Fixed Income

Problem set to prepare for quiz on the floating rate notes, swaps and the PiVe trade

Problems: Show all work. Clearly indicate your answer to each question. For the purposes of this problem set assume that any 6-month period is exactly one-half of a year, any 3-month period is exactly one-fourth of a year, etc. Short answer: Be precise and concise.

1. Suppose that on October 7, 2019 you enter a 5-year plain vanilla interest rate swap – receive fixed, pay floating with a coupon rate of 3%. The floating side has quarterly resets and tenor and is based on 90-day Libor. The notional principal is $10 million, and 90-day repo is 2.2%. Suppose that over the next year 90-day repo realizations are: January 7, 2020: 2.3%; April 7, 2020: 2.4%; July 7, 2020: 2.5%; and October 7, 2020: 2.6%.

   Show all of the cash flows that you will experience over the 12 month period October 7, 2019 through October 7, 2020.

2. Suppose the Libor yield curve is (quarterly-compounded basis):

Term (Years)	Libor
0.25	2.9%
0.5	2.8%
0.75	2.7%
1	2.65%

   (a) What is the value of a 1-year floating rate note with quarterly resets and tenor and index rate 90-day Libor?

   (b) What is the 1-year swap rate for a standard plain vanilla interest rate swap?

   (c) Suppose that 2 months later the yield curve is:

Term (Months)	Libor
1	2.6%
4	2.65%
7	2.7%
10	2.8%

   i. What is the value of the floater from part (a)?
   ii. What is the value of the swap from part (b)? You should be able to compute this using 2 different methods: a) taking the difference between the fixed and floating rate bonds; and b) using the forward rates as the future reset rates.

3. Suppose that today is the issue date for a new 5-year, 3% Treasury note. It sells for par. The 5-year swap spread is 75 basis points. 90-day repo is 2% and 90-day Libor is 2.2%. (These spreads are characteristic of the market pre-global financial crisis.)

   Show a spread (or convergence) trade that you can implement to attempt to lock-in the swap spread. Show what the expected profits / losses are (cash flows) if the spreads don't change over the holding period.

   Work through worse-case scenarios to lay out for your managers what could possibly go wrong if you were to put on this trade.

4. In 2019, the spreads are inverted (relative to pre-crisis). So we might see a situation where the new 5-year T-note sells at par and yields 3%, while the swap spread is -30 basis points (so the swap's coupon rate is 2.70%). 90-day Libor is 2% and 1-month repo is 2.4%. Discuss how you would implement a spread trade to capture the Treasury yield over the swap yield, and the advantages / disadvantages of entering the trade.

5. Suppose that you work for a company that has recently issued $10 billion in 5-year floating rate debt. The CFO is considering entering into a swap to hedge this exposure. He proposes a 5-year $10 billion notional principal swap to receive floating and pay fixed. Provide a risk assessment with respect to this "hedge." Provide a worse-case scenario to demonstrate what might go wrong.