# QE and the Mortgage Market during the COVID-19 Pandemic

July 25, 2023

1 FED purchases of MBS

The following figures show the daily time series of amounts and prices of FED purchases of MBAs for Fannie Mae and Freddie Mac products and 30-year maturity in the early COVID period. We plot by month the total amount by coupon and the mean price. If it only shows a dot is because there is only one month of data for that coupon. The period is January 2020 to April 2021.

Figure 1: FED purchases of Fannie Mae and Freddie Mac MBS securities in the early COVID period
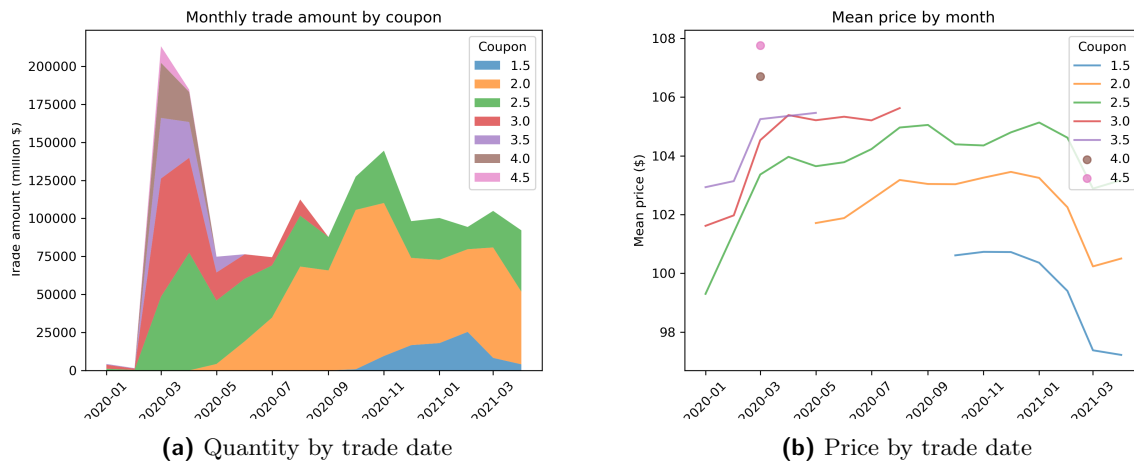
(a) Quantity by trade date   **(b)** Price by trade date

Notes: The figure shows the daily time series of amounts and prices of FED purchases of FNMA products and 30-year maturity. Colors represent different coupons.

Now, we choose the Coupon 2.5 that was traded in the majority of periods and plot the daily time series prices of FED purchases of the same product. The right panel shows the daily time series of prices normalized by the Bloomberg TBA price. The net price is then calculated as the difference between the FED price and the TBA price. This is only for FED purchases that we categorized as one month forward[1] and their respective TBA price.

Figure 2: FED purchases of Fannie Mae and Freddie Mac MBS securities in the early COVID period
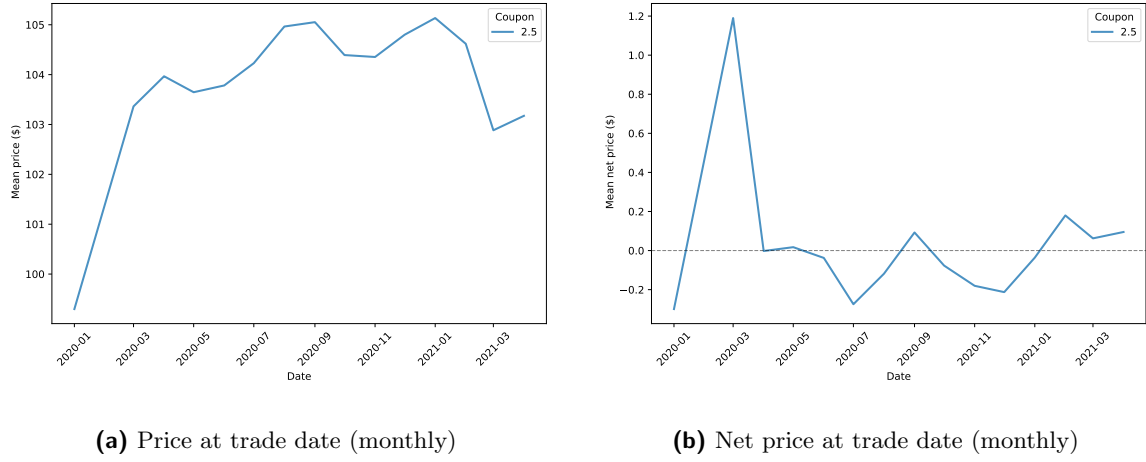
(a) Price at trade date (monthly)   **(b)** Net price at trade date (monthly)

Notes: The figure shows the daily time series of amounts and prices of FED purchases of FNMA products and 30-year maturity. Colors represent different coupons.

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[1]x months forward is defined as when the trade date is between x months and $x+1$ month before the settlement date.

2 OB Auctions in the Early Covid Period

The following figure shows a histogram of all bids for all auctions in the OB platform between January 2020 and December 2021. The product is Conforming loans with a 30-year maturity.
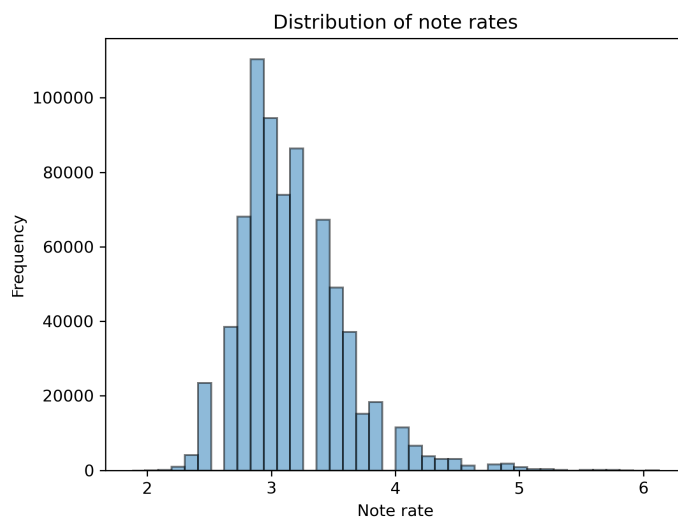
Figure 3: Histogram of all bids for all auctions in the oB platform for January, February, March, and April 2020. The product is Conforming loans with a 30-year maturity.
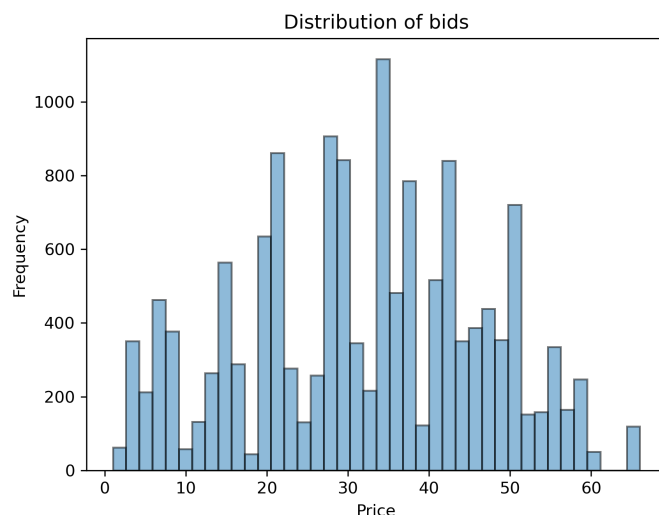
Notes: The figure shows a histogram of all bids for all auctions in the OB platform for January, February, March, and April 2020. The product is Conforming loans with a 30-year maturity.

This figure shows a histogram for the note rates by auction for the same period and product.

Figure 4: Histogram of all bids for all auctions in the oB platform for January, February, March, and April 2020. The product is Conforming loans with a 30-year maturity.

Notes: The figure shows a histogram of all note rates of auctioned loans in the OB platform for the months of January, February, March, and April 2020. The product is Conforming loans with a 30-year maturity.

Table 1 shows descriptive statistics for important outcomes at the auction level for the same period and product.

Table 1: Descriptive statistics at the auction level.

	count	mean	std	min	25%	median	75%	max
Loan amount	723382.0	286.90	133.51	14.68	185.26	267.00	370.00	1472.55
Note rate	723382.0	3.16	0.43	1.88	2.88	3.12	3.38	6.12
Price	723382.0	103.95	1.78	83.84	103.01	104.12	105.03	120.00
Days to auction	722664.0	5.01	9.03	-326.00	1.00	3.00	6.00	581.00
Number of participants	723382.0	10.96	5.66	1.00	7.00	11.00	15.00	32.00
Number of bulk bidders	723382.0	7.32	5.83	0.00	0.00	8.00	12.00	27.00
Sell rate	723382.0	0.74	0.44	0.00	0.00	1.00	1.00	1.00
Rate sell to winner	723382.0	0.44	0.50	0.00	0.00	0.00	1.00	1.00

Notes: The table shows descriptive statistics at the auction level of observation for the months of January, February, March, and April 2020. The product is Conforming loans with a 30-year maturity.

2.1 Naive comparison before after COVID

A similar table is depicted for the months of January and February and for the months of March and April. The idea is to compare the outcomes before and after COVID (tables 2 and 3 respectively).

Table 2: Descriptive statistics at the auction level January and February 2020.

	count	mean	std	min	max
Loan amount	26951.0	261.33	126.07	23.25	1184.92
Note rate	26951.0	3.98	0.39	2.75	6.12
Price	26951.0	104.01	1.33	97.90	120.00
Days to auction	26912.0	5.79	8.61	-326.00	288.00
Number of participants	26951.0	12.20	5.91	1.00	32.00
Number of bulk bidders	26951.0	8.89	6.43	0.00	27.00
Sell rate	26951.0	0.85	0.36	0.00	1.00
Rate sell to winner	26951.0	0.51	0.50	0.00	1.00

Notes: The table shows descriptive statistics at the auction level of observation for the months of January and February 2020. The product is Conforming loans with a 30-year maturity.

Table 3: Descriptive statistics at the auction level of March and April 2020.

	count	mean	std	min	max
Loan amount	52276.0	281.15	126.22	26.16	1470.00
Note rate	52276.0	3.56	0.41	2.25	6.12
Price	52276.0	104.07	1.37	94.03	120.00
Days to auction	52187.0	4.17	7.47	-244.00	234.00
Number of participants	52276.0	10.94	5.22	1.00	30.00
Number of bulk bidders	52276.0	6.58	5.72	0.00	26.00
Sell rate	52276.0	0.73	0.44	0.00	1.00
Rate sell to winner	52276.0	0.49	0.50	0.00	1.00

Notes: The table shows descriptive statistics at the auction level of observation for March and April 2020. The product is Conforming loans with a 30-year maturity.

3 OB Auctions in the Early Covid Period: Time Series analysis

This section includes a time series analysis of the OB auctions in the early COVID period. The analysis is done at the monthly level. The product is Conforming loans with a 30-year maturity. It includes the price and quantities of the auctions, as well as the number of auctions per period. Next, distress signs are explored by looking at the number of participants, the number of bids, and the number of bulk bids. Finally, the GSEs' response is by plotting the number of bids by the GSE and the number of auctions won by GSEs.

To analyze the OB auctions, we merge track each loan that was auctioned to know the MBS to which the loan was eventually pool. Then each loan is matched with an MBS coupon. The matched rate was around 95 %. Below, we can see the summary of the number of loans per coupon and statistics about the note rates that were pooled in each coupon.

Table 4: Descriptive statistics at the auction level January and February 2020.

| coupon	auctions count	note rate min	mean	median	max
1.000	5	2.000	2.000	2.000	2.000
1.500	42679	1.875	2.543	2.500	2.625
2.000	290103	2.250	2.884	2.875	3.125
2.500	283469	2.750	3.277	3.250	3.625
3.000	82924	3.250	3.694	3.750	4.125
3.500	16375	3.750	4.202	4.250	4.625
4.000	5729	4.250	4.704	4.750	5.125
4.500	1869	4.750	5.093	5.125	5.625
5.000	229	5.250	5.744	5.750	6.125

Notes: The table shows descriptive statistics at the auction level of observation for the period January 2020 to December 2021. The product is Conforming loans with a 30-year maturity.

For this analysis, we define net bid as the difference between the auctions in OB and the TBA Bloomberg price on the day of the auction. Hence, the collapsed OB auction bids are merged by coupon with the TBA Bloomberg price. We focus on conforming loans with a 30-year maturity with 2 months forward.

3.1 Prices and Quantities

The following figures show OB auctions mean, median higher bid, quantities, and the number of auctions that occurred daily from January 1st to December 31st, 2021. We focus on 2.5, 3.0, and 4.0 coupons.

Figure 5: OB auction outcomes.
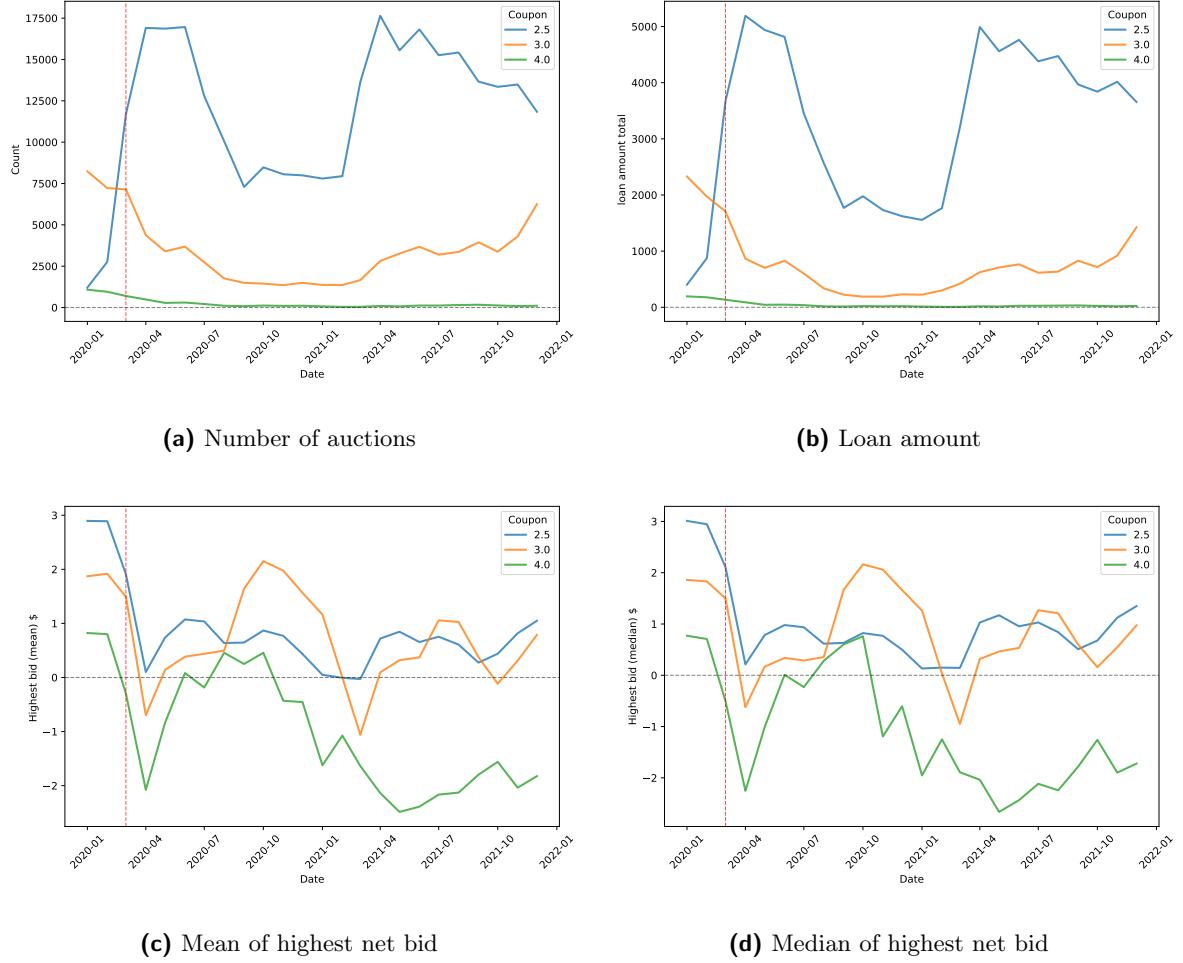
(a) Number of auctions

(b) Loan amount

(c) Mean of highest net bid
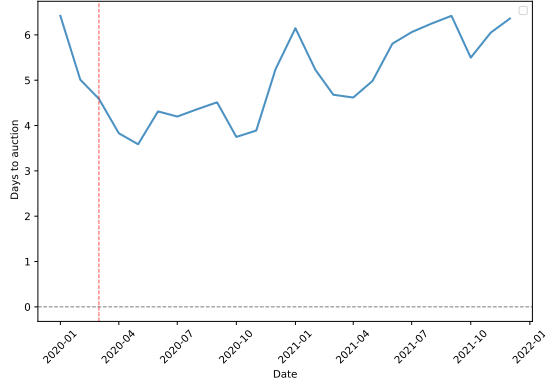

(d) Median of highest net bid

Notes: The figure shows the time series of auction outcomes for Conforming loans with a 30-year maturity. The vertical line is March 1. The net bid is calculated by subtracting the TBA Bloomberg price for the same coupon and two forward months from the OB auction price.

3.2 Distress signs in the OB auctions

Below, we show distress and illiquidity measures in the OB auctions during the early Covid period. The variables are defined as follows:

- **Days to auction**: Number of days between the auction date and the date the loan originated.

- **Number of participants**: Number of participants in the auction.

- **Winner Sell rate:** Rate to which the loan is sold to the auction participant with the highest bid. Since the highest bid is not always the winning bid because sometimes the winner's bid is missing, and other times the committed investor is not the one with the highest bid.

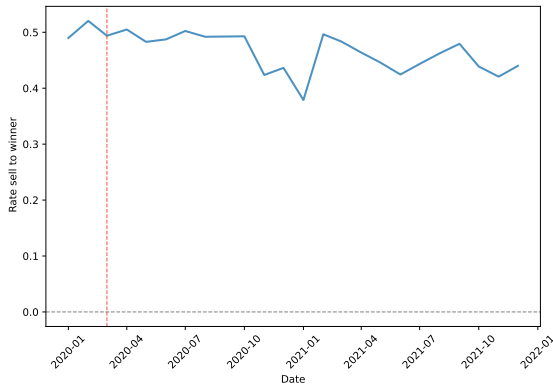- **Fraction of bulk bidders:** Fraction of bids that are bulk bids.
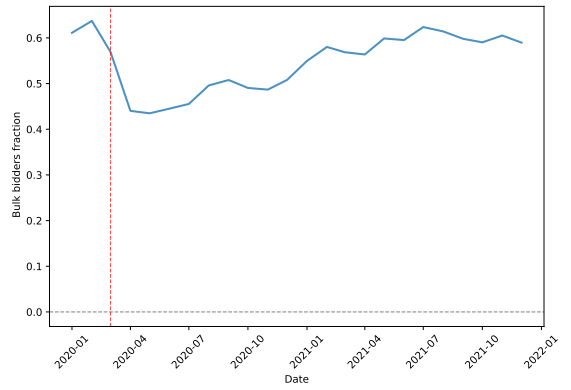
Figure 6: OB auction outcomes.

(a) Days to auction
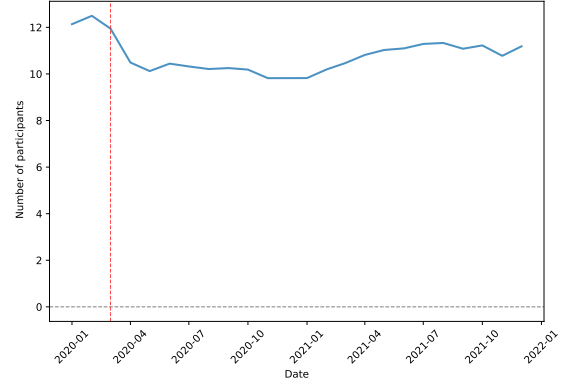
(b) Number of participants

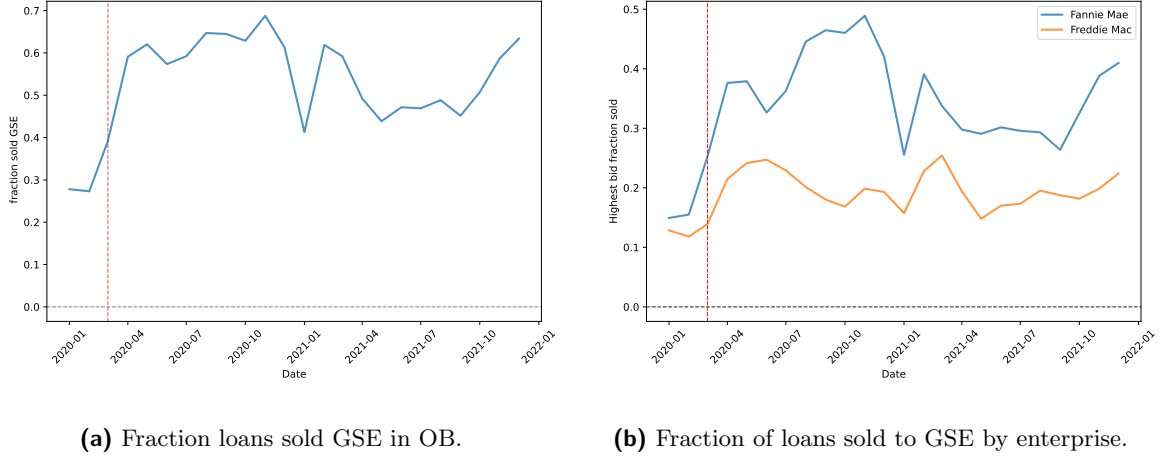**(c)** Winner sell rate

(d) Fraction of bulk bidders

Notes: The figure shows time series of auction outcomes for Conforming loans with a 30-year maturity. The vertical line is March 1.

3.3 GSE response

In this section, we show the GSE response to the covid crisis. The variables are defined as follows:

- **Fraction of loans sold to GSE**: Fraction of loans sold to the GSEs.

Figure 7: OB auction GSE response.

(a) Fraction loans sold GSE in OB.　　　**(b)** Fraction of loans sold to GSE by enterprise.

Notes: The figure shows time series of auction outcomes for Conforming loans with a 30-year maturity. The vertical line is March 1.

3.3.1　Comparison GSE vs non-GSE

Now we compare the highest bids of the auctions when the GSE is the committed investor and when the GSE is not the committed investor. More formally, we define:

- **auction transaction:** One of the non-GSE participants is the committed investor and the bid is in the sample. For 52 % of the transactions, a non-GSE is the committed investor, and 7 % of the time the bid is not in the sample. These observations are eliminated from the analysis.

- **cash window transaction:** The GSE is the committed investor. These are 48 % of the transactions. All highest bids are included in the analysis.
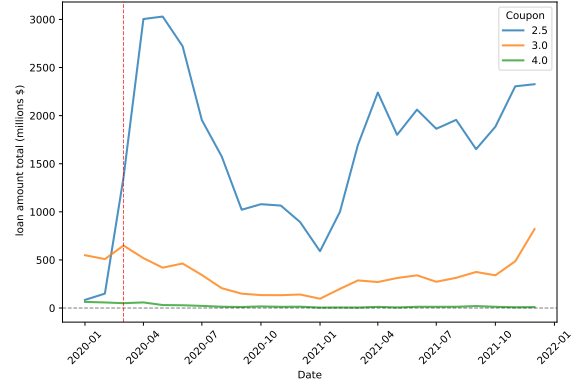
See ideally, we will plot the accepted bids, but these are not always in the data. Actually, 27 % of auctions for this type of loan do not have the committer investors bid (70 % of times the bid is not in sample the GSE is the committed investor).
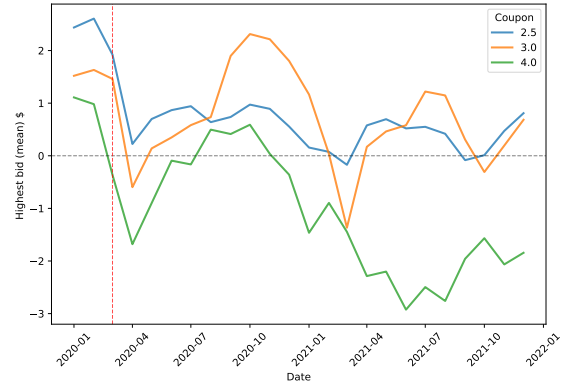
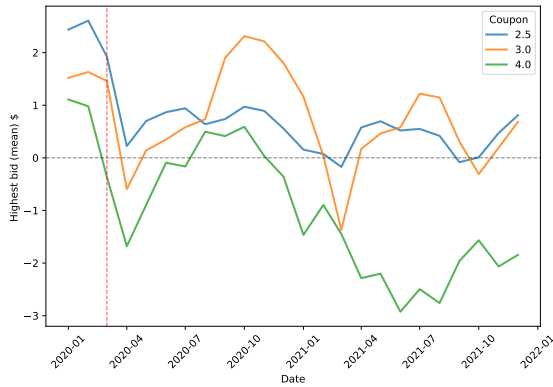Figure 8: OB auction outcomes.
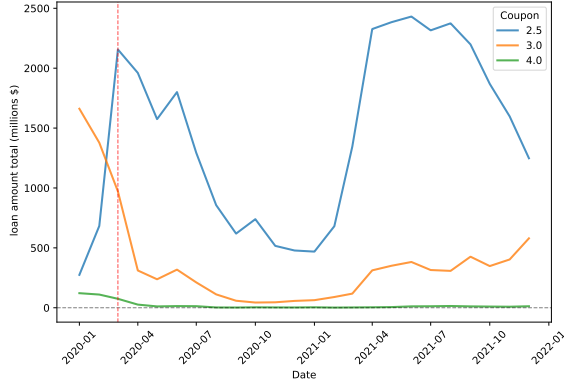
(a) Loan amount auction.
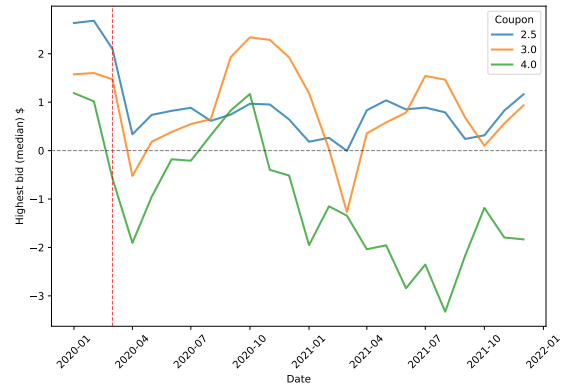
(b) Loan amount cash window.

(c) Mean of highest net bid auction.

(d) Mean of highest net bid cash window.

(e) Mean of highest net bid auction.

(f) Median of highest net cash window..

Notes: The figure shows the time series of auction outcomes for Conforming loans with a 30-year maturity. The vertical line is March 1. The net bid is calculated by subtracting the TBA Bloomberg price for the same coupon and two forward months from the OB auction price.

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