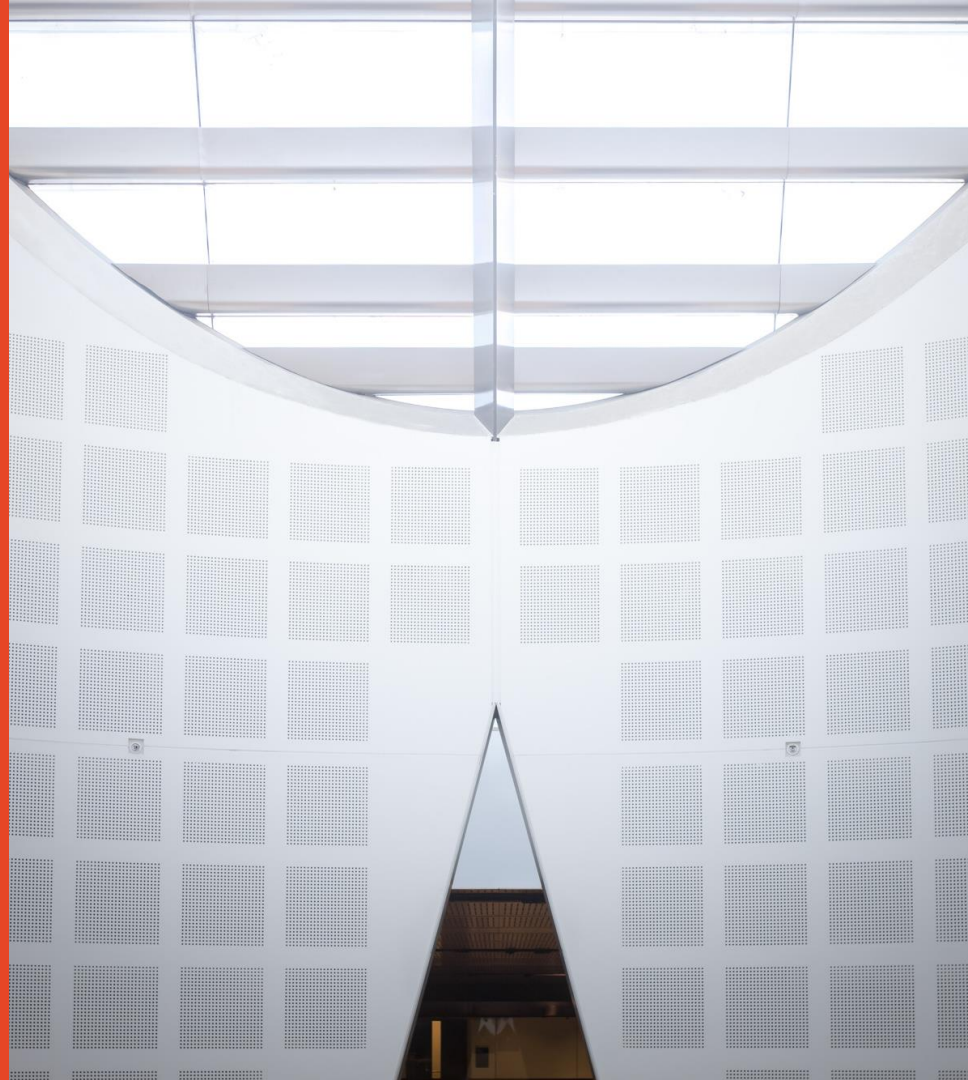


Trading behavior and market quality when the relative tick size is almost zero


Dr Sean Foley

Jiri Svec

Anne Haubo Dyhrberg



Tick size: Depth vs. Costs

A large green arrow pointing to the left, containing the text "Maximize liquidity provision".

Maximize
liquidity
provision

A large blue arrow pointing to the right, containing the text "Minimize spreads".

Minimize
spreads

Tick size	Spread	Spread (ticks)
0.1c	2c	20

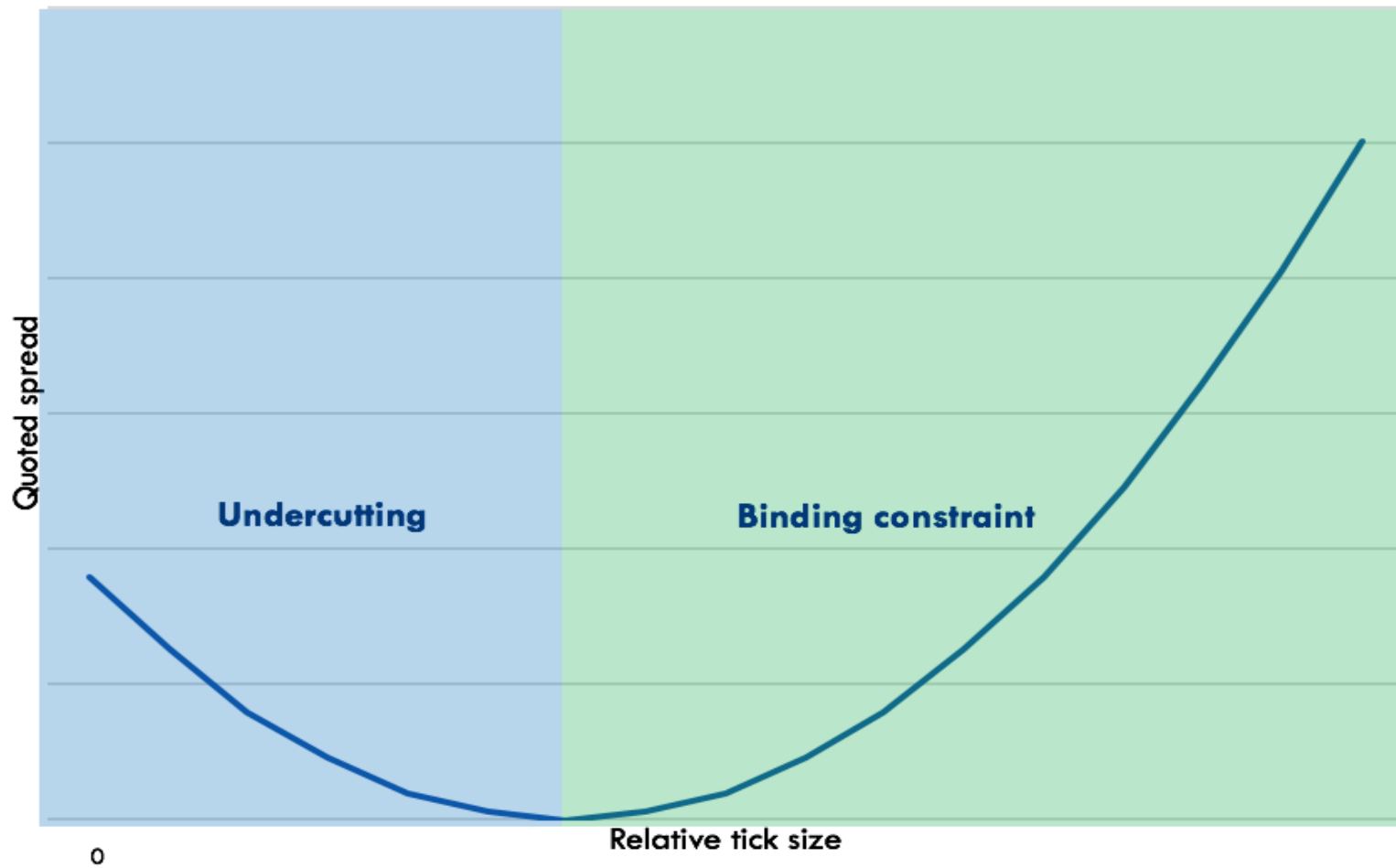
Quoted spread

Increased spreads
 Increased depth
 Increased volatility
 Improved liquidity provision

Binding constraint

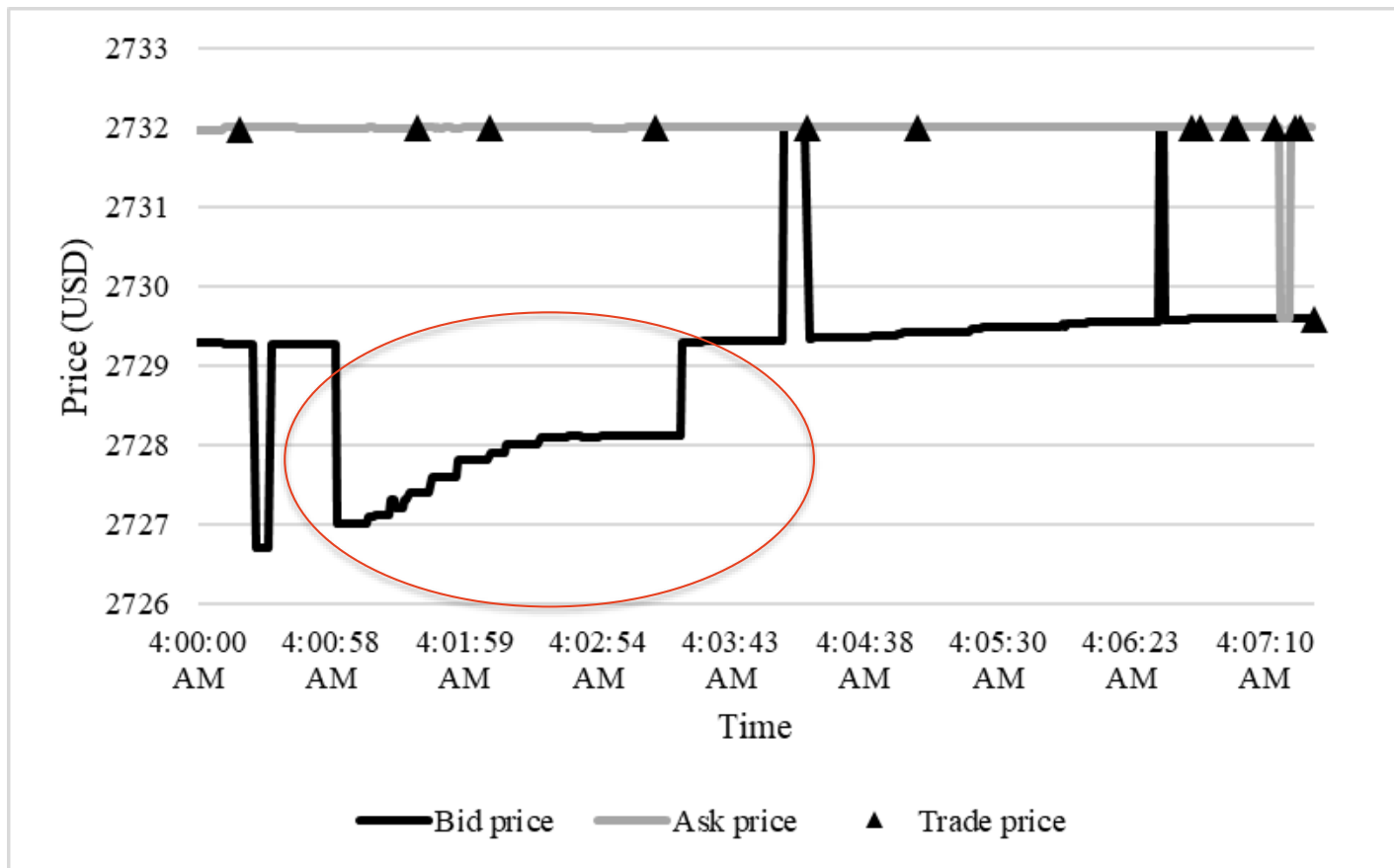
Reduced spreads
 Lower depth at best
 Trade size importance

Relative tick size



Undercutting - an example

Price	ETH
210.40940000	2.16960480
210.08979033	0.49168813
210.08979032	5.99000000
210.04000003	0.12551583
209.91818734	19.63800000
209.91818733	7.10000000
209.91818700	8.00000000
209.78217253	0.11741054
209.78153596	0.04630284
209.77155855	5.10000000
209.76982000	0.52438430
209.74000000	12.00000000
209.68020784	12.29768200
209.67967906	6.11316737
209.60953630	11.50000000
209.60833476	0.01441000
.....



Foucault, Kadan and Kandel (2005)

High waiting costs
Impatient traders
High order arrival rate
Relative tick size close to zero
→ Wide spreads

Quoted spread

Undercutting

Binding constraint

0

Relative tick size



ethereum



ethereum
classic

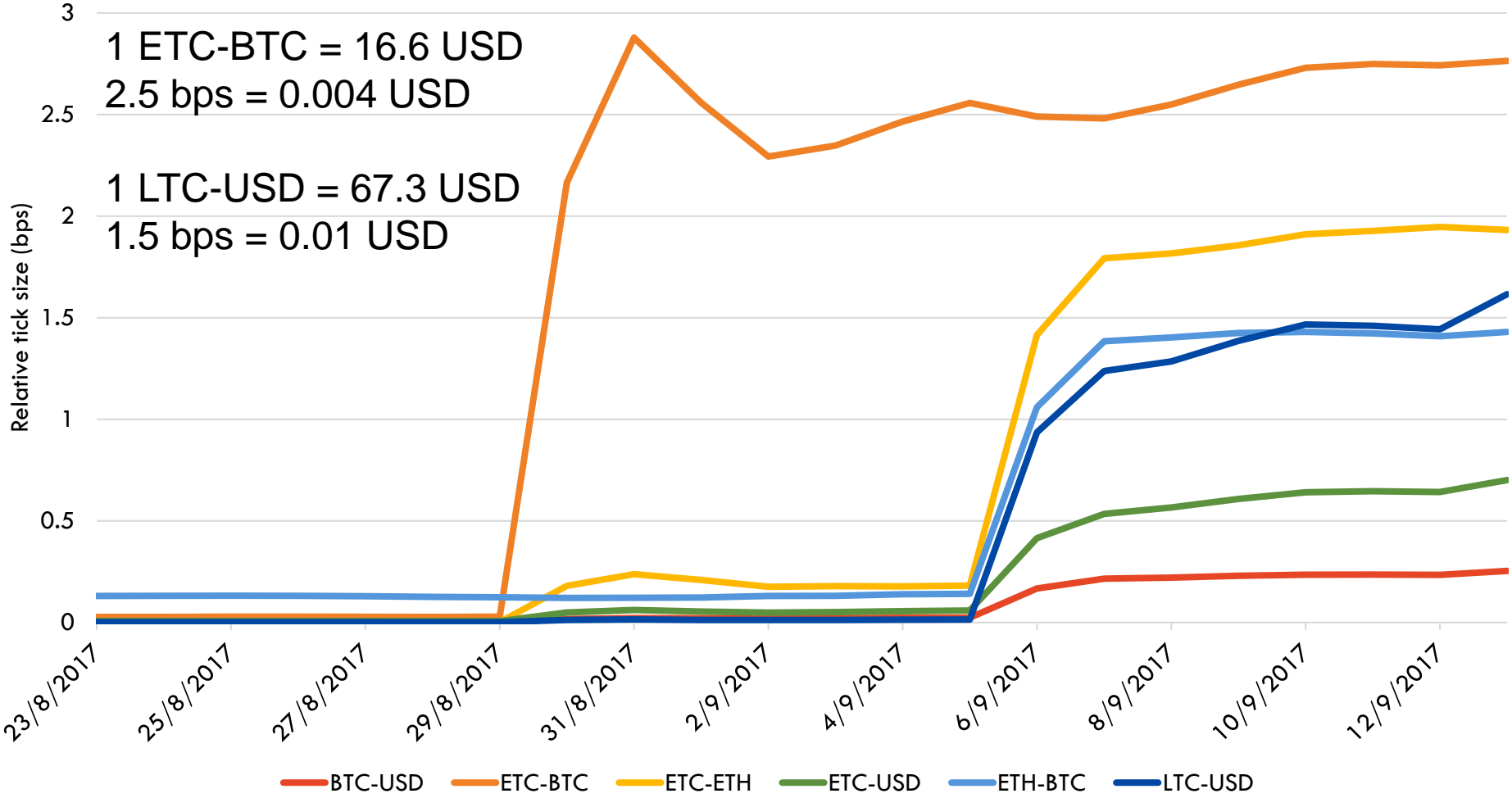


Assumptions of the theoretical model:

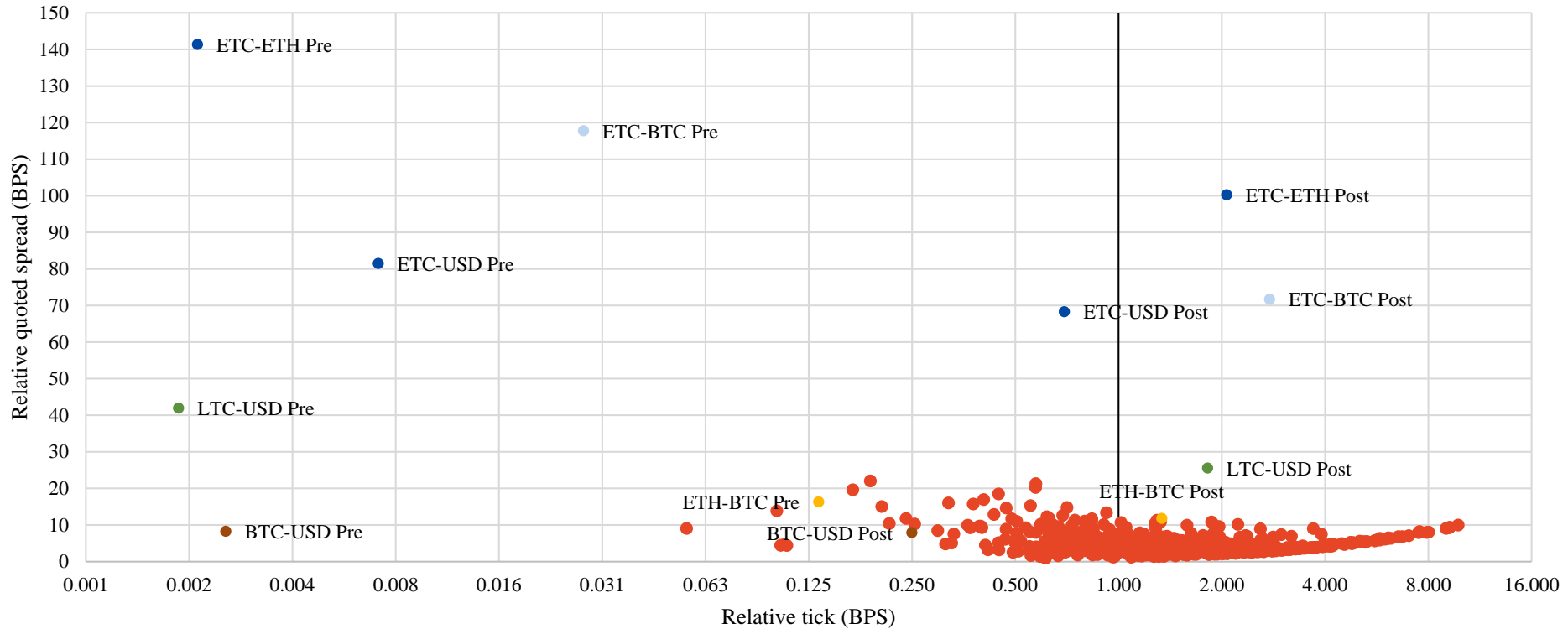
- Continuous market without intermediaries
- No asymmetric information
- Impatient traders

High frequency TAQ data

Tick size increase on
August 30th 2017
September 6th 2017



Relative tick size and relative quoted spread



2SLS Estimator

Endogeneity problem due to mechanical effect between tick sizes and spreads

→ Use instrumental variable

First stage

$$\widehat{Relative\ Tick}_{it} = \alpha_i + \beta_1 \mathit{PercentChange}_{it} + \beta_2 \mathit{\$Volume}_{it} + \beta_3 \mathit{Trades}_{it} + \beta_4 \mathit{Volatility}_{it} + \beta_5 \mathit{MeanPrice}_{it} + \varepsilon_t$$

Second stage

$$\mathit{Metric}_{it} = \alpha_i + \beta_1 \mathit{\$Volume}_{it} + \beta_2 \mathit{Trades}_{it} + \beta_3 \mathit{Volatility}_{it} + \beta_4 \mathit{MeanPrice}_{it} + \beta_5 \widehat{Relative\ Tick}_{it} + \varepsilon_t$$

More, Larger Limit and Market Orders

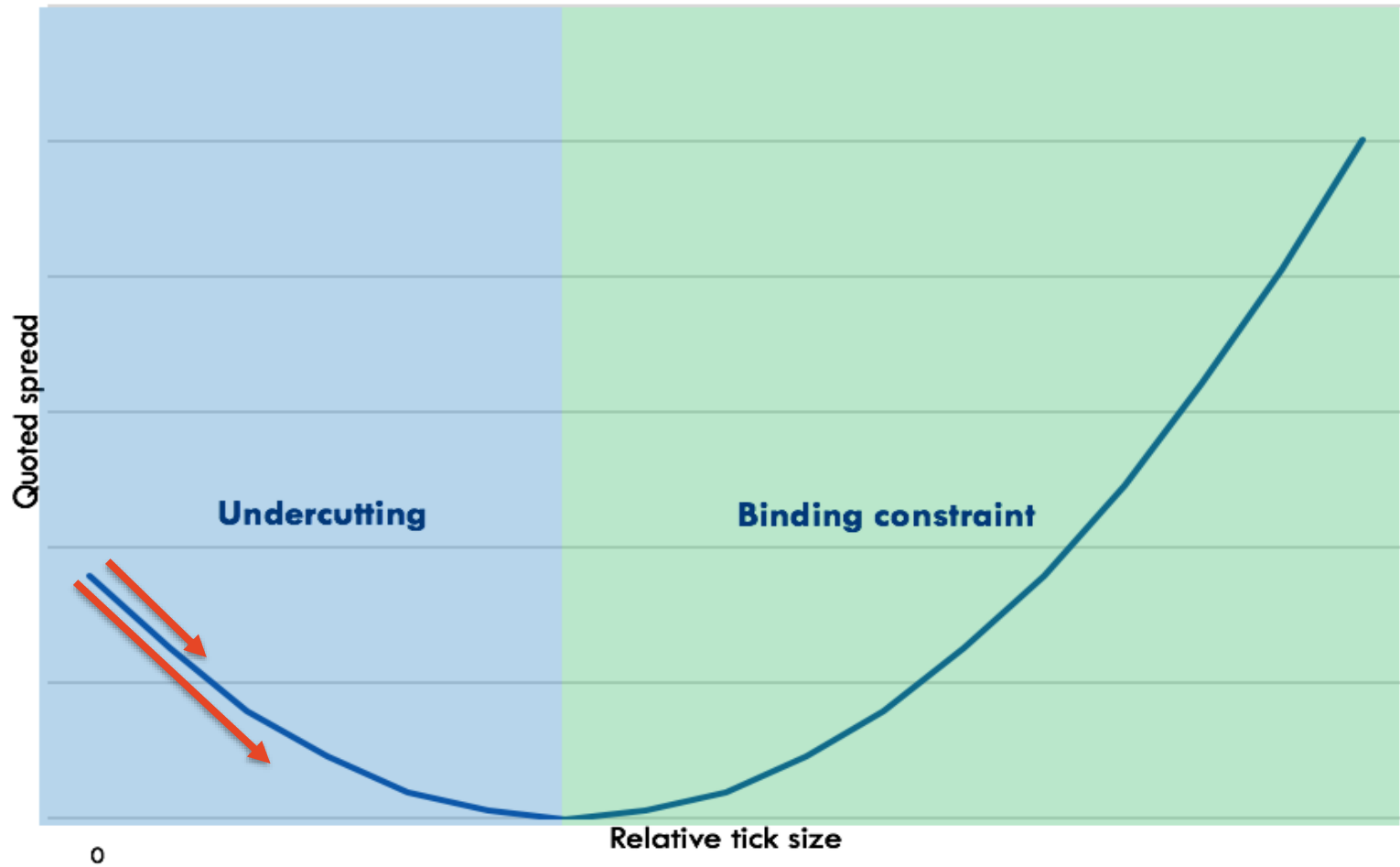
Variable	RelativeTick _{it}	Limit order volume _{it}	Resting limit orders _{it}	Market order volume _{it}	Price steps _{it}
PercentChange _{it}	2.14e-05*** (2.56e-06)				
<i>RelativeTickit</i>		1.030*** (0.333)	0.0428*** (0.00481)	1.709* (0.889)	-0.0163*** (0.00459)
\$Volume _{it}	0.00227 (0.00209)	0.144 (0.126)	0.00243*** (0.000744)	0.361 (0.328)	0.00435*** (0.00159)
Trades _{it}	-0.00207 (0.00122)	-0.0324 (0.0251)	0.000520*** (0.000103)	-0.117 (0.0784)	-0.00237*** (0.000791)
Volatility _{it}	-0.00106 (0.000825)	0.0116*** (0.00449)	0.000130** (6.39e-05)	0.0577*** (0.0140)	0.000755*** (6.93e-05)
Mean Price _{it}	-0.000108 (7.18e-05)	-0.000602 (0.000459)	6.44e-05*** (6.08e-06)	-0.00217 (0.00150)	-3.29e-05 (2.26e-05)
Observations	30,447	30,447	25,065	30,447	30,447
Adjusted R ²	0.470	0.004	0.023	0.009	0.044
Currency pair fixed effects	Yes	Yes	Yes	Yes	Yes
F-statistic	69.70				

Narrower spreads, more depth, less volatility

Variable	Quoted spread _{it}	Effective spread _{it}	Realized spread _{it}	Effective spread \$500	Effective spread \$200K	Depth at best _{it}	Depth at X bps _{it}	Short-term volatility _{it}
<i>RelativeTickit</i>	-12.95*** (1.268)	-10.00*** (1.743)	-11.19*** (2.385)	-16.01*** (2.900)	-2,461*** (630.7)	0.00525 (0.356)	16.59*** (1.231)	-0.249*** (0.0444)
\$Volume _{it}	0.134 (0.165)	0.150 (0.187)	0.165 (0.200)	0.0550 (0.163)	24.89 (21.60)	0.414*** (0.0403)	1.609*** (0.283)	-0.0241* (0.0144)
Trades _{it}	-0.262* (0.134)	-0.302** (0.138)	-0.322** (0.144)	-0.295** (0.150)	-20.15 (12.53)	0.0353* (0.0211)	-0.304*** (0.105)	0.0129* (0.00751)
Volatility _{it}	0.209*** (0.0348)	0.367*** (0.0296)	0.338*** (0.0348)	0.274*** (0.0453)	3.845 (6.421)	-0.0188** (0.00814)	-0.170*** (0.0631)	0.0246*** (0.000993)
Mean Price _{it}	-0.00576 (0.00363)	-0.00480 (0.00348)	-0.00455 (0.00361)	-0.00635 (0.00430)	-1.653*** (0.455)	0.00529*** (0.000933)	0.0212*** (0.00282)	0.000307 (0.000212)
Observations	33,120	30,013	30,013	33,120	33,120	33,120	32,622	33,120
Adjusted R ²	0.213	0.332	0.260	0.207	0.005	0.080	0.007	0.481
Currency pair fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Effect depends on size of shock

	(1) 2SLS	(2) Large relative tick	(3) Small relative tick
<i>Quoted spread (bps)</i>	-12.95*** (1.268)	-12.32*** (0.547)	-4.746*** (0.503)
<i>Effective spread (bps)</i>	-10.00*** (1.743)	-11.58*** (0.759)	-4.351*** (1.326)
Realized spread (bps)	-11.19*** (2.385)	-11.21*** (0.808)	-9.328*** (1.612)
<i>Depth at best (1,000 USD)</i>	0.00525 (0.356)	-0.300*** (0.102)	4.965 (3.038)
<i>Depth at X bps (1,000 USD)</i>	16.59*** (1.231)	8.711* (5.044)	58.37*** (20.49)
<i>Short – term volatility</i>	-0.249*** (0.0444)	-0.0714* (0.0382)	-0.938*** (0.120)
<i>Effective spread \$500 (bps)</i>	-16.01*** (2.900)	-12.84*** (0.609)	-6.412*** (0.586)
<i>Effective spread \$200K (bps)</i>	-2,461*** (630.7)	-644.2*** (44.08)	4,802 (4,868)



Thank you!

Sean Foley

Email: Sean.Foley@Sydney.edu.au

