Homework: FX Carry Strategy

February 3, 2023

1 Introduction

An FX carry strategy borrows in a (low-interest-rate) currency and lends in another currency (with high interest rates). This is typically arranged via a cross-currency swap.

2 Data

Obtain 1M (0.08Y) rates for UK overnight index swaps (OIS) along with spot rates for the dollar versus pound[1].

Obtain yield curves and FX rates of Vietnamese Dong, Thai Baht, Pakistani Rupee and Philippine Peso from the earliest possible date through now[2]. You may need to interpolate from sparser data in some cases. (Not all maturities are available in all currencies.)

3 Exercise

We will synthesize an approximate PL of weekly-traded cross-currency fixed-float swaps from the Libor rates and swap curves[3], normalized to have a USD

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[1]Available from 2009. Concatenate GBR_ISSC and GBR_ISSS from YC in Quandl.

[2]You may assume the data in Quandl's YC dataset has swap curves, though in fact they are not quite the same. See also the Jupyter notebook *Zero_And_Spot_Curves* on the class website.

[3]Use at least the 1, 2 or 3, and 5 year points.

notional of US$10MM at the beginning of each week[4]. To keep bugs out of our cash flow tracking, we will convert flows to USD, though in some cases doing so is superfluous.

4 Fixed-Float Carry

In the borrowing (funding) currency, assume a rate of OIS+50bp, paid on 4/5 the notional amount (5x leverage) in the borrowing currency for each active position. In the lending currency, assume the schedule has a coupon every quarter at the 5Y swap rate, or (optionally) the 5Y treasury rate.

Weeks in which the 5Y swap rate of the lending currency is less than 50bp higher than the 5Y swap rate in the funding currency will be assumed to have no position

At the end of each week, assume you sell out of the position before opening a new one. You therefore need to tally accrued interest at the borrow and lend rates, and then compute mark-to-market for the swap exit.

4.1 Lending Currency

4.1.1 Mark to Market

Mark-to-market losses (due to swap rate and exchange rate changes) are the main source of downside deviation in this strategy.

Your original bond yield is the 5Y swap rate s_5, as are the coupons. Use the new swap curve to form a corresponding zero-coupon bond curve, and reprice the bond (with its original coupons equal to s_5) on the new interest rate curve, with the time remaining to all payments reduced by 1 week (or $\frac{1}{52}$ of a year).

This is then converted (if necessary) to USD for buyback value at the new FX rate.

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[4]You may forward fill in cases where you are testing weekly and only monthly data is available. If holidays interfere, delay a day or so as necessary, being sure to align data from the same day where possible. Wednesdays work best for weekly analysis.

4.2   Borrowing Currency

4.2.1   Mark to Market

Here we can get a sufficiently good approximation just by assuming $\Delta V = 0$, since the durations are so short.

4.2.2   Accrual

Our interest payment is one week at the funding rate, multiplied by our borrowed amount. We borrowed the funding-currency[5] equivalent of \$8MM at the starting FX rate f. We must now return that same amount of home currency at the new FX rate, plus 1 week of interest on it (also in home currency) at $\text{OIS} + 50\text{bp}$.

5   Analysis

Study and describe performance.

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[5] In this context when talking about "home currency" we are referring to USD. If we refer to the home currency of a security, then we are talking about the currency in which that bond will pay notional and coupons.