

Subsidizing Liquidity: The Impact of Make/Take Fees on Market Quality

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Background

- Exchanges have changed over the last two decades.
 - Move from “serving their members” to “normal” for-profit entity (“demutualization”).
 - Move from national monopoly to competition from (1) international cross-listings and (2) alternative trading venues.
- Exchange decisions are increasingly subject to regulatory and public scrutiny.
- Exchange income
 - Listing fees.
 - Data streams & connection fees.
 - Trading fees.

Market Organization

- Most continuous public equity markets are *limit order books*.
- An electronic system collects all orders:
 - **Limit** order: post price and quantity.
 - **Market(able)** order: accept the terms of a previously posted limit order.
- Question: How to get traders to supply liquidity?
- Trading venues' answer: maker-taker trading fees (as defined by the *International Organization of Securities Commissions*):
 - Subsidize producers, or **makers**, of liquidity (**limit** orders)
 - Charge consumers, or **takers**, of liquidity (**market(able)** orders)

Research Question: do maker-taker fees matter?

- Do maker-taker fees affect:
 - trading costs?
 - traders' incentives and behavior?
 - trading volume?
- Which features of the fees should regulators focus on:
 - the fee that is retained by the exchanges ("total fee")?
 - the split of the total fee between makers and takers?
 - the handling of trading fees at the broker level?

Benchmark: No Frictions

- Suppose limit orders become cheaper (rebate) and market orders more expensive. Assume:
 - constant total fee (=taker fee minus maker rebate).
 - no frictions (e.g. no minimum tick size).
- Traders choose between liquidity-taking market orders and liquidity-making limit orders.
 - People submit more limit orders.
 - Execution probability declines.
 - Improve prices to attract market orders.
 - In equilibrium, the maker rebate is competed away.
- This point was formalized in Colliard & Foucault (RFS 2012).

Benchmark: Testable Predictions

Empirical Prediction (Benchmark)

1. *Holding the total exchange fee constant, as the maker rebate increases*
 - 1.1 *the raw bid-ask spread decreases;*
 - 1.2 *the cum fee bid-ask spread (spread plus (twice) the taker fee) is unaffected;*
 - 1.3 *volume is unaffected.*
2. *An increase (decrease) in the total exchange fee leads to an increase (decrease) in the cum fee effective spread.*
3. *Changes in the total exchange fee affect volume and the fraction of orders that are marketable.*

Evidence: Not Everybody Receives Rebates

Interactive Brokers' Webpage



Stocks, ETFs and Warrants / Overview

IB offers two pricing structures, *Flat Rate* and *Cost Plus*, to calculate commissions for stocks and ETFs in the US, Canada, Europe and Hong Kong. Portfolio Margin customers can pre-borrow US stocks for shorting when they join the IB Pre-Borrow program, and can borrow and lend stocks on AQS. Click the Borrow/Lend link above for fee details.

Flat **RATE** ✓

In the *Flat Rate* pricing structure, you will be charged either a fixed amount per share or a set percent of trade value, which includes commissions and all exchange and regulatory fees.

Cost **PLUS** +

In the *Cost Plus* pricing structure, you will be charged a fixed IB fee, based on volume, that does not include exchange, regulatory or other third-party fees. You will be charged separate fees that are intended to approximate the costs incurred by IB from exchanges, regulators or other third parties to execute your order.

Maker-Taker Fees and Flat Commissions

- When some traders do not get the rebate directly (they pay a flat commission), the relative incentives change.
 - Those who receive rebates compete and tighten spreads.
 - Market orders get more attractive to flat-commission payees.
- This point was formalized by Brolley & Malinova (2013).

Flat Commissions: Testable Predictions I

Empirical Prediction (Flat Commissions)

For a constant total fee, in the presence of flat commissions, as the maker rebate increases,

- 1. the raw bid-ask spread declines, the price impact of trades declines, and the cum fee bid-ask spread declines for the group of traders paying flat commissions;*
- 2. as the raw bid-ask spread declines, traders who pay flat commissions submit relatively more market orders than limit orders.*

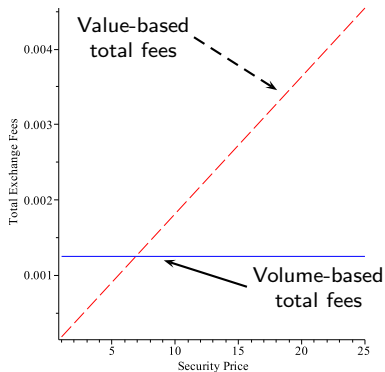
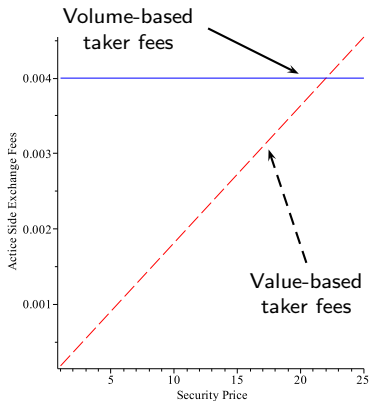
Flat Commissions: Testable Predictions II

- Intuition for information content:
 - maker rebate → spreads decline.
 - → marker order more attractive than limit order.
 - → marginal limit order submitter switches to market order.
 - limit order submitters are less-well informed than market order submitters.
 - → average info content of market order declines.
 - → price impact declines.

Empirical Identification Strategy: The TSX Experiment

- Oct 01 2005: TSX introduced maker rebates for a subset of stocks.
- Trading fee change details:
 - Prior to Oct 01 2005: value-based system.
 - Maker: no charge or rebate.
 - Taker pays a fee of $\frac{1}{50} \times 1\% \times \-volume .
 - After Oct 01 2005: make/take volume-based system for the pilot group.
 - Maker receives a **rebate** of .275 cents per share.
 - Taker pays a fee .4 cents per share.
- Non-pilot stocks remain under the value-based system but the taker fee declined to $\frac{1}{55} \times 1\% \times \-volume on Oct 01, 2005.

TSX Experiment: Per Share Costs Illustrated



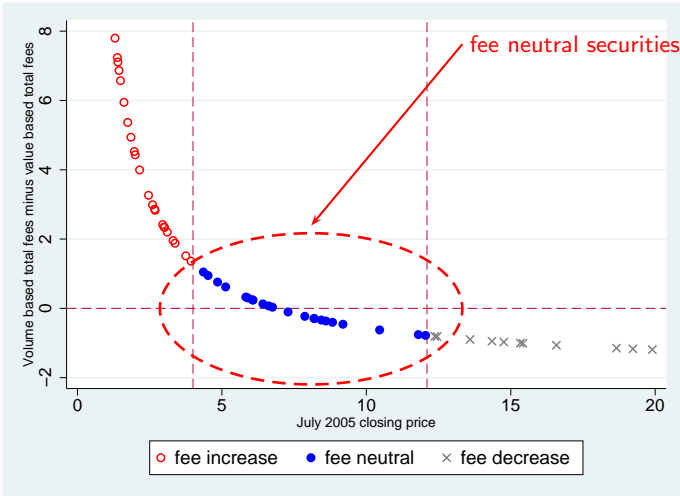
Value-based taker fee = $\text{price} \times \frac{1}{55} \times 1\%$
 Volume-based taker fee = \$0.004

Value-based total fee = taker - maker = $\text{price} \times \left(\frac{1}{55} \times 1\% - 0 \right)$
 Volume-based total fee = taker - maker = \$0.004 - \$0.00275

Observations and Identification Strategy

1. From theory: must distinguish the impact of the total fee from that of the split into maker rebate and taker fee.
 - To study the change in the split, fix total fee.
2. From graph: total fee and its split both change, but ↗ for some securities and ↘ for others.
 - identify *fee-neutral securities*: small total fee change.

Isolating the Impact of the Maker-Taker Split vs. Total Fee



Field Experiment

The Good, The Bad ... and the not so Ugly

- The Good:
 1. TSX is a monopolist on equity trading in Canada (→ no fragmentation or strategic routing effects).
 2. TSX introduced rebates only for a subset of companies.
 3. Heterogeneity w.r.t. the total fee and the make/take breakdown.
- The Bad: the subset is *not* random (NASDAQ and AMEX cross-listed).
 1. Cross-listed companies may be more affected by U.S. market fluctuations.
 2. Trading in cross-listed companies is more competitive than in an average TSX company.
- Why not Ugly?
 - A very detailed proprietary dataset:
→ use competition as a control group selection criterium.

Data and Methodology

Matched Sample Selection

- Compare NASDAQ/AMEX to those that are most comparable, based on (see also Davies and Kim (JFM 2009)):
 - price.
 - marketcap.
 - competition for liquidity provision
(measured by the Herfindahl Index (HHI) at the broker level).
- 65 NASDAQ/AMEX interlisted (new make/take fees) and 180 NYSE-interlisted/TSX only.
- For each NASDAQ/AMEX company find unique best match.

Who pays flat commissions?

- Empirical Prediction 2 relies on behavior of traders who pay flat commissions.
- Who are they? → Example: *Retail*.
- Data contains identifiers for trading desks (loosely).
- → Identify those that handle retail orders.
- Classify as retail if:
 - (High) fraction of oddlot trades ($> 1\%$ of transactions).
 - (Low) fraction of short-selling ($< 10\%$ of selling volume).
- Facts:
 - Classify 337 of 2,833 traders as retail.
 - Retail trade 56/44% of volume with market/limit orders.
 - Non-retail trades move prices 2.3 times more than retail.

Regression Specification

$$\begin{aligned}\Delta DV_{it} = & \alpha_1 \text{fee down}_i + \alpha_2 \text{fee neutral}_i \\ & + \text{event}_t \times (\beta_1 \text{fee down}_i + \beta_2 \text{fee neutral}_i + \beta_3 \text{fee up}_i) \\ & + \gamma \text{VIX}_t + \delta X_i + \zeta + \epsilon_{it}\end{aligned}$$

- ΔDV_{it} is the daily realization for cross-listed minus realization for the control.
- event_t is a dummy=1 after Oct 01, 0 before.
- VIX_t CBOE's volatility index for day t .
- X_i a vector of stock-level controls: log market cap, log price, share turnover, return volatility, HHI liquidity provision.
- fee down_i , fee neutral_i , and fee up_i are dummies for when security i 's total fee decreased, was neutral or increased.
- ζ are stock fixed effects.
- Sample horizon: ± 2 months around October 1, 2005.

Do posted quotes react to changes in maker-taker fees?

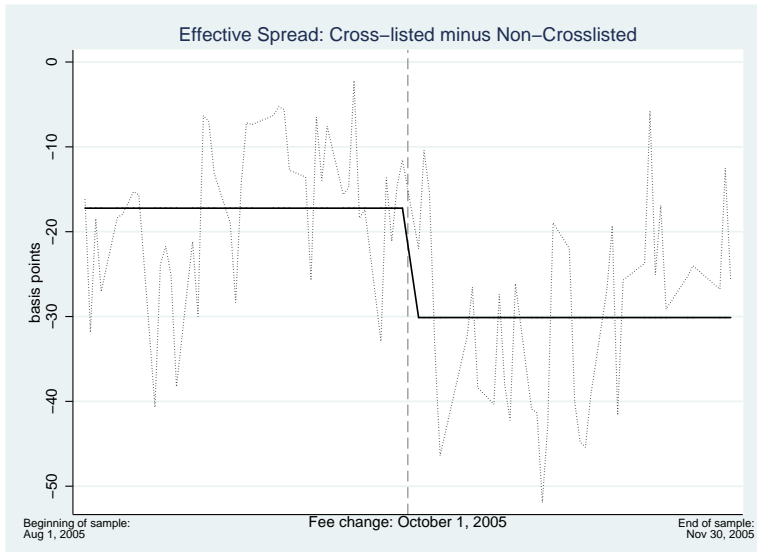
- Empirical Prediction 1.1: The raw bid-ask spread declines.
- Measure: effective spread

$$espread_{it} = 2q_{it}(p_{it} - m_{it})/m_{it} \quad (1)$$

- p_{it} = transaction price for security i at t .
- m_{it} = midpoint of the prevailing bid-ask spread at the time of the trade.
- q_{it} = buy (= 1) and sell (= -1) indicator.

Do posted quotes react to changes in maker-taker fees?

Results



Do posted quotes react to changes in maker-taker fees?

Results

| Dependent Variable | effective spread | | effective spread plus 2×taker fee | |
|---------------------------------|---------------------|---------------------|-----------------------------------|-----------------|
| | No | Yes | No | Yes |
| Stock fixed effects | | | | |
| $event_t \times fee\ down_i$ | -1.76 (2.10) | -1.77 (2.27) | -1.79 (2.14) | -1.80 (2.32) |
| $event_t \times fee\ neutral_i$ | -11.03** (5.17) | -11.04** (5.34) | -1.45 (5.57) | -1.46 (5.74) |
| $event_t \times fee\ up_i$ | -18.95*** (7.08) | -19.03*** (7.27) | 13.30 (8.15) | 13.21 (8.31) |
| Observations | 5,199 | 5,199 | 5,199 | 5,199 |
| Adjusted R-squared | 0.041 | 0.324 | 0.012 | 0.308 |
| $fee\ down \neq fee\ up$ | Yes** | Yes** | Yes* | Yes* |
| $fee\ down \neq fee\ neutral$ | Yes* | | | |
| $fee\ up \neq fee\ neutral$ | | | | |

Do posted quotes react to changes in maker-taker fees?

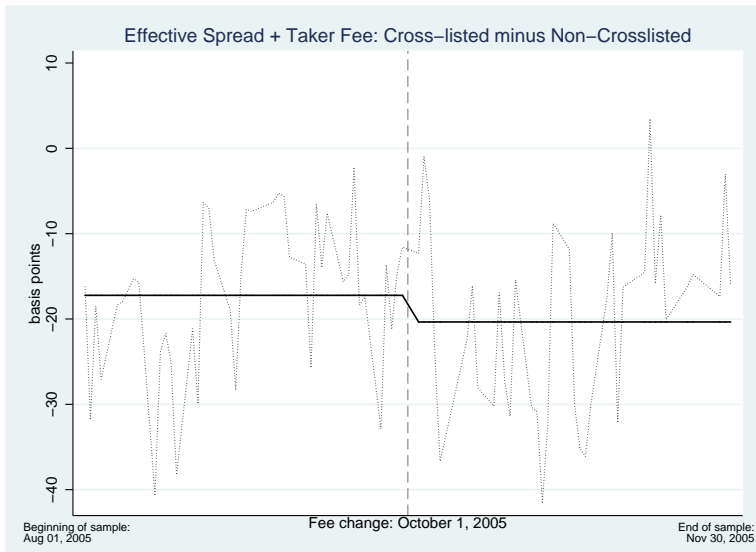
- Empirical Prediction 1.1b: The cum-fee spread is unaffected for fee-neutral securities.
- Empirical Prediction 1.2: The cum-fee spread increases for securities with increased total fees.
- Measure: effective spread plus (twice) taker fee

$$\text{cum fee espread}_{it} = 2q_{it}(p_{it} - m_{it})/m_{it} + 2 \times \text{taker fee}_{it} \quad (2)$$

- taker fee_{it} is
 - Before Oct 1: 2 bps.
 - After Oct 1: 1.81 bps for control group securities and $\$0.004/m_{ti}$ for cross-listed securities.

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Are there changes in volume?

- Empirical Prediction 1.1c: Volume is unaffected.
- Empirical Prediction 1.3: Changes in the total exchange fee affect volume and the fraction of orders that are marketable.
- Measures:
 1. log dollar volume.
 2. number of transactions.
 3. fill rate = number of market orders as a fraction of the sum of market and limit orders.

Volume, Transactions, and Fill Rates

| Dependent Variable | <u>log dollar volume</u> | | <u>transactions</u> | | <u>fill rate</u> | |
|---------------------------------|--------------------------|-----------------|---------------------|-------------------|-------------------|-------------------|
| | No | Yes | No | Yes | No | Yes |
| Stock fixed effects | | | | | | |
| $event_t \times fee\ down_i$ | 0.05 (0.10) | 0.05 (0.11) | 43.15 (38.03) | 43.15 (43.35) | 2.58*** (0.84) | 2.58*** (0.87) |
| $event_t \times fee\ neutral_i$ | 0.32* (0.18) | 0.32* (0.18) | 55.87* (29.76) | 55.87* (30.26) | 1.37** (0.64) | 1.37** (0.67) |
| $event_t \times fee\ up_i$ | 0.26* (0.15) | 0.26 (0.16) | 83.15* (47.40) | 83.15* (50.03) | -2.08** (0.90) | -2.08** (0.94) |
| Observations | 5,199 | 5,199 | 5,200 | 5,200 | 5,200 | 5,200 |
| Adjusted R-squared | 0.089 | 0.510 | 0.048 | 0.499 | 0.174 | 0.464 |
| $fee\ down \neq fee\ up$ | | | | | Yes*** | Yes*** |
| $fee\ down \neq fee\ neutral$ | | | | | | |
| $fee\ up \neq fee\ neutral$ | | | | | Yes*** | Yes*** |

The Information Content of Trades

- Empirical Prediction 2.1: The information content of trades will decline as the maker rebate increases.
- Measure: the price impact = signed change in the midpoint from just before the transaction to five minutes after the transaction.
- For trade at time t in security i

$$\text{price impact}_{it} = 2q_{it}(m_{i,t+5 \text{ min}} - m_{it})/m_{it}.$$

The Information Content of Trades: Results

| Dependent Variable | 5-minute price impact | |
|---------------------------------|-----------------------|--------------------|
| | No | Yes |
| Stock fixed effects | No | Yes |
| $event_t \times fee\ down_i$ | -1.68 (1.67) | -1.68 (1.71) |
| $event_t \times fee\ neutral_i$ | -11.14** (4.86) | -11.14** (4.94) |
| $event_t \times fee\ up_i$ | -9.05* (5.19) | -9.11* (5.27) |
| Observations | 5,199 | |
| Adjusted R-squared | 0.013 | 0.101 |
| $fee\ down \neq fee\ up$ | | |
| $fee\ down \neq fee\ neutral$ | Yes* | Yes* |
| $fee\ up \neq fee\ neutral$ | | |

Maker-Taker Fees and Retail Traders

Choice of Market vs. Limit Order

- Empirical Prediction 2.2: Retail traders (who are presumed to pay flat commissions) switch from market to limit orders.
- Measures
 1. % orders that are non-marketable limit orders.
 2. % traded volume that stems from executions of passive limit orders.
 3. the log dollar-volume of marketable orders.

Maker-Taker Fees and Retail Traders

Choice of Market vs. Limit Order: Results

| Dependent Variable | % limit orders | | % passive | | log aggressive dollar volume | |
|--|--------------------|--------------------|--------------------|-------------------|------------------------------|------------------|
| | No | Yes | No | Yes | No | Yes |
| Stock fixed effects | | | | | | |
| $event_t \times fee\ down_i \times retail_{it}$ | -2.52** (1.25) | -2.52* (1.34) | -0.42 (0.57) | -0.41 (0.67) | -0.03 (0.08) | -0.03 (0.10) |
| $event_t \times fee\ down_i \times non-retail_{it}$ | -3.29*** (1.01) | -1.51*** (0.57) | 1.53** (0.78) | 0.76* (0.45) | 0.02 (0.18) | 0.01 (0.13) |
| $event_t \times fee\ neutral_i \times retail_{it}$ | -2.44** (0.97) | -2.44** (1.03) | -2.33*** (0.89) | -2.33** (0.92) | 0.31** (0.16) | 0.30* (0.16) |
| $event_t \times fee\ neutral_i \times non-retail_{it}$ | 0.58 (1.02) | -0.98 (0.80) | 0.37 (1.06) | 0.92 (0.61) | 0.12 (0.27) | 0.37* (0.21) |
| $event_t \times fee\ up_i \times retail_{it}$ | -0.86 (0.85) | -0.86 (0.88) | -2.36** (1.00) | -2.36** (1.05) | 0.32** (0.13) | 0.32** (0.14) |
| $event_t \times fee\ up_i \times non-retail_{it}$ | 2.38* (1.25) | 2.33** (1.05) | 0.23 (1.00) | 0.38 (0.71) | 0.53** (0.26) | 0.30 (0.19) |
| Observations | 10,399 | 10,399 | 10,391 | 10,391 | 10,367 | 10,367 |
| Adjusted R-squared | 0.130 | 0.36 | 0.177 | 0.287 | 0.096 | 0.499 |
| <i>fee down: retail ≠ non-retail</i> | Yes** | | Yes* | Yes** | | |
| <i>fee neutral: retail ≠ non-retail</i> | Yes** | Yes** | Yes* | Yes* | | |
| <i>fee up: retail ≠ non-retail</i> | | | | | | |

Maker-Taker Fees and Retail Traders

Trading Cost Changes

- Retail traders use market orders more frequently.
- → Retail traders' ex-post transaction costs may change.
- Measure:
 - “the cum fee total cost” .
 - = volume-weighted difference of the cum fee effective spread paid (for market orders) and the cum fee realized spread received (for limit orders).

Maker-Taker Fees and Retail Traders

Trading Cost Changes: Results

| Dependent Variable | cum fee total costs | |
|--|------------------------|-------------------|
| | No | Yes |
| Stock fixed effects | | |
| $event_t \times fee\ down_i \times retail_{it}$ | -1.60 (1.21) | -1.61 (1.22) |
| $event_t \times fee\ down_i \times non-retail_{it}$ | -1.09 (0.98) | -1.45** (0.73) |
| $event_t \times fee\ neutral_i \times retail_{it}$ | -4.02 (2.57) | -4.01 (2.59) |
| $event_t \times fee\ neutral_i \times non-retail_{it}$ | -1.42 (1.68) | -0.62 (1.13) |
| $event_t \times fee\ up_i \times retail_{it}$ | 1.33 (2.81) | 1.33 (2.83) |
| $event_t \times fee\ up_i \times non-retail_{it}$ | 1.16 (1.92) | 0.68 (2.06) |
| Observations | 10,391 | 10,391 |
| Adjusted R-squared | 0.012 | 0.082 |
| <i>fee down: retail ≠ non-retail</i> | | |
| <i>fee neutral: retail ≠ non-retail</i> | | |
| <i>fee up: retail ≠ non-retail</i> | | |

Summary of Findings I

- Theory (and first principles) predict that the split of the total exchange fee into taker fee and maker rebate should be irrelevant (see, e.g., Colliard and Foucault (RFS 2012)).
- Empirical identification strategy to assess the impact of the split: a major fee change on the TSX.
- We find (as predicted):
 - Bid-ask spreads react to neutralize the maker-taker split.

Summary of Findings II

- However, we also identify behavioral changes:
 - (Weak) increase in volume and proportion of limit orders that trade.
 - Information content of trades declines.
 - Retail traders, who are presumed to be unaffected by maker-taker fees due to flat commissions, trade more with market orders.

Key Take-Home Message and Policy Implication

- Holding the total fee constant, the *breakdown* of fees into maker-taker fees does not matter for liquidity but the *total fee* matters.
- To interpret the effects of maker-taker pricing, it is important to understand how brokers adjust their pricing subsequent to changes in maker-taker fees.
- Regulators should thus focus their attention on the total fee charged by the trading venues, on broker commissions, and on the impact of maker-taker fees on these commissions.