

12. Lender/Dealer of Last Resort

http://www.newyorkfed.org/markets/Forms_of_Fed_Lending.pdf

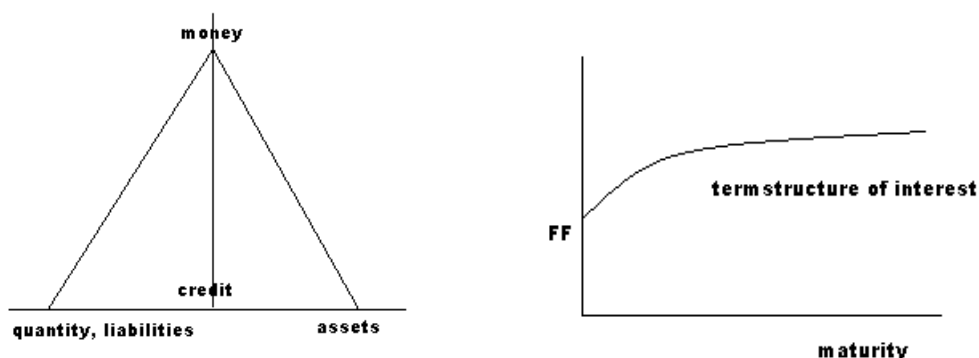
Now that we have built up a picture of the entire (domestic) monetary system, we can turn our sights to the problem of managing that system. As Walter Bagehot tells us, “Money does not manage itself, and Lombard Street has a great deal of money to manage.” Today we treat crisis management, which was the origin of management more generally, and indeed the focus of Bagehot’s famous Lombard Street (1873). Once the central bank took responsibility for crisis management, it was inevitable that it would take responsibility also for trying to prevent crisis by intervening well before any actual trouble. That is to say, lender of last resort is the logical as well as historical origin of modern money management.

Today we reverse the order, taking monetary management first, and crisis management second.

Evolution of Money Management

As you read Stigum Ch. 9, keep in mind the question whether the Fed controls the Fed Funds rate or some measure of reserves, i.e. price or quantity. We can think of Fed interventions in both ways. First, the Fed is using its control of money (at the top of the hierarchy) to try to influence the expansion of credit (at the bottom of the hierarchy). Second, the Fed is using its control of the money rate of interest (at the short end of the term structure maturity spectrum) to try to influence the bond rate of interest (at the long end).

In both cases, it is actually the private credit market that will determine quantities and prices, but the Fed is an important player in that market and can influence it. The point of this lecture is to understand exactly what it is that gives the Fed leverage.



In the earlier 3rd edition, Stigum made clear that standard economic theory has no very good answer to the question of how the Fed gets leverage over the real economy. Thus: “from long experience, Fed technicians knew that the Fed could not control money supply with the precision envisioned in textbooks” (395); Goodhart’s Law (400). Her general thrust is non-monetarist: “Much of the macro theory that links money supply to the price level depends on concepts that

have little relevance to the workings of a modern financial system, but at least such a theory exists and has even earned a Nobel prize. No comparable macroeconomic theory for credit aggregates yet exists.” (412) She is talking here about the quantity theory of money:

$$MV=PQ$$

which suggests that control of the quantity of money (left side) gives control over the price level and aggregate output (right side).

Leaving theory aside, and focusing on practice, Stigum further suggests that the talk about reserves (free reserves, borrowed reserves, non-borrowed reserves) is a cover for what the Fed is actually doing, which is targeting interest rates. Post 1951 it targeted free reserves, then explicitly interest rates. Volcker’s 1979 Saturday Night Special switched to non borrowed reserves, then in 1983 to borrowed reserves. Since 1987 there has been a more or less explicit targeting of the fed funds rate.

Date	Target	Quantity or Price?
1951	Free Reserves	Quantity?
	Interest Rates	Price
1979	Nonborrowed Reserves	Quantity
1983	Borrowed Reserves	Quantity?
1987	Fed Funds Rate	Price

Here are some definitions to help make sense of it all:

$$\text{Total Reserves} = \text{Required Reserves} + \text{Excess Reserves}$$

$$\text{Total Reserves} = \text{Non-borrowed Reserves} + \text{Borrowed Reserves}$$

$$0 = (\text{RR}-\text{NBR}) + \text{free reserves (ER}-\text{BR})$$

Throughout all of these regimes, **one constant is the Fed’s idea that its job is to attend to the balance of elasticity and discipline in the monetary system as a way of controlling the flow of credit.** Too rapid credit growth requires more discipline; too slow credit growth requires more elasticity. Operational practice changes, but the underlying goal is the same.

From these equations, you can see that targeting excess reserves amounts to accommodation of changes in required reserves, and targeting borrowed reserves amounts to accommodation of changes in non-borrowed reserves. So these “quantity” targets are not the kind of strict quantity control favored by the Currency School and modern monetarists. They involve accommodation in terms of quantities, but maybe not in terms of price. To maintain constant excess reserves, for example, the Fed may have to allow interest rates to change. In fact the idea of these policies was to use the quantity target to exert pressure on the market, since banks don’t like to be borrowing from the Fed, but to allow the market to determine the rate of interest.

Even the remaining quantity regime, the Volcker regime of nonborrowed reserves, might be viewed as a stealth interest rate target. Crandall is good on this.

Modern Money Management¹

Today, we are no longer on the gold standard, and central banks are not required to control the exchange rate. Instead they tend to focus on internal stabilization. They do not want to accommodate domestic credit expansions and contractions, but rather to counteract them in order to smooth business fluctuations. Modern money management looks not at gold flows but rather at movements of the price level as an indication of incipient imbalance between the pattern of cash flows and cash commitments.

Central banks typically follow some version of the so-called Taylor Rule, which I'll write as follows:

$$R = \rho + \pi^e + \alpha(\pi^e - \pi^*) + \beta(Y - Y^F)$$

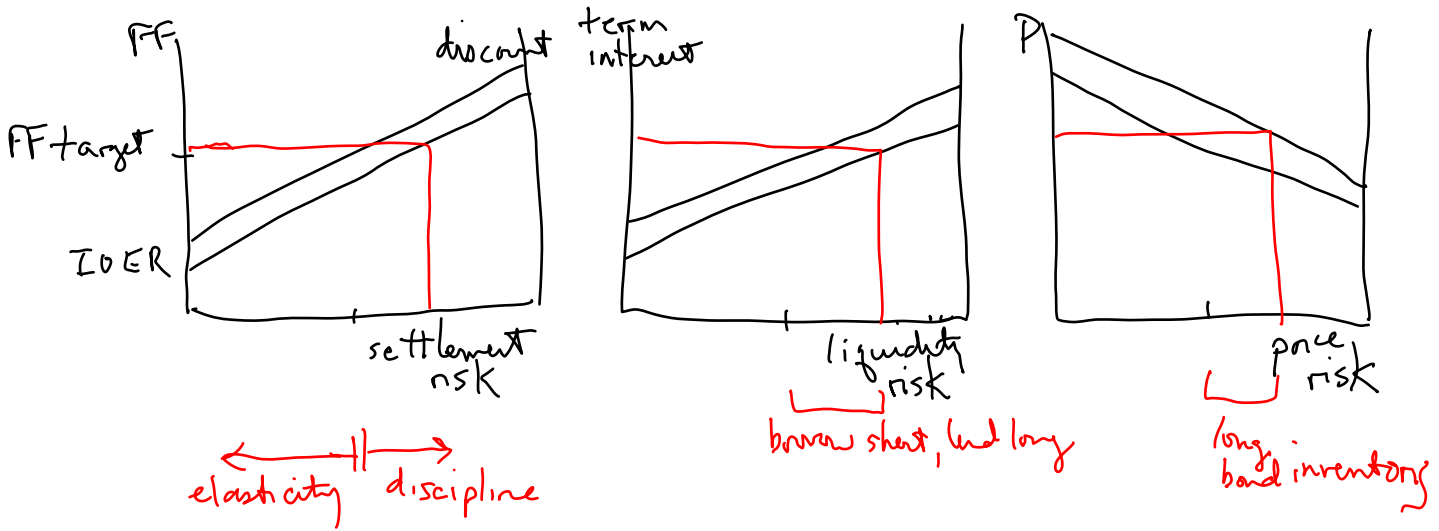
The first three terms of this equation express the idea of the Fisher Effect, which says that the private negotiations between borrowers and lenders tend to produce a nominal rate of interest that takes account of the expected rate of inflation (so $R = \rho + \pi^e$ where ρ is the real rate of interest and π is the rate of inflation). This is what the private markets tend to do on their own. Fisher himself thought that private markets tend to have “money illusion”, so they systematically underestimate future inflation, and hence mistake merely nominal interest rate changes for real interest rate fluctuations. In his view, monetary policy was mainly about correcting for these systematic mistakes.

In modern treatments, we tend to assume “rational expectations” which means that the private forecast is as good as can be achieved from available information. In modern treatments, the problem is not that people make mistakes, but that their adjustments of the nominal rate to expected inflation do nothing to bring inflation under control—they merely accommodate it. The role of the central bank is to do more than that, by raising interest rates even more when inflation exceeds the target, and lowering even more when inflation falls below the target. (That means that $\alpha > 1$.) Translated into our language, the central bank imposes discipline when prices are rising too fast, and tries to instill some additional elasticity when prices are not rising fast enough.

In the current crisis, this “inflation targeting” framework has come under some question. Many people think that the central bank played a role in causing the credit bubble by keeping interest rates too low for too long, and that it did so because it was watching inflation not asset prices (housing prices). So expect to see some evolution in thinking about money management, but that evolution will be about finding a more appropriate way to achieve balance between

¹ Unlike previous years, I skip over all the developments between Bagehot and Taylor. Thus there is nothing about the Strong Rule of the 1920s, or Monetary Walrasianism of 1960s and 1970s (both Keynesian and monetarist), which represented stages of the intellectual evolution from one to the other. All these stages can be interpreted as different ways of understanding the source of imbalance between cash flows and cash commitments, and hence different approaches to managing the balance of elasticity and discipline.

elasticity and discipline. Maybe we will be seeing a return to Hawtrey, with his emphasis on the inherent instability of credit, operating through the effect of lending on collateral valuation.



These are the three diagrams from last time. We can think of the leftmost as describing how the Fed controls the FF rate; the rightmost is about how the market determines the price of long term bonds. And the middle diagram shows how both of these two influences come together to determine the term rate of interest.

If the Fed wants to tighten, it raises FF target. That immediately lowers the profitability of the liquidity spread in the middle diagram unless the term interest rate rises by the full amount (and perhaps a bit more to compensate for anticipated future tightening as well). This is funding cost for bond dealers, so they are willing to hold existing bond inventories only at a lower price, hence higher expected profit.

This chain of events I propose to you as a sketch of the monetary transmission mechanism in the modern economy. Note it all goes through the price of money and the price of securities. This chain of events is just for normal times. What about crisis?

Anatomy of a “Normal Crisis”

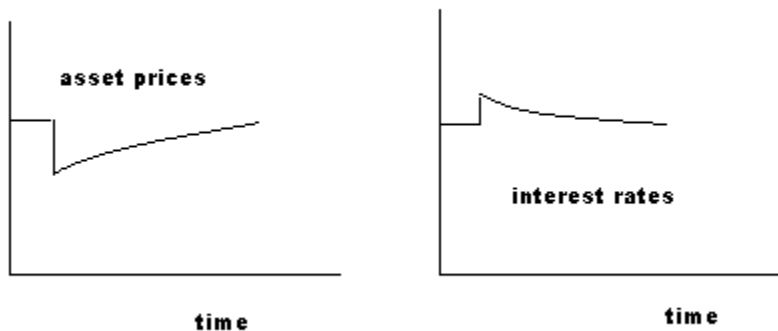
Suppose there is a sudden shift in preferences in favor of money and against securities. (I will come to the question of the origin of this shift by the end of lecture, but for now take it as given.) One way to put it is that people aren’t prepared to delay settlement anymore; they don’t want promises to pay, they want money.

If it’s a tiny and temporary shift, it might be able to be accommodated by the dealer system as follows.

Households		Dealers		Banks	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
-securities +deposits		+securities	+RP	+RP	+deposits

Thus dealers swap IOUs with the bank, and the effect is to increase the means of payment; this increase is what the dealers use to pay the households. The households get the trade they want because the dealer system is prepared to take the opposite side of the trade.

Why are they willing to do so? In order for dealers and banks to participate in this kind of action, they have to have an expectation of making money. Thus, dealers buy securities below equilibrium price, banks make loans above equilibrium price, and the distance from equilibrium is determined by the amount of risk they think they are taking. (You can think of this price change as determined by their inventory change, following the dealer model.) They will not be willing to do any of this unless they see a light at the end of the tunnel in terms of eventual return to equilibrium prices.



From this point of view, two important things happen during crises. First, the dealer system **buys time** by letting the private sector think that accounts are settling rather than being delayed; the private sector gets cash today instead of a promise of cash tomorrow. Of course accounts are not actually settling--the cash is new cash created for the purpose—but it is the same as old cash from the perspective of the private sector. Second, during that extended delay, prices are pushed away from equilibrium, and the disequilibrium prices **put pressure** on the system to actually settle rather than delay; just so, higher interest rates raise the cost of delaying payment. So although actual settlement is delayed, incentives are put in place to encourage more rapid settlement in the future.

In the course of normal economic interaction, there are many times when the marketmakers face trouble of this kind and turn to the banks for refinance, and the banks are able to meet the need without trouble, harvesting a nice return for doing so. That is to say, there are many cases where liquidity crises for market makers do not turn into banking crises. These are cases of "normal

crisis" where the liquidity constraint is doing its job of ensuring continued coherence in the economy.

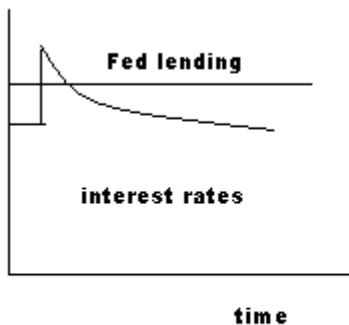
Anatomy of a Serious Crisis

Sometimes however the problem gets out of hand, and banks themselves run into trouble. Then they turn to the Fed.

Dealers		Banks		Fed	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
+securities	+RP	+RP	+deposits	+discount	+reserves
		+reserves	+discount		

Just as the dealer system could take the problem off the hands (the balance sheet) of the households, so too can the Fed take the problem off the hands (the balance sheet) of the dealer system. It does so by expanding its own balance sheet.

In such a circumstance, Fed lending can put bounds on the fluctuation of interest rates and so prevent the problem from spiraling out of control. If the Fed is willing to lend at 10%, then interest rates will not go higher than 10%, and that provides a lower bound to asset prices as well.



[This diagram is not exactly right. The Fed's discount rate, shown as "Fed lending", is the interest rate paid by banks, usually 100 basis points over the Fed Funds target. The interest rate charged by banks will be a markup over their cost of funds, not the same as the Fed lending rate. But this is a refinement. The important point is that the Fed's willingness to lend to the banks as a rate lower than they would lend to each other makes it possible for the banks to lend to the dealers at a rate lower than they would otherwise charge. Putting a ceiling on the money rate of interest thus indirectly puts a floor on asset prices. In the recent crisis this transmission broke down and the Fed moved to put a floor on asset prices directly by buying them, not just financing their purchase by dealers.]

Why **can** the Fed help? When the Fed helps the banks, what it does is to expand reserves. Hence the money supply expands. We have seen that the market makers are long securities and short cash. What the Fed does is to backstop those short positions by shorting cash itself. The advantage the Fed has is that it prints the stuff, and so there can be no short squeeze on the Fed. (Actually, this is strictly true only domestically. Internationally the Fed itself faces a reserve constraint. This international constraint becomes an issue only if the problem is so large that it cannot be solved within one country.)

Why **does** the Fed help banks in a liquidity crisis? Partly because that is its job. But that job assignment is backed up by a very real threat. If the Fed does not help the banks, what happens?

Why intervene (why elasticity)?

(1) Government Bank. Consider this. Your book makes the point that banks meet the demands of dealers, first by expanding up to their reserve constraint, and then by replacing security holdings with loans. In effect a liquidity crisis in any market tends eventually to get funneled into a demand for bank lending, and if that demand is high enough banks will eventually try to meet it by dumping their holdings of securities. Note well that the securities banks hold are overwhelmingly government securities. What this means is that, if the Fed does not help, there is always danger that liquidity problems in any market get translated into liquidity problems in the government securities market--and that cannot be tolerated. Government securities trade at a premium not only because they are default free, but also because of the liquidity of the markets. A Fed that failed to maintain the market for government debt would be a Fed soon under direct Congressional control. A Fed that ensures liquid markets for government debt in effect ensures liquid markets for other debts as well.

(2) Bankers Bank. Actually this problem of potential dumping of government securities is just one dimension of a larger potential problem. Sharp moves of security prices and interest rates can disrupt balance sheets, especially leveraged balance sheets, all over the economy and force emergency liquidation. If your security holdings fall in value, you can't borrow as much using the securities as collateral, and if you can't finance your holdings then you might be forced to sell. As more securities get thrown upon the market, the initial dislocation (consumers want money rather than securities) gets larger rather than smaller. Bank liquidation of security holdings is only one example of this more general phenomenon. The point is that such liquidation makes the problem worse not better, and drives security prices and interest rates even farther from their equilibrium levels. From time immemorial, the lead banker in the system has stepped in to play a stabilizing role in a crisis, even from self-interest.

(3) Stabilization Policy. Allowing liquidation to take its course can have even more profound effects through macroeconomic channels. One way for borrowers to raise needed cash is simply by reducing their spending. But their spending is the income for other agents in the economy, and reduction in their income receipts may thus spread the debt repayment problem throughout the economy. Something like this is what happened during the debt deflation of the Great Depression. In fact, the attempt to liquidate holdings of commodities also drove down the price level, which increased the burden of nominal debt and so made it harder to repay. Once again the

important point is that the natural mechanisms of the economy may make the problem worse rather than better.

So far so good. It looks like the Fed can solve any liquidity crisis simply by providing the needed liquidity. So why doesn't it just go ahead and do so? **Because the crisis is typically a symptom of some underlying deeper problem.** What the Fed wants to do is to buy time for adjustment, but not so much time that people lose the incentive to make an adjustment. Then the problem of the Fed is to ensure enough price movement to put pressure on the system but not so much as to make the problem worse.

Why not intervene (why discipline)?

Minsky's conception of financial crisis is helpful here. He emphasizes that at any moment in time the history of past borrowing and lending (based on expectations of future cash flows) has given rise to a certain pattern of cash commitments, some due today and some out into the future. At the same time, there is a pattern of cash flows emerging from the real economy, today and expected out into the future. If these two patterns are lined up, then debt is serviced and we have no problems.

When they begin to get out of kilter, cash commitments cannot be met and have to be delayed. If the people who are receiving the cash don't need it, again there is no problem because they'll just lend it, and the consequence is an expansion of credit. This is what happens in a boom. A boom is a credit expansion, which is to say a deliberate delay of settlement, on the basis of expectations about the future. The problem comes on the reverse side of this expansion, when there are demands to delay settlement and no supply, or demands to make payment and no matching cash flow.

Such a disjuncture between the pattern of cash commitments and the pattern of cash flows shows up as pressure in the money market, because it involves/requires an expansion of inside credit. (Such disjuncture also drives the kind of portfolio preference shift out of securities into money that I used as a characterization of financial crisis earlier.) What makes the problem worse (at least potentially) is that "the cash commitments of each unit depend on the cash commitments of every other unit. The whole web of interlocking commitments is like a bridge we spin collectively out into the unknown future toward shores not yet visible." That means that price movements in the money market may not be sufficient by themselves to bring the two patterns back into line with one another. Now the Fed could, as we have seen, solve the immediate problem by providing liquidity. The fear is, however, that by preventing crisis it prevents the kind of adjustment that will ultimately resolve the underlying problem.

One way to put this is to say that once the Fed expands the money supply to accommodate immediate needs (elasticity), it faces the problem of contracting again sometime in the future (discipline). But if the Fed always meets the demand for liquidity, then it allows people to delay adjusting their balance sheets to their changed circumstances, so the discipline never comes and the imbalance continues. If the imbalance is prevented from showing up in a liquidity crisis, it

will show up somewhere else, as for example in inflation (or exchange crisis). A summary way of saying this is that if the Fed does not succeed in imposing **discipline**, then its offer of **elasticity** means that the problem shows up somewhere else. This is a crude statement of a deeper truth--that masking the symptoms of the underlying problem does not resolve the problem.

Thus the Fed faces a dilemma. If it proves too ready to provide liquidity, it prevents necessary adjustment. If it does not prove ready enough, then adjustment may prove fatal to the system, or at least be more costly than need be. It is a fine line. From this point of view we can understand the job of the Fed better. It can paper over problems in times of crisis, but needs to be careful that in doing so it contributes to their solution not to a delay of their solution.

Dealer of Last Resort (Money Dealer)

Let us apply this idea to the shadow banking system, and the stresses it experienced in recent years. One of the first things that happened is that MMMFs refused to roll over ABCP—essentially they wanted to convert their money market asset into cash. In the first stage of the crisis (Fall 2007), this was handled by replacing ABCP with RP, still secured funding but now shorter term. In the second stage of the crisis (Bear, March 2008), RP became suspect as well, haircuts were increased, so forcing shift to unsecured Eurodollar and Financial CP funding. In the third stage of the crisis (Lehman), these also became suspect. In each crisis trouble shows up as upward pressure on money market funding.

We need to understand these pressures as coming ultimately from the need to maintain par. Banks that had backup lines of liquidity to the shadow banking system had themselves to step up to the plate in many instances, like so:

Shadow Bank		Citibank/Lehman		MMMF	
Assets	Liabilities	Assets	Liabilities		
	-ABCP + loan	+loan	+RP/ Fin CP/ Eurodollar	-ABCP +RP/ Fin CP/ Eurodollar	

This set of balance sheets shows more or less the anatomy of a normal crisis, and that's what everyone thought this was when it started. The Fed did not involve its own balance sheet, but it did try to encourage banks to involve their own balance sheets, by cutting the Fed Funds rate from 5% to 2%. But it wasn't enough.

The banks and more generally the dealer system, having taken on responsibility for financing the shadow banks, now began to run into problems themselves, and that required more serious Fed intervention. The cornerstone of the domestic intervention was various forms of term lending to banks and dealers. The cornerstone of international intervention was liquidity swaps with

foreign central banks that then made term loans to their own banking system. Here is the domestic story:

US Banks/Dealers		Fed		MMMF	
A	L	A	L	A	L
	+term loan	+term loan -Treasury bill		+Treasury bill	

Here is the international story:

Foreign banks		Foreign central banks		Fed		Treasury		MMMF	
A	L	A	L	A	L	A	L	A	L
	+term loan	+term loan	+liquidity swap	+liquidity swap	+Treasury deposit	+Treasury deposit	+Tbill	+Tbill	

The domestic story caused the Fed to liquidate about half of its holdings of Treasury bills. The international story caused the Fed to expand both sides of its balance sheet.

You might ask why the Fed got involved in supporting foreign banks. One reason is that they wanted to stop foreign banks from liquidating their holdings of RMBS, hence driving down the price and adding to the liquidity spiral. Another reason was the pressure that foreign banks were putting on domestic banks through the correspondent banking system. That pressure showed up in the spread between the Eurodollar rate and the term Fed Funds rate that we talked about back in Lecture 8.

Here is the correspondent pressure story:

In practice the first line of liquidity defense for the Eurodollar system flows through domestic banks, call it “lender of first resort”. Remember that the Eurodollar system uses correspondent balances in New York as its reserves. So even before the British Bank goes to the Bank of England, it will go to its New York correspondent. That New York correspondent can then go to the Fed Funds market. If the Fed is committed to a particular rate in the Fed Funds market, it has no choice but to supply the needed funds. In this case the lender of last resort operation works as follows:

British Bank		New York correspondent		Federal Reserve	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	-eurodollar deposit +interbank loan	+interbank loan	+daylight overdraft -overdraft +repo	+repo	+dollars

In the first step, the New York correspondent lends at the Eurodollar rate to the British bank, using daylight overdraft at the Fed as its source of funds. It then enters the Fed Funds market to look for reserves needed to meet end of day clearing, and that tends to push up the Fed Funds rate. The Fed, committed to keeping Fed Funds at target, intervenes in the market to provide the funds itself.

The spread between Eurodollar and OIS is the incentive for New York correspondents to do this business, so allowing foreign banks indirectly to tap the Fed. The liquidity swap channel took off this pressure by channeling funds instead through official central bank channels.