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Trading Activity and Transaction Costs in Structured Credit Products

Hendrik Bessembinder, William F. Maxwell, and Kumar Venkataraman

After conducting the first study of secondary trading in structured credit products, the authors report that the majority of products did not trade even once during the 21-month sample. Execution costs averaged 24 bps when trades occurred and were considerably higher for products with a greater proportion of retail-size trades. The authors estimate that the introduction of public trade reporting would decrease trading costs in retail-oriented products by 5–7 bps.

Structured credit products (SCPs), including asset-backed securities (ABSs) and mortgage-backed securities (MBSs), compose one of the largest but least-studied segments of the financial services industry. At the end of 2012, there was $8.6 trillion outstanding in MBSs and $1.7 trillion outstanding in ABSs, implying that the SCP markets are comparable in size to the $11 trillion U.S. Treasury security market.[1] SCPs are more complex than the more familiar corporate bonds. First, each corporate bond has a unique issuer that promises to make the contractual payments, whereas an SCP typically includes the payment obligations of numerous borrowers. Second, every owner of a bond issue is promised identical payments, whereas an SCP can include multiple tranches that differ in terms of payment priority in case of default. Third, SCPs are typically created by investment banks or their affiliates from credit contracts, whereas corporate bonds are issued directly to investors. Finally, the size of the asset pool underlying an SCP changes randomly over time as the underlying loans are paid.

Uncertainty associated with SCP valuation played a role in the transmission of shocks during the recent financial crisis. The uncertainty regarding valuation is partly attributable to the fact that secondary trades for SCPs occur in an opaque dealer market, with no public quotations or public trade reports. In contrast, other financial markets—including equities, Treasuries, and, more recently, corporate and municipal bonds—provide market participants with timely information regarding completed transactions.

In this study, our goal was to provide the first systematic look at the workings of the secondary market in SCPs, including estimation of the costs that customers pay to execute trades. We also compared SCPs with the corporate bond market to develop insights into potential market outcomes should post-trade price reporting be introduced for SCPs.[2]

For both investors and regulators, the key difficulty with market opaqueness lies in establishing the prevailing market price. Investors cannot compare their own execution prices with prices for other transactions. Even institutional investors must devote significant time and effort to obtaining market information, either via "indicative" quotes available through a messaging system or by phoning dealers. Opaque markets tend to benefit relatively well-informed dealers in their negotiations with customers (Pagano and Roell 1996). Increased transparency has the potential to reduce dealer markups and bid–ask spreads, provide more information on the fair price of securities, and improve the ability of regulators and customers to control and evaluate trade execution costs. These ideas have been articulated by Rick Ketchum, chairman and CEO of the Financial Industry Regulatory Authority (FINRA):

> From the standpoint of investor protection, which is and always will be FINRA's top priority, we simply must shed more light on the "darker" areas of the fixed income market. Transparency in these markets is central to ensuring best execution as well as fair markups (or markdowns). Without this information, it is difficult for investors to make informed investment decisions

Hendrik Bessembinder is the A. Blaine Huntsman Chaired Presidential Professor of Finance at the University of Utah, Salt Lake City. William F. Maxwell is the Mary Jo Vaughn Rauscher Chair in Financial Investments at the Cox School of Business, Southern Methodist University, Dallas. Kumar Venkataraman is the Fabacher Endowed Professor of Alternative Asset Management at the Cox School of Business, Southern Methodist University, Dallas.

and it's impossible for regulators to monitor market activity.[3]

Since May 2011, FINRA has required broker/dealers to report transaction prices and quantities for SCP trades to its TRACE (Trade Reporting and Compliance Engine) system, which has been capturing data on corporate bonds since 2002. However, FINRA does not yet disseminate to the public transaction data for most SCPs. The U.S. SEC recently approved (effective 5 November 2012) public dissemination of transaction prices for a subset of SCPs: trade prices for to-be-announced (TBA) government-agency-backed mortgage securities (see Appendix A for short descriptions of SCP product categories). The SEC continues to consider FINRA proposals for public dissemination of transaction prices for a broader set of SCPs.

In our study, we examined the proprietary FINRA data on SCP transactions to provide what we believe is the first comprehensive description of an important but little-studied market. In this article, we present empirical evidence on trading activity in subtypes of SCPs, the determinants of secondary market trading, and estimates of transaction costs for each subtype of SCP. Finally, focusing on segments of the corporate bond market that are comparable to segments of the SCP markets in terms of key characteristics, we report estimates of the potential effects of implementing transaction dissemination for the SCP markets.

To assess these issues, we relied on a comprehensive dataset that FINRA made available to us. The data included all secondary market transactions (price, quantity, dealer buy versus sell indicator, etc.) for the universe of U.S. SCPs from 16 May 2011 to 31 January 2013. FINRA also provided us with data for the universe of corporate bond transactions, including both transactions disseminated to the public through TRACE and transactions not so disseminated, from 1 July 2002 to 31 March 2011.

Trading Activity in Structured Credit Products

In this section, we report descriptive information regarding original issue size, maturity, and the determinants of trading activity for both MBS and ABS SCPs.

Mortgage-Backed Securities. The MBS database that FINRA provided to us contained almost 1.1 million distinct securities.[4] The large number of securities indicates that a basic pool of assets may have more than 100 tranches, each with a unique payoff structure, and assets can be resecuritized (in comparison, fewer than 5,000 companies were listed on the U.S. equity exchanges at the end of 2012). As Panel A of **Table 1** shows, however, many of these issues are very small: The 25th percentile issue size is less than $2 million, and the median issue size is less than $5 million. But the distribution is positively skewed because the mean issue size is $22.8 million. The MBSs have a long average maturity, as shown in Panel B, with a mean maturity of almost 19 years.

Breaking down the MBS data by issuing agency, we observe that nearly half the MBSs are issued by Fannie Mae, whereas Freddie Mac and Ginnie Mae each issue about a quarter.[5] Non-agency MBS

Table 1. Distribution of Issue Amounts and Maturities for MBSs

	Full Sample	Fannie Mae	Freddie Mac	Ginnie Mae	Non-Agency
A. Issue amounts					
5%	$1,000,088	$1,003,900	$1,040,273	$404,296	$1,958,394
25%	1,984,626	2,108,423	2,219,618	1,374,097	4,107,717
50%	4,721,315	5,357,815	5,470,587	2,705,009	6,881,360
75%	13,100,000	15,100,000	16,900,000	6,796,248	11,600,000
95%	70,600,000	73,800,000	95,000,000	39,000,000	25,700,000
Mean	22,800,000	23,300,000	28,800,000	15,400,000	9,658,304
N	1,085,979	514,187	301,649	265,163	4,980
B. Maturity (years)					
5%	4.6	4.3	4.2	5.4	2.7
25%	12.4	12.7	12.1	12.3	6.4
50%	20.3	21.0	20.3	18.7	10.9
75%	25.6	25.5	25.4	26.2	16.7
90%	28.9	28.9	27.7	29.7	20.7
95%	30.4	30.4	29.9	30.8	24.1
Mean	18.8	19.0	18.5	18.8	11.7

products compose only about 4% of issuances. On average, Freddie's issues are the largest ($28.8 million), followed closely by Fannie ($23.3 million). Ginnie's issues average $15.4 million; non-agency issues average $9.7 million. The mean maturity is approximately 19 years for all three agencies, compared with 11.7 years for non-agency issues.

Panel A of **Table 2** reports mean trading statistics for the full MBS sample and by issuing agency. Notably, only 17.8% of the issues traded *at all* during the 21-month sample period. The mean dollar volume traded across the full sample of MBSs is $106 million, with an average of only 4.1 trades in each security. Fannie's issues average 6.0 trades during the sample period, and the average trading volume of Fannie's issues is almost three times as large as that of the next most frequently traded issue (Ginnie). Freddie's issues are traded significantly less often than issues of either of the other two agencies. On average, non-agency issues trade only 1.8 times but, surprisingly, have the largest proportion of issues (23%) that trade at all. Non-agency issues have an average of 3.5 dealers at issuance, compared with slightly more than 4.0 dealers for each agency issue.

To assess the relative importance of issue size and issuing agency with respect to the likelihood that an issue trades, we estimated a logistic regression whereby the dependent variable is 1 if the issue trades during the sample period and 0 if it does not. The explanatory variables are maturity at time of issuance, a discrete variable indicating the tercile of issue size, and indicator variables that equal 1 for Fannie, Ginnie, and non-agency issues (the intercept thus reflects the trading frequency of Freddie's issues). Panel B of Table 2 reports the results. The coefficient of each explanatory variable reflects the change in the log odds ratio arising from a one-unit increase in the explanatory variable. Hence, a one-year change in issuance maturity is related to a 4% increase [exp(0.039) – 1] in trade probability, and a change across size terciles is associated with a 75% increase in trade probability. The increased trade probability is 47% for Fannie and 142% for Ginnie as compared with Freddie. The positive coefficient for Ginnie is the largest, whereas the coefficients for non-agencies and Fannie are smaller but also positive. Thus, after controlling for issue size and maturity, Ginnie securities are most likely and Freddie securities are least likely to be traded.

Asset-Backed Securities. **Table 3** reports on the ABS data, which contain slightly more than 300,000 issues (compared with 1.1 million issues in the MBS universe).[6] The ABS issues are larger than the MBS issues, with both the mean ($114 million) and the median ($29 million) issue sizes almost five times larger than those for the MBS issues. Still, some ABS issues are very small; the 5th percentile of the issue size distribution is only $100,000 for the ABSs, compared with more than $1 million for the MBSs. The ABS issues have an average maturity of 23.2 years, about 5 years longer than that of the MBS products.

Panel B of Table 3 reports trading activity in the ABS market. Like MBSs, ABSs trade infrequently, but the percentage of issues that trade at all is almost 30%, considerably higher than that of MBSs (18%). The average number of trades per security is 4.97, but the trades are, on average, smaller for ABSs; the mean cumulative trading volume for ABSs is $16.3 million, compared with

Table 2. Trading Activity in MBSs

	No. of Dealers	% with Multiple Dealers	No. of Trades	Cumulative Dollar Volume	% Traded	*N*
A. Trading statistics (means) by type of issuer						
Sample	4.2	14.1	4.1	$106,000,000	17.8	1,196,010
Fannie	4.1	27.3	6.0	170,000,000	18.6	564,919
Freddie	4.1	2.2	1.7	39,400,000	13.9	329,606
Ginnie	4.3	2.6	3.1	58,100,000	20.6	296,142
Non-agency	3.5	0.0	1.8	6,518,124	23.3	5,343

	Coefficient	Probability
B. Logit analysis, issue traded or not		
Intercept	–4.024	0.000
Issuance maturity	0.039	0.000
Bond size terciles	0.559	0.000
Fannie	0.383	0.000
Ginnie	0.882	0.000
Non-agency	0.802	0.000

Table 3. Issue Amounts, Maturity, and Trading Activity for ABSs

	Issue Amount	Maturity (years)
A. Issue amounts and maturity		
5%	$100,000	7.8
25%	8,250,000	20.0
50%	29,000,000	24.9
75%	88,700,000	28.1
95%	383,000,000	32.2
Mean	114,000,000	23.2
N	309,766	

		Size Tercile		
	Full Sample	1	2	3
B. Trading activity in ABSs				
No. of trades	4.97	4.55	5.13	5.41
Cumulative dollar volume	$ 16,300,000	$1,307,436	$ 7,790,192	$ 36,000,000
No. of dealers	2.17	1.78	2.16	2.86
% with at least one trade	29.8	22.57	31.36	30.64
Issue amount	$114,000,000	$4,718,667	$31,500,000	$305,000,000

$106 million for MBS issues. The likelihood of trading and the mean number of trades are surprisingly homogeneous across issue size terciles. However, the average trade size and the cumulative dollar volume are larger for ABSs of greater issue size.

Table 4 reports issue and trade statistics by ABS subclassification. Panel A shows that the preponderance of ABS issues (more than 271,000 of the 309,000 issues) are collateralized mortgage obligations (CMOs). However, non-CMO securities have a larger mean issue size ($157 million versus $109 million). The percentage of original issue size outstanding is 80% for the other ABSs, compared with slightly more than 50% for CMOs, which reflects the effects of mortgage prepayments. As compared with CMOs, other ABSs are also more likely to trade (44% versus 28%), have a larger average number of trades (7.3 versus 4.6), and have a larger average cumulative trading volume ($46 million versus $12 million).

We used logit models to assess the factors that determine the likelihood that an ABS issue trades during our sample period. The dependent variable is 1 for securities that trade and 0 for those that do not. Focusing on CMOs versus other ABSs, Panel B of Table 4 reports our results. Controlling for maturity and issue size (both of which are positively related to trade probability), we found that CMOs trade less frequently than other types of ABSs. Specifically, a one-year increase in issue maturity is related to a 2% increase in trade probability, and a change from one size tercile to the next increases trade probability by 21%. CMOs are 57% less likely to trade than other ABSs.

Panel C of Table 4 reports our results from estimating the logistic regression for the non-CMO products. In addition to controlling for issue size and maturity, we included indicator variables that equal 1 for ABSY issues,[7] collateralized debt obligations (CDOs), issues with senior priority in case of default, and issues with fixed interest rates. The intercept reflects the small pool of ABS products that are not categorized as either ABSY issues or CDOs, have nonfixed interest payments, and have debt rated lower than senior in capital structure. The results indicate that issue maturity is negatively related to trading activity (a small 0.4% decrease for every additional year), whereas issue size is positively related to trading activity (a change from one size tercile to the next increases trade probability by 64%). We found that the ABSY category has the highest coefficient (0.964) on trading activity (a 162% higher probability of trading than the base security). The coefficient for CDOs is also positive (0.438, or a 55% increase in probability) and statistically significant, indicating a higher likelihood of trading. In addition, coefficients on the senior and fixed-interest indicators are also positive (reflecting an 8% and 18% increased probability of trading, respectively), suggesting that securities with lower credit risk and lower interest rate risk are more likely to trade than are riskier ABSs.

Our analysis suggests that both the ABS and the MBS markets have a large number of securities outstanding and that there is significant variation in issue sizes. Most SCPs trade infrequently or not

Table 4. Trading Activity in CMOs and Other ABSs

	Issue Amount	Current Amount Outstanding	No. of Trades	Cumulative Dollar Volume	% Traded	*N*
A. Means for CMOs and other ABSs						
CMOs	$109,000,000	$57,400,000	4.64	$12,100,000	27.8	271,640
Other ABSs	157,000,000	125,000,000	7.31	45,800,000	43.7	38,126

	Coefficient	Probability
B. Logistic regression for CMOs and other ABSs		
Intercept	–0.926	0.000
Maturity	0.016	0.000
Issue amount (terciles)	0.188	0.000
CMO	–0.854	0.000
N	268,510	
Likelihood ratio chi-square(3)	5,928.9	
Prob. > chi-square	0.0000	
Pseudo R^2	0.0186	
C. ABS product categories		
Intercept	–1.633	0.000
Issue maturity	–0.004	0.005
Issue amount (terciles)	0.489	0.000
ABSY	0.964	0.000
CDO	0.438	0.000
SENIOR	0.077	0.000
FIXED	0.165	0.000
N	60,096	
Likelihood ratio chi-square(6)	5,051.5	
Prob. > chi-square	0.0000	
Pseudo R^2	0.0611	

Note: Explanatory variables include issue maturity; an ordinal variable that equals 1, 2, or 3 for the smallest, middle, and largest issue size terciles, respectively; indicator variables for ABSY issues and CDOs; and indicator variables for senior products (SENIOR) and fixed interest rates (FIXED).

at all. Overall, the secondary market is dominated by trading in the largest MBS and ABS issues.

Customer Profile and Trading Costs for SCPs

In this section, we present what we believe are the first estimates of trading costs for the universe of structured credit products in their opaque market. As reported in earlier tables, only 18% of MBSs and 29% of ABSs traded at all during the 21-month sample period. We based our trading cost analysis on transaction data for the subsets of SCPs whose trades are observed. We deleted from the dataset all canceled or corrected trades and all observations on convertible, putable, and callable securities, as well as trades that likely contained errors, leaving a sample of 6.24 million trades. We first report descriptive data regarding the distribution of trade size in SCPs—for customer-to-dealer and interdealer trades—and introduce the idea that SCP categories differ in terms of what we call their *customer profile*.

Customer Profile. Table 5 reports the distribution of trade size for SCPs. A trade is considered small if it is for less than $100,000 and large if it is for more than $1 million. Across the full sample, slightly more than two-thirds of trades are large. The full sample contains a nearly equal number of interdealer and customer-to-dealer (or customer) trades. Not surprisingly, more (80% versus 54%) interdealer trades are large. However, data for the full sample mask considerable variation in the proportion of large versus small trades and in the proportion of customer versus interdealer trades across the SCP categories.

Table 5. Distribution of Trade Size for SCPs

			Distribution of Trade Size (%)		
	No. of Trades	% of Total	Small Trades (< $100,000)	Medium Trades	Large Trades (> $1,000,000)
Full sample	6,241,266		21	11	68
Customer trades	3,052,388	49	30	16	54
Interdealer trades	3,188,878	51	13	7	80
Agency					
TBA	3,724,157		4	6	90
Customer trades	1,274,032	34	8	11	81
Interdealer trades	2,450,125	66	2	3	95
MBSs	1,242,289		38	23	39
Customer trades	813,141	65	34	24	42
Interdealer trades	429,148	35	45	21	34
Agency CMOs	664,523		68	12	20
Customer trades	473,582	71	70	11	19
Interdealer trades	190,941	29	64	15	21
Non-agency					
CMBSs	113,294		14	26	60
Customer trades	94,937	84	13	26	61
Interdealer trades	18,357	16	23	25	52
Private label CMOs	371,476		58	17	25
Customer trades	291,913	79	56	17	27
Interdealer trades	79,563	21	65	17	17

The TBA market is dominated by interdealer transactions, accounting for 66% of the reported trades. Approximately 95% of the interdealer TBA trades and 81% of the customer-to-dealer TBA trades are large. In contrast, customer-to-dealer trades are much more frequent in the MBS and agency CMO markets, accounting for 65% and 71% of reported transactions. Only 42% of customer-to-dealer MBS trades and 19% of customer-to-dealer agency CMO trades are large. Strikingly, 70% of the customer-to-dealer trades in agency CMOs are small.

The data suggest that trading activity in TBA securities is characterized by a market structure distinct from that of MBSs and CMOs. The TBA market has what we call an "institutional" customer profile, marked by large average transaction sizes and a high frequency of interdealer trades. The MBS and CMO markets have what we call a "retail" customer profile, marked by smaller average trade sizes and a substantially higher proportion of customer-to-dealer trades.[8]

With respect to non-agency issues, Table 5 reports our results for both commercial MBSs (CMBSs) and private label CMOs. Customer-to-dealer trades account for 84% of CMBS transactions and 79% of private label CMO transactions. Further, only 25% of private label CMO trades exceed $1 million, indicating that their market structure is closer to a retail customer profile. In contrast, 60% of CMBS customer trades are large, suggesting that a market dominated by customer-to-dealer trades can also be associated with large average transaction sizes. These differences in trade size distributions across product subtypes suggest that different categories of customers are present across products.

For comparison, we examined the distribution of trade size for corporate bonds over the six months before and after the introduction of the public dissemination of transactions. Our analysis included 1.9 million trades in 10,108 corporate bonds phased into TRACE dissemination between January 2003 and March 2011.[9] We found that 72% of corporate bond trades were small (less than $100,000), both before and after trades were publicly disseminated. We conclude that, on average, the market for corporate bonds is similar to the retail-oriented markets for SCPs, including CMOs and MBSs, and is distinct from the institutionally oriented markets for CMBSs and TBA securities.

Transaction Costs for SCPs. We then estimated trade execution costs paid by customers in customer-to-dealer trades for a variety of SCPs traded in an opaque market. The regression-based trading cost model that we used is similar to the one we used in an earlier study (Bessembinder, Maxwell, and Venkataraman 2006) and is estimated as follows:

$$\Delta P_{st} = b_0 + b_1 TRSYret_{st} + b_2 STOCKret_{st} + b_3 BONDret_{st} + b_4 TSret_{st} + b_5 CSret_{st} + b_6 \Delta Q_{st} + \varepsilon_{st}, \quad (1)$$

where

ΔP_{st} = the percentage change in the trade price of a given security from an observed trade at time s to the next observed trade at time t

Q_s and Q_t = indicator variables that equal 1 for customer buys and –1 for customer sells at times s and t, respectively

ΔQ_{st} = $Q_t - Q_s$

b_6 = the key parameter that estimates trade execution costs

The intent is to capture the amount by which the average price that a customer pays to purchase a security from a dealer exceeds the average amount received when a customer sells the security to a dealer. The coefficient b_6 estimates the effective trading cost by measuring the average price change when the trade-direction indicator variable Q changes from a customer buy at time s to a sell at time t, or vice versa.[10]

The precision of this estimate is enhanced by including additional explanatory variables that control for changes in the economic variables that also affect values, from the beginning of the trading day that includes trade s to the end of the trading day that includes trade t. The control variables are as follows:

- *TRSYret* = the percentage change in the Barclays Capital U.S. 7–10 Year Treasury Bond Index
- *STOCKret* = the percentage change in the S&P 500 Index
- *BONDret* = the percentage change in the Barclays Capital U.S. Corporate Bond Index (for corporate bond analysis) or the Barclays Capital U.S. MBS Index (for SCP analysis)
- *TSret* = the percentage change in the Barclays Capital U.S. 7–10 Year Treasury Bond Index in excess of the percentage change in the Barclays Capital U.S. 3-Month Treasury Bond Index
- *CSret* = the percentage change in the Barclays Capital U.S. High Yield Bond Index in excess of the percentage change in the Barclays Capital U.S. Corporate Bond Index

For our analysis, we excluded all interdealer trades because categorizing such trades as buyer or seller initiated is impossible. We also excluded the first sample trade for any bond issue because the dependent variable (price change) is missing. The resulting sample for estimation of execution costs contained 2,676,947 trades.

Table 6 reports our estimates of customer trade execution costs. For the full sample, the estimated average one-way trade execution cost is 24 bps. Consistent with results previously reported for corporate and municipal bonds, trade execution costs for SCPs decline with trade size, averaging 83 bps for small trades, 24 bps for medium-size trades, and only 5 bps for large trades. Trade execution costs also vary with trading frequency. Average costs for the least heavily traded tercile of securities are 31 bps, compared with 28 bps for the second tercile and 24 bps for the most frequently traded tercile.

Our finding that trade execution costs for SCPs decline with trade size mirrors the findings reported for corporate bonds (Edwards, Harris, and Piwowar 2007; Goldstein, Hotchkiss, and Sirri 2007) and for municipal bonds (Harris and Piwowar 2006; Green, Hollifield, and Schurhoff 2007). The overall level of estimated trading costs for SCPs is in line with estimates of trading costs for corporate bonds. In an earlier study (Bessembinder et al. 2006), we examined institutional trades in corporate bonds and reported average one-way trade execution costs (prior to the public dissemination of transactions) of 10–20 bps. Schultz (2001) also examined institutional trades in corporate bonds and estimated that trading costs average 27 bps. Edwards et al. (2007) studied a broader cross-section that included retail trades and estimated that one-way trade execution costs for corporate bonds range from 75 bps for very small trades to 4 bps for very large trades.

As noted earlier, subcategories of SCPs are quite heterogeneous. **Table 7** reports estimated one-way trading costs (the b_6 estimate from Equation 1), as well as additional descriptive information, for several types of structured products. Average issue sizes range from $18 million for MBSs to $202 million for student-loan-backed securities. Several types of issues have a high percentage of large trades, indicative of an institutional customer profile, including TBA securities (80% large), U.S. Small Business Administration (SBA) securities (60% large), CDOs (56% large), credit-card-backed ABSs (61% large), and student-loan-backed ABSs (64% large). Other categories—including agency CMOs (18% large), private label CMOs (27% large), and collateralized bond obligations, or CBOs (22% large), as well as the ABS subtypes TRAN (private label CMO tranches; 14% large) and WHLN (private label whole loan CMOs; 14% large)—have a distinct retail customer profile. We found that larger issue sizes tend to have an institutional customer profile, although the association is imperfect.

Results reported in Table 7 show that estimated one-way trading costs vary widely across SCP subtypes, from 92 bps for CBOs to just 1

Table 6. Trading Cost Regression Estimates for Customer Trades in SCPs, May 2011–January 2013 (p-values in parentheses)

		Trade Size Subsamples			Trading Frequency Subsamples		
	Full Sample	Small Trades (< $100,000)	Medium Trades	Large Trades (> $1 million)	Less Active Bonds	Middle Group	More Active Bonds
One-way trading cost (bps)	24	83	24	5	31	28	24
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Control variables							
Treasury index return	–1.24	–0.75	–1.77	–1.37	–1.77	–1.61	–0.89
	(0.00)	(0.16)	(0.00)	(0.00)	(0.06)	(0.00)	(0.00)
Stock market index return	0.01	0.01	0.01	0.01	0.03	0.02	0.01
	(0.07)	(0.02)	(0.00)	(0.00)	(0.59)	(0.00)	(0.32)
MBS index return	0.22	0.11	0.28	0.26	0.49	0.44	0.17
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Term spread return	1.25	0.77	1.79	1.37	1.73	1.59	0.90
	(0.00)	(0.14)	(0.01)	(0.00)	(0.07)	(0.01)	(0.00)
Credit spread return	0.01	0.01	0.01	–0.01	–0.04	–0.02	0.01
	(0.91)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	0.05	–0.01	0.09	0.03	0.11	0.13	0.04
	(0.00)	(0.36)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
No. of trades	2,676,947	804,975	417,564	1,453,745	66,268	133,545	2,477,134
Adjusted R^2	10%	33%	12%	3%	14%	12%	9%

Table 7. Estimates of SCP Customer Trading Costs by Category

	% of Trades Classified as Large	Median Issue Size ($ millions)	No. of Trades	One-Way Trading Cost (bps)	*p*-Value
Full sample	54		2,676,947	24	0.00
Agency debt					
TBA	80	NA	1,232,416	1	0.00
MBS	36	18.1	561,348	40	0.00
Agency CMO	18	33	415,591	74	0.00
SBA	60	182.8	7,269	32	0.00
CMBS	61	77.5	86,623	12	0.00
Non-agency debt					
Private label CMO	27	35.8	235,622	70	0.00
ABSY	53	57.59	114,511	24	0.00
CDO	56	37.5	13,522	52	0.00
CBO	22	150	5,946	92	0.00
CMOs and ABSs by credit type					
AUTO	54	145.8	23,559	7	0.00
EQIP	55	134.3	2,852	7	0.00
CARD	61	500	16,444	9	0.00
HOME	47	46	45,230	39	0.00
STUDENT	64	201.6	9,321	18	0.00
TRAN	14	34	414,403	76	0.00
WHLN	14	46.6	173,839	86	0.00

NA = not available.

bp for TBA securities. Trading costs are systematically related to customer profile. Subproducts with an institutional profile (a high percentage of large trades) tend to have lower costs than subproducts with a retail profile (a low percentage of large trades). The highest average trading costs are observed for agency CMOs (74 bps), CBOs (92 bps), and the ABS subtypes TRAN (76 bps) and WHLN (86 bps), each of which has a low (22% or less) proportion of large trades. The lowest average trading costs are observed for TBA securities (1 bp), CMBSs (12 bps), and the ABS subtypes secured by auto loans (AUTO; 7 bps), equipment (EQIP; 7 bps), and credit cards (CARD; 9 bps)—each of which has a substantial (54% or greater) percentage of large trades. Across SCP categories, the correlation between the percentage of large trades and the average one-way trading cost estimates is –0.91. This very low correlation suggests that the percentage of large trades alone can almost completely explain variations in average trading costs across various types of SCPs.

Our results are consistent with those of several recent studies of trading activity and transactions in SCPs based on FINRA's data. Atanasov and Merrick (2012) studied only TBA trades and reported relatively small (under 10 bps) execution costs. Hollifield, Neklyudov, and Spatt (2012) studied ABS and non-agency CMO transactions and found that bid–ask spreads charged by central, or more interconnected, dealers tend to be lower. Similar to the findings in our study, Friewald, Jankowitsch, and Subrahmanyam (2012) found that securities tend to be more liquid if they are institutionally traded, are issued by a federal authority, or have low credit risk.

Lessons from Corporate Bonds

As noted earlier, FINRA has proposed that transaction prices of SCPs be disseminated to the public. Focusing on subsamples of bonds with issue size and customer trading characteristics similar to those of structured product subtypes, we studied outcomes when transaction prices for corporate bonds were initially disseminated to the public through the TRACE system.

Public dissemination of corporate bond trade prices for 500 bond issues began in July 2002. Most corporate bonds were phased into the TRACE system between 2003 and 2005, and virtually all corporate bonds are now price transparent. We estimated trading costs for corporate bonds by using Equation 1 for all trades in corporate bonds over January 2003–December 2005. For this corporate bond sample, estimated one-way trade execution costs average 78 bps. Cost estimates decline with trade size, from 78 bps for small (less than $100,000) trades to 31 bps for medium-size trades and 22 bps for large (greater than $1 million) trades.

To assess the effect of TRACE implementation on trading costs for corporate bonds, we used an extended version of Equation 1:

$$\Delta P_{st} = b_0 + b_1 TRSYret_{st} + b_2 STOCKret_{st} + b_3 BONDret_{st} + b_4 TSret_{st} + b_5 CSret_{st} + b_6 \Delta Q_{st} + b_7 T_{st} \Delta Q_{st} + \varepsilon_{st}, \quad (2)$$

where

T_{st} = an indicator variable that equals 1 for trades that are publicly disseminated through TRACE and 0 for trades that are not disseminated

b_6 = estimate of execution costs for non-TRACE-disseminated trades

b_7 = estimate of the amount by which execution costs for TRACE-disseminated trades exceed (are less than, if negative) costs for nondisseminated trades

We first used Equation 2 for the full set of corporate bonds that became TRACE eligible in March 2003, including in our analysis trades executed six months before to six months after the initiation of public trade dissemination. We found that trading costs for corporate bonds decreased after the introduction of price dissemination by 9 bps for small trades, 6 bps for medium-size trades, and 3 bps for large trades. These results are quite similar to those reported by Edwards et al. (2007), who studied the same sample but relied on more-complex estimation techniques.

After verifying that the approach we used to estimate the effect of transaction reporting on trade execution costs for corporate bonds produces reasonable results, we then considered how the corporate bond experience can provide guidance as to the likely effects of initiating transaction reporting for SCPs. To do so, we used a matched sample approach whereby the overall pool of corporate bonds consisted of 10,108 issues phased into the TRACE system between January 2003 and March 2011. For each category of structured product in Table 7, we selected a set of comparable corporate bonds in terms of issue size and proportion of large trades for the period before the bonds were phased into the TRACE system. For a given bond to remain in the matched sample, we required a minimum of 10 trades in the six-month sample period before TRACE and

1. that the absolute value of the deviation in issue size, DEVIS = (Issue size bond – Issue size SCP)/(Issue size bond + Issue size SCP), be less than 1.0 and
2. that the absolute value of the deviation in the proportion of trades that are large, DEVLT = (Proportion large trades bond – Proportion large trades SCP)/(Proportion large trades bond + Proportion large trades SCP), be less than 1.0.

We also computed the mean absolute deviation, MAD = [abs(DEVIS) + abs(DEVLT)]/2, across the two criteria. For the structured product categories in which more than 50 bonds met these criteria, we adopted as the matched sample the 50 bonds with the lowest MADs. We then used Equation 2 for these groups of matched corporate bonds. **Table 8** reports the resulting estimates of pre-TRACE trading costs—and the estimates of the change in trading costs after the initiation of transaction dissemination—for the sets of corporate bonds selected as proxies for each set of SCPs.

In general, the selection of proxies on the basis of customer profile, as determined by issue size and the percentage of trades that are large, appears to be successful in that estimated trading costs for the SCPs are similar to the pre-TRACE trading cost estimates for the proxy bonds. The closest match is for the MBS category, where the estimated average trading cost for MBSs is 40 bps (Table 7), whereas the estimated pre-TRACE trading cost for corporate bonds with a customer profile similar to that of MBSs is 39 bps (Table 8). Across product types, the correlation between trading cost estimates for structured product types (Table 7) and estimates of pre-TRACE trading costs for corporate bonds matched on the basis of customer profile (Table 8) is 0.69.

We view this relatively high correlation as validation that the market for SCPs is indeed similar to the pre-TRACE market for corporate bonds, after allowing for variation in customer profiles. We also note, however, that for each category, the estimated mean structured product trading cost exceeds the corresponding estimate for corporate bonds. This result may reflect the fact that SCPs are more complex than corporate bonds, or it may indicate higher dealer markups.

Finally, Table 8 reports the changes in average one-way trading costs after TRACE implementation for the corporate bonds selected as matched samples for the groups of SCPs. We view these changes as rough estimates of the likely effect on transaction costs should public dissemination of SCP trade prices be implemented. The estimates indicate that increased transparency is likely to be associated with substantial decreases of 5–7 bps in one-way trading costs for MBSs, agency CMOs, and CBOs, as well as securities in the subgroups TRAN and WHLN. We would expect smaller trading cost reductions of about 2 bps for private label CMOs. In contrast, we would expect little or

Table 8. Potential Effects of Public Transaction Reporting on Trading Costs

	No. of Surrogate Bonds	% of Trades Classified as Large	Median Issue Size ($ millions)	Pre-TRACE One-Way Trading Cost (bps)	Effect of TRACE on Trading Cost (bps)
Full sample	11,688	34.0	129	71	–6
Agency debt					
MBS	17	22	45	39	–5
Agency CMO	47	15	64	56	–7
SBA	50	59	200	18	–1*
CMBS	50	55	100	26	1*
Non-agency debt					
Private label CMO	50	25	100	39	–2
ABSY	50	50	100	28	–1*
CDO	50	46	100	28	–1*
CBO	50	22	150	37	–6
CMOs and ABSs by credit type					
AUTO	50	52	150	32	1
EQIP	50	54	150	31	1
CARD	50	60	500	33	–1*
HOME	50	48	100	35	0*
STUDENT	50	62	200	32	–1*
TRAN	50	14	75	60	–7
WHLN	50	14	84	55	–7

*Significant at the 5% level.

no change in trading costs for CMBSs, SBA securities, ABSY issues, and CDOs. Broadly speaking, our analysis suggests that trading cost reductions are most likely to be observed for SCPs with a retail clientele, whereas transaction dissemination is less likely to be relevant for SCPs with an institutional clientele, which already carry lower trading costs.

These estimates of lower trading costs for SCPs have important implications for security issuers, investors in these products, and broker/dealers who supply liquidity. Improved liquidity that is attributable to post-trade price transparency could affect the valuation of the bonds themselves and lower yield spreads for SCP issues (for evidence from corporate bonds, see Chen, Lesmond, and Wei 2007). Moreover, the cumulative dollar impact of these trading cost reductions is potentially large. In the case of the transparency experiment for corporate bonds in our earlier study (Bessembinder et al. 2006), we estimated annual trading cost reductions of about $1 billion for the full corporate bond market. In addition, we documented the existence of "liquidity externalities," by which improved transparency for some products can lead to improved valuation and lower trade execution costs for related securities.

Conclusion

FINRA has recently proposed that trade prices for structured credit products, including mortgage-backed securities and other asset-backed securities, be disseminated to the public. In this article, we have presented the first comprehensive estimates of trading costs for ABSs in their opaque dealer market and assessed the potential effects of transaction reporting for SCPs in light of the experience gleaned from corporate bonds. We documented that one-way trade execution costs for SCPs average about 24 bps for the full universe of securities. However, trade execution costs vary substantially across SCP categories and depend in particular on what we call the customer profile, which depends on issue size and the proportion of small trades to large trades. In general, execution costs are greater for products with a retail profile, characterized by smaller trade and issue sizes.

We estimated the potential effects of introducing public trade price dissemination for groups of structured products by examining the experience of corporate bond samples matched to SCP groups on the basis of customer profile. Our analysis indicates that trade price dissemination is likely to be associated with substantial decreases of 6–7 bps, or about 25%, in trade execution costs for MBSs, agency CMOs, and CBOs, as well as securities in the ABS subgroups TRAN (CMO tranches) and WHLN (CMO whole loans). Some caution, however, is appropriate in interpreting these results. Characteristics other than those captured by customer profile may also be relevant. Future research can assess and allow for variations in additional relevant characteristics.

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This article qualifies for 1 CE credit.

Appendix A. Description of SCP Subtypes

In this appendix, we provide the reader with definitions of some of the basic terms used in the SCP markets.

To be announced (TBA): A TBA trade is a forward contract between the buyer and the seller for a pool of mortgage-backed securities. On the trade execution date, the buyer and the seller set a delivery price for a homogeneous pool of assets (typically, government-backed mortgages). The agreement specifies six criteria that the pool shall meet, which include issuer (e.g., Fannie Mae), maturity (typically a 30- or 15-year pool), coupon (e.g., 4%), face value ($100 million), price, and settlement month. Thus, the TBA market provides the secondary liquidity for mortgage underwriters to sell off loans that conform to prespecified lending criteria and offset the risk of locking mortgage rates.

Specified pool: In a specified pool trade, the identity of the security (i.e., CUSIP) to be delivered at settlement is specified on the date of trade execution. Many securities in this category are not considered homogeneous and include nonstandard contract terms, such as ARMs, interest only, and so on.

Mortgage-backed security (MBS): An MBS or pass-through bond is a structured bond that represents a claim on the cash flows from mortgage loans. Commercial mortgage-backed securities (CMBSs) are secured by commercial real estate (e.g., shopping malls, offices, multifamily, industrial), whereas residential mortgage-backed securities (RMBSs) are secured by single-family or two- to four-family real estate.

Agency vs. private label securities: Agency securities are issued by government-sponsored enterprises (GSEs), which enjoy an implicit government guarantee of timely payment of obligations (Freddie Mac, Fannie Mae, Ginnie Mae, and the Small Business Administration, or SBA). Private label securities are issued by private institutions (typically, special purpose vehicles associated with banks) and incorporate some form of credit enhancement from bond insurers.

Asset-backed security (ABS): An ABS is a pass-through bond that represents a claim on reference consumer assets, such as credit card receivables (CARD), student loans (STUDENT), auto loans and leases (AUTO), equipment loans (EQIP), and so on. Mortgage loans (HOME), made to credit-impaired borrowers, and home equity loans (HEL), made to prime borrowers, do not conform to GSE standards and serve as ABS reference assets.

Collateralized mortgage obligation (CMO): A CMO or pay-through structure is backed by a collateral pool of mortgages and allocates the cash flows of the underlying reference assets to a series of securities pursuant to a set of rules. The securities are divided into multiple tranches that have different maturities and different priorities for the receipt of principal and interest. The "senior" tranches are considered the safest securities. If the reference asset consists of high-yield bonds (leveraged loans), the structured notes are called *collateralized debt obligations* (CDOs) or *collateralized loan obligations* (CLOs).

Notes

1. Data are from www.sifma.org/research/statistics.aspx.
2. We are not the only authors who have studied the SCP data of the Financial Industry Regulatory Authority. Atanasov and Merrick (2012) examined a specialized segment of the SCP universe (TBA trades) and reported small (under 10 bps) execution costs. Hollifield, Neklyudov, and Spatt (2012) focused on asset-backed and commercial mortgage securities and found that bid–ask spreads charged by central, or more interconnected, dealers tend to be lower. Friewald, Jankowitsch, and Subrahmanyam (2012) found that securities that are institutionally traded, are issued by a federal authority, or have low credit risk are more liquid than other securities.
3. Rick Ketchum (speech, FINRA Fixed Income Conference, New York City, 9 March 2010): www.finra.org/Newsroom/Speeches/Ketchum/P121084.
4. Because the data provided to us did not include complete information in all fields, sample sizes vary across tables and panels.
5. The formal names for Fannie Mae, Freddie Mac, and Ginnie Mae are the Federal National Mortgage Association, the Federal Home Loan Mortgage Corporation, and the Government National Mortgage Association.
6. ABS products encompass a diverse group of asset classes underlying the structured pool. These products include

commercial property loans, aircraft, motorcycles, autos, credit card receivables, home equity lines, and so on.

7. ABSY is an internal FINRA designation for ABSs that are not TBA securities, MBSs, or CMOs.
8. The retail clientele for structured products in general consists of relatively sophisticated or "qualified" investors. Nevertheless, retail investors are at an informational disadvantage relative to dealers. Studies of structured products specifically designed for and marketed to wealthy private clients have found that the securities are often sold at a premium to estimated fair market value (see, e.g., Bergstresser 2008; Henderson and Pearson 2011).
9. Detailed results are available from the authors upon request.
10. Estimation is based on the pooled sample and the generalized method of moments. Each trade is weighted by the inverse of the square root of the elapsed time since the prior trade in the bond.

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