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Adverse selection, market access, and inter-market competition ☆

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ABSTRACT

This paper investigates the role of informed trading in a fragmented financial market under the absence of inter-market price priority. Due to frictions in traders' market access, liquidity providers on alternative trading platforms can be exposed to an increased adverse selection risk. As a consequence, the main market will dominate (display better quotes) frequently albeit charging considerably higher transaction fees. The empirical analysis of a dataset of trading in French and German stocks suggests that trades on Chi-X Europe, a low-cost trading platform, carry significantly more private information than those executed in the Primary Markets. Consistent with our theory, we find a negative relationship between the competitiveness of Chi-X Europe's quotes and this *excess* adverse selection risk faced by liquidity providers in the cross-section.

1. Introduction

The introduction of the Markets in Financial Instruments Directive (MiFID) in late 2007 spawned competition among stock exchanges across Europe by allowing so-called multilateral trading facilities (henceforth MTFs) to compete directly with the national stock exchanges (Primary Markets) for customer order flow. Ultimately, MiFID aimed at creating a level playing field that promotes competition between market centers and fosters innovation.

One issue that has received a great deal of attention in the context of inter-market competition is the design of best execution policies. Under MiFID, intermediaries such as banks and brokers are responsible for obtaining "the best possible result" for their clients' orders. Importantly, best execution is not only based on prices but rather permits the consideration of a wide array of additional execution characteristics such as liquidity, order size, and the likelihood of execution, among others (see e.g. Petrella, 2009 and Gomber and Gsell, 2010, for details). Consequently, MiFID does not formally enforce inter-market price priority and orders are permitted to execute at a price that is inferior to the best available price across venues ("trade-throughs"). This differs considerably from the rules that are in place in the United States under Reg NMS, which mandates exchanges to re-route orders to other market centers if those are offering a better price ("trade-through rule").

In this article, we argue that allowing for trade-throughs can benefit the Primary Markets and therefore limit inter-market competition. To this end, we study how market access frictions give rise to differences in adverse selection risks across trading venues in the absence of inter-market price priority. Inspired by the market setting in Europe, we develop an extension of the Glosten and Milgrom (1985) sequential trade model where liquidity providers post quotes in two separate trading platforms, the Primary Market and a low-cost MTF. A key ingredient in our model is the existence of market access frictions. Following Foucault and Menkveld (2008), we assume that the Primary Market is accessible by all agents in the economy, while trading on the MTF requires a

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so-called smart order routing system that is only available to a subset of the trader population. Due to the absence of a trade-through rule, this access friction gives rise to inter-market differences in the adverse selection risk faced by liquidity providers. If informed traders are more likely than uninformed traders to be "smart routers", situations can arise where the Primary Market offers better quotes frequently despite charging higher transaction fees.

The analysis of a sample of trades and quotes in German and French stocks from April–May 2008 confirms the existence of imperfections in traders' routing abilities, as only about every second trade originates from agents with perfect access to Chi-X Europe (henceforth Chi-X), the only existing MTF at that time. Moreover, trades executed on this alternative trading platform carry significantly more private information than their counterparts on the Primary Markets, while trade-throughs are particularly uninformative. This implies that liquidity providers on the MTF incur a higher adverse selection risk precisely because an important fraction of the uninformed order flow is held captive in the Primary Markets. Cross-sectional regressions provide empirical support for our theory, as we find that this excess adverse selection risk is negatively related to Chi-X's presence at the inside quote.

This paper contributes to the existing literature on inter-market competition. While early theoretical papers (e.g. Pagano, 1989 and Chowdry and Nanda, 1991) argue that markets display a natural tendency to consolidate as a consequence of liquidity externalities, there is a large empirical literature that empirically documents the existence of fragmented financial markets (e.g. Bessembinder, 2003; Boehmer and Boehmer, 2004; Goldstein et al., 2008; Biais et al., 2010).

Most closely related to our paper, Foucault and Menkveld (2008) develop and test a theory of competition between two markets in an environment that allows for trade-throughs. In their model, which abstracts from uncertainty about the asset's fundamental value, risk-neutral competitive agents trade off the expected revenue from liquidity provision against order submission fees. They find that the share of liquidity provided on the alternative trading platform (weakly) increases in the proportion of smart routers. While our work shares their assumption of frictions in traders' routing abilities, we consider a model with a risky asset and asymmetric information. We therefore contribute to the literature by studying the role of market access frictions (together with the absence of a trade-through rule) for inter-market competition through differences in informed trading. A similar angle is analyzed by van Kervel (2015), who shows how inter-market competition can lead to an "overprovision" of liquidity.

Naturally, our work is also closely related to a number of papers that study differences in informed trading across markets. One strand of this literature analyzes the effects of "cream-skimming" and payment for order flow (e.g. Easley et al., 1996; Bessembinder and Kaufman, 1997; Battalio et al., 1997; Parlour and Rajan, 2003). In our context, the competitiveness of alternative trading platforms is hampered by the concentration of uninformed order flow on the Primary Markets due to trade-throughs generated by captive traders. This contrasts strongly with the standard paradigm within this literature, where uninformed order flow is directed away from the main market center due to so-called preferencing agreements.[1]

Other papers (e.g. Grammig et al., 2001; Barclay et al., 2003; Goldstein et al., 2008) document differences in informed trading between dealer markets and anonymous electronic trading systems. Generally, these studies find order flow in electronic markets to be more informative, presumably because informed traders value the higher speed of execution offered by these venues and try to prevent information leakage due to interacting with intermediaries such as market makers. In contrast, we show that differences in informed trading across exchanges may also arise through the absence of inter-market price priority paired with frictions in traders' market access. Finally, our model also accommodates the results of Hengelbrock and Theissen (2009), who study the market entry of the Turquoise MTF in late 2008 and find that the trading activity in larger and less volatile stocks tends to fragment more.

This paper is organized as follows. Section 2 introduces our theoretical model, while Section 3 describes the institutional environment and presents the data. Section 4 presents estimates for differences in informed trading between the Primary Markets and Chi-X, and Section 5 presents evidence on the model's empirical implication. Section 6 concludes, while proofs and tables are relegated to the Appendix.

2. The model

This section presents a simple model of informed trading with two trading venues, based on Glosten and Milgrom (1985). We focus on deriving conditions for market co-existence in equilibrium.

2.1. Model setup

There is a single risky asset with liquidation value $V \in \{\overline{V}, \underline{V}\}$, where we set $\Pr(V = \overline{V}) \equiv \delta_0 = 1/2$ for simplicity. The asset can be traded on two separate trading platforms, which we denote by *C*(hi-X) and *P*(rimary Market). These markets are populated by $N^P \geqslant 2$ and $N^C \geqslant 2$ identical, risk neutral market makers, respectively, who post bid and ask quotes for a single unit of the risky asset. There is a continuum of traders (of unit mass), who arrive sequentially at time points $t = 1, \ldots, T$. They can buy or sell at most one unit of the asset and then exit the market forever. A proportion $\mu \in (0, 1)$ of the trader population is perfectly informed about the liquidation value *V*, while the remaining traders are uninformed.

We make two crucial assumptions concerning the way in which trading platforms differ. First, in line with the observation that entering MTFs offered trading at considerably lower fees, we assume that market *P* charges a cost $c > 0$ per trade to market makers, while the cost charged by market *C* is normalized to zero.[2] Naturally, *c* is assumed to be very small in comparison to the asset's fundamental uncertainty, $(\overline{V} - \underline{V})$. Second, following Foucault and Menkveld (2008), we assume that access to market *C* is imperfect because it requires the use of smart order routing technology. Further supporting evidence for this assumption is presented in Section 3.2. Let $\theta^I < 1$ and $\theta^U < 1$ denote the respective fractions of informed and uninformed traders that can trade in both markets. We call these agents smart routers. The remaining agents are assumed to be only able to trade in market *P*, and we call them captive traders. Fig. 1 graphically depicts the structure of the trader population for the case $\theta^I > \theta^U$.

The overall proportion of smart routers is given by $\theta = \mu\theta^I + (1 - \mu)\theta^U$. The proportion of informed traders among smart routers and captive traders, respectively, are defined as

$$\mu^{SR} \equiv \frac{\theta^I \mu}{\theta} \quad \mu^{CT} \equiv \frac{(1 - \theta^I)\mu}{1 - \theta}$$

[1] Preferencing agreements usually establish a relation between a broker and a trading platform, where brokers receive a payment for directing the entire order flow to a particular venue. This practice was pioneered by Bernard Madoff in the 1980s.

[2] See Section 3.1 for a comparison of fees between Chi-X Europe and two major Primary Markets. Notice that the assumption that fees are charged to market makers is without loss of generality in our setup, because ultimately all fees are borne by market order traders.