# Discriminatory Versus Uniform Auctions : Evidence From JGB Market

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## Abstract

1. This is the first study that investigates the effect of auction switch considering asymmetric valuation among bidders.
2. We use data of the Japanese government bonds (JGBs) market.
3. We find that discriminatory auctions lowered auction yield compared to uniform auctions.
4. Our result also shows that this effect was diminished when bidders are asymmetric in terms of valuation on the auctioned bond.

## Two Auction Formats

1. In a **discriminatory auction**, winners pay their bid prices.
2. In a **uniform auction**, all winners pay the same price (the lowest winning price) regardless of their bid prices.
3. 30-year JGBs switched from uniform to discriminatory in April 2007.

## Discriminatory Auction Outperforms Uniform Auction?

1. Ausubel et al. (2014) find that the general revenue ranking between the two formats is ambiguous.
2. This justifies conducting more empirical research on this topic.
3. However, they also argue that **in settings with symmetric bidders the discriminatory auction outperforms the uniform auction in revenues**.

## Research Questions

Based on the argument by Ausubel et al (2014), this paper studies the following hypotheses using the auction format switch of 30-year JGBs in April 2007.

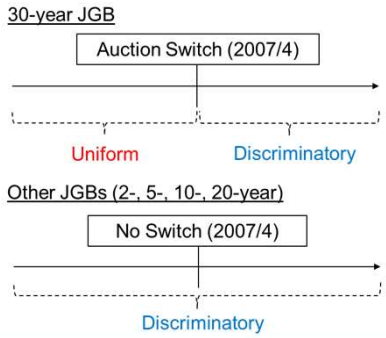
**Hypotheses**:

1. Does a discriminatory auction lower an auction yield?
2. Is the effect weaker when bidders' valuations for the auctioned bond are different (asymmetric)?

## Empirical Approach

1. We analyze the effect of the auction switch of 30-year JGBs in April 2007 by **the difference-in-difference approach**.
   - Treatment: 30-year JGBs
   - Control: 2-, 5-, 10- and 20-year JGBs
2. For the proxy of asymmetric valuation among bidders, we use either of:
   - **Difference between the highest price and the lowest price** ("WI price gap") **in the forward JGB market** (WI market)
   - **Tail** (average price minus the lowest winning price) at the auction
3. As a dependent variable, we follow previous studies and use the markup defined as auction winning yield minus either of the following reference yields to remove unobserved heterogeneity.
   - WI yield of the auctioned bond in the prior day (Simon, 1994)
   - The prior day's corresponding market yield based on maturity (Barbosa et al, forthcoming)

Figure 1. Auction switch in the JGB primary market




## Result

1. **Shifting to discriminatory lowered the markups by 1.9-2.7 bsp** and they are statistically significant.
2. However, the coefficients of triple interactions are positive and statistically significant.
3. This means that **the effect of the shift was diminished when there was a large asymmetricity** in terms of auctioned bonds' valuations.
4. This result is consistent with the theoretical argument by Ausubel et al. (2014)

## Additional Result

1. We also use a Triple-Difference approach seeing WI yield of auctioned JGBs as an additional control group.
2. The result is similar to the result in the DID approach.

Table 1. DID estimation result

| Dependent variable | Winning yield minus WI yield | | Winning yield minus the prior day's corresponding market yield | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| 30-JGB dummy × Post Apr 2007 | -0.022 ** (0.009) | -0.019 ** (0.009) | -0.027 *** (0.009) | -0.024 *** (0.009) |
| 30-JGB dummy × Post Apr 2007 × WI price gap | 0.685 ** (0.315) | | 0.864 ** (0.352) | |
| 30-JGB dummy × Post Apr 2007 × Tail | | 0.028 ** (0.012) | | 0.027 ** (0.013) |
| Other controls | Yes | Yes | Yes | Yes |
| R-squared | 0.12 | 0.11 | 0.19 | 0.18 |
| F stats | 4.16 | 4.66 | 5.57 | 5.03 |
| # Obs | 879 | 879 | 879 | 903 |

Note: Sample period is Apr 2004 - Mar 2020. Other controls include volatility, bid-to-cover ratio, bid-ask spread, log of issuance amount and its square, log of time lag from the last auction, tap issue dummy, bond fixed effect, post Apr 2007 dummy, year fixed effect, month fixed effect and linear time trend. Robust standard errors are shown in parentheses.

Table 2. Triple-D estimation result

| Dependent variable | Winning yield minus the prior day's corresponding market yield | |
|---|---|---|
| | (1) | (2) |
| 30-JGB dummy × Post Apr 2007 × Auction dummy | -0.009 (0.007) | -0.013 * (0.007) |
| 30-JGB dummy × Post Apr 2007 × Auction dummy × WI price gap | 0.665 ** (0.326) | |
| 30-JGB dummy × Post Apr 2007 × Auction dummy × Tail | | 0.033 *** 0.012 |
| Other controls | Yes | Yes |
| R-squared | 0.1748 | 0.1739 |
| F stats | 2.66 | 4.52 |
| # Obs | 1758 | 1782 |

Note: Sample period is Apr 2004 - Mar 2020. Other controls include volatility, bid-to-cover ratio, bid-ask spread, log of issuance amount and its square, log of time lag from the last auction, tap issue dummy, bond fixed effect, post Apr 2007 dummy, primary auction dummy, year fixed effect, month fixed effect and linear time trend. Robust standard errors are shown in parentheses.

## References

1. Ausubel, L. M., Cramton, P., Pycia, M., Rostek, M., Weretka, M. 2014. Demand reduction and inefficiency in multi-unit auctions. *Review of Economic Studies*, 81 (4), 1366–1400.
2. Barbosa, K., De Silva, D. G., Yang, L., Yoshimoto, H. Auction Mechanisms and Treasury Revenue: Evidence from the Chinese Experiment. *American Economic Journal: Microeconomics*, Forthcoming.
3. Simon, D. 1994. The Treasury's experiment with single-price auctions in the mid 1970's: winner's or taxpayer's curse? *Review of Economics and Statistics*, 76(4), 754–760.