

Do regulatory hurdles work?

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The paper

Drivers of regulatory inventions

- ▶ **Traditional, public choice:** regulatory intervention is justified to solve market failures:

1. Market power
2. Public goods
3. Externality
4. Asymmetric information

- Proposed intervention should address the market failure appropriately;
- Costs are outweighed by gains.

- ▶ **Recently, securities markets:** interventions to address public interest concerns.

For example: Concerns about “excessive” trading activity on securities markets.

- ▶ **But** interventions can have unintended consequences.

Examples: transactions taxes impact on the competitiveness of the domestic securities markets;

(From India), the Andhra Pradesh ban on micro-finance in 2010 which caused a persistent drop in average household consumption (Sane and Thomas, 2016).

This paper

- ▶ Examine the effect of a regulatory intervention in securities markets.
- ▶ **The intervention:** Charge fees/penalise traders with high orders to trades (OTR) ratio.
- ▶ **The question:**
 1. Was there a stated market failure?
 2. Was there a stated target outcome?
 3. Did the intervention achieve the target outcome?
 4. Did the intervention address the market failure?
 5. Did the intervention have unintended consequences?
- ▶ Unique about India: same intervention – OTR fee, same target market, multiple events (Event 1, Event 2) by different regulatory agencies.

What the paper finds

1. Was there a stated market failure?

Ans: Market power?

2. Was there a stated target outcome?

Ans: There was no stated target outcome in either event. We infer the expected target outcome to be *lower* OTR.

3. Did the intervention achieve the target outcome?

Ans: The Event 1 fee *lowered* OTR.
The Event 2 fee left OTR *unchanged*.

4. Did the intervention address the market failure?

Ans: Unclear (no stated market failure).

5. Did the intervention have unintended consequences?

Ans: The Event 1 fee *improved* market liquidity and *lowered* liquidity risk.
The Event 2 fee had no impact on and *decreased* liquidity risk.

The research context

OTR fee: The rationale

- ▶ **Intended target outcome:** Reduce the high levels of OTR.
- ▶ Market power in placing orders in securities markets leads to:
 1. Increased load on trading infrastructure.
In India, load on clearing infrastructure and possible systemic effects (example: Emkay fat-finger trade on Nifty, 2012)
 2. Orders without trade can be unproductive:
 - 2.1 Increase latency in order placement and execution for the overall market;
 - 2.2 Spoof information about prices and trading intentions.
- ▶ **Solution:** Impose a fee if the $OTR > \text{threshold}$.
- ▶ **Outcome:** Higher costs on order placement → lower number of orders.
- ▶ **Unexpected outcome:** Higher cost → lower liquidity provisioning.
- ▶ Answer to how the OTR fee impacts the market is complicated.

Behavioural links

- ▶ Transactions fees: disincentivise hurt “excessive” trading.
- ▶ OTR fee: disincentivise “unproductive” trading.
- ▶ Target audience → uninformed (algorithmic) traders.

Behavioural links

- ▶ Transactions fees: disincentivise hurt “excessive” trading.
- ▶ OTR fee: disincentivise “unproductive” trading.
- ▶ Target audience → uninformed (algorithmic) traders.
- ▶ Possible unintended consequences if interventions are successful?
 - ▶ “Informed” traders use algorithms to minimise liquidity risk.
→ Such traders will earn less when trading information.
 - ▶ “Uninformed” algorithmic traders are constantly seeking and snuffing out arbitrage flaws in market prices.
→ Such traders will earn less when trading information.

Both the above consequences can lead to lower market efficiency.

Empirical impact analysis

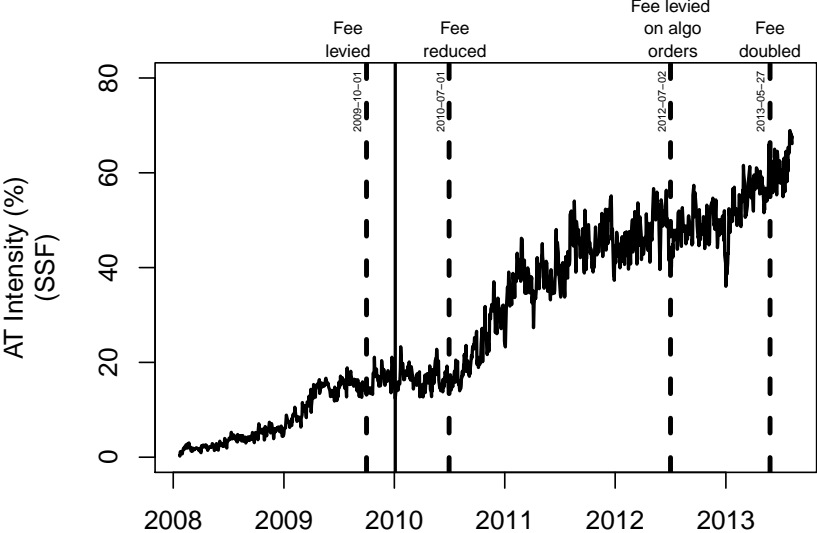
- ▶ International exchanges who implemented the fee: NASDAQ, NYSE, Euronext, OSE, Borsa Italiana, TSX.
- ▶ Objective: public interest concerns rather than observed market failure.
- ▶ Literature: Capelle-Blancard, 2017 (in Journal of International Financial Markets, Institutions and Money); Jorgensen et al, 2017 (in Journal of Financial Markets); Friederich and Payne, 2015 (in Journal of Banking & Finance).

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- ▶ Literature: Capelle-Blancard, 2017 (in Journal of International Financial Markets, Institutions and Money); Jorgensen et al, 2017 (in Journal of Financial Markets); Friederich and Payne, 2015 (in Journal of Banking & Finance).
- ▶ Summary: mixed results; Canadian study suggested that the rationale for the intervention matters.
- ▶ Research opportunity in India about whether the objectives matter.
- ▶ Two implementations with different rationale.
 1. NSE charged OTR fee in 2009 to reduce load on its infrastructure. (Reduced a year later, in 2010.)
 2. SEBI forced a fee in 2012 to address public interest concerns.
- ▶ Also: emerging economy effects due to different standards of regulatory enforcement and governance.

The Indian context

Growth of algorithmic trading in India and the interventions



Fee implementation

- ▶ **2009-10:** Fee applied uniformly across **all** market participants and order types.
- ▶ **2012-13:** Fee applicable on **algo** orders only on all order types with the following exemptions:
 1. Orders within +/-1% LTP price limits not included.
 2. Members covered under the LES excluded.
 3. Additional penalty of no trading in the first 15 minutes on the next trading day if OTR > 500.
- ▶ Fee computed at a member level on a daily basis.
- ▶ Fee **only** on derivatives.

Data

- ▶ **Focus:** 1st and the 3rd event
- ▶ Methodology: Event study, difference-in-difference regressions.
- ▶ Event window: Three months around implementation.
- ▶ Dates:
 1. Event 1: Imposition of OTR fee by NSE on Oct 1, 2009.
 - a) Pre event: Jul - Sep 2009
 - b) Post event: Oct - Dec 2009
 2. Event 2: Fee hike on SEBI direction on July 2, 2012
 - a) Pre event: Apr - Jun 2012
 - b) Post event: Jul - Sep 2012
- ▶ Sample: All securities traded on NSE equity segment; Near month single stock futures.
- ▶ Data type and frequency: Tick by tick orders and trades data, with flags identifying if an order or a trade is AT or non AT, and trader category.
Flag on type of order event: entry, modification or cancellation.

Endogeneity issue?

- ▶ In both the events, the fee **only** implemented on the derivatives segment.
- ▶ Use cash market as control? **Perhaps not.**
- ▶ Impact likely on cash market after the fee imposition:
 1. Higher cost of trading on derivatives turns traders to the cash market (Brunnermeier and Pederson, 2009).
Higher trading on the cash markets?
 2. Both markets connected by the force of arbitrage.
Reduced trading on cash market?
- ▶ Need a different set of controls.
Our candidate: underlying stocks as treated and matched stocks (equity spot) as controls.
- ▶ Difference-in-difference regressions on both sets of treated-control samples: coefficients should tell the same story.

Research design we use

Identification strategy

- ▶ NSE's eligibility criteria for selection of securities for derivatives trading:
 1. Stock should be in the top 500 stocks in terms of average **daily market capitalisation** and **average daily traded value** in the previous six months on a rolling basis.
 2. The stock's median quarter-sigma **order size** over the last six months shall be not less than Rs. 10 lakhs.
 3. The **market wide position limit** (determined by number of shares held by non-promoters) in the stock shall not be less than Rs. 300 crores.
- ▶ Some stocks will not meet the above criteria around the thresholds and become “non-derivative” stocks.
- ▶ We exploit this setting, and match non-derivative stocks with derivative stocks for each event.

Obtaining the set of matched firms

- ▶ Define
 - ▶ **'Treated'**: “derivative” stocks with derivatives trading within the event window.
 - ▶ **'Control'**: “non-derivative” stocks, without derivatives trading.
 - ▶ *Leave out* the firms that got **excluded** from derivatives trading within the event window.
- ▶ Match stocks using data **before** the fee implementation,
 - ▶ **Distance** measure: Propensity score.
 - ▶ **Covariates**: market cap, price, turnover, number of trades and percentage of floating stock.
 - ▶ One-to-one matching on estimated propensity scores using the nearest neighbor algorithm (without replacement), and a caliper of 0.05.

Impact evaluation: Difference-in-Differences regression framework

- ▶ Use the treated and control (matched) stocks and estimate the following regression:

$$\begin{aligned} \text{MEASURE}_{i,t} = & \alpha + \beta_1 \times \text{TREATED}_i + \beta_2 \times \text{FEEDUMMY}_t + \\ & \beta_3 \times \text{TREATED}_i \times \text{FEEDUMMY}_t + \\ & \beta_4 \times \text{MCAP}_{i,t} + \beta_5 \times \text{INVERSE-PRICE}_{i,t} + \\ & \beta_6 \times \text{NIFTY-VOL}_t + \epsilon_{i,t} \end{aligned}$$

- ▶ Measure \in (OTR-measure, market quality measures).
- ▶ **Hypothesis:** If the event did not have any impact on the level of OTR or market quality, $\beta_3 = 0$.

Regression details

- ▶ To determine the impact on futures market:
 - ▶ DiD regression using matched treated stocks data on futures market and matched control on cash market.
- ▶ To determine the impact on cash market: DiD regression using cash market data for matched treated and matched controls.

Measurement

OTR measures

- ▶ At an order level for each stock, compute
 1. $OTR = \text{Number of orders events} / (1 + \text{Number of trades})$
 2. $OTR \text{ intensity} = OTR / (\text{Average time between modifications})$

This is the value weighted average OTR for the day.

- ▶ At the level of each stock: Total number of messages on a stock to total number of trades on the stock within a day.

Market quality measures

- ▶ Liquidity:

Qspread, Impact cost (at two different sizes), Depth (in INR) at the best price and at the top five, Amihud's illiquidity measure.

- ▶ Efficiency:

Variance ratio (ten minutes to five minutes), returns volatility, impact cost volatility (at two different sizes).

Results

Event 1: DiD regression

$$\begin{aligned} \text{OTR}_{i,t} = & \alpha + \beta_1 \times \text{TREATED}_i + \beta_2 \times \text{FEE}_t + \\ & \beta_3 \times \text{TREATED}_i \times \text{FEE}_t + \\ & \beta_4 \times \text{MCAP}_{i,t} + \beta_5 \times \text{INVERSE-PRICE}_{i,t} + \\ & \beta_6 \times \text{NIFTY-VOL}_t + \epsilon_{i,t} \end{aligned}$$

Impact on OTR

	Event 1		Event 2	
	Treated SSF- Control Spot	Treated Spot- Control Spot	Treated SSF- Control Spot	Treated Spot- Control Spot
Fee	-0.422** (-2.087)	0.037 (1.711)	2.875** (3.188)	1.471** (3.315)
Treated	22.362** (15.115)	0.236** (3.878)	60.69** (8.685)	1.307 (0.854)
Treated \times Fee	-3.453** (-3.191)	0.325** (5.613)	7.41 (0.631)	4.419 (1.487)
Adjusted R ²	0.65	0.34	0.26	0.13
# of obs	6060	6715	7485	9515

OTR fee impact across trader classes, Event 1

NINP = retail; INST = institutional; PROP = proprietary

	Treated(SSF)-Control(Spot)			Treated(Spot)-Control(Spot)		
	OTR _{NINP}	OTR _{INST}	OTR _{PROP}	OTR _{NINP}	OTR _{INST}	OTR _{PROP}
Fee	-0.157 (-0.866)	0.091 (1.198)	-0.683 (-1.37)	0.038** (1.983)	0.028 (0.68)	0 (0)
Treated	16.355** (13.095)	3.972** (9.649)	39.261** (12.503)	0.208** (3.342)	-0.07 (-0.93)	0.08 (0.327)
Treated×Fee	-4.149** (-4.423)	-0.673 (-1.677)	-1.904 (-0.746)	0.131** (3.725)	-0.066 (-1.265)	0.894** (4.888)
Adjusted R ²	0.53	0.18	0.54	0.18	0.03	0.26
Treated	39	39	39	39	39	39
Control	39	39	39	39	39	39
# of obs	6060	5253	6060	6715	6194	6715

Market quality

DiD on market quality

$$\begin{aligned} \text{MARKET QUALITY}_{i,t} = & \alpha + \beta_1 \times \text{TREATED}_i + \beta_2 \times \text{FEE}_t + \\ & \beta_3 \times \text{TREATED}_i \times \text{FEE}_t + \\ & \beta_4 \times \text{MCAP}_{i,t} + \beta_5 \times \text{INVERSE-PRICE}_{i,t} + \\ & \beta_6 \times \text{NIFTY-VOL}_t + \epsilon_{i,t} \end{aligned}$$

Impact on liquidity, Event 1

	QSPREAD	IC _{250k}	IC _{500k}	IC _{1000k}	TOP1DEPTH	TOP5DEPTH	TOP7DEPTH	TOP10DEPTH	ILLIQ
Panel A: Treated SSF - Control spot									
Fee	0.006 (1.906)	-0.014 (-1.936)	-0.016 (-1.762)	0 (0)	0.029 (0.815)	0.043 (1.156)	0.047 (1.261)	0.04 (1.064)	-0.235 (-0.576)
Treated	0.131** (9.475)	-0.025 (-1.19)	-0.043 (-1.786)	0.027 (1.047)	1.902** (19.112)	1.692** (18.833)	1.675** (18.767)	1.665** (18.808)	-1.22 (-1.487)
Treated×Fee	-0.06** (-6.799)	-0.032** (-2.713)	-0.047** (-3.411)	-0.103** (-5.785)	0.131** (2.529)	0.145** (2.587)	0.138** (2.486)	0.136** (2.507)	-1.178** (-2.078)
Adjusted R ²	0.46	0.18	0.19	0.17	0.83	0.81	0.8	0.8	0.06
# of obs	6060	6058	6037	5740	6060	6060	6060	6060	6060
Panel B: Treated Spot - Control spot									
Fee	-0.003 (-1.026)	-0.017** (-2.216)	-0.018** (-1.963)	-0.006 (-0.551)	-0.018 (-0.544)	0.01 (0.265)	0.014 (0.367)	0.005 (0.133)	-0.302 (-0.741)
Treated	-0.012 (-1.896)	-0.065** (-3.506)	-0.072** (-3.305)	-0.042** (-2.063)	0.379** (4.36)	0.394** (4.663)	0.354** (4.161)	0.31** (3.626)	-2.097** (-2.795)
Treated×Fee	0.002 (0.704)	0.009 (0.935)	0.006 (0.525)	-0.008 (-0.616)	0.192** (3.899)	0.184** (3.502)	0.192** (3.52)	0.208** (3.714)	0.358 (0.742)
Adjusted R ²	0.1	0.21	0.19	0.16	0.48	0.49	0.46	0.43	0.06
# of obs	6715	6713	6692	6379	6715	6715	6715	6715	6715

Impact on liquidity, Event 2

	QSPREAD	IC _{250k}	IC _{500k}	IC _{1000k}	TOP1DEPTH	TOP5DEPTH	TOP7DEPTH	TOP10DEPTH	ILLIQ
Panel A: Treated (SSF) - Control (Spot)									
Fee	-0.007** (-2.811)	-0.031** (-4.066)	-0.036** (-3.826)	-0.028** (-2.169)	0.086 (1.764)	0.104 (1.881)	0.113** (2.052)	0.118** (2.209)	-0.964** (-2.656)
Treated	0.108** (8.697)	-0.038** (-2.22)	-0.046** (-2.004)	0.025 (0.704)	2.124** (16.782)	1.802** (14.23)	1.76** (13.788)	1.752** (13.816)	-1.755** (-2.626)
Treated×Fee	-0.039** (-3.202)	-0.007 (-0.46)	-0.015 (-0.762)	-0.058 (-1.927)	0.094 (1.042)	0.136 (1.398)	0.122 (1.249)	0.101 (1.053)	0.092 (0.159)
Adjusted R ²	0.56	0.32	0.3	0.34	0.76	0.67	0.65	0.65	0.11
# of obs.	7485	7482	7408	6442	7485	7485	7485	7485	7485
Panel B: Treated (Spot) - Control (Spot)									
Fee	-0.006** (-2.602)	-0.027** (-3.534)	-0.031** (-3.29)	-0.022 (-1.656)	0.08 (1.595)	0.101 (1.801)	0.111** (1.985)	0.118** (2.167)	-0.96** (-2.637)
Treated	-0.001 (-0.18)	-0.015 (-0.879)	0.003 (0.132)	0.082** (2.23)	0.32** (3.033)	0.338** (3.057)	0.337** (2.989)	0.353** (3.084)	-0.565 (-0.835)
Treated×Fee	-0.004 (-1.285)	-0.016 (-1.382)	-0.028 (-1.876)	-0.056** (-2.054)	0.193** (2.173)	0.18 (1.867)	0.186 (1.929)	0.188** (1.963)	-0.237 (-0.498)
Adjusted R ²	0.67	0.34	0.33	0.12	0.45	0.35	0.33	0.31	0.13
# of obs.	9515	9512	9435	8304	9515	9515	9515	9515	9515

Thank you

Comments / Questions?

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