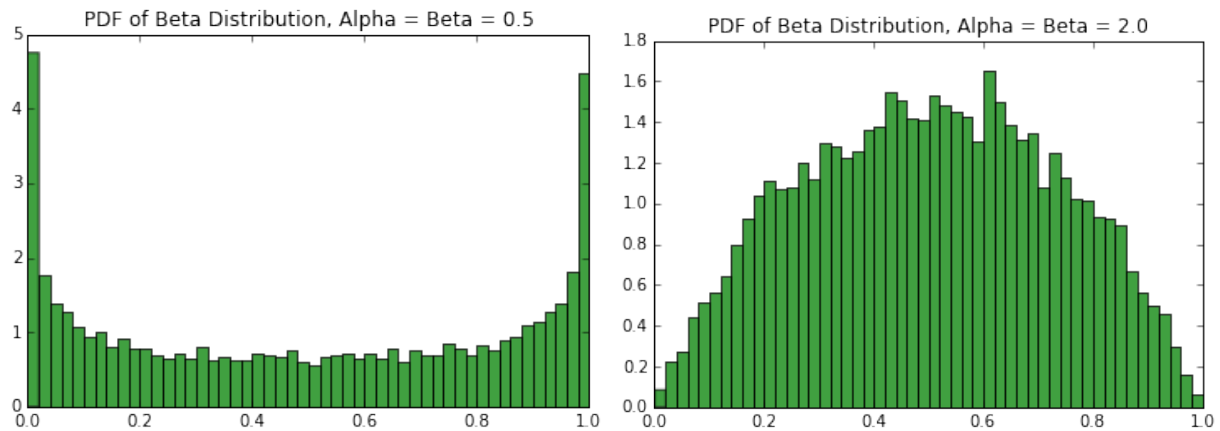


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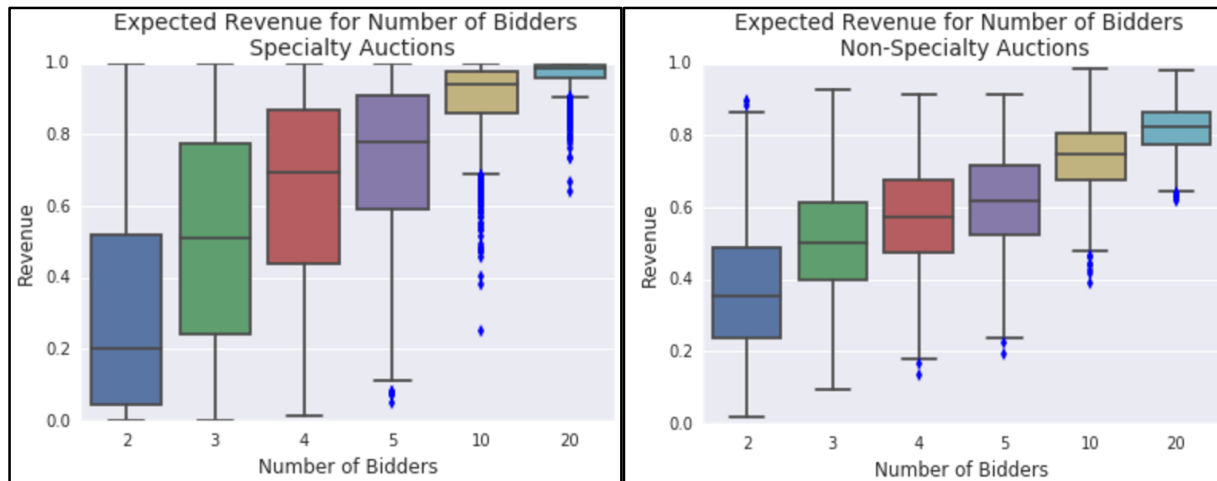
Preliminaries:

The beta distribution with alpha and beta values equal to 0.5 closely models the distribution of values seen in a specialty auction. Bidders attending a specialty auction are likely interested in only a small subset of the items, on which they place a high value. They likely place a low value on other items. A beta distribution with alpha and beta values equal to 2.0 resembles the values typically seen for a non-specialty auction.



Simulations:

The plots and tables show expected revenue for increasing numbers of bidders in both specialty and non-specialty auctions.



Expected revenue and variances for both distributions:

Specialty Auctions			Non-specialty Auctions		
Bidders	Expected Revenue	Variance	Bidders	Expected Revenue	Variance
2	0.31	0.086	2	0.37	0.034
3	0.50	0.086	3	0.49	0.026
4	0.62	0.071	4	0.58	0.022
5	0.71	0.054	5	0.62	0.018
10	0.90	0.012	10	0.74	0.009
20	0.97	0.001	20	0.82	0.004

1. Simulations demonstrate that auction revenue increases with increasing bidders for both specialty and non specialty auctions, although the effect is much more dramatic in specialty auctions. For example, the expected revenue for a specialty auction with two bidders is approximately 0.31 and increases to 0.50 with the addition of a third bidder. The expected revenue in a non-specialty auction with two bidders is approximately 0.37, and only increases to 0.49 with the addition of a third bidder.

2. As the simulations demonstrate, specialty auctions are extremely sensitive to the number of bidders. A reduction in bidders per item is expected to cause a drop in revenue. The data in table B.2 confirms that the number of attendees has been rising, while the number of items as well as the mean bidders per item has been diminishing. Karl's hypothesis is most likely correct.

3. Given the clear weakness in the specialty auction model, Karl has a few options to increase revenue:

1. Move away from the specialty auction model entirely. With this solution 1334 York Avenue would no longer auction the unique items characteristic of a specialty auction. Non-specialty auctions aren't as sensitive to the number of bidders and wouldn't be as susceptible to the revenue drops Karl has observed
2. Maintain a diverse selection of items, but hold them in inventory until a group of similar items could be auctioned together
3. Increase the number of expensive items to the list of items getting auctioned. Horses & gold snuff boxes are better than Vintage Tart & Golden retriever from the bottom line perspective (Table B.1)
4. Maintain the current auction format, but aggressively promote each auction to increase participation amongst attendees enough to increase the number of bidders per item. This last strategy is questionable because Karl's data suggests that an

increase in attendance doesn't necessarily translate to an increase in bidders per item

4. Beta simulations have been helpful for modelling these sealed bid 2nd price auctions.

Some advantages with the same are:

- Easy to create, interpret, and is extremely multi-purpose
- Doesn't depend on many assumptions, hence can fit in many applications

However, some disadvantages of beta simulations are as such:

- Alpha & Beta in auctions is hard to evaluate, this could seriously affect the outcome. We have taken a declarative approach, where we assume that $\alpha=\beta=0.5$ for specialty auctions and $\alpha=\beta=2.0$ for non-specialty auctions
- It does not incorporate conditional dependencies as they assume independence of objects. So it is potentially too simplistic for modeling real world auctions
- It fails to incorporate external variables such as Economic booms, busts, rumors, news, etc. that could greatly influence any auction or group of auctions for a specific day/season/week etc.
- It deals in expected values over a large set of events. So it could fail to mimic any specific auction with high accuracy