Impact of Securities Transactions Tax on Stock Markets and Market Participants

Evidence From India

Deepak Agrawal[1] K. R. Subramanyam[2] Prasanna Tantri[1] Ramabhadran S. Thirumalai[1]

[1]Indian School of Business

[2]University of Southern California

IGIDR Financial Markets

Motivation

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- Tobin (1978) first proposed a securities transaction tax (STT) to prevent excessive speculation in foreign exchange markets
- This led to the debate as to what types of traders an STT would impact

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- **Proponents:** Would impact noise traders and have negligible impact on informed investors
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- **Proponents:** Would impact noise traders and have negligible impact on informed investors
  - Would improve price efficiency and reduce volatility
  - e.g., Stiglitz (1989) and Summers and Summers (1989)
- **Opponents:** Would impact all categories of traders
  - Would worsen liquidity and price efficiency and increase volatility
  - e.g., Amihud and Mendelson (1992)

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No direct real-world evidence of impact of STT on trader types

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- Schwert and Seguin (1993) examine the impact of STT on stock characteristics like liquidity and efficiency and infer the type of traders it will impact most
  - But contrary views of whether noise traders are good or bad for liquidity and efficiency [e.g., Black (1986), De Long, Shleifer, Summers, and Waldmann (1990), Shleifer and Summers (1990)]
- Bloomfield, O'Hara, and Saar (2009), in an experimental setting, show that an STT reduces both noise as well as informed trading

Motivation

- Umlauf (1993) examines the imposition of STT in Sweden
  - STT imposed for political reasons rather than to alter stock market behavior
  - Finds that volatility did not decline but stock prices and turnover did
  - Trading activity migrated to London
- Becchetti et al. (2014) find that STT reduces volumes and volatility but liquidity and prices are unaffected

Our setting

- STT imposed by the Indian government in July 2004 for both equity as well as derivatives markets (effective October 2004)
- Different levels of STT for equities and derivatives market
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  - STT for equity is an order of magnitude greater than that for derivatives
- The National Stock Exchange of India (NSE) has provided proprietary data at a stock–trader category level on a daily basis for equity as well as derivatives markets

Research questions

- Which categories of traders does an STT impact more?
- Does it lead to flight of liquidity from highly taxed segments (equity) to those with lower taxes (derivatives)?
- How does an STT impact stock liquidity, efficiency, and volatility?

Identification problem

- An "event" study of variables of interest may ignore the impact of unobservables
- STT applies to all stocks and derivatives
- Both of these create an identification problem

Identification

- Amihud and Mendelson (1992) argue that transaction costs cause a clientele effect across stocks
  - Since long-term investors can depreciate their transaction costs over a longer period of time, they are more willing to hold relatively illiquid stocks than short-term investors
  - So a given change in transaction costs will have a greater impact on liquid stocks than on illiquid stocks

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  - So a given change in transaction costs will have a greater impact on liquid stocks than on illiquid stocks
- In our context, the STT is likely to have a greater impact on liquid stocks ("*treatment*") than illiquid stocks ("*control*")
- We then run a diff-in-diff specification

Announcement of the STT

- The newly-elected Indian government announced the introduction of an STT on July 8, 2004 as part of the annual budget presented to the Indian Parliament
- Extensive news search prior to July 8 shows that there was no mention of an STT being introduced
- Also finds no mention in the party's election platform
- So its introduction was completely unexpected

Announcement of the STT

- In his speech to the Indian Parliament, the Finance Minister stated the following reasons for introducing the STT:
  - Strengthening capital markets
  - Limiting price volatility and manipulation of prices
  - Generating revenue for the government
- The Finance Minister announced a flat 15 basis point STT on all exchange-based transactions, to be entirely paid by the buyer

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- The Finance Ministry announced a modified STT regime on July 21, 2004
- For delivery-based transactions in the equity segment, it was 15 basis points, half paid by the buyer and half by the seller
- For non-delivery based transactions in the equity segment, it was 1.5 basis points, paid entirely by the seller
- In the derivatives segment, it was 1 basis point, paid entirely by the seller and based on gross contract value

Introduction date

- Tax came into effect on October 1, 2004
- Unclear what is likely to happen between announcement (July 8) and introduction (October 1) and hence exclude this period from our entire analyses

Data sources

- Proprietary data from the NSE: For each stock on each day, it provides value traded by different categories of traders:
  1. Retail investors (noise traders)
  2. Institutional investors, which include mutual funds, foreign institutional investors, banks, insurance companies, etc. (informed traders)
  3. Exchange trading members or proprietary traders (informed traders)

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- CMIE Prowess: All relevant financial statement and daily stock-level market data

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- We focus only on the top 200 stocks in terms of market capitalization
- These 200 stocks account for 93% of the entire market's capitalization and 97% of the trading volume
- Of these 200, 50 are in the derivatives segment
- These 50 form our Futures & Options (F&O) sample
- The remaining firms form our non-F&O sample

Treatment and control firms

For each of the F&O and non-F&O samples, we create the treatments and controls in the following way:

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- We use the Amihud illiquidity measure as a proxy for liquidity
- For each stock, we calculate the median daily Amihud illiquidity measure between July 1, 2003 and June 30, 2004
- Stocks below the cross-sectional median are liquid (*treatment*) and those above are illiquid (*control*)

Sample period

- Pre-event period is from April 1 to June 30
- Post-event period is from October 1 to December 31

Table 1: Sample stats over pre-STT period

	Cash and F&O	Cash Market	F&O Market
Number of Stocks	200	200	50
Market Cap	9,932.83	9,932.83	7,187.27
Average Daily Volume	89.35	79.77	9.58
Retail	68.5%	68.3%	59.0%
Proprietary	16.3%	16.2%	38.5%
Non-Prop Institutional	15.3%	15.6%	2.6%

Market cap and total volume are in billions of rupees

Table 2: Sample comparison

F&O sample	Treatment (High Liquidity)			Control (Low Liquidity)			Difference of Mean	Difference of Median
	N	Mean	Median	N	Mean	Median		
Total Assets	21	2,990.14	2,648.70	17	3,340.22	1,858.90	-350.081	789.800
							(-0.299)	(-0.617)
Revenue	21	135,212.67	75,755.80	17	199,923.02	66,893.00	-64,710.352	8,862.800
							(-0.695)	(0.558)
Market Cap	25	105,583.46	53,193.26	25	181,907.32	105,737.05	-76,323.863	-52,543.792***
							(-1.470)	(-2.678)
Price to Book	25	2.46	1.95	25	3.89	2.75	-1.427**	-0.805**
							(-2.034)	(-2.522)
Profit to Sales	21	0.37	0.27	17	0.30	0.23	0.067	0.040
							(0.821)	(-0.264)

Table 2: Sample comparison

F&O sample	Treatment (High Liquidity)			Control (Low Liquidity)			Difference of Mean	Difference of Median
	N	Mean	Median	N	Mean	Median		
Volume (Total)	25	2,271.88	1,092.37	25	745.01	504.34	1,526.868***	588.035***
							(3.002)	(2.736)
Fraction (Retail)	25	0.50	0.51	25	0.44	0.42	0.063**	0.094***
							(2.351)	(2.658)
Fraction (Inst.)	25	0.50	0.49	25	0.56	0.58	-0.063**	-0.094***
							(-2.351)	(-2.658)
Volume Cash (Total)	25	1,944.72	1,069.10	25	690.01	501.92	1,254.707***	567.176***
							(2.924)	(2.910)
Frac. Cash (Retail)	25	0.50	0.51	25	0.43	0.41	0.064**	0.102***
							(2.389)	(2.639)
Frac. Cash (Inst.)	25	0.50	0.49	25	0.57	0.59	-0.064**	-0.102***
							(-2.389)	(-2.639)
Volume F&O (Total)	25	327.18	14.36	25	56.19	6.01	270.988	8.350**
							(1.466)	(2.270)
Frac. F&O (Retail)	25	0.58	0.57	25	0.60	0.59	-0.026	-0.028
							(-1.241)	(-1.048)
Frac. F&O (Inst.)	25	0.42	0.43	25	0.40	0.41	0.026	0.028
							(1.241)	(1.048)

Table 2: Sample comparison

Non-F&O sample	Treatment (High Liquidity)			Control (Low Liquidity)			Difference of Mean	Difference of Median
	N	Mean	Median	N	Mean	Median		
Total Assets	41	2,494.86	409.00	46	1,021.51	398.70	1,473.350	10.300
							(1.314)	(0.923)
Revenue	41	23,484.81	13,239.00	46	13,088.31	10,289.90	10,396.494	2,949.100
							(1.496)	(0.455)
Market Cap	75	14,870.19	9,851.17	75	21,737.25	10,917.03	-6,867.057	-1,065.855*
							(-1.531)	(-1.887)
Price to Book	74	2.22	1.58	75	4.51	3.50	-2.292***	-1.913***
							(-4.517)	(-5.572)
Profit to Sales	41	0.32	0.22	46	0.24	0.18	0.080	0.038*
							(1.547)	(1.807)
Volume Cash (Total)	75	151.48	60.95	75	33.83	9.29	117.656***	51.662***
							(3.337)	(7.281)
Frac. Cash (Retail)	75	0.76	0.77	75	0.76	0.77	0.002	0.001
							(0.087)	(-0.331)
Frac. Cash (Inst.)	75	0.24	0.23	75	0.24	0.23	-0.002	-0.001
							(-0.087)	(0.331)

Figure 1: Daily stock market turnover – all traders – F&O sample

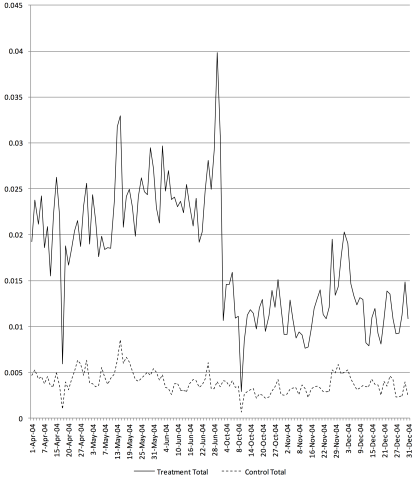

Figure 2: Daily stock market turnover – retail traders – F&O sample

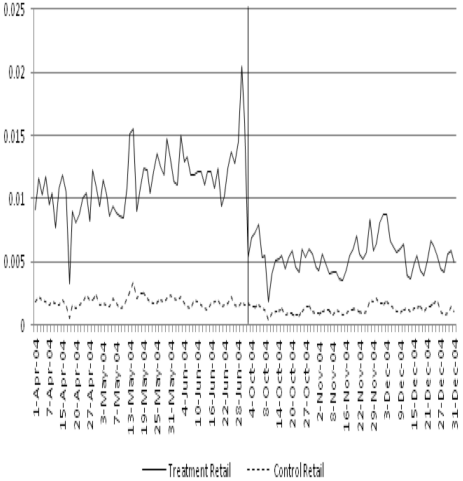

Figure 3: Daily stock market turnover – institutional traders – F&O sample

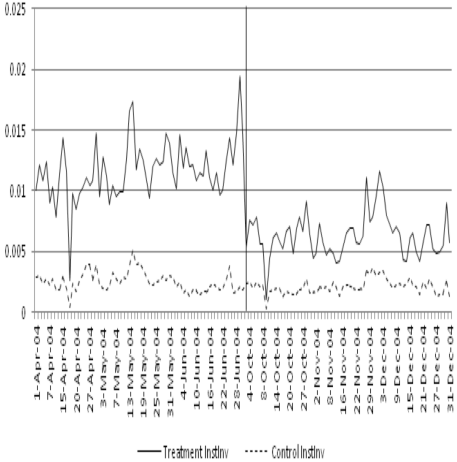

Table 3: Impact on log(rupee volume) – stock market – F&O sample

	(1) Total	(2) Retail	(3) Institutional	(4) Non Prop	(5) Prop
*Treatment*Post*	-0.391***	-0.311**	-0.496***	-0.213	-0.620***
	(0.133)	(0.135)	(0.146)	(0.154)	(0.169)
Observations	6,250	6,250	6,250	6,158	6,250
No. of companies	50	50	50	50	50
R-squared	0.398	0.381	0.392	0.262	0.403
Adj R-squared	0.403	0.403	0.403	0.403	0.403
Control Variables	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Table 4: Impact on log(rupee volume) – derivatives market – F&O sample

	(1) Total	(2) Retail	(3) Institutional	(4) Non Prop	(5) Prop
*Treatment*Post*	-0.430	-0.350	-0.496*	-0.570*	-0.450*
	(0.298)	(0.271)	(0.251)	(0.320)	(0.241)
Observations	6,014	6,009	5,907	3,624	5,906
No. of companies	50	50	50	50	50
R-squared	0.710	0.639	0.696	0.421	0.673
Adj R-squared	0.673	0.673	0.673	0.673	0.673
Control Vars	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Table 5: Impact on proportion of trading – F&O sample

	Stock market			Derivatives market		
	(1) Retail	(2) Non Prop	(3) Prop	(4) Retail	(5) Non-Prop	(6) Prop
*Treatment*Post*	0.040**	0.017	-0.058***	0.040**	-0.011*	-0.029**
	(0.016)	(0.019)	(0.014)	(0.015)	(0.006)	(0.014)
Observations	6,250	6,250	6,250	6,014	6,014	6,011
No. of companies	50	50	50	50	50	50
R-squared	0.195	0.173	0.196	0.164	0.200	0.103
Adj R-squared	0.196	0.196	0.196	0.103	0.103	0.103
Control Vars	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Summary of results – F&O sample

- Both retail and proprietary trading volume in the stock market decrease in response to the STT
- Other institutions' trading volume does not change significantly
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- Other institutions' trading volume does not change significantly
- Relatively speaking, proprietary volume decreases more than retail
- To the extent that proprietary traders are short-term informed while other institutions are long-term informed, not all informed trading decreases after STT
- No significant overall change in the derivatives segment, although there is a significant drop in all types of institutional trading
- It does not appear that volume switches from the equity to the derivatives segment

Figure 4: Daily stock market turnover – all traders – non-F&O sample

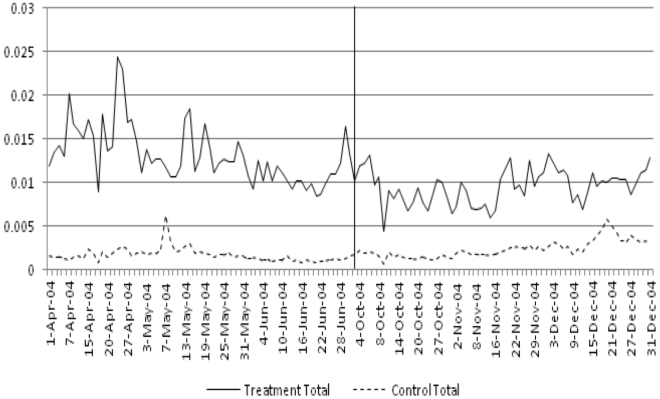

Figure 5: Daily stock market turnover – retail traders – non-F&O sample

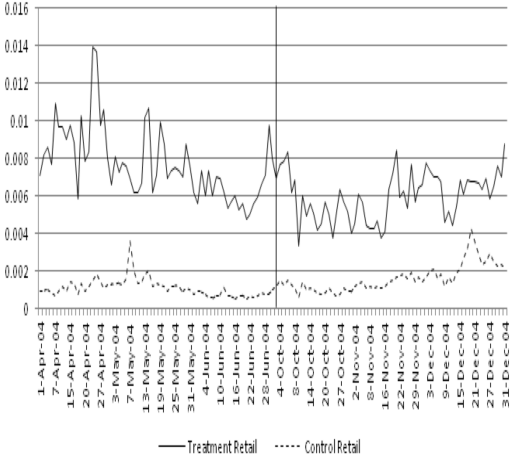

Figure 6: Daily stock market turnover – institutional traders – non-F&O sample

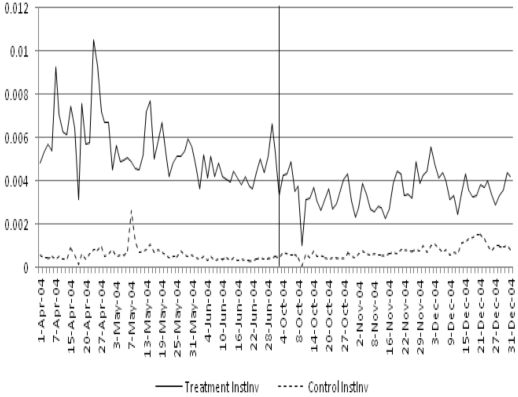

Table 6: Impact on log(rupee volume) – stock market – non-F&O sample

	(1) Total	(2) Retail	(3) Institutional	(4) Non Prop	(5) Prop
*Treatment*Post*	-0.613***	-0.601***	-0.704***	-0.489***	-0.685***
	(0.120)	(0.120)	(0.155)	(0.117)	(0.195)
Observations	18,441	18,441	17,778	13,807	17,149
No. of companies	149	149	149	148	149
R-squared	0.320	0.331	0.197	0.100	0.182
Adj R-squared	0.182	0.182	0.182	0.182	0.182
Control Vars	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Price efficiency measures

- Measures are from Hou and Moskowitz (2005) and Saffi and Sigurdsson (2011)
- Estimate the following regression:

$$r_{i,t} = \alpha + \nu_i + \beta_1 * r_{m,t} + \beta_2 * r_{m,t-1} + \beta_3 * r_{m,t-2} + \beta_4 * r_{m,t-3} + \beta_5 * r_{m,t-4} + \epsilon_{ij}$$

  where $r_{i,t}$ is the return on stock i in week t, $r_{m,t}$ is the return on the market (CNX200 Index) in week t and the corresponding four lags on the market

- The above equation as well as a constrained version with all lag coefficients set to zero are estimated

$$\begin{aligned} D_1 &= 1 - \frac{R^2_{constrained}}{R^2_{full}} \\ D_2 &= \frac{|\beta_2| + |\beta_3| + |\beta_4| + |\beta_5|}{|\beta_1| + |\beta_2| + |\beta_3| + |\beta_4| + |\beta_5|} \end{aligned}$$

Table 7: Impact on price efficiency

	(1) D1	(3) D2
*Treatment*Post*	0.052***	0.026**
	(0.019)	(0.013)
Observations	3,020	3,020
Number of Companies	199	199
R-squared	0.276	0.287
Adj R-squared	0.287	0.287
Control Vars	Yes	Yes
Firm FE	Yes	Yes
Time FE	Yes	Yes

Table 8: Impact on liquidity

	Avg Daily Trade	Avg Daily Volume (Cash)	Avg Daily Volume (Cash, F&O)	Avg Trade Size	Avg Turnover (Cash)	Avg Turnover (Cash, F&O)	Amihud (Cash) Illiquid-ity	Amihud Illiq-uidity (Cash,F&O)	Roll Im-pact
*Treatment*Post*	-0.973***	-1.244***	-1.018***	-0.235***	-1.207***	-0.983***	1.376***	1.161***	1.119***
	(0.107)	(0.109)	(0.114)	(0.038)	(0.108)	(0.113)	(0.121)	(0.125)	(0.151)
Observations	7,157	7,155	7,155	7,155	7,155	7,155	7,152	7,152	3,201
Number of Com-panies	484	484	484	484	484	484	484	484	481
R-squared	0.531	0.659	0.655	0.557	0.367	0.356	0.699	0.696	0.394
Adj R-squared	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.394	0.394
Control Vars	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 9: Impact on volatility

	Skewness	Kurtosis	Std Dev	|Return|	High-Low
*Treatment*Post*	-0.106**	-0.090	0.000	0.753***	-0.243*
	(0.046)	(0.103)	(0.003)	(0.137)	(0.142)
Observations	7,059	7,041	7,075	7,083	7,083
Number of Companies	483	483	483	483	483
R-squared	0.083	0.017	0.129	0.190	0.176
Adj R-squared	0.176	0.176	0.176	0.176	0.176
Control Vars	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Conclusions

- STT has a negative impact on markets
- Volumes decrease, largely due to retail trading and proprietary trading, who tend to be short-term traders
- There is no evidence of traders switching from equity (high tax) to derivatives (low tax)
- Liquidity and efficiency worsen
- Impact on volatility not clear