

# Bond Data Analysis


## [PRELIMINARY]

Artur Carvalho

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## I. Bond Data

I obtain the records of U.S. Corporate bond transactions from the enhanced Trade Reporting and Compliance Engine (TRACE). This database is maintained by the Financial Industry Regulatory Authority (FINRA) and contains information on all OTC secondary market trades in eligible corporate bonds. To classify the trades according to their underlying securities' characteristics, I merge the TRACE records with the Mergent Fixed Income Securities Database (FISD), a comprehensive database of publicly offered U.S. bonds that includes information on debt covenants. Next, I compare the profile of electronic trades taking place in Alternative Trading Systems (ATS) with trades executed through the regular voice OTC systems.

### A. *Transaction Data*

The TRACE database records detailed information on every transaction of eligible securities, including a trade's date, time, (untruncated) principal, bond identifier (CUSIP), the reporting side's capacity (either principal or agent), the type of the reporting side's counterparty (dealer or customer), whether the trade took place in an ATS, among others. The use of this data, however, requires the application of filters to correct for reporting errors that can bias the estimations of standard measures of market-liquidity.

Following [Dick-Nielsen \(2013\)](#), I apply a number of filters to remove errors and eliminate the double counting of trades. Specifically, I remove transaction records where the bond identifier (CUSIP) is missing, records of trades that were cancelled within the following 20 days (trade *cancellations*) or at a later time (trade *reversals*), as well as their original

reports.<sup>1</sup> I also adjust the sample to account for the correction of earlier transaction reports (trade *corrections*). Since FINRA members are required to file a report for every transaction, trades between dealers (*inter-dealer* trades) are recorded twice. To avoid double-counting, which would distort measures of market volume, bond turnover, trade price impact, etc., I delete the buyer-side reports. Finally, I also remove reports of trades executed on an when-issued basis, trades executed under special conditions, trades where the reported price is a weighted-average price, locked-in trades (that is, trades in which a reporting firm reports on behalf of both actual trading counterparties), trades of non-corporate securities, and the reports of trades which were settled more than 6 days after their execution date.

## B. *Electronic Trades*

Among the transactions in the TRACE database are trades executed via electronic protocols in Alternative Trading Systems (ATS.) ATS platforms are electronic trading venues that take part in every transaction executed through their systems, and thus have a reporting obligation. Starting in July 2016, the TRACE enhanced dataset has included an indicator to mark trades executed in ATS platforms. I use this variable as a flag for electronic trades. It must be noted, however, that this approach leaves out trades executed in platforms that are not registered as ATS.<sup>2</sup> Moreover, as documented by Kozora, Mizrach, Peppe, Shachar, and Sokobin (2020), the industry has adopted a few electronic trading protocols, and many platforms can offer more than one. However, the available data does not distinguish among them.

The two most common types of protocols are the request-for-quote (RFQ) and the electronic limit order books protocols. The latter is similar to the electronic communication network (ECN) protocols used in the U.S. equity and Treasury markets, where automated matching systems which provide immediately executable liquidity. The RFQ protocols, on the other hand, hold similarities with the traditional voice OTC trading, where quotes submitted in response to a request are meant for the soliciting party only, and expire at the end of the session. Given the limitations of the data, in what follows I treat all ATS trades as electronic trades, regardless of their protocol, and all non-ATS trades as voice OTC transactions.

## C. *Bond Characteristics*

I investigate the characteristics of the corporate bonds traded in the competing secondary venues using the Mergent Fixed Income Securities Database (FISD). This dataset contains detailed information on public-offered U.S. bonds, such as age, maturity, amount outstanding, issuance amount, coupon information, and so on. Of particular interest to this analysis, the Mergent FISD data documents the credit ratings issued by multiple rating agencies, and the presence of any call, put or convertibility features, as well as of covenants designed to protect bondholders.

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<sup>1</sup>See section 3.1.9 in FINRA’s TRACE FAQ: <https://www.finra.org/filing-reporting/trace/faq>

<sup>2</sup>Non-ATS platforms need only report a trade if they are a party to the transaction, such as when acting as a riskless counterparty to both sides of a trade involving anonymous buyer and seller.

From an FISD sample containing all the bonds issued up until the third quarter of 2020, I exclude non-perpetual bonds with a missing maturity date, as well as non-corporate bonds, and bonds denominated in foreign currency. This process preserves nearly 139 thousand Dollar-denominated US corporate bonds. Once completed, I merge the cleaned TRACE files with the Mergent FISD data by matching entries on the bonds' CUSIPs. In the resulting sample, I then look for information on debt covenants and exclude any bonds missing both covenant and subsequent data information. The vast majority of those are Medium Term Notes (MTNs), for which the FISD does not record covenant information.<sup>3</sup> I call this later sample the *post-filtered* sample, and the former, containing all U.S. Corporate bonds in both TRACE and FISD, the *pre-filtered* sample. In section II, I briefly discuss the differences between these two datasets. Finally, I classify bonds' as Investment Grade (IG) or High Yield (HY) based on the latest credit rating data available, either from Moody's or Standard & Poor's (S&P), as of the time a trade takes place. Bonds with Moody's ratings Baa3 and above or S&P's ratings BBB- and above are considered IG.

#### D. Covenant Categories

Bonds offer a variety of covenants designed to reduce the cost of debt by guaranteeing investors some protection from potential losses. These contractual clauses work either by restricting the actions of the issuer and its subsidiaries (*debt restrictive* covenants), such as limitations on the issuance of additional debt or the adoption of a particular investment policy, or by triggering certain provisions upon the occurrence of a specific contingency (*bondholder protective* covenants), for example a decline in the credit rating or the net worth of the issuer, or the occurrence of a default event on any other debt of the company. In addition, some bonds can be converted into equity shares of common stock in the issuing company, and may also include provisions for additional cash to be paid by bondholder to effect conversion (*convertible* bonds.)

The FISD relies on over 50 variables to codify the many different bondholder and issuer restrictive covenants. These manifold variables, however, can be grouped into broader categories, according to the types of activities they restrict. I follow Billett et al. (2007) and sort covenants into 15 categories, listed in Table I below.<sup>4</sup> The first two categories restrict payouts to shareholders and other investors, either in the form of a dividend payment or share repurchase. Among these are covenants that prevent subsidiaries from making payments to their parent companies, and covenants that preclude issuers from redeeming subordinate debt.

The next seven categories relate to restrictions on the financing activities of the parent company or its subsidiaries. These include covenants precluding the issuance of additional debt with maturity of 1 year or longer (*funded*, or *long-term*, debt), or debt of varying seniority (*subordinate*, *senior* and *secured* debt). Covenants that place accounting-based restrictions on an issuer's or its subsidiaries' leverage are grouped into the "total leverage tests" category. Such covenants may impose a minimum net worth level, a minimum ratio of earnings or a specified fixed-charge coverage ratio, or even limitations on the total-indebtedness

<sup>3</sup>MTNs are Rule 415 shelf-registered securities. See Billett, King, and Mauer (2007).

<sup>4</sup>A list of the all the FISD variables used in to form each group, as well as their FISD table of origin, can be found on <https://github.com/abcarvalho/bond-data/wiki/Covenant-Categories>.

of the issuer. The following category consists of covenants that preclude an issuer or its subsidiaries from selling and then leasing back assets that serve as collateral, requiring instead that outstanding debt be retired or that the net proceeds from the sale be used to acquire equivalent assets. Another way covenants can affect a firm’s funding decisions is by prohibiting the issuance of additional common or preferred stocks. The last three categories pertaining to financing activities consist of event-driven covenants. In the first group are covenants that trigger certain provisions when either the issuer’s rating or its net worth fall below pre-specified levels. Next, cross-default provisions stipulate that default (or acceleration of payments in default) be triggered in the issue when default (or acceleration of payments in default) occurs for any other debt issue. Lastly, a poison put allows debt to be redeemed before its maturity in case of a change in control of the issuer, and is usually deployed by companies as a takeover defense mechanism.

The final three categories gather covenants that affect the investment activities of the issuer or its subsidiaries. These can take the form of a requirement that the net proceeds from the sale of specific assets be used to redeem outstanding debt, or a proscription of certain risky investments. They can also cover the legal obligations in the case of a merger by specifying the contractual clauses of existing debt that must be honored by the surviving entity.

In the next section, I analyze the profile of secondary-market trades by trading protocol (electronic v.s. voice systems), credit quality and the covenant categories described above. If indeed electronic trading favors simpler, more standardized securities, we can expect trades in ATS to consist primarily of covenant-free bonds and debt with a fewer number of covenants relative to bonds traded in voice OTC systems.

## II. The Profile of Trades

Using the combined TRACE and Mergent sample, I compare the characteristics of the transactions in Alternative Trading Systems (ATS) to the profile of the trades executed using the more traditional voice OTC system (OTCS). I focus on the third quarter of 2019, the last quarter in my sample, and begin by presenting the general characteristics of trades by secondary market and credit rating. Next, I extend the analysis by contrasting the number and volume of small trades and those in the larger sample. Finally, I examine the breakdown of trades across [Billett et al. \(2007\)](#) covenant categories discussed in the previous section.

After merging the TRACE and MERGENT FISD datasets and excluding bonds for which covenant information is not available, as outlined in section I, I assign each covenant a category. I then slice the sample along three dimensions. Bonds are grouped according to (i) the trading systems where their trades took place, (ii) the categories assigned to their covenants, and (iii) their credit rating. Notice all these groups overlap, as bonds can be traded in both ATS and OTCS, and have multiple covenants belonging to distinct categories. In addition, bonds that are traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Nonetheless, when slicing the sample between trading systems, each trade is assigned to either the ATS or the OTCS sub-group, and thus counted only once.

To get a sense of how the analysis might have been skewed by the removal of bonds

without covenant information available, I compare the (i) the number of bonds, (ii) the trade count, as well as (iii) the trade volume in the *pre-* and *post-filtered* samples by trading system and credit rating. The results are shown in Tables II and III in Appendix A. The Filtered sample drops 8571 bonds, or 49% of the bonds in the General Sample, out of which approximately 60% were classified as high-yield (HY). Of these HY bonds, only a quarter traded in ATS. Interestingly, the trade count shares by credit rating are remarkably similar across the two samples, which suggests the bonds discarded only rarely trade. This notion is further corroborated by the ratios in the trade volume sub-tables. Finally, both tables indicate that, even though most bonds are transacted electronically, the overwhelming majority of trades still takes place in OTCS, regardless of the underlying bonds' credit quality.

Tables IV and V extend the analysis by contrasting the trade count and volume by trade size and credit rating in the *pre-* and *post-filtered* samples, respectively. I define small trades as those with a notional value no greater than USD 100 thousand. Once again, the breakdown ratios in the post-filtered data follow those in the pre-filtered sample quite closely. While small trades account for a little under 70% of all trades in OTCS, they represent over 85% of the transactions in ATS. Not surprisingly, the difference in the shares of small trades is even more pronounced when we consider the trading volume. It is well documented that the volume in secondary corporate bond markets tends to be concentrated in few but large trades. However, small trades account for nearly 18% of the total trading volume in ATS, a figure that is nearly fivefold its corresponding value in OTCS.

I now turn to the breakdown of trades by the Billett et al. (2007) covenant categories. Figures 1 to 20 in Appendix B.1 contrast the prevalence of the categories in ATS and OTCS along four variables, namely (i) number of bonds, (ii) number of issuers, (iii) trade count, and (iv) trade volume. Figures 1 and 6 show that most non-MTN bonds with covenants are traded both on ATS and OTCS. In addition, the distribution of bonds and issuers over the covenant categories is quite similar across trading systems: figure 3 (8) reports the ratio of bonds (issuers) in each trading-system/covenant category group to the total number of bonds (issuers) in the same trading-system. The most prevalent types of covenants are those that restrict share repurchases (category 2) and leverage (category 7), impose cross-default provision (category 11), prevent the sale of the assets of a firm or its subsidiaries (category 13), or secure the rights of creditors in case of mergers (category 15).

The overlap in the pool of securities suggests there is no insurmountable barrier to trading bonds electronically, however complex these bonds might be. In fact, approximately 95% of the bonds with at least one covenant in the sample were traded in ATS. It is still possible, however, that investors in electronic markets favor different types of covenants relative to bondholders in the more traditional voice OTC markets, which would be reflected in how trades are broken down across the different covenant categories. Focusing once again exclusively on non-MTN bonds with covenant data available, the transactions in ATS comprised only a little over 21% of the total, while the trade volume in electronic platforms made up roughly about 6% of the total volume in the sample (table III). This is in line with previous studies that found electronic trades to be concentrated in smaller tickets. Nevertheless, the distribution of trades over the covenant groups is virtually identical in both trading systems (figure 13). A similar scenario holds when we look at the trade volume (figure 18).

The picture is a bit more nuanced when we consider the differences across credit ratings.

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Figure 5 (10) shows the differences in the share of bonds (issuers) between ATS and OTCS by credit rating for each covenant category. Shares are computed as the ratio of bonds (issuers) in a given trading system, covenant-category and credit rating bin to the total number of bonds (issuers) in the same trading system and credit rating broader group. While there are no sizeable differences in the shares of IG bonds in each covenant category across trading systems, HY bonds in ATS are more likely to feature a covenant from categories 2, 6 or 8. Moreover, ATS trades of HY bonds tend to be more concentrated in categories 2 and 8 relative to trades in OTCS (figure 15.) Lastly, figure 20 shows that the trading volume in ATS is relatively more concentrated in bonds featuring secured debt restrictions (covenant category 6) in comparison to OTCS. Conversely, HY bonds offering a Poisson Put covenant (category 12) comprise a substantially larger share of the total trading volume in OTCS.

Another way trades can differ in secondary markets has to do with how complex the bonds most commonly traded in one system tend to be relative to those transacted in another. As a proxy for the complexity of a bond, I use its number of distinct covenant categories. Once again, I split the sample into bonds that were traded in the ATS and bonds that were traded via the voice OTC system. This time, however, in each sub-sample I group the bonds by their covenant category count. Figures 21 to 36 in Appendix B.2 then contrast the profile of trades in ATS and OTCS, focusing once more on the differences in the number of bonds and issuers, as well as in trade count and trade volume.

Figure 22 (figure 26) shows the trading system-specific bond (issuer) histograms of the covenant category count. That is, for each trading system and category count, I compute the ratio of bonds that (issuers whose bonds) fall into that group over the total number of bonds (issuers) in the trading system in question<sup>5</sup>. Perhaps not surprisingly given the overlap in the pool of bonds traded in both systems, the ATS distribution closely resembles its OTCS counterpart. Nearly 70% of all bonds traded in either system feature from 5 to 8 distinct covenant categories. A similar picture holds for the trade count (figure 30): about 70% of all trades involve bonds in the same range of covenant category count. These trades amount to approximately 67% of the total trade volume in either system (figure 34.) Interestingly, the more remarkable difference between trading systems across is observed in the subset of bonds featuring 3 distinct covenant categories: while its trades correspond to about 9% of the volume in OTCS, this share jumps to 14% in electronic platforms. Further analysis by credit rating reveals this difference to be entirely driven by trading in IG bonds (figure 36.)

As in the initial analysis that grouped bonds by covenant categories, further splitting the samples by credit rating reveals interesting differences in the profile of the trades of IG and HY bonds across electronic and voice OTC systems. Indeed, HY bonds traded in ATS are slightly more likely to feature 6 or more covenant categories (figure 24.) Turning to the trade count figures, transactions of HY bonds in ATS are more concentrated in bonds with 7 or 8 covenant categories relative to trades of risky debt in OTCS, a disparity that comes at the expense of less complex bonds (figure 32.) This pattern is observed in trades of highly rated bonds as well, albeit much less pronounced. Perhaps more importantly, and despite the seeming skewness in ATS toward the trading of more complex bonds suggested in the previous plots, particularly in the case of risky debt, the trading volume in electronic systems

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<sup>5</sup>In the case of issuers, there are likely overlaps across the histogram bins, as a company's debt outstanding can be comprised of multiple issues with distinct covenant category counts.

tends to favor securities featuring a moderate number of covenant categories (figure 36.) As pointed out above, IG bonds with 3 distinct covenant categories respond for a significantly higher share of the total volume in ATS relative to OTCS. In the case of risky debt, the trading volume is relatively more concentrated in bonds with 5 or 6 categories in electronic systems, with all other groups of bonds responding for a larger share of the total volume in OTCS relative to ATS.

### III. Conclusion

I compare the profile of U.S. Corporate bonds trades executed via modern electronic trading protocols to that of trades in the more traditional voice OTC systems (OTCS), focusing on the differences in the complexity of the securities transacted. I measure a bond’s complexity by the presence of 15 distinct covenant categories, as defined by [Billett et al. \(2007\)](#). I rely on the enhanced Trade Reporting and Compliance Engine (TRACE) for the records on trades in secondary markets, and on the Mergent Fixed Income Securities Database (FISD) for the characteristics of the bonds traded, in particular their credit rating and covenant information. Due to limitations in the data, the sample of trades executed electronically is restricted to the transactions reported by Alternative Trading Systems (ATS), and no distinction is made between the electronic trading protocols used.

In line with previous studies, I find that trades in ATS in the third quarter of 2019 accounted for only slightly over 20% of the trade count in secondary markets, and less than 6% of the total trading volume. Moreover, trades executed electronically were on average smaller, with nearly 18% of all trades in ATS being comprised of transactions with a notional size no greater than USD 100 thousand, as compared to less than 4% in OTCS in the same period. Despite these differences, when restricting the sample to bonds with covenant information available, the sets of securities trading in these two systems largely overlap. Over 92% of the bonds in this filtered sample that traded over-the-counter also traded in ATS.

Due to this overlap, the shares of bonds featuring a particular covenant category in ATS closely resemble those in OTCS. These similarities also hold when comparing the trade count and trade volume shares in these two trading systems. Differences arise when further splitting the samples by credit rating. ATS trades of HY bonds tend to be more concentrated in bonds with *share repurchase* and *sale and leaseback* restrictions in comparison to OTCS. Moreover, the trading volume in ATS is driven relatively more by bonds featuring *secured debt* restrictions, regardless of credit quality, while HY bonds with a *Poisson Put* respond for a relatively larger share of the risky debt volume in OTCS.

Finally, I look into the number of distinct covenant categories offered by each bond. Nearly 70% of all bonds feature between 5 and 8 categories. These securities account for approximately 70% of all trades and 67% of the trade volume in both ATS and OTCS. Once again, breaking the sample down by the credit quality of the bonds reveals differences in the profile of trades ATS and OTCS. HY bonds in ATS are more likely to feature 6 or more covenant categories relative to risky bonds in OTCS. And HY bonds with 7 or 8 categories represent a larger share of the total trade count in ATS vis-à-vis voice OTC systems. Perhaps more importantly, trades of IG bonds with 3 covenant categories account

for a substantially larger share of the total trade volume in ATS relative to OTCS. Among HY bonds, the trading volume in ATS is remarkably more concentrated on bonds with 5 or 6 distinct covenant categories.

In conclusion, most U.S. Corporate bonds that trade through voice OTC system also trade via electronic protocols. However, the adoption of these modern protocols remains limited, with only but a fifth of all trades being done through ATS, and amounting to an even smaller share of the total trade volume in secondary markets. Additionally, the profile of trades in ATS is skewed toward smaller ticket sizes. Interestingly, although the trades of risky debt tend to favor bonds featuring a larger number of covenant categories in ATS relative to OTCS, the volume in electronic platforms seems to be more driven by trades of bonds with moderate complexity. If investors are reluctant to trade more complex securities in more transparent exchanges, this particular finding might help explain the rather slow pace in the adoption of the more modern trading protocols in US. Corporate debt markets.

## References

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# Appendix A. Tables

**Table I:** Covenant Categories by the Type of Restricted Activity

Covenant Restrictions	
Payouts	
1	Dividend pmnt. restrs.
2	Share repurchase restrs
Financing Activities	
3	Funded debt restrs
4	Subordinate debt restrs
5	Senior debt restrs
6	Secured debt restrs
7	Total leverage test
8	Sale & leaseback
9	Stock issue restrs.
10	Rating & net wrth. trgs.
11	Cross-default provisions
12	Poison Put
Investments	
13	Asset sale clause
14	Invest. policy restrs.
15	Merger restrictions

The table lists the 15 major categories [Billett et al. \(2007\)](#) use to group the Mergent Fixed-Income Securities Dataset (FISD) covenant variables according to the type of activity they restrict.

**Table II:** Secondary Markets Bond and Trade Counts and Trade Volume by Trading System and Credit Rating - All U.S. Corporate Bonds, 2019Q3

<i>Bond Count</i>						
Rating	ATS	OTCS	Total	ATS/OTCS (%)	ATS/Total (%)	OTCS/Total (%)
IG	8,903	10,071	10,075	88.40	88.37	99.96
HY	2,976	6,806	6,808	43.73	43.71	99.97
All	11,853	16,822	16,828	70.46	70.44	99.96

<i>Trade Count</i>						
Rating	ATS	OTCS	Total	ATS/OTCS (%)	ATS/Total (%)	OTCS/Total (%)
IG	486,718	1,889,545	2,376,263	25.76	20.48	79.52
HY	199,015	649,489	848,504	30.64	23.45	76.55
All	685,733	2,539,034	3,224,767	27.01	21.26	78.74

<i>Trade Volume (USD tn)</i>						
Rating	ATS	OTCS	Total	ATS/OTCS (%)	ATS/Total (%)	OTCS/Total (%)
IG	53.99	926.64	980.63	5.83	5.51	94.49
HY	21.81	322.05	343.87	6.77	6.34	93.66
All	75.80	1,248.69	1,324.50	6.07	5.72	94.28

The tables show the breakdown in the number of bonds, trade count and trade volume by trading system and credit rating. The sample consists of all U.S. corporate bonds, including medium-term notes (MTNs), that were traded in 2019Q3, either in (i) Alternative Trading Systems (ATS) or via (ii) the voice over-the-counter systems (OTCS). The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Likewise, bonds that were traded in both trading systems are featured in both the ATS and OTCS sub-samples. Notice, however, each trade is assigned a single trading-system sub-group, and thus counted only once.

**Table III:** Secondary Markets Bond and Trade Counts and Trade Volume by Trading System and Credit Rating - U.S. Corporate Bonds with Covenant Data Available, 2019Q3

<i>Bond Count</i>						
Rating	ATS	OTCS	Total	ATS/OTCS (%)	ATS/Total (%)	OTCS/Total (%)
IG	6,322	6,694	6,697	94.44	94.40	99.96
HY	1,749	1,898	1,900	92.15	92.05	99.89
All	8,059	8,566	8,571	94.08	94.03	99.94

<i>Trade Count</i>						
Rating	ATS	OTCS	Total	ATS/OTCS (%)	ATS/Total (%)	OTCS/Total (%)
IG	386,053	1,487,588	1,873,641	25.95	20.60	79.40
HY	188,845	585,750	774,595	32.24	24.38	75.62
All	574,898	2,073,338	2,648,236	27.73	21.71	78.29

<i>Trade Volume (USD tn)</i>						
Rating	ATS	OTCS	Total	ATS/OTCS (%)	ATS/Total (%)	OTCS/Total (%)
IG	44.55	725.98	770.53	6.14	5.78	94.22
HY	20.24	285.91	306.15	7.08	6.61	93.39
All	64.79	1,011.89	1,076.68	6.40	6.02	93.98

The tables show the breakdown in the number of bonds, trade count and trade volume by trading system and credit rating. The sample consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3, either in (i) Alternative Trading Systems (ATS) or via (ii) the voice over-the-counter systems (OTCS). The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Likewise, bonds that were traded in both trading systems are featured in both the ATS and OTCS sub-samples. Notice, however, each trade is assigned a single trading-system sub-group, and thus counted only once.

## *A.1 Small Trades*

**Table IV:** Secondary Markets Trade Count and Trade Volume by Trade Size, Trading System and Credit Rating  
All U.S. Corporate Bonds, 2019Q3

Trade Count								
Rating	ATS			OTC			All	
	Small (< 100k)	All	Share (%)	Small (< 100k)	All	Share (%)	Small (< 100k)	Share (%)
IG	417,369	486,718	85.75	1,324,843	1,889,545	70.11	1,742,212	73.32
HY	174,621	199,015	87.74	444,826	649,489	68.49	619,447	73
All	591,990	685,733	86.33	1,769,669	2,539,034	69.70	2,361,659	73.24

Trade Volume (USD tn)								
Rating	ATS			OTC			All	
	Small (< 100k)	All	Share (%)	Small (< 100k)	All	Share (%)	Small (< 100k)	Share (%)
IG	10.22	53.99	18.93	33.91	926.64	3.66	44.13	4.50
HY	3.64	21.81	16.68	11.59	322.05	3.60	15.23	4.43
All	13.86	75.80	18.28	45.50	1,248.69	3.64	59.36	4.48

The tables show the breakdown in trade count and trade volume by trade size, trading system and credit rating. Small trades are trades with a notional no greater than USD 100,000.00. The sample consists of all U.S. corporate bonds, including medium-term notes (MTNs), that were traded in 2019Q3, either in (i) Alternative Trading Systems (ATS) or via (ii) the voice over-the-counter systems (OTCS). The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Likewise, bonds that were traded in both trading systems are featured in both the ATS and OTCS sub-samples. Notice, however, each trade is assigned a single trading-system sub-group, and thus counted only once.

**Table V:** Secondary Markets Trade Count and Trade Volume by Trade Size, Trading System and Credit Rating  
U.S. Corporate Bonds with Covenant Data Available, 2019Q3

*Trade Count*

Rating	ATS			OTC			All		
	Small ( $< 100k$ )	All	Share (%)	Small ( $< 100k$ )	All	Share (%)	Small ( $< 100k$ )	All	Share (%)
IG	329,691	386,053	85.40	1,039,077	1,487,588	69.85	1,368,768	1,873,641	73.05
HY	165,922	188,845	87.86	401,714	585,750	68.58	567,636	774,595	73.28
All	495,613	574,898	86.21	1,440,791	2,073,338	69.49	1,936,404	2,648,236	73.12

*Trade Volume (USD tn)*

Rating	ATS			OTC			All		
	Small ( $< 100k$ )	All	Share (%)	Small ( $< 100k$ )	All	Share (%)	Small ( $< 100k$ )	All	Share (%)
IG	8.10	44.55	18.17	26.80	725.98	3.69	34.90	770.53	4.53
HY	3.44	20.24	16.98	10.39	285.91	3.63	13.83	306.15	4.52
All	11.53	64.79	17.80	37.19	1,011.89	3.68	48.72	1,076.68	4.53

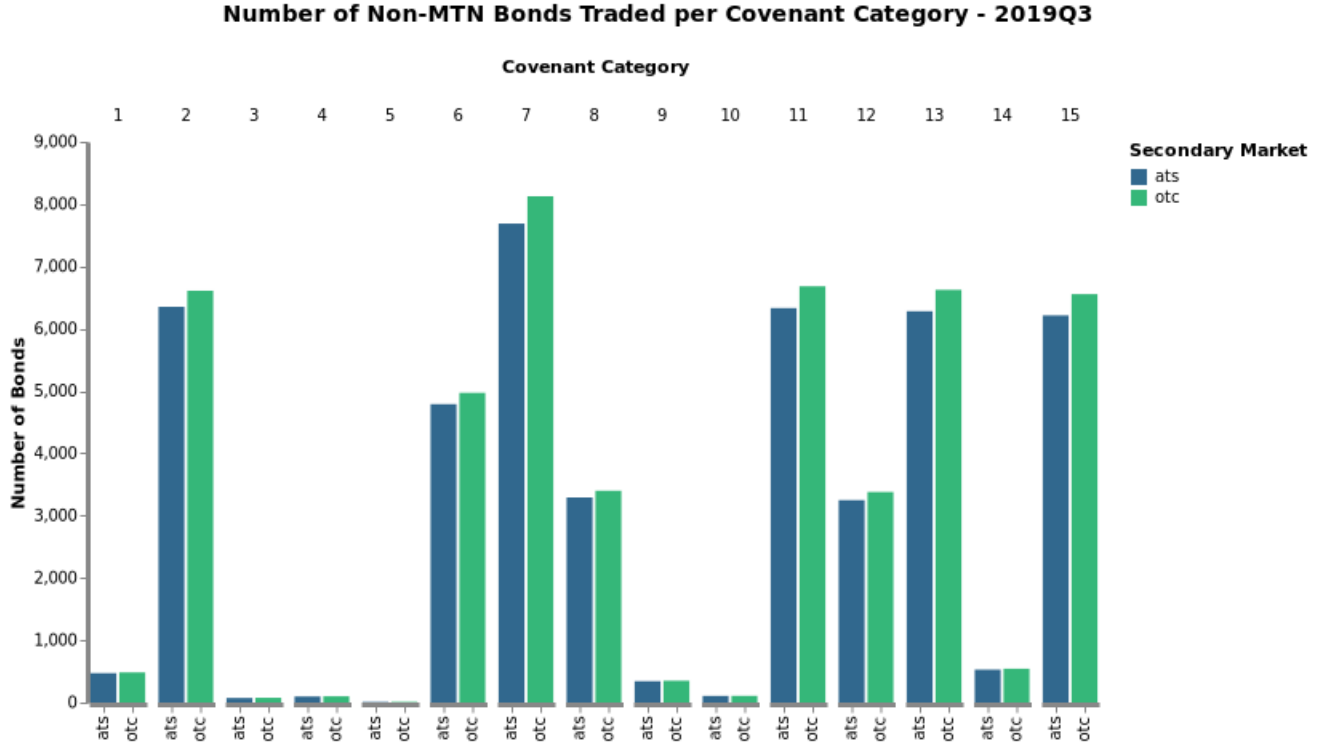
The tables show the breakdown in trade count and trade volume by trade size, trading system and credit rating. Small trades are trades with a notional no greater than USD 100,000.00. The sample consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3, either in (i) Alternative Trading Systems (ATS) or via (ii) the voice over-the-counter systems (OTCS). The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section 1.) Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Likewise, bonds that were traded in both trading systems are featured in both the ATS and OTCS sub-samples. Notice, however, each trade is assigned a single trading-system sub-group, and thus counted only once.

## Appendix B. Plots

### B.1 Covenant Categories

#### B.1.1 Bonds

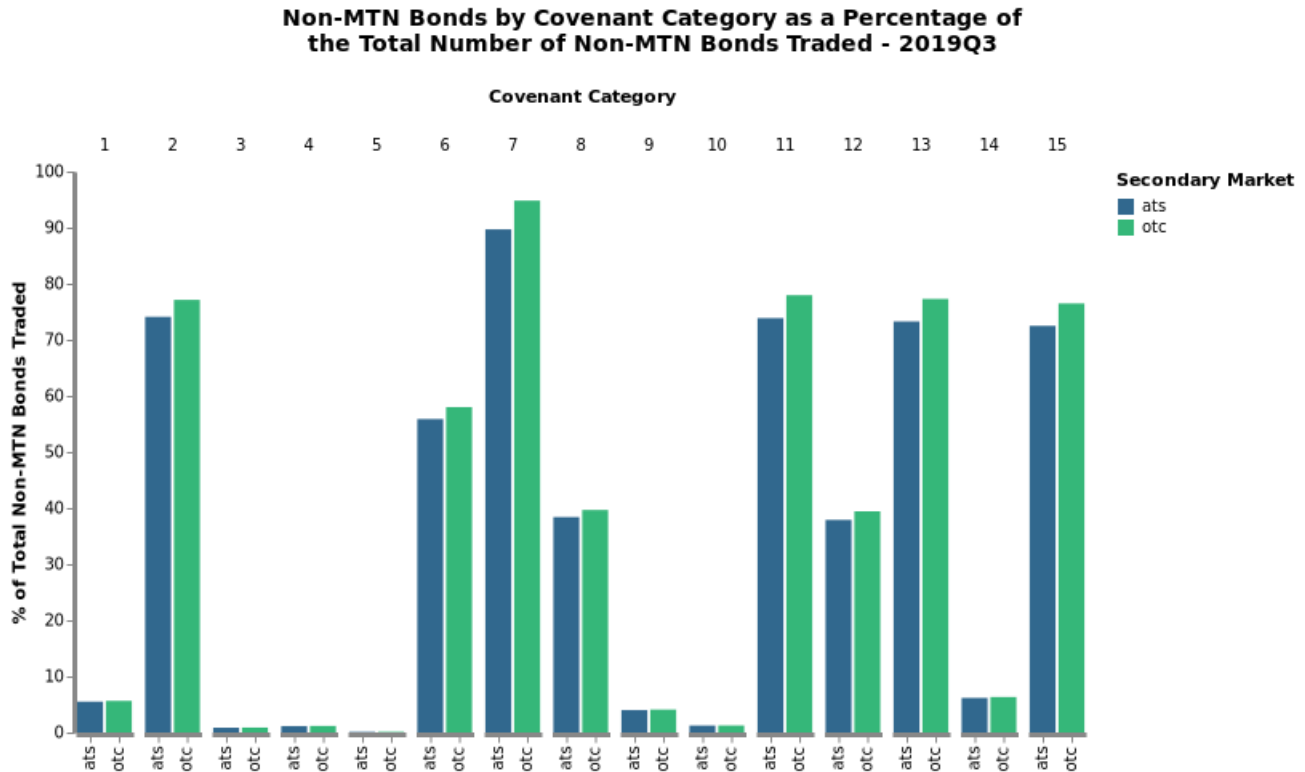
**Figure 1.** Number of Bonds traded by Covenant Categories and Secondary Trading System



The picture shows the number of corporate bonds, excluding medium-term notes (MTNs), in each covenant category that were traded (i) in Alternative Trading Systems (ATS) and (ii) via the voice over-the-counter systems (OTC) during 2019Q3. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

**Figure 2.** Bonds traded by Covenant Categories and Secondary Trading System as a Share of Bonds traded across Secondary Venues

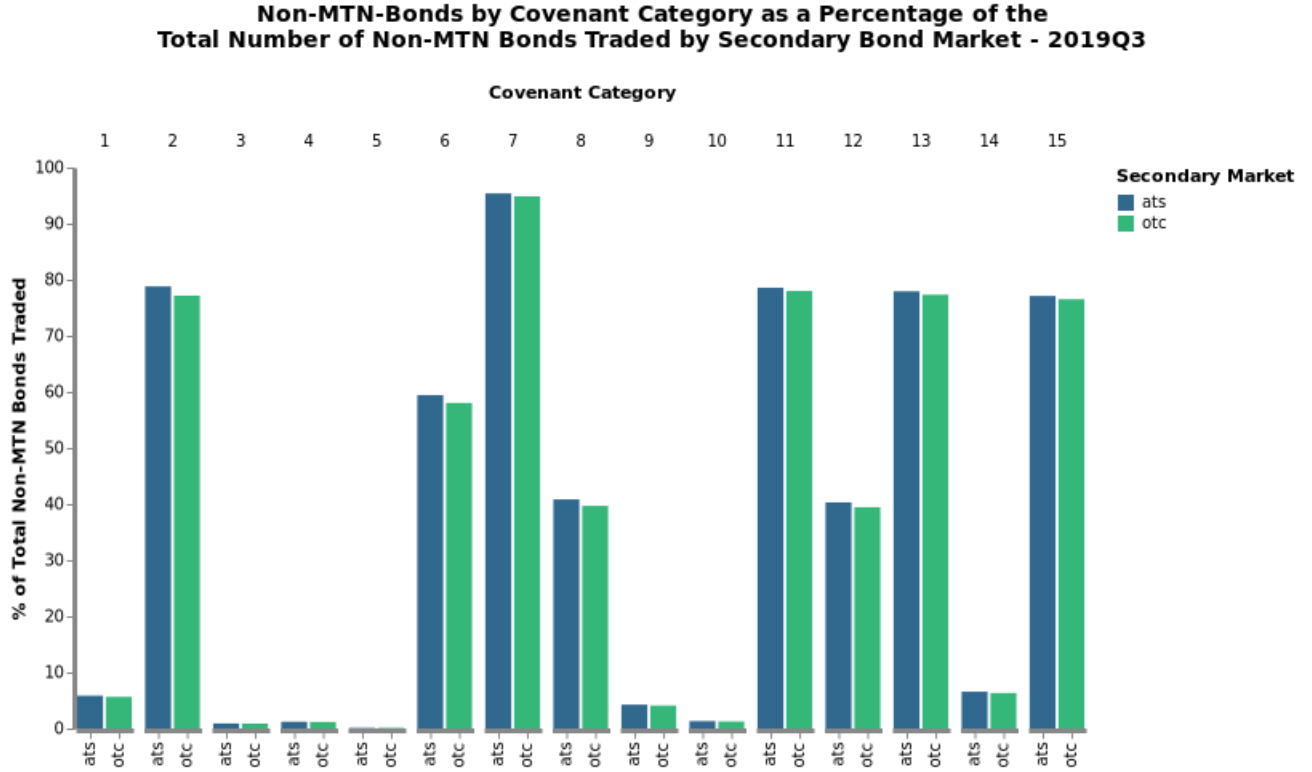


The samples consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. The picture shows the share of bonds in each covenant category that were traded (i) in Alternative Trading Systems (ATS) and (ii) via the voice over-the-counter systems (OTC) during 2019Q3. Shares were computed as the ratio of bonds in covenant- and trading-system-specific groups to the total number of bonds traded across secondary venues in the sample. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.



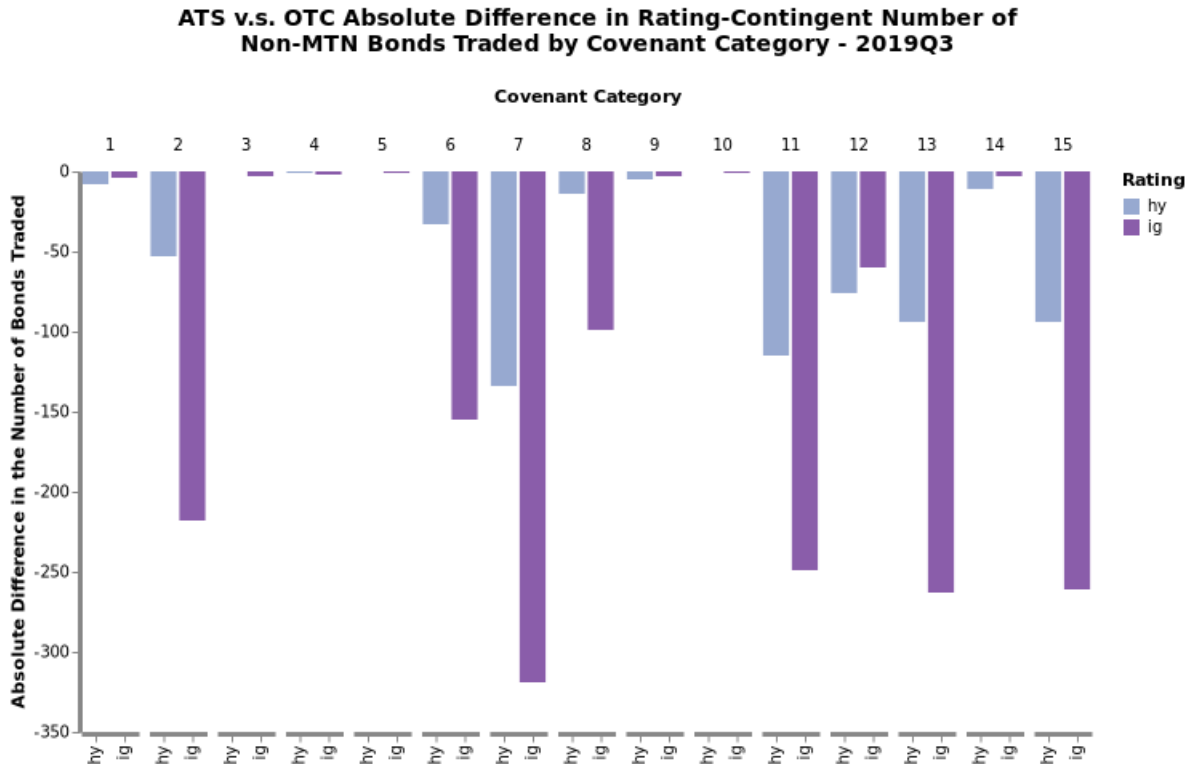
**Figure 3.** Non-MTN Corporate Bonds traded by Covenant Categories and Secondary Trading System as Share of All Non-MTN Corporate Bonds traded in each Secondary Venue



The picture shows the share of corporate bonds, excluding medium-term notes (MTNs), in each covenant category that were traded (i) in Alternative Trading Systems (ATS) and (ii) via the voice over-the-counter systems (OTC) during 2019Q3. Shares were computed as a percentage of the total number of corporate, non-MTN bonds with at least one covenant traded in each secondary venue. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

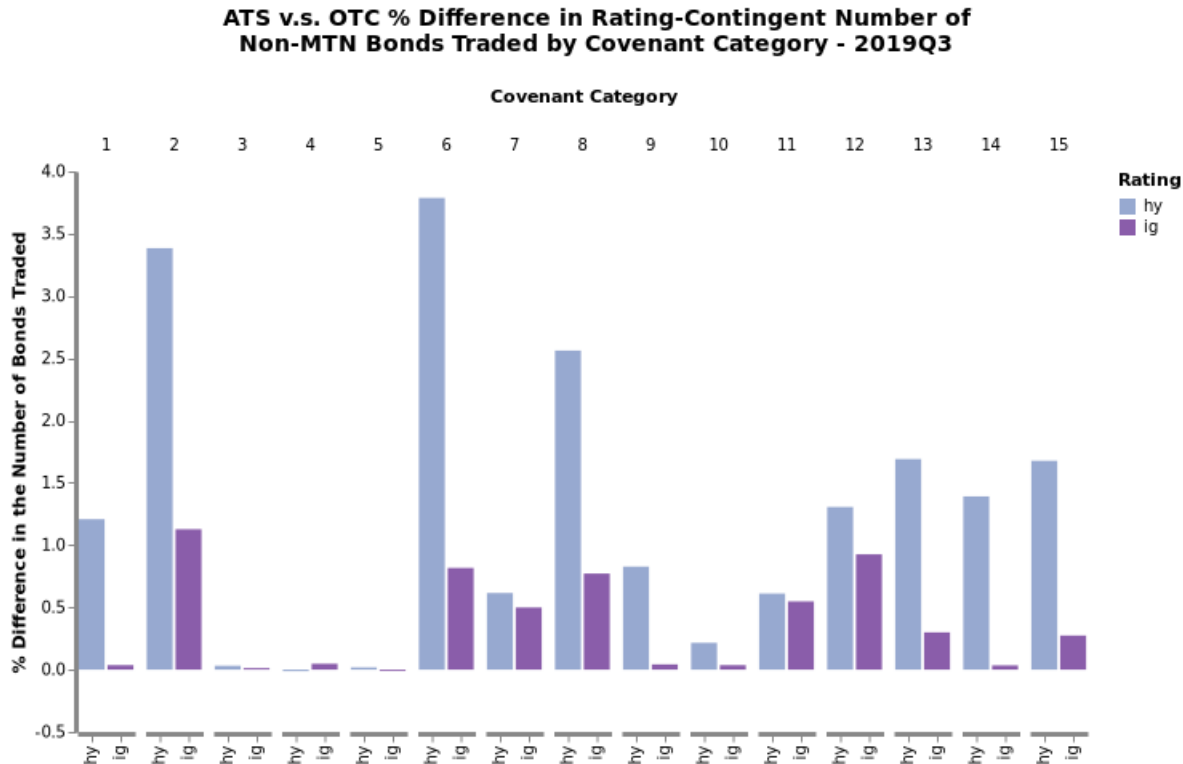
**Figure 4.** ATS/OTC Absolute Difference in the Number of Non-MTN Corporate Bonds traded by Credit Rating and Covenant Category



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in the number of bonds traded in Alternative Trading Systems (ATS) and via the voice over-the-counter systems (OTC) by credit rating and covenant category. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

**Figure 5.** ATS/OTC Difference in the Share of Non-MTN Corporate Bonds traded by Covenant Categories and Secondary Trading System

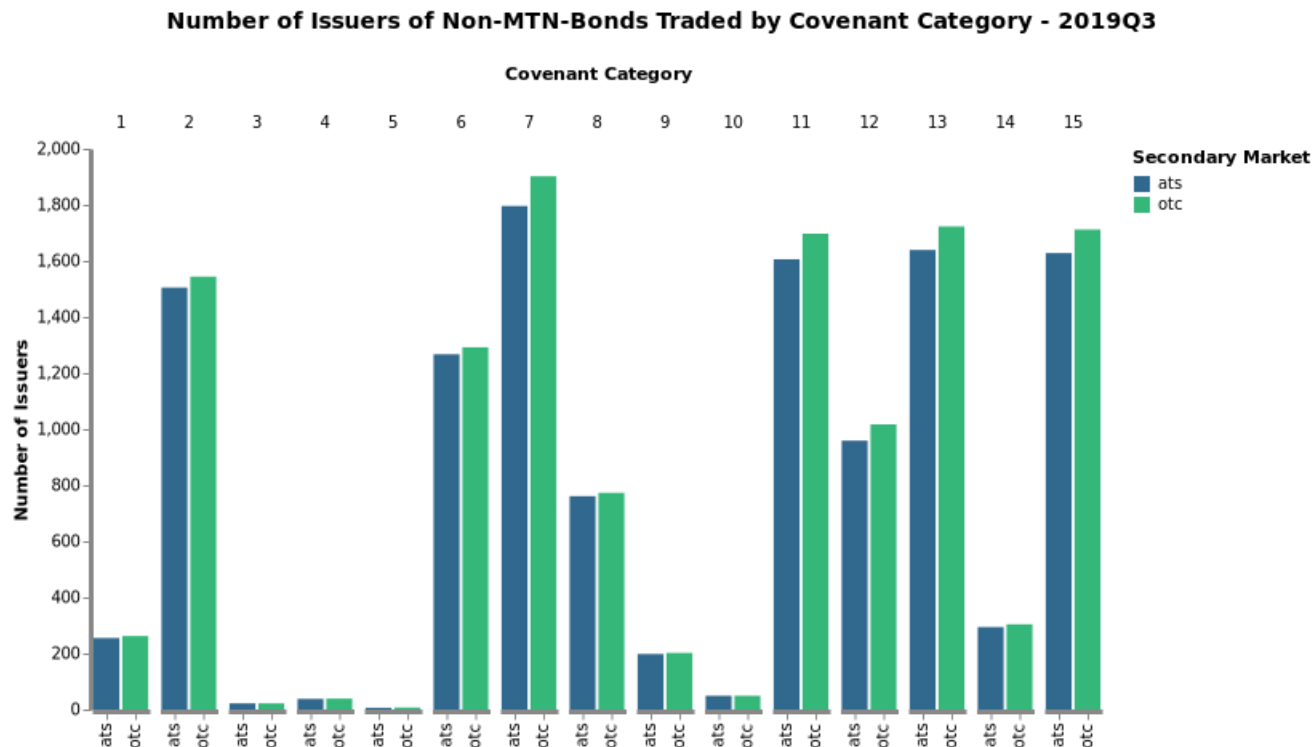


The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in (i) the Alternative Trading Systems' (ATS) and (ii) the voice over-the-counter systems' (OTC) shares of bonds by credit rating and covenant category. For a given trading-system, covenant category and credit-rating group, its share of bonds is the ratio of its number of bonds to the total number of bonds in the same trading system and credit rating. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

### B.1.2 Issuers

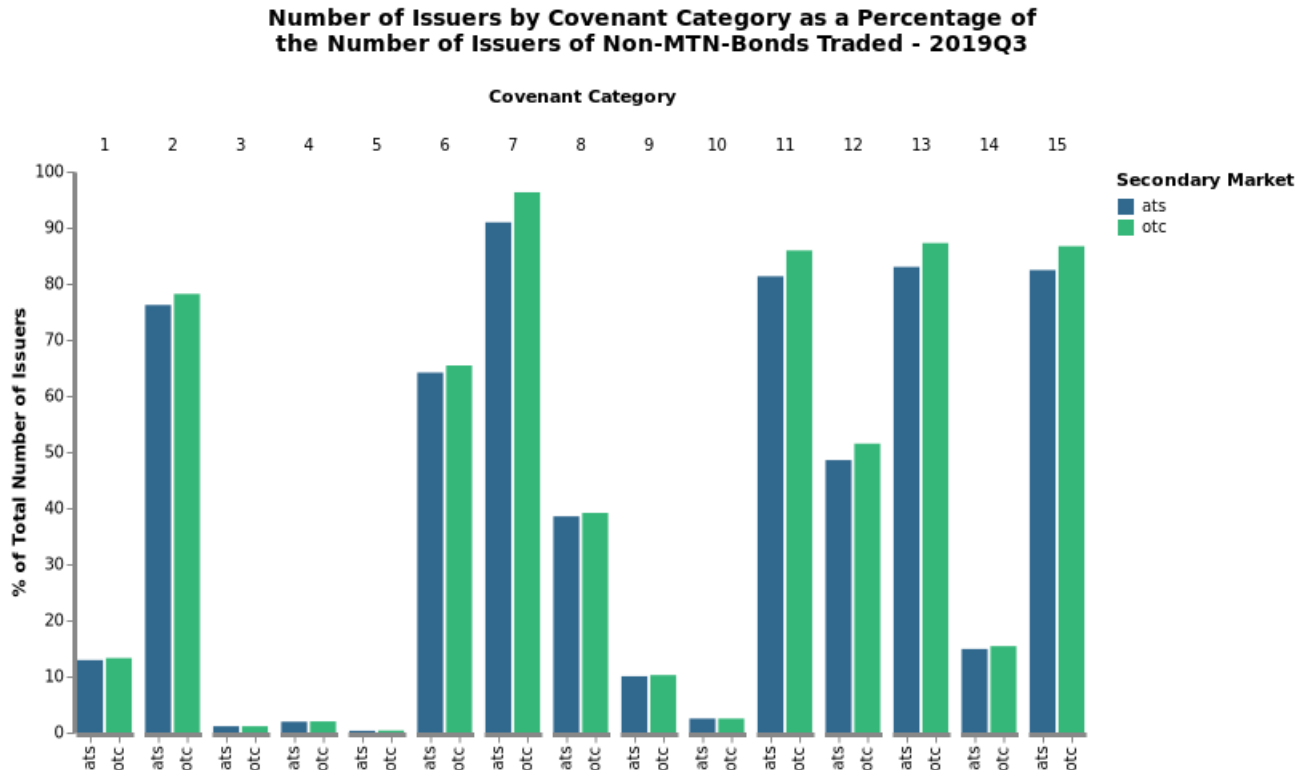
**Figure 6.** Number of Issuers by Covenant Categories and Secondary Trading System



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. For each secondary market and covenant category, I identify the bonds offering one or more covenants pertaining to the category in question. I then count the number of unique issuers among the selected bonds. Notice that a bond can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

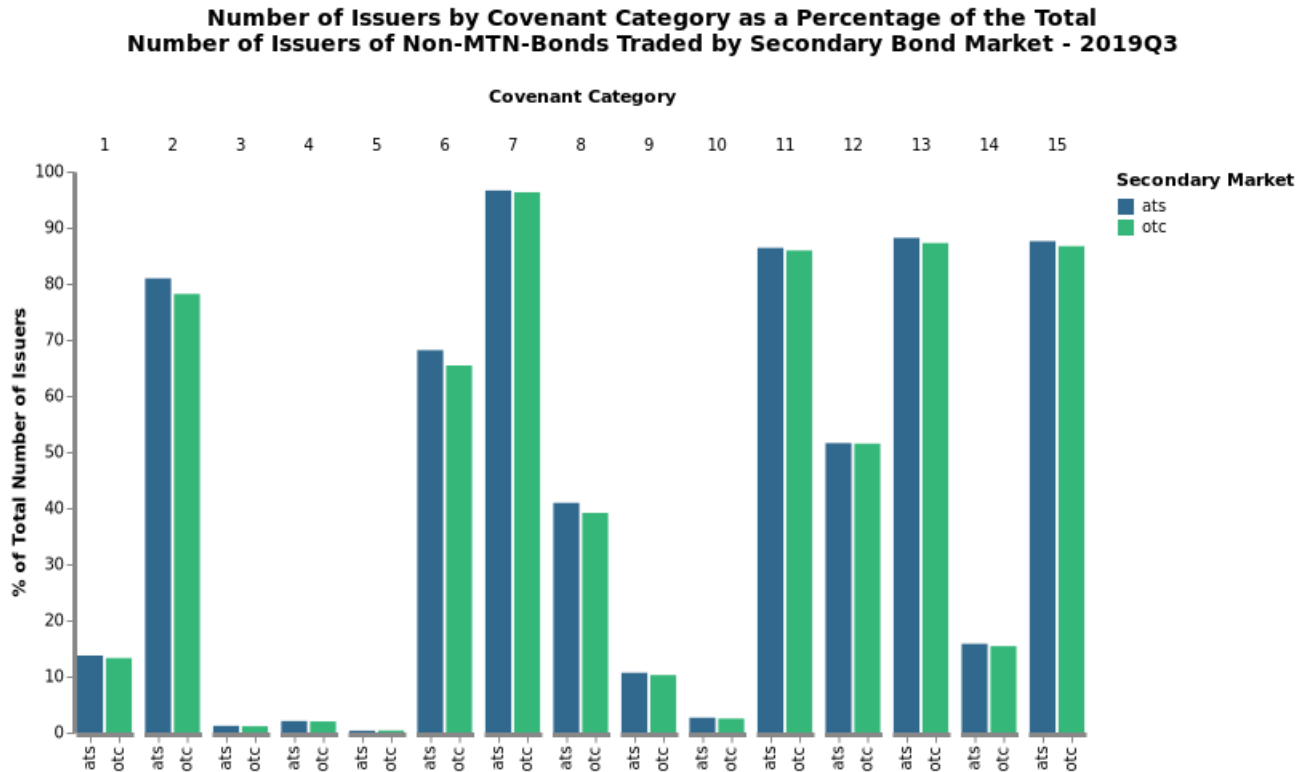
**Figure 7.** Number of Issuers by Covenant Categories and Secondary Trading System as a Share of All Issuers across Secondary Venues



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. For each trading system and covenant category, I identify the bonds offering one or more covenants pertaining to the category in question. I then count the number of unique issuers among the selected bonds. The picture shows the share of issuers in each covenant category by trading system. Category- and market-specific shares were computed as the ratio of the number of issuers of bonds belonging to a specific category in the trading system in question to the total number of issuers across secondary venues in the sample. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

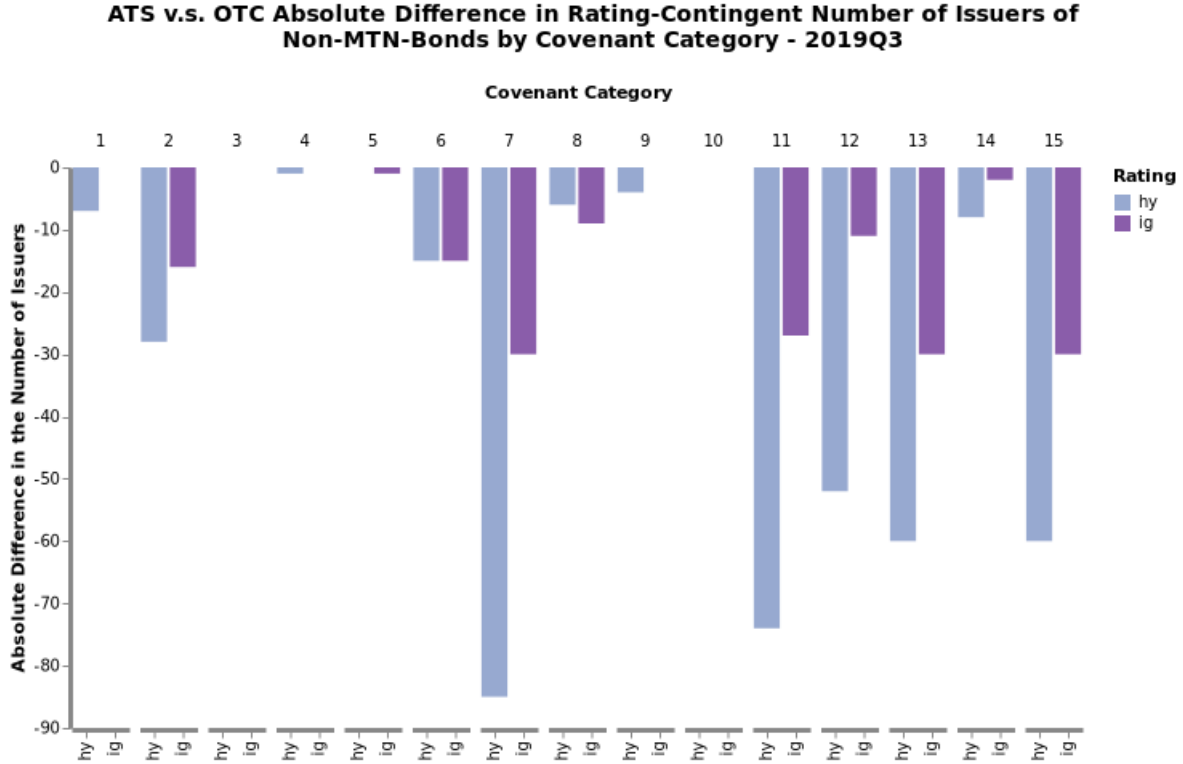
**Figure 8.** Number of Issuers by Covenant Categories and Secondary Trading System as Share of Market-Specific Issuers across Covenant Categories



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. For each trading system and covenant category, I identify the bonds offering one or more covenants pertaining to the category in question. I then count the number of unique issuers among the selected bonds. The picture shows the share of issuers in each covenant category by trading system. Category- and market-specific shares were computed as the ratio of the number of issuers of bonds belonging to a specific category in the trading system in question to the total number of issuers in the same trading system found in the sample. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

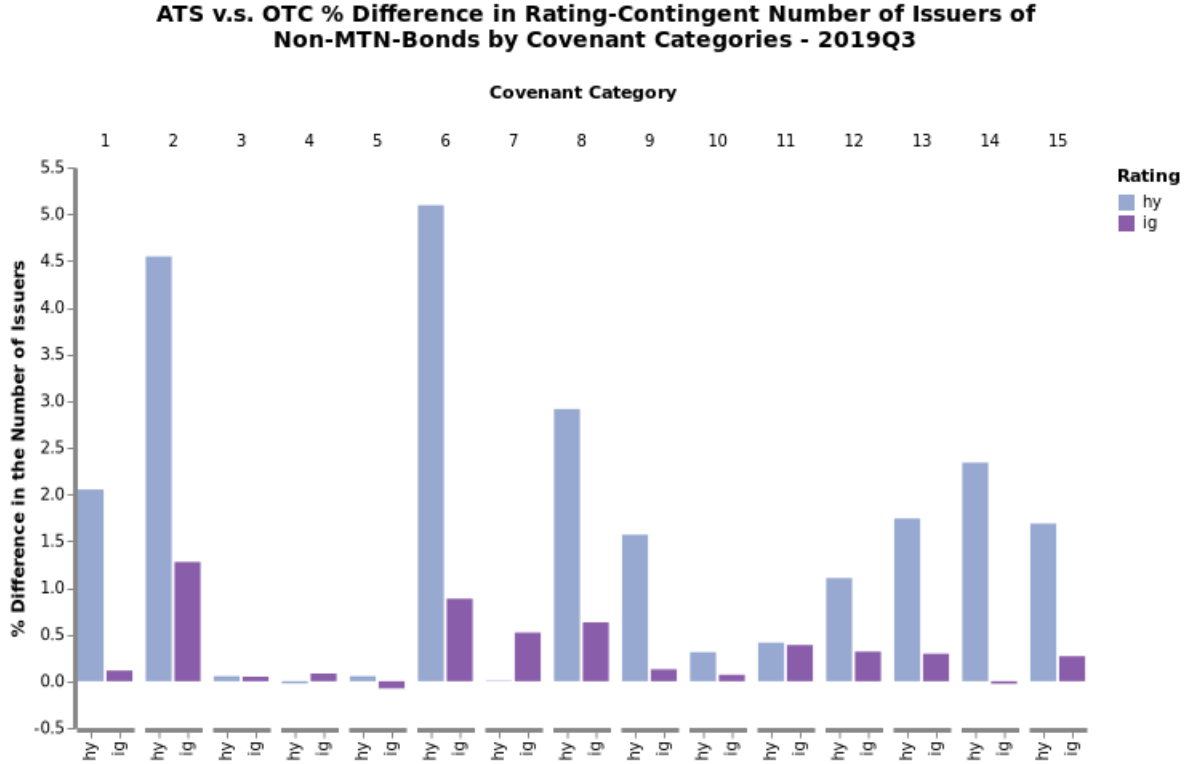
**Figure 9.** ATS/OTC Absolute Difference in the Number of Issuers of Non-MTN Corporate Bonds traded by Credit Rating and Covenant Category



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in the number of issuers of bonds traded in Alternative Trading Systems (ATS) and via the voice over-the-counter systems (OTC) by credit rating and covenant category. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

**Figure 10.** ATS/OTC Difference in the Share of Issuers of Non-MTN Corporate Bonds traded by Covenant Categories and Secondary Trading System



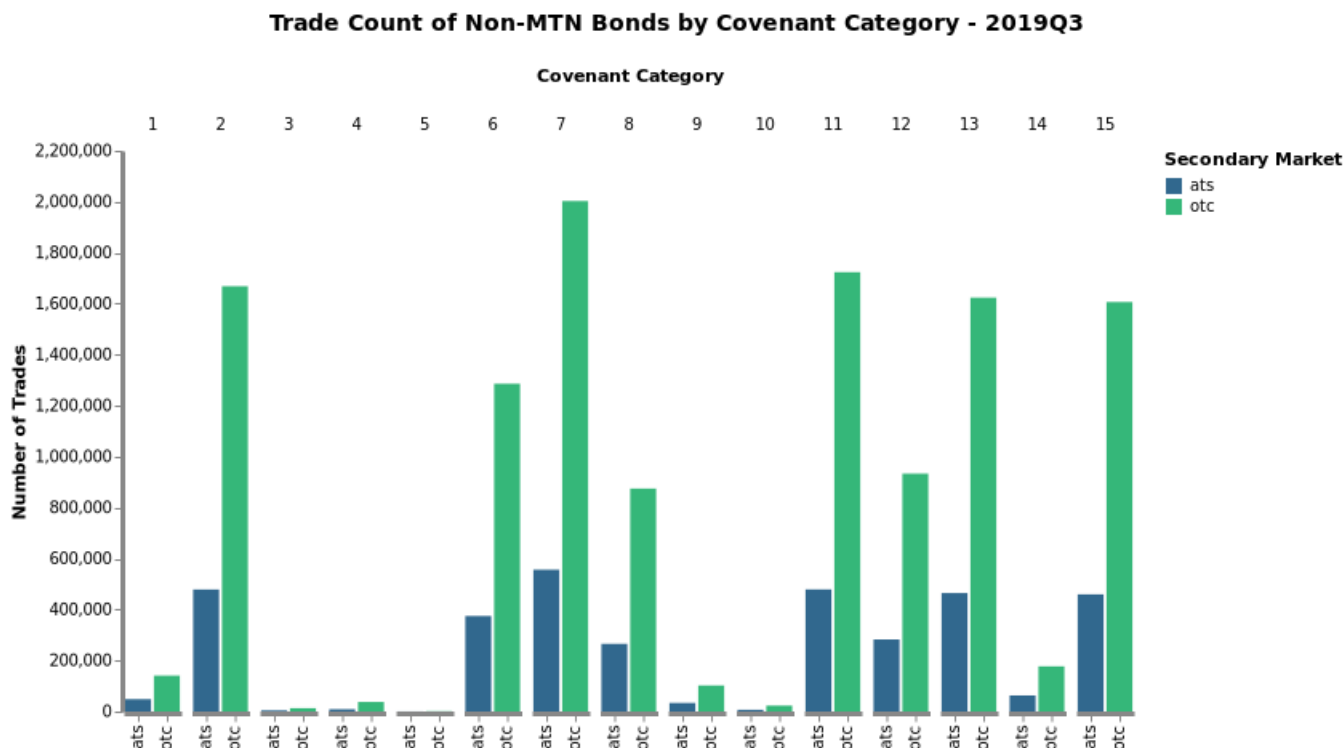
The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in (i) the Alternative Trading Systems' (ATS) and (ii) the voice over-the-counter systems' (OTC) shares of issuers of bonds by credit rating and covenant category. For a given trading system, covenant category and credit-rating group, its share of issuers is the ratio of its number of issuers to the total number of issuers of bonds in the same trading system and credit rating wider group. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.



### B.1.3 Trade Count

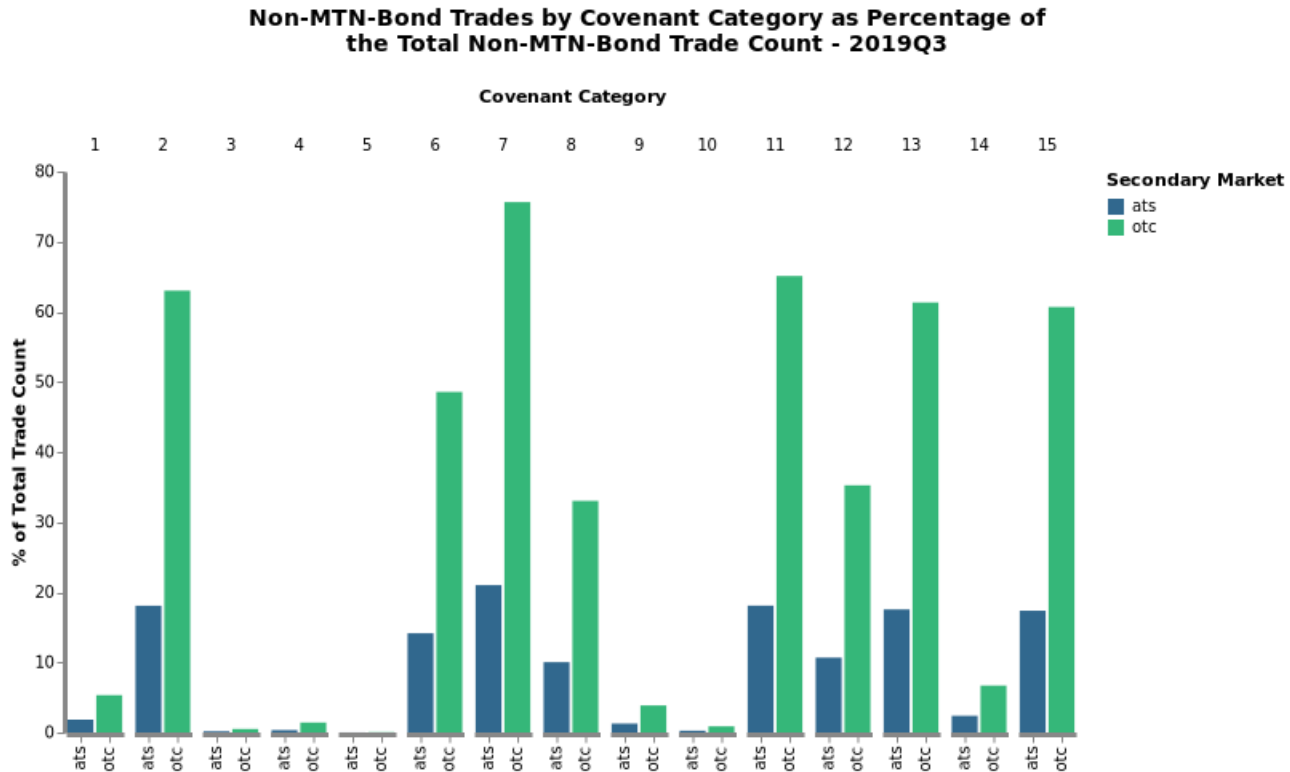
**Figure 11.** Non-MTN Corporate Bonds Trade Count by Covenant Categories and Secondary Trading System



The picture shows the trade count of corporate bonds, excluding medium-term notes (MTNs), by covenant category in (i) Alternative Trading Systems (ATS) and (ii) in the voice over-the-counter systems (OTC) during 2019Q3. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes (MTNs) are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

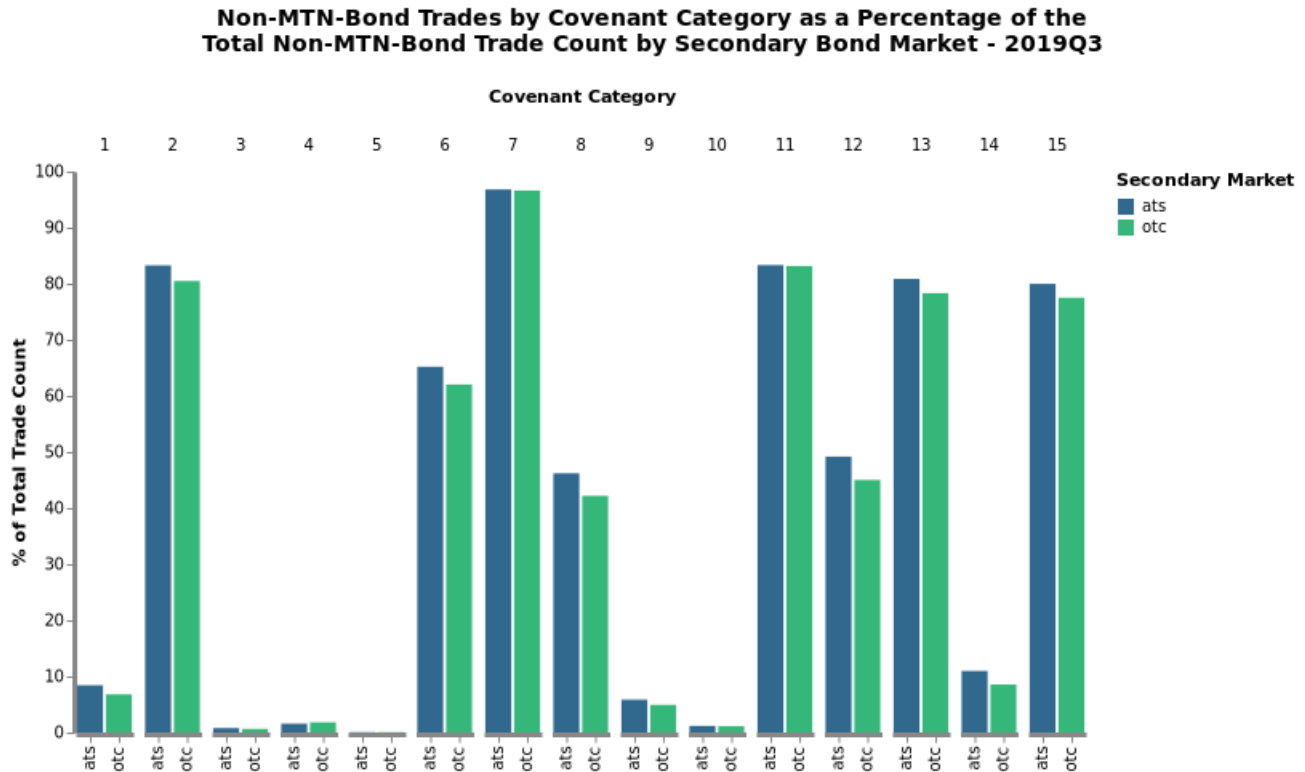
**Figure 12.** Trade Count by Covenant Categories and Secondary Trading System as Share of All Trades across Secondary Venues



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. The picture shows the share of trades in each covenant category by trading system. Category- and market-specific shares were computed as the ratio of the number of trades of bonds belonging to a specific category in the system in question to the total number of trades across secondary venues in the sample. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group, but trades are computed only once.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

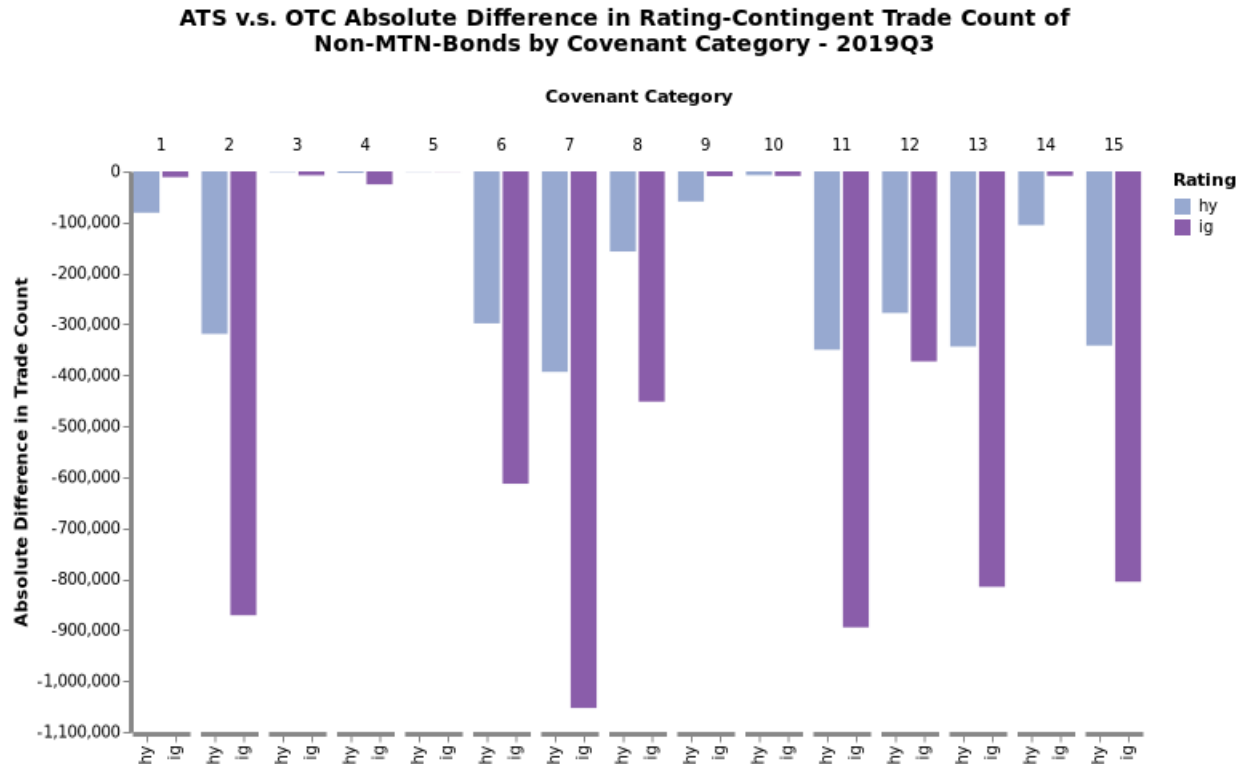
**Figure 13.** Trade Count by Covenant Categories and Secondary Trading System as Share of Market-Specific Trades across Covenant Categories



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. The picture shows the share of trades in each covenant category by trading system. Category- and market-specific shares were computed as the ratio of the number of trades of bonds belonging to a specific category in the system in question to the total number of trades across secondary venues in the same trading system. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group, but trades are computed only once.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

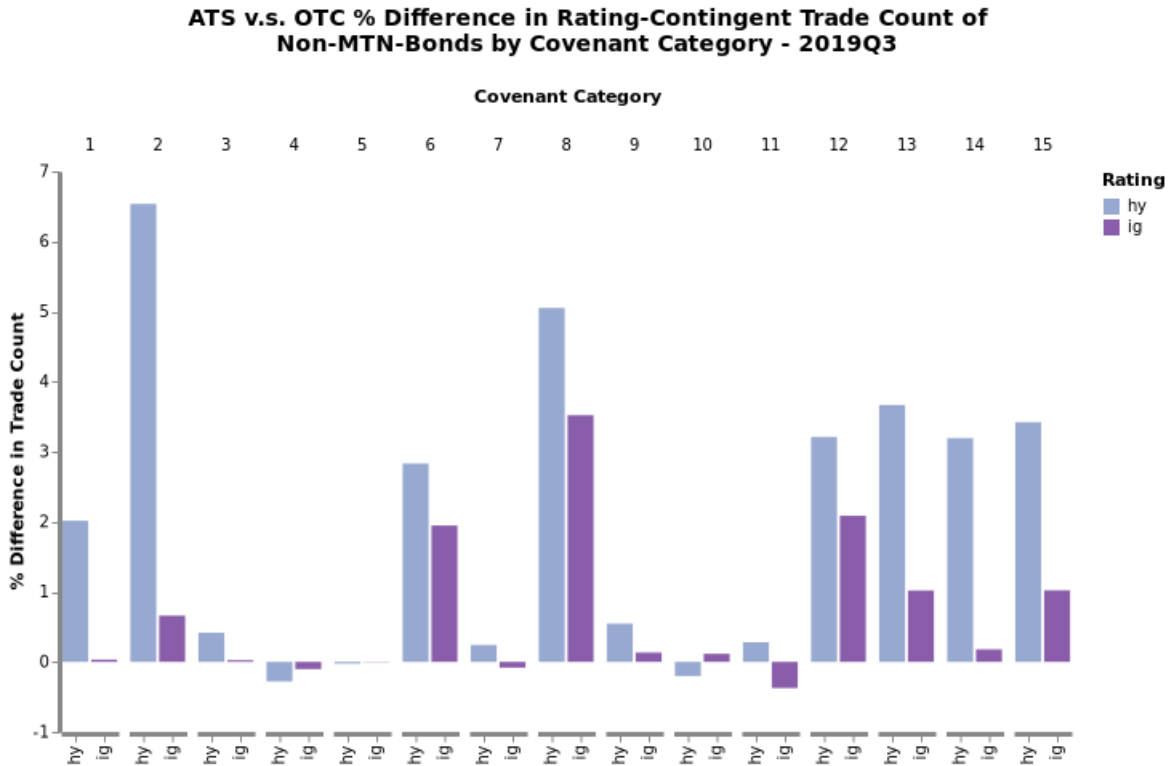
**Figure 14.** ATS/OTC Absolute Difference in the Trade Count of Non-MTN Corporate Bonds traded by Credit Rating and Covenant Category



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in the trade count of bonds traded in Alternative Trading Systems (ATS) and via the voice over-the-counter systems (OTC) by credit rating and covenant category. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

**Figure 15.** ATS/OTC Difference in the Share of the Trade Count of Non-MTN Corporate Bonds traded by Covenant Categories and Secondary Trading System

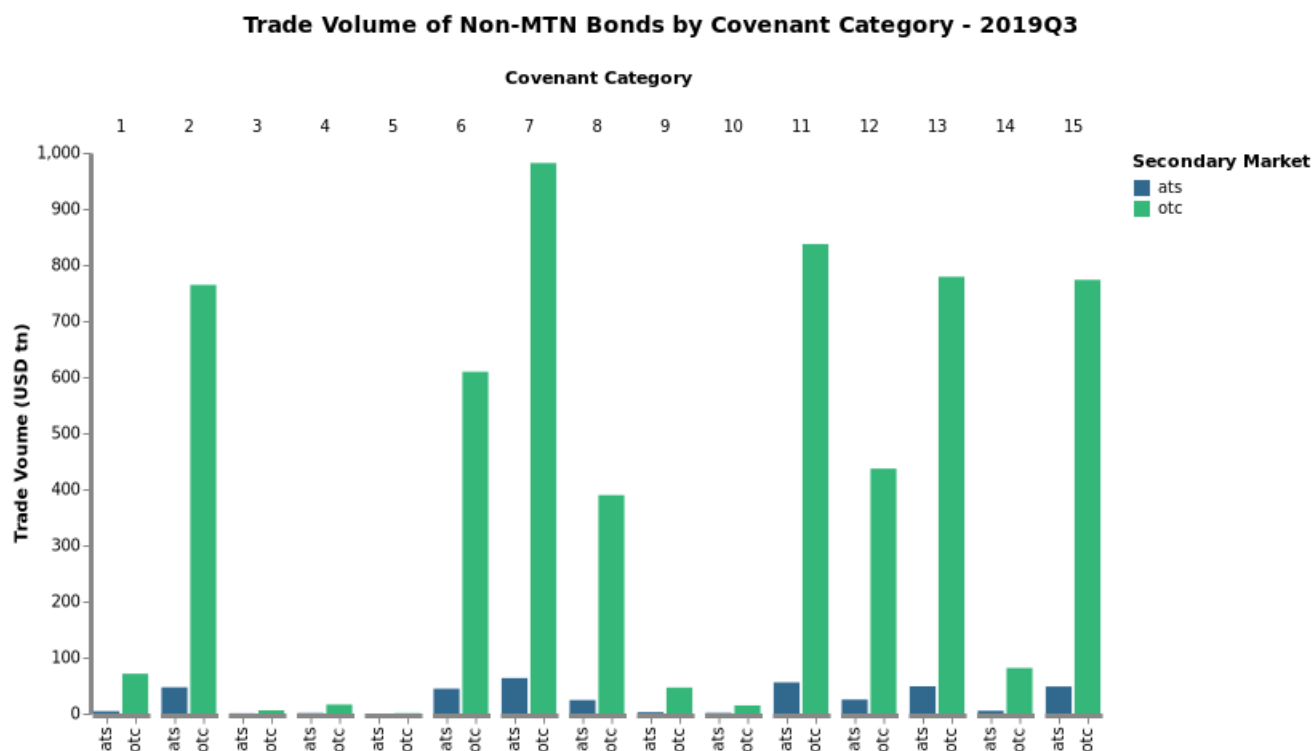


The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in (i) the Alternative Trading Systems' (ATS) and (ii) the voice over-the-counter systems' (OTC) shares of the trade count of bonds by credit rating and covenant category. For a given trading system, covenant category and credit-rating group, its share of the total trade count is the ratio of the trade count of its bonds to the total number of trades of bonds in the same trading system and credit rating wider group. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

### B.1.4 Trade Volume

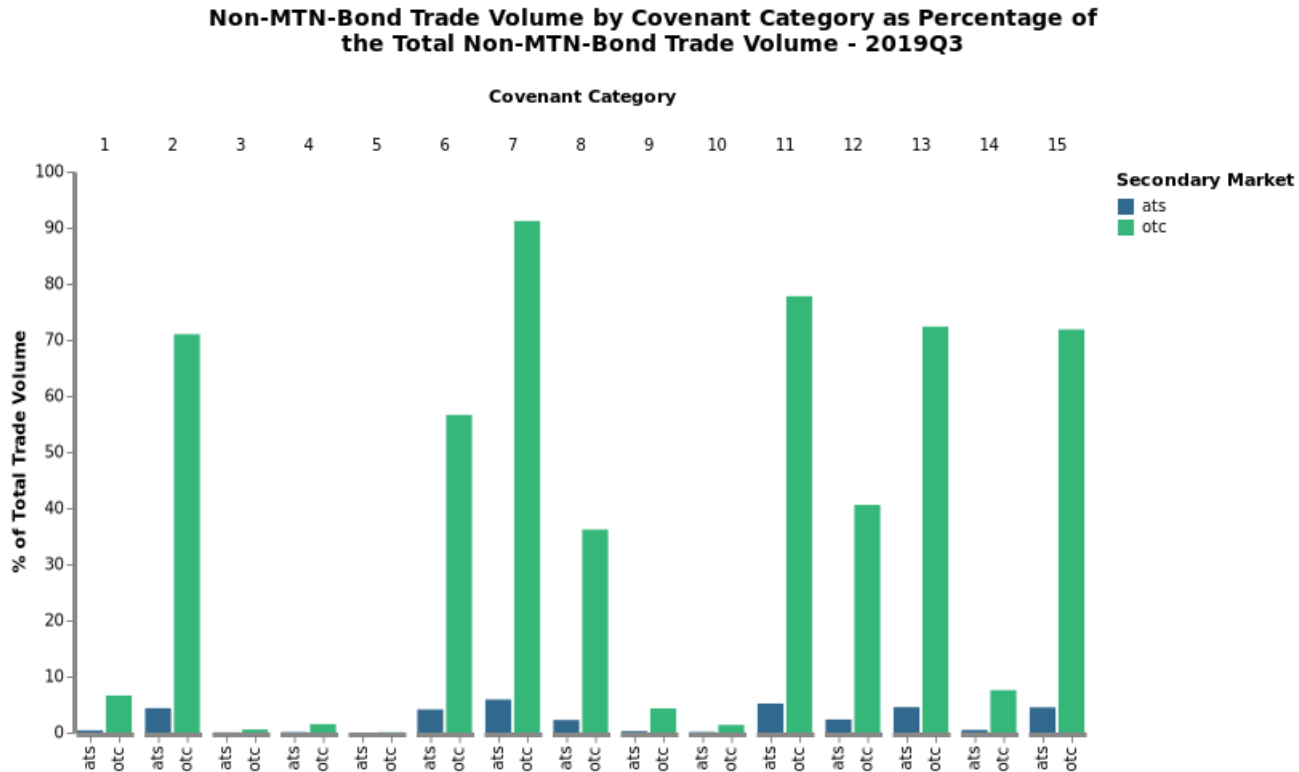
**Figure 16.** Trade Volume by Covenant Categories and Secondary Trading System



The picture shows the trade volume (in USD tn) of corporate bonds, excluding medium-term notes (MTNs), by covenant category in (i) Alternative Trading Systems (ATS) and (ii) in the voice over-the-counter systems (OTC) during 2019Q3. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes (MTNs) are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

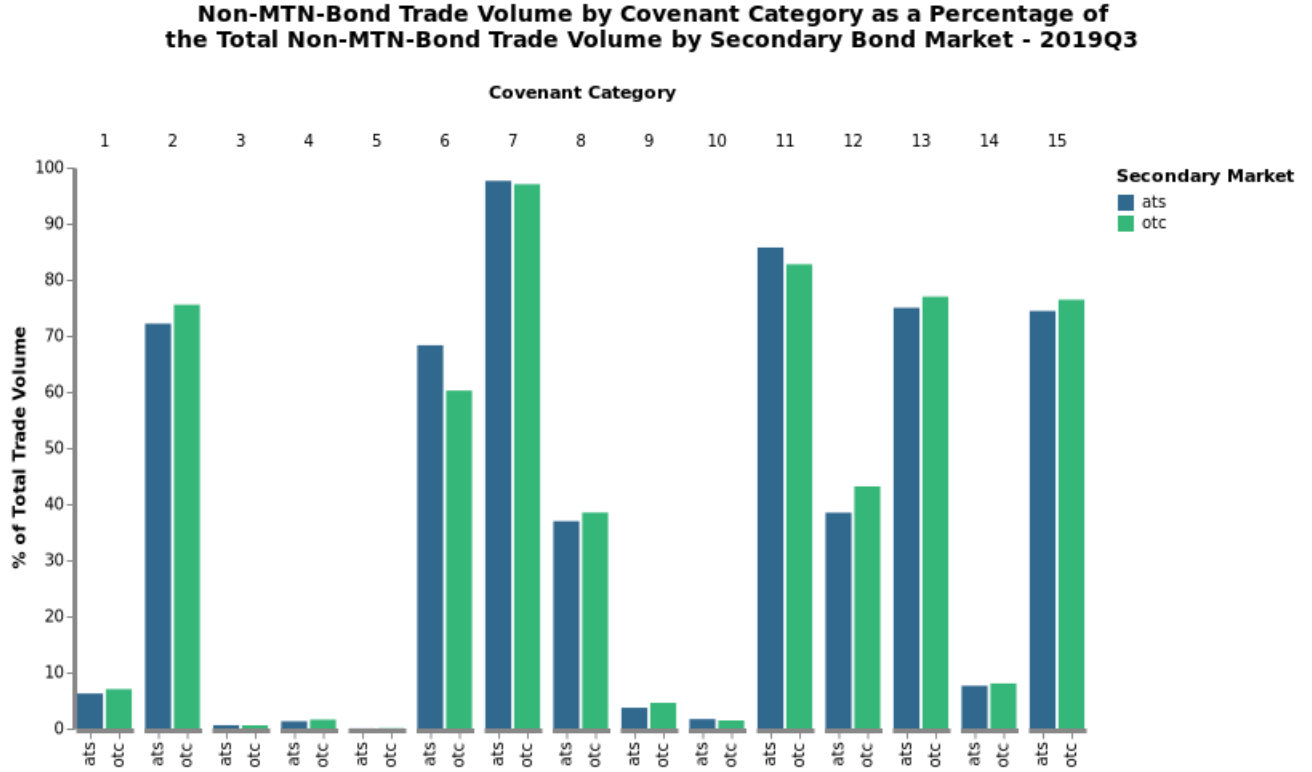
**Figure 17.** Trade Volume by Covenant Categories and Secondary Trading System as Share of All Trades across Secondary Venues



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. The picture shows the share of trades in each covenant category by trading system. Category- and market-specific shares were computed as the ratio of the total volume of trades of bonds belonging to a specific category in the system in question to the total volume of trades across secondary venues in the sample. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

**Figure 18.** Trade Volume by Covenant Categories and Secondary Trading System as Share of Market-Specific Trade Volume across Covenant Categories

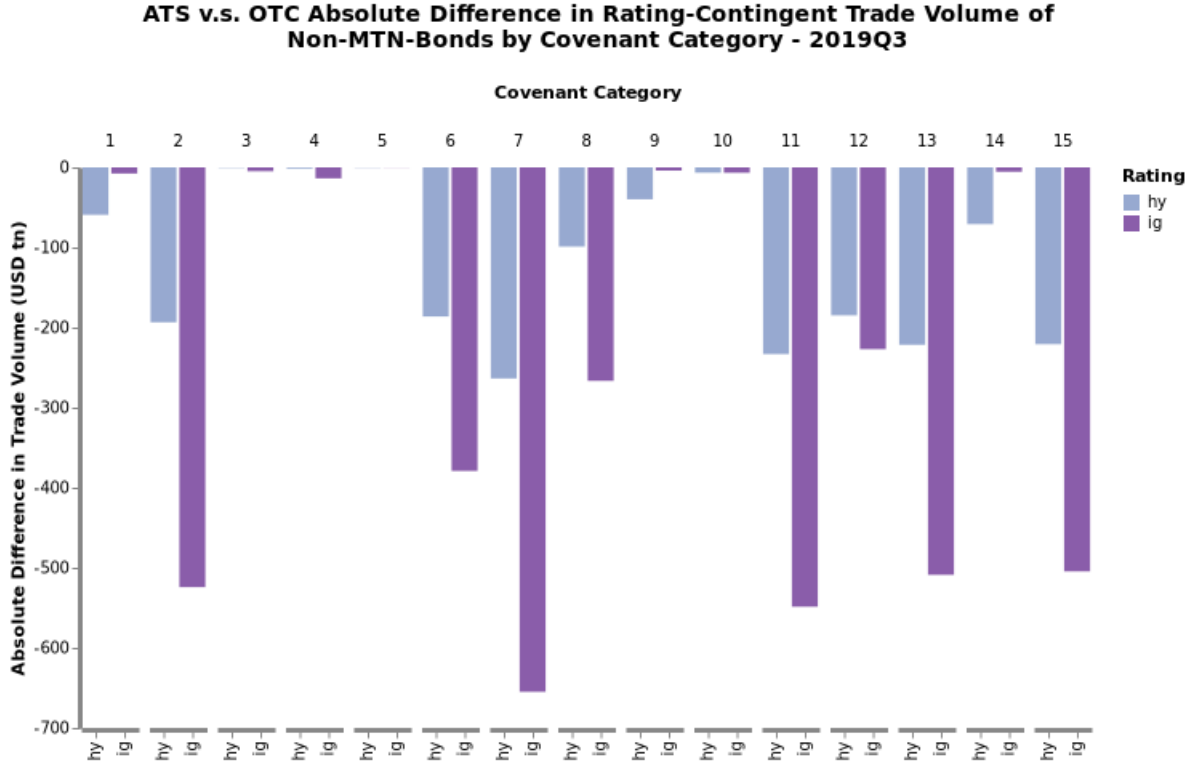


The samples consists of all corporate bonds, excluding medium-term notes (MTNs), with at least one covenant that were traded in 2019Q3. The picture shows the share of trading volume in each covenant category by trading system. Category- and market-specific shares were computed as the ratio of the trade volume of bonds belonging to a specific category in the system in question to the total volume of trades across secondary venues in the same trading system. Notice covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.



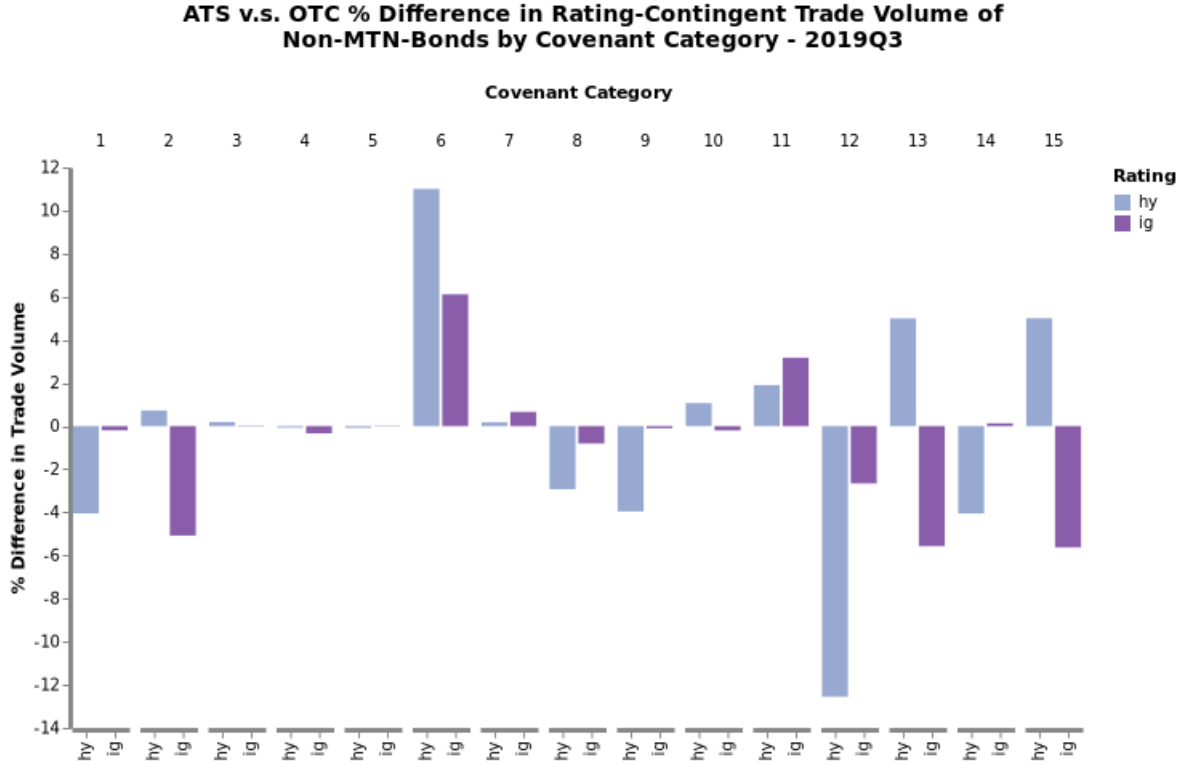
**Figure 19.** ATS/OTC Absolute Difference in the Trade Count of Non-MTN Corporate Bonds traded by Credit Rating and Covenant Category



The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in the trade volume of bonds traded in Alternative Trading Systems (ATS) and via the voice over-the-counter systems (OTC) by credit rating and covenant category. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

**Figure 20.** ATS/OTC Difference in the Share of the Trade Count of Non-MTN Corporate Bonds traded by Covenant Categories and Secondary Trading System



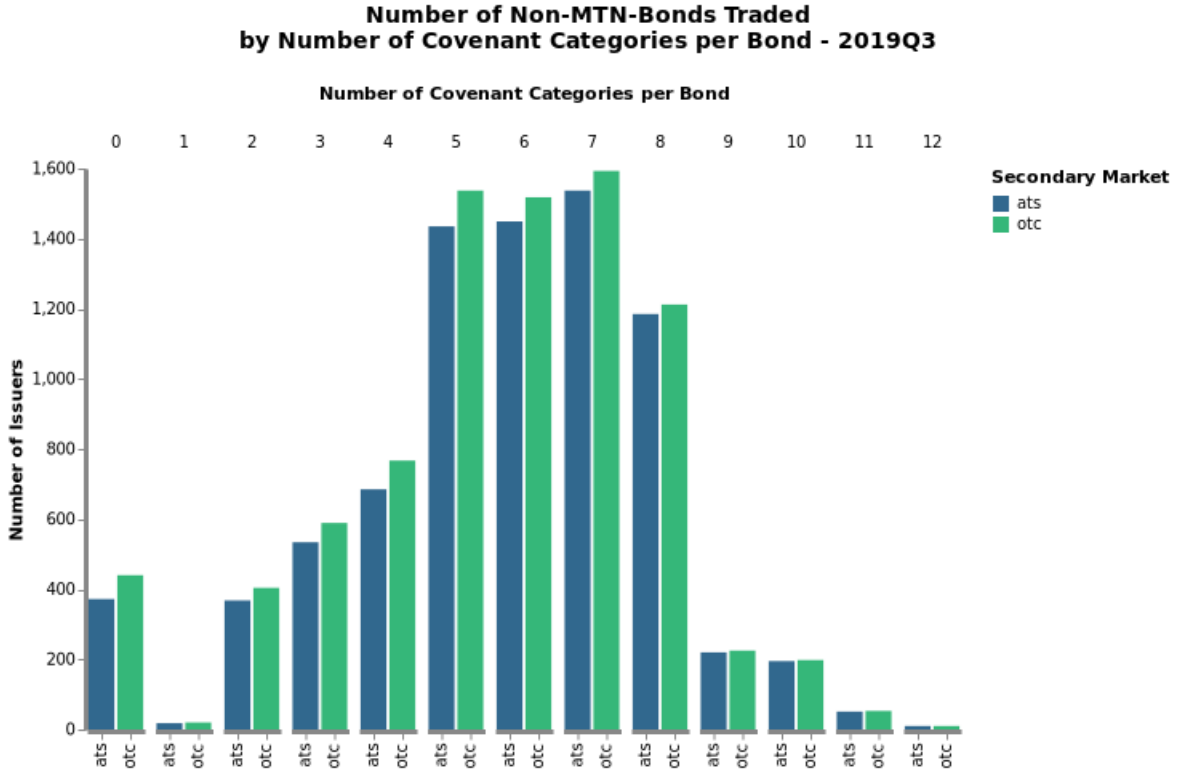
The samples consists of all corporate bonds, excluding medium-term notes (MTNs), for which covenant information was available and that were traded in 2019Q3. The picture shows the difference in (i) the Alternative Trading Systems' (ATS) and (ii) the voice over-the-counter systems' (OTC) shares of the trade volume of bonds by credit rating and covenant category. For a given trading system, covenant category and credit-rating group, its share of the total trade volume is the ratio of the trade volume of its bonds to the total trade volume of bonds in the same trading system and credit rating wider group. Bonds are classified as Investment Grade (IG) or High-Yield (HY) according to the most recent credit rating by Moody's or S&P's available as of the time a trade takes place. Bonds that were traded before and after a credit rating change in the same quarter are counted among both the IG and HY subgroups. Notice, in addition, that covenant categories overlap, as bonds can have multiple covenants and thus belong to more than one group.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories are taken from [Billett et al. \(2007\)](#) and are reproduced in Table I in Appendix A.

## B.2 Covenant Categories per Bond

### B.2.1 Bonds

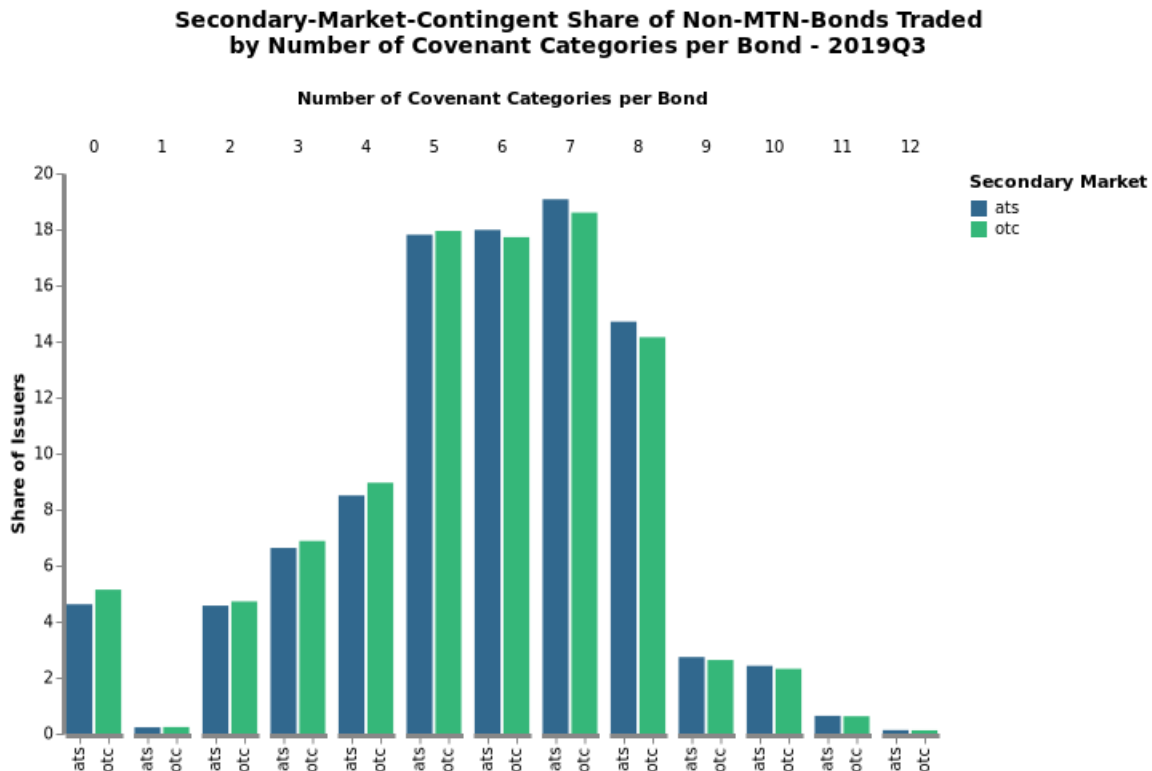
**Figure 21.** Number of Bonds by Covenant Category-Count and Secondary Trading System



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I group the bonds by their number of distinct covenant categories. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

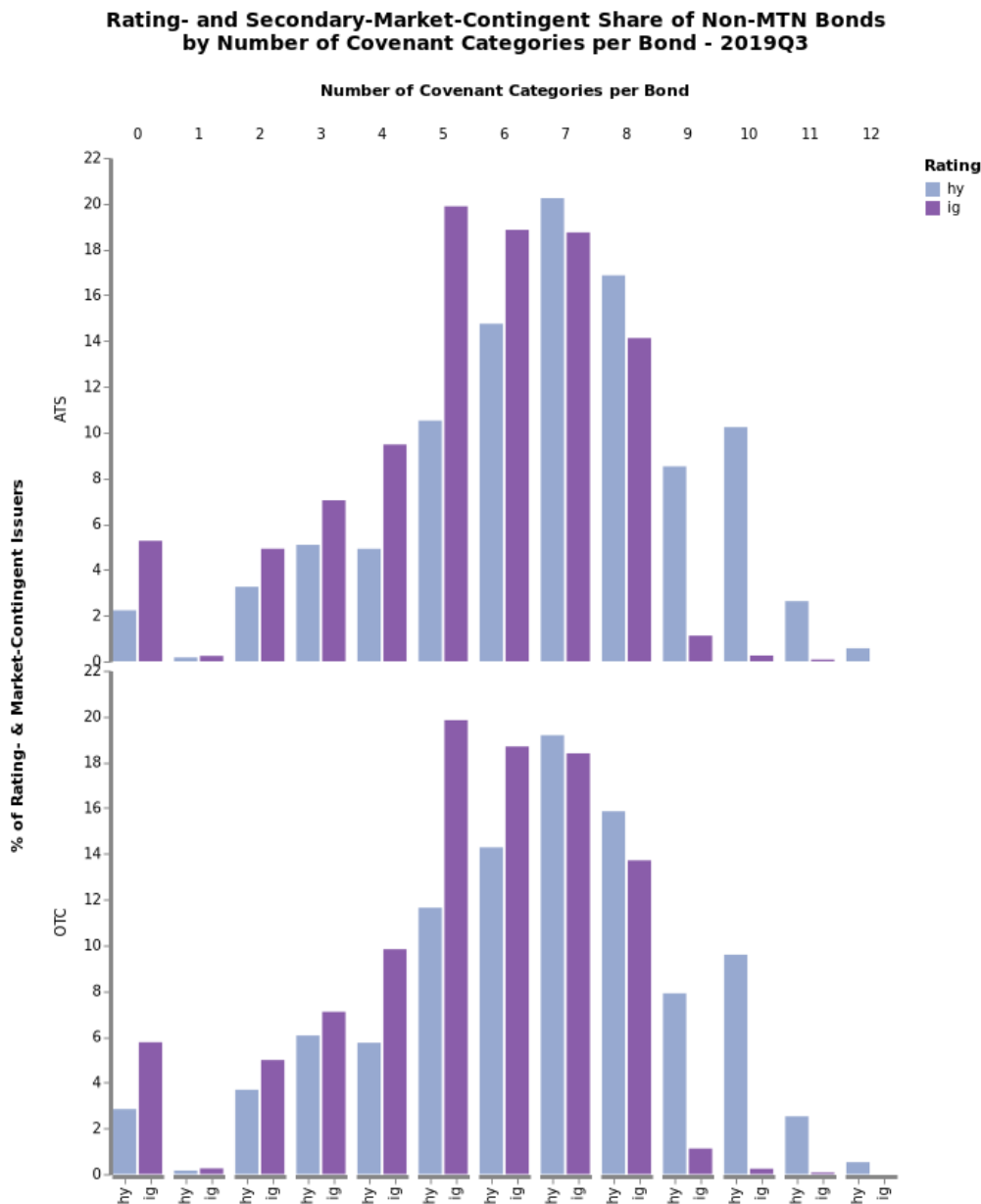
**Figure 22.** Share of Bonds by Covenant Category-Count and Secondary Trading System



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I group the bonds by their number of distinct covenant categories and divide the number of bonds in each group by the total number of bonds traded in the sub-sample. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

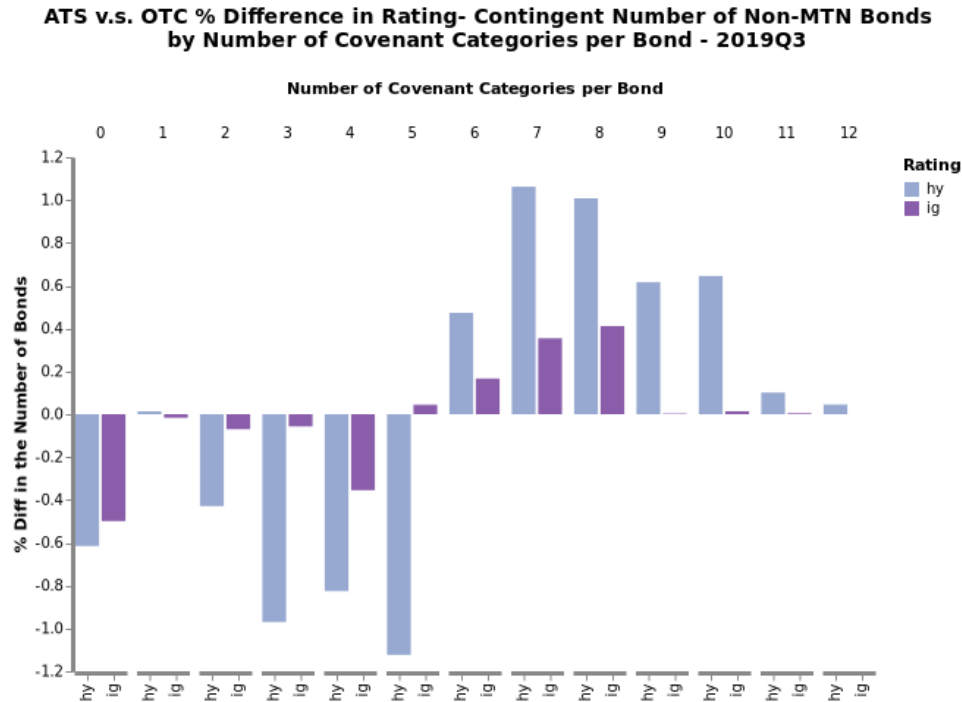
**Figure 23.** Trading-System Specific Share of Bonds by Covenant Category-Count and Credit Rating



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Finally, I divide the number of bonds in each category-count and rating group by the total number of bonds traded in the same trading system and credit rating. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

**Figure 24.** Trading-System Share Differential of Bonds by Covenant Category-Count and Credit Rating

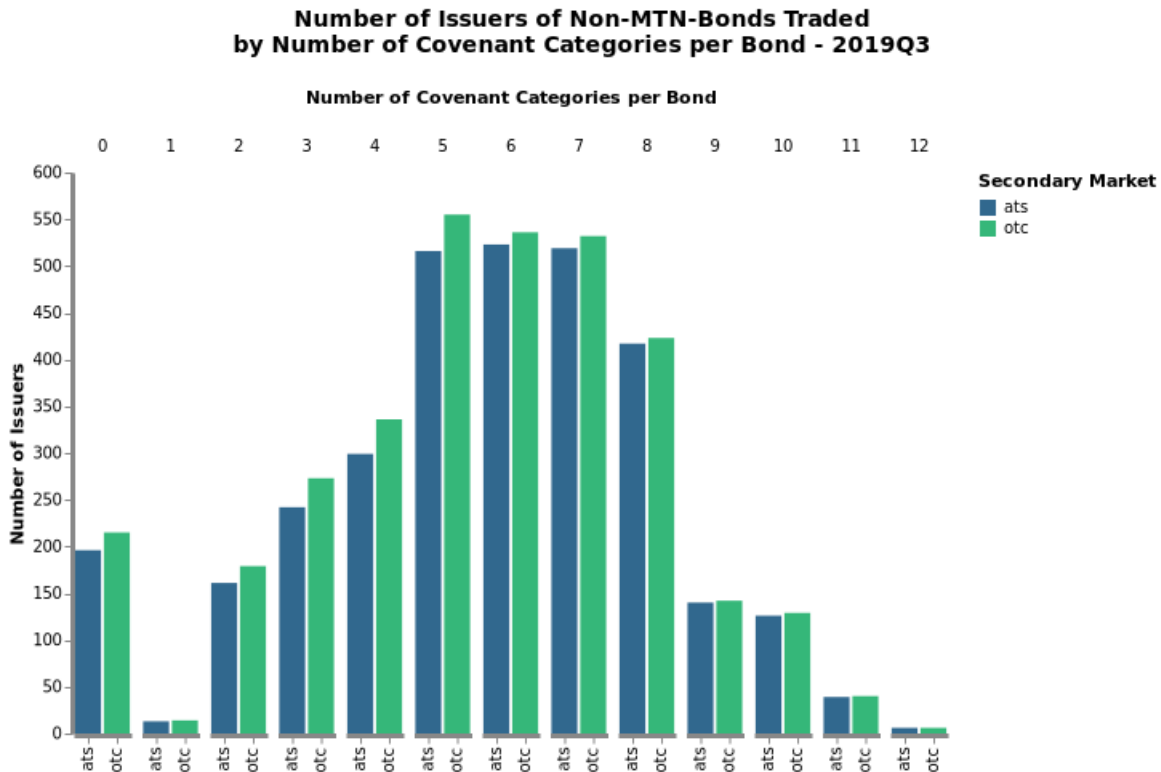


The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Next, I divide the number of bonds in each category-count and rating group by the total number of bonds traded in the same system and credit rating, as in figure 23. Finally, I take the difference between the ATS and OTC covenant-category-count and credit-rating-specific groups. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

### B.2.2 Issuers

**Figure 25.** Number of Issuers by Covenant Category-Count and Secondary Trading System

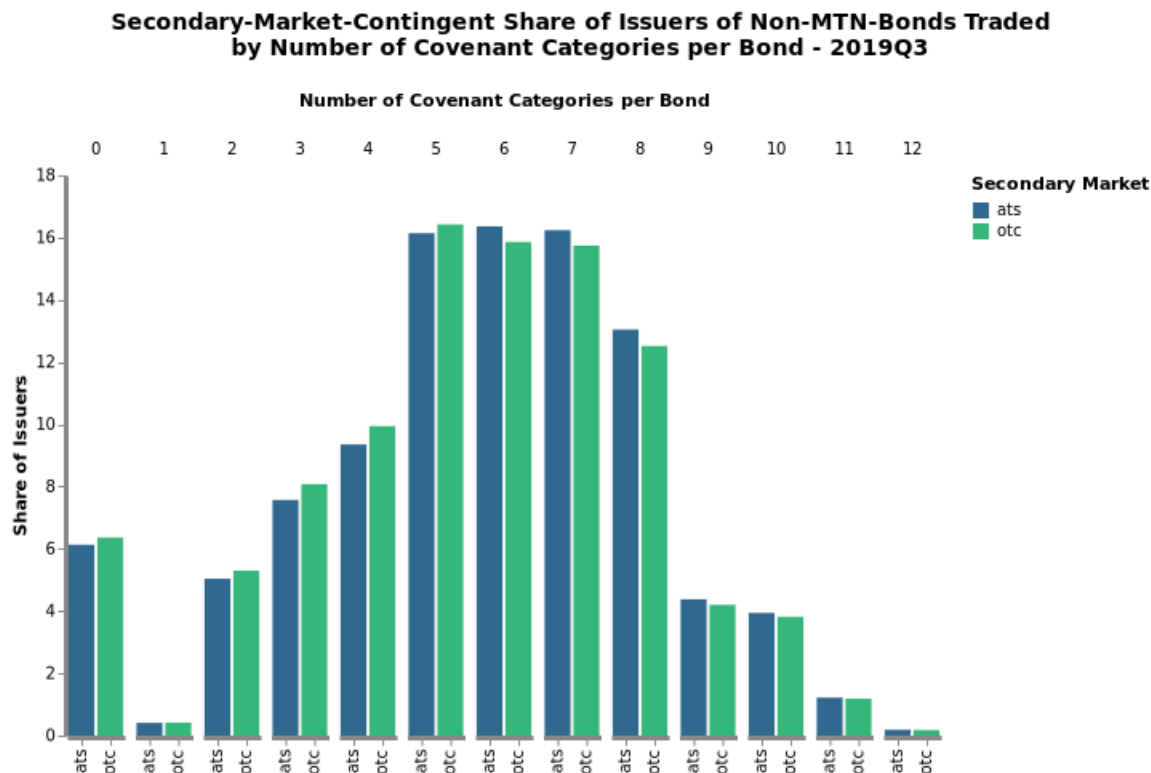


The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I group the bonds by their number of distinct covenant categories and count the number of unique issuers within each group. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.



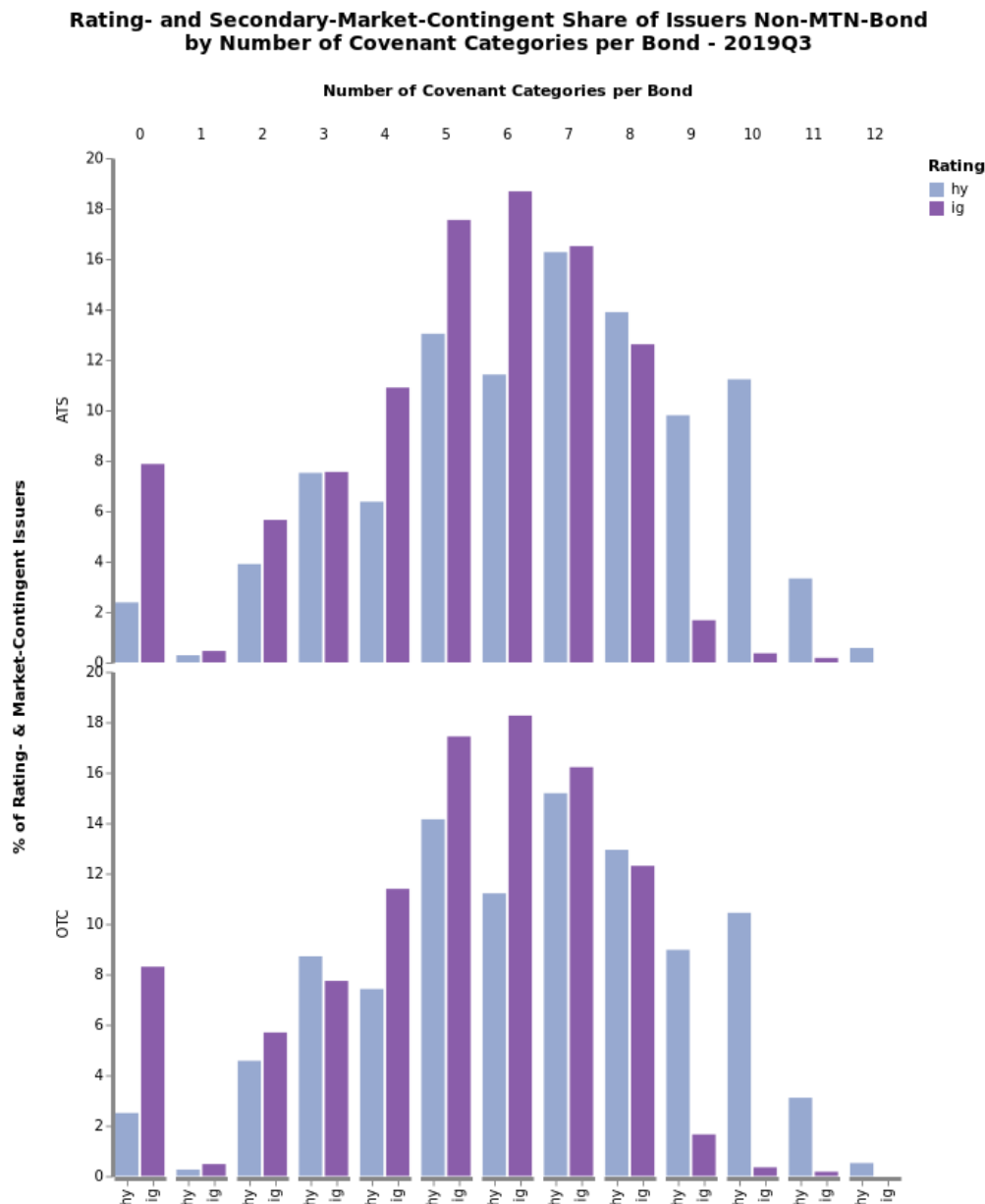
**Figure 26.** Share of Issuers by Covenant Category-Count and Secondary Trading System



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I (i) group the bonds by their number of distinct covenant categories, (ii) count the number of unique issuers within each group, and (iii) divide it by the total count of issuers in the sub-sample. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

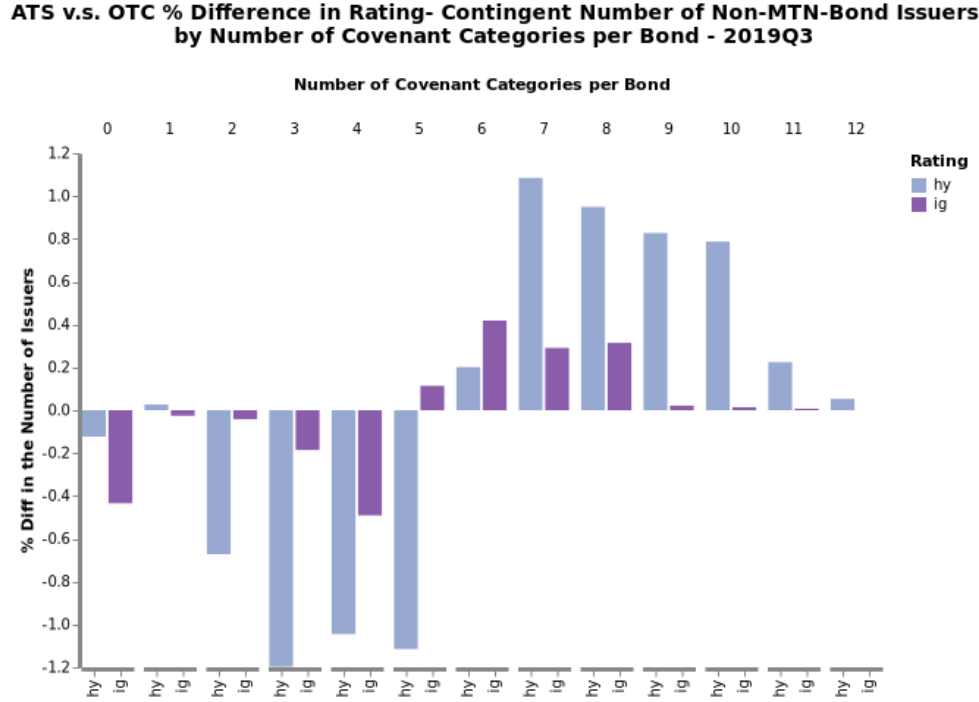
**Figure 27.** Trading-System Specific Share of Issuers by Covenant Category-Count and Credit Rating



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Finally, I count the number of unique issuers within each group, and divide it by the total count of issuers in the same trading system and credit rating. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

**Figure 28.** Trading-System Share of Issuers Differential by Covenant Category-Count and Credit Rating

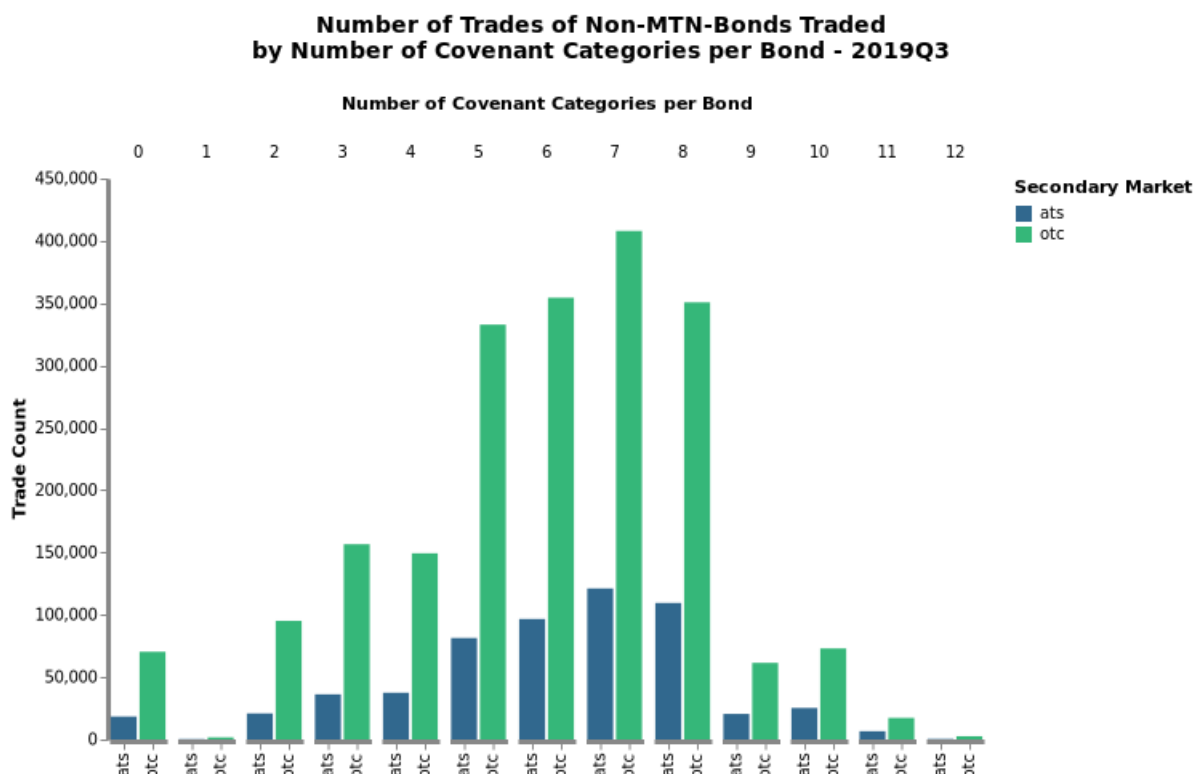


The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). For each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Next, I count the number of unique issuers within each group, and divide it by the total count of issuers in the same trading system and credit rating, as in figure 27. Finally, I take the difference between the ATS and OTC covenant-category-count and credit-rating-specific groups. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

### B.2.3 Trade Count

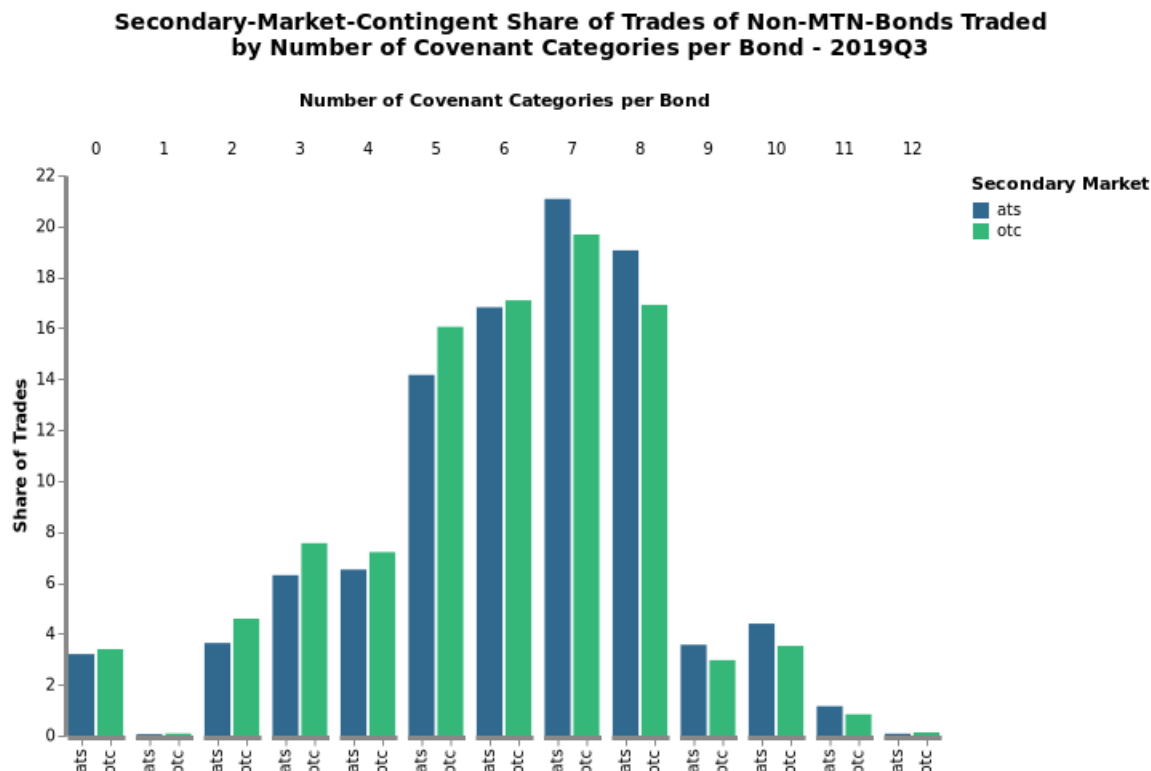
**Figure 29.** Trade Count by Covenant Category-Count and Secondary Trading System



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I group the bonds by their number of distinct covenant categories and count the number of trades within each group. Notice that a bond that trades on both systems is present in both the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

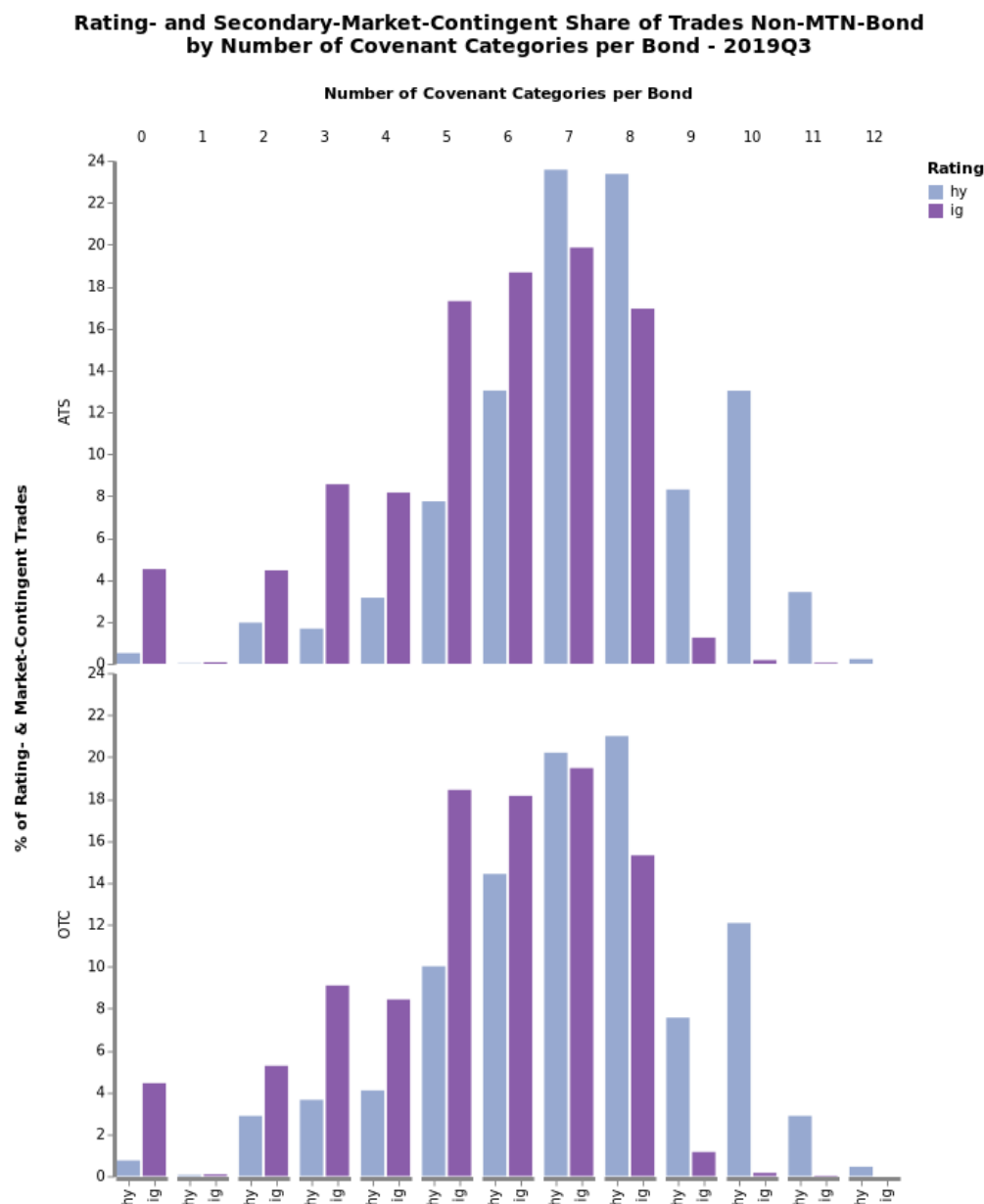
**Figure 30.** Share of Trades by Covenant Category-Count and Secondary Trading System



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I (i) group the bonds by their number of distinct covenant categories, (ii) count the number of trades within each group, and (iii) divide it by the total number of trades in the sub-sample. Notice that a bond that trades on both systems is present in both the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

**Figure 31.** Trading-System Specific Share of Trades by Covenant Category-Count and Credit Rating

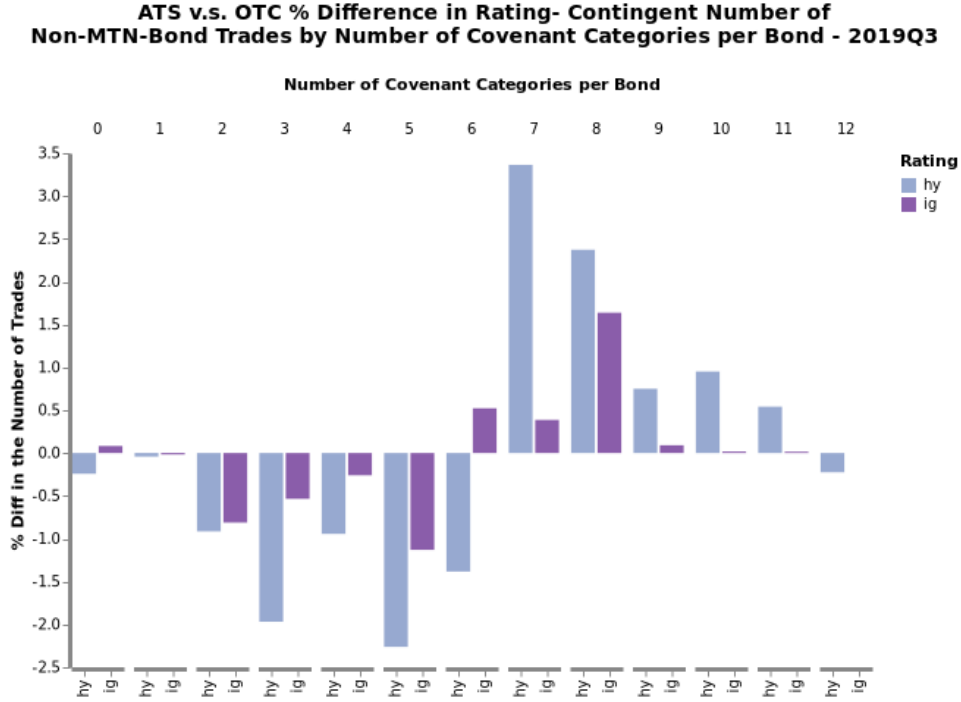


The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Finally, I count the trades each group, and divide it by the total number of trades in the same trading system and credit rating. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.



**Figure 32.** Trading-System Trade Count Differential by Covenant Category-Count and Credit Rating

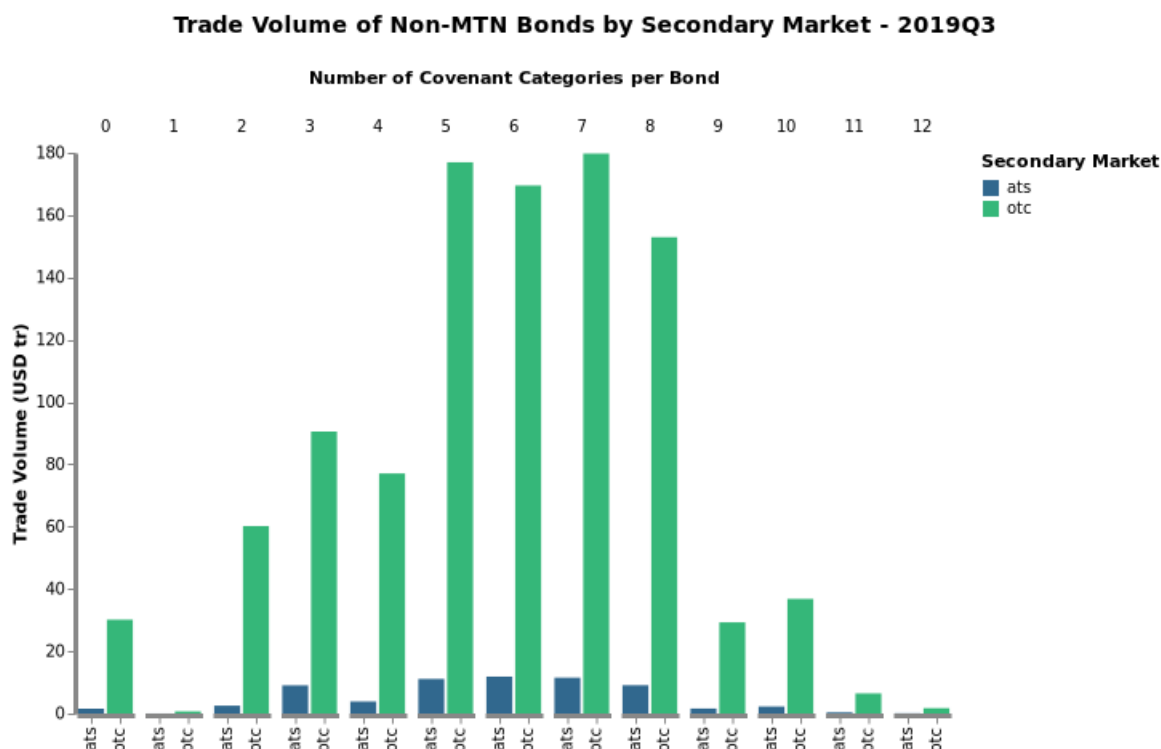


The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). For each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Next, I count the trades within each group, and divide it by the total trade count in the same trading system and credit rating, as in figure 27. Finally, I take the difference between the ATS and OTC covenant-category-count and credit-rating-specific groups. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

### B.2.4 Trade Volume

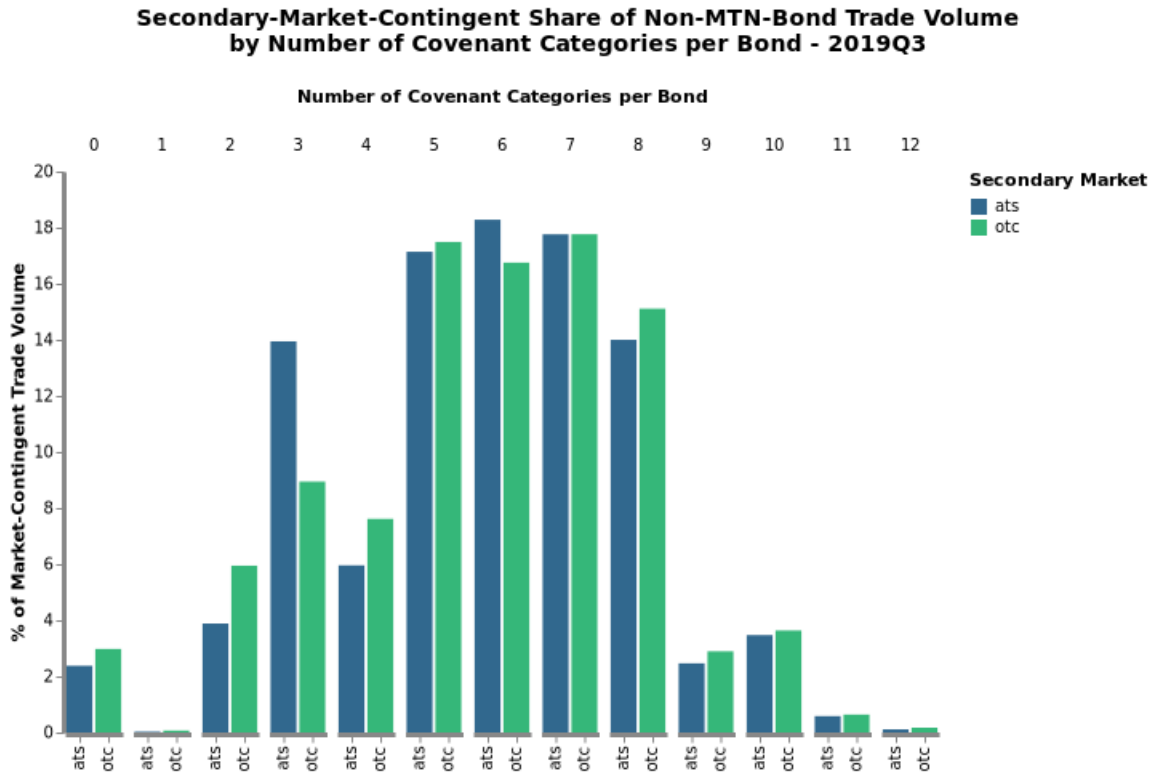
**Figure 33.** Trade Volume by Covenant Category-Count and Secondary Trading System



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I group the bonds by their number of distinct covenant categories and compute the trade volume in USD tn within each group. Notice that a bond that trades on both systems is present in both the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

**Figure 34.** Trade Volume Share by Covenant Category-Count and Secondary Trading System

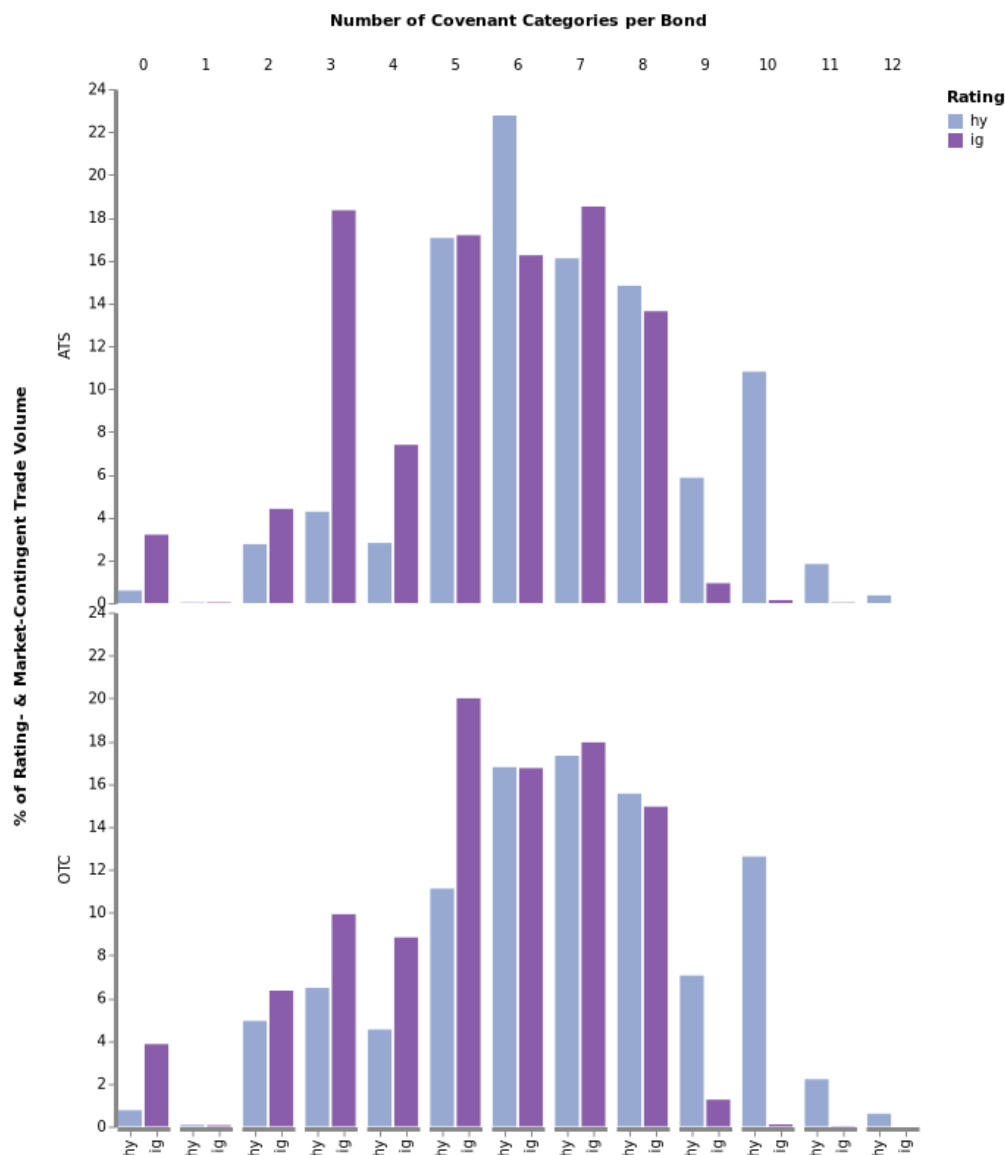


The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. Finally, in each sub-sample, I (i) group the bonds by their number of distinct covenant categories, (ii) compute the trade volume within each group, and (iii) divide it by the total trade volume in the sub-sample. Notice that a bond that trades on both systems is present in both the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

**Figure 35.** Trading-System Specific Trade Volume by Covenant Category-Count and Credit Rating

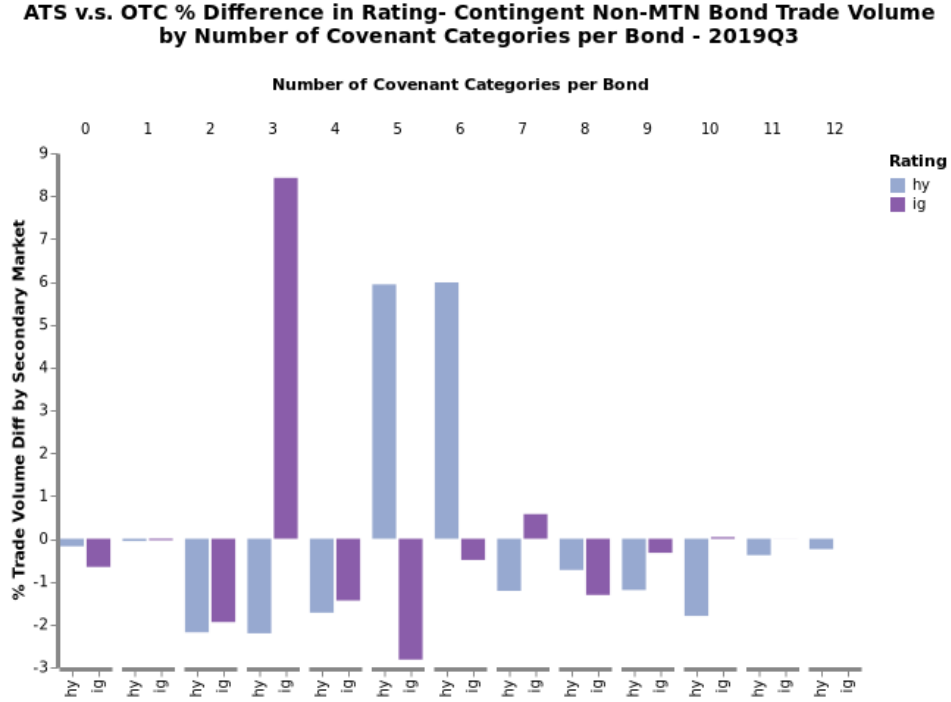
**Rating- and Secondary-Market-Contingent Share of Total Non-MTN-Bond Trade Volume by Number of Covenant Categories per Bond - 2019Q3**



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). Next, for each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Finally, I compute the trade volume each group, and divide it by the total trade volume in the same trading system and credit rating. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA’s TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.

**Figure 36.** Trading-System Trade Trade Volume Differential by Covenant Category-Count and Credit Rating



The sample consists of all corporate bonds, excluding medium-term notes (MTNs), that were traded in 2019Q3. I assign each covenant in a bond to one of the categories taken from [Billett et al. \(2007\)](#). For each bond I count the number of distinct categories among its covenants. I then split the sample into bonds that were traded in the Alternative Trading System (ATS) and bonds that were traded via the voice OTC system. In each sub-sample, I group the bonds by their number of distinct covenant categories and credit rating. Next, I compute the trade volume within each group, and divide it by the total trade volume in the same trading system and credit rating, as in figure 27. Finally, I take the difference between the ATS and OTC covenant-category-count and credit-rating-specific groups. Notice that a bond that trades on both systems is counted among the ATS as well as the OTC sub-samples, but trades are computed only once.

The trading data comes from FINRA's TRACE-Enhanced dataset, while information on individual bonds is obtained from the MERGENT Fixed Investment Securities Database (FISD). Medium-term notes are excluded from the analysis since FISD does not record covenant information for MTNs (see section I.) The covenant categories taken from [Billett et al. \(2007\)](#) are reproduced in Table I in Appendix A.