can see the proof in appendix. (**Next Page pls**)

So how to carry the basis trading with usdcny swap? The first step of basis trading is to sell-buy a long term, like a year, swap. The second step is to buy-sell a short-term swap and roll over it till the end of the year with the same notional amount, so that the inflow and outflow of USD in each period can just be completely hedged, while for cash flow of CNY, the difference between the far leg of the old swap and the near leg of the new one just would become the profit and loss during the process of basis trading. What’s more, in order to conduct a basis trading, there is still a step that we need to do. That is to hedge the rates risk of both USD and CNY by paying a USD IRS and receiving a CNY IRS. **(Next Page)**

Ok, let’s move to the last section—the Basis Analysis. This chart shows how the 1 year Xccy basis and the Swap point move along with the US/China rates spread. We can find that Basis widening tends to occur when spreads remain high for a long period of time. 【……】At the same time, swap points and Basis show consistency in their movements. **(Next Page)**

So which term should we choose for basis arbitrage or trading? This plot is the trends of basis in different terms. The plot below zooms up the movement of Basis after it entered the sub-zero range since last march. It can be noticed that since last September, the 1-year basis has become the lowest one of all terms, lower than both its longer-term and shorter-term basis. So is the reason of this phenomenon?

Actually, this is caused by the PBoC's intervention in the FX market through selling 1-year forwards USD. We have found more solid evidence of this intervention by observing the trading volume of 1 year swap. The plot shows the net Sell-Buy amount by various types of institutions. You can notice a significant increase in net selling of 1-year swaps by SOE commercial banks since last September. **(Next Page)**

Also, We can see more evidence by comparing the basis with the spread between CNH and CNY 1 year swap point. We can see from the plot that the two show a high correlation. **(Next Page)**

Then the question is how long will the basis continues to wide, as this determines our arbitrage space and when to enter basis trading. In order to answer this question, we need some indictors to monitor the flowing of onshore USD. I sort out the onshore USD liquidity system. This chart plots the system of onshore dollar flows based on the current account and the capital and financial account of the balance of payments. The blue boxes on the left indicate the sources of dollar inflows, the pink boxes on the right indicate where dollar outflows go, the red below indicates the foreign exchange flows between commercial banks and the PBoC, and the blue box in the center indicates the disposable dollar pool for the banking sector. The white dotted boxes indicate the two data that banks are required to report to SAFE, which records the inflows and outflows of US dollar funds through a rigorous statistical system. **(Next Page)**

So based on the two statistical data by SAFE, the plot below shows the trend of difference between foreign exchange settlement and sales by bank for customer. We can find that it has become negative since the second half of last year, accompanied by a rapid decline of the basis and swap point.

The last plot is an estimate of Onshore USD net inflow, also based on the two statistical data from SAFE. The estimate formula is a little bit complicated. I won’t extent too much here. But also we can see some correlations between the Xccy basis and the estimate net inflow from the plot.

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The next step is to sell-buy an 1y USDCNY swap, selling the dollar just borrowed to obtain the CNY. Moreover, if the arbitrager wants to settle the arbitrage profits in USD at the end, it needs to buy an additional 1 year USD forward at the beginning. (**Next Page pls**).

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The arbitrager can just buy 1-year zero-coupon CGB directly through Bond Connect or CIBM. Similarly, apart from the principal portion, the FX exposure of the arbitrage profits left at the end of the arbitrage can be closed by buying additional amounts of forward USD at the beginning, just as shown in Step2. In this case, we can write down the formula of the arbitrage profit as shown in the slide. The arbitrage profit from lowercase t to Uppercase t can be expressed as basis in the second and third formula. The point I want to emphasize here is that the arbitrage profit doesn’t count on the narrowing or widening of Basis in the future, but the absolute value of Basis at the beginning of the arbitrage. As long as the Basis is not zero, the Arbitrage can be conducted. The only pressure is that the MtM value of the portfolio may temporarily be negative, but it will be able to make a definite return at the end of the period. (**Next Page pls**)

But in practice, the basis arbitrage cannot be conducted by onshore institutions because we don’t have direct access to USD funding for the arbitrage purpose. But still we can bet on the basis narrowing by conducting basis trading. So the first step of basis trading is to sell-buy a long term, like a year, swap. (**Next Page pls**)

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Let me just show you the result of cash flow calculation. You can just focus on the third line, the total cash flow in . So basically, as the current basis is negative, so if the Basis narrow in the future, we can gain profits. Otherwise, we may encounter a loss with the Basis widening further. And although the double IRS has largely reduced the rates risk of USD and CNY, the risk exposure of rates cannot be perfectly hedged, as shown in the blue terms. As for the unhedged spot risk, if we ignore the effect of discounting factor and sum the total cash flows for each period, then the last term will be just minus , which is just the opposite of the swap point at the beginning of the period. **(Next Page pls)**

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This plot is the trends of basis in different terms. The plot below zooms up the movement of Basis after it entered the sub-zero range starting in March last year. It can be noticed that since September last year, the 1-year basis has become the lowest one of all terms, lower than both its longer-term and shorter-term basis. Therefore, it is reasonable to assume that this could be caused by the PBoC's intervention in the FX market through 1-year forwards. **(Next Page pls)**.

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