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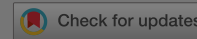
Articles

Where do electronic markets come from? Regulation and the transformation of financial exchanges

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Abstract

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Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1 We study the US case because it is an early instance of the regulated interlinking and routing of orders for securities exchanges, which later facilitated HFT activities. For a comparison of US regulations and those of the Market in Financial Instruments Directive (MiFID), see [Brunner and Schick \(2011\)](#). The MiFID, since its implementation in 2007, has been widely criticized for its impact on trading and

2 This discussion is based on the critique of the economic impact of HFT by [Brunner and Schick \(2011\)](#).

3 The status of HFT is still unclear, differing from the standardization of HFT (see [Brunner and Schick \(2011\)](#)).

4 In this paper, we focus on the ‘trading’ services provided by HFT, which describe what HFT does (see [Brunner and Schick \(2011\)](#)).



5 The subdomain within economics focusing on fixed-role markets is that of industrial organization (IO) (Schmalensee & Willig, [1989](#)). Some of the notions from contemporary industrial organization, such as multi-sided markets (Rochet & Tirole, [2006](#)), are quite suggestive and can permit a good degree of theoretical complexity (despite their canonical examples including somewhat imaginary entities, like now-nonexistent 'singles bars').

6 White has outlined and elaborated on this idea in many articles, beginning with White ([1981a](#)) and White ([1981b](#)) and culminating with the monograph *Markets from networks: Socioeconomic Models of Production* (White, [2002](#)). Intermediary presentations on similar material include White and Leifer ([1988](#)), White ([1988](#)) and White ([1992](#)). White's explicit influences from economics are manifestly not neoclassical theorists like Walras, but instead include Chamberlin on monopolistic competition (Chamberlin, [1933](#)) and the signalling theory of Michael Spence; on Chamberlin, see Swedberg ([2003](#), pp. 113–114).

7 For Smith's distinction between goods and services, see Smith ([1776](#)).

8 Gadrey ([2000](#)) describes theoretical progress in the goods/services dichotomy, including those of Peter Hill, who points out the traditional weaknesses of neoclassical economics in the study of services: 'Because services cannot be transferred from one economic unit to another, models of pure exchange economics of a Walrasian type in which existing goods are traded between economic units are quite inapplicable and irrelevant to services' (Hill, [1977](#), p. 318).

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12 Dobbin ([1994](#)) and Fourcade ([2009](#), pp. 36–37) argue that the regulatory tradition in the United States (going back to the 1891 Sherman Antitrust Act) normalized oligopolies as inherently ‘competitive’ within legal discourse. It should also be noted that Aspers criticizes Fligstein for only considering the role of the state in production as opposed to financial markets (Aspers, [2009](#)).

13 ‘Markets consolidate because traders attract traders. Trading is easiest and cheapest where most traders of an instrument or similar instruments trade. Liquidity attracts liquidity’ (Harris, [2003](#), p. 539).

14 ‘As the value to one trader of transacting on a given trading system increases when another trader chooses to transact there as well, such a system is said to exhibit network effects or network externalities’ (Domowitz & Steil, [1999](#)).

15 The term continuous auction can thus be contrasted to the call auction, in which orders are aggregated and then later matched at periodic, prearranged times. For a classification of exchange trading systems based on empirical observation in the mid-1980s, see Cohen et al. ([1986](#), pp. 16–37).

16 It is sometimes stated that Walras’s original model was designed on the actual call auction process of the late-nineteenth-century Paris Bourse. Walras states: ‘let us go into the stock exchange of a large investment centre like Paris or London’ (Walras, [1954](#) [[1892](#), p. 84]). That the Paris Bourse ever functioned in a manner similar to Walrasian tâtonnement is disputed by Walker ([2001](#)).

17 The period of transition before the end of fixed commissions in 1975 is well-documented

18 These ... respectively (Harris, ...)

19 These ... as inter ... (y-side) and the ex ... is buying and the ... a perspective ... a simplified ... investor diversified



20 Seligman ([1985](#), p. 7) describes the AMEX as a 'minor league' to the 'major league' NYSE.

21 There were also an array of independent dealer markets for trading securities; these 'over-the-counter' (OTC) markets were also known (in aggregate) as the 'third market'. Additionally, Rule 394 (later Rule 390) prevented NYSE members from effecting trades in the over-the-counter market (the dealer markets regulated by the National Association of Securities Dealers, NASD) (Seligman, [1995](#), pp. 505-516).

22 The term 'Listed' markets refers to financial markets hosted by the exchange (for example, NYSE, AMEX) on which a stock first made its IPO. 'Over-the-counter' refers to the trading of these and other stocks in settings not hosted by a formal exchange (SEC, 1963, p. 657). Sperry Rand was then one of the 'seven dwarves' of computer manufacturing in competition with IBM.

23 NASD was the self-regulatory organization (SRO) for OTC broker-dealers (Smith et al., [1998](#)).

24 A 'block trade' is simply a large transaction - at least 10,000 shares, but often much more. On the founding of Instinet, see Pardo-Guerra ([2014](#)).

25 'We note our satisfaction with the manner in which the NASDAQ communications system has been operating and intend to continue to monitor its operations and development in order to determine whether any modifications may be necessary as the evolution of a central market system progresses' (Study of the Securities Industry, [1972](#), pp. 2447-2449)

26 The a Securities Acts Am

27 The "consolidate" and mid-[1970s](#) through

28 The L 2) required the disse SDAQ stocks on some price for a security,



29 The Quote Rule is 240.11Ac1-1, 'Dissemination of Quotations'. It required brokers/dealers to send their quotes to exchanges, and for those exchanges to make those quotes available.

30 The Display Rule is 240.11Ac1-2.

31 Before the Consolidated Tape Association, information on the last-sale price was provided by NYSE or AMEX ticker tapes or electronic displays (Seligman, [1984](#), p. 86).

32 Release No. 34-26708; File No. S7-13-89 (SEC, 1989).

33 Release No. 34-30920; File No. S7-18-92 (SEC, 1992).

34 Release No. 34-36310 (proposal), Release No. 34-37619A (final); File No. S7-30-95.

35 Release No. 34-39884 (proposal), Release No. 34-40760 (final); File No. S7-12-98.

36 Only partial online coverage was available for the SEC comment letters for these proposals; the majority of the comment letters were scanned from the National Archives II in College Park, Maryland (Accession No. 266-07-0121), converted to plain text (when possible) via OCR software and manually cleaned during reading for various conversion errors.

37 Adams's 1969 patent is 'Instinet communication system for effectuating the sale or exchange of fungible properties between subscribers', US3573747 A.

38 By contrast with the above perspectives, it is worth noting the relative weakness of

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39 On phatic communication, see Jakobson ([1960](#)). In the 2000s, the competitive proliferation of ‘maker-taker’ pricing – which grants various rebates to either ‘liquidity suppliers’ (those ‘makers’ posting marketable limit orders) or, alternatively, to those ‘takers’ submitting the orders which match them – further complicated this notion of best execution (Foucault, [2012](#)).

40 The exemplary case of this was, of course, the NASDAQ odd-eighths scandal (Christie & Schultz, [1994](#)).

41 Harris ([1991](#)) gives an excellent discussion of liquidity.

42 Steven Wunsch’s Arizona Stock Exchange was, at the time, the only proprietary trade execution system actually registered as an exchange.

43 The proposed rules are in SEC ([1995](#)); The final rules are in SEC ([1996](#)). The Limit Order Display Rule is Rule 11Ac1-4; the amended Quote Rule (‘ECN Alternative’ to ‘Dissemination of Quotations’) is Rule 11Ac1-1.

44 The NYSE had a higher latency of placing and cancelling orders.

45 For more on the effect of the Order Handling Rules, see Schwartz and Francioni ([2004](#), pp. 229–230). According to Schwartz and Francioni ([2004](#), p. 241), ‘A market maker could use a Nasdaq system (SelectNet) to send an order it has received to another market maker or to broadcast the order to all market makers. As quote providers, an ECN could also connect directly into SelectNet. SelectNet included a negotiation feature that allows a participant (market maker or ECN) to accept, reject, or counter

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