Working Paper 273

Securities Transaction Tax-
Case study of India

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April 2014

INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS

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Abstract

Security Transaction Tax (STT) was introduced in the Indian capital market in 2004. It is a tax on transaction of equities as well as their derivatives. Despite the reduction in STT over the years, it constitutes a large percentage (next only to brokerage fee) of the total cost of trading. The rationale behind STT was to replace the long-term capital gains tax and create a level playing field for all participants in the stock market. It was also seen as a way to mobilise additional revenue. Against this backdrop, the paper examines the trends in the Indian stock market in the past decade and attempts to quantify the impact of STT imposition and subsequent revisions on volatility and trading volume during Oct 2003-July 2013. Empirical results show a mixed response of volatility and volume to changes in STT. Even though STT has contributed to the exchequer, it can be argued that the absence of such a tax could have added more to economic growth and hence, higher revenues by promoting smooth operation of the capital market.

JEL Classification: *G10, G14, G17, G18, G19.*
Keywords: *Security Transaction Tax, Equity Market, Equity Derivatives, Volatility, Trading Volume, Liquidity.*

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Securities Transaction Tax-Case study of India

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1. Introduction

India's capital market, which includes both primary and secondary markets, forms a pivotal part of its financial system. This is reflected in the market capitalisation of listed companies which was equal to 68.6 percent (of GDP) in 2012.[1] The two main stock exchanges in India are the National Stock Exchange (NSE), and the Bombay Stock Exchange (BSE). Both permit trade in the equity/cash, as well as derivatives segments. A third exchange, the MCX-Stock Exchange Limited (MCX-SX) was granted registration in the Cash and Equity Derivative Segment in July 2012. [2]

In the last decade, there was a rise in the cash turnover of both BSE and NSE. The rate of increase in the cash turnover was however, outpaced by that of the Equity Futures and Options (F&O) segment in both exchanges. More importantly, there has been a significant fall in some indicators of liquidity. For instance, the NSE's Turnover Ratio declined from over 200 per cent in 2000-01, to 29.2 per cent in 2012-13. The BSE's Turnover Ratio dropped from 175 per cent, to 5.9 per cent in the same period.[3] Available statistics also indicate a likely migration of capital to the global trading platforms.

Substitution of asset classes domestically as well as migration of capital to other geographies can be linked to an array of factors including global and domestic macroeconomic conditions, rate of return, time differentials, transaction charge differentials, general preference of the investors for certain asset classes, etc. The present study focuses particularly on the trading cost differential. Cost of trading is crucial in determining the investors' choice for an asset class.

A critical component of the transaction charge in India is the transaction tax, more specifically, the security transaction tax (STT). STT is the tax on transaction of equities as well as their derivatives and accounts for a bulk of the transaction cost (at the Indian stock exchanges) after deducting the brokerage fee. Keynes (1936) was the first to propagate such a tax.[4] Over the years, STT has been implemented (and removed subsequently) by different countries such as the UK, Sweden, and Japan, with the main objective of mobilising revenue.

[1] World Development Indicators 2014, World Bank

[2] Handbook of Statistics, 2012, SEBI, April 2013.

[3] Although market cap as a percentage of GDP has gone up in both exchanges, turnover ratios have declined steeply during the period 2000-2012. Advance Estimate of GDP at market prices for 2012-13 (at 2004-05 prices) is considered. Handbook of Statistics on the Indian Securities Market, April 2013, SEBI.

[4] Keynes (1936) was one of the earliest proponents of the STT. He strongly condemned speculation and according to him the market was not run on fundamentals but by, "what average opinion believes average opinion" of the expected price to be. Matheson (2011).

The STT was introduced in India in 2004 to replace the long-term capital gains tax (LCGT). The rate of taxation has been revised several times since it was imposed and currently stands at 0.1 per cent for both, buyers and sellers of cash deliverables.[5] Despite the reduction in the rate over the years, it still accounts for a reasonably high proportion of the total trading cost, as will be discussed later.

One of the main arguments in favour of imposing STT in India is its potential to generate revenue. The other was that it will create a level playing field for all participants in the stock market.[6] Most empirical literature on global experience with STT points towards an inverse relationship between transaction tax and trading volumes. However, evidence for its impact on volatility remains inconclusive.[7] While STT has been successful in raising substantial revenues in some countries, in others, revenues from STT have contributed to a small percentage of overall GDP.[8]

The present study examines the impact of STT on different variables of the Indian stock market, especially on volatility and volumes in the cash segment. Section 2 is an overview of the available literature on global experience with STT. Section 3 analyses trends in the Indian stock market over the last decade; imposition of the tax in India has also been discussed. An empirical analysis of the impact of STT implementation/revisions on volumes and volatility in the Indian stock market has been provided in Section 4. Section 5 concludes.

2. Review of the literature on global experience with STT

Proponents of STT argue that it reduces volatility in the market by driving away noise traders/speculators. Opponents, on the other hand, argue that the tax has an adverse impact on market efficiency by sapping liquidity and raising asset prices. The global experience with STT has been reviewed by category: impact on stock volumes, volatility, and liquidity.

2.1 Volume and Revenues

A review of the literature suggests that STT leads to a reduction in traded volumes. One reason for this is that transaction costs go up, making it costlier to trade (Wang and Yau, 2012). In certain cases, trading becomes unviable because STT does not discriminate between good and bad realizations as opposed to capital gains tax (CGT) (Matheson, 2011). Another factor that leads to a fall in volume in the taxed region is migration of trade to other untaxed geographies, thus, establishing an inverse relationship between STT and trading volume (Wang and Yau, 2012 and Matheson, 2011).

[5] STT on equity futures was revised downward from 0.017 per cent to 0.01 per cent in the Union Budget of 2013-14.

[6] On account of STT, even foreign investors who enjoyed a tax free return by routing their investments through countries with which India had double taxation avoidance treaty were taxed on their transactions in the stock exchanges.

[7] Wang and Yau (2012)

[8] Matheson (2011)

Trades within the French CAC 40 dropped by approximately 16 per cent compared to the benchmark within 40 days of implementation of French STT on August 1st, 2012 (Haferkorn and Zimmermann, 2013). Campbell and Froot (1994) show that trading of Swedish stocks within Sweden as a percentage of their turnover in London, New York, and Stockholm, fell from 61 percent in 1988, to 52 percent in 1991. Sweden imposed transaction taxes with a levy of fifty basis points on registered Swedish brokerage services involved with the purchase and sale of equities in 1984. According to Chou and Wang (2006), a drop in STT from 5 basis points to 2.5 basis points on the Taiwanese Futures Markets in 2000 led to a reverse migration of trading volume from Singapore to Taiwan. Available evidence also indicates a shift to untaxed substitutes. In the case of Sweden it was found that taxed fixed income assets were substituted for Swedish debentures and variable rate notes (VRNs) following the introduction of tax on the former (Campbell and Froot, 1994).

Experience with respect to revenue is varied across the globe. In some cases, it represents a cyclical pattern linked to the financial activity (Matheson, 2011). While calculating the estimated potential of revenues from such taxes, the possibility of migration of trade volume is generally not taken into account. Hence, actual revenue mobilized in most cases, does not correspond with the estimated potential. Most studies suggest that the revenue potential is a function of the elasticity of trading volume with respect to transaction cost/STT/Bid-ask spread (BAS) (Wang and Yau, 2012). Various studies have tried to estimate the elasticity of trading volume with respect to change in transaction cost; such elasticities range between -0.5 and -1.7 (Matheson, 2011). Elasticity of volume with respect to STT was estimated to be -0.5 in case of China (Baltagi et al., 2006) and -1 for the Taiwanese futures market (Chou and Wang, 2006). Elasticity of the Swedish stock market with respect to total transaction cost was estimated to be in the range of -0.9 to -1.4 percent (Lindgren and Westlund, 1990). Chou and Wang (2006) found that reduction in TAIFEX transaction tax rate in 2000 led to an increase in the revenue collected in the second and third year following the reduction.

2.2 Volatility

On theoretical grounds, the impact of STT on volatility is ambiguous (Kupiec, 1996). There are two types of volatility: short-term price volatility and long-term price volatility (Matheson, 2011). From the viewpoint of a transaction tax, short-term price volatility is more pertinent. There is also a distinction between short-term price volatility and return volatility. While STT may lower asset price volatility by causing a fall in asset prices, it simultaneously increases return volatility (Kupiec, 1996).

According to some studies, STT decreases short-term price volatility by reducing the number of destabilizing speculators (Wang and Yau, 2012). The other view is that the impact of transaction tax on volatility is a function of the market microstructure and composition of traders (Song and Zhang, 2005 and Pellizzari and Westerhoff, 2007). For instance, if the number of fundamentalists[9] or liquidity providers far exceeds that of noise traders, then STT

[9] Fundamentalists are those who operate on the basis of market fundamentals.

will not only affect the latter but also have a disproportionate effect on the former, leading to a fall in trade volume and hence, liquidity, implying a rise in volatility (Wang and Yau, 2012). Some have also argued that it is the variability in prices or returns on the asset that represents volatility. The latter, however, is commonly interpreted as velocity of price changes. Thus, STT may be desirable in some cases since it reduces the velocity of financial markets (Miller, 1990).[10]

Empirical evidence, however, remains inconclusive. Roll (1989) found no direct relationship between volatility and transaction costs while examining stock return volatility across 23 countries, from 1987 to 1989. Umlauf (1993) conducted an ex ante and ex post analysis of Swedish transaction tax on brokerage services and found no reduction in volatility after the introduction of the tax.[11] An increase in the stamp tax rate from 0.3 per cent to 0.5 per cent in 1997 in China led to a significant rise in volatility as per Baltagi et al. (2006). Green et al. (2000) concluded that increases in UK stamp duty were generally accompanied by higher short-term price volatility. Pomeranets and Weaver (2011) examined changes in New York STT from 1905-1981 and found no statistically significant relationship between STT and volatility.

Volatility, it is argued, is also sometimes spurred by the process of trading itself (Matheson, 2011; Habermeier and Kirilenko, 2003). French and Roll (1986) examined the variability in stock returns for all NYSE and AMEX stocks over trading and non-trading hours during 1963-1982. They concluded that volatility in stock returns was higher during the trading hours.

2.3 Liquidity and Efficiency

The overall impact of STT on the efficiency of stock markets is determined by its effect on volume, liquidity, asset prices and volatility. The tax, as mentioned earlier, can trigger migration of trade volumes to other global untaxed/lesser taxed trading platforms. In the absence of a critical level of liquidity, such migration turns the (taxed) market illiquid, increasing the cost of trading (Campbell and Froot, 1993). An illiquid market obstructs smooth flow of information hampering price discovery and lowering efficiency (Wang and Yau, 2012; Habermeier and Kirilenko, 2003). The tax might also sometimes cause the withdrawal of essential market participants such as the market makers (Habermeier and Kirilenko, 2003). Market makers and dealers are desirable in case of stocks that are less frequently traded. They also help to promote price stability in most cases (Madhavan, 2000).

An increase in volatility also implies a fall in efficiency of the market. Baltagi et al. (2006) concluded that the Chinese stock market became less efficient due to quick assimilation of volatility shocks following the increase in STT from 0.3 percent to 0.5 percent in May 1997. Chou and Lee (2002) found that efficiency in TAIFEX futures market improved significantly in response to the tax rate reduction in 1986.

[10] Culp (2010)
[11] The period under consideration is 1980-1987.

Transaction tax is also believed to cause a shift in the focus of the management from short-term to long-term gains (Wang and Yau, 2012) by discouraging trade by short-term traders[12] (Schwert and Seguin, 1993). This argument, however, does not support the view that long-term decisions of the management may, in fact, be a function of the stock prices in the short-term.

STT is widely believed to cause an increase in the cost of capital (Schwert and Seguin, 1993; Matheson, 2011).Theoretically, as trading becomes costlier in response to the introduction/increase in transaction tax/cost, investors demand a higher rate of return to offset the effect of the former which leads to an increase in the cost of capital for companies (Matheson, 2011; Kupiec, 1996). This further leads to a fall in the price of the asset (Schwert and Seguin, 1993).[13] Opponents such as Stiglitz (1989), however, argue that the tax induces a reduction in the cost of capital and therefore, increases asset prices.[14] Empirical evidence bolsters theoretical findings in this case. Stockholm stock exchanges witnessed a crash of about 5.3 per cent within a month's time of the introduction of the Swedish STT in 1983 (Umlauf, 1993). Schwert and Seguin (1993) estimated that an introduction of 0.5 per cent of STT in the U.S. would be followed by an increase in the cost of capital.

There is, thus, a lack of consensus in theory with respect to the effect of STT on volatility and efficiency in the stock markets. This is matched by equally inconclusive empirical findings. As regards the impact on volumes, theoretical research suggestive of migration induced by transaction tax is corroborated by the empirical results in most cases.

3. The Indian Stock Market and STT imposition

3.1 Trends in the Indian stock market (2000-2012)

The present analysis sheds some light on the changing patterns in volumes and turnover of the cash and derivatives segments of the NSE and BSE over a period of time. Derivatives here refer to only equity derivatives. Traded quantity (in lakhs) and number of contracts are taken as proxies for trading volume in cash, and equity derivatives segments, respectively.[15] Other statistics related to liquidity have also been examined.

There was a significant shift in volumes and turnover from cash to the F&O segment in both exchanges over the last decade. The compound annual growth rate (CAGR) of the turnover in the F&O segment of both, the NSE and BSE, was over 80 per cent for the period 2001-12. The corresponding figure for the cash segment was approximately 18 per cent for NSE and a meagre 8 per cent for BSE (Table 1). NSE accounted for more than 97 per cent of the total derivatives turnover of the two exchanges for the entire period. At the same time, the

[12] This argument was also put forward by Stiglitz (1989).
[13] The Present Value of the asset is the discounted value of the asset.
[14] It is argued that as transaction tax reduces the activities of the speculators. A reduction in such activities reduces the amount of risk premium accounted for in the calculation of discount rate in the discounted cash flow. Hence, it raises the present value of the asset. Culp (2010) and Baltagi, et al. (2006)
[15] Please refer to Appendix A for the diagrams.

combined cash volume[16] (traded quantity) grew at 17.2 per cent on a compound basis, while the CAGR for the combined volume (total number of contracts) in the F&O segment was 76.1 per cent in the given period.[17]

Table 1: Total Turnover in the Cash and F&O segment of NSE and BSE (Rs. crore)

	NSE		BSE	
	Turnover Cash	**Total Turnover (F&O)**	**Turnover Cash**	**Total Turnover (F&O)**
2001-02	513167	76764	307292	1812
2002-03	617989	339731	314073	2456
2003-04	1099534	1913234	503053	11743
2004-05	1140072	2378195	518715	16111
2005-06	1569558	4643981	816074	9
2006-07	1945287	7162459	956185	59006
2007-08	3551038	12731341	1578857	242308
2008-09	2752023	10781254	1100074	11775
2009-10	4138023	17157601	1378809	234
2010-11	3577410	28217878	1105027	154
2011-12	2810893	30372701	667498	807008
CAGR	**18.5%**	**81.8%**	**8.06%**	**84.02%**

Source: SEBI (2013)

Notes: a) For derivatives, the turnover is in notional value.

b) Notional Turnover for options= (Strike Price + Premium) * Quantity

More importantly, the combined turnover and volume (NSE and BSE) in the cash segment show similar trends (Figures (i) and (ii) in Panel A, Appendix 1). Both show an upward trend from 2002-03, and peak in 2009-10, falling steeply thereafter. An important feature is that the combined cash turnover of both exchanges from April to December 2012 was almost equal to the level in 2000-01, approximately Rs. 23 lakh crore (Figure ii), Panel A, Appendix 1). Cash volume and turnover trends for both exchanges separately are also similar, both trading volume and turnover increased from 2002-03 arriving at a peak in 2009-10,followed by a decline in the rest of the period . Within the cash segment, delivered quantity (in absolute terms) during 2000-12, increased in both, BSE and NSE but delivered quantity as a percentage of traded quantity grew at a dismal 1.2 and 4.6 per cent (on a compounded basis)[18] (Table 2).

[16] Sum of traded quantity in BSE and NSE

[17] Author's calculations based on the data given in the Handbook of Statistics 2012, SEBI, April 2013

[18] Author's calculations based on the data provided in Handbook of Statistics, 2012, SEBI, April 2013.

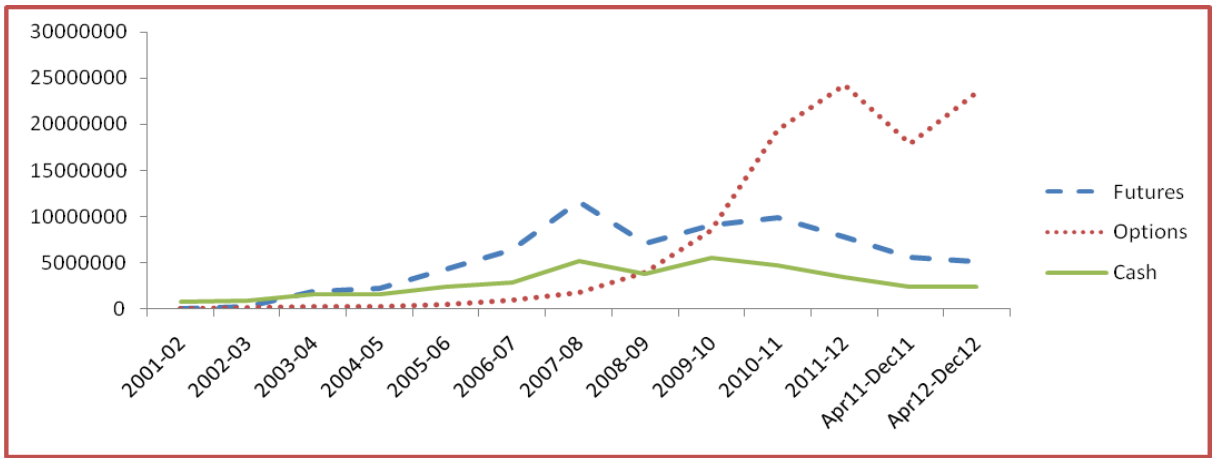
Table 2: Delivered Quantity as a percentage of Traded Quantity in the cash segment of NSE and BSE (2000-12)

	BSE			NSE		
	Traded Qty (lakh)	Delivered Qty (lakh)	Percent of Delivered Qty to Traded Qty	Traded Qty (lakh)	Delivered Qty (lakh)	Percent of Delivered Qty to Traded Qty
2000-01	258511	86684	34	304196	50203	17
2001-02	182196	57668	32	274695	59299	22
2002-03	221401	69893	32	365403	82305	23
2003-04	385806	133240	35	704539	174538	25
2004-05	477171	187519	39	787996	201405	26
2005-06	664467	300653	45	818438	226346	28
2006-07	560780	229685	41	850515	238571	28
2007-08	986009	361628	37	1481229	366974	25
2008-09	739601	196630	27	1418928	303299	21
2009-10	1136513	363578	32	2205878	473952	21
2010-11	990776	376890	38	1810910	497367	27
2011-12	654137	255999	39	1605205	443232	28

Source: SEBI (2013)

In the F&O segment, growth in options superseded growth in futures in the latter half of the period under consideration. Figure 1 shows a comparison of growth in the combined (both BSE and NSE) turnover of cash, futures and options segment. It can be observed that the options turnover which was below both cash as well as the futures turnover before 2008-09, has outpaced the other two since then. For instance, the turnover of all options in 2007-08 was approximately Rs. 17 lakh crore, while that of cash and futures was Rs. 51.3 lakh crore, and Rs 116 lakh crore, approximately. The corresponding figures for 2011-12 were approximately Rs. 240 lakh crore, Rs. 34 lakh crore and Rs. 78 lakh crore, respectively. A similar trend is observed for trading volume of options which was below that of futures before 2009-10. After this, trading volume of options exceeded futures and also increased at a higher rate.

Figure 1: Combined Turnover of Cash and F&O segment of BSE and NSE (Rs. cr)



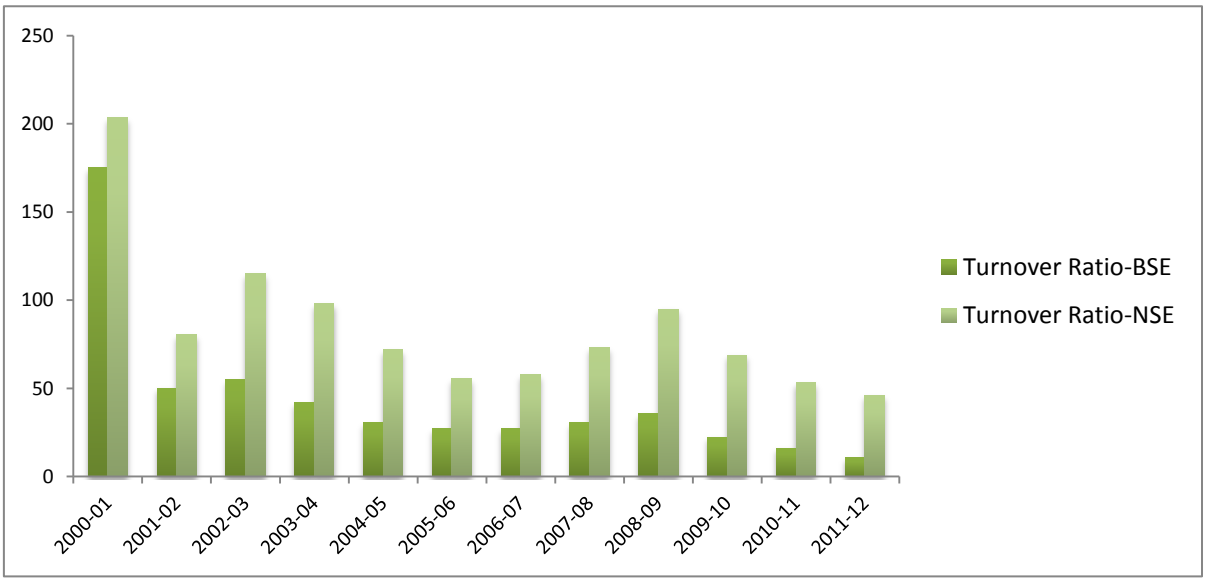
Source: SEBI (2013)

Note: Turnover for both futures and options is in notional value.

The equity F&O segment can be further classified into stock and index futures, and stock and index options. An analysis of trends in turnover and volume of index and stock futures (BSE and NSE combined) suggests an overall increase in both for the entire period though there was a fall in the period immediately after 2011-12. While the turnover of stock futures was higher than that of index futures throughout the period, the traded volume (number of contracts) for the former coincided with that of the latter after 2008 (Appendix 1, Panel B). The increase in the options segment has been quite sharp both in terms of number of contracts and turnover. This has been governed primarily by the steep rise in index options (Appendix 1, Panel B). For instance, the volume of index options in 2011-12 stood at more than 80 crore (contracts) while that of stock options for the same year was approximately 3.6 crore (contracts).

The Turnover Ratio,[19] which is an important indicator of liquidity in the cash segment, declined for both stock exchanges over the period 2000-12 (Figure 2). The Average Turnover Ratio during 2000-05, was 70.5 and 113 per cent for BSE and NSE, respectively. It declined to 24.23 and 64.3 per cent for the rest of the period under consideration. Trading Frequency, measured by share of traded companies in the listed companies is another indicator of liquidity. Trading frequency at the BSE has gone up since 2000. Although there has been a rise in the number of listed companies on the NSE, the share of traded companies among those listed has decreased since 2000-01.[20]

Figure 2 : Turnover Ratio (2000-12) (per cent)



Source: SEBI (2013)

It is therefore, apparent that since 2000, the growth of the equity derivative segment (in both exchanges) in terms of turnover as well as volume has been remarkable when compared to that of the cash segment. Within the equity derivatives, there has been an unprecedented

[19] Turnover Ratio is defined by Turnover/Market Capitalization
[20] Please refer to Table A in Appendix 2

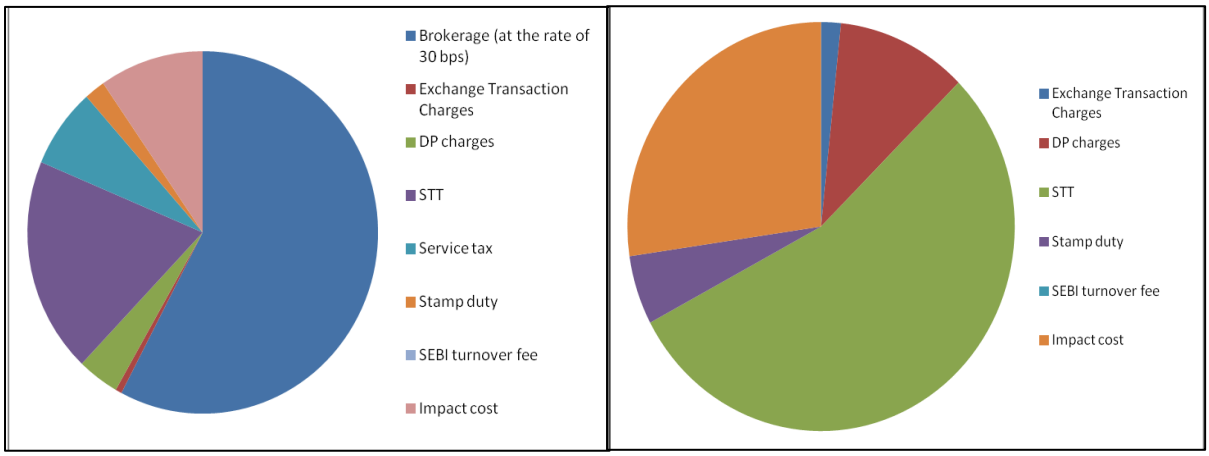
increase in the index options since 2007-08, and they now account for the bulk of the equity derivatives turnover. The increasing dominance of index options has been attributed to factors such as greater diversification for investors; limited investment by way of option premiums; structural shifts caused by the financial crisis; and revision in the STT rate (applicable to options) in June 2008.[21] The next section analyses the impact of STT on the Indian equity market.

3.2 India's experience with STT

The imposition of STT leads to an increase in transaction costs and makes it costlier to trade. An increase in the cost of trade has been found to cause a decline in traded volume in most cases globally.[22] Trades executed on Indian stock exchanges are subject to high transaction costs of which STT constitutes the bulk. It accounts for 54.64 per cent of the total trading cost after excluding the cost of brokerage (Figure 3).[23]

Figure 3: Explicit costs (as percentage of total) for cash deliverables (as of 2013)

Explicit costs (% of total) incl. brokerage **Explicit costs (% of total) excl. brokerage**



Source: Author's calculations

The global experience with STT (as mentioned in the previous section) has established the possibility of migration of investment from a taxed asset class to either a substitutable untaxed/lesser taxed asset class or untaxed geographies.[24]

3.2.1 Migration of volumes to substitutable assets

A rapid growth in the options turnover of the Indian stock market can, in a sense, be classified as migration of volumes from cash (the higher taxed segment) to the F&O segment (the lower taxed segment). This has certainly increased liquidity in the F&O segment but it can be argued that much of it has been sapped out of the cash market. There are factors that

[21] Narain (2011)
[22] Wang and Yau (2012)
[23] Please also refer to Table B in Appendix 2.
[24] Matheson (2011)

make equity derivatives seem more lucrative, such as relatively small investments in the form of margin for futures or premium for options, arbitrage opportunities in the case of single stock derivatives, greater diversification for investors when compared to investment in single stocks, etc. The shift can also be attributed to the tax differential between the cash and the derivatives segment.

Table 3 shows the STT rates applicable to different segments for 2004-12. The highest STT rate in the Indian stock market applies to cash deliverables. It can be seen that for the entire period, the F&O segment was subject to a much lower tax rate than that levied on the cash market. More importantly, growth in the options segment picked up momentum around 2008 when it also outpaced growth in the futures market. This could be traced to changes in the structure of taxation in the options market. Before 2008, for unexercised options (options that were squared off), the tax was levied on the aggregate of the notional value of the transaction and the premium. After the revision in June 2008, the tax applied to only the premium value for the seller. The buyer is required to pay a tax on the settlement price only if the option is exercised. It needs to be emphasised however, that exercised options form a negligible percentage of total options in the Indian stock market.

Table 3: Revised STT rates (2004-12) (per cent)

Date	Cash Deliverable (buy and sell)	Cash Non Deliverable (sell)	Equity Futures (sell)	Options Premium (sell)	Exercised Options
1-Oct-04	0.075	0.015	0.01	NA	0.01
1-Jun-05	0.1	0.02	0.0133	NA	0.0133
1-Jun-06	0.125	0.025	0.017	NA	0.017
1-Jun-08	0.125	0.025	0.017	0.017	0.125
1-Jul-12	0.1	0.025	0.017	0.017	0.125
1-Jun-13	0.1	0.025	0.01	0.017	0.125

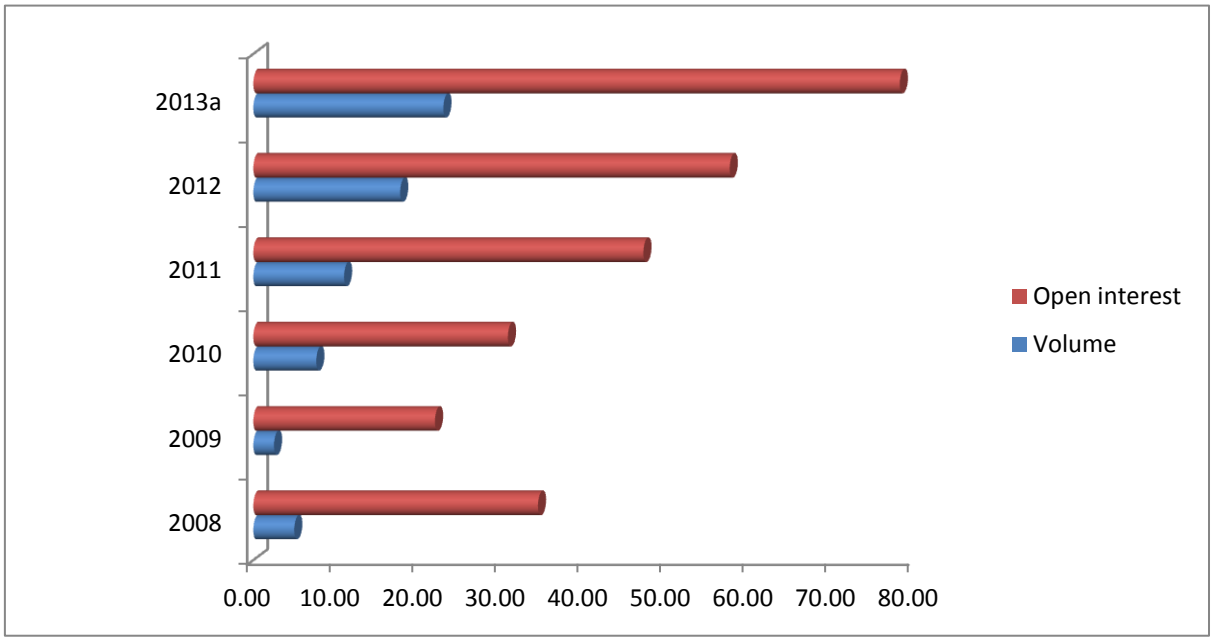
Source: SEBI and NSE

3.2.2 Migration of volumes to other geographies

There has also been a case of flight of capital from the Indian securities market to other international markets. An example of this is the migration of FII flows in NSE Nifty futures to those traded on Singapore Exchange (SGX). SGX launched Nifty Futures Trading around 2000-01.Trade in Nifty Futures on SGX as a percentage of trade on NSE, both in terms of volume and open interest has increased over the years (Figure 4) . For instance, open interest of SGX Nifty Futures as a percentage of open interest of NSE Nifty Futures increased from approximately 34 per cent in 2008, to 57 per cent in 2012. Similarly, the volume of SGX Nifty Futures as a percentage of volume of NSE Nifty Futures rose from 4.9 per cent to 17 per cent in the same period. The compounded growth in volume and open interest of SGX Nifty Futures was approximately 12 per cent and 2.5 percent during 2008-12. The volume and open interest of NSE Nifty Futures declined by 18.7 percent and 10 per cent on a

compounded basis.[25] Although factors such as time difference and global macroeconomic forces also play a role in determining such a transfer, difference in transaction cost is usually an important consideration for investors. This is, however, an empirical question and can serve as a subject of further study.

Figure 4: Nifty Futures Trading in SGX as a percentage of Trading in NSE (in terms of volume and open interest)



Source: Bloomberg Note: Figures for 2013 are till the month of July

Table 4 shows a comparison of cost of trading at global exchanges vis-a-vis the cost at the MCX-SX in India. The mandatory cost of trading on the MCX-SX, India is as high as 98 percent of the total cost of trading leaving a small residual component, the exchange cost. For other exchanges such as the SGX, Singapore, and Bovespa, Brazil, the exchange charges as opposed to mandatory costs makes up the bulk of the total trading charges.

Table 4: Cost of Trading on Indian and International exchanges

Country	Exchange	Mandatory Cost as % of Total Cost	Exchange Cost as a % of Total Cost
India	MCX-SX	98.54	1.46
Korea	KRX	99.10	0.90
Mexico	BMV	0.00	100.00
Hong Kong	HKEx	95.37	4.63
Spain	BME Spanish Ex	0.00	100.00
Thailand	SET	0.00	100.00
Singapore	SGX	6.54	93.46
Taiwan	TAIFEX	98.30	1.70
China	Shenzen Stock Exchange	93.61	6.39

[25] Please refer to Table C in Appendix 2

Country	Exchange	Mandatory Cost as % of Total Cost	Exchange Cost as a % of Total Cost
Malaysia	Bursa Malaysia	76.92	23.08
Brazil	Bovespa	0.00	100.00
Switzerland	Swiss SIX	0.00	100.00
Canada	TMX	0.00	100.00

Source: Calculations from individual exchange websites

Note: Total Cost = Exchange costs + Mandatory costs. Mandatory costs are inclusive of Stamp duty and STT

3.2.3 Revenue Mobilization

As regards revenue generation, the average collection from STT since its implementation, has been in the range of 0.02-0.05 per cent of GDP (Table 5). Though this may be regarded as significant in some cases, revenue from STT in other Asian countries such as Hong Kong and Taiwan has been around 2.1 per cent and 0.8 per cent in some years.[26] Thus, it can be said that even though the total collection from STT (in absolute terms) has risen since its imposition, STT collection as a percentage of GDP has not been as significant as in other Asian economies.

Table 5: STT collection at BSE and NSE (in Rs. cr)

	Cash Deliverable	Cash Non Deliverable	Equity Futures	Options Premium	Exercised Options	Total	Percentage of GDP
2004-05	316	56	127	0	17	516	0.02
2005-06	1,738	249	573	0	69	2,628	0.08
2006-07	2,814	362	1,185	0	168	4,529	0.11
2007-08	5,178	626	1,974	0	293	8,071	0.18
2008-09	3,510	502	1,201	67	64	5,344	0.1
2009-10	4,871	758	1,552	24	97	7,301	0.12
2010-11	4,653	602	1,675	36	98	7,064	0.1
2011-12$	1,749	193	656	22	32	2,652	0.06

Source: Pore (2012). Note: $ as on September 2011.

3.2.4 Volatility

STT's impact on volatility remains ambiguous both, theoretically and empirically. The average volatility[27] of the BSE Sensex and S&P CNX Nifty, the main indices of the BSE and the NSE, rose in the post STT period (Table 6). This however, cannot be linked solely to STT imposition. The section on empirical analysis tries to test the actual impact of STT on volatility in the Indian securities market.

[26] SEBI Bulletin, March 2012

[27] Volatility is calculated as the standard deviation of the natural log of returns in Indices in the respective period.

Table 6: Volatility of Major Indices (percent)

	BSE Sensex	CNX Nifty
2000-01	2.2	2
2001-02	1.5	1.4
2002-03	1	1
2003-04	1.4	1.4
2004-05	1.5	1.6
Average	**1.52**	**1.48**
2005-06	1	1
2006-07	1.8	1.8
2007-08	1.9	2
2008-09	2.8	2.7
2009-10	1.9	1.9
2010-11	1.1	1.1
2011-12	1.3	1.3
Average	**1.69**	**1.69**

Source: SEBI (2013)

4. Empirical Analysis: The Impact of STT on Market Returns, Volatility, Volumes and Efficiency[28]

This section aims at estimating the impact of STT imposition and subsequent changes in the rate[29] on volatility and volumes in the Indian stock market.

4.1 Impact of STT on volatility in returns and efficiency

This section analyses the impact of STT imposition/revisions on the Indian stock market using stock index returns from NSE around 2004, 2005, 2006 and 2012, when there was either an increase or decrease in the tax rate. The period under consideration is 1st October 2003 to 30th August 2013. The impact of the tax, however, is analysed before and after revisions in STT rates. For example, the impact of STT introduction in 2004 is assessed for the period 2nd October 2003 to 30th September 2005, as the date of imposition was 1st October 2004.

4.1.1 Impact of STT revisions on Market Efficiency

The switching GARCH (SGARCH) model, originally proposed by Lee and Ohk (1992) to test the volatility structure of a stock market, has been used to analyse the impact of STT on the structure of volatility and hence, efficiency (rate of assimilation of new information) in the Indian stock market. SGARCH can identify the structural change in return volatility, and

[28] This section has been written jointly with Francis Rathinam, Research Adviser, DFID South Asia Research Hub, New Delhi and Vijay Varadi Economic Analyst, HP. The research was undertaken when both authors were based at ICRIER.

[29] In the cash segment

the direction of information assimilation in the conditional variance equation. It allows regime switching in both the mean equation and the conditional variance equation around the time of introduction/change of STT. While the dummy in the mean equation captures the changes in mean level of returns due to changes in STT, the dummy in the conditional variance equation will capture the regime switching in the autoregressive structure.

Previously, Lee and Ohk (1992), using SGARCH found that listing in stock index futures has a positive effect on the underlying index in the cash market. Li et al. (1997) used SGARCH to analyse the impact of switching from same-day settlement to next-day settlement. Baltagi et al. (2006) used it in the context of introduction of STT in China to show that STT had reduced market returns and efficiency.

GARCH family models are used to analyse time-dependent volatility in return series as a function of observed prior volatility.[30] The standard GARCH (1,1) as proposed by Bollerslev (1986) is as follows:

$$R_t = \mu + \varepsilon_t, \varepsilon_t \approx N(0, \sigma^2)$$
$$\sigma^2{}_t = \alpha_0 + \alpha_1 \varepsilon^2_{(t-1)} + \alpha_2 \sigma^2_{(t-1)}$$

where, σ^2_t is the conditional variance defined as a function of the last period's squared error and conditional volatility. The SGARCH, allowing for regime switching in both the conditional mean and conditional variance equation, could be specified as follows:

$$R_t = \mu_0 + \mu_1 D_t + \varepsilon_t, \varepsilon_t \approx N(0, \sigma_t) \quad \text{.....(1)}$$
$$\sigma^2{}_t = \alpha_0 + \alpha_1 \varepsilon^2_{(t-1)} + \alpha_2 \sigma^2_{(t-1)} + \alpha_3 D_t + \alpha_4 D_t \varepsilon^2_{(t-1)} + \alpha_5 D_t \sigma^2_{(t-1)} \quad \text{.....(2)}$$

where, $D_t = 0$ if $t \leq t'$ and 1 if $t' \leq t$. t' is the date of introduction of STT, that is, the regime switching point.

The null hypothesis is $H_0 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ as the coefficients of the dummy and its interactive terms will be insignificant and equal to zero if there is no structural change in the mean level and in the autoregressive structure in equation (2). The changes in market efficiency could be obtained from the sign and significance of coefficients of $D_t\varepsilon^2_{(t-1)}$ and $D_t\sigma^2_{(t-1)}$.: A negative α_4 and a positive α_5 would imply that the effect of the immediate squared error term is decreasing while the impact of past squared error terms is increasing indicating that the new information is not absorbed quickly, hence, the market is less efficient than before (Lee and Ohk, 1992; Li et al.,1997; Baltagi et al. 2006; Su, 2010). While a positive α_4

[30] See Bollerslev et al. (1992), Bera and Higgins (1993), Enders (2004) and Stock and Watson (2011) for a survey of various extension of GARCH models and their applications.

and a negative α_5 would imply that the market is more efficient, the same sign for both coefficients would not reveal anything about the change in efficiency.[31]

The SGARCH model estimates regime switching in both, the conditional mean and conditional variance equations. Regime switching in the mean equation indicates changes in mean returns, while switching conditional variance equation indicates volatility persistence and structural changes in information assimilation. In the mean equation (Equation 1), μ_1 captures the impact of introduction of/revision in STT on mean returns. Results (Table 7) show that increases in STT in 2005 and 2006 resulted in a reduction in average returns while the introduction of STT in 2004 had a positive impact. Reduction in STT in 2012 improved mean returns.

A negative α_4 and a positive α_5 for the year 2005, when STT was increased from 0.075 per cent to 0.1 per cent, shows that the increase in STT negatively affected market efficiency, that is, the assimilation of information. For the introduction of STT in 2004 and its revision in 2006, the impact on market efficiency is unclear. The same holds true for the revision in 2012.

Table 7: Stock Returns, STT and Market Efficiency

	1-Oct-2004	1-Jun-2005	1-Jun-2006	1-Jul-2012
μ_0	0.071 (59.82)	0.070 (363.40)	0.09 (62.44)	0.002 (201.88)
μ_1	0.002 (175.15)	-0.003 (214.70)	-0.002 (42.79)	0.002 (219.64)
α_0 $(\times 10^{-6})$	3.35 (6.82)	1.77 (13.17)	3.76 (1.55)	3.51 (2443.60)
α_1	0.149 (5.29)	0.149 (8.69)	0.149 (2.98)	0.149 (13.06)
α_2	0.599 (10.11)	0.599 (19.19)	0.599 (2.70)	0.599 (60.85)
α_3 $(\times 10^{-6})$	-1.51 (-3.01)	-1.42 (-10.63)	-2.05 (-0.85)	-2.29 (-662.11)
α_4 $(\times 10^{-6})$	-1.35 (-116.19)	-2.98 (-366.22)	-1.45 (-112.97)	-1.17 (-331.55)
α_5 $(\times 10^{-5})$	-4.04 (-0.01)	0.99 (5.78)	-0.125 (-0.03)	0.121 (0.09)
L	13442.65	13926.55	13291.41	13416.48

Notes: The z-statistic is provided in parentheses and L is Log likelihood.

4.1.2 Impact of STT revisions on volatility in returns

The second model assesses the impact of STT on returns volatility. The component GARCH (C-GARCH) is used to decompose the short- and long-run volatility (Engle and Lee, 1993), while the threshold GARCH (T-GARCH) is used to assess the asymmetric impact of positive and negative information flow on volatility (Glosten et al., 1993). The analysis in this section is on the lines of the analysis in Liau et al. (2012) which combines the component and threshold GARCH models to estimate the long- and short-run effect of STT on returns volatility allowing for a differential impact for negative shocks. The Asymmetric Component GARCH (AC-GARCH) model is specified as,

[31] See Baltagi et al. (2006) for a discussion.

$$R_t = \mu + \mu_1 R_{(t-1)} + \varepsilon_t, \varepsilon_t \approx N(0, \sigma^2) \quad \text{.....(3)}$$

$$\sigma_t^2 = q_t + \alpha(\varepsilon^2_{(t-1)} - q_{(t-1)}) + \gamma(\varepsilon^2_{(t-1)} - q_{(t-1)})d_{(t-1)} + \beta(\sigma^2_{(t-1)} - q_{(t-1)}) \quad \text{.....(4)}$$

$$q_t = \omega + \rho q_{(t-1)} + \delta(\varepsilon^2_{(t-1)} - \sigma^2_{(t-1)}) \quad \text{.....(5)}$$

Where, R_t and $R_{(t-1)}$ are stock index returns in period, t, and their lagged values, respectively, and ε_t is the error term representing contemporaneous shocks. q_t is the mean reversing variance which is a constant. Asymmetric shock is captured by the dummy $d_{(t-1)}$ where the dummy is equal to one if the error term is negative, that is, $\varepsilon_{(t-1)}<0$, and zero if the shocks are positive: the positive shocks have an impact equal to μ while the negative shocks have an impact of $\alpha + \gamma$ in Equation 4. γ captures the transitory leverage effect, that is, asymmetric effect in the variance. The fourth equation also determines the speed of mean reversion by a factor $\alpha + 0.5\gamma + \beta$ as discussed in Hadsell (2006) and Liau et al. (2012). While equation 4 captures short-term transitory variance, the last equation captures the long-term permanent variance.

AC-GARCH, captures short- and long-term changes in volatility due to STT. As Table 8 suggests, γ that captures the transitory asymmetric volatility is possessive, and marginally increased as tax was increased during 2005 and 2006 vis-à-vis earlier lower tax regimes, while the tax reduction in 2012 had a substantial positive effect on volatility reduction indicating that market returns during low tax regimes are less sensitive to negative shocks. The transitory volatility as captured by $\alpha + 0.5\gamma + \beta$ is mixed: when tax rate was increased from 0.1 per cent to 0.125 per cent in 2006, transitory volatility increased indicating that volatility is larger in the new increased tax regime, while an increment in 2005 shows a decline in volatility. However, the last reduction in tax (2012) is associated with a decline in volatility.

A larger ρ implies higher long-term volatility. The results, however, are mixed as tax increment in 2005 indicates an increase in volatility, while a further increment in 2006 suggests a marginal decline in volatility when compared to the level in 2005. Notably, reduction in tax in 2012 spurred a rise in permanent volatility relative to the level in 2006.

Table 8: STT and Volatility in Stock Returns

	1-Oct-2004	1-Jun-2005	1-Jun-2006	1-Jul-2012
μ	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
μ_1	0.132 (0.02)	0.131 (0.02)	0.129 (0.02)	0.121 (0.02)
q	0.001 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
α	0.978 (0.01)	0.980 (0.01)	0.975 (0.01)	0.984 (0.01)
γ	0.034 (0.02)	0.036 (0.02)	0.036 (0.02)	0.014 (0.01)
β	0.134 (0.02)	0.097 (0.02)	0.115 (0.02)	0.085 (0.02)
ω	0.003 (0.01)	-0.104 **(**0.03**)**	-0.117 **(**0.03**)**	-0.090 **(**0.03**)**
ρ	0.001 (0.01)	0.196 (0.04)	0.187 (0.04)	0.205 (0.04)
δ	-0.970 **(**0.05**)**	0.772 (0.09)	0.769 (0.10)	0.764 (0.08)
L	8036.516	8047.203	8048.953	8043.911
$\alpha+0.5\gamma+\beta$	0.62	0.58	0.60	0.57

Notes: The t-statistic is shown in parentheses. L is Log likelihood. $\alpha + 0.5\gamma + \beta$ *captures transitory volatility*

4.2 Impact on volumes

This section tries to estimate the impact of STT imposition and revisions on traded volume of the companies constituting the CNX Nifty Index. We use the switching first order autocorrelation model to examine the effect during the time period, Oct 2003-July 2013.

Sinha and Mathur (2012b) used a similar model to evaluate the impact of an increase in STT in 2006 on quantity traded, returns and volatility in returns on both BSE and NSE stocks. They considered the time period from June 1, 2005 to May 31, 2007, a window of one year before and after the revision in tax. Their data set comprised 302 out of 500 companies forming the CNX 500 Index (NSE). The chosen companies were classified into four sub-categories: NSEALL, NSELARGE, NSEMEDIUM and NSESMALL. The Switching First Order Autocorrelation Model was used to study the impact of STT change on the traded shares of these companies. Results were significant for NSELARGE and NSEMEDIUM suggesting an inverse relationship between upward revision in STT and shares traded of large and medium cap companies. Results for NSESMALL were also found to be statistically significant but the sign of the coefficient in this case was positive, indicating a switch in the volume of trade from large- and medium-sized to a small-sized stock portfolio.[32]

We examine the impact of STT imposition and all subsequent revisions[33]. Though we use the daily data from Oct 2003 to July 2013, we conduct a one-year event study to test the impact of imposition/revision, as in the section on volatility. For instance, daily data from Oct 3 2003- Sept 30 2005 has been used to evaluate the impact of STT imposition in October 2004. Shares traded of the companies constituting the CNX Nifty Index have been taken as a proxy

[32] For additional details, please refer to Sinha and Mathur (2012b).
[33] In the cash segment

for traded volume. We use the CNX Nifty Index since it is the benchmark index for Indian equity markets and represents overall market conditions. Data on shares traded was checked for stationarity using the Phillips-Perron test. There was no presence of unit root. Equation (6) specifies the model used in this analysis.

$$\mathbf{Vol_t = C + \alpha_1 Vol_{t-1} + \alpha_2 D_t * Vol_{t-1} + \varepsilon_t} \quad \text{.....(6)}$$

where, Vol_t and Vol_{t-1} represent aggregate shares traded of companies comprising the CNX Nifty Index in period t and t-1, respectively. D_t is the dummy variable which takes the value of 0 if $t \leq t^*$, and 1 if $t^* \leq t$ where t^* is the date of introduction/revision in STT. Table 9 shows the results for the impact of STT imposition and each revision.

Table 9: Impact of STT imposition/revisions on shares traded of companies constituting the CNX Nifty

	2004			**2005**		
	Constant	**α_1**	**α_2**	**Constant**	**α_1**	**α_2**
Coefficient	34554956	0.70*	-0.17*	25304554	0.72*	-0.04**
t-Statistic	10.07	23.58	-6.56	8.92	22.41	-1.77
Prob.	0.00	0.00	0.00	0.00	0.00	0.08
R-squared	0.65			0.50		
Adj. R-squared	0.64			0.50		
	2006			**2012**		
	Constant	**α_1**	**α_2**	**Constant**	**α_1**	**α_2**
Coefficient	35474903	0.57*	-0.03	78233479	0.52*	-0.09*
t-Statistic	11.47	15.19	-1.57	12.61	13.78	-3.81
Prob.	0.00	0.00	0.12	0.00	0.00	0.00
R-squared	0.32			0.29		
Adj. R-squared	0.32			0.29		

*Source: Author's calculations. Note: * indicates significance at all levels. ** indicates significance at 10 per cent level only.*

The results suggest a significant drop in shares traded of CNX Nifty companies after STT imposition in 2004 (at all levels of significance) and an upward revision in 2005 (at 10 per cent level only). As for the 2006 revision, the results indicate a decline in volumes but not a significant one. Results for the downward revision of STT in 2012 are contradictory as they indicate a significant fall (instead of an expected rise) in traded shares.

The model, however, is parsimonious and has its limitations. It does not control for other relevant variables which can have a bearing on the trading volume, such as volatility in returns, bid-ask spread, domestic/global macroeconomic fundamentals, investors' preferences etc. Data on companies constituting S&P BSE Sensex can also be included. Since, daily data

on the BSE Sensex does not provide information on aggregate traded shares of its constituent companies, conducting a similar exercise on daily data for each company included in the index was out of the scope of this study.

5. Conclusion

India's stock market has grown tremendously over the years in terms of market capitalisation. Turnover and volumes in both, the cash and equity derivatives segments of the two main stock exchanges of India have risen persistently over the last decade. The rate of increase in the derivatives segment, however, has been much higher than that of the cash segment. More importantly, there has been an unprecedented rise in the turnover of index options since 2008.

A whole host of factors such as arbitrage opportunities, rate of return, transaction charges and tax differentials can trigger the substitution of one financial asset class for another. Equity derivatives are highly leveraged and facilitate risk management and are thus, a preferred asset class for the hedgers. The uneven tax structure in different verticals of the Indian equity market is also to some extent, responsible for spurring the migration of volumes from the higher taxed segment (cash) to the one that has a lower tax rate (derivatives). There has also been substantial flight of capital to the lesser taxed geographies, such as the spurt in FII investment in Nifty Futures traded on SGX vis-a-vis those traded on NSE during the latter half of 2001-12. A comparison of trading costs at some of the global exchanges suggests that the mandatory costs component (inclusive of stamp duty and STT) of the total transaction cost in India is significantly higher than that in other exchanges. There is, however, a need to undertake further empirical research to discern the impact of transaction costs (particularly taxes) on migration of capital to substitutable asset classes as well as other geographies.

Our empirical results show a mixed response of volatility and volume to changes in STT. Results of the SGARCH model suggest that while upward revisions in STT in 2005 and 2006 caused a reduction in mean returns, the imposition of STT in 2004 led to an increase in them. AC-GARCH results show that market returns during low-tax regimes are less sensitive to negative shocks. The impact of STT on market efficiency and long-term volatility is unclear. As regards the impact of STT on volumes, results of our one year event study suggest a significant fall in the aggregate shares traded of the companies comprising CNX Nifty after STT was imposed in 2004. Results for upward revisions in 2005 and 2006 also suggest a fall in volumes, though not a significant one.[34] A downward revision in 2012 also, surprisingly, indicates a fall in traded volume.

Despite the reduction in STT over the years, it still constitutes a large percentage (next only to brokerage fee) of the total cost of trading. Lowering transaction costs by reducing taxes, especially STT, which forms the bulk of transaction costs, may help induce additional liquidity in both cash as well as derivative markets and smoothen the process of trading. It may also stem migration of capital to other markets although the efficacy of this effect needs

[34] Results for 2005 revision are significant at the 10 per cent level.

to be studied empirically. A more liquid cash market is always preferred, from a growth perspective, since higher liquidity not only facilitates trade and investment but also ensures efficient allocation of capital to the real sector. Though, liquidity in the derivative segment has grown faster compared to that in the cash segment, the former is nonetheless at a disadvantage compared to its global counterparts because of the higher relative transaction costs.

A large percentage of the savings of the Indian household sector are in fixed income instruments, especially deposits. The securities market comprises of a negligible proportion of such savings. Impediments such as high transaction charges and taxes in the securities market may further incentivize other avenues of investment. A thorough research of the market micro-structure and composition of traders in the few main segments, therefore, may be necessary before studying this issue in further detail. Revenue realisation from STT in India represents only a small percentage of GDP when compared with other Asian countries. Even though STT has contributed to the exchequer, it can be argued that the absence of such a tax could have added more to economic growth and hence, higher revenues by promoting smooth operation of the capital market.

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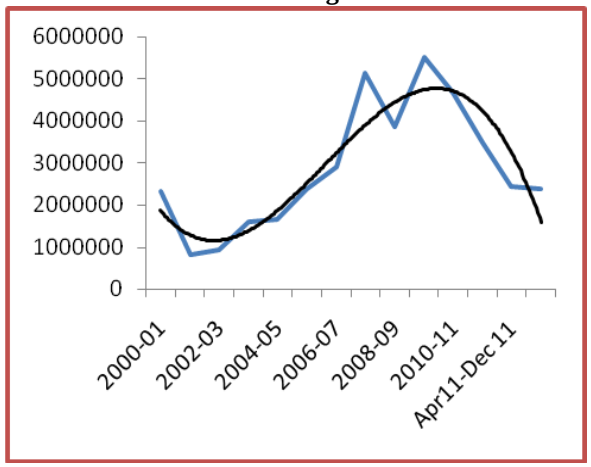
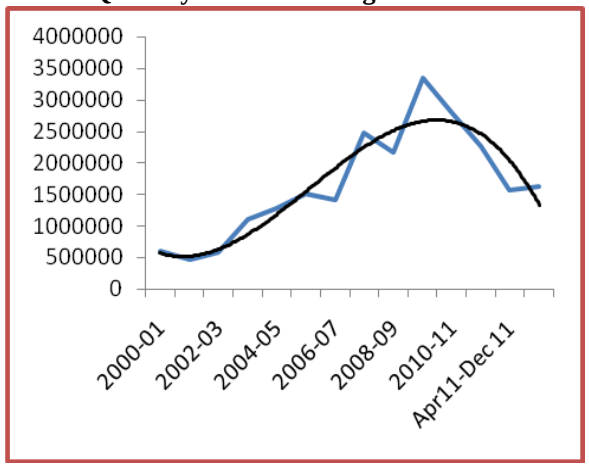
Appendix 1

Panel A Turnover and Volume in the Cash Segment of BSE and NSE (2000-12)

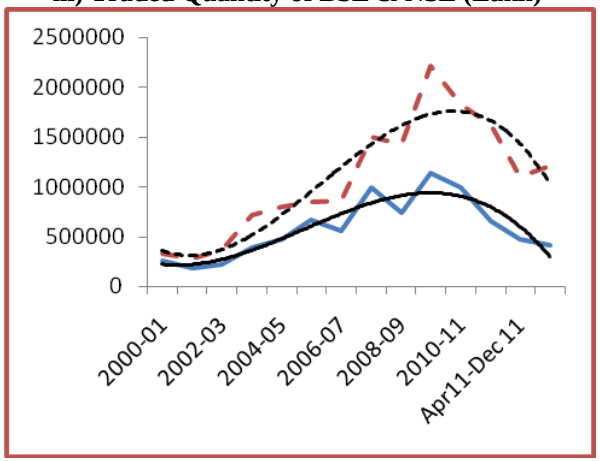
i) Combined Turnover of the Cash Segment of BSE and NSE (Rs. Cr)



ii) Combined Traded Quantity in the Cash Segment of BSE and NSE (Lakh)

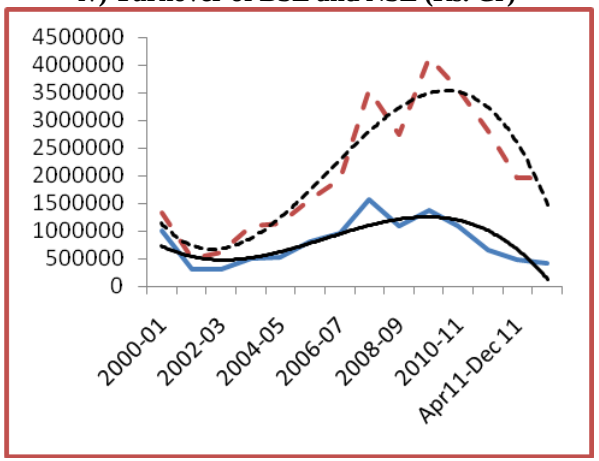


iii) Traded Quantity of BSE & NSE (Lakh)



Source: SEBI. Note: The dashed line represents NSE. The smooth curves represent trend lines.

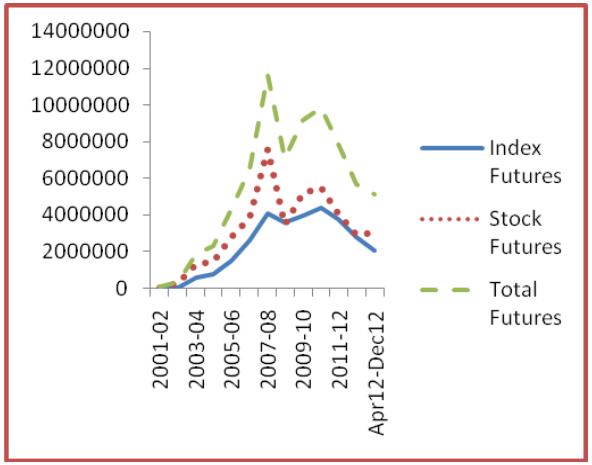
iv) Turnover of BSE and NSE (Rs. Cr)



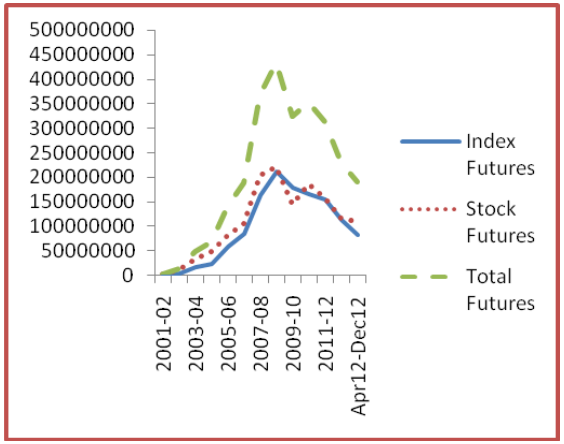
Source: SEBI. Note: The dashed line represents NSE. The smooth curves represent trend lines.

Panel B **Turnover and Volume in the F&O segment of BSE and NSE (2001-12)**

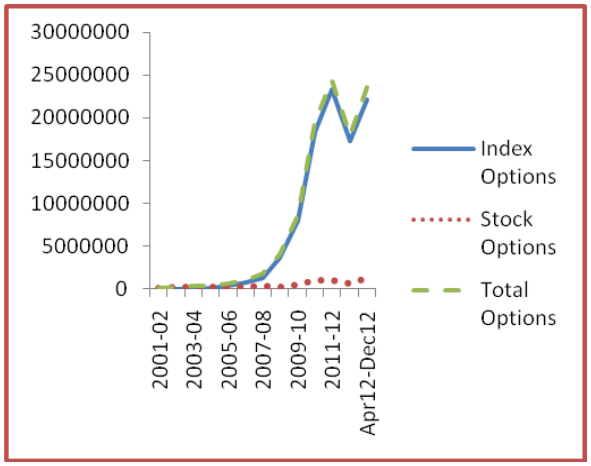
i) Turnover for Futures (BSE and NSE combined) (Rs. Cr)



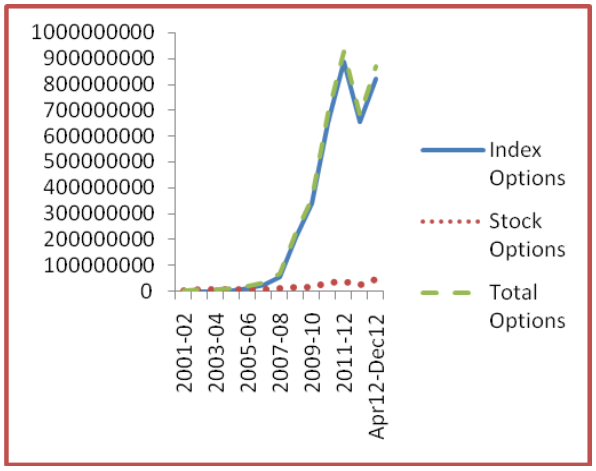
ii) No. of contracts Futures (BSE and NSE combined)



iii) Turnover for Options (BSE and NSE combined) (Rs. Cr)



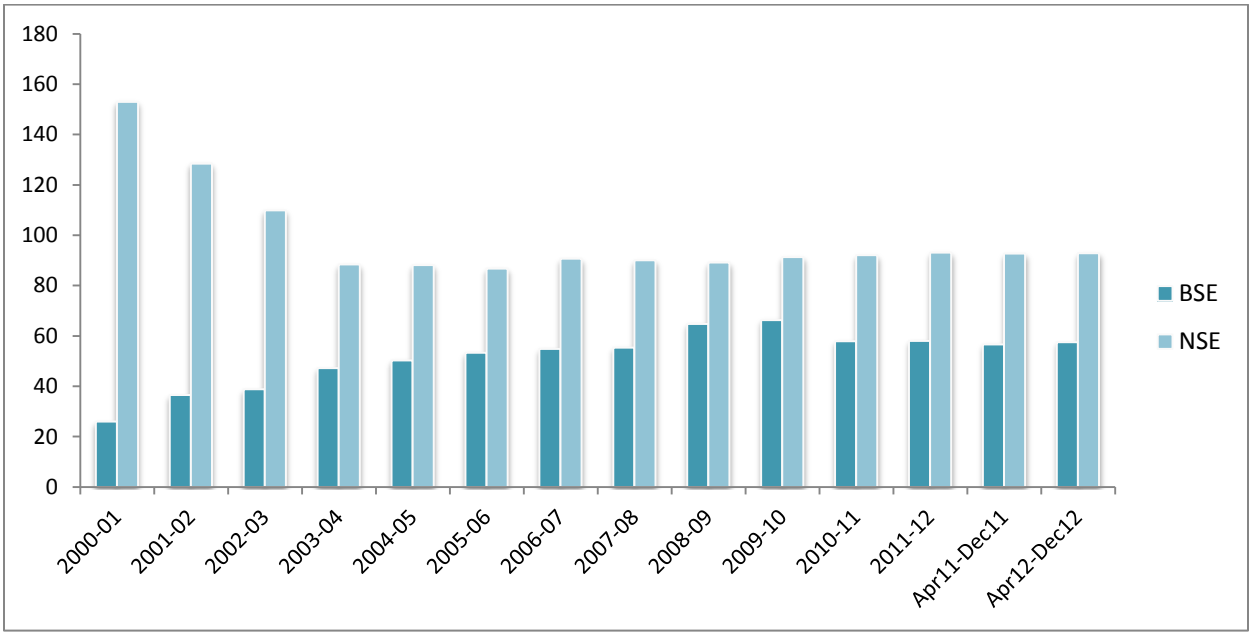
iv) No. of contracts Options (BSE and NSE combined



Source: Handbook of Statistics on Indian Securities Market 2012, April 2013

Appendix 2

Table A: Trading Frequency at BSE and NSE (Percent of traded companies to listed companies)



Source: Handbook of Statistics 2012, SEBI 2013.

Table B: Approximate cost of cash based delivery transactions valued at Rs 1 lakh (as of 2013) [35]

	Cost (incl. brokerage)	Percent of Total Cost (incl. brokerage)	Cost (exc. Brokerage)	Percent of Total Cost (excl. brokerage)
User Charges	**323**	**62.11**	**23**	**12.57**
of which:				
Brokerage (at the rate of 30 bps)	300	57.68	0	0
Exchange Transaction Charges	3	0.58	3	1.64
DP charges	20	3.85	20	10.93
Statutory levies	**147.08**	**28.28**	**110**	**60.11**
of which:				
STT	*100*	19.23	*100*	54.64
Service tax on brokerage	37.08	7.13	0	0
Stamp duty	10	1.92	10	5.46
SEBI turnover fee	**0**	**0**	**0**	**0**
Impact cost	**50**	**9.61**	**50**	**27.32**
Total	**520.08**	**100.00**	**183**	**100.00**

Source: Author's calculations

[35] The methodology in Table 2 has been borrowed from Mohanty (2011). Figures for brokerage cost, exchange transaction charges and SEBI turnover fee have been taken from Table 4, pg.206, SEBI Bulletin, March 2012. Figures for service tax and impact cost have been taken from NSE's website. Monthly Impact cost of CNX Nifty from Jan-Oct 2013 has been averaged to arrive at the figure provided in Table 2.

Table C: Nifty Futures Trading in SGX and NSE

Year	SGX Nifty Futures		NSE Nifty Futures	
	Volume	**Open Interest**	**Volume**	**Open Interest**
2008	36677	260165	741874	755599
2009	17128	140024	686597	637245
2010	38791	196297	509495	637420
2011	54685	252321	498515	534748
2012	57553	286562	324041	497241
2013	56981	306673	247886	392140
CAGR till 2012	**11.92**	**2.45**	**-18.70**	**-9.93**

Source: Bloomberg Note: Figures for 2013 are till the month of July

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