

7. Repos: Postponing Settlement

A repurchase agreement is a **collateralized overnight loan, legally constructed as two security transactions one day apart**. Keeping our eye on the loan interpretation, we can call the agent who “repos securities” (sells securities for repurchase) the borrower of money, and the agent who “reverses in securities” (buys securities for resale) the lender of money. (To make things confusing, it is the latter person who is said to “do repo,” meaning to invest in overnight loans.) On the first leg of the repo, money flows from the lender to the borrower and securities flow the other way. On the second leg of the repo, the securities flow back to the borrower, and somewhat more money flows back to the lender. See diagram on p. 534, and refer back to it as often as you need in order to keep straight how the repo works.

Security Dealers

In practice a security dealer is on the other side of most repo transactions. He is either borrowing money by using his securities as collateral or lending money by taking in securities as collateral. Think of the security dealers as a kind of bank. Stigum says that corporations and pension funds invest in repo (make overnight secured loans to security dealers) as a way of earning interest on their money balances, and banks repo their security holdings because it is often the cheapest way to finance them. Figure 13.9 (p. 562) shows the stylized balance sheet of a security dealer, treating borrowing of money as a liability and lending of money as an asset. This will be our convention in this course; I call it “following the money”.¹ Here is a version of that figure that includes the balance sheet of the ultimate borrower (corporation A) and the ultimate lender (corporation B). Concretely we might think of corporation A as a bank that funds its security holdings with overnight repo, and corporation B as a pension fund that uses overnight repo to hold its money balances.

Bank Corporation A		Dealer		Pension Fund Corporation B	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	+reverse	+reverse	+repo loan	+repo loan	

As these transactions take place, collateral flows from left to right, from the bank through the dealer to the pension fund. And money flows from right to left, from the pension fund to the dealer to the bank. Note that I call repo a reverse when it is an asset of the dealer, in line with reporting conventions (see below). But it is important to emphasize that it is the exact same instrument, just the opposite side of the exact same instrument.

¹ Since the person borrowing money is also in effect lending securities, in principle you might think of that person as acquiring an asset, but we don't do that. Our convention is suggested by the hierarchical character of the money-credit system.

Using this balance sheet, compare the repo market to the Fed Funds market we talked about last time. We saw how Fed Funds can be understood as interbank borrowing, and can be used to channel funds from banks that have cash inflow greater than outflow (surplus banks) to banks that have cash inflow less than cash outflow (deficit banks). It should be clear now that the repo market does much the same thing as the Fed Funds market but for a much wider class of economic agents, a class that includes just about anybody that owns eligible collateral. Repo can be thus be understood as inter-corporate borrowing, and thought of as channeling funds from corporations that have cash inflow greater than outflow (Corporation A, the surplus corporation) to corporations that have cash inflow less than outflow (Corporation B, the deficit corporation).

Whereas the Fed Funds market is largely a direct or brokered market, the repo market is largely a dealer market, and the most important dealers are the primary security dealers whose balance sheets are monitored by the Fed. Why are dealers so much more important in the repo market? By serving as the counterparty for most RP transactions, they serve to make a unified and relatively homogeneous market out of what would otherwise be extremely fragmented and heterogeneous (various counterparties, various collaterals, various maturities.) Like Fed Funds dealers, RP dealers can be thought of as market makers.

The Nitty Gritty

The legal construction as paired security transactions is important because it means that the transaction is more symmetric than an ordinary collateralized loan would be. Think of a house mortgage for comparison. The house itself is security for the money loan, but the lender of money has no right to deliver the house to anybody else, nor even to sell it when the borrower defaults without a lengthy foreclosure process. For repo, by contrast, the lender of money does often have the right to sell the securities (or something pretty close, such as the right of rehypothecation). The legal niceties of the contract are an attempt to establish that symmetry. (They have to get around existing law that gives bankruptcy protection to borrowers and so prevents lenders from selling collateral to recover except after a lengthy legal proceeding.)

But the transaction is not completely symmetric because the price at which the security is transferred is lower than its market price. This means that the money lender gets control over more securities than a clean purchase would allow. Stigum refers to that difference as margin. She talks a bit about the question of margin, and suggests that it is not clear as a matter of principle who should be paying the margin, the borrower or the lender. The problem is that the price of the security could go up or down, so giving incentive for default to either the money lender or the money borrower, respectively. Stigum concludes however, “traditionally on a repo transaction, the lender of money, because it is lending the more liquid asset, receives margin” (p. 535). In other words, the asymmetry is a symptom of the money-credit hierarchy.

The way that margin works is that the price of a security that is used as repo collateral is less than its market price by an amount called the “haircut”. In the book there is an example (p. 533, Figure 13.1), in which a 10 year Treasury Bond trading at 100-29/32 plus accrued interest is used as collateral for an overnight repo. The haircut is 2%, so the borrower gets only 99.228 for his collateral. The agreed overnight interest rate is 4.92%, which means that the borrower has to pay $99.228 \times (1 + 0.0492/360) = 99.228137$ the next day in order to repurchase his securities. The overnight interest on an approximately million dollar loan is about \$137.

(Note that money market convention treats the year as having only 360 days. Also by convention, interest is not compounded, so a 3 day repo would pay back $[1+.0492*(3/360)]$, not $[1+.0492/360]^3$).

Repo as Source of Funding for Securities Dealers

I began this lecture with a motivation that referred back to last time discussion of Fed Funds, seeing dealers as another way of getting deficit agents and surplus agents together to push settlement off for another day. And I emphasized that the repo market is open to many more agents, hence a kind of generalization of the FF market. But there is more to it than that. The FF market is largely a broker market, while repo is pretty much entirely a dealer market, and that means that we have to take more into account what the dealer thinks he is doing. He does not think he is bringing deficit agents and surplus agents together. Rather, he thinks he is bringing buyers and sellers of securities together, and absorbing the mismatch on his own balance sheet.

Figure 13.3 (p. 539) shows that in general security dealers borrow more than they lend in the overnight market (repos > reverses), but lend more than they borrow in the term market (repos < reverses). Like banks, dealers seem to be in the business of borrowing short term to lend long term, but unlike banks dealers are specialists in the very short end of the money market term structure. (Note that the numbers don't balance exactly because reverses are not the only asset held by security dealers. Stigum makes clear however that reverses are a very desirable asset for dealers, and they do as much of them as they can, for the simple reason that they can repo out whatever they reverse in, and earn something on the spread. That is the "matched book" business in a nutshell.)

The figures in Figure 13.3 all come from the weekly report that primary dealers send to the New York Fed. Stigum shows one part of the report in Table 13.1 (p. 564), the dealers' net outright holdings of securities of various types. This table allows us to see the exposure of dealers to fluctuations in asset prices. In the table dealers are long Agency securities but short Treasuries, so they are picking up the spread but will lose money if that spread narrows.² For our purposes at the moment we are more interested in the gross holdings of securities, and how those gross holdings are financed using repo and reverses. See <http://www.newyorkfed.org/banking/reportingforms/primarystats/deal.pdf> and scroll down to Table IV. The following balance sheet can be constructed:

Security Dealers, Sept 2012 (billions)

Assets		Liabilities	
RP loans, overnight	879	1842	RP loans, overnight
RP loans, term	1317	932	RP loans, term
Net Assets Financed		Net Worth (Capital)	

² In fact the net outright holdings can be a very misleading indication of exposure because it does not include any exposure that comes from futures and other derivatives which can be substantial. Perhaps we can assume that dealers are making the same bets in their off-balance sheet portfolio as they are in their on-balance sheet portfolio?

I've added in entries for net assets financed and net worth as a gesture toward the entire balance sheet, but let's focus on the RP entries for now. Security dealers have 2.5 trillion dollars of overnight borrowing, which we can consider analogous to bank deposits. You can't spend an RP, but you can certainly spend the next day proceeds, and corporate treasurers use that feature heavily. Compared to those liabilities, their assets are noticeably longer term, even if we just look at the money market portion of the portfolio. Apparently security dealers borrow short and lend long, providing liquidity to the market in much the same way that banks do.

The Fed in the repo market, with security dealers

As economists, we are used to thinking of the Fed as engaged in open market operations, buying Tbills when it wants to increase the supply of reserves, and selling when it wants to contract. In the course of a business cycle, it may be doing both. Secularly however it is a buyer since the economy is growing and so the supply of reserves grows. Whether secularly or cyclically, these open market operations are made at most a couple times a year.

On a daily basis, the Fed is involved in ensuring elasticity of reserves by standing ready to soak up excess and meet temporary demand. "Operating factors" that might require Fed intervention include changes in Treasury balances (since Treasury balances are held at the Fed, an increase in balances drains reserves from the banking system), changes in cash holdings of the public (increased cash holding is a reserve drain). The Fed intervenes to adjust for operating factors by engaging in repo. It does repo (buys Tbills for resale, lends money) like everyone else when it wants to temporarily increase reserves. But when it want to decrease reserves, it does MSP (matched sale purchase).

MSP is like a reverse, but since a reverse is understood as borrowing money, the Fed wants to make it more symmetric. An MSP is legally two distinct sales. The new edition of Stigum suggests that the Fed is now more willing to do outright reverses, but the evidence is that it doesn't do much. The reverses that are on the Fed's balance sheet are almost all done as part of the Fed's repo pool for foreign central banks. Thus foreign central banks get interest at the repo rate on their balances at the Fed, whereas normal reserve balances pay no interest.

Figure 13.10 (p. 569) shows an example of the Fed's overnight repo operations. The Fed tells the primary dealers that it wants to do repo, and asks them to submit collateral and bid for the money. It accepts the best bids and does the repo. The effect is to increase reserves as follows:

Bank		Dealer		Fed	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
+reserves	+deposit	+deposit	+repo	+repo	+reserves

Thus by expanding its own balance sheet, the Fed expands the balance sheet of dealers and banks as well.

More recent examples are posted daily on the website of the New York Fed, www.newyorkfed.org/markets/omo/dmm/temp.cfm. The annual Open Market Operations report at www.newyorkfed.org/markets/omo/omo2006.pdf has a wealth of summary information about these operations. One important fact is that the Desk arranged short term RPs on all but 8

business days in 2006. Basically before the crisis the Fed was in the market every day, and the size of its daily RP was large relative to total bank reserves.

All that changed with the crisis. Nowadays the Fed intervenes in this way only rarely, in the last few months mostly to test its ability to do reverse repo with the dealers, as a way of shrinking its balance sheet eventually. Here is the balance sheet describing that:

Bank		Dealer		Fed	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
-reserves	-deposit	+reverse repo -deposit			+reverse repo -reserves

You can see that the reverse works to shift its liabilities from reserves (which are high powered money) to repo (which is less high powered, especially if it is term repo), and to shift the Fed's counterparty from banks to dealers. Whether or not this is such a big deal is something we can talk about; the point right now to emphasize is understanding exactly how it all works.

Pricing

Stigum says that in general the overnight repo rate is a bit lower than the overnight Fed Funds rate, and a bit higher than the three month Treasury bill rate. Why should this be? She suggests two reasons for this, but neither is convincing. First, she observes that repo is secured credit whereas Fed Funds is unsecured, and concludes that 5-10 basis point differential is compensation for the higher risk involved in Fed Funds. I don't buy it. In the Fed Funds market, control of credit lines is the way that banks avoid credit risk, and they set these lines in order to ensure that they face essentially zero risk of default. No one lends 1MM overnight to gain only about \$100 interest if they have any concern at all about default. It would be better simply to forego the interest, and it is easy to do that simply by foregoing the loan.

The second reason given is that there are many economic entities that cannot invest in Fed Funds but can invest in repo, and they might tend to push rates on repo below Fed Funds. I don't buy this one either. There are plenty of agents who can borrow at the repo rate and lend at the Fed Funds rate—your typical bank for example—so the question is why this arbitrage does not close the gap.

In my view, we are closer to the institutional facts of the matter if we think of the Fed Funds target as a kind of penalty discount rate that dealers have to pay if they are unable to meet their survival constraint by borrowing at the repo rate.³ Dealers expand their balance sheets to the extent possible on very thin capitalization while holding essentially no cash reserves, depending instead on the repo market to raise cash as needed. If they run into trouble, (which is to say if they find themselves with insufficient collateral for additional repo borrowing) they rely in the first instance on their clearing banks for a dealer loan, which is priced over Fed Funds since the bank depends on the Fed Funds market to fund the loan. But that's just for the

³ In this respect, the modern US system is very much like the classic British system of the nineteenth century that has been analyzed by Bagehot and Sayers. See my "Monetary Policy Implementation: A Microstructure Approach" (October 2006) for detailed argument from which the following is summarized.

occasional last minute mistake. More fundamentally, and more routinely, dealers can rely on the Fed itself for a repo loan priced at the Fed Funds rate, since that is the rate that the Fed is trying to establish with its daily intervention.

Think of it this way. At the morning auction, dealers bid for the money. Bids that are below the Fed Funds rate will not be attractive to the Fed. It wants to supply needed reserves, but also to retain discipline in the market by keeping reserves scarce. It does that by accepting bids that are at or above the Fed Funds rate. For their part, dealers are willing to bid above the market repo rate, even if they think they will be financing most of their needs at the market repo rate, so long as they face any probability of having to ask for a dealer loan from their bank, which charges typically $FF+50bp$. So long as they get the money from the Fed for less than they could get it at their clearing bank, they are happy. The end result is the pattern we see, that the Fed funds rate tends to be above the repo rate.

Observe how thinking about the balance sheet relationships helps us make sense of the typical price relationships. We observe how the institutional mechanism of the daily auction serves to establish a premium on the best money in the system, and that premium provides an incentive for agents throughout the system to try to meet their obligations at the clearing rather than roll them over to another day. That premium shows up in the slight premium of fed funds over repo, and it also shows up in the typical premium of overnight money over longer term money, such as the three month bill. The answer to the otherwise puzzling pattern of interest rates in the money market is nothing more than the natural hierarchy of money and credit.

Again all this is changed since the crisis. Currently repo is higher than Fed Funds, which definitely shows that the difference is not a premium for default risk. Above I argued that a situation of $repo < FF$ could be understood as a particular balance between elasticity and discipline, with the Fed keeping the better money (FF) at a premium in order to establish some discipline. Analogously, it seems we could think of the opposite situation of $repo > FF$ as the opposite balance, with the Fed keeping the better money at a discount in order to establish some elasticity. In effect the market rate of interest is the repo rate, and the official rate is the Fed Funds rate. The Fed is trying to set up incentives for banks to borrow at the Fed Funds rate and lend at the repo rate, so supporting short term credit markets more generally. The fact that the gap stands now at 15 basis points suggests that this strategy is not working very well—that is a large gap in money market terms, even if it seems small to us.