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# Repo Rate Patterns for New Treasury Notes

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*Despite the enormous popularity of the market for repurchase agreements, the behavior of interest rates on "repo" transactions is not well understood. An analysis of new data for 1992-95 reveals that repo rates on recently issued Treasury notes rise and fall in a regular pattern as the Treasury auction cycle progresses.*

In the past several years, the market for repurchase agreements—the "repo market"—has grown rapidly, achieving a daily trading volume in excess of $500 billion. Securities dealers, corporate underwriters, money managers, and others routinely use the market as a temporary funding mechanism. Spurred by the need to finance inventories or fulfill commitments to customers, these institutions enter the market to borrow money or securities for return at a later date.

Despite the repo market's size and popularity, information about basic market characteristics is surprisingly limited. This edition of *Current Issues* sheds light on an important segment of the market, the borrowing of newly issued Treasury securities. Using new data for the 1992-95 period, we track the interest rate on these transactions—the "repo rate"—and evaluate the associated costs. To the casual observer, repo rate movements may appear irregular and transaction costs high. We demonstrate, however, that repo rates follow a predictable pattern based on Treasury auction cycles and that costs are in fact modest.

## Understanding Repo Transactions

Repurchase agreements are essentially collateralized loans: when the object of the transaction is to borrow money, securities are posted as collateral; when the object is to borrow securities, the collateral is cash. In both cases, the instrument borrowed is returned to the original holder when the loan matures. Although these loans can be of any maturity, the great majority mature after one day, and transaction length rarely exceeds ninety days.[1]

The price of a repo transaction is always expressed as an interest rate. Dealers[2] that enter the market to borrow money against securities will pay the "general repo rate"—an interest rate tied to general market interest rates. For dealers that enter the market to borrow securities, however, the price of the transaction is more complicated. As the providers of funds (they post cash as collateral to obtain securities), these dealers *receive* an interest rate. If this rate drops below the general repo rate prevailing over the term of the loan, it is said to be "special." Repo rates become special when dealers need specific securities to cover "short sales" and consequently accept a lower return on their funds to obtain them.[3] (The use of the repo market to cover short sales is explained in the box.) For dealers in this position, receiving a special repo rate on their funds is equivalent to *paying* the spread between that rate and the general repo rate.

Note that the price paid by these dealers will fluctuate with the availability of the securities they are

seeking. As the desired securities become scarcer in the repo market, the spread between the general and the special repo rates will widen, driving up the effective cost of the transaction.[4]

### Repo Rate Patterns and the Treasury Auction Cycle

In this section, we track the spread between general and special repo rates over the Treasury auction cycle for new notes. This spread is our measure of "specialness."

***Our analysis of the data reveals a strong positive correlation between repo specialness and the Treasury auction cycle. On average, repo rates for the most recently issued notes become increasingly special until the next issue is announced.***

We focus on the most recently issued coupon securities—called on-the-run issues by market participants—because most trading and hedging occur in these highly liquid notes.

For the period June 1992 through January 1995, we studied transaction data for thirty-one monthly cycles of the two-year note and the five-year note, eleven quarterly cycles of the three-year note, and ten quarterly cycles of the ten-year note.[5] Both monthly and quarterly cycles were defined as beginning on the issue date and ending on the subsequent issue date.[6] We converted the data to cycle averages for each maturity sector, with the position in the cycle defined as the number of business days until the next issuance of a note with the same original maturity.

Some of the issues in our sample were "reopened" issues. The Treasury at times expands the supply of an outstanding issue of notes rather than issuing new notes. In the case of ten-year notes, the Treasury reopened issues in three of the ten cycles we tracked.

Our analysis of the data reveals a strong positive correlation between repo specialness and the Treasury auction cycle. On average, repo rates for the most recently issued notes become increasingly special until the next issue is announced (Charts 1 and 2).[7] Despite differences in maturity and issue size, strong cyclical patterns emerge for all four maturity sectors of the note market. In addition, the two notes on a monthly auction cycle exhibit almost identical specialness patterns (Chart 1), as do the notes on a quarterly cycle (Chart 2).[8]

What accounts for the patterns we observe? For both the monthly and the quarterly cycles, the average specialness of a new issue increases over the cycle because the proportion of the issue available to the repo market progressively diminishes as the notes are placed in investment portfolios. The tendency of average specialness to peak and then decline rapidly once the next issue is announced reflects the same natural market forces. Activity shifts to the newest issue because it is more plentiful and, consequently, much less likely to be special.

Although the general pattern of specialness is the same for all market sectors, the monthly and quarterly cycles progress in slightly different ways. For the

### Using the Repo Market to Cover Short Sales

Much of the activity in the special repo market stems from the need to cover short sales. A dealer that sells "short" is selling a security that it does not own. When the time comes to deliver the promised security, the dealer will arrange to borrow it through a repo transaction with a customer or another dealer. Since the loan is likely to mature quickly, often overnight, the dealer may choose to extend the transaction by renewing the loan with the original counterparty, borrowing the same security from another party in the repo market, or borrowing the security for a longer period. Alternatively, the dealer can choose to close out its position by purchasing the security in the cash market and delivering it to the repo counterparty.

Still unanswered is the question, Why does a dealer sell a security it does not own? Dealers sell securities short to profit from, or hedge against, rising interest rates. If interest rates rise, the price of a fixed-rate security falls. A dealer that has sold a security it does not own stands to profit by purchasing the security later at a lower price. If that dealer has holdings that will lose value when interest rates rise, the move to sell short and buy later will offset this exposure. By countering potential losses with potential gains, the dealer hedges its balance sheet against changes in interest rates.

As the discussion makes clear, dealers use the repo market to finance their cash market positions. The great advantage of the repo market as a funding mechanism is its flexibility: dealers that are uncertain how long they will need to maintain a position or a hedge can borrow securities for a short period or, if necessary, extend the loan indefinitely.

monthly cycle, specialness increases smoothly over the life of the new security and peaks near the announcement of the next issue. For the quarterly cycle, specialness increases over the cycle but exhibits two notable peaks. One peak occurs about the time the next issue is announced, when demand for the on-the-run issue has crested. The other peak occurs approximately halfway through the cycle (thirty to thirty-five days before the next issue date). This earlier peak coincides with quarter-end periods and reflects the tendency of general repo rates to rise at the end of a quarter. Most likely, general repo rates rise because market participants are less willing to borrow funds at this time, preferring to reduce the size of their balance sheets in advance of statement dates.

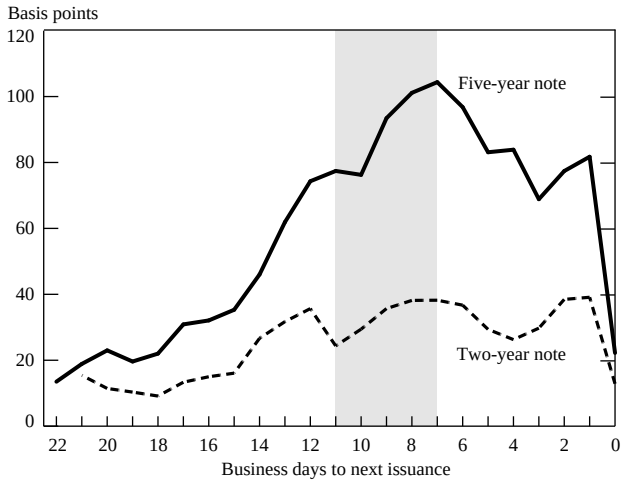
***Although the general pattern of specialness is the same for all market sectors, the monthly and quarterly cycles progress in slightly different ways.***

For reopened issues, the average level of specialness remains below that for other issues of the same maturity (Chart 2). The greater size of a reopened issue—typically about double that of nonreopened issues—means that the scarcity value of these notes, and hence their specialness, will be less. Despite this difference, the basic repo pattern for reopened and nonreopened issues is the same: specialness rises over the life of the

**Chart 1**

**Average Spread between General and Special Repo Rates for Two- and Five-Year Treasury Notes**

Monthly Auction Cycle

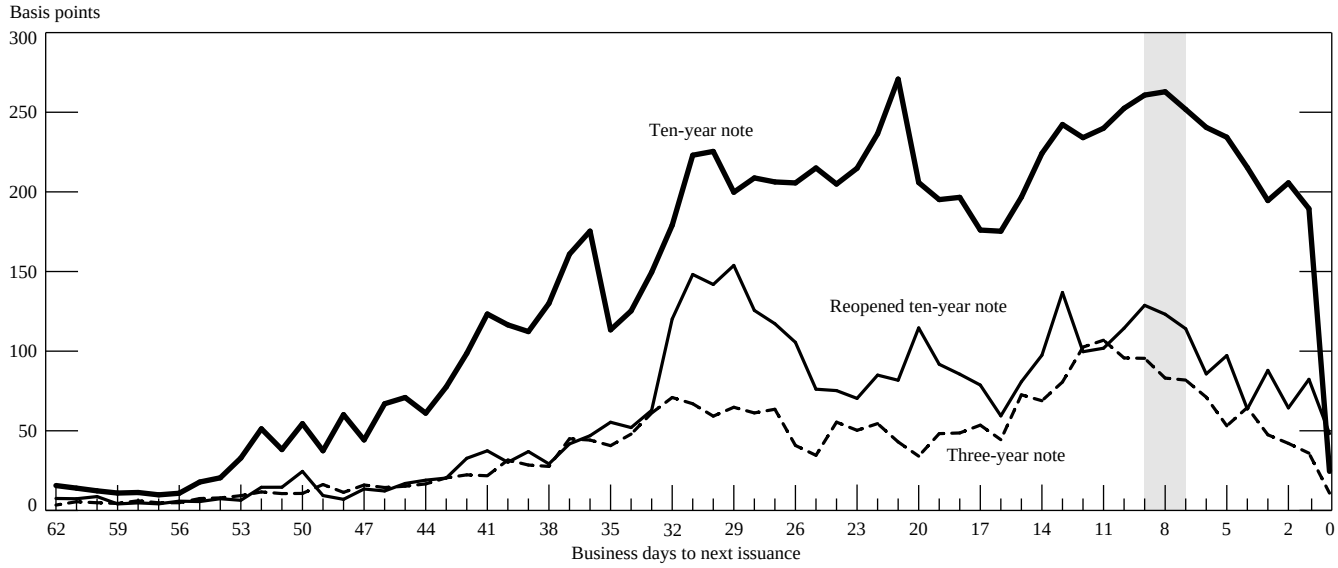



Notes: The spread is calculated using overnight rates from June 12, 1992, to January 25, 1995. The monthly auction cycle extends from one issue date to the next. The shaded area marks announcement days for the next issue.

**Chart 2**

**Average Spread between General and Special Repo Rates for Three- and Ten-Year Treasury Notes**

Quarterly Auction Cycle




Notes: The spread is calculated using overnight rates from June 12, 1992, to January 25, 1995. The quarterly auction cycle extends from one issue date to the next. The shaded area marks announcement days for the next issue. In 1996, the Treasury increased the frequency of ten-year note issuance from four to six times a year.

issue, spikes at the end of each quarter, and reaches its peak just before the announcement of the next issue.

As we have seen, repo specialness follows a regular pattern that is closely tied to the Treasury auction cycle. The predictability of this behavior allows participants to anticipate the additional funding costs associated with repo specialness. These costs are the subject of our next section.

### Specialness Costs

For dealers borrowing Treasury securities in the repo market, the cost of the transaction is equivalent to the spread between the general repo rate and the special repo rate they earn on the money lent to their counterparties. These spreads can be sizable, often rising to hundreds of basis points on an annualized basis. Recall, however, that in most of these transactions, the dealers agree to return the securities after only one day, and few repo transactions extend beyond ninety days. Once we adjust for these brief holding periods, potential cumulative costs appear low (Table 1). Even for large repo spreads, the marginal cost over short holding periods is not especially high. Repo specialness of 400 basis points on an annualized basis will result in a marginal cost of about 1 basis point for an overnight loan.

To put these costs in perspective, consider the following: Underwriters of investment-grade corporate bonds would expect to earn between 25 and 75 basis points in fees for placing securities. If in hedging the interest rate risk on these activities the underwriters faced an exposure to repo specialness of as much as 400 basis points over an entire week, they would still pay less than 8 basis points, an amount easily absorbed by their fee structure.

When we look at the actual specialness costs for all transactions in our sample (Table 2), they prove to be even more modest than the potential costs cited in Table 1. The cumulative cycle costs, which reflect the average expected cost for a participant who maintains an exposure to specialness for the entire cycle, are generally low. For most issues, the average monthly specialness costs are only 2 to 5 basis points. The exception is the standard or nonreopened ten-year issue, which shows an average monthly specialness cost of 12 basis points. The higher average specialness costs for these notes may reflect the smaller size of the issues. Overall, average specialness costs vary somewhat among maturity sectors, but all appear small in absolute terms.

**The Relationship between Cash Market Premia and Specialness Costs**. Specialness costs appear even more reasonable when we consider that they are sometimes offset by changes in cash market premia. Investors' strong preference for liquidity creates an increased demand for the most recently issued Treasury securities. For this reason, on-the-run Treasury notes typically trade at a small premium until the next issue of the same maturity is announced, when the premium dissipates or declines.[9] Investors can capture this premium if they sell the on-the-run securities short, cover the sales by borrowing in the repo market, and then buy

**Table 1**
**Potential Specialness Costs for New Treasury Notes, Adjusted to Typical Holding Periods**
Basis Points

| Annualized Spread between General and Special Repo Rates | Holding Periods | | | |
|---|---|---|---|---|
| | Overnight | Seven Days | Thirty Days | Ninety Days |
| 25 | 0.1 | 0.5 | 2.1 | 6.3 |
| 50 | 0.1 | 1.0 | 4.2 | 12.5 |
| 100 | 0.3 | 1.9 | 8.3 | 25.0 |
| 200 | 0.6 | 3.9 | 16.7 | 50.0 |
| 400 | 1.1 | 7.8 | 33.3 | 100.0 |

Source: Author's calculations.

Note: We convert annual repo spreads to an overnight holding period by dividing the repo spread by 360. For longer terms, we use the repo market convention of multiplying rather than compounding to convert the annual spread. The marginal cost of repo specialness is simply these adjusted amounts multiplied by the dollar value of the repo loan.

**Table 2**
**Observed Specialness Spread for New Treasury Notes**

| Maturity Sector | Issuance Cycle | Typical Issue Size (Billions of Dollars) | Number of Actual Cycles | Average Spread (Basis Points) | Cumulative Cycle Cost (Basis Points) | Cost per Month (Basis Points) |
|---|---|---|---|---|---|---|
| Two-year | Monthly | 17 | 31 | 27 | 2 | 2 |
| Three-year | Quarterly | 15 | 11 | 41 | 10 | 3 |
| Five-year | Monthly | 11 | 31 | 58 | 5 | 5 |
| Ten-year | Quarterly | 12 | 7 | 143 | 35 | 12 |
| Ten-year, reopened | Quarterly | 23 | 3 | 62 | 15 | 5 |

Sources: U.S. Department of the Treasury; proprietary data sources; author's calculations.

**Table 3**
**Repo Specialness Costs Compared with Price Risk of Unhedged Exposures**
Basis Points

| Treasury Note Maturity | Average Monthly Specialness Cost | Daily Price Exposure | Weekly Price Exposure | Corporate Bond Underwriter Fee |
|---|---|---|---|---|
| Two-year | 2 | 28 | 69 | 25 |
| Three-year | 3 | 42 | 99 | 35 |
| Five-year | 5 | 72 | 154 | 50 |
| Ten-year | 12 | 117 | 241 | 62.5 |
| Ten-year, reopened | 5 | 117 | 241 | 62.5 |

Sources: Proprietary data sources; HSBC Securities; author's calculations.

Note: The price exposures are based on data from second-quarter 1994 and assume confidence intervals of two standard deviations.

the securities after the next issue is announced. In other words, these investors can profit from selling the securities at the initial higher price and buying them when the price premium evaporates. This small gain may help to offset the specialness cost that the short seller faces.

**Alternative Costs.** How do specialness costs compare with the costs of not using the repo market? Dealers that ordinarily borrow in the repo market to maintain a hedge against changing interest rates have two alternatives: they can cover a short position by buying a security outright or they can leave their existing exposure unhedged. To assess the costs of these alternatives, we use the price risk faced by holders of Treasury notes in a particularly volatile quarter of 1994 as a proxy for the cost of not using the repo market (Table 3). This measure indicates how much note prices could swing in response to extreme fluctuations in interest rates. As the comparison presented in Table 3 shows, the average monthly repo specialness costs that dealers would incur in insulating themselves against such fluctuations are small relative to the daily and weekly price exposure faced by note holders and to the underwriting fees earned by corporate bond underwriters.

## Conclusion

Our analysis of repo specialness for the 1992-95 period yields four major findings. First, repo rate movements for new Treasury securities follow a predictable pattern that is closely aligned with the Treasury auction cycle. Second, differences between general and special repo rates are normal, repeating events. Third, the costs associated with repo market patterns are quite small for short holding periods and may be offset for some participants by gains from declining cash market premia. Finally, and perhaps most important, the costs of repo specialness seem quite reasonable when compared with those created by the alternatives to the repo market. On the whole, our analysis suggests that recurring specialness in newly issued Treasury notes reflects a highly active and cost-effective marketplace.

## Endnotes

1. See Duffie (1996) or Stigum (1989) for a lengthier introduction to repo market mechanics.

2. This article focuses on dealers as the most representative group among the broad range of institutions participating in the repo market.

3. Note, however, that dealers are sometimes able to obtain specific securities at a rate equivalent to the general repo rate.

4. It is possible, of course, to take a different view. Because dealers that need to borrow a specific Treasury issue cannot do so in the general collateral market, some market participants may not consider the spread between the general repo rate and the special repo rate a "cost" of selling a specific issue short. Although repo rates represent one component of the price of the trade, the change in price of the underlying security and the price change's deviation from expectations are other components.

5. The raw data for this analysis were provided by sources outside the Federal Reserve Bank of New York and consequently cannot be made available to readers.

6. Although cycles may be defined as extending from announcement to announcement or from auction to auction, we choose the issue date as the starting and ending point for the cycle because cash market trades do not require use of the repo market until the issue date.

7. Trading in new Treasury notes begins anywhere from one to two weeks before the original issue date, immediately after the Treasury announces the auction date and size of an issue.

8. These findings are consistent with data presented in Duffie (1996), who studies an earlier sample period (1988-92). The rise and fall of the repo spread pattern is also broadly consistent with the model presented by Fisher and Gilles (1995).

9. The premium attaching to the newest Treasury notes may also derive in part from the expected value of repo specialness over the on-the-run period. Figure 4 in Duffie (1996) provides a helpful illustration of the impact of repo specialness on note prices.

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