

## 10. Dealers: Liquid Security Markets

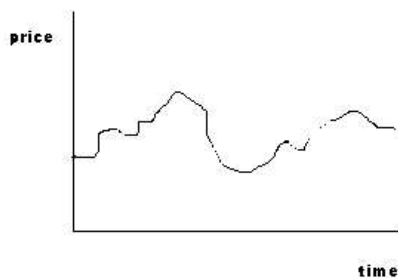
I said last time that the focus of the next section of the course will be on how different financial institutions make liquid markets that resolve the differences between qualitatively different kinds of credit into mere quantitative differences of price.

### Liquid Markets and Inventories

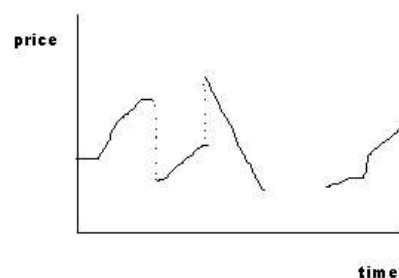
A **liquid market** is "one in which an individual transaction does not disrupt the continuity of the market". More specifically, it is a market in which you can buy and sell (1) quickly, (2) in volume, (3) without moving the price much. This feature of markets is absolutely crucial for the smooth operation of our economy, so crucial that it tends to be taken for granted. All of microeconomics revolves around the idea that suppliers and demanders are trying to find the optimal supplies and demands **given** the market price. They never consider whether they will actually be able to complete desired trades at that price.

One way of understanding the concept of liquid market is therefore as continuity in the time path of market price. There are no jumps or gaps as price evolves over time. The question is, what is the institutional basis of a liquid market?

Continuous Liquid Market



Discontinuous Illiquid market



Consider an example (inspired by Hicks, Market Theory of Money). When I pass the Westside market in the morning there is almost no one in the store, but the shelves are all stocked. When I pass the Westside market in the evening the whole world seems to be in there, and the shelves are in some places seriously depleted. And yet, despite these intraday fluctuations in the flow of demand, the price of the various goods remains the same, and we would be seriously surprised if it did not. The prices of goods fluctuate over time, across days and weeks and years, but not within the day. The Westside market is a liquid market.

My concern at the moment is not so much with why merchants find it useful and profit-maximizing to make liquid markets, as with how merchants manage to do it. A moment's thought reveals that the secret is inventories. Merchants take delivery of a large quantity of a particular good, set the price so as to ensure a profit on the load, and then proceed to supply individual demanders from the inventory until it runs sufficiently low that they make another order.

The answer is simple, but it is also deep, because when you think a little more you realize that Westside chooses its inventories on the assumption that it can get resupply and that resupply depends on inventories somewhere else in the system, and so forth all the way back to the factory or the original producer. The **continuity** of the market price for a particular good thus seems to depend on a hierarchical structure of inventories. Even so-called "just-in-time" production is best viewed as a very careful adjustment of the flow of ultimate supply to ultimate demand in order to minimize inventories. We are amazed at the Japanese just-in-time inventory system because this is really very difficult to do, but it does not eliminate inventories. Rather it pushes the ultimate inventory back before production into inventories of the parts and components held by suppliers.

### Security Dealers and Market Makers

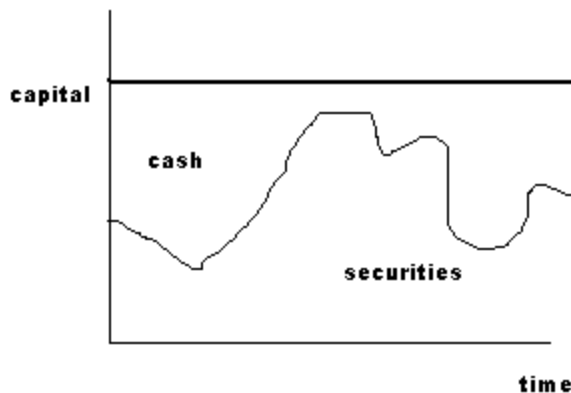
A security dealer is somewhat like Westside market, more so than might first appear. A security dealer who acts as an agent in a primary issue of corporate securities buys the securities from the corporate clients at one price and then sells them at a higher price to its retail clients. That's exactly what Westside market does. More generally, however, we are interested in two-sided dealers, who offer to sell retail but also to buy retail. Security dealers quote two prices--a lower **bid** (to buy) and a higher **ask** or offer (to sell). (In money markets prices are quoted as yields, so the bid is a higher number than the ask.) It is as if the Westside market was willing to buy mangoes from its retail customers, as well as sell them.

In the securities market both bid and ask prices are retail prices, and wholesale (interdealer) prices are within the bid-ask spread. The one sided dealer (like Westside) only sells, so it only needs an inventory of the good that it sells. The two sided dealer also buys, and so it also needs an inventory of cash. We begin therefore by thinking of the dealer holding inventories of both cash and securities in order to be prepared to fulfill when bids are "hit" and offers are "lifted".

Hypothetical Dealer Balance Sheet (showing inventories)

Assets	Liabilities
securities cash	 capital

The consequence from the point of view of retail trade is a liquid market, meaning the ability to buy or sell without moving the price. My hypothetical dealer has inventories of cash and securities, and uses those inventories to absorb fluctuations in demand and supply. Any increase in one inventory is matched by a decrease in another. The result is that imbalances in the time pattern of demand and supply show up as balance sheet changes, not price changes.

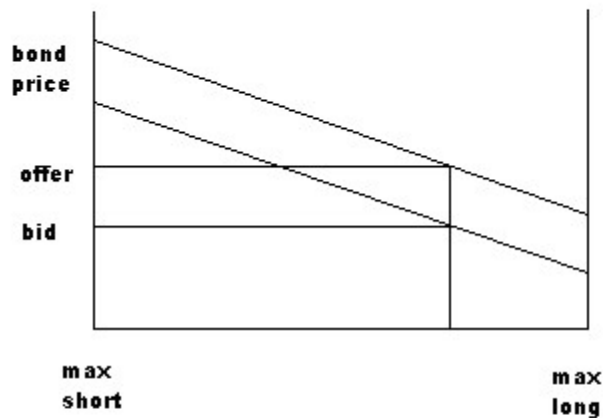


One way to appreciate what dealers do is to think about what would happen without them. Imbalances in supply and demand would cause prices to jump around, or force ultimate suppliers and demanders to wait for the opposite side. The security market would be like the housing market in which individual buyers have to find individual sellers and negotiate individual deals.

Instead, in the securities market, buyers and sellers only have to find a dealer, and the dealer takes the opposite side of their trade. The dealer makes liquid markets by buying when there is excess selling pressure, and selling when there is excess buying pressure. So he is buying at a price higher than would otherwise be (higher than if excess supply had to drive prices down far enough to attract demand), and selling at a price lower than would otherwise be (lower than if excess demand had to drive prices up far enough to attract supply). He has to pay attention to these prices if he is going to survive, and make sure that he is not paying too much or selling for too little. Dealers thus operate to smooth prices as well as to make continuous markets out of discontinuous order flow.

### **Economics of the Dealer Function**

Now, the fundamental value of securities can and does change over time, and this is the major source of risk in the dealing business: “inventory risk”. Also there is the risk that a customer might know more than the dealer, so the dealer will be buying at too high a price and selling at too low a price: “adverse selection risk”. The Bid-ask spread compensates somewhat for this risk, and in times of high volatility (and for securities that have especially high volatility) we see dealers widen the bid-ask spread. Equally important, however, is the dealer’s ability to **change the price as inventories change**. Treynor offers the following model of the dealer function (my picture is a stripped down version of his, so refer to his for the full model):



Here the offer (or ask, or selling price) is above the bid (buying price), and the spread means that the dealer is always buying low and selling high. The level of both prices also changes with the inventory. By lowering the price at which he is willing to add to a large long position, he protects himself from the risk that price may fall. By raising the price at which he is willing to add to a large short position, he protects himself from the risk that price may rise.

Three key pieces make up this model. First, the position limits of the dealer. He has limited capital and limited credit (from his clearing bank) and perhaps also limited taste for risk. We capture all these in the position limits, max long and max short. Second, the “outside spread”, which is the price at which value based traders (the ultimate suppliers and demanders) are willing to buy and sell. This is a wide spread, maybe 20% below and 20% above fundamental value as estimated by the value based trader (VBT). When the dealer hits his position limits, the VBT becomes market maker of last resort. Third, the volatility of price and the prevalence of adverse selection risk, which influences the inside spread.

We can think of the dealer as supplying liquidity because he is offering the option to trade. If you want to trade he is willing to trade at the quoted prices, either way, but if you don't want to trade that's okay too. It's up to you, not the dealer. He supplies liquidity and you demand it, whether you want to sell or buy.<sup>1</sup>

<sup>1</sup> In fact, anyone who offers to trade, by placing a “limit order” is supplying liquidity to the market. Anyone can be a dealer in this respect, although it takes a lot of work and attention to make money at it. (Amateur day traders often supply liquidity until they run out of money.) This way of conceptualizing liquidity is developed in more detail in Larry Harris, Trading and Exchanges: Market Microstructure for Practitioners (2003).

## Leverage

Actual dealers differ from my hypothetical dealer in one important respect. They actually hold almost no inventories of either cash or securities. (The balance sheet I showed you is actually more like the balance sheet of a value based trader who makes the outside spread.) Competition among dealers forces them to offer a very tight “inside spread”, so the profit on any one trade is very small. They compensate for this with leverage. One step toward greater leverage is to reduce cash inventories to a bare minimum and rely instead on borrowing, so the dealers balance sheet looks like this:

Assets	Liabilities
Securities	Loans

A dealer that looked like this would experience fluctuation in the size of his balance sheet as he bought more securities to absorb selling pressure, and then sold them off to absorb buying pressure. But a balance sheet like this is always net long securities and net short cash, and that involves risk exposure (to falling security prices) that is not necessary to the market making business. Ideally, the dealers would like to reduce inventories to zero, so they eliminate inventory risk, and they can do this only if they hold as many short positions as long positions. Typically real world dealers wind up net long, but they move as close as they can to the following ideal balance sheet:

Assets	Liabilities
Reverse	Repo

Outside the dealer balance sheet there are other people holding inventories of securities and cash. The dealer accesses the inventory of securities using reverse and the inventory of cash using repo. We can think of the repo as borrowing money to finance the dealer’s long security positions, and reverse as lending money (borrowing collateral) to finance the dealer’s short positions.<sup>2</sup>

In effect, the dealers have very good access to cash (repo market) and to securities (reverse market) when they need them, so they can behave as though they do have inventories even though the inventories are actually out in the market some place. In effect, dealers operate a just-in-time inventory system.

In a crisis, as we will see later, it matters where the inventories are. Ultimately access to cash comes from higher up in the hierarchy, from banks, and access to securities comes from lower down in the hierarchy, from security holders. So the dealer is in effect straddling layers of

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<sup>2</sup> I remind you that I construct these balance sheets by “following the money”. Thus, what I have on the liability side is a money debt, a promise to pay money at a later date that is secured by security collateral. And what I have on the asset side is a money loan. This makes sense of the accounts, but you have to see the security flows as well in order to see what is happening as knitting together the layers of the hierarchy. The money debt is a security sold and repurchased later, and the money asset is a security purchased and resold later. See Stigum Table 10.1 (p. 434) for actual data on the balance sheets of security dealers.

the monetary hierarchy. Sometimes they get into trouble when they have to come up with securities they have reversed in and then sold. The more significant troubles come when the dealer has to come up with money they have repoed in and then spent.<sup>3</sup> They are dependent on banks for refinance. Meanwhile, in normal times, the dealers make the market between cash and securities, standing ready to take the opposite side of trades that others may wish to make.

## Arbitrage

The business of making markets is sufficiently competitive that profits are hard to come by. The real profit in the business comes from trading on the information one gets from knowing the state of the market better than anyone else, and from having privileged access to both money and securities in the repo and reverse markets which means the ability to put on a position more cheaply than anyone else.

Dealers take “positions”, which means they speculate on how prices will change in the future. They deliberately mismatch their book in the direction they think will be profitable. They may be net long securities if they are bullish on security prices, but mostly the trades are more subtle than that. They may be net long some class of securities and short another class, betting on the relative price between them. Sometimes this means betting on what the Fed will do, since the Fed influences the price of money in Fed Funds and all other markets key off that. Sometimes this means betting what the market will do, since spreads can change.

Example: yield spread arbitrage, in which the dealer identifies apparent mispricing at one segment of the yield curve, takes a position but hedges overall interest rate exposure by taking an opposite position at another segment of the yield curve. The initial distortion in asset prices that the dealer identified as offering an arbitrage opportunity can be understood as a (temporary) fluctuation in demand or supply. Observe that, by taking advantage of the distortion, the dealer in effect spreads its impact into other markets, so reducing its impact, indeed counteracting the distortion. (Dealers engaged in arbitrage are acting as “porters” of liquidity from one market to another.)

This kind of arbitrage is important. The consequence is that markets for individual securities are in fact not separate, each with its own flow of supply and demand that causes price to fluctuate. Speculators are joining the separate markets into a single market, and in doing so they bring about a result that is no part of their intention, namely liquidity. Arbitrage and liquidity are in this sense two sides of the same coin.<sup>4</sup>

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<sup>3</sup> In this recent crisis, dealers have had problems of both kinds. So-called “fails”, meaning failure to receive back collateral that had been used to secure a loan, became so widespread that the Fed intervened using its Term Securities Lending Facility, lending its own inventory of Treasury securities to dealers. Also, access to cash became a problem as the repo market collapsed, so the Fed opened its Primary Dealer Credit Facility, essentially a lender of last resort facility for dealers.

<sup>4</sup> A philosophical question: What is the relation between liquidity and asset prices? The modern theory of finance is built on the assumption of perfect liquidity, so that prices can be fully efficient. It is supposed to be arbitrage that creates perfect liquidity by entering to take advantage of even the smallest deviation of price from fundamental value. To say that liquidity is perfect is to say that liquidity is a free good.

But in a fully efficient market, arbitrage would not be profitable since all bets would be fair bets. So

In financial theory, it is common practice to assume perfect arbitrage, and hence also complete liquidity. Assets are assumed to trade at their fundamental value since any other price would create an arbitrage profit opportunity. In effect, the world that the finance theorists imagine is a world in which the VBT outside spread is very very narrow, so there is no room and no need for dealers. In the real world, the outside spread is quite wide, dealers offer prices inside that spread but the prices can deviate very far from fundamental value. That is the world Fischer Black was talking about in his infamous presidential address to the American Finance Association when he said that he thought markets were efficient, meaning price was usually within a factor of two of true value.

We can understand what Black is saying by referring back to the Treynor model. Suppose that fundamental value is the price that dealers would quote if their inventories were exactly zero, so they are not exposed to any price risk. The Treynor model then shows how market making by dealers pushes price away from fundamental value, on one side or another, by more or less depending on the size of the outside spread and the dealer's maximum long and short position limits. Standard asset price theory abstracts from this effect, in effect treating the outside spread as collapsed around fundamental value, so there is no need for dealers. Some markets are close approximations to this, but others are not; some times are close approximations to this, but others are not.

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position takers would not make money. And if position takers do not make money, they will not compete so much for the market-making business. This seems to imply that markets would be less liquid--wider bid-ask and more volatile prices. Thus, in practice it seems that we must expect liquidity to enter into asset prices.

## 11. Banks: The Market for Liquidity

Last time we introduced the concept of a continuous or liquid market, and argued that the institution of a dealer is key to achieving a liquid market. The dealer supplies market liquidity by quoting prices to buy and sell, and absorbing the resulting order flow onto his balance sheet. The consequent positions, long and/or short, have to be financed somehow, which means that the dealer is a demander of funding liquidity.

Today we ascend the hierarchy and consider banks as dealers. Way back at the beginning of the course, I said we would be thinking of the banking system as making markets by being prepared to trade currency for deposits and vice versa, at a fixed price par. When we try to apply the Treynor model directly to banks in this sense, we immediately confront a puzzle. From the perspective of the Treynor model, we are looking at a limiting case, in which the spread is zero and the price is fixed, and from what we know about dealers this kind of restriction makes such dealing both impossible and unprofitable. And yet apparently it happens; that's the puzzle.

Instead of confronting this puzzle head-on, let's start from what we already understand. Let's start by thinking of security dealers as banks.

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The Treynor model focuses attention on the net position of the dealer, because he is mostly concerned about price risk. However, if we want to understand banking, we need to bring into the picture the gross position as well, which is an order of magnitude larger. Here is a stylized balance sheet, dividing the dealer's balance sheet into two pieces.

	Assets	Liabilities
Matched book dealer	Securities in, 100	Securities Out, 100
Treynor "speculative" dealer	Net financing, 10	Loans, 10

The matched book part is comprised, in principle, of equal and opposite long and short positions, so that fluctuation in security prices have exactly offsetting effects. Only the speculative book is exposed to price movement, and it is an order of magnitude smaller than the matched book. I am showing the dealer as net long, and funding this net long position with loans. The data for primary dealers in the US shows their outright position, but not necessarily their actual exposure since it does not include derivative positions, so we cannot exactly translate between the conceptual distinction and the data.

### Security Dealers as Money Dealers, Term Rates

The data does however show in some detail how all these positions are financed, and it is instructive to look at closely. The data below is from October 3, 2012, Table 4 in the dealer statistics: <http://www.newyorkfed.org/banking/reportingforms/primarystats/deal.pdf>



	Assets	Liabilities
	854 overnight reverse 1253 term reverse 515 net financing	1796 overnight repo 826 term repo

(Might be useful to refresh your understanding of repo, lecture 6, p. 46.) Note that I have added net financing as a balancing item, since borrowing is greater than lending. Net financing is not the same as the outright positions shown in Table 3 (which add to about 270), and one reason is the way that mortgage backed security positions are treated. We don't have to worry about that, since we are trying to understand concepts.

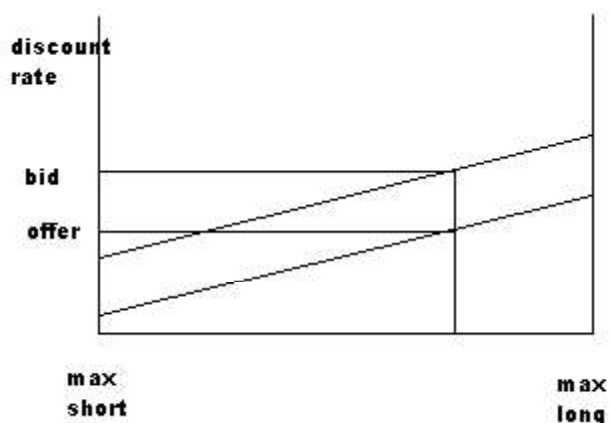
I have made the point before that security dealers operate somewhat like banks, insofar as they are borrowing short term and lending long term, which you can see in the data. Now I want to go farther using our idea of matched book. Suppose that the term of reverse lending and reverse borrowing are exactly the same. Then we can rewrite the dealer balance sheet as follows

	Assets	Liabilities
Matched book dealer	854 overnight reverse 826 term reverse	854 overnight repo 826 term reverse
Treynor "speculative" dealer	427 term reverse 515 net financing	942 overnight repo

In fact we can go farther still, by distinguishing two different kinds of price risk on the speculative dealer side. Just add 515 term repo on the liability side and 515 term reverse on the asset side

	Assets	Liabilities
Matched book dealer	854 overnight reverse 826 term reverse	854 overnight repo 826 term reverse
Treynor "speculative" dealer	942 term reverse 515 net financing	942 overnight repo 515 term repo

So the dealer has 515 exposure to security price risk, and is funding that exposure using term repo. That's the risk we talked about last time. But he also has 942 exposure to liquidity risk, borrowing short and lending long in the money market. That is new, but we can adapt the Treynor model to handle it.



Liquidity Risk

Since here we are talking about the money market, prices are quoted as yields, so the bid is higher than the offer and the dealer quote curves slope up rather than down. But the same idea applies, that the dealer is willing to take on more risk, in this case liquidity risk, only if compensated by higher expected return, in this case the difference between the term rate and the overnight rate. (I label the vertical axis as discount rate to remind us of our discussion of the world that Bagehot knew, where the discount rate was a term rate. For now think of the overnight rate as fixed by the Fed's official Fed Funds target. In effect, the vertical axis is the spread of 3 month over overnight)

The point to emphasize here is that the security dealer chooses not only how much price risk to take (and chooses price quotes to achieve that) but also how much liquidity risk to take (and chooses yield quotes to achieve that). The balance sheets show clearly that, if the dealer wanted to, he could take either less or more liquidity risk than price risk—the two numbers do not have to be the same.

Now let's translate all this into banking language. Overnight repo is analogous to a demand deposit account, and term repo is analogous to a short term loan. So our Treynor diagram is not just about the determination of term repo rates, but also about bank term rates as well. Banks make money, in part, by issuing money as their liability and investing the funds they receiving in interest bearing securities. That is exactly what the dealers are doing as well.

### **Digression: The Evolution of Banking**

It will be helpful when reading Stigum to have in mind the traditional picture of banking that she would have learned when she was in school. In this picture, a bank is an institution that makes loans to corporate customers and takes deposits from households retail. These are essentially passive activities. Where the action comes is in managing the difference between these two. If lending exceeds deposits (as is typical for money center banks) then they must raise

additional funds in the money market. If deposits exceed lending, then they must find profitable outlets for excess funds, typically some money market asset or longer term security.<sup>1</sup>

This traditional view sees banks as intermediaries between savers (household depositors) and investors (corporations). All the money market does is to move those deposits from banks with excess to banks with deficit, so in the aggregate what is happening is that deposits are funding loans. Banks are intermediaries that facilitate that movement, and also intermediaries in the sense that borrowers and lenders both face the bank, not each other. In this traditional view, banks are important mainly because of their role in fostering capital accumulation.

<b>Corporations</b>		<b>Banking System</b>		<b>Households</b>	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	Loans	loans	deposits	deposits	
		securities	borrowing		
		reserves	capital		

This is a pretty good picture of what things looked like in the fifties. One thing it leaves out is that government securities were a large portion of bank portfolios, so that much expansion of lending was replacing government securities with private loans. (As you read you will note a lot of ways in which government securities are given privileged legal status. The government in time of war uses the banking system to support the market in its debt.)

Things have however changed. Stigum talks about the “Death of loans”--top corporate customers have access to open market credit, particularly commercial paper, where they can borrow more cheaply than banks. Banks have adjusted to the loss of this business by instead providing backup lines of credit to commercial paper issues.

The second big change I would call the “Death of deposits”. Reg Q worked to provide banks with low cost funds by limiting interest payment on deposits, but this eroded over time. Rise of money market mutual funds as competitors. So-called “disintermediation” as ultimate borrowers and lenders began to take interest rate risk, without the bank standing between them.

### **Finance Companies**

### **MMMFs**

Assets	Liabilities	Assets	Liabilities
Loans	Commercial Paper	Commercial Paper	MMMF shares

See data at <http://www.federalreserve.gov/releases/z1/Current/>  
MMMFs are table L.121, Finance Companies are table L.127

<sup>1</sup> There is also the matter of managing interest rate risk and liquidity risk. See Stigum and Branch Managing Bank Assets and Liabilities; Strategies for risk control and profit (1983).

As Stigum was writing, banks were losing their core business, but at the same time being prevented from going into any others. The Securities Industry Association (SIA) resists bank attempts to get into underwriting non-exempt securities. The Fed imposes capital adequacy regulations on banks that are not imposed on others. This accelerates the tendency to strip the balance sheet, to go for off-balance sheet exposure, substituting FRA for deposits, futures for actuals, etc....

This apparent discrimination against the banks was also in part motivated by concerns about safety and soundness of the payment system. Also the fact that banks, unlike their competitors, have privileged access to the Fed, and the Fed wants to keep use of that access to a minimum.

In the last ten years or so we have seen a further development of this parallel banking system, into what now people call the shadow banking system. Essentially we seem to be moving from a system of bank credit to a system of capital market credit. Corporations pioneered in this shift, but the latest development has notoriously been more about household credit, namely mortgage credit.

Households		Shadow Bank		MMMF	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	mortgage	RMBS	MM funding ABCP RP	ABCP RP	Shares

The shadow banking system faces the same problems of liquidity and solvency risk that the traditional banking system faced, but without the government backstops (mainly Fed LOLR and FDIC deposit insurance). Instead the shadow banking system relies on the market for both, the wholesale money market and the CDS market mainly.<sup>2</sup> We will focus on liquidity risk and hence the wholesale money market.

### Overnight Rates—Fed Funds

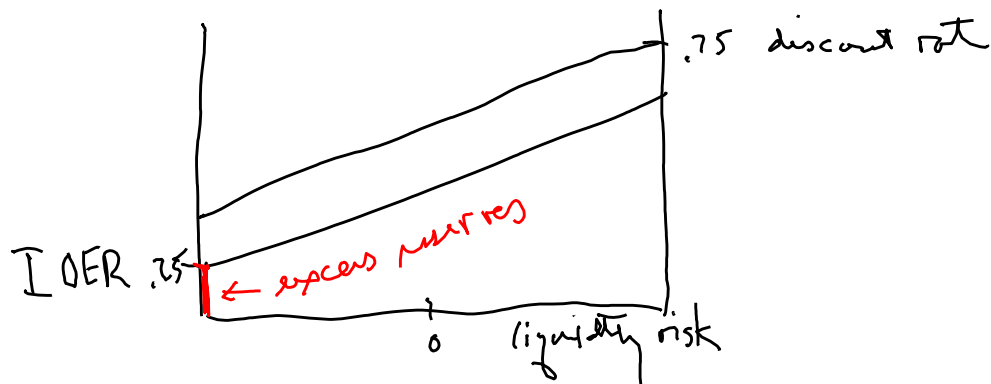
We turn now to the question of the overnight rate, which we have so far treated as though it were pegged by the Fed. The full story is more interesting. Essentially the Fed does two different things—it fixes the outside spread, and it trades in the repo market to influence the supply of reserves. (Remember that Fed Funds are overnight promises to pay reserves.)

Outside spread. Interest on reserves is currently .25, and the discount rate is currently .75. These are essentially an outside spread. It is a pretty narrow outside spread (only 50 basis points), and the Fed’s communication makes clear that it anticipates widening that spread in the future. The

<sup>2</sup> The lender of last resort to the shadow banking system is the traditional banking system, operating through various lines of credit and liquidity support commitment.

interest on reserves, in particular, it imagines will be 75 basis points below the target. And before the crisis, discount rate was 100 basis points above the target. At the moment the effective funds rate is actually below IOER rate (16 bp vs. 25 bp), but that is because there are some lenders in the market who are not eligible to receive interest on reserves, and there are lots of excess reserves, so they have to take what they can get. In a way, we should think of the effective FF rate as 25, not 16, and that helps us a bit to understand why repo rates are higher than FF. A lot of distortion in the system right now.

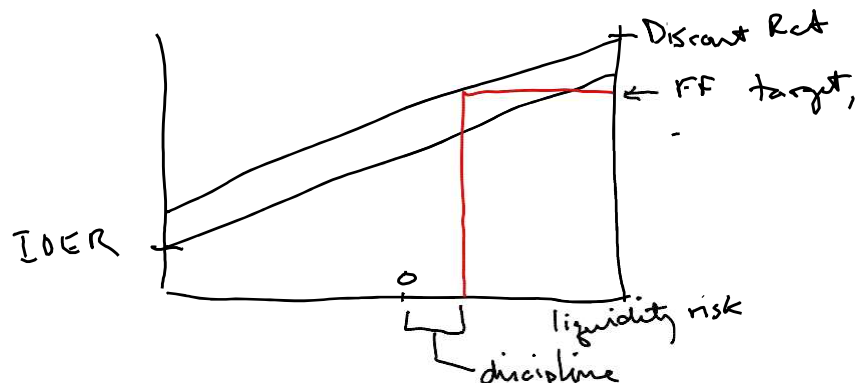
That said, we can use the Treynor diagram to understand what is happening:



In this situation clearly the Fed can just establish the FF rate as IOER. In the future however, it intends just to set the outside spread and then perhaps influence the level by trading. Just so, recall how temporary open market operations work:

Bank		Dealer		Fed	
A	L	A	L	A	L
+reserves			+repo	+repo	+reserves
-loan			-loan		

Here I am showing the dealer using the Fed's loan to pay off bank loan. (Before I showed it used to accumulate a deposit.) The result is that the Banking system as a whole now has more reserves, which should ease some of the need to borrow reserves and hence lower the effective funds rate. The point is to keep the FF rate near the target by intervening daily. The outside spread is intended only for anomalous situations for individual banks.



So now we can return to the puzzle we started with—how do banks manage to make markets in currency and deposits at a zero bid-ask spread and a price that is fixed at par, and how do they make profit doing so? The answer is that they are also in a complementary business, the business of bearing liquidity risk by issuing demand liabilities and investing the funds at term, and this business is highly profitable. They cannot change the price of deposits in terms of currency, but they can expand and contract the quantity of deposits because deposits are their own liability, and they can expand and contract the quantity of currency because of their access to the discount window at the fed. Security dealers are stuck with the quantity of securities out there, and stuck also with the quantity of cash out there. Banks are not stuck with the quantity of deposits or currency, so although they have less flexibility on price, they have more flexibility on quantity.

### **Term Rates, Redux**

In normal times, the Fed targets overnight rates, leaving term rates to be determined in the market. But during the crisis the Fed did a lot of intervention in term markets, which broke down, mainly lending. And now the Fed is experimenting with intervention on the other side of the market, by issuing term deposits of its own, first time Sept 10, 2012.

[http://www.frb services.org/files/centralbank/pdf/termdepositfacility\\_offeringresults\\_A26\\_091012.pdf](http://www.frb services.org/files/centralbank/pdf/termdepositfacility_offeringresults_A26_091012.pdf)

We can see the consequence for the Fed's balance sheet:

<http://www.federalreserve.gov/releases/h41/Current/>

What is the Fed trying to undo? Topic for next lecture.

[http://www.newyorkfed.org/markets/Forms\\_of\\_Fed\\_Lending.pdf](http://www.newyorkfed.org/markets/Forms_of_Fed_Lending.pdf)