

Problem Set #2—Repo Math
(due Monday Oct 7, in class, physical copy)

1. Security Dealers. Table III at

<http://www.newyorkfed.org/banking/reportingforms/primarystats/deal.pdf> shows the positions of primary dealers, and Table IV shows how they finance those positions. In lecture 7 we saw how security dealers could be viewed as a kind of bank, with overnight RP borrowing analogous to a demand deposit, and term reverse lending analogous to a bank loan.

a) Suppose that one of the dealer's RP clients ("depositors") declines to renew the RP for another day because the client needs the money to make a payment, so the dealer faces the problem of a "reserve drain". If the dealer were a bank, it would use the interbank Fed Funds market to borrow the needed reserves. By analogy, consider how the dealer might use the interdealer RP market to raise the needed funds.

b) Suppose that the interdealer RP market doesn't solve the problem (perhaps because the ultimate recipient of the client's payment does not invest in RP with another dealer). By analogy to the role of the Fed's discount window for banks, consider how the dealer might use his clearing bank to raise the needed funds. Where does the bank get the funds?

c) Consider now a third alternative, that the dealer raises the needed cash by declining to renew a term reverse RP ("loan") that is maturing. Using balance sheets, trace how in this case the reverse client pays the dealer who pays the RP client, and the dealer's balance sheet shrinks on both sides.

d) Usually the dealer prefers the first solution to the second, because RP is usually a cheaper source of funds. Why does the dealer usually prefer both the first and second alternative to the third?

2. Fed Repo Operations. According to data at

<http://www.newyorkfed.org/markets/omo/dmm/temp.cfm?SHOWMORE=TRUE>, on Tuesday April 9, 2013, the Fed agreed to borrow \$2.75 billion using repo. (The website somewhat confusingly refers to this transaction as a Reverse RP, presumably because that is what it looks like to their dealer counterparties, who are lending money and taking in collateral.) This is supposed to be an experiment, aimed at getting ready for one possible "exit strategy" from the enormous expansion of the Fed's balance sheet during the crisis.

a) Some of the money was borrowed against mortgage-backed security collateral, and the stopout rate was .2%. Suppose that 10MM was borrowed at the stopout rate. Calculate the amount of money the Fed will pay back at the end of the loan. Note that the loan is for 5 days, not overnight (Stigum p. 534).

b) The "haircut" applied to the MBS collateral in the transaction is not reported, but suppose the Fed's haircut is 5% off face value (so that on 1MM MBS the dealers can

borrow only .95MM). By contrast, in the private market it is quite difficult for anyone else to borrow against MBS collateral, even with a much higher haircut, say 30%. Why is the Fed's haircut so much lower?

c) Observe that the repo deal was for 1-day forward delivery, so no money changed hands until April 10. Illustrate how the balance sheets change for the dealers, their clearing banks, and the Fed itself over the course of this transaction. (Hint: Describe the initial conditions of the balance sheets, the changes at stage 1, and the changes at stage 2.)

3. Fed Funds Market. Consider the data at <http://www.newyorkfed.org/markets/omo/dmm/fedfundsdata.cfm>, which shows how the overnight Fed Funds rate fluctuates around the Fed Funds target both during the day and during each two week reserve maintenance period.

a) In the past, the effective Fed Funds rate has typically shown a tendency to rise toward the end of a maintenance period. Why so? Is there any indication of such a phenomenon in recent data? Why not?

b) Suppose Citibank borrowed 10MM Fed Funds overnight from Chase on Sept 13 at the average FF rate. How much would it have to repay Chase on Sept 23?

c) Starting Oct 9, 2008, the Fed began paying interest on reserves, now 25 basis points. See <http://www.federalreserve.gov/monetarypolicy/regresbalances.htm>. Given this, why do we see trading in the Fed Funds market at rates generally below 25 bp, with some transactions much lower? Put another way, why doesn't arbitrage in the Fed Funds market keep the FF rate near 25 bp?

4. Eurodollars. The Financial Times quotes the following LIBOR rates for Sept 25, 2013:

	3 month	6 month
Dollar	.24760	.36850
Yen	.15286	.22250
Euro	.15714	.26143

a) Suppose a bank finds itself taking in 5 million dollars at the 3 month rate and lending 5 million dollars at the 6 month rate, so it has a mismatch. Using the numbers above, calculate the implied forward rate at which the bank can today buy 3 month dollars for delivery 3 months from now (a so-called forward forward contract).

b) Now suppose that instead of buying the needed funds forward in the cash market, the bank instead enters into a forward rate agreement (FRA) using the implied forward rate as the contract rate. What will be the cash flow consequences 3 months from now if 3 month LIBOR turns out to be .2%?

c) On Sept 25, 2013, the euro was trading spot at \$1.3508, and the dollar was trading at 98.69 yen. Using the LIBOR interest rates above, calculate the implied 3 month forward exchange rates corresponding to these spot exchange rates.