Market fragmentation and price impact

By Lewen Guo and Pankaj K. Jain

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contact: lguo5@memphis.edu; guolewen1994@gmail.com

Motivation

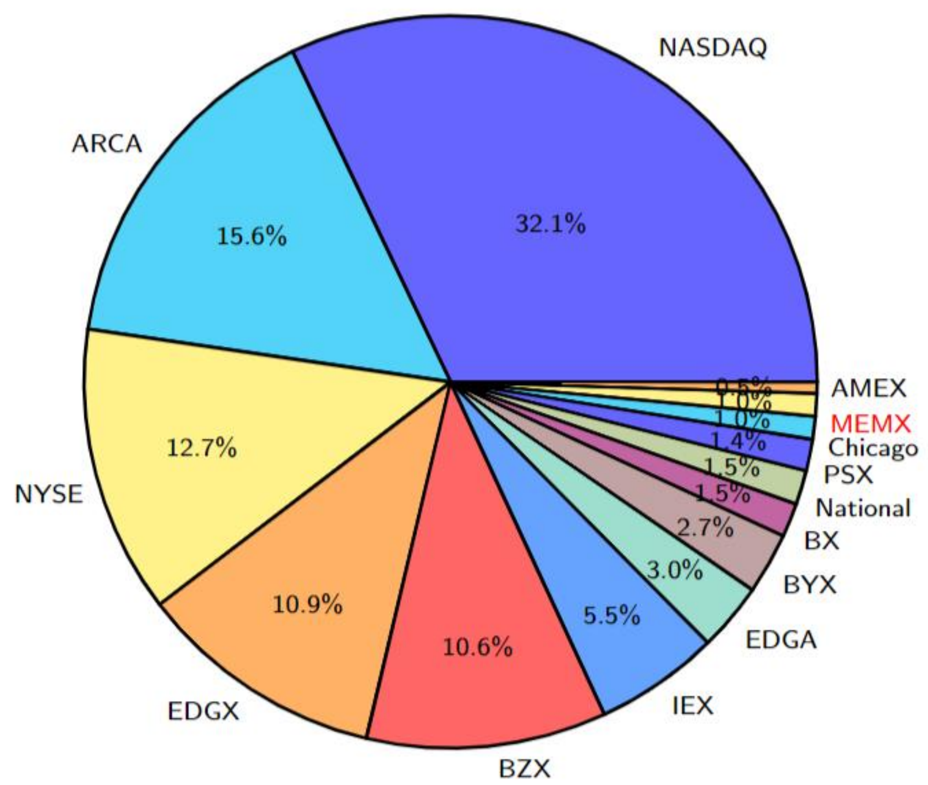


Figure: Lit market shares (trades executed at the U.S. exchanges) in 2020 October.

Research Question

Is market fragmentation beneficial and detrimental?

Proponents: i) **higher welfare** as a result of the **higher price informativeness** and the **increased allocation efficiency**

ii) **reduced transaction costs** due to **competition** among trading venues

Opponents: i) **higher adverse selection costs** due to **cross-venue arbitrage**

ii) **reduced market depth** at **each trading venue**, and therefore may possibly induce a **higher price impact** of trading

Our Paper

User newly launched lit exchange--**the Members Exchange (MEMX)**--as an exogenous shock to market fragmentation level

AND

Investigate the *causal effects* of market fragmentation on a particular dimension of liquidity--the price impact

Why **price impact**?

Informational price impact → adverse selection costs based on the seminal works of Glosten and Milgrom (1985) and Kyle (1985)

Mechanical price impact → fluctuations in orderbook status such as market depth, slopes in demand schedules

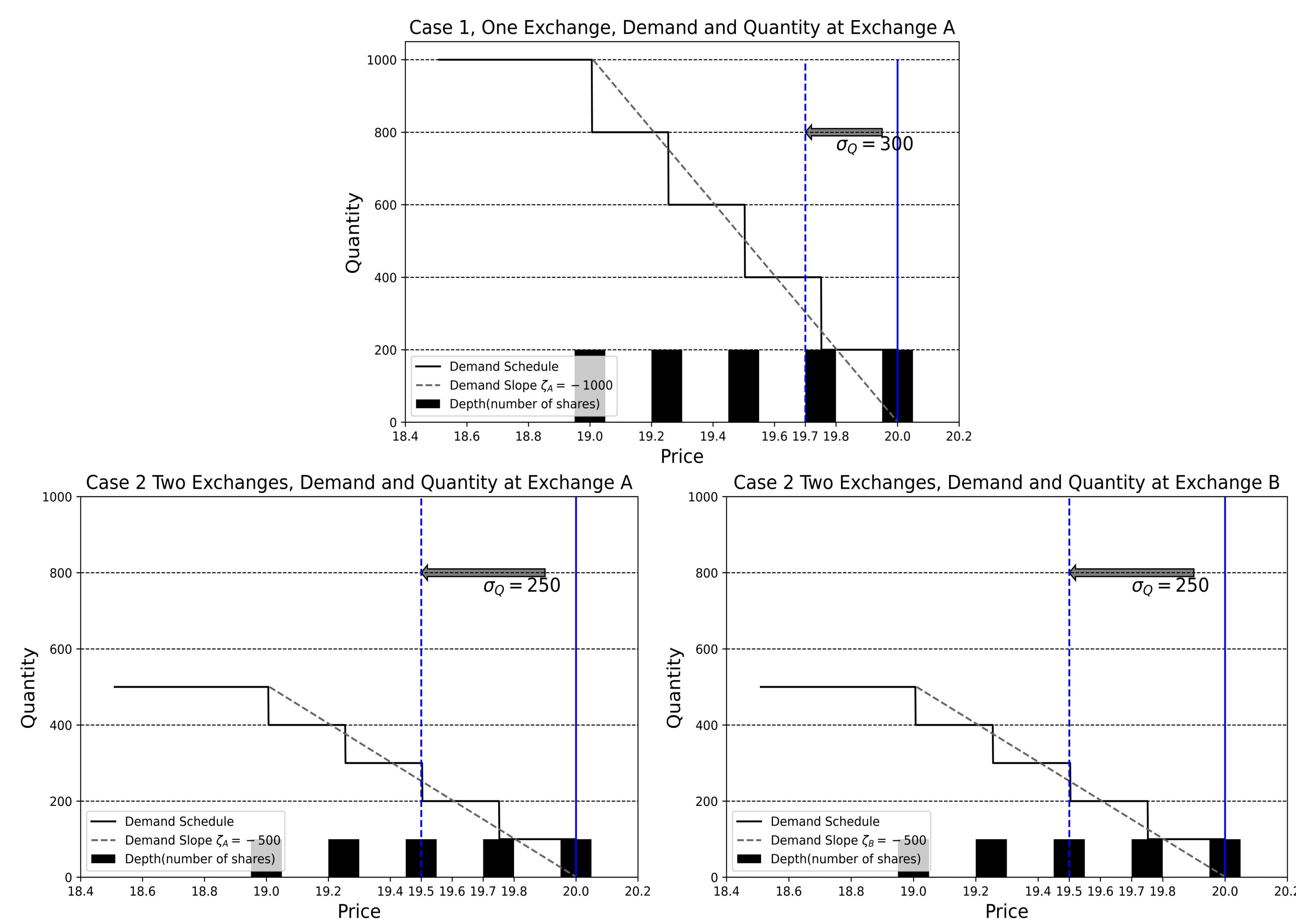
Hypotheses

Chen and Duffie (2021) predict price impact of trading increased when a new lit exchange is launched:

Why?

Order book status changed: reduced **market depth** at each ***local*** exchange due to potential order splitting to the new exchange, and more **inelastic** (inverse) demand schedules → **mechanical price impact** due to the fluctuations in order book status

Order submission strategies changed: more **aggressive** orders and thus lead to higher **price informativeness** → **informational price impact** due to some trades may be more informed in more fragmented markets



Major Findings

Higher market fragmentation level leads to an **increase** in **price impact of trading** in the U.S. equity markets →

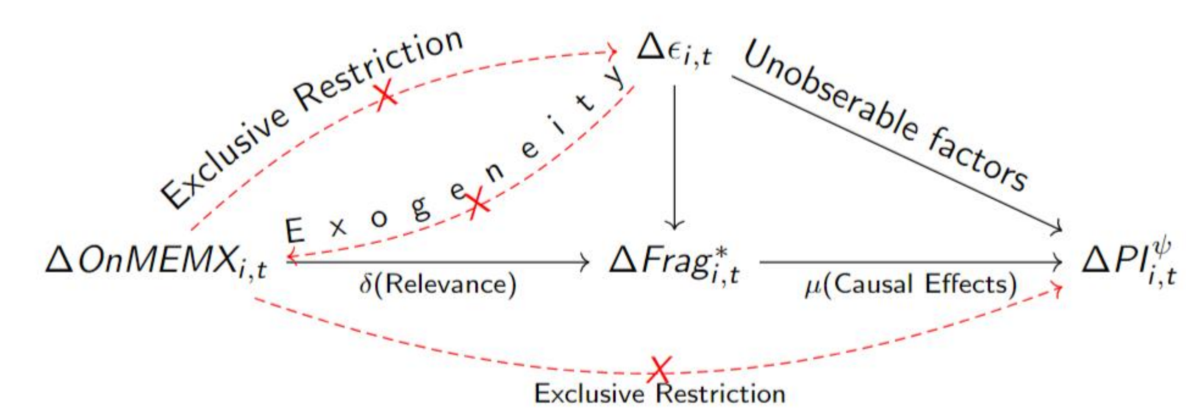
a one-standard ↑ in market fragmentation level leads to 26.5 bps ↑ in NBBO price impact

More increases in ***exchange-based*** **price impact**

Results are **robust**: ①alternative measures of market fragmentation and price impact, ②heterogenous effects on different types of stocks, ③reverse causality and endogenous venue choice, ④NMS rule, and ⑤external validity

Major Findings

Estimation of *causal effects* is based on an **IV** approach:



$OnMEMX_{i,t}$ is an indicator whether a stock is traded on MEMX exchange on day, $Frag_{i,t}$ is the fragmentation measure defined as 1-HHI index, $PI^{\Psi}_{i,t}$ is the ***exchange-based*** price impact measurement similar to Holden and Jacobsen (2014). Δ is the first-difference operator.

Second-stage						First-stage	
Dependent: $\Delta PI^{\psi}_{i,t}$	Independent: $\Delta\widehat{Frag}^{trade}_{i,t}$	$\Delta\widehat{Frag}^{volume}_{i,t}$	Controls	Day FE	N	Estimates δ	Tests K-P
NBBO	0.0260*** (0.003)		Y	Y	834,156	0.0140***	199.6
		0.0241*** (0.003)	Y	Y		0.0150***	169.2
NASDAQ (Q+T)	0.0400*** (0.007)		Y	Y	824,218	0.0134***	195.3
		0.0376*** (0.007)	Y	Y		0.0143***	164.2
ARCA (P)	0.0554*** (0.007)		Y	Y	805,977	0.0106***	225.2
		0.0491*** (0.006)	Y	Y		0.0120***	170.3
NYSE (N)	0.0768*** (0.015)		Y	Y	714,984	0.0066***	152.6
		0.0660*** (0.013)	Y	Y		0.0077***	111.9
BZX (Z)	0.0771*** (0.009)		Y	Y	798,129	0.0093***	207.2
		0.0691*** (0.008)	Y	Y		0.0104***	158.4
EDGX (K)	0.0590*** (0.007)		Y	Y	808,862	0.0119***	213.1
		0.0534*** (0.007)	Y	Y		0.0131***	169.0
IEX (V)	0.0562** (0.026)		Y	Y	644,892	0.0063***	140.7
		0.0524** (0.024)	Y	Y		0.0068***	75.4
EDGA (J)	0.0785*** (0.017)		Y	Y	756,034	0.0082***	204.1
		0.0713*** (0.016)	Y	Y		0.0090***	125.3
BYX (Y)	0.0763*** (0.014)		Y	Y	774,033	0.0085***	192.6
		0.0669*** (0.013)	Y	Y		0.0097***	139.5
BX (B)	0.1894*** (0.052)		Y	Y	684,579	0.0056***	117.8
		0.1671*** (0.047)	Y	Y		0.0064***	74.6
National (C)	−0.0925 (0.100)		Y	Y	680,021	0.0050***	100.0
		−0.0816 (0.089)	Y	Y		0.0057***	62.5
PSX (X)	0.3033** (0.121)		Y	Y	613,467	0.0045***	69.7
		0.2744** (0.108)	Y	Y		0.0050***	50.1
Chicago (M)	−0.0004 (0.029)		Y	Y	299,690	0.0038***	32.6
		−0.0005 (0.030)	Y	Y		0.0037***	24.3
AMEX (A)	0.0869*** (0.025)		Y	Y	571,535	0.0058***	83.1
		0.0804*** (0.025)	Y	Y		0.0062***	51.9

Additional analysis suggests both changes in **order book status** (**mechnical price impact channel**) and **order submission strategies** (**informational price impact channel**) play a role in the determinants of price impact when a new **lit** exchange is launched

Conclusion and Policy Implication

Market fragmentation may deteriote a particular price impact of equity trading

Though **more lit exchanges** may enhance **price informativeness**, it may not always be benificial to market participants in terms of **liquidity**

Regulators should realize the consequences of introducing addtional exchanges to thus far **fragmented** U.S. equity market