

ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

Auctioning Treasury Securities

by E. J. Stevens and Diana Dumitru

The U.S. Treasury expects to sell about a trillion dollars of new securities this fiscal year to finance a projected \$400 billion budget deficit and to refinance maturing debt. Most of the securities will be issued through public auctions, where competition among bidders might be expected to minimize interest payments on the debt.

The competitiveness of Treasury auctions was called into question last August, however, when Salomon Brothers, a large securities dealer, admitted to having placed unauthorized bids in the names of customers during eight auctions. For example, in the May 22, 1991 note auction, the firm controlled more than 90 percent of the issue, far exceeding the 35 percent limit set by the Treasury. Rumors of a market "squeeze" had surfaced even before the notes were issued on May 31.¹ Disappointed bidders, with contracts to deliver the security after it was issued, had to pay an unexpectedly high price for the issue in the secondary market, where Salomon controlled most of the supply.

Two causes for concern emerge from this incident. First, of course, is simply that the market is not fair when auction rules are broken. Some investors might shun the Treasury securities market rather than be exposed to losses resulting from market manipulation. Thus, any short-term gain to the Treasury from an artificially high price at a single auction could be outweighed by lower demand and prices in all auctions. Second, as suggested here, is the possibility that the auction process

itself may be at fault. Perhaps a different system of selling new issues of Treasury debt would reduce incentives for manipulation.

Following Salomon's admissions and other reported irregularities, the Treasury Department, the Board of Governors of the Federal Reserve System, and the Securities and Exchange Commission conducted a study in 1991 leading to a joint report on the government securities market. The report reaffirms that public auctions are the best means of issuing new Treasury debt and recommends some minor adjustments that have already been adopted to ensure public access to the existing auction process. It also recommends a more thorough exploration of alternative methods of conducting public auctions. This *Economic Commentary* examines the rationales for adopting a different system for determining the price paid by a winning bidder and a new technology for bidding.² Both of these changes could make public auctions of Treasury securities less susceptible to manipulation.

■ Today's Auctions:

Multiple-Price, Sealed-Bid

The Treasury maintains a regular schedule of auctions in which it sells bonds, notes, and bills. Bonds and notes are sold in \$1,000 denominations and pay interest every six months until maturity, which ranges from 10 to 30 years for bonds and from one to 10 years for notes. The recent schedule has included monthly auctions of two- and five-year notes and quarterly

The current method of auctioning Treasury securities contains both incentives and opportunities for market manipulation. Two suggested changes in the auctions might eliminate these problems and thus reduce the need to police arbitrary auction rules.

auctions of three-, seven-, and 10-year notes and 30-year bonds.

Treasury bills, in \$10,000 denominations, have no coupon. An investor's return comes from the difference between the maturity value and the price paid — the "discount." Bills maturing in 13 weeks and 26 weeks are auctioned every Monday. Bills maturing in 52 weeks are offered every four weeks.

About a week before each auction, the Treasury announces the auction day, size, maturity, and the settlement day when successful bidders must make payment. From this announcement until settlement, the impending security actually trades in the market on a "when-issued" basis, with the promise of delivery on settlement day. When-issued trading thus may provide potential bidders with information about the likely price in the auction.

By 1:00 p.m. on auction day, bidders must submit tenders (written, sealed bids) at Federal Reserve Banks or their branches. Two kinds of tenders can be used: Competitive tenders state the amount of securities desired (as much as several billion dollars) and either a

yield bid (for bonds and notes) in one-basis-point increments or a price bid (for bills) on the basis of 100 (for example, 98.995). Noncompetitive tenders can be placed only for smaller amounts (up to \$5 million for notes and bonds, or \$1 million for bills), with the yield or price determined by the average of awards in competitive bidding.

At 1:00 p.m. on the day of an auction, bids are tabulated and transmitted to the Treasury. Securities are awarded to all noncompetitive bidders; the remainder of the issue is awarded to competitive bidders in descending order of price bid (increasing yield bid).³ A bidder may submit tenders up to a maximum of 35 percent of the amount being auctioned, with bids at various prices. The exception is that if too many bids are received at the lowest accepted "stop-out" price, these awards are made in proportion to the total of all bids received at that price.

The process can be summarized as a sealed-bid auction, open to anyone, with awards at multiple prices. Modifications already adopted address the openness of the process, to ensure that any financially responsible party can participate in a Treasury auction. Some drawbacks are nevertheless associated with multiple prices and sealed bidding.

■ The Winner's Curse

Making auction awards at multiple prices means that the highest bidders must follow through, actually paying the prices they offered even though others are paying less for the identical security. This may seem only fair. After all, if the high bidders didn't think the securities were worth so much, they shouldn't have bid so much. This view assumes that the item's value to the winner may be largely independent of the lower value placed on the item by unsuccessful bidders.

In the case of Treasury auctions, however, the value of a security is not independent of the market. A dealer wants the security being auctioned only in order to sell it, but must compete with other dealers who may have paid less in

the auction; an investor wants the securities for portfolio purposes and could wait to buy in the post-auction market. No matter how fair it may seem, paying a high price for an award of securities that others have bought more cheaply truly involves a "winner's curse."

The winner's curse has serious implications for Treasury auctions. While a high bid will increase the chances of an award, it also raises the possibility of paying more than the post-auction market value of the security. The auction process might reveal something about that value, but only the smallest-volume bidders can benefit by submitting noncompetitive tenders; competitive bidders cannot take advantage of the information revealed in the auction. The winner's curse dampens the aggressiveness of their bidding, resulting in a lower auction price received by the Treasury. Bids may be lowered to cover the costs of gathering information about what others are likely to bid. Alternatively, customers may submit their bids through a small number of well-informed dealers, where bidding might tend to become concentrated. Thus, a winner's curse may dampen all competitive bidding and lower multiple auction prices relative to market values.

Sealed bidding, on the other hand, when coupled with multiple prices, enables a single bidder to corner the post-auction market, transforming the auction-winner's curse into a post-auction blessing. A well-informed and well-financed bidder or group of bidders could deliberately submit a high bid to ensure receiving a dominant share of auction awards. Because of the substantial volume of when-issued trading, controlling the post-auction supply of a Treasury security places the high bidder in a position to squeeze unsuccessful bidders who had contracted to deliver the security after the auction. While not a necessary outcome, the current auction setup does contain the seeds of market manipulation that can discourage demand. The winner's curse places a premium on discovering how others will bid, creating the basis

for a bid that will corner an auction and squeeze the post-auction market.

■ Safeguards against Manipulation

Treasury auctions contain an important safeguard against cornering the supply of a new issue: A single bidder is prohibited from acquiring more than 35 percent of an issue. As the Salomon example attests, enforcing this rule is not easy. For example, winning bidders must be contacted to ensure that customers' names are not used improperly by a dealer trying to control more than his share of an issue. Moreover, 35 percent is an arbitrary limit that may restrict demand and unnecessarily lower auction prices when there is no threat of manipulation.

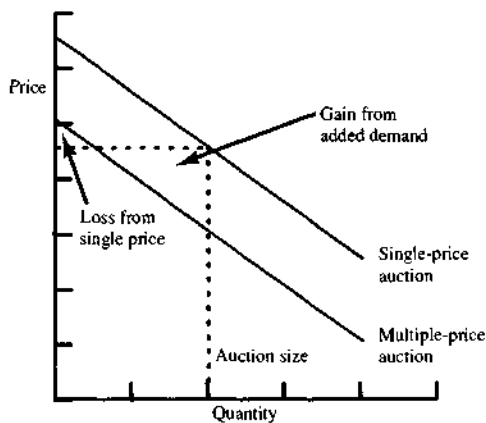
One alternative to this rule is to reopen the issue whose supply has been cornered. Augmenting supply would drive down an artificially high price and eliminate profits expected by the perpetrators of the squeeze. Knowing that the Treasury would respond in this way would eliminate the incentive to manipulate the market. Of course, this approach is simply the price equivalent of the 35 percent rule, reducing the high bidder's market share by increasing total supply. It would involve an equally arbitrary judgment about the permissible range within which the post-auction price could vary without triggering a reopening, as well as arbitrary judgments about whether prices reflected manipulation or a change in market fundamentals.

■ A Single-Price Auction

Changing to a single-price auction has been proposed as an alternative to enforcing arbitrary rules on the current auction process.⁴ This procedure would be identical to the current one, except that all competitive awards would be made at the stop-out price, which is the price that clears the market. The winner's curse would disappear because winning bidders would receive their awards at the stop-out, even if they bid higher.

Resistance to a single-price auction centers around its implication for the

FIGURE 1 SINGLE-PRICE AUCTIONS: GAINS AND LOSSES



SOURCE: Authors.

cost of servicing government debt. With a single-price auction, the Treasury would forgo revenue now received from the difference between successful price bids and the stop-out price. Actually, however, Treasury auction revenues might increase, although auction theory is ambivalent on this matter.⁵ Revenue forgone by shifting from a multiple- to a single-price auction might be more than offset by an increase in demand as participants bid more aggressively in the absence of a winner's curse, as illustrated in figure 1. Whether the gain would actually exceed forgone revenues, though, depends in part on the size of the increase in demand. It could be slight if most participants are already so averse to the risk of not getting an award that they bid aggressively in multiple-price auctions, despite the winner's curse. So, a single-price auction will increase demand, but might not reduce the interest cost of financing the debt.

More to the point, a single-price auction also might or might not produce a less fertile environment for market manipulation. A high bid could garner a dominant market position without requiring the successful bidder to pay any more than the stop-out price. But other incentives to corner the market might be weaker, because bidders would no longer conduct as intensive a pre-auction search for information about others' bids. Thus, a bidder

would have to make special efforts to gather information; cornering the market would become more costly. Chances of pre-auction detection by other bidders, who might raise their own bids by enough to defeat an attempted corner, would also increase.

■ An Auction by Open Outcry

Perhaps the most intriguing alternative presented in the joint report is that of conducting Treasury auctions by open outcry, rather than by sealed bid. The disadvantage of sealed bidding is that participants cannot be certain of the distribution of all other bids. In the multiple-price auction, winning with a bid higher than the stop-out implies that your estimate was too high, and the risk of this winner's curse leads to conservative bidding. In a single-price auction, your winning bid is lowered to the stop-out, based on the auctioneer's information about the actual distribution of bids, all of which will be less conservative than in a multiple-price auction. In an open-outcry auction, which is typically used to sell antiques or works of art, information about the distribution of bids is revealed gradually to all bidders before the auction closes. As the auction process drives the bidding higher and higher, low prices become irrelevant.

An attempt to gain a dominant share of Treasury auction awards seems unlikely to succeed with this system, because the auction process reveals more information about the actual distribution of bids. If the distribution of bids initially contains an unusually large bid at a high price, the ascending price reveals that a large number of bidders underestimated the value of the security and therefore can raise their bids. While the final auction price may be unusually high, the individual who attempted to corner will not gain a large share of awards.

In the past, formidable obstacles have stood in the way of conducting Treasury auctions by open outcry, obstacles mostly absent from the typical auction of a unique art object. At one time, it might have been difficult even to assemble all bidding in a single place, but

today, open communication lines to Federal Reserve offices and to individual bidders could overcome that geographic problem, just as telephone bidding does in major art auctions.

More difficult, and unlike an auction of a single work of art, bidders must cry out not just a price, but a quantity at each price. Bidding must ascend from low prices, where the demand for securities exceeds the supply, to the market-clearing price, where demand exactly equals supply. As envisioned in the joint report, bidding would have to proceed in discreet "rounds," starting from a low price and rising by small increments. As the results of each round were announced, participants could drop out, resubmit the same quantity, or adjust the quantity in light of information gained from the previous round.

Auctioning Treasury securities by open outcry would consume too much time to be feasible with current auction technology. Each round of bidding probably would take more than an hour using today's paper tenders, manual tabulation, verification of payment status, transmission to the Treasury, and final compilation. Each open-outcry auction might consume most of a day, during which unfolding world events might be moving market fundamentals enough to change bidding decisions and to prevent the process from moving smoothly toward an equilibrium market-clearing price.

The Treasury expects to automate the current sealed-bid, multiple-price auction process this year, allowing telecommunication of tenders and computerized compilation of bids. Going any further toward auctions by electronic open outcry would require substantial investments, both in hardware and software and, before that, in design. One critical design question would involve the information feedback provided at the end of each round of bidding. Simply announcing the amount of excess demand might not be sufficient for bidders to detect an aggressive effort to dominate the awards. On the other hand, a complete (anonymous) list of all bid quantities

received might prove too cumbersome for rapid rounds of bidding. Another design question involves the computer and telecommunications capacity required to receive large numbers of bids virtually simultaneously. Too little is known at this time, but automation could conceivably reduce the turn-around time between successive rounds of bidding to a matter of minutes, with an entire auction lasting perhaps less than an hour.⁶ Given the information benefits of open outcry, serious further exploration seems warranted.

■ Conclusion

The U.S. Treasury securities market is the largest and most efficient market in the world today. Nonetheless, the events of 1991 demonstrated that concerted strong bidding in the primary market for an issue could result in a squeeze in the secondary market. More aggressive policing of the current rule against control of more than 35 percent of a new issue promises to reduce chances of similar episodes in the future.

Embedded in the current sealed-bid, multiple-price auction process are both incentives and opportunities for a bidder to seek a dominant share of awards. New methods of conducting auctions are worth serious consideration if they would reduce the need for arbitrary policing of the market. A single-price, sealed-bid auction would reduce the

current incentive of each bidder to discover the price at which other bidders will make tenders. With less of their activity focused on discovering one another's intentions, bidders would have less opportunity and incentive to corner an issue. Perhaps more promising would be to enlist telecommunications and computer technology in conducting auctions by electronic outcry, relying on competition among the bidders themselves to limit the share of auction awards controlled by any single bidder.

■ Footnotes

1. A squeeze occurs when there is an unexpected restriction of supply relative to demand for a particular security, manifested by an unusually high price of that security relative to prices of comparable securities.
2. See *Joint Report on the Government Securities Market*. Washington, D.C.: Department of the Treasury, Securities and Exchange Commission, and Board of Governors of the Federal Reserve System, January 1992. A somewhat more technical examination of these matters appeared recently in Vincent Reinhart, "Theory and Evidence on Reform of the Treasury's Auction Procedures," Federal Reserve Board, Finance and Economics Discussion Series No. 190, March 1992.
3. Federal Reserve Bank and government tenders are also awarded in full at the price established for noncompetitive bidders, but the amount of these awards is added to the amount being auctioned.

4. Milton Friedman has been a long-time proponent of this procedure. For references, see *Joint Report on the Government Securities Market*, p. B-22.

5. See Robert J. Weber, "Multiple-Object Auctions," in Richard Engelbrecht-Wiggins, Martin Shubik, and Robert M. Stark, eds., *Auctions, Bidding, and Contracting: Uses and Theory*. New York: New York University Press, 1983.

6. An alternative to rounds of bidding might be to conduct auctions on an interactive, open-screen basis: Qualified bidders would have access directly (or at a Federal Reserve Bank) to a telecommunications terminal. Beginning hours (or days) before the close of an auction, a screen would display an instantaneously updated list of all (anonymous) bids received and their implied auction stop-out price. Bidders would have the right to alter their bids up until the close of the auction, when the final stop-out price would be determined, with awards made to all who bid at or above that price.

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