

# Corporate Bond Trading on a Limit Order Book Exchange

Meni Abudy, Bar-Ilan University

Avi Wohl, Tel Aviv University

12<sup>th</sup> Annual Central Bank Workshop on the  
Microstructure of Financial Markets, Paris,  
October 2016

# Motivation

- Corporate bonds (c-bonds) are mostly traded worldwide in OTC (over-the-counter) markets while stocks are mostly traded by an open limit order book on exchanges.
- US OTC c-bond market: \*
  - Investors pay high trading costs. For example: Harris (2015) → annual customer transaction costs \$26B (~ 0.5% of volume).
  - Although there are many dealers (~400), very few dealers are active in each bond-year (O'Hara, Wang and Zhou, 2015: for most c-bonds # dealers  $\leq 3$ )
  - Different customers get different prices (O'Hara, Wang and Zhou, 2015, and Hendershott, Li, Livdan and Schürhoff, 2016 ).
  - The market has a very large share of institutional investors and negligible retail trading.

# Motivation (2)

- In the U.S. (and probably worldwide) c-bond markets are much less liquid than stock markets, although c-bonds are less volatile and have less information asymmetry.
- Biais and Green (2007) found quite active bond trading on the NYSE until the 1940s but then trading migrated to the OTC market.  
They state: "Liquidity may not gravitate to the most efficient trading venue... even in the long term".
- Harris, Kyle and Sirri (2015) suggest a regulation change that actually enforces an open limit order book.

# This paper

- Can c-bonds be successfully traded by a limit order book?
- To examine this issue we take advantage of the fact that on the Tel Aviv Stock Exchange (TASE) all instruments (including c-bonds) are traded on the exchange by a limit order book.
- We are currently revising the paper. In this presentation we focus on the current version and at the end of the presentation we provide highlights of the new version.

# Main findings

We find a liquid c-bond market with:

- Low bid-ask spreads (lower than in TASE stocks)
- Significant retail participation
- Significant competitive short-term trading
- Low off-exchange trading

The differences between c-bond trading and stock trading are not material and arise mainly from the security's characteristics (*STD* and *SIZE*) and not from the security type (c-bond vs. stock)

# Comparison to the U.S.

- Our formal comparison is between Israeli c-bonds and Israeli stocks, but the informal comparison between the Israeli and American c-bond markets is striking.
- The American market is much larger than the Israeli market. The American stock market is more liquid than the Israeli stock market, but the opposite is true for c-bonds.
- In our c-bond sample the (weighted) average half effective spread is 0.08% (0.068%) while Harris (2015) finds that average customer trading costs are 0.85% for trades below \$100K and 0.52% for larger trades.

# Conclusion

- C-bonds can be as successfully traded on an exchange, like stocks.
- At the TASE, there is no fundamental difference between c-bond trading and stock trading.
- A caveat: we do not claim that c-bond trading on an exchange is guaranteed to be a success. Rather, we show an example of successful c-bond trading on an exchange.

# Is the Israeli capital market unique ? NO

- The participants in the Israeli market are quite similar to those in other developed markets. The main types are:
  - Institutions that manage "other people's money" (tax-subsidized long-term savings, mutual funds, portfolio managers and hedge funds)
  - Banks and insurance companies that hold stocks and bonds as assets
  - Firms that typically trade for short-term horizons (mainly using ATS)
  - Individuals: controlling stockholders and retail investors
  - Foreign investors.



# Why c-bond trading in Israel is on the exchange ?

- Is the c-bond trading on the TASE a result of special conditions relevant for Israel?
- We think that this is **not** the case. In our opinion, the current trading characteristics have their roots in the economic conditions of 60 years ago, which were entirely different than they are today.

# The history of the TASE c-bond market

- 1935: a daily gathering of ~10 brokers that traded in few stocks and few c-bonds
- 1953: this gathering became the TASE, which operated a daily auction in each security (stocks, government bonds and c-bonds). The entire market was very small\* with almost no c-bonds → no room for the operationally inefficient OTC mechanism
- 2000s: the c-bond market expanded dramatically (~\$6B in 2003, \$73B in 2009, ~\$90B in 2014), in part due to regulatory changes.

In 1960 : the daily volume of all bonds (mostly governmental and few corporate) - \$59K

# The Tel Aviv Stock Exchange

- Trading mechanism: electronic limit order book (the same as for stocks).
  - opening and closing sessions: call auctions.
  - continuous bilateral stage throughout the trading day.
- Traders can submit orders only via exchange members (27 in 2014). The exchange members provide their clients with online access to the exchange without any human intervention (the market is very accessible for retail investors).
- Limit orders are executed by price and time priority.
- Minimum order amount in the continuous stage:
  - c-bonds: ~ \$2,800.
  - Stocks (TA-25 stocks): ~\$550 (\$1,400)

# Our database

- We use a unique and proprietary database of the TASE's transactions **that identifies both sides of the transaction** (exchange member code + member's client number).
- The database also includes:
  - Transaction time
  - Trading phase
  - A "buyer initiated" or "seller initiated" indication.
- C-bond characteristics are obtained from [valuation.co.il](http://valuation.co.il)

# The sample

- Sample period – 2014
- Securities of non-dual-listed firms with both stocks and c-bonds and a total market value of the securities of each firm above 800 million NIS (~\$223M)
- The sample: 49 non-dual-listed firms with 49 stocks and 149 c-bonds
- In the analysis we focus on the continuous stage, which attracts most of the volume
- The c-bonds:
  - 133 investment grade (BBB and above) and 13 not rated.
  - 111 CPI-linked
  - 23 included in the Tel-Bond 60

# A quick look

	c-bonds	stocks
Transaction half spread (EW)	0.080%	0.107%
Transaction half spread (VW)	0.068%	0.097%
# transactions per security-day	54	219
Transaction size (\$)	8,491	5,482
% of off-exchange trading	9.5%	25.5%
Active accounts in entire market	178K	230K

# Comparing bid-ask spreads

In 34 out of the 49 firms the HQS (half quoted bid-ask spread) is smaller in the bonds than in the stocks

(p-value of the binomial test 0.0094)

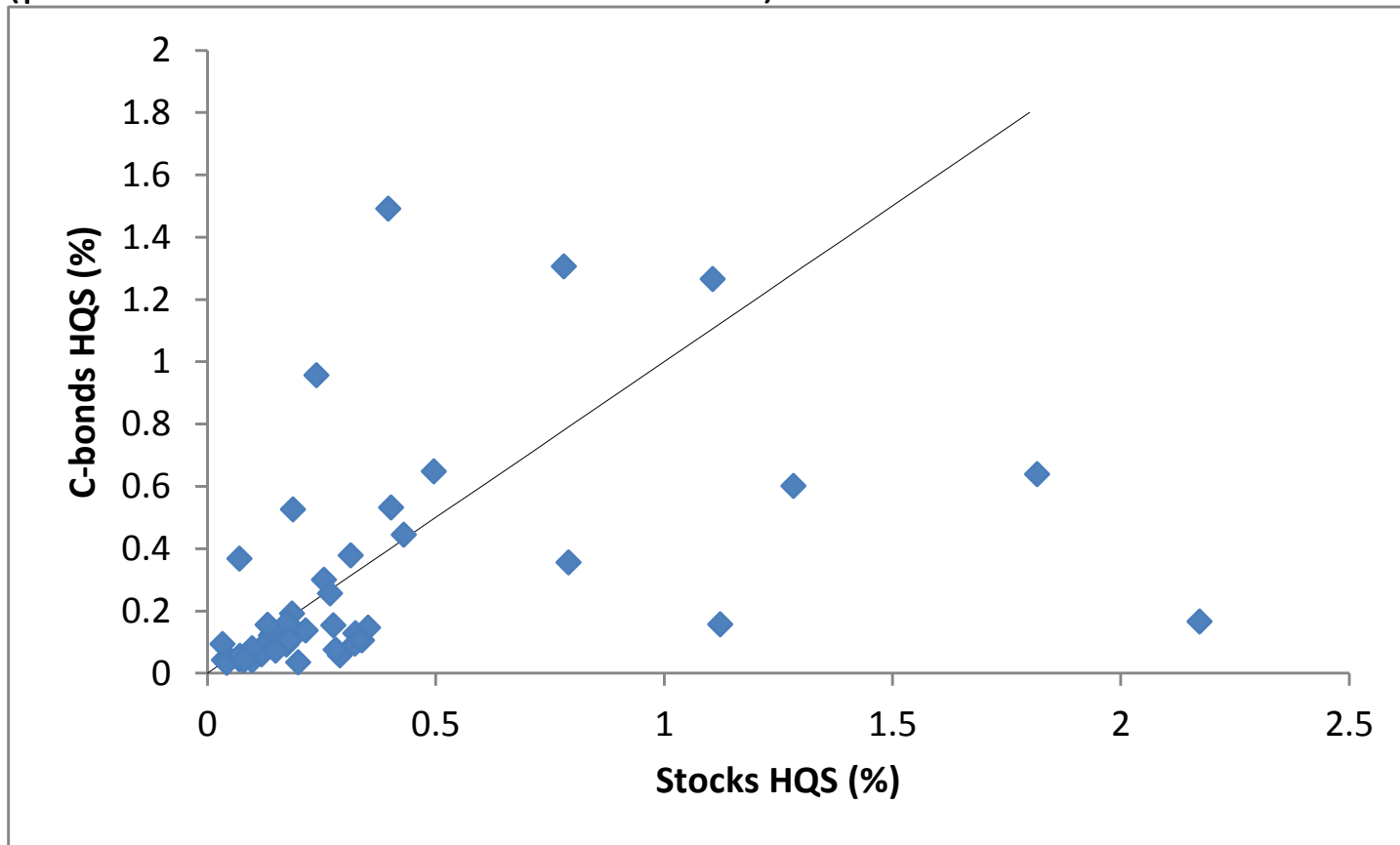


Figure 1 – Panel A

# Explaining bid-ask spread measures of corporate bonds and stocks

Table 2

	LOG_HQS			LOG_HES			Average coefficients of 245 daily regressions.
	(1)	(2)	(3)	(4)	(5)	(6)	
Intercept	-2.817 (-148.12)	6.571 (29.65)	9.148 (46.43)	-2.721 (-147.80)	6.048 (30.97)	8.457 (49.78)	
DUMMY_CB	-0.250 (-8.87)		-0.859 (-20.34)	-0.276 (-9.68)		-0.807 (-18.46)	
LOG_SIZE		-0.123 (-11.56)	-0.302 (-28.90)		-0.123 (-11.19)	-0.291 (-28.51)	
LOG_FIRM_SIZE		-0.325 (-28.79)	-0.233 (-21.04)		-0.299 (-27.27)	-0.212 (-20.21)	
STD		0.676 (40.50)	0.223 (8.22)		0.697 (42.13)	0.271 (9.70)	Newey-West 3 lags
R <sup>2</sup>	0.0659	0.3981	0.4688	0.0789	0.4319	0.5043	
N	245	245	245	245	245	245	

1- c-bond,  
0-stock

- Security characteristics (*LOG\_SIZE*, *LOG\_FIRM\_SIZE* and *STD*) explain much more of *log\_HQS* and *log\_HES* than whether the security is a bond or a stock (*DUMMY\_CB*).
- C-bond spreads are lower than stock spreads, even after controlling for the security's characteristics



# Trader types

We identify two trader types: **retail investors** and **short-term traders**.

Why do we focus on these two groups?

1. The participation of retail investors in OTC markets is negligible. Is this the case in a limit order book market?
2. The short-term traders provide liquidity to other investor types (institutional, retail). In the U.S. c-bond market, the short-term traders are the dealers. It is of interest to see if when c-bonds are traded on an exchange like stocks, short-term trading takes place as it does in stock trading.

## Trader types (cont.)

We define "**retail investors**" (**RI**) as traders with an annual volume of less than 2 million NIS (roughly \$559,000 during the sample period – 2014) in all the securities traded on the TASE (excluding options). These traders are almost surely "retail" but there are probably many other retail investors with an annual trading volume above 2 million NIS.

A "**short-term trader**" (**STT**) is a (non-retail) trader that on average flips between buying and selling within a trading day.

# The trading participation of retail investors and short-term investors

Table 5 – Panel A

Newey-West 2 lags

Panel A: NIS participation proportion of double-sided volume			
Investor type	Proportion in stocks	Proportion in c-bonds	<i>t</i> -stat (difference)
Retail investors	6.38%	7.28%	4.83
Short-term traders	43.70%	34.18%	-16.66
Other traders	49.92%	58.55%	14.32

- More retail trading in c-bonds and less short-term trading but the numbers are comparable.
- In another table: Security characteristics (LOG\_SIZE, LOG\_FIRM\_SIZE and STD) explain much more of RI and STT participation than whether the security is a bond or a stock (DUMMY\_CB).

# Competition among short-term traders

In the U.S., although there are hundreds of dealers, very few are active in each bond-year (O'Hara, Wang and Zhou, 2015: for most of c-bonds # dealers  $\leq 3$ ).

The analogue of dealers in open limit order book trading is the short-term traders. The trading on the exchange enables traders to be active at low cost in many c-bonds. Indeed, we find that the short-term trading is much less concentrated in the TASE than in the U.S.

# Herfindahl-Hirschman index (HHI)

In each security we measure:

$$HHI = \sum_{i=1}^n s_i^2$$

where  $s_i$  is the NIS market share of short-term trader  $i$

The HHI ranges from  $1/n$  to 1 (monopoly).

$1/HHI$  is the "equivalent" number of equal share short-term traders.

The Horizontal Merger Guidelines of the **U.S. Department of Justice** and the Federal Trade Commission generally classify markets into three types:

- **Unconcentrated Markets: HHI below 0.15**
- Moderately Concentrated Markets: HHI between 0.15 and 0.25
- Highly Concentrated Markets: HHI above 0.25

# Concentration of short-term trading in stocks and corporate bonds

Table 7

Variable	Stocks					C-bonds				
	N	Mean	VW mean	Median	STD	N	Mean	VW mean	Median	STD
Number of STT	49	168.63	361.00	129.00	122.25	149	44.25	76.39	40.00	28.62
HHI	49	0.080	0.050	0.069	0.045	149	0.150	0.089	0.097	0.119
1/HHI	49	15.30	21.62	14.52	6.10	149	9.66	12.84	10.26	4.76
Proportion of largest trader out of STT volume in the security	49	18.91%	15.13%	17.10%	6.67%	149	26.45%	19.68%	21.98%	14.60%
Proportion of 5 largest traders out of STT volume in the security	49	50.41%	39.50%	47.92%	12.99%	149	66.00%	53.90%	59.87%	17.45%
Proportion of largest trader out of the security volume	49	5.67%	5.58%	5.50%	2.19%	149	6.85%	6.88%	6.33%	3.05%
Proportion of 5 largest traders out of the security volume	49	15.08%	14.54%	15.54%	4.22%	149	18.11%	18.87%	17.76%	5.53%

For comparison, O'Hara, Wang and Zhou (2015) find an average *HHI* of 0.61, indicating a highly concentrated market in each bond.

At the TASE, short-term trading falls into the unconcentrated category in both markets, though it is more concentrated in c-bonds.

In another table: short-term trading concentration is explained by the market cap of the security and not by its type (c-bond or stock).

# Measuring trading profits/costs

We measure the trading profits for buyers as the security's closing price divided by the transaction price minus one; for sellers, it is this value with a minus sign. A negative profit means a cost.

For the “making” side this is the percentage realized spread and for the “taking” side it is minus the percentage realized spread, where the realized spread is measured using the closing price.

The intuition is that the closing price is the benchmark price for the transaction, or a proxy for the unperturbed "true" value.

# Trading profits/costs of the trader types

Table 9

Panel A: percentage profit of trader type (in %)

Investor type	Profit in stocks	Profit in c-bonds	Total profit	<i>t</i> -stat (difference)
Retail investors	-0.087%	-0.068%	-0.078%	(1.63)
<i>t</i> -stat	(-8.73)	(-9.47)	(-11.70)	
Short-term traders	0.002%	0.014%	0.008%	(3.41)
<i>t</i> -stat	(0.67)	(9.79)	(4.23)	
Other traders	0.011%	0.000%	0.004%	(-2.67)
<i>t</i> -stat	(2.89)	(0.38)	(2.59)	

- The trading profits of short-term traders are small, consistent with a competitive market.
- An observation: the trading profits of short-term traders arise from trading with retail investors.

In another table: security characteristics (LOG\_SIZE, LOG\_FIRM\_SIZE and STD) explain trading costs of RI and trading profits of STT and not security type (stock or c-bond).



# Summary

- We find no fundamental difference between c-bonds and stocks, which are traded on the TASE by an open limit order book mechanism.
- Whatever differences there are arise mainly from security characteristics (STD, SIZE) and not from their type.
- The TASE c-bond market is characterized by:
  - Low bid-ask spreads (smaller than in stocks)
  - High retail participation
  - Significant competitive short-term trading
  - Low off-exchange trading

# The new version we are working on

- Less emphasize on the comparison with stocks
- Enlarging the sample of c-bonds to include almost all aggregate market cap of c-bonds

## Why is the open limit order book good ? "Competition"

- LOB makes the competition between STT easier. We show that the competition between STT is related to (actually causes) lower bid-ask-spread, lower realized spread and smaller price dispersion
- The non-STT compete with the STT on quotation. Their transactions as “makers” are with lower spreads than the STT “maker” transactions (remember the effect of the NASDAQ reform on spreads)

# The new version (cont.)

- Open LOB facilitates retail trading. We find that, by and large, retail investors do not impose adverse selection costs when trading. Therefore, their presence enables posting narrower spreads.
- In a simultaneous equations analysis we find that a 1% difference in retail NIS share out of the total c-bond volume (say from 7% to 8%) reduces the half effective spread by 6% (say from 0.10% to 0.094%)
- In the U.S., larger and more active customers pay much lower transaction costs. An explanation: lack of competition between the dealers. At the TASE, the transaction half-spread of small transactions is larger by only  $\sim 0.02\%$  than for larger transaction (an explanation: for small quantities it is not worthwhile to wait for better quotes). Beyond that, there is no difference between retail and non-retail transactions.

THANK YOU!