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## The microstructure of the bond market in the 20th century ☆

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### Abstract

Bonds are traded in opaque and fragmented over-the-counter markets. Is there something special about bonds precluding transparent limit-order markets? Historical experience suggests this is not the case. Before WWII, there was an active market in corporate and municipal bonds on the NYSE. Activity dropped dramatically, in the late 1920s for municipals and in the mid 1940s for corporate, as trading migrated to the over-the-counter market. Average trading costs in municipal bonds on the NYSE were half as large in 1926-1927 as they are today over the counter. Trading costs in corporate bonds for small investors in the 1940s were as low or lower than they are now. The difference in transactions costs likely reflects the differences in market structures, since underlying technological changes have likely reduced costs of matching buyers and sellers.

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### Introduction

Bonds are mostly traded on fragmented and opaque over-the-counter (OTC) markets.<sup>1</sup> Stocks, in contrast, are for the most part traded in transparent centralized limit order books. Why is there such a contrast? Is it inherently problematic to trade bonds on a transparent limit-order book? Could mandate changes in trading mechanisms lower costs for investors? Or would regulatory interference simply suppress a natural diversity in institutional arrangements benefiting all investors?

Answers to these questions are difficult to obtain through cross-sectional comparisons of existing markets because liquidity, transactions costs, and trading mechanisms are all jointly endogenous. Perhaps corporate and municipal bonds have low liquidity and high trading costs because they are traded in opaque and decentralized dealer markets. Alternatively, perhaps they trade over the counter because the infrequent need for trade renders the continuous maintenance of a widely disseminated, centralized limit-order book wasteful and costly.

We believe the historical experience can shed light on these questions, because it has not always been the case that equities and bonds were traded in such different venues. Until the late 1940s, there was an active market in corporate bonds on the NYSE. In the 1930s, on the NYSE, the trading volume in bonds was between one fifth and one third of the trading volume in stocks. In earlier periods, there was also an active market for municipal bonds and government bonds. Indeed, the first organized exchange in New York, from which the modern NYSE traces its descent, was established by a group of brokers “under the buttonwood tree” to trade U.S. government bonds. Municipal bond trading largely migrated from the exchange in the late 1920s, and NYSE volume in corporate bonds dropped dramatically in the late 1940s.<sup>2</sup> Since this collapse, bond trading on the NYSE has been limited.

This historical evidence shows that an active bond market with a centralized and transparent limit-order book was feasible. This, in turn, raises other questions. Why did liquidity dry up on the NYSE? Why has it been so difficult for the exchange to regain volume despite its periodic attempts to do so? What were the consequences for transactions costs of the migration of bond trading to the OTC market?

To answer these questions we first provide institutional information on the microstructure of the bond market in the twentieth century. We then consider possible explanations for the drop in the liquidity of the bond market on the NYSE. First, we ask whether decreases in liquidity could have been associated with changes in the role of bond financing generally. Based on data assembled from different sources (Federal Reserve, NBER and Guthmann, 1950) we show that bond financing actually grew during the periods when trading volume collapsed on the NYSE.

Second, we ask whether the drop in liquidity could have resulted from SEC regulations increasing the cost of listing on the NYSE, e.g., the Securities Act of 1933 and the Securities Exchange Act of 1934 required firms offering securities to the public and listing on an exchange to disclose detailed information and file reports. We show that the decline in bond liquidity on the NYSE was not correlated with a decline in listings. Furthermore, while NYSE trading disappeared in securities that were exempt from the 1933 and 1934 acts (such as municipal bonds), it remained active in securities which were subject to this regulation (most notably stocks).

A third possible explanation focuses on the interaction between classes of traders with different preferences. It is widely recognized that there are positive externalities in liquidity (see for example Admati and Pfleiderer, 1988 and Pagano, 1989). Traders prefer to route their orders where they expect to find liquidity, i.e., where they expect the other investors to have sent their orders. Complementarities can give rise to multiple equilibria. While each of these equilibria can be locally stable, it can be upset by an exogenous shock, or a change in the characteristics of the players. Different equilibria will vary in terms of their attractiveness for different categories of market participants. Intermediaries benefit when liquidity concentrates in venues where they earn rents, such as opaque and fragmented markets. For reasons we will show were quite evident to observers at the time, large institutions fare better than small investors in a dealership market.<sup>3</sup> This was especially true on the NYSE until 1975, because commissions were regulated by the Constitution of the NYSE, while intermediary compensation was fully negotiable on the OTC market. We find that liquidity migrated from the exchange to the OTC market at times when institutional investors and dealers became more important relative to retail investors. As institutions and dealers became more prevalent in bond trading, they tipped the balance in favor of the over-the-counter markets.

To evaluate the impact on trading costs, we collected high frequency data on transactions and quotes for 6 corporate bonds from 1943 through 1947 and 6 municipal bonds between 1926 and 1930. We chose these dates because they bracket the periods during which liquidity vanished from the NYSE for municipal bonds

and then for corporate bonds. Average transactions costs were substantially lower in the late 1920s for municipal bonds than they are today. In the 1940s, despite fixed commissions, costs for retail investors trading corporate bonds were as low or lower than they are today in OTC markets. We believe this is quite striking. The natural or potential liquidity of corporate and municipal bonds is unlikely to have been higher historically than it is today, and the availability of counterparties is likely to have improved, since a much larger portion of the population invests and the population is much larger. More obviously, the cost of finding counterparties and processing trades is likely to have decreased, given the improvements in communication and data processing technology. These technological changes have dramatically reduced the costs of trading in other sectors of the economy. For example, Jones (2002) shows that, starting in the 1980s, bid-ask spreads and commissions declined persistently and significantly.

Municipal bonds are a particularly interesting security to study in this context. The interest on the bonds is tax-exempt, and retail investors are therefore a significant presence in the market, as they are with equities. Migration of liquidity from the NYSE to the OTC market is most costly for retail investors.<sup>4</sup> Our high-frequency data shows there was a striking drop in municipal bond trading on the NYSE in the late 1920s. At that time trading volume in equities was soaring. The NYSE was desperately short of capacity. (See Davis et al. (2005).) The NYSE decided to reallocate capacity from relatively inactive bonds towards stocks, which were more profitable for the floor traders. For example, and telephones and trading space on the floor were reallocated from bonds to stocks. Simultaneously, retail investors, attracted to equities by the large recent returns, lost their appetite for municipal bonds, leaving investment in this market to institutions. At this point, trading activity in municipal bonds rapidly migrated to the OTC market. This experience illustrates how shocks can lead to shifts in the focal point for trading. The difficulty of reversing such shifts once they have occurred (even after the disappearance of the conditions triggering the shift, e.g., the opportunity cost of trading munis in the late 1920s) is illustrated by the inability of the NYSE to regain volume in municipal bonds, even when equity trading dropped relative to bonds during the years of the Great Depression.

Several papers have shown empirically that, in the OTC bond market, investors can incur large transactions costs, in particular for smaller trades. Green et al. (2007b) show that, when municipal bonds are issued, there is a large amount of price dispersion and retail investors systematically buy at relatively high prices. Harris and Piwowar (2006) write: “Our results show that municipal bond trades are significantly more expensive than equivalent sized equity trades.” That bonds command transactions costs, larger than for stocks, is surprising. Risk is one of the main components of the cost of supplying liquidity. Bonds are less risky than stocks. They should have lower spreads. The large transaction costs paid by final investors in the bond market could reflect dealers' market power. Indeed, Green et al. (2007a) find that dealers in the municipal bond market exercise substantial market power. In the corporate bond market, Di Maggio et al. (2016) find that, when dealers trade with clients (as opposed to other dealers), they charge an extra markup of about 50 basis points. But could transactions costs be lowered by trading bonds in transparent centralized limit order market instead of a fragmented dealer market? It is difficult to answer that question without a counterfactual. While modern bond markets don't offer such a counterfactual, historical experience does.

An important source of exogenous variation showing the importance of market structure for bond trading costs has been the introduction of post-trade transparency. Edwards et al. (2007), Goldstein et al. (2007) and Bessembinder et al. (2007) show that the improvement in post-trade transparency associated with TRACE lowered trading costs.<sup>5</sup> For example, Goldstein et al. (2007) find that, for small and intermediate trade sizes, transparency caused spreads to decrease by more than 22 basis points per \$100 face value. Note that, while TRACE introduced post-trade transparency, the limit order book used for bond trading on the NYSE also

involved pre-trade transparency and enabled final investors to place their own limit orders. These two additional features potentially could further reduce investors' transactions costs.

More recent, but also very important, regulatory reforms affecting the microstructure of the bond market have been the “Volcker Rule” of the Dodd Frank act, whose implementation was finalized in 2014, and the Basel accords implemented in 2012 and 2013. Both reforms made it costlier and more difficult for bank-affiliated dealers to trade (and hence to provide liquidity) in the bond market. As shown by Bessembinder et al. (2018) and Trebbi and Xiao (2016) this did not lead to reduced liquidity, as non-bank dealers stepped in to supply liquidity, and some trading moved to more transparent and competitive trading platforms. Their findings and ours are consistent with the view that i) OTC bank-affiliated dealer markets are not the only possible trading arrangement for bonds, but ii) strong exogenous shocks play a key role in triggering changes in the microstructure of that market.

In the next section we review the organization of the bond market in the 20th century. Section 3 describes our data sources. Section 4 reviews long term trends in bond financing and investing and discusses their possible link with the migration of bond market liquidity off the exchanges. Sections 5 and 6 consider trading and trading costs for corporate bonds in the 1940s and municipal bonds in the 1920s, respectively, using transactions data from the NYSE. Section 6 offers additional remarks on convertible bonds and stocks. Section 8 concludes.

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## Section snippets

### The organization of bond trading in the 20th century

Corporate and municipal bonds have historically been available both on organized exchanges and on over-the-counter markets, with the relative importance of these venues changing over time. A few mechanical aspects of the trading process are similar across the different venues. Prices on long-term bonds have traditionally been expressed as percentage of par, with trading in eighths, except for Treasuries which trade in finer increments.<sup>6</sup> In other...

### Data

We use aggregate series from various sources to document the broad features of the bond market's evolution, and we supplement this with high-frequency data from historical and modern sources....

### Long term trends in bond investing and financing

In this section we survey long term trends in bond investing and financing and discuss whether they could have caused the demise of exchange-based bond trading....

### The collapse in municipal bond trading on the NYSE

Trading in municipals on the NYSE collapsed at the beginning of 1929. Fig. 6, Panel (a), displays monthly trading volume on the NYSE for the six NYC municipal bonds, measured in number of lots traded. Panel (b) plots the average price impact of trades (defined as the absolute value of the difference between the

transaction price and the midquote, divided by the midquote). The market was quite active in 1926 and 1927, and price impact rather low (below 50 basis points). Towards the end of the...

## Corporate bond trading and trading costs in the 1940s

Fig. 1 shows that bond trading activity dropped on the NYSE in the mid-forties. Our high-frequency data enables us to provide a more detailed picture of this drop. Table 6 shows the number of trades and average trade size on the NYSE by year, from 1943 to 1947, for the six corporate issues in our sample. In 1943 and 1944, trading activity was relatively high. There were on average 823 trades per bond issue each year, which is over two transactions per trading day. The trading frequency observed ...

## Convertible bonds and stocks

A relatively recent example of migration from the NYSE to the OTC market is offered by the convertible bond market. As can be seen in Fig. 1, Panel (a), and in Fig. 4, there was a modest revival of the NYSE bond market in the late 1960s. This was due to the rise of the convertible market, and the interest that retail investors took in this market. An early indication of this evolution is given in the 1967 NYSE fact book (page 14):

Bond volume on the exchange in 1966 was the highest since...

...

## Conclusions

When several trading venues are available there can be multiple equilibria in the allocation of trades. When the investors expect that one market venue will attract all or most orders, they direct their own orders to that market, thus confirming the initial expectation. Hence, liquidity may not gravitate to the most efficient trading venue, and market forces may fail to correct this inefficiency, even in the long term. The history of the bond market in the US in the 20th century offers an...

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2023, Journal of Accounting and Economics

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### [Over-the-counter versus double auction in asset markets with near-zero-intelligence traders](#)

2022, Journal of Economic Dynamics and Control

*Citation Excerpt :*

...However, their study was limited by the paucity of information about the identity of investors and dealers. Biais and Green (2019) studied the microstructure of the bond market in the 20th century.<sup>10</sup> They argued that institutional investors grew dramatically in bond markets and these investors preferred OTC markets to more centralized ones...

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## What is the impact of introducing a parallel OTC market? Theory and evidence from the chinese interbank FX market

2021, Journal of Financial Economics

*Citation Excerpt :*

...One hypothesis about trading mechanisms is that the LOB or hybrid mechanism should predominate, because theoretically the transaction costs of an LOB or hybrid should be much less than a dealer market, and much evidence supports this (see Glosten, 1994; Jain, 2005b; Abudy and Wohl, 2017). A second hypothesis is that the OTC should predominate when institutional traders are more prevalent, because they can use their larger average trade size to bargain for a better price in an OTC mechanism and have enough market power to get what they want (see Biais and Green, 2019). It is difficult to test these two hypotheses because we rarely see the introduction of a parallel trading mechanism to an existing market.1...

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