Turnover Tax and Trading Volume: Panel Analysis of Stocks Traded in the Japanese and US markets

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ABSTRACT

Japan eliminated turnover tax on stock trading through the end of the 1990’s to revitalize its ailing stock market by reducing the overall stock trading transaction cost. This paper empirically examines the effect of this exogenous, institutional change in tax policy on stock trading volume in the Japanese market. To do so, we use panel data of stocks traded both in the Japanese and United States markets and compare changes in their trading volumes at the times of the tax changes. A statistically significant increase in the trading volume was found in the Japanese market but not in the United States market for April 1999. However, such a result was not obtained for April 1996. These results indicate that the abolition of turnover tax in 1999, but not the rate reduction in 1996, contributed to the trading volume increase.

Key Words: turnover tax, taxation on financial transactions, stock trading volume, Japanese market

Journal of Economic Literature Classification Numbers: (C53), G18, H24, H25
1. INTRODUCTION

Japan’s stock market fell into the deepest slump in its history when the bubble economy burst at the beginning of 1990s. Within a few years, the NIKKEI price index had plunged to below half its peak value at the end of the 1980s\(^1\). After some fluctuations, it started to drop again in the mid-1990s and continued to do so until it finally hit a 21-year low of some 7,600 yen in April 2003. It was widely believed that this slump in the stock market caused the weakening of the Japanese economy at large by damaging the balance sheets of its financial institutions and other major corporations. With the rapid globalization of financial markets, it was also believed that this market turmoil would lead to the loss of status of Tokyo as a world financial center, which once almost matched that of New York. The widespread concern about such loss of status is best expressed in the 1998 Tax Commission interim report stating:

“as financial globalization advances, financial transactions are becoming more and more sensitive to transaction cost. Therefore, if the cost including transaction fees and turnover taxes remains high relative to the international standard, transactions themselves may shift outside Japan\(^2\).”

Accordingly, to revitalize the stock market, thereby alleviating the said loss of status, the Japanese Government cut the rate of the securities transactions tax (hereinafter STT) levied on each transaction of shares and bonds twice in the 1990s, before completely abolishing it in April 1999, as a part of the Japanese Big Bang.

Sometime prior to the tax changes in Japan, an intensive policy debate was ignited in the United States (US) in the aftermath of the stock investment boom in the 1980s and the subsequent Black Monday market plunge in October 1987. This concerned the introduction rather than abolition of a turnover tax on stock trading. Opinions were widely divided. Stiglitz (1989), and Summers and Summers (1989), for instance, were in favor of the introduction, arguing that the tax would reduce excess volatility and thus increase the efficiency of the stock market, as well as serve as a good revenue source\(^3\). On the other hand, Hakkio (1994) criticized this line of argument as lacking sufficient evidence. He argued that, because the tax would also suppress the “rational” trading based on market fundamentals, the damage to the market would

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\(^1\) The NIKKEI average hit a historical high of 38,915 yen on December 29, 1989, and dropped below 15,000 yen in August 1992.

\(^2\) The authors' own translation.

\(^3\) The US had already abolished all turnover taxes on financial transactions by 1981, but in 1987 then House Speaker Jim Wright proposed legislation to re-introduce the tax. In 1991, the Republican leadership also reportedly considered a similar bill under the Bush Administration.
outweigh the benefit to it⁴.

In parallel with those policy debates, several studies have formally investigated the effects of transaction cost in general, and of a turnover tax in particular, on stock market behavior, including Barclay et al. (1998), Epps (1976), Hu (1998), Jackson and O'Donnell (1985), Keifer (1987, 1990), Lingrend and Westlund (1990), Roll (1989), and Umlauf (1993). They conducted empirical studies with data from the US, United Kingdom (UK), Sweden, and four Asian countries, and reported that transaction cost exerts an adverse effect on transaction volume, but that its effects on price and return volatility are not clearly supported one way or the other. On the other hand, Constantinides (1986) and Vayanos (1998), for instance, explored the issue theoretically, deriving the results consistent with the findings of the empirical studies. In short, these academic studies were not clear-cut on the effects of a turnover tax on stock markets. The aforementioned Tax Commission report states, in referring to the Japanese STT, “theoretically a turnover tax is generally believed to have a negative effect on the trading and efficiency of the market and a positive effect on the reduction of volatility, but it is not made clear as of yet to what extent the present STT ... affects the actual trading.”⁵

As this statement infers, a concrete, academic investigation is essentially non-existent for the Japanese STT to date, despite various simulations and reform plans having been suggested in the midst of policy debates on stock market reforms in the mid-1990s.⁶ We aim to partially fill this gap and quantitatively examine the effects of the STT on Japan’s stock market, thereby evaluating the tax changes in the late 1990s. There are at least three important aspects of a stock market of concern: trading volume, prices, and volatility. As a first exploration into this ambitious research agenda, in the present paper we take up only the first, leaving the other two for future investigation. That is, we investigate whether the STT reduction during the 1990s achieved the aimed objective of increasing transactions in the Japanese market.

This paper is organized as follows. The next section overviews Japan’s STT, including the history of its reform. Section 3 briefly reviews the related literature focusing on trading volume only. Section 4 explains the methodologies and data employed in this analysis, with the results reported in Section 5. The final section

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⁴ Other opponents to the financial turnover tax include Kupiec (1996), Ross (1989), Schwert and Seguin (1993), and Stultz (1994).
⁵ The authors' own translation.
summarizes the findings and offers concluding remarks in a broader perspective, with
caveats of this analysis and venues for future research.

2. JAPAN’S STT: INSTITUTIONAL OVERVIEW

Japan’s STT was an ad valorem tax levied on value of transactions of shares and
bonds to be paid by the seller. It is classified as a turnover tax, because the tax base is
the volume of transactions, namely, transfers of ownerships of financial assets. It is
different from income taxes on interest payments and dividends because it is not levied
on the fruit of capital. It is also different from a capital gains tax, because it is payable
whether or not assets are transacted for a higher price than in the previous transaction.
In Japan, such turnover taxes include, besides the former STT, real estate and
automobile transaction taxes.

Japan first introduced a turnover tax in 1937, but abolished it in 1950 following
Shoup’s Advisory Opinion. As early as 1953, however, it was reintroduced when the
new capital gains tax under Dr. Shoup’s advice was abolished on the grounds that it
would have an adverse effect on capital accumulation, which was much needed for
recovery from the war. In the period following, the STT rate on stock trading was
increased four times: 1957, 1973, 1978, and 1981. In the 1980s, however, the STT came
to be acknowledged as a distortion of securities transactions and thus an impediment to
the development of Japan’s capital markets. Thus, in 1989, the STT was cut for the first
time. Moreover, when the stock market fell into a great slump in the 1990s, the STT
was cut in 1996 and 1998, and finally was completely abolished in 1999 (see Table 2-1).
The tax cut in 1996 was partial in that it was not applied to brokerage firms’ own
trading; only the tax rate for other trading was reduced from 0.03% to 0.021%. The
reduction in 1998 applied to both types of trading, however. The rate for brokerage
firms’ trading was reduced from 0.012% to 0.006%, while that for other trading was
reduced from 0.021% to 0.01%. A year later, these two rates were both cut to zero in the
reform to abolish STT.

Table 2-1: Recent Historical Changes in STT Rates and Commission Fees

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7 It was called securities transfer tax.
8 This reform plan by the occupation forces after World War II drastically changed the Japanese tax
system. It was named after Dr. Carl Shoup of Columbia University, who headed the expert group to
formulate the opinion. Although termed an advisory opinion, it was a de facto order from the
occupation forces command.
9 More detailed description of the historical changes of the STT can be found in Shouken Dantai
Kyougikai (1992), for instance.
<table>
<thead>
<tr>
<th>Date</th>
<th>STT rates</th>
<th>Fees on Customers' Transaction Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brokerage firms</td>
<td>Non-brokerage firms</td>
</tr>
<tr>
<td>Apr 1996</td>
<td>From 0.03% to 0.021%</td>
<td></td>
</tr>
<tr>
<td>Apr 1998</td>
<td>From 0.012% to 0.006%</td>
<td>From 0.021% to 0.01%</td>
</tr>
<tr>
<td>Apr 1999</td>
<td>Abolished</td>
<td></td>
</tr>
<tr>
<td>Oct 1999</td>
<td></td>
<td>Liberalized for all trading</td>
</tr>
</tbody>
</table>

Source: STT rates, National Tax Agency, Statistical Annuals (various years); fees, Appendix in *Shoken Roppou* or the Compendium of Security Trading Laws.

These measures were in accord with similar changes that were already happening in other countries. For example, the US abolished federal tax on stock trading in 1965 and the last remaining New York state tax in 1981. In Europe, the UK reduced its turnover tax, known as stamp duty, by half in 1984 and again in 1986. In the 1990s, France and Denmark followed the same path as the UK, while Germany and Sweden completely abolished turnover tax in 1991. See Table II below for details.

**Table 2-2: Turnover Taxes on Stock Trading in Various Countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Outline</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Abolished federal tax in 1965 and New York State tax in 1981</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Reduced the rate from 2% to 1% in 1984 and from 1% to 0.5% in 1986</td>
</tr>
<tr>
<td>France</td>
<td>Reduced the registration tax rate from 4.8% to 1% and placed a limit on exchange tax in 1993</td>
</tr>
<tr>
<td>Denmark</td>
<td>Reduced the rate from 1% to 0.5% in 1995</td>
</tr>
<tr>
<td>Germany</td>
<td>Abolished turnover tax in 1991</td>
</tr>
<tr>
<td>Sweden</td>
<td>Abolished turnover tax in 1991</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Implemented federal stamp duty of 0.085%; various Kanton taxes also apply</td>
</tr>
<tr>
<td>Korea</td>
<td>Implemented sales tax of 0.15%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Implemented sales tax of 0.30%</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>Implemented STT of 0.01%</td>
</tr>
</tbody>
</table>

Sources: SIA (1994), Niimi (1996), Campbell and Froot (1994), and inquires to several brokerage firms.

It is obvious that a turnover tax like the STT constitutes a cost to transactions. It is not the only cost to stock trading, however. An individual or corporate investor usually transacts shares and bonds through security dealers, and pays them various fees such as sales fees, security deposit fees, and account opening fees, which are also considered as transaction cost. Under Japanese tax laws, consumption tax is also levied
on these fees. Further, in the finance literature, the bid-ask spread is often considered as a cost to transactions, too\textsuperscript{10}. In the same period that the STT was cut, the Japanese Government implemented large-scale stock market deregulation in the Japanese Big Bang and considered lowering these other transaction costs as well. For example, as shown in Table I, in April 1998, fees levied on large volume transactions in excess of five million yen were liberalized. In October 1999, fees on all transactions were liberalized. It is important to note these concurrent changes in transaction fees, because they would have qualitatively the same effect as the reduction in the STT rate. We would like to separate their effects from that of the STT reduction in the following analysis.

3. REVIEW OF PREVIOUS STUDIES

This section reviews some earlier studies empirically investigating the effect of a turnover tax on the volume of stock trading\textsuperscript{11}. Epps (1976) is essentially the earliest study on the subject. He estimated the elasticity of trading volume with respect to transaction costs, with treating taxes, bid-ask spread, and broker commissions being its three components. He examined the daily data of 20 common stocks listed on US stock exchanges for 90 days before the fee liberalization in 1968. His work was an ambitious attempt to derive a theoretical model of the demand function for brokerage service and deduced a concrete expression to estimate transaction volume. However, the function becomes nonlinear and very complex, necessitating some restrictive assumptions.

Jackson and O'Donnell (1985) attempted to answer the question with the British stamp duty over the period 1964 to 1984 in a much simpler framework on an aggregate market level. They supposed that price changes likely represent news affecting individual investors' evaluations on stock values, thereby causing transactions to occur. They accordingly regressed the transaction volume on price change and transaction cost, together with other variables thought to affect the trading volume in the UK market in a time-series setup, and report a large effect of the tax increase on transaction volume. Lindgren and Westlund (1990) examined the Swedish securities transaction tax for the period between 1970 and 1988 using a similar method, and report also a strong, but somewhat smaller effect. These regression models may be criticized as atheoretical, but have an unequivocal advantage in that they can be applied with the aggregate market

\textsuperscript{10} See, for instance, Barclay et al. (1998).

\textsuperscript{11} Other studies such as Constantinides (1986) and Vayanos (1998) theoretically analyze the effect of transaction cost in general, not a turnover tax per se, on trading volume and derive a significant negative effect. Barclay et al. (1998) estimate a strong effect of the bid-ask spread as a proxy of transaction cost empirically.
data for a longer period. Umlauf (1993) also took up the Swedish case and claimed that turnover declined in response to the introduction of a turnover tax. However, mainly concerned with the volatility, he did not conduct any formal statistical analysis but merely observed a change in the turnover rate between tax regimes.

Hu (1998) inquired, for four East Asian countries including Japan, whether there was a statistically significant difference in turnover before and after tax changes by a test of equality in population means. With 14 tax changes between 1975 and 1994 in the four countries, using 40 weekly observations, he concluded that overall there was no statistically meaningful effect of tax changes on turnover. For Japan in particular, he found that while the 1981 tax increase reduced trading volume significantly, the movement was statistically significant in the opposite direction for the 1978 tax increase. This is the only study known to the authors that deals with the Japanese STT\textsuperscript{12}. However, it only covers the period before the major changes were enacted. Moreover, Hu’s (1998) simple test of equality does not exclude the possibility of other factors affecting turnover. A closer look at Japanese institutional details of STT in the present study addresses these shortcomings.

4. METHODOLOGIES AND DATA

4.1. Methodologies

This study attempts to establish whether or not the reductions in the STT enacted during the 1990s increased trading volume significantly. In addressing this issue, we note that the US markets provide a useful control for institutional changes and compare the trading volume of stocks traded both in the Japanese and US markets around the dates of the tax changes in the former. If the tax changes in the Japanese markets had any impact on the trading volume of such stocks, we should be able to observe a significant change in the Japanese market but not in the US market because such institutional changes did not take place in the latter. In this comparison, we also note that the tax reform can not be the only source of changes in trading volume and, therefore, need to control for other possible determinants. In particular, we exploit a well-documented asymmetric V-shape relationship between the trading volume and price change in daily data (e.g., Karpoff [1987]). That is, we include returns and absolute values in panel data regressions of trading volume as an explained variable.

\textsuperscript{12} Sakata (1994) investigated the effect of transaction tax and volume in the context of stock index futures, however, there has not been any attempt in regards to stock spot transactions.
In executing the analysis, we employ the following simplest regression specification:

\[ V_{it} = \alpha_i + \beta_1 V_{i,t-1} + \beta_2 r_{it} + \beta_3 D_{jt} \gamma_j + \gamma_{jt} D_{jt} + \gamma_{us} D_{us} + \varepsilon_{it} \]  

(1)

where

\[ D_{jt} = \begin{cases} 1, & \text{if stocks are traded in the Japanese market and } t \geq t_0 \\ 0, & \text{elsewhere} \end{cases} \]

\[ D_{us} = \begin{cases} 1, & \text{if stocks are traded in the US market and } t \geq t_0 \\ 0, & \text{elsewhere} \end{cases} \]

Date \( t_0 \) stands for the date when the tax change was put in effect. \( V \) and \( r \) are the turnover rate and return, respectively. The turnover rate, defined as the number of shares traded divided by the number of shares listed, is used instead of the trading volume itself, in order to control for any changes in the number of shares listed. \( \varepsilon \) is a disturbance term. The subscripts \( jp \) and \( us \) denote Japan and the US, respectively. Also, the subscripts \( i=1,2,\ldots,N \), and \( t=1,2,\ldots,T \), stand for stock and date, respectively.

Here, we are interested in whether \( \gamma_{jp} \) is significantly greater than 0 while \( \gamma_{us} \) is not, because there was a tax reduction in the Japanese market but not in the US market at date \( t_0 \).

In this specification, we are assuming that the coefficients are common for all

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13 In this and the following two specifications, we also allowed for longer periods for the lagged dependent variable. However, the results were basically the same. So, we only employ one lag period.

14 In the comments on an earlier version of the paper, the referee suggested that we should also try out a specification allowing for shifts in the coefficients for \( r \) and \( V \) in addition to shifts in the intercepts. When we did so in this main specification, they were found to be significant for Japan but insignificant for the US. However, for Japan the shift in the intercept was negative and significant, while insignificant for the US. In the second model (to be explained), for Japan the shifts in the slope were significant but of the “wrong” sign in the second quadrant in the sense that the tax cut made the slope flatter, rather than steeper. For the US, the coefficients for \( r \) and \( V \) became insignificant. The results for the third model are various with no clear tendency for either country. These mixed results prompted us to drop the shift in the intercept while keeping the one on the slopes, but a similar tendency emerged. In view that the literature generally attempts to capture the effect of a tax cut on the trading volume by an intercept dummy, we attribute these unclear results to the erred addition of the slope shifts, and do not attempt to make any interpretations.
stocks traded in both markets; for example, the coefficients for Sony and Toyota are the same in the Japanese market as well as in the US market. This assumption, although simple and easy to understand, may be a little restrictive. Therefore, we also employ the following two somewhat unrestrictive specifications as a robustness check. More specifically, first we assume that the coefficients are the same for all stocks traded in the same market, but are different for each market. That is, the coefficients are different even for, say, Sony, if they are traded in the different markets. This assumption prompts us to sort the data by market, pool them from the same market, and then run the following regression for each of the two markets:

\[ V_i = \alpha_i + \beta_i V_{i-1} + \beta_i \bar{r}_i + \beta_i |\bar{r}_i| + \gamma_i D_i + \varepsilon_i, \quad (2) \]

where

\[ D_i = \begin{cases} 
1, & t \geq t_0 \\
0, & \text{elsewhere} 
\end{cases} \]

for each market. We are interested in whether \( \gamma \) is significantly greater than 0 when the regression is conducted for the Japanese market while \( \gamma \) is not significantly different from 0 for the US market.

In addition to this specification, we also assume that the coefficients are the same for the same stock traded in the two markets, but are different for different stocks within each market. For example, the coefficients for Sony are the same in the two markets, but are different from those for Toyota in both markets. This assumption prompts us to sort the data by stock and pool them from the two markets, and then to run the following regression on a stock by stock basis:

\[ V_{ct} = \alpha_{ct} + \beta_{ct} V_{c,t-1} + \beta_{ct} \bar{r}_{ct} + \beta_{ct} |\bar{r}_{ct}| + \gamma_{ct} D_{ct}^j + \gamma_{ct} D_{ct}^{us} + \varepsilon_{ct}, \quad (3) \]

where the subscript \( c = \text{jp and us} \) stands for the countries Japan and US, respectively,

\[ D_{ct}^j = \begin{cases} 
1, & c = \text{jp and } t \geq t_0 \\
0, & \text{elsewhere} 
\end{cases} \]

and

\[ D_{ct}^{us} = \begin{cases} 
1, & c = \text{us and } t \geq t_0 \\
0, & \text{elsewhere} 
\end{cases} \]

Here, we are interested in whether \( \gamma_{ct}^j \) is significantly greater than 0 while \( \gamma_{ct}^{us} \) is not,
because there was a tax reduction in the Japanese market but not in the US market at date $t_0$.

We will see whether the results obtained in these two additional specifications would support or contradict that of the first specification. As we do not know exactly how the price change variables relate to the change in trading volume across stocks and markets, these two additional specifications should function as a useful robustness check.

4.2. Data

As noted in Section 2, there were four tax cuts since 1989: April 1 in 1989, 1996, 1998, and 1999. Because the aim of this paper is to examine the effect of the STT reform on revitalization of the ailing stock market after the bubble burst, however, we will not look at 1989. We will not analyze the 1998 reform either because, on the same date, the commission fees were liberalized for large-sized transactions. We wanted to pick up only the pure effect of the tax cut, which would otherwise be difficult to distinguish from that of the fees liberalization (see Table 2-1) if that year is included. In the periods relevant to the remaining two dates of the tax change, there were 26 Japanese stocks traded in the US market\(^\text{15}\), which were also traded in the Tokyo Stock Exchange (TSE) First Section. They are listed in Table 3 below. Finally, the return $r$ is calculated based on the closing price of the day. All the data are obtained from Datasream\textsuperscript{©}.

Table 3: Stocks Traded in Both the Tokyo Stock Exchange and US Stock Exchanges


5. ESTIMATION RESULTS

5.1 Tax Abolition in April 1999

We first examine the tax abolition enacted on April 1, 1999. We compare the

\(^{15}\) NYSE and NASDAQ.
turnover rates, taking 120 weekdays\textsuperscript{16} before and after the date of the tax change, $t_s = \text{April 1, 1999}$, that is, from October 15, 1998, to September 16, 1999. A longer period may be desired but cannot be employed, because on October 1, 1999, the transaction fees were completely liberalized, and, therefore, we would not be able to separate the effect of the STT abolition in April from that of this additional event if we took a longer period. Among 26 stocks listed in both markets, the necessary data are continuously available only for 17 stocks. Table 5-1 reports their descriptive statistics.

Table 5-1: Descriptive Statistics for 17 Stocks Examined for April, 1999

\textsuperscript{16} However, the “weekday” includes national holidays; so, the data sets contain less than 120 trading days. This is the reason why Tables 5-2, 5-3, 5-4, and 5-5 report less than 240 observations.
stands for the price return, calculated as the logarithm of the closing price of the day minus that of the previous day. We are interested in whether \( \gamma \) is positive and significant at less than the 1% level. On the other hand, the value for \( \gamma_w \) is not. The value for \( \gamma_w \) is significantly greater than 0 while \( \gamma_w \) is not. The value for \( \gamma \) is positive and significant at less than the 1% level. On the other hand, the value for \( \gamma_w \) is insignificantly positive. The V-shape relationship, implied by

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
\text{Stock} & \text{variable} & N & \text{mean} & \text{standard deviation} & \text{min. value} & \text{max. value} \\
\hline
\text{NTT} & V & 216 & 0.00110 & 0.00057 & 0.00209 & 0.00319 \\
& r & 216 & 0.00166 & 0.00093 & 0.00251 & 0.00337 \\
& \beta & 216 & 0.00174 & 0.00096 & 0.00262 & 0.00348 \\
\hline
\text{Honda Motor} & V & 216 & 0.00111 & 0.00076 & 0.00168 & 0.00581 \\
& r & 216 & 0.00165 & 0.00094 & 0.00238 & 0.00351 \\
& \beta & 216 & 0.00173 & 0.00098 & 0.00241 & 0.00364 \\
\hline
\text{Samsung Motor SPN} & V & 216 & 0.00254 & 0.00206 & 0.00427 & 0.00613 \\
& r & 216 & 0.00309 & 0.00243 & 0.00478 & 0.00659 \\
& \beta & 216 & 0.00317 & 0.00249 & 0.00488 & 0.00669 \\
\hline
\text{Toyota Motor} & V & 216 & 0.00099 & 0.00057 & 0.00189 & 0.00343 \\
& r & 216 & 0.00156 & 0.00093 & 0.00235 & 0.00351 \\
& \beta & 216 & 0.00164 & 0.00097 & 0.00242 & 0.00365 \\
\hline
\text{Wacoal} & V & 216 & 0.00099 & 0.00059 & 0.00177 & 0.00325 \\
& r & 216 & 0.00133 & 0.00093 & 0.00202 & 0.00339 \\
& \beta & 216 & 0.00141 & 0.00097 & 0.00218 & 0.00345 \\
\hline
\end{array}
\]

Notes: V stands for the daily turnover rate, as the number of traded stocks divided by the number of listed stocks. r stands for the price return, calculated as the logarithm of the closing price of the day minus that of the previous day. \( \beta \) is the absolute value of the price return.

First, let us look at the results for the first type of regression. Table 5-2 reports the result. We are interested in whether \( \gamma_w \) is significantly greater than 0 while \( \gamma_w \) is not. The value for \( \gamma_w \) is positive and significant at less than the 1% level. On the other hand, the value for \( \gamma_w \) is insignificantly positive. The V-shape relationship, implied by
\((\beta_1 + \beta_2) > 0\) and \((\beta_1 - \beta_2) < 0\), is clearly maintained and the coefficient of determination is reasonably high. This result clearly suggests that the tax abolition on April 1, 1999, contributed to the increase in trading volume.

Table 5.2: Regression Results for Specification (1), April 1999

<table>
<thead>
<tr>
<th></th>
<th>coefficient</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\beta_1)</td>
<td>0.700617</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>(\beta_2)</td>
<td>0.305742</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>(\beta_3)</td>
<td>0.338397</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>(\gamma_{jp})</td>
<td>0.008302</td>
<td>0.0014</td>
</tr>
<tr>
<td>(\gamma_{us})</td>
<td>0.001313</td>
<td>0.635</td>
</tr>
<tr>
<td>adjusted (R^2)</td>
<td>0.6369</td>
<td></td>
</tr>
<tr>
<td>number of observations</td>
<td>238</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The regression specification is (1) on page 9, which is to regress daily turnover rates on price returns, its absolute values, and dummies for the Japanese and US markets for April 1, 1999, pooling data for all the firms in both markets. The estimation is OLS. The first and second columns report the coefficient estimates and their associated P-values for each of the key parameters. Those for the idiosyncratic intercepts, \(\alpha_i\), are not reported, however, to economize on space.

Next, let us examine the results for the second type of regression to see whether the above result is supported or refuted. Table 5.3 reports the result. For the Japanese market, the V-shape relationship is maintained. In addition, the coefficient of determination is reasonably high. \(\gamma\) is estimated to be significantly positive at less than the 1% level. The result for the US markets is in contrast. While it is good in terms of the V-shape relationship and the coefficient of determination, \(\gamma\) is insignificantly different from 0. Overall, these results are consistent with that in the first regression, and thus are considered to support a view that the tax abolition contributed to the increase in trading volume.

Table 5.3: Regression Results for Specification (2), April 1999

\(\sqrt{r} = \sqrt{r}\) when \(r > 0\) and \(\sqrt{r} = -\sqrt{r}\) when \(r < 0\). Because of this, the slope in the first quadrant is \((\beta_1 + \beta_2)\) and in the second quadrant is \((\beta_1 - \beta_2)\).
Finally, we ran the third type of specification. The results are reported in Table 5-4. In 15 out of 17 cases where the V-shape relationship is maintained, the coefficients for $\gamma_{jp}$ are estimated to be significantly positive at the 10% level in 9 cases. There are two cases where the estimated coefficients are negative, but they are insignificant. On the other hand, those for $\gamma_{us}$ are not estimated to be significantly positive for any case.

Given that this specification allows for various individual factors to affect the trading volume, we interpret, although not unanimously, these results are in line with the result in the first regression. In all, the results of the three panel data regressions indicate that the tax abolition on April 1, 1999, contributed to the increase in trading volume.

Table 5-4: Regression Results for Specification (3), April 1999

<table>
<thead>
<tr>
<th>$\gamma_{jp}$</th>
<th>US</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>positive (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>significant (9)</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>insignificant (4)</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>negative (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>significant (0)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>insignificant (2)</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes: The regression specification is (3) on page 10, which is to regress daily turnover rates on price returns, its absolute values, and dummies for the Japanese and US markets for April 1, 1996, for each of the two markets. The estimation is OLS. The table reports only the 15 cases where the V-shape relationship is maintained in the regression results. The entry in each cell is the number of the coefficients for $\gamma_{jp}$ and $\gamma_{us}$ which fall in each category. For example, the entry "0" in the top-left cell indicates that there is no case where the coefficients for $\gamma_{jp}$ and $\gamma_{us}$ are both positive and significant. The number in parentheses is the sum of the number in each row or column. The level of significance is 10%.

5.2. Tax Rate Reduction in April 1996
Next we examine the effects of the tax rate reduction enacted on April 1, 1996. To be consistent with the preceding analysis for 1999, we take 120 weekdays before and after this date: from October 16, 1995, to September 16, 1996. In the period under study here, out of 26 stocks, data are continuously available only for 16 stocks. Their descriptive statistics are reported in Table 5-5.

**Table 5-5: Descriptive Statistics for 16 Stocks Examined for April, 1996**

<table>
<thead>
<tr>
<th>Stock</th>
<th>Industry</th>
<th>USD mean</th>
<th>USD standard deviation</th>
<th>USD min. value</th>
<th>USD max. value</th>
<th>JPY mean</th>
<th>JPY standard deviation</th>
<th>JPY min. value</th>
<th>JPY max. value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canon</td>
<td>Electronic</td>
<td>0.002949</td>
<td>0.001584</td>
<td>0.000578</td>
<td>0.012973</td>
<td>225</td>
<td>0.000418</td>
<td>0.000545</td>
<td>9.32E-06</td>
</tr>
<tr>
<td>Daiei SPN</td>
<td></td>
<td>0.001052</td>
<td>0.007456</td>
<td>0.003731</td>
<td>0.010163</td>
<td>0</td>
<td>0.001019</td>
<td>0</td>
<td>0.011669</td>
</tr>
<tr>
<td>Fujifilm</td>
<td></td>
<td>0.001247</td>
<td>-0.06733</td>
<td>0.051991</td>
<td>0.023473</td>
<td>225</td>
<td>0.000854</td>
<td>0.014921</td>
<td>-0.04077</td>
</tr>
<tr>
<td>HDG</td>
<td></td>
<td>0.001188</td>
<td>0.010854</td>
<td>0.010669</td>
<td>0.010485</td>
<td>0</td>
<td>0.001049</td>
<td>0</td>
<td>0.011669</td>
</tr>
<tr>
<td>Hitachi</td>
<td></td>
<td>0.002092</td>
<td>0.009452</td>
<td>0.002974</td>
<td>0.010049</td>
<td>225</td>
<td>0.0305-06</td>
<td>0.0688-05</td>
<td>0.000962</td>
</tr>
<tr>
<td>Nissan</td>
<td></td>
<td>0.001003</td>
<td>0.009338</td>
<td>0.005738</td>
<td>0.008136</td>
<td>0</td>
<td>0.001012</td>
<td>0</td>
<td>0.011669</td>
</tr>
<tr>
<td>NEC</td>
<td></td>
<td>0.002084</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
<tr>
<td>Toshiba</td>
<td></td>
<td>0.001059</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
<tr>
<td>TDK</td>
<td></td>
<td>0.000946</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
<tr>
<td>NEC</td>
<td></td>
<td>0.001059</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
<tr>
<td>Sony</td>
<td></td>
<td>0.001059</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
<tr>
<td>Toyota</td>
<td></td>
<td>0.001059</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
<tr>
<td>Wacoal</td>
<td></td>
<td>0.001059</td>
<td>0.009872</td>
<td>0.004987</td>
<td>0.008872</td>
<td>225</td>
<td>0.001728</td>
<td>0.013565</td>
<td>-0.00496</td>
</tr>
</tbody>
</table>

Notes: V stands for the daily turnover rate, as the number of traded stocks divided by the number of listed stocks. r stands for the price return, calculated as the logarithm of the closing price of the day minus that of the previous day. |r| is the absolute value of the price return.
In the first type of regression, we are interested in whether $\gamma_p$ is significantly greater than 0 while $\gamma_u$ is not. The result reported in Table 5-6 shows that this is not the case. The value for $\gamma_p$ is negative and insignificant, while that for $\gamma_u$ is positive and insignificant. The result thus fails to indicate that the rate reduction in April 1996 helped increase trading volume significantly.

Table 5-6: Regression Results for Specification (1)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_1$</td>
<td>0.244971</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>0.029334</td>
<td>0.385</td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>0.204244</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>$\gamma_p$</td>
<td>-0.0007</td>
<td>0.6043</td>
</tr>
<tr>
<td>$\gamma_u$</td>
<td>0.000357</td>
<td>0.8091</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.4602</td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
<td>237</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The regression specification is (1) on page 9, which is to regress daily turnover rates on price returns, its absolute values, and dummies for the Japanese and US markets for April 1, 1996, pooling data for all the firms in both markets. The estimation is OLS. The first and second columns report the coefficient estimates and their associated P-values for each of the key parameters. Those for the idiosyncratic intercepts, $\alpha_i$, are not reported, however, to economize on space.

Let us examine whether consistent indications were obtained for the other two specifications. The results for the second type of regression are reported in Table 5-7. For the Japanese market, while the V-shape relationship is well maintained, the $\gamma$ value is negative, albeit insignificant. The results for the third type regression are found in Table 5-8. In 14 out of 16 cases where the V-shape relationship is maintained, the coefficients for $\gamma_p$ are estimated to be significantly positive at the 10% level in 4 cases only. There are 8 cases where the estimated coefficients are negative, and they are significant in 4 cases. On the other hand, those for $\gamma_u$ are insignificant in all cases. These results are in clear contrast to the result for 1999 and are consistent with that in the first regression for 1996. Taken together, they show that the STT reduction in April, 1996, did not significantly contribute to the increase in trading volume.

Table 5-7: Regression Results for Specification (2), April 1996
<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th></th>
<th>US</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>coefficient</td>
<td>P-value</td>
<td>coefficient</td>
<td>P-value</td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>0.2446</td>
<td>&lt;.0001</td>
<td>0.1774</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>$\beta_2$</td>
<td>0.0485</td>
<td>0.4336</td>
<td>-0.0001</td>
<td>0.4004</td>
</tr>
<tr>
<td>$\beta_3$</td>
<td>0.3848</td>
<td>&lt;.0001</td>
<td>0.0017</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>-0.0003</td>
<td>0.852</td>
<td>-0.00001</td>
<td>0.0088</td>
</tr>
<tr>
<td>adjusted $R^2$</td>
<td>0.4548</td>
<td></td>
<td>0.3158</td>
<td></td>
</tr>
<tr>
<td>number of observations</td>
<td>221</td>
<td></td>
<td>225</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The regression specification is (2) on page 10, which is to regress daily turnover rates on price returns, its absolute values, and dummies for the Japanese and US markets for April 1, 1996, for each of the two markets. The estimation is OLS. The first and second columns report the coefficient estimates and their associated P-values for each of the key parameters. Those for the idiosyncratic intercepts, $\alpha_i$, are not reported, however, to economize on space.

<table>
<thead>
<tr>
<th></th>
<th>Japan 13 cases out of 16</th>
<th></th>
<th>US 13 cases out of 16</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>positive (12)</td>
<td></td>
<td>positive (12)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>significant (0)</td>
<td>0</td>
<td>significant (0)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>insignificant (12)</td>
<td>3</td>
<td>insignificant (0)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>negative (2)</td>
<td></td>
<td>negative (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>significant (0)</td>
<td>0</td>
<td>significant (0)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>insignificant (2)</td>
<td>2</td>
<td>insignificant (0)</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes: The regression specification is (3) on page 10, which is to regress daily turnover rates on price returns, its absolute values, and dummies for the Japanese and US markets for April 1, 1996, for each of the firms in both markets. The estimation is OLS. The table reports only the 14 cases where the V-shape relationship is maintained in the regression results. The entry in each cell is the number of the coefficients for $\gamma_{jp}$ and $\gamma_{us}$ which fall in each category. For example, the entry “0” in the top-left cell indicates that there is no case where the coefficients for $\gamma_{jp}$ and for $\gamma_{us}$ are both positive and significant. The number in parentheses is the sum of the number in each row or column. The level of significance is 10%.

5.3. Discussion

How should we interpret these results of the two STT changes? Given that the changes in the tax rates applicable to non-brokerage firms are more or less comparable, 0.009% (from 0.03% to 0.021%) in April 1996 and 0.01% (from 0.01% to 0%) in April 1999, can we make any sense out of these different results? Recall that the tax rate change in April 1996 was inapplicable to transactions by brokerage firms, i.e., the rate applied to trading by brokerage firms was kept the same. In 1996 and 1999, the transactions made by brokerage firms on their own behalf were roughly one third and one fourth of all transactions, respectively. In view of this, the scope of the tax change was significantly wider in April 1999 than in 1996. In addition, the tax rate change in April 1996 is a mere reduction, while that in 1999 a complete abolition. It is plausible that tax *abolition* may have a greater psychological impact on investors’ behavior than a
tax reduction, even when the magnitudes of the rate changes are comparable. Considering these differences, it is not surprising that the tax abolition in 1999 had a significant impact on turnover, while the mere rate reduction in 1996 did not.

5. CONCLUSIONS

In the midst of the stock market turmoil after the burst of the bubble economy, Japan first reduced then abolished its turnover tax levied on stock trading, in the hope that these institutional changes would revitalize the stock market, thereby alleviating concern about loss of its status as a world financial center. The effect of the turnover tax on trading volume has not been well established empirically, at least in the Japanese context. These facts motivated us to investigate whether or not the STT changes during the 1990s had the desired impact of increasing trading volume in the Japanese stock market. With a panel of data on stocks traded both in the Japanese and US markets, we compared changes in volume before and after the tax changes between the two markets in three types of specifications. We found that in April 1999, there was a significant increase in the volume in the Japanese market, but such an increase was not detected for the US market. We found, however, that such contrasting results were not observed in April 1996. This suggests that the tax abolition in April 1999 had an effect of increasing transaction volumes, but that effect was not present in the tax rate reduction in April 1996.

In concluding the paper, we would like to mention a few shortcomings of the present analysis as well as venues for future research. This paper only examined the effect of the STT reduction on trading volume. However, the STT tax is only a part of the transaction cost, which the overall reform measures aimed to eliminate. During periods in which these tax reductions were implemented, commission fees were also deregulated. In the present analytical setup, we carefully selected the estimation periods, thereby avoiding the possible influence of the fee deregulation. However, it would offer richer policy implications if we include other costs and investigate the relationship of stock trading and transaction cost in a broader perspective. Second, the effect of the STT on the stock market is not only limited to the trading volume; it can also affect market volatility. Some studies claim that a turnover tax has a positive effect of reducing excess volatility (e.g., Stiglitz [1989]). If true, the reduction in the STT in Japan should be evaluated on the grounds of increasing volume against increasing volatility. Therefore, one should investigate the effect of the STT on market volatility. Finally, the STT reduction under study is only a part of a greater picture of the
securities tax reform. In January 2003, a new securities tax system was introduced, in which capital gains and dividend taxes were streamlined. In order to evaluate the overall policy changes to revitalize the Japanese stock market in the last decade or so, this new tax law must also be examined.


