Box 3

The Rate of Interest on Term Investment Option Balances

One of the key issues in the Term Investment Option program is how interest rates on TIO balances compare with rates on Main Account balances. This box examines the variation in the spread between TIO auction rates and Main Account rates in the program's first forty-two auctions, which took place between April 2002 and April 2004.

Let $Rtio_k$ denote the rate from the kth auction (in percent), Q_k the size of the kth offering (in billions of dollars), T_k the term of the kth offering (in days), and A_k the time elapsed (in decimal years) between the first auction and the kth auction. Let $Rmain_k$ denote the average rate on Main Account balances over the same interval as the kth offering. Regressing the interest rate differential $Rtio_k - Rmain_k$ on Q_k, T_k, and A_k gives[a]

$$Rtio_k - Rmain_k = \underset{(0.0228)}{0.1037} - \underset{(0.0027)}{0.0109} \times Q_k + \underset{(0.0017)}{0.0049} \times T_k + \underset{(0.0122)}{0.0632} \times A_k \qquad (1)$$

standard error of estimate = 0.039
R-squared = 0.4277
42 observations

The standard errors of the estimated coefficients are shown in parentheses. All of the coefficients are significantly different from zero at a 95 percent confidence level. The estimates suggest that an offering of $6 billion for fifteen days in January 2004 would have attracted an interest rate about 22 basis points above the Main Account rate. (The expected value of $Rtio_k - Rmain_k$ is 0.22 percent when $Q_k = 6.0$, $T_k = 15$, and $A_k = 1.75$.) Longer-term offerings generally attracted relatively higher rates (each additional day raised the spread by about 0.5 basis point) and larger offerings attracted relatively lower rates (each additional billion dollars reduced the spread by about 1.1 basis points).[b] In addition, the spread widened at a rate of about 6 basis points per year as the TIO program evolved from a pilot effort to a regular feature of the Treasury cash management system.

The positive coefficient on T_k in equation 1 shows that bidders paid relatively higher rates for longer-term balances. However, the willingness of bidders to pay for longer-dated TIO balances was not different from the willingness of borrowers to pay for longer-dated funds from other sources. Let Rp_k denote the rate on a repurchase agreement on Treasury collateral for the same term as the kth TIO offering observed on the day of the kth auction.[c] Regressing the interest rate differential $Rtio_k - Rp_k$ on Q_k, T_k, and A_k gives

$$Rtio_k - Rp_k = \underset{(0.0272)}{-0.0372} - \underset{(0.0032)}{0.0123} \times Q_k + \underset{(0.0021)}{0.0017} \times T_k + \underset{(0.0145)}{0.0567} \times A_k \qquad (2)$$

standard error of estimate = 0.047
R-squared = 0.3465
42 observations

The insignificant coefficient on T_k implies that the variation of TIO auction rates as a function of term was about the same as the variation of RP rates as a function of term. The coefficients on Q_k and A_k are about the same as the coefficients on those two variables in equation 1. Spreads between TIO auction rates and RP rates tended to be algebraically smaller (less positive or more negative) the larger an offering and tended to become algebraically larger (more positive or less negative) as the TIO program evolved.

Equation 2 also suggests that the Treasury was not far from the mark when it proposed in 1999 (see Box 1) to change the Treasury Tax and Loan rate from the federal funds rate less 25 basis points to the RP rate. The estimated coefficients imply that an offering of $6 billion for fifteen days in January 2004 would have attracted an interest rate not materially different from the contemporaneous rate on fifteen-day repurchase agreements. (From equation 2, the expected value of $Rtio_k - Rp_k$ is 0.01 percent when $Q_k = 6.0$, $T_k = 15$, and $A_k = 1.75$.) On average over all forty-two auctions, the difference between TIO auction rates and rates on repurchase agreements with comparable terms was -1.7 basis points.

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[a]There were two unusual auctions in the data set. The third auction in December 2002 offered $3 billion but attracted bids for only $1.1 billion. The auction in December 2003 was covered but attracted unusually weak bids. The regression results are not materially different when these two offerings are withheld from the data set.

[b]We examined whether the existence of outstanding TIO balances had a similarly depressing effect. Let AOB_k denote the quantity of TIO balances already outstanding at the time of the kth auction. Adding AOB_k to equation 1 resulted in an estimated coefficient that was not significantly different from zero. The lower auction rates associated with larger offerings thus appear to be a matter of the offerings themselves and not of the total amount of TIO balances that would be outstanding following placement of the offered funds. This finding suggests that the Treasury might get better rates with frequent small offerings than with less frequent large offerings.

[c]We did not observe directly the RP rate over the same term as a given TIO offering, but we did have data on rates on repurchase agreements that began on the day of a TIO auction and matured one business day later; one, two, and three weeks later; and one, two, and three months later. We fit a cubic spline to the data we had and identified from the spline the rate on a repurchase agreement ending on the day the TIO offering was to mature. We then identified the forward RP rate over the same term as the TIO offering from the one-business-day RP rate and the term rate identified from the spline. The identified forward RP rate for the kth TIO auction is our estimate of Rp_k.