

**Underwriting Government Debt Auctions:  
Internet Appendix**

October 10, 2019

# 1 Institutional Description of the Two-Stage Auction

The auction of Government of India securities is conducted by India's central bank, the Reserve Bank of India (RBI). Each year, the RBI issues calendars of auctions in March and September listing the auctions to be held during, respectively, the first and second halves of the financial year. The calendars provide, for each auction, a 6-to-7 day time frame within which the auction will be conducted, the amount that will be auctioned (called the "notified amount"), and the maturity bucket of the auction (e.g., 5-9 years, 10-14 years, etc.). The auctions could be for new issues or for "re-issues," that is, for the further issue of a specified amount of an already existing security. Auctions are typically held on Fridays; the precise details of the security being auctioned are made available the preceding Monday and settlement takes place on the Monday following the auction.

What makes the auction distinctive is its use of a two-stage structure with an "underwriting auction" preceding the main auction. The underwriting auction is held the day before the main auction (so typically on a Thursday) and the entire notified amount of the main auction is underwritten at this point by the primary dealers, all of whom are required to participate in the underwriting auction. The underwriting auction determines (i) how much of the main auction's notified amount will be backstopped by each of the participating dealers, and (ii) how much each primary dealer will receive as underwriting commission for providing this backstop. Underwriting involves nontrivial risk: the RBI has the right, exercised at its discretion, to disregard the bids received in the second-stage main auction and "devolve" the entire notified amount to the primary dealers according to their first-stage backstopping commitments at a price determined by the RBI; the situation is akin to one where the auctioneer has a (secret) "reserve price" and exercises the devolvement right if demand in the main auction is insufficient to reach this reserve price. We describe below both the underwriting and the main auctions.

## The Underwriting Auction

The underwriting part of the auction has two components to it. First, all primary dealers are subject to a mandatory *minimum underwriting commitment* or MUC. The commitment amount is the same across all dealers, irrespective of differences in their capital or balance sheet size.<sup>1</sup> The MUC is chosen such that aggregated across all dealers, the total commitment is at least 50% of the notified amount. For example, through much of the period of our study, there were 17 primary dealers, so the typical MUC was around 3% of the notified amount per dealer.<sup>2</sup>

The second component is the auction part. All primary dealers are required to submit bids for *additional competitive underwriting* or ACUs for the remaining 50%. A bid is a quantity-commission pair denoting the commission rate—i.e., the compensation—the dealer wants for underwriting the specified quantity. Each dealer may submit multiple bids (effectively, may submit an underwriting supply curve), but there are two constraints specifying limits on the total quantity bid. Each dealer must bid for a *minimum* total quantity in the ACU; this minimum is set to be the same across all dealers and is again chosen so that the total bids amount to at least 50% of the notified amount. For instance, through much of the period of our study, there were 17 primary dealers, so the minimum quantity each dealer had to bid for in the ACU was around 3% of the notified amount. In addition, there is a *maximum* cap: the total bids submitted by a dealer cannot exceed 30% of the notified amount.

The underwriting commissions are worked out separately for the MUC and ACU parts. For the ACU, the commission rates are determined by the auction. The rules specify that

The auctions could be either uniform price-based or multiple price-based [i.e., discriminatory] depending upon the market conditions and other relevant factors,

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<sup>1</sup>See, Revised Scheme for Underwriting Commitment and Liquidity Support, RBI document, Money, Banking and Finance, Volume 77, May 2006. Most of the institutional details are derived from RBI publications. See also Sahana and Ghose (2012).

<sup>2</sup>Currently (November 2014), there are 20 primary dealers, and the MUC per dealer is 2.50% of the notified amount.

which will be announced before the underwriting auction for each issue.<sup>3</sup>

In practice, however, the ACU auctions have followed a discriminatory format. Organizing the submitted quantity-commission rate pairs in ascending order by commission rate, the cut-off commission rate is determined as the smallest commission rate at which the total submitted quantity equals or exceeds the amount to be filled via the ACUs, i.e., the amount not underwritten by the MUCs. (Since the total ACU bids submitted are required, by construction, to exceed the amount not underwritten by the MUCs, there is no risk of a underwriting shortfall.) Commission rates for the ACU are then allocated accordingly.

For the MUC component, the RBI compensates the dealers differentially depending on how aggressively they bid in the ACU auction. Those dealers who win 4% or more of the notified amount in the ACU get a commission on their MUC amount equal to the weighted average of *all the accepted* bids in the ACU. All other dealers will receive a commission on their MUC equal to the weighted average rate of the *three lowest* bids in the ACU.

## The Main Auction

The main auction of the notified amount is itself a standard government securities auction in many respects. As with other treasury auctions worldwide, the auction may be a uniform-price or discriminatory auction; the auction format that will be followed is announced in advance of the auction (typically on the Monday of the week the auction is conducted). Our data set consists of both discriminatory auctions and uniform-price auctions; the latter are much more preponderant in the data during our period of study, accounting for just under three-quarters of all auctions (403 out of 494). This leaves in the data with over 91 discriminatory auctions, giving us a unique opportunity to explore how dealers underwrite securities under two very different auction mechanisms.

Secondly, again as is not uncommon in treasury auctions worldwide, the auction could be for the issue of a new security or for the “reissue” of an existing security (i.e., for the

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<sup>3</sup>See <http://www.rbi.org.in/scripts/NotificationUser.aspx?Id=2804&Mode=0>

sale of a further quantity of a previously-issued security).<sup>4</sup> Our data base consists of both new issues and re-issues. Auctions for new issues are conducted on a yield basis (i.e., bids are yield-quantity pairs) while auctions of re-issues are conducted on a price basis (bids are price-quantity pairs).

Finally, there is one wrinkle on the standard formats. Each primary dealer is required to bid for an amount in the main auction at least equal to the amount of the dealer's commitment in the ACU and MUC combined. Since the entire notified amount has been underwritten, requiring each dealer to bid at least its underwritten amount ensures there is no danger of the auction failing—there is always adequate demand in the main auction to take up the entire notified amount. Nonetheless, the RBI retains the right to disregard any or all of the bids received in the main auction, and instead to devolve any balance amount to the primary dealers according to their underwriting commitments, and at a price that is set by the RBI.

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<sup>4</sup>For example, all four auctions conducted by the RBI on September 19, 2014, were for re-issues of existing bonds—INR 20 billion in face value of the 8.27% bond originally issued June 9, 2014 and maturing June 9, 2020; INR 60 billion in face value of the 8.40% bond originally issued July 28, 2014 and maturing July 28, 2024; INR 20 billion in face value of the 8.32% bond originally issued August 2, 2007 and maturing August 2, 2032; and INR 20 billion in face value of the 9.23% bond originally issued December 23, 2014 and maturing December 23, 2043.

Figure 1: Kernel Densities for Stage-1 and Stage 2 Outcomes

This figure provides kernel densities for selected Stage 1 and Stage 2 outcomes. The two figures in the top panels relate to Stage 1 outcomes; the one on the upper left concerns underwriting allocations, while the one on the upper right concerns average underwriting cut-off rates. The two figures in the bottom panels relate to Stage 2 outcomes; the one on the bottom left looks at bid-shading in the main auction, while the figure on the bottom right compares the actual price to the counterfactual price (that would have obtained had the auction not been devolved) in devolved auctions. Within each of the four figures, the dotted lines corresponds to the second stage auction being a UPA while the solid lines correspond to the second stage being a DA. In all cases, the shaded area represents the bootstrapped standard error.

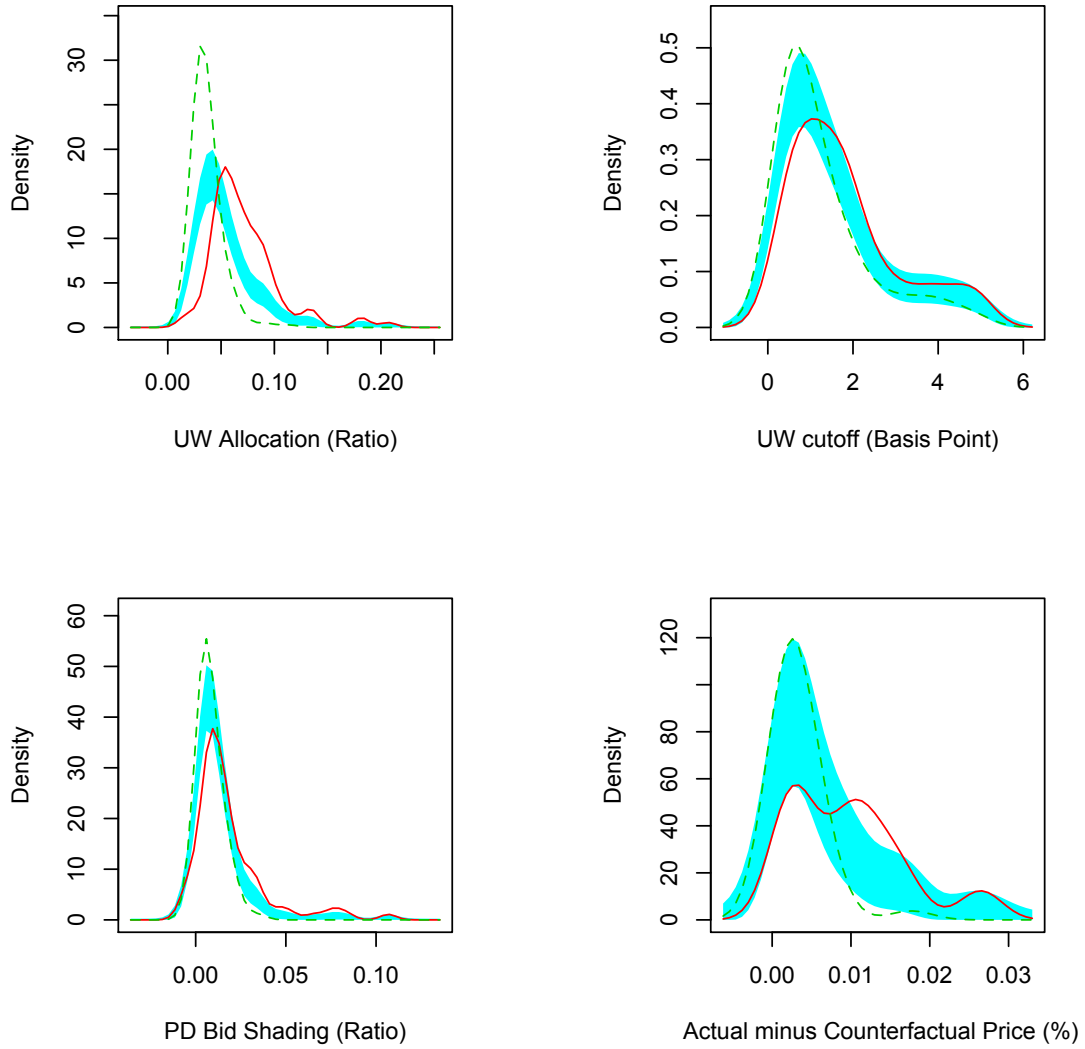


Table 1: Stage 1 Auction Outcomes

This table provides summary statistics of outcomes in the first stage underwriting auctions in our sample divided into two groups: those underwriting auctions for which the second-stage main auction was a uniform-price auction and those for which it was a discriminatory auction. The underwriting auction outcomes include the underwriting cut-off, i.e., the highest winning underwriting bid; the average underwriting share (measured as a percentage of the total auction notified amount) won by each winning bidder; the average share won by each bidder in the main auction; the average range of underwriting bids, averaged first over individual bidders in an auction, then averaged over the auctions; and the average underwriting bid volatility, i.e., the variance of bids submitted by each individual bidder, averaged over each auction and then averaged over all the auctions.

	Uniform	Discriminatory	Difference
Underwriting Cut-off(bps)	1.42	2.98	1.84***
Underwriting Share (in %)	5.18	5.69	0.31
Main Auction Share (%)	2.35	2.59	0.24***

\*\*\* implies the difference is significant at the 1% level

Table 2: List of Primary Dealers in India: June 13, 2014

This table provides a list of the 20 primary dealers in India as of June 13, 2014, further identified by whether they were also banks or standalone dealers. All primary dealers have to mandatorily participate in the underwriting auction and take on mandatory underwriting commitments, as described in the text. During the period of our sample, the number of primary dealers varied between 17 and 21.

<u>Standalone Primary Dealers</u>	<u>Bank Primary Dealers</u>
ICICI Securities Primary Dealership	Bank of America
Morgan Stanley India Primary Dealer	Bank Of Baroda
Nomura Fixed Income Securities	Canara Bank
PNB Gilts	Citibank
SBI DFHI	Corporation Bank
STCI Primary Dealer	HDFC Bank
Goldman Sachs (India) Capital Markets	HSBC
	J P Morgan Chase Bank
	Kotak Mahindra Bank
	Standard Chartered Bank
	Axis Bank
	IDBI Bank
	Deutsche Bank

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Table 3: Summary Statistics of Independent Variables

This table provides summary statistics for the independent variables used in our analysis. The variables are defined in the paper.

	Mean	Median	Std Dev.
Underwriting Share (%)	5.39	2.4	5.9
Notified Amount	39.2	30	17.41
No of Bidders (Main Auction)	45.2	45	9.89
Duration	10.8	8.93	6.28
Pre Auction Secondary Market Volume	19.5	18.2	32.2
Pre Auction Secondary Market Volatility	0.12	0.08	0.16

Table 4: Underwriting Insurance Costs

This table reports the total cost of insurance premium paid by the RBI to underwriters. The insurance premium paid has two components: the minimum compulsory underwriting (MUC) and additional competitive underwriting (ACU) determined via auction. All numbers except the number of auctions are in INR billion.

Panel A : All Auctions

Mean	Median	Std Dev.	Total	No of Auctions
0.018	0.030	0.069	12.99	590
0.006	0.002	0.020	5.05	590
0.012	0.001	0.050	7.94	590

Panel B1 : Uniform Auctions

Mean	Median	Std Dev.	Total	No of Auctions
0.011	0.002	0.045	7.95	415
0.004	0.001	0.007	3.54	415
0.006	0.001	0.030	4.42	415

Panel B2 : Discriminatory Auctions

Mean	Median	Std Dev.	Total	No of Auctions
0.054	0.014	0.130	5.03	175
0.016	0.004	0.040	1.51	175
0.038	0.009	0.089	3.52	175

Panel C1 : Devolved Auctions

Mean	Median	Std Dev.	Total	No of Auctions
0.064	0.017	0.100	4.44	73
0.016	0.008	0.020	1.58	73
0.047	0.009	0.090	2.86	73

Panel C2 : Devolved Auctions

Mean	Median	Std Dev.	Total	No of Auctions
0.014	0.003	0.060	8.546	517
0.005	0.001	0.020	3.464	517
0.008	0.001	0.047	5.082	517

Table 5: The Net 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 Auction	11.0091	0.028	0.079	0.018	0.01
Uniform Auctions	6.9488	0.019	0.058	0.0091	0.0099
Discriminatory Auctions	4.0603	0.04	0.142	0.057	-0.017