

Competition in Underwriting of Government Debt Auctions

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1. Introduction

The choice of mechanism to sell government debt is a policy issue of considerable importance that raises important research questions such as: How do different formats of competition amongst bidders affect revenue to the debt manager? How does the choice of mechanism affect information production? How does it affect the cost of issuance? And so on. In this project we attempt to answer these questions using a unique dataset from the Indian government debt auction.

Government security auctions worldwide commonly use one of two structures. In a discriminatory auction (DA), winning bids are filled at the bid price; that is, the demands of the bidders are met by starting with the highest-price bidder down, until the entire quantity is exhausted. In a uniform-price auction (UPA), winning bidders pay a price, called the stop-out price for each unit they receive; the stop-out price is simply the lowest winning price, i.e., the maximum price at which the aggregate demand equals the supply being auctioned. A substantial literature has examined the theoretical implications and empirical performance of these auction forms, in particular, the possible dominance, from the seller's viewpoint, of one auction over the other. The right choice of the format theoretically remains inconclusive and is an empirical question.

Government security auctions also sometimes fail; for instance, the Chinese treasury auction on June 23, 2015, of Rmb26 billion attracted total bids of only Rmb25.16 billion, the second time this had happened within a year.² To guard against such failure and, more generally, against

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² See "China treasury bond auction failure raises concerns on debt plan," Financial Times, June 24, 2015 at:

outcomes in the main auction that are less than satisfactory, the auction of government securities in India employs a unique two-stage mechanism. In the first stage, the RBI, as debt manager, auctions the underwriting of the aggregate amount of the securities on offer. All primary dealers must mandatorily participate in the underwriting auction. This underwriting auction is discriminatory in style; its outcome determines the number of winning underwriters, the amount each winning entity underwrites, and the fees (“commission”) received for providing these underwriting services. Upon completion of the underwriting auction, the results are announced, and the second stage, the actual auction of the debt, commences. This second stage auction is either a DA or a UPA, and participants in this stage include the primary dealers as well as other financial market participants. Outcomes in this second stage are determined in the usual fashion—but with an important caveat: the RBI may, at its discretion, ignore all or part of the second-stage submissions and “devolve” any or all of the auctioned quantity to the winning underwriters in the first stage.

The economics of this two-stage auction forms our focus in this paper. The framework that informs our analysis is straightforward. By obtaining insurance via the underwriting, the government gains an option, the right to “put” any part of the supply in Stage 2 back to bidders in the event of unsatisfactory second stage outcomes such as insufficient demand. (We note that over the period of our study, the RBI in exercised this right over 8% of the auctions.) Set against this benefit is the costs of obtaining this insurance. The direct costs are the underwriting commissions paid, the magnitude of which depends on bidding behavior in the underwriting auction, behavior that will in turn depend on a number of factors including the anticipated strength of demand in the second round and the possibility of devolvement, whether the main auction is a UPA or a DA, and so on. In addition, there may be indirect costs in the form of “bid shading” by participants in the main auction, the extent of which may depend on whether the bidder is also a winner in the underwriting auction. The nature of information revealed in the underwriting auction and whether the main auction is a DA or a UPA also affects the indirect cost.

Motivated by these considerations, there are three broad sets of questions we investigate in this paper. First, we study the informational impact of the first-stage underwriting auction outcomes

<http://www.ft.com/cms/s/0/00129228-1a3c-11e5-a130-2e7db721f996.html#axzz4GqRqBY8O>

on second-stage behavior and outcomes, in particular, the extent to which first stage behavior and outcomes presage second-stage behavior and outcomes including the strength of second-stage demand, the bidding behavior in the second stage, the likelihood of devolvement following the second stage, and how second-stage bidding behavior is affected by being a “winner” in the underwriting auction. Second, we estimate and report the direct cost and benefits of this unique underwriting mechanism, and finally, we examine the differential impact on auction outcomes of the second stage auction being a DA versus a UPA; we are interested in both the impact this choice has on first stage underwriting auction behavior and outcomes, as well as the broader question of whether from the seller's standpoint one auction form dominates the other.

We examine these and other questions using a proprietary data set obtained from the RBI that covers 494 auctions of government securities in India from 2006-2012. The dataset masks individual bidder-bid data for confidentiality. The data set enables us to trace bidders through the different stages of the auction and potentially through the sample period across auctions. This allows us to look at the distribution of bids submitted by the primary dealers in Stage 1 and how they differ across the two auction mechanisms used in Stage 2. We are also able to relate bidder-specific variables in Stage 2, with outcomes in the underwriting auction in Stage 1. The auctions are roughly at a weekly frequency, so we learn about economic responses of agents over relatively short horizons. In addition, we are also able to obtain secondary market prices for 92% of the auctions in our sample. Since most of the auctions are for re-issues of existing securities, this means we observe market prices of the auctioned securities before and after auction outcomes. Using the pre- and post-auction market prices we can compute refined measures of bidding and the volatility of pre- and post-auction prices. And finally, of importance, the data contains both UPAs and DAs in the main auction, including one year (2009) when there were several auctions of each type. This facilitates direct comparison of outcomes under DAs and UPAs.

2. Does Underwriting Auction Produce Information?

Looking at the impact of the first stage underwriting auction on the second stage behavior and outcomes, we find strong evidence that underwriting auction outcomes predict the nature of the second-stage selling outcomes such as devolvments, aggregate demand and bidding behavior in

the second stage and relative difference of auction identified price to post auction secondary market price.

We find that the primary dealer's bid-shading, defined as the difference of the value weighted bids by primary dealers in the main auction relative to the secondary market price is, ceteris paribus, larger the more "pessimistic" are underwriting auction outcomes (especially, a higher underwriting auction cut-off price); bid shading is also greater the larger the amount underwritten in the first round. These results are obtained after controlling for information in pre-auction secondary market prices, which are trumped by information revealed in the underwriting auction. They are also economically significant; for example, one standard deviation increase in the amount underwritten increases bid shading by about 3.4%.

Measures of information produced in the first stage auction are also statistically and economically significant in explaining the strength of demand and the probability of devolvement in the second stage auction. In particular, measures of aggressiveness of the underwriting bids (such as the stop-out yields) and bidder uncertainty in the first stage auction matter. And once again, these auction-related variables trump measures constructed from secondary market information such as volume of trading prior to bidding in explaining the outcomes in stage 2 auctions.

3. Direct Costs and Benefits of Underwriting

We measure the direct cost as the total amounts paid as underwriting commission (for both the MUC and the ACU) summed over all the auctions in our data. The direct realized benefit is measured as the extra revenue generated from devolvement, i.e., it is the sum over all devolved auctions of the amount:

$$((P_{dev} - P_{auc}) \times \text{Devolved Amount})/100;$$

where P_{dev} is the price (per INR 100 in face value) at which the devolved amount is devolved and P_{auc} is the auction stop-out price (per INR 100 in face value) that would have prevailed in the absence of the devolvement. The direct benefit is well explained in Figure 1 below. The figure represents three different prices for a particular bond: the pre-auction value weighted secondary market price (the first point in the graph), the auction identified price (the middle

point(s) in the graph) and the value weighted secondary market price post auction (the third point in the graph). For the devolved auctions there are two potential auction identified prices: the price that RBI chooses as auction final price (the top point) and the price that would have prevailed if RBI did not devolve the auction (the bottom point). We define the difference between these two points as the net benefit for RBI per bond as it can now sell the bond at a higher price. This difference multiplied by the notified amount is the benefit of underwriting to the RBI.

Figure 1: Auction Identified Price relative to Devolved Price

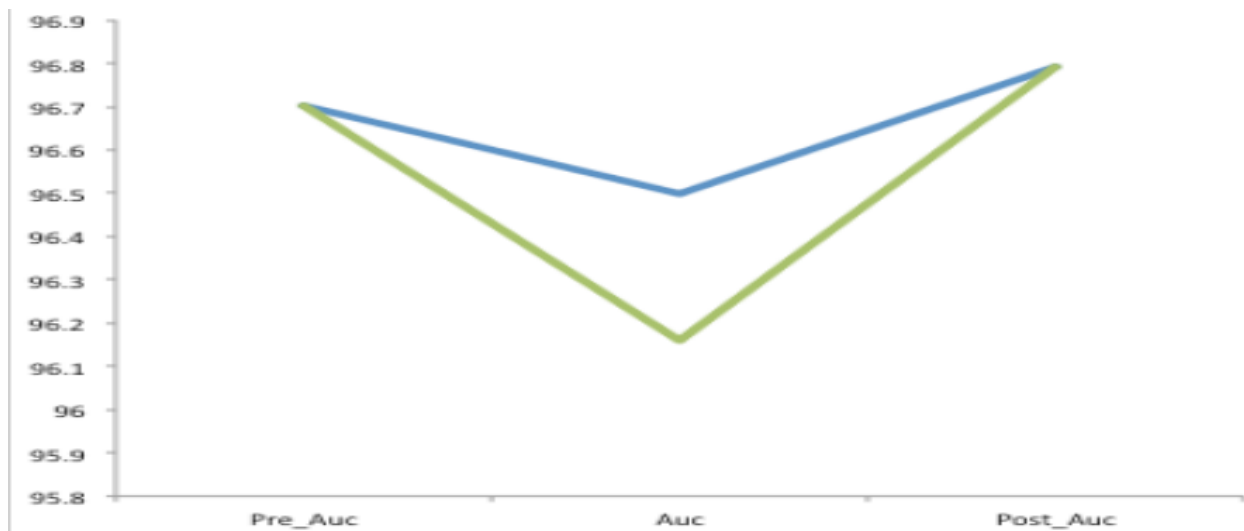


Table 1 below summarizes the benefits of the underwriting auction. The RBI is able to put the residual supply below the devolvement price back to the insurers and thus able to sell the securities at the devolvement price which is higher than the market-clearing price in the auction. It turns out that these benefits are higher for discriminatory auctions, on a per auction basis. The sum of this item over all auctions is reported in the first column in table 1 as total benefit. Hence the total benefit from underwriting to RBI is about INR 9.44 billion. The average benefit reported in the second column is a simple average of the first item over all auctions. The fourth column in table 1 reports the total amount of commissions paid by RBI per auctions. The last column is the difference between average benefit and average cost. Interestingly, RBI had a net positive benefit in all auctions and lost money in discriminatory auctions.

Table 1: Direct Costs and Benefits of Underwriting

This table summarizes the gross and net benefit of underwriting to the RBI. The numbers are in INR billions. The benefit is calculated by using the devolved auctions. For uniform auctions, this amount is simply the difference between the devolvement price and the price that would have prevailed based on auction bids (multiplied by the notified amount). For discriminatory auctions, it is the difference between the devolvement price and the value weighted average price above the cut-off that would have prevailed absent devolvement (again, multiplied by the notified amount). The cost is simply the direct cost of the underwriting commissions that were paid over all auctions.

	Total Benefit	Avg Benefit	Std Dev	Avg Cost	Avg Net Benefit
All Auctions	9.44	0.0191	0.073	0.0170	0.0021
Uniform Auctions	5.39	0.0134	0.046	0.0086	0.0048
Discriminatory Auctions	4.05	0.0445	0.139	0.0544	-0.0098

4. Does Uniform Price Format Dominate Discriminatory Price Format?

We compare various statistics of the auction outcomes for DA vs. UPA and report them in table 2 below. Underwriting commissions for DAs are significantly (more than six times) higher on average and exhibit more volatility than those for UPAs. Award concentrations in Stage 1 (measured as underwriting share) are also higher for DAs. We also find that bid-shading (measured as the relative difference between value weighted bids in the auction relative to the post auction secondary market price), by the primary dealers are higher in the DA format than in the UPA format.

The greater bid-shading we find under DAs suggests that perhaps the benefits of obtaining underwriting insurance (the ability to “put” the securities to winning underwriters) may be greater for DAs than UPAs. And, indeed, we find that while devolvments in our sample occur across both formats, proportionately almost twice as many DAs were devolved (13.2%) as UPAs (7.4%). As reported in table 1 the average benefits per auction are almost four times higher under DAs than under UPAs. However, this is insufficient to offset the higher underwriting costs under DAs, which are, as we noted, on average more than six times higher than under UPAs. As a consequence, while the average net benefit per UPA is INR +4.8 million, there is a small net loss of INR 1 million on average for DAs. These results collectively lend support to the policy view that UPAs may better serve the interest of the seller in this two-stage mechanism than DAs. Aggregated over both auction forms, we find that the underwriting scheme has roughly broken even overall over the 6+ years of our study with a small average net benefit per auction of INR +2.1 million.

Table 2: Comparison of Uniform Price Format and Discriminatory Price Format

	Uniform	Discriminatory	Difference
Underwriting Cut-off (bps)	1.98	13.14	11.16***
Underwriting Share (in %)	2.53	6.63	4.10***
Main Auction Share (%)	2.40	2.68	0.28***
Average Underwriting bid range (bps)	1.45	8.72	7.27***
Average Underwriting bid volatility	0.63	3.66	3.03***

*** implies that the difference is significant at the 1% level using the Kolmogorov-Smirnov Test

Bidders also spread the underwriting bid more in the DA format, perhaps signifying more information asymmetry and risk. Based on all the major statistics reported in Table 2 as well as other corroborative regression analysis, we find that the UPA format dominates the DA format from RBI's perspective in this special scheme of debt auction with underwriting.

5. Conclusion and Policy Implications

In this project we analyzed a unique two-stage auction process to promote underwriting competition to underwrite and sell government securities. We find that the stage-1 outcome differs a great deal depending on whether the stage-2 auction is discriminatory or uniform price. Average underwriting premia are higher when discriminatory auctions are used in stage-2, the concentration of underwriting allocation is also higher as are underwriting cutoff rates, when stage-2 auction is of discriminatory format. We find that the first stage auction of underwriting provides significant information about the possible devolvement (tail risk) of the main auction. It also produces more information about post auction secondary market prices relative to pre-auction variables and the main auction selling securities. The insurance paid by the government has a direct cost (of commissions), and an indirect effect through the bidding, but the insurance provision is beneficial in mitigating devolvement risks and the steps that underwriters must take to avoid devolvement. We provide empirical evidence of these components. Overall discriminatory auctions appear to result in higher direct and indirect costs, relative to uniform price auctions.