The Demand for Treasury Securities at Auction

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Abstract

This study empirically analyzes the demand for Treasury securities at auctions over the period October 1998 through July 2010 from the perspective of bid composition and the influence of demand at auction in the secondary market. We find that aftermarket returns are positively related to demand at auction, but negatively related to both the competitive acceptance ratio and the bid-to-cover ratio. We also find evidence that demand at auction for Treasury securities increases with the noncompetitive total ratio, as well as the bid-to-cover ratio, but it decreases with the competitive acceptance ratio.

I. Introduction

Since October 1998, the US Treasury has switched to uniform price auctions in order to more efficiently market new Treasury security issues. In this system, all securities are awarded at the market clearing price. Prior to the uniform price auction system, the Treasury adopted multiple price-discriminatory auctions, in which bidders would pay the price they bid and the reported yield was the weighted average of all accepted yields. Under this prior pricing mechanism, the "winners' curse" could (easily) occur, in that successful bidders needed to pay the actual price at bid, which could be greater than the market consensus. Presumably, with the current uniform price system, the fear of the "winner's curse" can be substantially reduced, leading to more aggressive bidding (Malvey and Archibald, 1998).

Rising confidence among investors would likely increase the demand for Treasury securities and subsequently eventually affect the secondary market for those Treasury issues. Thus, how can biddings at auction reflect demand for Treasury securities? How can demand at auction influence the secondary market? We investigate those issues in this study. The published research in this regard are still limited in the literature since prior studies mainly focus on the effectiveness of the uniform price system from the perspective of market efficiency (Bikhchandani, Edsparr and Huang, 2000; Chatterjea and Jarrow, 1998; Godbout, Storer and Zimmermann, 2002; Goldreich, 2007; Malvey and Archibald, 1998).

From TreasuryDirect, a proprietary treasury book entry system introduced in 1986 for the purpose of accommodating those retail investors that typically purchase securities in the primary market and hold them until maturity, we collected relevant auction data, such as aggregated tendered bid, the accepted yields, the clearing yield and price, and so forth. We find evidence that bidders prefer submitting competitive bids with lower yields to submitting noncompetitive bids, for the purpose of securing their bids. The demand at auction decreases with the percentage of accepted competitive bids out of total competitive bids (competitive acceptance ratio, hereafter). But it increases with the percentage of noncompetitive bids out of total tendered bids (noncompetitive total ratio, hereafter), as well as the ratio of total accepted bids out of total tendered bids ("bid-to-cover ratio," hereafter). We also find that the aftermarket return increases with demand at auction. However, the aftermarket returns are negatively related to the bid-to-cover ratio. Such findings suggest that failed bidders quit buying from the secondary market to fill their orders. The results of such could be due to the trading activities in the when-issued market.

The remainder of the study is organized as follows: Part II reviews the literature and proposes the hypotheses. Part III analyzes the relation between demand at auction and the various types of bids. Part IV discusses the association between the aftermarket return and demand at auction. Part V provides the overall summary and conclusions.

II. Literature Review and Hypotheses

The uniform price format replaced the multiple price-discriminatory system beginning with the October 1998 Treasury securities auction. Theoretically, such a price-format change can lead to more aggressive bidding, in that the fear of the winner's curse is reduced. Meanwhile, more bidders would participate due to the simpler bidding procedure under the uniform price auction (Malvey and Archibald, 1998; Chatterjea and Jarrow, 1998).

With the uniform price system, competitive bids are accepted in order of increasing yields until the offering amount is fully covered. Further, all successful bidders pay the same price, which is computed from the highest accepted yield. Although anyone may submit competitive bids, the competitive bidding is dominated by 38 primary dealers. By contrast, noncompetitive bidders are mainly individual investors. They submit sealed bids specifying quantity only and always win at a discount rate equal to the high yield of the competitive bids (Bikhchandani, Edsparr and Huang, 2000).

Although competitive bidders just need to specify a minimum yield at which the participant is willing to buy a specified quantity, if the auction ends at a higher yield, the bidder can receive full benefits of buying at that higher yield (Garbade and Ingber, 2005). However, there are risks involved and the procedures can be dangerous in that once the bidding yields stay above the clearing rate, the competitive bids are voided. Thus, why do investors submit competitive bids rather than noncompetitive bids, when there are no price discrepancies between the two types of bids? Competitive bids are definitely needed. Imagine all but one bidder submit noncompetitive bids. In this scenario, the clearing price is set by the sole competitive bidder. Thus, competitive bidders are influential at determining the final rate. Hence, competitive bidders must juxtapose the risk of unsuccessful bids with the reward of receiving higher yields for successful bids. When the demand for securities at auction is high, bidders are under pressure to bid with relatively lower rates or just simply submit noncompetitive bids. The lower rates submitted by competitive bidders thereby force bids to be more clustered. In other words, the standard deviations of bids tend to decrease with the demand at auction. Since bid dispersion can be measured by standard deviation, bid dispersion is thereby viewed as a proxy for the demand of Treasury securities at auction. A lower dispersion is associated with a lower standard deviation and thus a greater demand.

Since investors can choose either competitive bids with low yields or noncompetitive bids, when demand is high, more noncompetitive bids, as well as more competitive bids with lower yields are expected to be submitted. More noncompetitive bids tend to reduce the amount of winning bids available to competitive bidders, thus, competitive acceptance ratio is expected to be negatively related to demand at auction, whereas noncompetitive total ratio tends to be positive related to demand at auction. Of note, the demand of the Treasury securities is negatively related to bid dispersion, which shows bid clustering level.

Meanwhile, demand at auction can affect the aftermarket. For instance, failed bidders can fill orders in the secondary market in the following days. Primary dealers buy large quantities of securities at auction and then sell them in the secondary market. Some of those securities are sold after a security is issued and others are sold before issuance in the when-issued market (Fleming, 2007). Greater buying pressures from failed bidders in the auction are more likely to drive up prices and thereby drive down yields in the following day. Thus, when demand at auction as proxied by bid dispersion is high, a condition suggestive of a higher level of unfilled bids, it is possible for sellers to make some profits in the market. Furthermore, a higher bid-to-cover ratio indicates greater demand at auction and which implies a higher return in the secondary market. However, it is the amount of unfilled orders from the auction that determines the returns in the following day. When there is a high noncompetitive total ratio or a high competitive acceptance rate, the percentage of unfilled orders tends to be low. Thus, we hypothesize that aftermarket returns are negatively related to noncompetitive total ratio as well as competitive acceptance rate. Of note, lower dispersion of yields can hint of greater possibility of collusion or market manipulation (Bikhchandani, Edsparr and Huang, 2000; Chatterjea and Jarrow,1998; Klemperer, 2002).

III. Bid Composition and Demand at Auction.

In this study, we investigate the demand for Treasury securities at auction and its influence on the secondary market in the period from October 1998 through July 2010. In October 1998, the U.S. Treasury launched a uniform price auction system for new issues of Treasury securities, under which, all Treasury securities are awarded at the same finalized market clearing rate (Garbade and Ingber, 2005). The announcement and results of each auction are provided in the TreasuryDirect website. We combine all the Treasury securities into one file. The final dataset has a total of 2,045 observations for the study period.

As discussed in Section Two, bidders can submit either noncompetitive bids or competitive bids (yields), to secure their bidding. Bikhchandani, Edsparr and Huang (2000) find that primary dealers are more likely to submit competitive bids and individuals typically submit noncompetitive bids. Due to data availability, we do not divide bidders into these groups but instead investigate bidding strategies on an aggregated level. In specific, we examine how the noncompetitive total ratio and competitive acceptance ratio change in the sample period and then study their impact on demand at auction. Competitive acceptance ratio measures the percentage of competitive bids that are accepted. It equals to the number of accepted competitive bids over total competitive bids. Noncompetitive total ratio equals to the number of noncompetitive bids over total tendered bids excluding Foreign and International Monetary Authority (FIMA) account. FIMA is mainly the account for foreign governments and therefore is excluded in this study. FIMA bids are noncompetitive in nature. An example of the auction results is shown in the Appendix. Figure 1 shows the relations among noncompetitive bids, accepted competitive bids, competitive bids tendered, FIMA, and total bids tendered. Of note, total bids tendered are the sum of FIMA bids, noncompetitive bids and total competitive bids. The bid-to-cover ratio is calculated by dividing the sum of FIMA bids, noncompetitive bids and accepted competitive bids by total tendered bids.

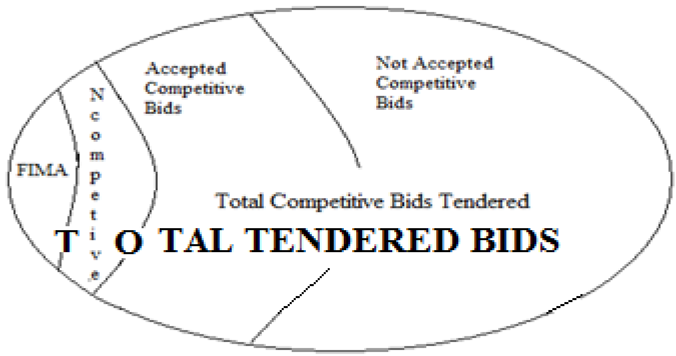

Figure 1: Type of Bids for Treasury Securities

To secure bids, investors can choose between noncompetitive bids and low yield competitive bids. Figure 2 and Figure 3 show the means of the noncompetitive total ratios, competitive acceptance ratios, and total acceptance ratios by year and by security type, respectively. Total acceptance ratio measures the percentage of tendered bids that are accepted, excluding FIMA bids. It is similar to the bid-to-cover ratio, except for the FIMA bids.

Total acceptance ratio = total accepted bids / total tendered bids excluding FIMA bids
= (accepted competitive bids + noncompetitive bids) / (total competitive bids+ noncompetitive bids)

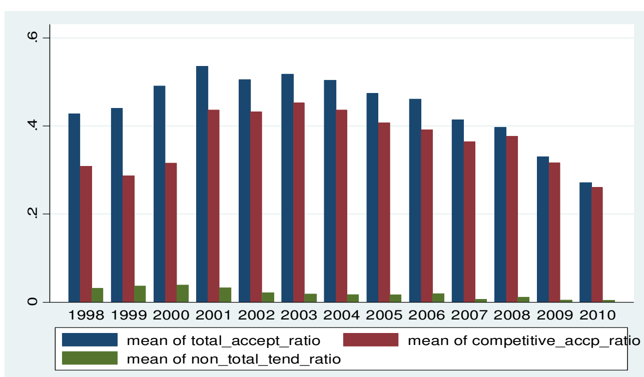

Figure 2: Profile of Means of Noncompetitive Total Ratio, Competitive Acceptance Ratio and Total Acceptance Ratio by Year.

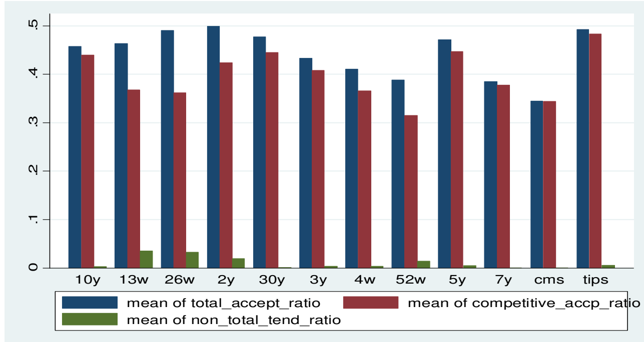

Figure 3: Profile of Means of Noncompetitive Total Ratio, Competitive Acceptance Ratio and Total Acceptance Ratio by Security Type.

Clearly, less than 50% of bids are accepted, with the peak of approximately 50% appearing in 2001 and with two year Treasury notes. Interestingly, the acceptance rate has fallen consistently since 2003. In 2010, less than 30% of total tendered bids were accepted. Furthermore, the majority of investors submit competitive bids. The average noncompetitive total ratio is consistently less than 5%, suggesting that over 95% of bids are competitive. This ratio also falls each year reaching its low in 2010, which suggests that noncompetitive bids may be passive as investors increasingly use competitive bids to manage yields. Among the total competitive bids, the relatively high acceptance rates occur in 2003 and 2008. After 2008 rates decline. Figures 2 and 3 show that while a higher percentage of competitive bids have been submitted in recent years fewer have been filled. This suggests that auctions for Treasury securities have become more intensified in recent years.

As discussed in Section Two, the demand at auction as proxied by bid dispersion is positively related to the competitive acceptance ratio, but negatively related to the noncompetitive total ratio. The hypotheses are as follows.

H_1: When fewer competitive bids are accepted, demand at auction tends to increase.

H_2: When more noncompetitive bids are accepted, demand at auction tends to increase.

Next, we test those hypotheses.

Following Godbout, Storer and Zimmermann (2002), the demand for Treasury securities at auction is measured by bid dispersion. We calculate bid dispersion as the ratio of the differences between high and low yields over the median yield. Indeed, when demand is high, bids tend to be clustered at the lower ends, resulting in lower bid dispersion. In specific, high, median and low yields are the accepted yields of the 100^{th} percentile, 50^{th} percentile and 5^{th} percentile, of the bids, respectively. High yield is thereby the final rewarding rate.

Bid dispersion= (high yield – low yield) / median yield
= (highest accepted yields – accepted yields 5^{th} percentile) / accepted yields 50^{th} percentile.

Goldreich (2007) measures bid dispersion as the difference in yield space between the marginal winning bid and the median bid. He argues that a wide dispersion could result from disagreement among bidders about the value of securities. Godbout, Storer and Zimmermann (2002) measure bid dispersion as 100*(high yield – low yield) / low yield. They investigate the auction of Treasury securities in Canada where a multiple price system still dominates. They explain that high levels of auction bid dispersion are because of uncertainty in the financial markets, unexpected monetary policy intervention, and manipulation of the market by some participants.

Rather than emphasizing macroeconomic factors, we focus on three bidding ratios: the competitive acceptance ratio, the noncompetitive total ratio, and the bid-to-cover ratio. We expect the competitive acceptance ratio to be positively related to demand at auction or bid dispersion whereas the noncompetitive total ratio to be negatively related to demand at auction. We also include bid-to-cover ratio in the regressions and expect it to be positively related to bid dispersion, since when demand is high, investors would bid more but fewer bids would be accepted. Bid-to-cover ratio is the ratio of bids submitted to offering amount. It is the ratio of aggregate bids to supply and captures the extent of competition in the auction. In addition, we take the log of bid dispersion, competitive acceptance ratio and noncompetitive total ratio, since the values of those variables are between 0 and 1. Furthermore, to control for the influence of the financial crisis which began in early 2008, we create a financial crisis dummy. It is given a value of one when an auction occurs after year 2007. Otherwise, it is zero. We also include interaction terms between the financial crisis dummy and each of our ratios, i.e., the competitive acceptance ratio, noncompetitive total ratio and bid-to-cover ratio.

We use the following fixed-effects model to test the association between bid dispersion and types of bids.

Bid dispersion = α + β_1 * competitive acceptance ratio + β_2 * noncompetitive total ratio + β_3* bid-to-cover + $\sum_{i=1}^{10} \beta i * Treasury\ Type\ i$ + β_4* financial crisis dummy + β_5* (competitive acceptance ratio * financial crisis dummy) + β_6* (noncompetitive total ratio * financial crisis dummy) + β_7* (bid-to-cover * financial crisis dummy) + ε;

The correlations of the bid composition variables are reported in Table 1.

Table 1: Correlations of the Bid Composition Variables

Variables	**Competitive Acceptance Ratio**	**Non-Competitive Total Ratio**	**Bid to Cover Ratio**
Competitive Acceptance	1.0000		
Non-Competitive Total **P value**	0.5685*** (0.0000)	1.0000	
Bid to Cover Ratio **P value**	0.3088*** (0.0000)	0.2278*** (0.0000)	1.0000

Note: P values are reported in the bracket. *** indicate significance at 1% level.

The estimation results are reported in Table 2.

Table 2: Regression Results to Test the Demand for Treasury Securities at Auction

	Model 1		**Model 2**		**Model 3**		**Model 4**	
Variables	**Coefficient**	**t stat**	**Coefficient**	**t stat**	**Coefficient**	**t stat**	**Coefficient**	**t stat**
competitive ratio	2.3104***	7.23	0.8843***	11.89				
noncompetitive ratio	-0.0128	-0.63			-0.0439**	-2.12		
bid cover ratio	0.5943***	4.61					-0.3140***	-10.37
four week bill	0.0544	0.69	0.1050	1.44	-0.0550	-0.67	0.11	1.47

thirteen week bill	-0.0139	-0.18	-0.0991	-1.37	-0.1600**	-2.06	-0.1528**	-2.11
twenty six week bill	0.2246***	2.89	0.1715**	2.26	0.0415	0.52	0.12	1.64
fifty two week bill	-0.3067	-2.38	-0.3369***	-2.61	-0.5057***	-3.81	-0.3779***	-2.91
three year bond	-0.2655*	-1.79	-0.2331	-1.60	-0.2935*	-1.90	-0.23	-1.53
five year notes	-0.3189***	-3.12	-0.2556*	-2.57	-0.2925***	-2.76	-0.2279**	-2.28
seven year notes	-1.0040***	-4.58	-0.9480***	-4.47	-1.1090***	-4.87	-0.9430***	-4.41
ten year bond	-0.5650***	-5.05	-0.5098***	-4.80	-0.5706***	-4.91	-0.4900***	-4.58
thirty year bond	-1.1104***	-6.93	-1.0206***	-6.69	-1.1055***	-6.65	-0.9863***	-6.41
CMS	0.2183	1.44	0.3615***	3.26	0.0776	0.50	0.3937***	3.52
financial crisis (fc)	0.2190	0.91	-0.2486	-1.14	0.5915***	2.66	-0.37	-1.63
bid cover ratio * fc	2.9199	1.14	3.0670	1.21	2.8704	1.08	3.12	1.22
noncompetitive ratio * fc	0.0530*	1.92	0.0518*	1.92	0.0697**	2.43	0.0539**	1.98
competitive ratio * fc	0.4709	0.19	0.1342	0.01	0.7583	0.29	0.06	0.02
Intercept	-3.3883		-3.1657***	-35.42	-4.1160***	-37.02	-3.1897***	-33.62
R^2	70.87%		70.54%		68.56%		70.07%	
Adjusted R^2	70.63%		70.32%		68.33%		69.85%	
Number of observations	2045		2045		2045		2045	

The results show that bid dispersion, the proxy for auction demand, increases with competitive acceptance ratio, at the 1% statistical significance level. Further, bid dispersion decreases with noncompetitive total ratio in Model 3 at 5% significance level. However, in the full model including all variables, the coefficient of noncompetitive variable is negative but not significant anymore. The results regarding bid-to-cover ratio is interesting. In Model 1, its coefficient is significant and positive, just opposite to our prediction. However, it becomes negative and significant as expected in Model 4, when it is kept as the only variable for bidder composition. The conflicts could be due to the high correlations among the three variables. Of note, the adjusted R^2 in all of the models are around 70%. In sum, the results are supportive of our hypotheses. When demand at auction is high, as proxied by lower bid dispersion, less competitive bids are accepted and more noncompetitive bids are submitted.

IV. Aftermarket Returns of Treasury Securities

Investors can trade Treasury securities in three essential markets: the when-issued market for forward trading of Treasury securities, the auction market, and the secondary market. Immediately following the announcement of a forthcoming auction, market participants start trading the new security on a when-issued basis. This market enables participants to hold contracts for the purchase and sale of a new security prior to the announcement of the security and thereby works as a path to reduce price uncertainty (Garbade and Ingberm, 2005; Goldreich, 2007).

When demand at auction is high, failed bidders can have their orders filled in the secondary market on the following day which would presumably generate positive aftermarket returns. Thus, aftermarket returns in the following day are expected to be positively related to demand at auction. Of note, lower bid dispersion indicates higher demand at auction.

H_3: When demand at auction is higher (bid dispersion is lower), the aftermarket returns increase.

To test this hypothesis, we collect daily yields of Treasury securities from US Treasury website and merge them with the auction database. We exclude one month Treasury bill, since its term is too short. Our final dataset includes a total of 996 observations, covering the period from 1998 to July 2010.

Aftermarket return in the following day is calculated as follows:

Aftermarket return = (following day closing price - closing price in auction) / auction closing price.

Since rates on Treasury securities in the following day are available, instead of using price, we calculate aftermarket returns by adding a negative sign to the difference between the rates in the following day and the closing rates at auctions, due to the inverse relation between bond prices and bond yields, *ceteris paribus*.

Aftermarket return = - (yield in following day - closing rate at auction).

Figure 4 and Figure 5 show the profiles of the aftermarket returns in the following day by type of Treasury securities and by years, respectively.

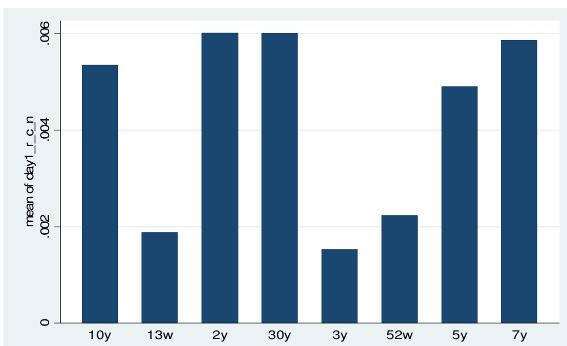

Figure 4: Means of the Aftermarket Return on the Following Day by Type of Treasury Security

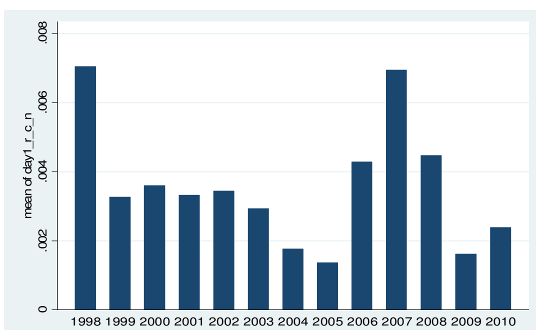

Figure 5: Means of the Aftermarket Return on the Following Day by Year

Figure 5 shows clear variation of aftermarket return by year, with the peak and the bottom appearing just prior to the onset of the 2008 financial crisis and in 2005, respectively. Similarly, there are variations of aftermarket return by security type. Thus, it would be helpful to consider the effects of year and type. Interestingly, the means of aftermarket returns by year and by type are all positive. However, their corresponding median values, unreported in this study, display negative numbers.

The fixed-effects model is as follows.

Aftermarket return = $\alpha + \beta_1 *$ bid dispersion + $\sum_{i=1}^{6} \beta i * Treasury\ Type\ i + \sum_{i=1}^{13} \beta i * year\ i + \varepsilon$;

As discussed in Section Two, we expect that aftermarket returns in the following day are negatively related to the auction day noncompetitive total ratio as well as bid-to-cover ratio, but are positively related to competitive acceptance ratio. To test those hypotheses, we use the following fixed-effects model.

Aftermarket return = $\alpha + \beta_1 *$ bid dispersion + $\beta_2 *$ competitive acceptance ratio + $\beta_3 *$ noncompetitive total ratio + $\beta_4 *$ bid-to-cover ratio + $\sum_{i=1}^{6} \beta i * Treasury\ Type\ i + \sum_{i=1}^{13} \beta i * year\ i + \varepsilon$;

Of note, in the above models, we take the log of the ratios except for bid-to-cover ratio, which is always greater than one.

The estimation results with respect to aftermarket returns are provided in Table 3.

Table 3: Regression Results Regarding Aftermarket Returns

	Model 1		**Model 2**		**Model 3**		**Model 4**	
Variables	**Coefficient**	**t stat**	**Coefficient**	**t stat**	**Coefficient**	**t stat**	**Coefficient**	**t stat**
bid dispersion	-0.0003	-0.67						
competitive ratio			-0.0145**	-2.1	-0.0152**	-2.21		
noncompetitive total			-0.0005	-0.88			-0.0006	-1.02
bid cover ratio			-0.0061**	-2.25	-0.0062**	-2.33	-0.0007	-0.88
thirteen week bill	-0.0039***	-3.07	-0.0039***	-3.07	-0.0045***	-4.21	-0.0033***	-2.67
fifty two week bill	-0.0040**	-2.3	-0.0038**	-2.2	-0.0038**	-2.16	-0.0038**	-2.17
three year notes	-0.0037*	-1.89	-0.0041**	-2.01	-0.0036*	-1.83	-0.0043**	-2.11
five year notes	-0.0012	-0.89	-0.0014	-0.87	-0.0008	-0.54	-0.0019	-1.22
ten year bond	-0.0011	-0.63	-0.0011	-0.63	-0.0002	-0.15	-0.0017	-0.94
thirty year bonds	0.0001	-0.01	-0.0008	-0.31	0.0004	0.16	-0.0012	-0.48
year 1999	-0.0034*	-1.67	-0.0042**	-2.02	-0.0042**	-2.05	-0.0038*	-1.83
year 2000	-0.0033	-1.62	-0.0041*	-1.95	-0.0041*	-1.95	-0.0037*	-1.76
year 2001	-0.0035*	-1.68	-0.0043*	-1.91	-0.0041*	-1.84	-0.0046**	-2.02
year 2002	-0.0032*	-1.46	-0.0038	-1.63	-0.0036	-1.55	-0.0044*	-1.89
year 2003	-0.0038*	-1.77	-0.0044*	-1.93	-0.0041*	-1.81	-0.0053**	-2.30
year 2004	-0.0052**	-2.52	-0.0059***	-2.62	-0.0056**	-2.5	-0.0065***	-2.90
year 2005	-0.0057***	-2.78	-0.0065***	-2.94	-0.0062***	-2.83	-0.0068***	-3.07
year 2006	-0.0030	-1.48	-0.0038*	-1.75	-0.0035*	-1.65	-0.0038*	-1.76

year 2007	-0.0022	-0.85	-0.0030	-1.45	-0.0026	-1.01	-0.0032	-1.20
year 2008	-0.0024	-1.02	-0.0038*	-1.71	-0.0032	-1.52	-0.0042*	-1.90
year 2009	-0.0052**	-2.18	-0.0066***	-2.95	-0.0056***	-2.90	-0.0074***	-3.31
year 2010	-0.0045*	-1.83	-0.0050**	-2.02	-0.0040*	-1.82	-0.0063***	-2.62
Intercept	0.0088***	3.12	0.0098***	2.64	0.0117***	3.93	0.0098***	2.64
R^2	4.70%		5.27%		5.19%		4.84%	
Adjusted R^2	2.85%		3.23%		3.25%		2.89%	
Number of observation	996		996		996		996	

The first model tests the association of demand at auction, proxied by bid dispersion, and aftermarket returns. The coefficient of bid dispersion is negative and statistically insignificant. This is consistent with our expectation, which states that when bid dispersion is lower indicating of higher demand at auction, aftermarket returns in the following day tend to be higher. Of note, the activities in the secondary market could be influenced by the when-issued market, from which investors can purchase and sell Treasury securities before the auction (Pichler and Stomper, 2009; Bikhchandani, Edsparr and Huang, 2000; Fleming, 2007).

The remaining three models test the determinants of post auctions returns from the perspective of bidder compositions, including competitive acceptance ratio, noncompetitive total ratio and bid-to-cover ratio. The coefficients for competitive acceptance ratio are negative and statistically significant in both Model 2 and Model 3. This is in supportive of our hypothesis, implying that when more competitive bids are filled in auction, fewer unfilled orders exist and thus fewer purchases are needed in the secondary market, resulting in lower aftermarket return. The signs of noncompetitive bids in Model 3 and Model 4 are both negative but statistically insignificant. The coefficient of the bid-to-cover ratio in Model 2, Model 3 and Model 4 are all negative and statistically significant, suggesting that most failed bidders do not participate in the secondary market. This is inconsistent with our hypothesis, which stating that when bid-to-cover ratio is high, more bids are unfilled and those failed bidders are potential buyers in the aftermarket. This finding could be due to the activities in the when-issued market.

In sum, we *do* find evidence regarding the positive relation between demand at auction as proxied by bid dispersion and the aftermarket returns. Furthermore, we find evidence that aftermarket returns are a decreasing function of the competitive acceptance ratio as well as bid to cover ratio.

V. Conclusion

In this study, we analyze the demand for Treasury securities at auctions from October 1998 to July 2010. During this period, the US Treasury adopted the uniform price auction system. With the new auction mechanism, revenues for Treasury are expected to increase and “winner’s curse” are supposed to be eliminated (Chatterjea and Jarrow, 1998; Koesrindartoto, 2004; Garbade and Ingber ,2005). We investigate such demand from the perspective of types of bids submitted and the influence of demand at auction in the secondary market. So far as we know, this topic is still new in the literature.

We estimate fixed-effects models and find that aftermarket returns are positively related to demand at auction proxied by bid dispersion. Furthermore, aftermarket return is a decreasing function of the competitive acceptance ratio as well as the bid-to-cover ratio. The findings regarding the latter suggest that failed bidders quit buying from the secondary market to fill their orders. The results of such could be due to the when-issued market, from which investors can purchase orders of Treasury securities prior to auction.

We also find evidence that the demand at auction decreases with competitive acceptance ratio. But it increases with the noncompetitive total ratio as well as bid-to-cover ratio.

Future studies can apply game theory to explore the benefits and costs from submitting competitive bids rather than noncompetitive bids. Another avenue for future research can focus on the aftermarket returns in the secondary market after exempting the trading activities in the when-issued market (Nyborg and Strebulaev, 2004).

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Appendix

An Example of Treasury Security Auction Results

Department of the Treasury • Bureau of the Public Debt • Washington, DC 20239
TREASURY SECURITY AUCTION RESULTS
BUREAU OF THE PUBLIC DEBT - WASHINGTON DC
FOR IMMEDIATE RELEASE CONTACT: Office of Financing
February 11, 2003 202-691-3550

RESULTS OF TREASURY'S AUCTION OF 5-YEAR NOTES

Interest Rate: 3%	Issue Date: February 18, 2003
Series: E-2008	Dated Date: February 15, 2003
CUSIP No: 912828AT7	Maturity Date: February 15, 2008
High Yield: 3.029%	Price: 99.866

All noncompetitive and successful competitive bidders were awarded securities at the high yield. Tenders at the high yield were allotted 71.96%. All tenders at lower yields were accepted in full. Accrued interest of $ 0.24862 per $1,000 must be paid for the period from February 15, 2003 to February 18, 2003.
AMOUNTS TENDERED AND ACCEPTED (in thousands)

Tender Type	Tendered Accepted	Accepted
Competitive	$ 33,895,105	$ 23,732,654
Noncompetitive	237,378	237,378
FIMA (noncompetitive)	30,000	30,000
SUBTOTAL	34,162,483	24,000,032 1/
Federal Reserve	3,483,950	3,483,950
TOTAL	$ 37,646,433	$ 27,483,982

Median yield 2.980%: 50% of the amount of accepted competitive tenders was tendered at or below that rate. Low yield 2.900%: 5% of the amount of accepted competitive tenders was tendered at or below that rate.
Bid-to-Cover Ratio = 34,162,483 / 24,000,032 = 1.42
1/ Awards to TREASURY DIRECT = $145,222,000