Note on Repos, Shorting, and Securities Lending

This note is meant to provide selected background material on the US Treasury market such as treasury auctions, Bloomberg quote conventions, discount yields, creation of synthetic bonds through cash-flow replication, and convergence trades which we did not discuss but touched upon when we mentioned LTCM’s spectacular bankruptcy in 1998.

1. Repurchase Agreements

First, three different terms are equivalent: Repurchase Agreement, Repo, and RP. A Repo is an agreement to sell securities on one day, and then repurchase them on a later day, where the repurchase price is determined in advance. A Reverse-Repo is just the other side of the transaction. Hence, a repo consists of a spot portion in which a security is sold for cash and a forward portion in which the same security is repurchased for later settlement. In practice, a repo is a collateralized loan but never structured as such to avoid legal complications in case of default.

A repo is simply this: two traders agree today to 1) exchange cash for securities today, and 2) exchange back on a later date, usually the next business day. There are two crucial details

- The terms of the later transaction are fixed today. That is, the traders agree today how much money will be exchanged for the securities on the later date.
  - Therefore, as long as each trader upholds his side of the bargain, the repo does not alter each trader’s exposure to the value of the securities
- The relation between the cash transferred today and the cash transferred on the later date implies an interest rate
  - The trader who is delivering cash today and getting cash on the later date is effectively lending the cash he delivers, and the interest rate on this loan is the difference between what he delivers and what he gets back

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1 This note is based in part on material by Professor David Musto, Wharton.
A Representative Transaction:

Traders $X$ and $Y$ agree today that

- **Today:**
  - $Y$ pays $F$ to $X$
  - $X$ delivers security $S$ to $Y$

- **$n$ days from now:**
  - $X$ pays the $F$ back to $Y$
  - $X$ also pays $n$ days of interest on $F$, at annual rate $r$ to $Y$
    - Interest is $(F(n/360)(r/100))$
  - $Y$ delivers security $S$ back to $X$

Note the following:

- **From $X$’s point of view**
  - Gets $F$, pays it back $n$ days later with interest
  - Getting his security back is conditional on repaying
  - Almost like a collateralized loan, where $S$ is the collateral
    - Difference is, $X$ doesn’t possess $S$ while the loan is outstanding
    - Contrast with a home mortgage, or any other mortgage

- **From $Y$’s point of view**
  - Pays $F$, gets it back with interest
  - Possesses the collateral $S$ while the loan is outstanding
  - Unaffected by changes in the market value of $S$ if it is repurchased as scheduled

- **No necessary relation between $F$ and the value of $S$**

What connects $F$ and the value of $S$ is the concerns of $X$ and $Y$ about the possibility that the other side of the trade doesn’t perform on the repurchase day. Consider the possible scenarios:

**$S$ worth less than $SF$:**

$X$ is supposed to buy the security back for $F$. Suppose it doesn’t.

- $Y$ still has $S$, and can sell it at the current bid price
- But $S$ is worth less than the $F$ that $Y$ paid out in the first place, so $Y$ takes a loss

Therefore, $Y$ is exposed to $X$’s credit risk to the extent that the bid price for $S$ could be less than $F$ on the repurchase day

$Y$ can defend against this possibility by requiring $F$ to be some amount less than the *initial* bid price of $S$. This amount is called the *margin*

- If the security’s price has historically been very stable, then a small margin will do
• If the price hardly ever changes more than \( x\% \) over \( n \) days, then \( Y \) is well-protected if \( F = \frac{(\text{bid price of } S)}{1 + x} \)
• Riskier securities require higher margins.

**S worth more than \( S F \):**
Suppose the repurchase day arrives, and \( X \) is somehow prevented from exchanging \( S F \) for the security
• \( X \) suffers a loss; instead of the value of \( S \), \( X \) has \( S F \) which is lower
• \( X \) can defend against the possibility of such a loss by requiring that \( F \) be *more* than the initial value of the security
• *Undercollateralization.* This is called *reverse margin.*

The operative question is whether there is a meaningful possibility of this happening
• \( Y \) could go into bankruptcy, and the bankruptcy judge could try to nullify the agreement
  • Views \( S \) as an asset that \( Y \)'s other creditors should get a piece of
• \( Y \) could itself try to nullify the agreement, either legitimately or fraudulently, to get the profit

The actual likelihood of these scenarios is not clear from legal precedent. But reverse margin does occur in situations where the borrower of funds is nervous about the lender

Consider the following repo rates on 1/7/08:
If you want to do an overnight repo with a bond dealer where you are the one borrowing money (when you’re financing a purchase of a bond) then you’ll pay 4.05% interest to the dealer

- But if you are the one borrowing the security, and therefore lending money, you’ll get less interest, 3.90%
- Note that the concurrent Fed Funds rate is 4.25%

Bloomberg Repo analysis for the current 10yr, as of 1/7/08:

- Trading 103-08/08+
- Same-Day Settlement Assumed (a)
- Accrued Interest is (53/182)(4.25/2) = 0.6188 (b)
- Invoice bid price is 103 + (8/32) + 0.6188= 103.8688 (c)
- Yield to Maturity @ bid price = 3.85% (d)

Bloomberg calculates a repo of this note, assuming

- $1M face value (e)
- Next business-day termination (f)
- 4.05% interest rate (g) from the screen above
- Sale/Repurchase amount = 1/1.02 of Security value at the bid (h)

So

- Sale/Repurchase amount (per $100 face)=103.8688/1.02=101.8322 (i)
• So for $1M face value it is $1,018,321.75 (j)
• Interest = \((1,018,321.75)(1/360)(4.05/100)\) = $114.56 (k)

So if you had $1M face value of this note, you could (at these terms) borrow $1,018,321.75 for a day, paying $114.56 interest.

Bloomberg does some calculation to help you think about the margin
• If the market bid price drops from 103:08 to 101.21 34, i.e. about 101:07, then the margin is wiped out (security value = loan amount)
• Yield corresponding to 101:07 is 4.10 (l)
• So: If the bid yield rises from its current 3.85 up to 4.10, then the value of the bond will be just enough to make the money lender whole if the money borrower defaults. If the yield rises any more than that then the collateral cannot make the money-lender whole, so he is exposed to the borrower’s default risk.

2. Financing with Repos

Repos are how bond-market participants finance their portfolios. Let’s stick with the same example to see how you could finance an investment in $1M of the current 10yr
• Purchase price, at the ask of 103:08+, is
  \[ \begin{align*}
  103 +8.5 /32 + 0.6188 & = 103.8844 \text{ per } $100 \text{ face value, so } $1M \text{ face value costs } \\
  1,038,844. \\
  \end{align*} \]
  Where to get it?
• Repoing out the bond, as we just illustrated, brings in $1,018,322
• You only need $1,038,844 – 1,018,322 = $20,522 in cash
• Remember all that talk about hedge funds like LTCM engaging in 50:1 leverage? This is where that’s coming from.
• Daily cost of the loan is the $114.56 interest on the borrowed money, plus any capital charge on the $20K you’re paying in

So to buy $1M FV of this note from Z by means of a repo with Y, X could (simultaneously)
• Get $1,018,322 from Y, and add $20,522 from his own account
• Deliver the $1,038,844 to Z
• Get the note from Z and deliver it to Y
• Z is now out of the picture

On the following day
• X gets the note back from Y, and sells it at the current bid price
  • Note that there will be 1 more day of accrued interest
• X pays $1,018,322 plus $114.56 interest to Y
  • So if quoted bond prices do not move (i.e. the quoted prices are still 103-08/08+ the next day) then X’s net profit is one day of accrued interest, minus the bid/ask spread, minus the interest paid on the repo (and also minus any opportunity cost on the $20K capital)
    • 1 day of accrued interest= \((1/182)(4.25/2)(1000000/100)\) = 116.76
    • Bid/Ask Spread = \((0.5/32)(1000000/100)\) = 156.25
Repurchase Agreements

- Repo Interest = 114.56
- Net profit = 116.76 – 156.25 – 114.56 = -154.05

Y’s total profit/loss is just the $114.56 interest income
So, using the Repo market, you can take a position in a $1M bond with just $20K cash

As the security in question becomes riskier, you need more cash
- The 2% here reflects the 2% margin assumption, which is common
- If you needed 10% margin, it would require $100K

Two categories of repo
- Overnight repo, repurchase is the next business day
- Term repo, longer

3. Shorting with Repos

In the above example, the repo was X’s idea, to finance his long position in $1M face value of the note. But the repo could instead have been Y’s idea, to facilitate a short position in the note, i.e. to
- Sell the note at the current bid
- Buy the note at a later ask

Here’s how it works:

Y agrees to sell $1M FV of the bond to W for the bid price of $1,038,688, and arranges to get the note, for delivery to W, by means of a repo with X. So (simultaneously)
- W delivers $1,038,688 to Y
- Y delivers $1,018,322 to X
  - I’m assuming here the same 2% margin as in the previous case. In practice the short-seller might expect less margin (and therefore have to deliver more cash) since the originator of a transaction generally has to make some concession to get the trade done, and less margin means less protection for the lender of cash
- X delivers the note to Y, and Y passes it on to W
  - W is now out of the picture

The next day,
- Y buys the note at the current ask, and delivers it to X
- X pays Y $1,018,322 plus 1 day of interest @ 3.90% (from the screen above), which is $110.32

So Y’s total profit/loss is
- Pays the bid/ask spread, $156.25
- Also pays 1 day of accrued interest, $116.76
- Gets the interest on the collateral, $110.32
- Plus any price change that occurs
X’s total profit/loss is just the $110.32 interest expense
• Just borrowed $1,018,322 for a day, using his bond as collateral

Y could facilitate a longer-term trade with either a term repo, or by a sequence of overnight repos

Motive could be speculation, but often it is hedging
• Investment bank commits on Thursday to the price it will pay for a bond issue on Friday, so they lose money if bond prices tank in-between
• Lay off the risk with a short position
• Ten-year and Five-year notes are especially popular for that purpose
  • Especially for mortgage-backed securities, which have a similar duration
• Maybe you would go short in the futures market rather than the spot market, but the trader on the long side of the futures contract will want to lay off his exposure, so he would go to the spot market

4. T-Bill Repos

Recall that T-bills are quoted in terms of “discount yields,” i.e., a multiplicative linear rebate from their face value (not to be confused with discount rates which means dividing a face value by an interest-rate factor). Let’s look at a simple repo transaction without margin first.

On Thursday, Sep 22, 2005 Lehman Bros.’ Government Securities desk “sold” $10m par value of the 3M T-bill, which it just had acquired in the weekly auction, maturing on Dec 22, 2005 to Wachovia for $9,884,483.33 in cash. The bill traded at a discount yield of 4.78% quoted for regular settlement so that with settlement in two days its remaining maturity comes to 87 days:

\[ P_r = F \left( 1 - y_d \frac{T}{360} \right) = 10m \left( 1 - 0.0478 \frac{87}{360} \right) = 9,884,483.33 \]

Simultaneously, they bought it back the next day at an overnight repo rate \( r \) of 4.50%:

\[ P_{t+1} = P_r \left( 1 + r \frac{T}{360} \right) = 9,884,483.33 \left( 1 + 0.045 \frac{1}{360} \right) = 9,885,718.89 \]

Although the transaction is structured as a simultaneous spot sale and forward purchase it effectively amounts to a collateralized loan in which Lehman’s borrows $9,884,483.33 from Wachovia overnight paying a loan rate of 4.50% which explains why repos are quoted in terms of interest rates paid on the collateralized loan rather than forward prices (comes to the same, though). It is a discount loan because they paid back $9,885,718.89 the next day consisting of the principal and $1,235.56 in interest. The collateral, however, is delivered as if it were an actual sale and the lender (“repo buyer”) generally has the right to sell the collateral in case of default. However, the seller receives any principal, interest, coupon, etc. payments made on the collateral during the deal’s life.
Settlement in repo markets is usually for cash so that the market clears early in the day (before 10am) and it is hard to find any counterparties after 12pm. A round lot is $25m (making the preceding transaction an “odd lot” one) and the market is primarily for overnight loans, i.e., deals with the next day as maturity date for the forward portion. Accepted collateral comprises T-bills, government and agency coupon securities, mortgage-backed securities (!) and various money market instruments. Corporates are subject to up to 50% of margin requirement (default risk!) which limits their usefulness in repo transactions.

A reverse repo is simply the same transaction from the buyer’s = lender’s perspective who might engage in the deal for two reasons

- Investors: secured overnight lending to park money in a relatively safe manner;
- Traders: need to cover a short position (having sold a security after borrowing but not owning it) so that they buy a specific (“special”) security in a reverse repo.

As we argued in class, repo rates are intimately tied to the federal-funds rate and US monetary policy. The general (as opposed to special) collateral rate is typically slightly below the fed-funds rate; it cannot rise above it without triggering arbitrage opportunities (why? what is the difference between overnight interbank lending in the fed-funds and repo markets? how could you benefit as a bank from repo rates being higher than fed-fund rates?). For special collateral, i.e., specific issues, the repo rate can be higher or lower than the general collateral rate depending on traders’ positions and, hence, demand for repos and reverse repos.

The interplay of US Treasury, repo, and fed-funds rate involves complex dynamics ultimately driven by US monetary policy – itself conducted through repos – and the demand for credit. As an example, the Fed intervenes every day in the repo market to change available liquidity and, thereby, steer fed-funds rates toward their target levels. It also keeps an inventory of specific issues to avoid short squeezes. When specific collateral needed for, say, delivery against futures positions has become very scarce market participants can borrow it from the Fed’s System Open Market Account (SOMA). Under their security lending program a multi-price auction is held every day at noon (discriminatory pricing: you pay what you bid) in which dealers bid a lending rate (at least 100 bpts over the general collateral rate) to borrow a given amount of a specific security held by SOMA.

In implementing monetary policy the Fed’s Open Market desk in NY (“the Desk” run by the NY Federal Reserve Bank) typically conducts one operation daily around midmorning (10h30 to 11am) but in times as unsettled as recently might do so more frequently to smooth out liquidity. There are several types of interventions:

- to temporarily inject money into the markets/economy it acts as the buyer of repos either using its own funds (“System repo”) or funds owned and deposited with it by foreign institutions (“customer repo”);
- to temporarily reduce liquidity it drains money by engaging in reverse repos, i.e., selling collateral;
- to permanently inject or drain liquidity it buys or sells government securities.
Since repo transactions expose the buyer to credit (negligible: they have the collateral) and price risk (and default risk on corporates) they ask for “margin” to overcollateralize the loan. Margins tend to be small but depend on the quality of the collateral and term (maturity) of the repo. Short-term (less than a week) T-bill repos have margin requirements of about 10 bpts, 3M MBS repos may carry 5% margin so that the loan is 105% collateralized. Margin needs to be maintained during the life of the deal so that the seller might deliver additional collateral or the buyer as for repayment of part of the loan.

Suppose a customer buys a $10m T-bill repo (182 days of maturity left, discount yield of 5.22% at bid, repo rate of 4.25%) with a margin of 10 bpts.

<table>
<thead>
<tr>
<th>Settlement day</th>
<th>2/18/2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill maturity</td>
<td>8/18/2005</td>
</tr>
<tr>
<td>Days to maturity</td>
<td>181</td>
</tr>
<tr>
<td>Bid</td>
<td>4.45%</td>
</tr>
<tr>
<td>Margin rate (&quot;haircut&quot;)</td>
<td>0.10%</td>
</tr>
<tr>
<td>Market price (at bid)</td>
<td>0.977626389</td>
</tr>
<tr>
<td>Margin value</td>
<td>0.977123611</td>
</tr>
<tr>
<td>Repo principal</td>
<td>$10,000,000</td>
</tr>
</tbody>
</table>

**Face amount of collateral required:**
- with margin $10,234,119.70
- without margin $10,228,856.46
- margin amount $5,263.25
- Percent of face value 0.051%
- market value of margin $5,145.49

The first crucial bid of information is that, contrary to other examples (s.a.) the face value of the repo is $10m. Hence, we need to gross the bills resale value up so that it comes to the right amount in light of the quoted prices by finding the “market price factor” which is simply at bid (in case you need to sell the bill as the holder of the collateral)

\[
p_t = 1 - y_d \frac{T}{360} = 1 - 0.0445 \cdot \frac{181}{360} = 0.977626389
\]

so that with margin the price factor comes to

\[
p_t + m_t = 1 - (y_d + m) \frac{T}{360} = 1 - (0.0445 + 0.01) \cdot \frac{181}{360} = 0.977123611
\]

Note that we follow the quote conventions in the computation for margin for both discount and coupon securities. The face value of collateral involved with margin is now simply the repo’s face value (the two are not the same because of pricing and margin!) divided by the appropriate factor, i.e.,

\[
F_{mr} = \frac{F_{repo}}{p_t + m_t} = \frac{$10m}{0.977123611} =$10,234,119.70
Without margin it would be

\[ F = \frac{F_{\text{repo}}}{p_t} = \frac{10m}{0.977626389} = \$10,228,856.46 \]

so that the margin amount comes to $5,263.25 which has a market value of

\[ M \cdot p_t = 5,263.25 \cdot 0.977626389 = \$5,145.49 \]

5. **T-Bill Tails**

A tail relies on a repo to create a fixed-income security of a particular maturity at a future point in time. It is intimately related to forward rates and the mechanics are very similar.

Consider the following example, in which a dealer wishes to buy a T-bill forward to lock in future returns on government paper: she buys a 3M T-bill, repos it out for 7 days = 83D bill (which is called a tail because you just hold the instrument for the tail maturity). Here are the transaction details:

- Buy a T-bill with \( t_1 = 90 \) days to maturity
- Finance it for \( t_2 = 7 \) days with term repo
- Inherit a T-bill with \( t_1 - t_2 = 83 \) days to maturity when the financing comes off.
Here is the summary from class on the transaction:

<table>
<thead>
<tr>
<th>Settlement date</th>
<th>1/7/2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill maturity date</td>
<td>4/6/2008</td>
</tr>
<tr>
<td>Days to maturity</td>
<td>90</td>
</tr>
<tr>
<td>90-day bill rate</td>
<td>4.42%</td>
</tr>
<tr>
<td>Amount (face)</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>Market value</td>
<td>$988,950.00</td>
</tr>
<tr>
<td>Repo rate</td>
<td>4.100%</td>
</tr>
<tr>
<td>Margin (in bp)</td>
<td>10</td>
</tr>
<tr>
<td>Repo amount</td>
<td>$988,700.00</td>
</tr>
<tr>
<td>Dealer equity ($ margin)</td>
<td>$250.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unwinding date</th>
<th>1/14/2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days financed</td>
<td>7</td>
</tr>
<tr>
<td>Financing cost</td>
<td>$788.48</td>
</tr>
<tr>
<td>Days until the bill matures</td>
<td>83</td>
</tr>
<tr>
<td>Implied 83-day bill cost</td>
<td>$989,738.48</td>
</tr>
<tr>
<td>Implied 83-day bill rate</td>
<td>4.45%</td>
</tr>
</tbody>
</table>

Note that in this instance the various amounts are driven by the face value of the 83-day tail, which the trader wishes to create, not the repo’s face value, which is a secondary consideration in this instance.

The 1W repo rate is given by the above Bloomberg quotes as \( r = 0.041 \) whereas the bill’s market value follows as always from

\[
P_t = F \cdot p_t = \left( 1 - y_d \frac{T}{360} \right) = $1m \left( 1 - 0.0442 \frac{90}{360} \right) = $988,950.00
\]

which is the repo amount with margin whereas the underlying repo amount is then (always keeping the bill’s discount-yield quote convention)

\[
F_m = F \left( p_t + m_r \right) = $1m \left( 1 - \left( 0.0442 + 0.01 \right) \frac{90}{360} \right) = $988,700.00
\]

The difference is then the $250 in margin which represents the trader’s equity in the transaction. Notice that in this instance we are not grossing up the repo’s face value but work from the bill face value which the trader wishes to hold in a week’s time. The rest of the calculations are straightforward where I computed the financing cost as the true cost with compound interest, i.e.,

\[
F \cdot \left( \frac{1 + r \frac{T}{360}}{\left( 1 + 0.041 \frac{T}{360} \right)^{\frac{1}{7}}} - 1 \right) = \$988,700 \cdot \left( \frac{1 + 0.041 \frac{7}{360}}{\left( 1 + 0.041 \frac{7}{360} \right)^{\frac{1}{7}}} \right) = $788.48
\]

as compared to simple interest \( \$988,700 \cdot 0.041 \frac{7}{360} = \$788.21 \) so that the implied 83-day bill cost comes to \( P + \text{interest} = \$988,950.00 + \$788.48 = \$989,738.48 \) and the implied return on this tail is
6. Specialness and Supply Dynamics

One way to look at the shorting example is that $Y$ offers to lend to $X$, provided that $X$ uses the 10-year note as collateral

- Other bonds won’t do; $Y$ needs that bond to deliver to $W$

Now suppose lots of traders want to short the 10-year note, and they’re all trying to lend to $X$ for that purpose. $X$ can tell them

- I’ve got something you need, so you’ll have to pay up
- Since you’re lending, the way to pay up is to lower the interest rate

When the interest rate on repos of a specific bond drops below the general repo rate, that bond is said to be on special, and the difference between its repo rate and the general rate is called its’ specialness.

On 1/7/08, Bloomberg reports the following:

**U.S. Repo Open: Old Five-Year Note Is at Lowest Rate of 2.6%**

By Ye Xie

Jan. 7 (Bloomberg) -- The following is a summary of early trading in the market for U.S. repurchase agreements, or repos, in New York. All repo rates are for overnight transactions based on trading at nine repo brokers, as reported to GovPX Inc., a unit of ICAP Plc, the world’s largest interdealer broker.

**Lowest Repo Rate as of 8 a.m. New York time:**

The old five-year note, a 3 3/8 percent coupon maturing in November 2012, opened with the lowest repo rate: 2.6 percent.

**Other Rates:**
- Current two-year note: 4.05 percent
- Old two-year note: 3.75 percent.
- Current three-year note: 3.45 percent.
- Old three-year note: 3.90 percent.
- Current five-year note: 3.80 percent
- Old 10-year note: 4.05 percent.
- Current 10-year note: 3.35 percent
- Old 10-year bond: 4.05 percent.
- Old 30-year bond: 4 percent.

Current issues are the most recently issued securities, and old issues are those sold previously with the same maturity.

Specific Treasury securities in the greatest demand are considered to be ‘‘on special.’’ Firms that want to borrow them are willing to lend money overnight at rates below those on general collateral or other Treasuries in exchange for them.

**Behind the Numbers**

Securities firms use repos to borrow money to finance positions in Treasury, corporate and mortgage-backed securities. They also borrow securities on reverse repos to make deliveries of sales of securities the dealers don’t own, and engage in speculative repo trading based on expectations for the future direction of interest rates.

Current five- and 10-year notes often trade at the lowest repo rates because they are widely used as hedges against positions in corporate, mortgage and global debt.

**General Collateral**

Delivery repos: 4.15 percent. The collateral is sent to an investor’s bank against receipt of funds.
Triparty repos: 4.18 percent. A clearing bank acts as a third party to make sure there’s adequate collateral behind the repo and that it conforms throughout the life of the transaction to the investor’s requirements, providing the customer with an additional layer of safety.

Securities firms are willing to pay higher rates to borrow money through triparty repos because they can allocate leftover collateral at their clearing bank late in the day as backing for the transactions, saving on delivery costs.

Rates on general repos, or those backed by non-specific collateral, are usually set slightly below federal funds levels.

**Treasury Bills**

The three- and six-month Treasury bills opened at 4.15 percent.

**Federal Funds**

Federal funds, the overnight inter-bank lending rate, traded at 4¼ percent, matching the Federal Reserve’s target rate, according to ICAP.

Hence, the general repo rate on 1/7/08 was 4.15%, but the rate for repos of the current 10-year note was 3.35%, 80bp lower. This 80bp is its specialness.

- Increases the cost of shorting the bond
- Decreases the cost of financing a long position in the bond

The article *Repo Rate Patterns for New Treasury Notes* observes that a bond’s specialness is concentrated early in its life, when it is on-the-run.

- Starts near zero in the first weeks after issuance
- Grows steadily over the ensuing weeks, reaching a peak around the time when the next auction for that maturity is announced
- Plummets to zero
- The article looks at a time when 5-year auctions were 3 months, rather than 1 month, apart.

Rationale for this pattern is related to our discussion in class:

- Major investment houses are big bidders in the auctions, but are not long-term investors
- Long-term bond investors, such as pension funds and insurance companies, accumulate their positions while spreads are low
- So the supply of the on-the-run issue in the hands of repo-market participants decreases over time
- Once it is scarce enough, specialness sets in and remains as long as shorting demand is strong
7. **Securities Lending**

Whenever you make a short sale, not just of Treasuries, you are selling securities you don’t have so you need to get them somehow, to deliver them. In the equity market, you would go to a securities lender and the transaction would be similar to a repo.

**EXAMPLE:**

You short 40,000 shares of GE, which is selling for $35 bid, $35.1 asked. Now you need the 40,000 shares to deliver to the guy you sold to. The securities lender tells you

- The shares are currently worth $40,000(35) = $1.4M. I’ll lend you 40,000 shares this way
  - You give me $1.4M(1.02) = $1.428M cash collateral
  - Note, reverse margin
  - I give you 40,000 shares
  - Tomorrow,
    - I’ll give you interest on the $1.428M at the general repo rate minus \(n\) basis points (called the interest rebate)
    - If GE went up, you’ll give me more collateral. If it went down, I’ll return some collateral, keeping the reverse margin at 2%
  - We’ll keep going like that until one of us wants out, at which point
    - You return the shares
    - We return the cash collateral

What’s going on here:

- The securities lender needs the collateral to protect against you not returning the shares
- Your proceeds from the short sale are invested at the short rate, minus \(n\) basis points
- The \(n\) basis points is essentially the securities-lending fee
  - The lender invests the collateral at the general repo rate, keeps \(n\) basis points of this interest income for itself, and gives you the rest

When stocks go on special, the rebate goes down, or in other words \(n\) goes up.
EXAMPLE from Internet days: JDSU and ETEK:

On 1/17/00, JDS Uniphase (JDSU) announced plans to merge with E-TEK Dynamics (ETEK). If this plan goes through, each share of ETEK will be exchanged for 1.1 shares of JDSU.
- On the final date, price of ETEK should be at least 1.1 times the price of JDSU, or else there’s an arbitrage
  - Buy 1 ETEK, exchange for 1.1 JDSU, and sell that

ETEK rallied on the announcement, but remained below (1.1)JDSU:

On Friday 1/21/00, JDSU was 233 1/8, ETEK was 218. Suppose you
- Bought 10,000 ETEK, payout is $2,180,000
- Shorted 11,000 JDSU, brings in $2,564,375, so net = $384,375
  - Have to borrow the JDSU, that’s also going to cost
Merger goes through:
- Exchange your 10,000 ETEK for 11,000 JDSU
- Return the 11,000 JDSU to the lender, you’re all done
- Net profit is the $384,375 minus the cost of the borrow
- Cost of the borrow depends on
  - How many days until the merger
  - Specialness between now and then

Merger doesn’t go through:
- ETEK would drop relative to JDSU, and you’d have to buy JDSU to return to the lender. You could lose a lot of money.

ON SPECIAL
This arb appears to be popular, because JDSU is getting expensive to borrow
- General rebate rate was 5¼%
- For JDSU, 3%
  - Extra daily cost of the trade above is
    - ($2,564,375)(1.02)(1/360)(.0225) = $163.48
  - This cost goes up as the rebate goes down
During the Staples/Office Depot merger speculation, rebate rate dropped to minus 20%
  - Then, the merger didn’t go through

(The JDSU/ETEK merger went through on 6/30/00, so this trade made money.)

Securities lending can be a meaningful source of income for an institutional account like a pension or mutual fund, particularly if it is:
- Indexed, since this means it holds stocks for long periods, and therefore can lend without needing the shares back anytime soon, and
- Small-cap focused, since these are more likely to be hard to borrow, and therefore on special For example, the Vanguard Small Cap Index Fund reports $13.7MM of security-lending income for 2006
  - Offsets 66% of the fund’s total expenses of $20.8MM