

Algorithms Leave but Insiders Arrive: Evidence from the Tick Size Pilot

Chen Lin

Discussant: Moritz Wiedemann

Erasmus University Rotterdam

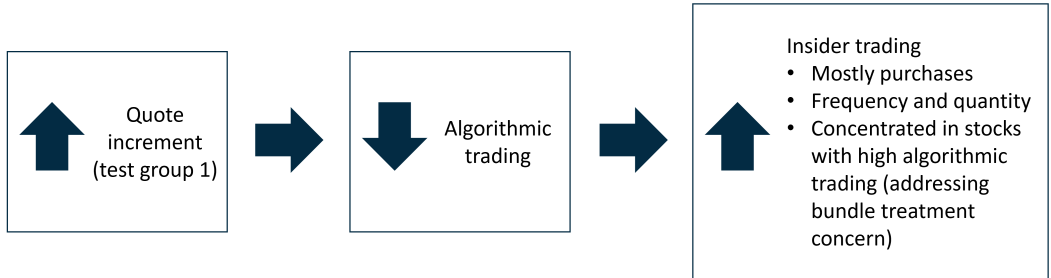
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Which market participants gain or lose from algorithmic trading?

- ▶ Why it matters?
 - ▶ Algorithmic trading represents a growing and large share of trading
⇒ 70% of comprehensive trading volume in the US stock market
(GrandViewResearch, 2022)
 - ▶ Policy relevant
⇒ Guidance for trading regulations and design of market structure
- ▶ Laboratory: US small cap stocks
 - ▶ Tick Size Pilot Program between 04/2014 and 09/2016
 - ▶ 3 types of treatment groups ⇒ Critical change: Raise in the minimum quote increment

Main Findings



This discussion in two parts

- ① Can you tighten the link between algorithmic trading and insider trading?
- ② How do the 3 test groups in the Tick Size Pilot Program differ?

1. Can you tighten the link between algorithmic trading & insider trading?

► Two proposed channels:

- ① $\uparrow$ algorithmic trading $\Rightarrow$ $\downarrow$ mispricing $\Rightarrow$ $\downarrow$ insider trading
- ② $\uparrow$ “back running” $\Rightarrow$ $\downarrow$ informed trader profits $\Rightarrow$ $\downarrow$ insider trading

1. Can you tighten the link between algorithmic trading & insider trading?

- ▶ Two proposed channels:
 - ① $\uparrow$ algorithmic trading $\Rightarrow$ $\downarrow$ mispricing $\Rightarrow$ $\downarrow$ insider trading
 - ② $\uparrow$ “back running” $\Rightarrow$ $\downarrow$ informed trader profits $\Rightarrow$ $\downarrow$ insider trading
- ▶ Concern: Possible horizon mismatch
 - ▶ Algorithmic short-horizon trading vs infrequent insider trading
 - ▶ Paper currently uses monthly outcomes
 - ▶ *Suggestion:* Test short-horizon price efficiency measures (e.g. autocorrelation (Chorida et al., 2008), variance ratio (Lo & Mackinlay, 1998), price delay (Hou & Moskowitz, 2005) for (1)
 - ▶ *Suggestion:* Test trade execution metrics for (2)

2. How do the 3 test groups in the Tick Size Pilot Program differ?

- ▶ Pilot created 3 different test groups
 - ① Q: Minimum increment of 0.05 for quotes
 - ② T: Q + minimum increment of 0.05 for trades
 - ③ AT: Q + T + trade-at-prohibition
- ▶ Different implications for algorithmic trading

Table 2: Was Algorithmic Trading Weakened?

	Dependent Variable:	
	1st PC of Algorithmic Trading Proxies (1)	(2)
Q	0.023 (0.024)	-0.148*** (0.021)
T	-0.013 (0.031)	0.005 (0.022)
AT	-0.037 (0.033)	-0.054** (0.026)
$Q \times Post^{Intro}$	-0.174*** (0.024)	
$T \times Post^{Intro}$	0.016 (0.019)	
$AT \times Post^{Intro}$	-0.042** (0.019)	
$Q \times Post^{Comp}$		0.170*** (0.013)
$T \times Post^{Comp}$		0.000 (0.012)
$AT \times Post^{Comp}$		0.019 (0.014)
Industry FE	Yes	Yes
Month FE	Yes	Yes
Observations	85,817	72,521
r2	0.221	0.185

2. How do the 3 test groups in the Tick Size Pilot Program differ?

- ▶ Pilot created 3 different test groups
 - ❶ Q: Minimum increment of 0.05 for quotes
 - ❷ T: Q + minimum increment of 0.05 for trades
 - ❸ AT: Q + T + trade-at-prohibition
- ▶ Different implications for algorithmic trading
- ▶ Different implications for insider trading
- ▶ *Suggestion:* Discuss how to think about each of these groups

Table 3: Did Insiders Trade Higher Quantities?

	Dependent Variable:							
	Purchase				Sale			
	<i>purchaseInShrout</i>	<i>purchaseValue</i>	<i>saleInShrout</i>	<i>saleValue</i>	<i>purchaseInShrout</i>	<i>purchaseValue</i>	<i>saleInShrout</i>	<i>saleValue</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Q</i>	0.200 (0.271)	1.052*** (0.384)	2.363 (4.603)	20.41* (11.07)	-1.364** (0.628)	-0.256 (0.609)	-106.6** (41.64)	14.15 (70.87)
<i>T</i>	-0.097 (0.310)	-0.402 (0.418)	-2.718 (5.778)	-2.899 (10.11)	1.854** (0.810)	-0.123 (0.985)	110.8* (58.02)	-2.899 (10.11)
<i>AT</i>	-0.281 (0.276)	-1.219*** (0.438)	-4.850 (6.006)	-27.58** (11.47)	-0.185 (0.798)	0.679 (0.673)	26.39 (56.82)	72.09 (75.74)
<i>Q</i> × <i>PostIntro</i>	0.684** (0.277)		14.72** (6.419)		0.838 (0.731)		101.4 (68.97)	
<i>T</i> × <i>PostIntro</i>	-0.199 (0.362)		1.799 (6.876)		-2.097** (1.027)		-181.3* (96.18)	
<i>AT</i> × <i>PostIntro</i>	-0.827** (0.373)		-20.74** (7.849)		1.014 (0.798)		51.54 (77.80)	
<i>Q</i> × <i>PostComp</i>		-0.832** (0.392)		-12.10 (9.162)		0.572 (0.404)		4.199 (43.16)
<i>T</i> × <i>PostComp</i>		0.470 (0.392)		1.001 (8.591)		-0.293 (0.823)		24.58 (69.37)
<i>AT</i> × <i>PostComp</i>		0.358 (0.424)		10.17 (7.918)		-0.689 (0.616)		-88.46 (78.27)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	85,817	72,521	85,817	72,521	85,817	72,521	85,817	72,521
r ²	0.009	0.009	0.010	0.011	0.010	0.015	0.012	0.016

Few methodological quibbles

- ▶ Choice of fixed effects $\Rightarrow$ Can you include stock fixed effects?
- ▶ Timing of interaction terms $\Rightarrow$ when are interaction terms determined?
- ▶ Balance tables of control and treatment groups
- ▶ Is it important to cluster standard errors by stock?

Good luck with the paper

- ▶ Very timely paper with policy relevance
- ▶ Highlights that algorithmic trading can affect other market participants
- ▶ Open questions:
 - ▶ Can you tighten the link between algorithmic trading and insider trading?
 - ▶ How do the 3 test groups in the Tick Size Pilot Program differ?