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Abstract

This paper studies the effect of Securities Transaction Tax (STT) on the behavior of the returns on the Indian stock market using a switching first order autocorrelation model. It is found that an increase in STT doesn't influence the return on American Depository Receipts (ADRs) which are dually listed in United States of America and India. The increase in STT doesn't have a major impact on the returns of the stocks listed on the National Stock Exchange in India whereas it influences the volume of traded shares. Volatility of stocks listed on the National Stock Exchange in India is affected by the change in tax level and thus investors switch from large and medium sized stocks to small sized stocks to mitigate the risk.

Keywords: Securities Transaction Taxes, Stock Markets, Returns, Risk

JEL Codes: G14, G18, G28

Introduction

Securities Transaction Tax (referred to STT later) is a tax levied on every transaction in the stock market, irrespective of the fact whether it is a profit earning or a loss making transaction. STT is levied on the gross amount traded and not on the profit or loss. On July 1, 2012, STT on equity transactions was reduced to 0.1% from 0.125% in India. STT has recently been in the discussion since the Expert Committee in its report on General Anti Avoidance Rules (GAAR) in Income-tax Act, 1961 headed by Dr. Parthasarathi Shome recommended an increase in the level of Securities Transaction Tax (Government of India, 2012).

Arguments in favor of Securities Transaction Tax

Keynes (1936) discusses the imposition of STT would lead to an increase in welfare and bring a reduction in wastage of resources and market volatility. Tobin (1978) is of the view of taxing foreign exchange transactions to reduce speculation in capital markets. Summers and Summers (1989) argue that STT would help in reduction of instability due to speculation and the benefits of increased revenue would exceed the disadvantages in the form of reduced liquidity and higher transaction costs.

In agreement with the proponents of imposition of STT, Stiglitz (1989) addresses the issue by questioning the desirability of the tax. The author believes STT would discourage noise traders leading to less volatility in stock markets.

Arguments against imposition of Securities Transaction Tax

A number of studies have been against the imposition of Securities Transaction Tax, Roll (1989) attempts to study whether an increase in transaction taxes leads to a fall in volatility. He finds that imposition of transaction taxes are inversely but insignificantly correlated with volatility in some countries.

Umlauf (1993) examines the impact on Swedish Equity Returns due to imposition of transaction taxes over the period from 1980-1987. With introduction of a 1% round-trip tax on equity transaction and a subsequent increase in the tax, the author concludes that volatility doesn't decline, although stock prices and turnover fell during the period. Opponents of STT including Kupiec (1995) is of the view that STT is likely to impede the information efficiency of markets by discouraging the volume of information motivated trading. A later work of Kupiec (1996), discusses STT alters the relative price of assets by discouraging agents from selling shares rather than reducing speculators to purchase shares. This leads to decline in volatility accompanied by a fall in the level of taxed asset's price thus leading to an increase in volatility of risky asset returns, thereby defying the very purpose of imposition of tax to reduce volatility.

Froot and Perold (1995) discusses that a decrease in transaction costs does not hamper the dissemination of information leading to a fall in autocorrelation of index returns. It demonstrates

the change in first order autocorrelation of 15 minute S&P 500 index returns for the period 1983-1989. Hu (1998) tries to study the effect of stock transaction tax on the stock market for a number of Asian Economies including - Hong Kong, Japan, Korea, and Taiwan during the period 1975-1984. He concludes that an increase in tax rate is bad news for the return on market and doesn't find significant change in market volatility and turnover. He iterates that stock transactions tax doesn't have the potential to reduce noise trading.

Habermier and Kirilenko (2003) based on literature on market microstructure, asset pricing, rational expectations, and international finance conclude that transaction taxes can have negative effects on price discovery, volatility, and liquidity and lead to a reduction in market efficiency.

Lo et al. (2004) develop a model to examine the influence of transaction costs on the level of trading volume. They conclude that a one percent increase in the transactions cost decreases trading volume by only 0.25 percent. Chou and Wang (2006) assess the affect on trading volume and bid ask spread when transaction tax is reduced, they find trading volume is increased and bid-ask spread decreased. They argue that reduction in transaction tax doesn't increase price volatility.

More recently, a study undertaken by Pomeranets and Weaver (2011) examines the changes in New York State Securities Transaction Tax for the time period between 1932 and 1981. The affect of the tax is studied on the volatility of returns, width of the spread and volume traded. The authors agree with work of opponents, as they find imposition of STT leads to increase in the width of bid-ask spread and lower trade volumes. The authors are unable to find a consistent relationship between tax and volatility.

Liu (2007) examines the effect of transaction cost on times series behavior of stock returns and concludes that there is a significant decrease in returns for Japanese stocks listed in Japan but no change on the returns of stocks dually listed in both, Japan and United States of America. Sinha and Mathur (2012) discusses the evolution of Securities Transaction Tax in India and examines the impact of increase in level of STT on traded volume by using bootstrap method.

In this paper, we investigate the impact of the increase in STT, effective from June 1, 2006, on return, volume of traded shares and risk of stocks listed on National Stock Exchange (NSE) in Indi and returns of ADRs dually listed in India and United States of America, using switching first order autocorrelation model.

I. Data, Methodology and Empirical Findings

I.1 Data

The study uses daily data of stocks contained in S&P CNX 500 Index. The index is India's first broad based stock market index. The owner of the Index is National Stock Exchange. It consists of the 500 most actively traded stocks in India. We use CMIE's Prowess database to extract daily data for all the stocks in the S&P CNX 500 Index. The sample period extends from June 1, 2005 to May 31, 2007 for the tax event occurred on June 1, 2006. The level of STT on equity transactions was increased from 0.1% to 0.125% on June 1, 2006. We could use daily adjusted closing price and daily shares traded data for only 302 companies listed on the index, since data for only these stocks was available continuously for the two year period.

Out of the 15 ADRs listed both in India and United States, the study uses data for seven Indian stocks (American Depository Receipts, ADRs) dually listed in New York Stock Exchange in United States of America and National Stock Exchange in India during the two year sample period. Daily adjusted closing price data for the two year period for ADRs is extracted from Yahoo Finance. The seven stocks which are included in the study are mentioned in Table 1.

Table 1: ADRs used in the current study

	Ticker Symbol	
Stock	**NSE**	**NYSE**
Dr. Reddys Laboratories Ltd.	DRREDDY	RDY
HDFC Bank Limited	HDFCBANK	HDB
Mahanagar Telephone Nigam Limited	MTNL	MTE
Tata Motors Limited	TATAMOTORS	TTM
ICICI Bank Limited	ICICIBANK	IBN
Wipro Limited	WIPRO	WIT
Tata Communication Limited	TATACOMM	TCL

Besides, data for ADRs, the study also uses daily closing level data of S&P 500. S&P 500 is a stock market Index based on common prices of 500 top publicly traded American companies. S&P 500 data is used to determine the influence of the host and the home market on the ADR closing level. The data source of S&P 500 is Yahoo Finance.

I.2 Methodology and Empirical Findings

The portfolios are categorized into control portfolios and treatment portfolio. The control portfolio consists of the 7 Indian stocks dually and continually listed in United States during the two year period. Returns on the ADRs are subjected to the economic forces in India, like the returns on the stocks listed in India. S&P 500 index closing price are also part of the control portfolio.

For the treatment portfolio, 302 stocks are sorted by size, size is measured by market capitalization as of 31st May, 2006, the day prior to the increase in STT. Four treatment stock portfolios are constructed: NSEALL (this is an equally weighted portfolio covering all 302 stocks) and is categorized into three sub portfolios as per market capitalization. These are NSELARGE (covering all large stocks), NSEMEDIUM (covering all medium stocks), NSESMALL (covering all small stocks). The impact of the tax on each of the portfolios has been assessed by studying their return from adjusted closing price, shares traded and risk.

Using the daily adjusted closing prices of the 302 stocks in the treatment portfolios and 7 ADRs and closing level of S&P 500, daily returns for each by the following formula are calculated:

$$\text{Return} = \ln (P_{t+1}) - \ln (P_t)$$

Besides return, risk using the standard deviation of return for each day over the two year sample period for each of the four treatment portfolios respectively is calculated.

Table 2 contains summary statistics for the returns on both the control portfolio (ADRs and S&P 500) and the treatment portfolio. Table 3 contains summary statistics for traded shares for treatment portfolios. Table 4 contains summary statistics for risk (standard deviation of returns) for treatment portfolios.

Table 2: Summary Statistics for daily returns on control and treatment portfolios

Portfolio	Number of stocks	Mean	Median	Minimum	Maximum
Control Portfolio					
ADR	7	0.0013	0.0028	-0.0698	0.0891
S&P 500	500	0.0013	0.0009	-0.0353	0.0213
Treatment Portfolio					
NSEALL	302	0.0011	0.0031	-0.0816	0.0618
NSELARGE	110	0.0013	0.0037	-0.0748	0.0654
NSEMEDIUM	96	0.0012	0.0032	-0.0903	0.0561
NSESMALL	96	0.0008	0.0025	-0.0871	0.0636

Table 3: Summary Statistics for daily traded shares for treatment portfolio

Portfolio	Number of stocks	Mean	Median	Minimum	Maximum
Treatment Portfolio					
NSEALL	302	956850.5	922102.3	127830.4	1894854.4
NSELARGE	110	1522824.6	1460871.1	236301.3	2780671.1
NSEMEDIUM	96	572040.1	517951.3	58897.5	1690041.1
NSESMALL	96	693149.1	551957.7	71182.7	4025195.2

Table 4: Summary Statistics for risk (standard deviation) for treatment portfolio

Portfolio	Number of stocks	Mean	Median	Minimum	Maximum
Treatment Portfolio					
NSEALL	302	0.0231	0.0223	0.0140	0.0530
NSELARGE	110	0.0208	0.0197	0.0104	0.0775
NSEMEDIUM	96	0.0233	0.0223	0.0136	0.0558
NSESMALL	96	0.0244	0.0238	0.0129	0.0561

I.2.2 Returns

To assess whether the ADRs are influenced by stocks in Indian market (via treatment portfolios) and host markets (S&P 500), we compute the correlations between the return on the control portfolios and those to the treatment portfolios (NSEALL, NSELARGE, NSE MEDIUM, NSESMALL) and the S&P 500. Table 5 reports the correlations in the two year sample period.

Table 5: Correlations between Returns on ADRs and Return on S&P 500, and treatment portfolios

Correlation	S&P 500	NSEALL	NSELARGE	NSEMEDIUM	NSESMALL
ADR (Pearson)	0.5902	0.1411	0.1250	0.1420	0.1489
ADR (Spearman)	0.5340	0.1300	0.1150	0.1230	0.1350

The correlations between ADR return and returns on the above five portfolios are relatively very low except in the case of S&P 500 (host market of ADRs).

To assess the relative influence of the home and host market, a linear regression model is used with independent variables being returns of S&P 500 and NSEALL and dependent variable being returns of ADR in the two year sample period. The following results are obtained from the linear regression:

ADR = 0.0004 + 1.617*SNP + 0.123*NSEALL……Equation (1)

(0.0000)*** (0.0045)***

df= 498 Adjusted R^2=35.59%;

*** significant p values

From Equation (1), it is clear that ADR returns are poorly correlated with returns on NSEALL.

Now let us investigate the efficiency effects of the change in STT on June 01, 2006, this can be done by using the following switching first order autocorrelation model (Liu, 2007).

$R_t = c + \beta R_{t-1} + \mu DUMMY^* R_{t-1} + \varepsilon_t$……Equation (2)

Where R_t is the return on a portfolio (ADR, NSEALL, NSELARGE, NSEMEDIUM, and NSESMALL) on a day t, R_{t-1} is the lagged return on a portfolio respectively and DUMMY is the variable, which takes the value 0 for dates ranging between June 1, 2005 and May 31, 2006 and it takes the value 1 for dates ranging between June 1, 2006 till May 31, 2007. We run the model as specified in Equation (2) separately for each of the five portfolios. The regression results are summarized in Table 6.

Table 6: Summary of Switching First Order Autocorrelation Model

Model	**Portfolio\Coefficients**	**C**	**β**	**μ**	**Adjusted R^2**	**F statistic for significance of the model**
I	ADR	0.0012 (0.1261)	0.0501 (0.4534)	-0.0141 (0.8753)	-0.0022	0.459708 (0.631735)
II	NSEALL	0.0009 (0.1616)	0.1760 (0.0116)	0.0069 (0.9389)	0.0285	8.300554 (0.000285)
III	NSELARGE	0.0011 (0.0992)	0.1606 (0.0246)	-0.0482 (0.5969)	0.0138	4.476278 (0.01184)
IV	NSEMEDIUM	0.0010 (0.1375)	0.1805 (0.0098)	0.0479 (0.5932)	0.0405	11.49333 (0.000013)
V	NSESMALL	0.0006 (0.3361)	0.1818 (0.0067)	0.0342 (0.7003)	0.0369	10.50836 (0.000034)

The associated p values of the coefficients of the model are given in parentheses. The coefficient of R_{t-1} and (DUMMY* R_{t-1}) β and μ are the first order autocorrelation coefficients for all the five portfolios respectively. In Model I, the coefficients (β and μ) for the control portfolio (ADR) are not significant. This implies increase in STT in India doesn't influence the return on ADRs which are dually listed in India and United States of America.

Whereas for the treatment portfolios (NSEALL, NSELARGE, NSEMEDIUM, NSESMALL), the coefficient of R_{t-1}, that is β, is significant at 5% level of significance. The coefficient of R_{t-1} (β), rises as we move from a portfolio with large sized stocks to a portfolio with small sized stocks (the portfolios are sorted as per market capitalization of the stock as on May 31, 2006). Thus, first order autocorrelation coefficient increases as firm size decreases, this is consistent with the finding by Liu (2007). As the coefficient increases, this implies that smaller sized stocks are priced less efficiently. On the other hand, the coefficient of (DUMMY* R_{t-1}), μ, is not significant at 5% level of significance for any of the treatment portfolios. Thus, the treatment portfolios (NSEALL, NSELARGE, NSEMEDIUM, and NSESMALL) do not experience a statistically significant change around June 1, 2006 when the STT was increased from 0.1% to 0.125%. Thus, efficiency measured by the first order autocorrelation, remains unaffected by the change in the level of STT.

I.2.2 Traded Shares

Let us now study the effect of change in STT on traded shares using the switching first order autocorrelation model.

$$TV_t = \gamma + \gamma' TV_{t-1} + \gamma'' DUMMY^* TV_{t-1} + \varepsilon_t \quad \text{.....Equation (3)}$$

Where TV_t is the average number of traded shares of a portfolio (NSEALL, NSELARGE, NSEMEDIUM, and NSESMALL) on a day t, TV_{t-1} is the lagged value average number of traded shares of a portfolio and DUMMY is the variable, which takes the value 0 for dates ranging between June 1, 2005 and May 31, 2006 and it takes the value 1 for dates ranging between June 1, 2006 till May 31, 2007. The results of the estimates model as specified in Equation (3) for each of the four portfolios are reported in Table 7.

Table 7: Summary of Switching First Order Autocorrelation using Traded shares data

Model	Portfolio\Coefficients	γ	γ'	γ''	Adjusted R^2	F statistic for significance of the model
I	NSEALL	350077.2 (0.0000)	0.6390 (0.0000)	-0.0071 (0.6631)	0.4159	178.3579 (0.0000)
II	NSELARGE	795380.9 (0.0000)	0.5033 (0.0000)	-0.0507 (0.0069)	0.2678	92.09027 (0.0000)
III	NSEMEDIUM	163794.3 (0.0000)	0.7530 (0.0000)	-0.0886 (0.0002)	0.6104	391.1426 (0.0000)
IV	NSESMALL	153492.9 (0.0000)	0.7340 (0.0000)	0.0796 (0.0217)	0.6706	508.0196 (0.0000)

The associated p values of the coefficients of the model are given in parentheses. The first order autocorrelation coefficient (**γ'**) of all the four portfolios is significant at 5% level of significance. Whereas, in the fourth column of Table 7, it is found that the first order autocorrelation coefficient (with dummy) which takes the tax change into account (**γ''**) of NSEALL (Model-I), is not significant at 5% level of significance. The coefficient (**γ''**) is negative for NSELARGE (Model-II) and NSEMEDIUM (Model-III) and significant at 5% level of significance. The same coefficient (**γ''**) is positive and significant for NSESMALL (Model-IV). One can assert that traded shares are affected by the tax event on June 01, 2006. The traded shares of Large and Medium sized stocks portfolio decline with a rise in STT. The positive coefficient (**γ''**) of the Small sized stocks portfolio indicates that investors switch their strategy in favor of Small sized stocks, thus with rise in STT there is a shift of volume of trade from Large and Medium sized stock portfolio towards Small sized stock portfolio.

I.2.3 Risk

Model-I

Next, the impact of increase in STT on risk on treatment portfolio is studied using two models specified in the following Equation 4 and Equation 5:

$$R_t = k+\tau R_{t-1} + \varphi DUMMY^* R_{t-1} +\chi(SD_t) + \varepsilon_t \quad \text{.....Equation (4)}$$

Where R_t is the return on a portfolio (NSEALL, NSELARGE, NSEMEDIUM, and NSESMALL) on a day t, R_{t-1} is the lagged return on a portfolio and DUMMY is the dummy variable, which takes the value 0 for dates ranging between June 1, 2005 and May 31, 2006 and it takes the value 1 for dates ranging between June 1, 2006 till May 31, 2007. SD_t is the standard deviation of the return of a portfolio (NSEALL, NSELARGE, NSEMEDIUM, and NSESMALL) on a day t. The results of regression model as specified in Equation (4) for each of the four portfolios considered as treatment portfolio are reported in Table 8.

Table 8: Summary of Switching Order Autocorrelation model with a risk component

Model	Portfolio\Coefficients	Constant, k	ô	Φ	χ	Adjusted R^2	F statistic for significance of the model
A	NSEALL	0.0064 (0.0496)	0.1589 (0.0237)	0.0022 (0.9808)	-0.2351 (0.0857)	0.0324	6.544109 (0.00024)
B	NSELARGE	0.0057 (0.0292)	0.1458 (0.0419)	-0.0491 (0.5888)	-0.2183 (0.0691)	0.0184	4.104473 (0.006808)
C	NSEMEDIUM	0.0056 (0.0437)	0.1642 (0.0195)	0.0456 (0.6107)	-0.1990 (0.0859)	0.0443	8.679465 (0.000013)
D	NSESMALL	-0.0028 (0.3556)	0.1875 (0.0053)	0.0413 (0.6429)	0.1411 (0.2460)	0.0375	7.460286 (0.000068)

The associated p values of the coefficients of the model are given in parentheses. It is observed that coefficient of risk (χ) is negative for NSEALL, NSELARGE and NSEMEDIUM and significant, with a level of significance of approximately less than 9%. Risk measured in terms of standard deviation bears a negative relationship with return, thus it is consistent with the financial theory. The coefficient of risk (χ) for NSESMALL (small sized stocks) is not significant. It indicates that there is no relationship between risk and return in small sized stocks.

Model-II

Another model that this study uses is to examine the relationship between risk and level of STT as mentioned in specification of Equation (5).

$$SD_t^2 = g + \nu\ DUMMY*(SD_{t-1})^2 + \varepsilon_t \quad \text{.....Equation (5)}$$

Where SD_t^2 is the square of the standard deviation of the return of a portfolio (NSEALL, NSELARGE, NSEMEDIUM, and NSESMALL) on a day t, SD_{t-1}^2 is the lagged square of standard deviation of the return for the four portfolios and DUMMY is the variable, which takes the value 0 for dates ranging between June 1, 2005 and May 31, 2006 and it takes the value 1 for dates ranging between June 1, 2006 till May 31, 2007. The results of the model as specified in Equation (5) for each of the four portfolios in treatment portfolio are reported in Table 9.

Table 9: Summary of results for risk (Specification in Equation 5)

Model	Portfolio\Coefficients	g	v	Adjusted R^2	F statistic for significance of the model
A	NSEALL	0.0005 (0.0000)	0.2316 (0.0000)	0.0835	46.2951 (0.0000)
B	NSELARGE	0.0004 (0.0000)	0.1615 (0.0000)	0.0309	16.87554 (0.000047)
C	NSEMEDIUM	0.0005 (0.0000)	0.2682 (0.0000)	0.0811	44.95818 (0.0000)
D	NSESMALL	0.0006 (0.0000)	0.1723 (0.0000)	0.044	23.89908 (0.000001)

The associated p values of the coefficients of the model are given in parentheses. It is seen that the coefficient of lagged square of standard deviation of the return (ν) is significant for all the four portfolios. Thus one can argue that, change in tax affects the risk of return for the four portfolios. In other words, by simple regression, we conclude that tax affects volatility of return on assets. This argument is consistent with the opponents of STT who believe that increase in STT would lead to increase in volatility of returns rather than reducing volatility in the stock market (Umlauf, 1993).

II. Conclusion

With the change in STT continuing to be a debatable issue in India inspite of the recent decrease in STT on equity transactions on July 1, 2012 from 0.125% to 0.1%. The study tries to assess

whether a change in tax affects the returns of dually listed stocks and stocks listed on the National Stock Exchange in the two year period surrounding the tax event on June 1, 2006, when tax on equity transactions was raised from 0.1% to 0.125%.

Employing the Pearson and Spearman correlations we investigate whether the ADRs are influenced by stocks in Indian market (via treatment portfolios) and host markets (S&P 500) and conclude that the correlations between ADR return and returns on the portfolios are relatively very low except in the case of S&P 500 (host market of ADRs). Similar results were seen when a two factor regression model is used, the host market dominates in the price discovery process for the dually listed stocks.

Using a switching regression analysis of the first order autocorrelation in stock returns of ADR (control portfolio) and stocks listed on the National Stock Exchange, it is found that increase in the Securities Transaction Tax in India doesn't influence the return on ADRs which are dually listed in India and United States of America. For the stocks considered in the treatment portfolio, the first order autocorrelation coefficient increases as firm size decreases; this implies that smaller sized stocks are priced less efficiently compared to medium and large sized stocks. After the tax event, efficiency measured by the first order autocorrelation, remains unaffected by the change in the level of STT. On applying switching regression analysis to traded shares data for the four treatment portfolios, it is concluded that the first order autocorrelation coefficient is significant following the tax event, thus volume of traded shares are influenced by the change in tax rate on equity transactions.

With respect to risk, it concludes that risk and return are inversely related even after increase in the level of STT imposed on equity transactions. The large and medium sized stocks are affected while the returns of small sized stocks are not affected by risk following the tax event. Another conclusion from the study which is consistent with the previous studies (Umlauf, 1993) is that volatility of return rises with the increase in Securities Transaction Tax from 0.1% to 0.125%. Thus the study asserts that the increase in STT is not desirable in India opposing the recommendation by the Expert Committee in its report on General Anti Avoidance Rules

(GAAR) in Income-tax Act, 1961 headed by Dr. Parthasarathi Shome (Government of India, 2012).

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