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The Stock Market Reactions to the Bank Business Tax Reduction Act in Taiwan: A Multiperiod Event Approach

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Abstract

To cope with the recent financial crisis in Southeastern Asia, the government of Taiwan launched a series of economic reforms. Among them, the Bank Business Tax Reduction Act (hereafter, the Act) reduced the bank business tax rate from 5% to 2%. The whole enactment process took five months with five major events. This study adopts a multiperiod event approach to empirically investigate the impacts of the Act. And three methods (portfolio test statistic, standardized test statistic, and dummy variables in the market model approach) are used to test the significance of the abnormal returns in order to examine the robustness of the results. Also, the U statistic (Patell, 1976) is employed to test the volatility of stock returns in some situations. The findings show that the Act impacted the security returns on four of the five event dates with significantly positive abnormal returns. The existence of significantly positive cumulative two-day and five-day abnormal returns before the announcement of the Act by the Ministry of Finance (1999/2/20) and the approval by the Executive Yuan to the Act (6/3) implies possible information leaks or information

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searches by investors. The post-event drifts after 2/20 and 3/2 (the late President Lee expressed an opinion showing that the bank business tax rate should be reduced to zero) suggest that investors took time in the early part of the enactment process to figure out the full impacts of the Act and the probability of its final approval, or the results may be due to the regulated 7% market fluctuations. The only situation that can be tested for the volatility of stock returns is the cumulative two-day abnormal return after 6/17 (the date that the Finance Committee of the Legislative Yuan approved the Act). Even though its abnormal return is zero, its *U* statistic is significant. It shows that the variance of stock returns has been significantly increased.

Keywords: Bank Business Tax, Multiperiod Event Approach.

Introduction

The recent financial crisis in Southeastern Asia raised concerns about the financial health of countries in the region. Although financially sound, the government of Taiwan reacted to the crisis cautiously. Yet, as the bank loan loss problems became serious in the country, the Economic Development Commission proposed "the Draft for Enhancing Economic Infrastructure" on February 9, 1999 in order to avoid a financial crisis. The Executive Yuan held several meetings, unprecedentedly during the Chinese Lunar New Year Holidays, on "the Current Economic Issues and Their Related Policies" on February 12 and 13. Important policy decisions made in the meetings include strengthening the operations of financial institutions, order keeping of the security trading, and enhancing the land policies, etc.

In the evening of February 19, the Ministry of Finance announced five plans to enhance the operations of financial institutions. These proposals provided that, among others, the bank business tax rate (hereafter, BBTR) would be reduced from 5% to 2%.[1] The favorable news for financial institutions appeared on the electronic

[1] The bank business tax, unpopular in the western world, is levied on loans lent by banks in Taiwan and amounts over 1 billion US dollars each year. A cut in the BBTR could boost bank earnings.

media that evening and on the newspapers the next day (2/20) on which the stock market resumed trading after the 10-day holidays. The price of bank shares rose sharply, on 2/20 and the day after, by the 7% maximum allowed by the security trading authority in the country.

When asked by a news reporter of the London Financial Times, President Lee suggested that the BBTR be reduced to zero. The news showed on local papers on 3/2. Later on, the Executive Yuan passed the proposed BBTR Reduction Act (hereafter, the Act) in the morning of 6/3 and then moved the Act to the Legislative Yuan. In the Legislative Yuan, its Finance Committee approved the Act in the morning of 6/17 and the General Meeting voted in the evening of 6/22 to enact it. The whole enactment process took five months with the above five major events bringing the Act to higher levels for approval and its pass closer to certainty each time. It is thus imperative to examine the impacts of the Act on security returns for the purpose of evaluation to government economic policy decisions.

This study adopts a multiperiod event approach to empirically investigate the impacts of the Act, including possible information leaks and post-announcement drifts, in the series of enactment events. Three methods (portfolio test statistic, standardized test statistic, and dummy variables in the market model approach) are used to test the significance of the abnormal returns in order to examine the robustness of the results. Also, the U statistic (Patell, 1976) is employed to test the volatility of stock returns in some situations.

The remainder of this paper is organized as follows. Testable hypotheses are developed in the next section. Section 3 presents the research methods. The empirical results are discussed in Section 4. Section 5 concludes the paper.

Literature Review and Hypotheses

The single-event approach could not catch the economic consequences of a series of events as a whole (Beaver, 1968; Bernard and Stober, 1989). Leftwich (1981) first adopted the multiperiod event approach to examine the 21 events in the deliberations of accounting principles for business combinations (Accounting Principles Board Opinion no. 16 and Opinion no. 17). Of the 21 events, some were favorable to the enterprises involved but most were unfavorable. Among the 9 events that presented significant abnormal returns, only one showed positive returns and the rest negative returns. The multiperiod event approach has been followed in later studies (Espahbodi et al., 1991; Khurana and Loudder, 1994; Lin and Chang, 1999).

This study examines the impacts of the Act on the banks' stock returns. All the five events under investigation were favorable. It is expected that, as the approval level went higher each time, the stock market should react favorably to the events. The first testable hypothesis is thus developed as follows.

H1: From the first proposal of the Act to every higher level of its final enactment, on each event date, the stock market reacted favorably with positive abnormal returns.

Ball and Brown (1968) investigated the stock returns before and after earnings announcements and found positive (negative) returns to good (bad) news. It is natural for investors to search for and trade on information before earnings announcements. The Act per se is a public policy carrying potential impacts on the sensitive security market. As such, during its deliberation and before the announcement in each stage, it may induce public discussions, information searches, or even information leaks. Therefore, it is hypothesized that the stock market would react on the events before the announcement on the media.

H2: From the first proposal of the Act to every higher level of its final enactment, before each event date, the stock market reacted favorably with positive abnormal returns.

Bernard and Thomas (1989) found positive (negative) drifts for good (bad) news after earnings announcements. They conjectured that investors did not figure out the implications of current earnings to future earnings. In this study, inventors might not be able to figure out the full impacts of the Act on the future earnings of banks and their stock prices, or they might not be sure about the probability of its final enactment. Therefore, it is expected as a third hypothesis that the stock market might have post-announcement drifts.

H3: From the first proposal of the Act to every higher level of its final enactment, after each event date, the stock market reacted favorably with positive abnormal returns.

The information content of a public announcement is measured not only by the associated abnormal returns, but also by their variances. The *U* statistic (measured as squared abnormal returns divided by variances of residuals of the market model) developed by Beaver (1968) had been revised and extended by Patell (1976) and Dodd et al. (1984) to test the change in variances of returns. To evaluate the impact of the Act on the volatility of returns, the fourth hypothesis is tested as follows.

H4: From the first proposal of the Act to every higher level of its final enactment, around each event date, the stock market reacted with changes in the variances of returns.

Research Methods

1. Event Dates

The following five event dates are identified for the study.

(1)2/20/1999: The first trading day after the 1999 Chinese Lunar New Year for the market to react to the information about the Act accumulated during the holidays.

(2)3/2/1999: The day the local newspapers reported President Lee's opinion about reducing the BBTR to zero.

(3)6/3/1999: The day the Executive Yuan approved the Act.

(4)6/17/1999: The day the Finance Committee of the Legislative Yuan passed the Act.

(5)6/23/1999: The day before which in the evening the Act was finally enacted.

2. Sample Selection and Data Sources

The financial institutions listed on the Taiwan Stock Exchange or the Over-the-Counter Market in Taiwan are selected as samples. Up to June 30, 1999, there were 51 listed financial institutions. Due to data availability for parameter estimation, 1 bank, 9 insurance companies, 1 venture financial company, and 5 securities companies are removed from the sample. The final sample consists of 35 banks and Table 1 exhibits its descriptive statistics. The stock returns and related data are retrieved from the Taiwan Economic Journal database.

Table 1 Descriptive Statistics of the Sample Firms

(Amounts in millions of New Taiwan Dollars)

Summary Statistics	Age	Total Assets (As of 12/31/1998)	Total Sales (For the year 1998)
Mean	26	329,630	23,879
Standard Deviation	21.9	288,999	20,396
Minimum	5	20,942	1,423
Maximum	86	1,100,532	77,594

3. Measurements of Variables and Methods of Analysis

To test the hypotheses in a multiperiod event setting, two approaches are employed in this study. The first approach is individual tests on the abnormal returns using the traditional market model.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{i,t} \tag{1}$$

Where R_{it} = rate of return on the common stock of firm *i* on day *t*,

α_i, β_i = ordinary least squares estimates of the market model parameters over the 291 day period (day -302 through day -11, relative to the first event date (2/20) as day 0),

R_{mt} = rate of return on the value-weighted index of the market on day *t*.

The abnormal returns for each firm on day *t* are calculated as:

$$AR_{it} = R_{it} - [\hat{\alpha}_i + \hat{\beta}_i R_{mt}] \tag{2}$$

Where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the parameter estimates using (1).

Different methods may lead to different results. This study employs two different statistics to test the significance of abnormal returns in order to evaluate the robustness of the tests. They are the traditional portfolio test statistics and standardized test statistics. See Appendix for details.

The second approach is an expanded market model with dummy variables added to control for the joint impact of each event (Schipper and Thompson, 1983; Thompson, 1985; Karafiath, 1988; Henderson, Jr. 1990; Karafiath and Spencer, 1991; Espahbodi et al., 1991; Salinger, 1992; Akhigbe et al., 1993). Adding dummy variables to the market model is equivalent to taking the estimation period as the base. This approach is especially appropriate for multiperiod event studies. By putting dummy variables in a regression model, it takes advantage of controlling for each other. But this approach should be used with caution. As the number of event dates increases, together with their related windows, the number of explanatory variables in the model becomes too many, resulting in a loss in the degree of freedom and thus the validity of the test results.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \sum_{v=1}^{5}\sum_{t=S}^{E}\theta_{iv,t} DUM_{iv,t} + \mu_{it} \tag{3}$$

Where R_{it} = rate of return on the common stock of firm i on day t,

R_{mt} = rate of return on the value-weighted index of the market on day t,

v = 1, 2, 3, 4 and 5 to represent the event date of 2/20, 3/2, 6/ 3, 6/17, and 6/23, respectively,

S = the beginning of the event window,

E = the end of the event window,

$DUM_{iv,t}$ = dummy variables for event dates; v = 1 to 5; t = S to E; for example, $DUM_{i1,-2}$ is 1 for two days before the first event date (2/20) or 0 otherwise,

$\theta_{iv,t}$ = estimated coefficient on dummy variable $DUM_{iv,t}$, representing the abnormal returns for the respective event date.

The average abnormal return for event date v on day t is then calculated as:

$$AAR_{v,t} = 1/N_t \sum_{i=1}^{N_t} \theta_{iv,t} \tag{4}$$

Akhigbe et al. (1993) tested $AAR_{v,t}$ as follows.

$$Z_{v,t} = \frac{1}{\sqrt{N_t}} \sum_{i=1}^{N_t} TSTAT_{iv,t} \tag{5}$$

The following model jointly estimates the cumulative abnormal returns, before and after each event date.

$$\begin{aligned} R_{it} &= \alpha_i + \beta_i R_{mt} + \sum_{v=1}^{5} \gamma_{iv,B} DUM_{iv,B} \\ &+ \sum_{v=1}^{5} \gamma_{iv} DUM_{iv} + \sum_{v=1}^{5} \gamma_{iv,A} DUM_{iv,A} + \xi_{it} \end{aligned} \tag{6}$$

Where $DUM_{iv,B}$ = 1 for the pre-event period of date v or 0 otherwise,

$DUM_{iv,A}$ = 1 for the post-event period of date v or 0 otherwise.

The average abnormal returns for model (6) are calculated similarly to those in (4) and their significance tested similarly to (5). The coefficients of the dummy variables represent the abnormal returns of the event dates and their related windows.

In order to test the changes in volatility of stock returns, the standardized squared abnormal returns test statistic (the U statistic) developed by Beaver (1968) and extended by Patell (1976) and Dodd et al. (1984) is used. The derivation of U statistic is also presented in Appendix.

Since U_{it} is derived directly from standardized abnormal returns (SAR_{it}), both statistics in some sense measure the same effect. When the expected value of AR_{it} is not equal to 0, but its variance remains $\ddot{\sigma}_{it}^2$, the tests of SAR_{it} and U_{it} will reject their respective null hypotheses. In this case, both SAR_{it} and U_{it} are used to test whether AR_{it} is different from 0 and U_{it} is not suitable for testing if the variance of AR_{it} changes. On the other hand, when the expected value of AR_{it} is equal to 0, and its variance is greater than $\ddot{\sigma}_{it}^2$, then U_{it} can be used to test for changes in the variance of AR_{it}. In other words, when AR_{it} cannot be rejected as different from 0, the U statistic can be used to test for changes in the variance of AR_{it}.

Empirical Results

1. Individual Tests

Table 2 exhibits average abnormal returns (AAR_t), average standardized abnormal returns (SAR_t) and average standardized squared abnormal returns (AU_t) on each event date. For AAR_t, among the five event dates, 2/20 present significant (AAR_t = 0.0328, t = 4.00).[2] The event dates of 3/2, 6/3, and 6/23 all have positive, but insignificant, abnormal returns; the abnormal returns of 6/17 are negative but insignificant. For SAR_t, all of the five event dates present significant abnormal returns, although SAR_t of 6/17 is negative. All AU_t's of the five event dates are significantly different from 1. This confirms the results of SAR_t that the abnormal returns of the five event dates are significantly different from 0. Obviously, the Act impacted the security returns for the banking sector and H1 is supported except 6/17.

Table 2 Average Abnormal Returns (AAR_t), Average Standardized Abnormal Returns (SAR_t), and Average Standardized Squared Abnormal Returns (AU_t) on Each Event Date

Event Date	AAR_t	SAR_t	AU_t
2/20	0.0328 (4.00)***	2.1568 (12.76)***	5.6605 (19.3)###
3/2	0.0137 (1.67)	0.9223 (5.46)***	1.7443 (3.10)###
6/3	0.0136 (1.66)	0.8511 (5.04)***	1.4386 (1.83)#
6/17	-0.0089 (-1.08)	-0.5328 (-3.15)***	2.4195 (5.91)###
6/23	0.0132 (1.61)	0.8022 (4.75)***	3.2655 (9.43)###

The first row in the data cell is the test statistic of abnormal returns and the second its t-value (or z-value). Please see the Appendix for details of the test statistics.

(*), (**), and (***): Statistically different from zero at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

(#), (##), and (###): Statistically different from 1 at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

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2 Note that the existence of abnormal returns on 2/20 might be confounded by the other news associated with the banking industry, such as the policies to reduce reserve rates and to raise tax-deductible loan loss provisions.

Table 3 shows the cumulative two-day abnormal returns ($CAAR_{t_S,t_E}$), standardized abnormal returns ($SCAAR_{t_S,t_E}$), and standardized squared abnormal returns (AU_{t_S,t_E}), before and after each event date. Before the event, $CAAR_{t_S,t_E}$ is significantly positive (negative) for the dates of 2/20 (6/17), $SCAAR_{t_S,t_E}$ significantly positive (negative) for the dates of 2/20 and 6/3 (3/2 and 6/17), and AU_{t_S,t_E} significantly different from 1 for every event date. These findings show that there are possible information leaks or information searches by investors, and H2 is partly supported.

Table 3 Cumulative Two-day Abnormal Returns ($CAAR_{t_S,t_E}$), Standardized Abnormal Returns ($SCAAR_{t_S,t_E}$), and Standardized Squared Abnormal Returns (AU_{t_S,t_E}) before and after Each Event Date

Event Date	Pre-event			Post-event		
	$CAAR_{t_S,t_E}$	$SCAAR_{t_S,t_E}$	AU_{t_S,t_E}	$CAAR_{t_S,t_E}$	$SCAAR_{t_S,t_E}$	AU_{t_S,t_E}
2/20	0.0248 (2.14)**	1.6954 (7.09)***	4.4607 (14.40)###	0.0783 (6.76)***	5.0514 (21.13)***	13.5440 (52.20)###
3/2	-0.0094 (-0.81)	-0.8112 (-3.39)***	2.8115 (7.54)###	0.0710 (6.13)***	4.6887 (19.61)***	12.5212 (47.94)###
6/3	0.0115 (0.99)	0.8478 (3.55)***	1.7979 (3.32)###	-0.0195 (-1.68)*	-1.2597 (-5.27)***	1.2979 (1.24)
6/17	-0.0213 (-1.84)*	-1.3279 (-5.56)***	2.5375 (6.40)###	-0.0013 (-0.11)	-0.0654 (-0.27)	3.6982 (11.23)###
6/23	-0.0013 (-0.11)	-0.0654 (-0.27)	3.6982 (11.23)###	-0.0276 (-2.39)**	-1.7835 (-7.46)***	3.4368 (10.14)###

The first row in the data cell is the test statistic of abnormal returns and the second its t-value (or z-value). Please see the Appendix for details of the test statistics.

(*), (**), and (***): Statistically different from zero at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

(#), (##), and (###): Statistically different from 1 at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

H3 tests for post-event drifts after each event date. As Table 3 indicates, after the event, $CAAR_{t_S,t_E}$ and $SCAAR_{t_S,t_E}$ are significantly positive (negative) for the dates of 2/20 and 3/2 (6/3 and 6/23), and AU_{t_S,t_E} significantly different from 1 for every event date except 6/3. These test results indicate that, in the earlier stage of the enactment, it took time for the market to evaluate the impact of the Act and to figure out the possibility of its final enactment, or the results may be due to the regulated 7% market fluctuations. H3 is also partly supported.

H4 tests for changes in the variances of abnormal returns around each event date. Only when the abnormal returns are equal to 0, can the U statistics be used to test for changes in variances of abnormal returns. As shown in Tables 2 and 3, for the SAR_t and $SCAAR_{t_S,t_E}$ statistics of each event date and every window, only the cumulative two-day abnormal returns after 6/17 (the same as those before 6/23) cannot be rejected as different from 0.[3] Yet, the related AU_{t_S,t_E} is significantly greater than 1 as shown in Table 3. This finding confirms the prediction of H4 and indicates that there is an increase in the variances of stock returns even though the cumulative two-day abnormal returns are 0.

2. Joint Tests

Tables 4 presents the abnormal returns and cumulative two-day abnormal returns estimated by adding dummy variables to the market model. For sake of saving degrees of freedom in the regression model, besides each event date, only the cumulative two-day abnormal returns before and after each event date are added to the model.

Table 4 Cumulative Two-day Abnormal Returns Estimated by Adding Dummy Variables to the Market Model

Event Date	Variable	Coefficient	t-value
	Intercept	-0.0013	-8.64***
	R_{mt}	0.8261	82.25***

[3] Note that 6/21 and 6/22 are the only two trading days between 6/17 and 6/23.

Pre-event 2/20	$DUM_{1,B}$	0.0127	6.28***
2/20	DUM_1	0.0307	10.39***
Post-event 2/20	$DUM_{1,A}$	0.0389	18.72***
Pre-event 3/2	$DUM_{2,B}$	-0.0046	-2.76***
3/2	DUM_2	0.0142	4.97***
Post-event 3/2	$DUM_{2,A}$	0.0352	16.89***
Pre-event 6/3	$DUM_{3,B}$	0.0054	2.72***
6/3	DUM_3	0.0133	4.42***
Post-event 6/3	$DUM_{3,A}$	-0.0098	-4.72***
Pre-event 6/17	$DUM_{4,B}$	-0.0106	-4.92***
6/17	DUM_4	-0.0100	-3.13***
Post-event 6/17	$DUM_{4,A}$	-0.0014	-0.83
Pre-event 6/23	$DUM_{5,B}$	-0.0014	-0.83
6/23	DUM_5	0.0140	4.40***
Post-event 6/23	$DUM_{5,A}$	-0.0130	-6.19***

Please see equation (6) for details of the test statistics.

(*), (**), and (***): Statistically different from zero at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

In Table 4, except 6/17, all other event dates have significantly positive abnormal returns. These joint test results support H1 once again. The cumulative two-day abnormal returns are significantly positive (negative) before 2/20 and 6/3 (3/2 and 6/17). On the other hand, the cumulative two-day abnormal returns are significantly positive (negative) after 2/20 and 3/2 (6/3 and 6/23). Surprisingly, these findings conform to the findings derived from average standardized abnormal returns (SAR_t and $SCAAR_{t_S,t_E}$), but differ from those derived from average abnormal returns (AAR_t and $CAAR_{t_S,t_E}$). This raises the issues of model choosing and robustness of empirical results.

3. Analysis of the Robustness of Empirical Results

Two methods are used to test the abnormal returns, individually and jointly. Tables 5, 6, and 7 compare the results of these methods on the abnormal returns on, before, and after each event date, respectively, to evaluate the robustness of the results.

Table 5 Comparisons of Abnormal Returns on Each Event Date by Method

Event Date	Individual Tests		Joint Test	
	Portfolio Test Statistic	Standardized Test Statistic	Standardized Squared Test Statistic (*U*)	Dummy Variable Approach
2/20	⊕	⊕	Φ	⊕
3/2		⊕	Φ	⊕
6/3		⊕	Φ	⊕
6/17		⊖	Φ	⊖
6/23		⊕	Φ	⊕

⊕ and ⊖: Significantly positive and negative different from 0, respectively.

Φ: Significantly different from 1.

Table 6 Comparisons of Pre-event Two-day Cumulative Abnormal Returns by Method

Event Date	Individual Tests		Joint Test	
	Portfolio Test Statistic	Standardized Test Statistic	Standardized Squared Test Statistic (*U*)	Dummy Variable Approach
2/20	⊕	⊕	Φ	⊕
3/2		⊖	Φ	⊖
6/3		⊕	Φ	⊕
6/17		⊖	Φ	⊖
6/23			Φ	

⊕ and ⊖: Significantly positive and negative different from 0, respectively.

Φ: Significantly different from 1.

Table 7 Comparisons of Post-event Two-day Cumulative Abnormal Returns by Method

Event	Individual Tests		Joint Test	
Date	Portfolio Test Statistic	Standardized Test Statistic	Standardized Squared Test Statistic (*U*)	Dummy Variable Approach
2/20	⊕	⊕	Φ	⊕
3/2	⊕	⊕	Φ	⊕
6/3	⊖	⊖		⊖
6/17			Φ	
6/23	⊖	⊖	Φ	⊖

⊕ and ⊖: Significantly positive and negative different from 0, respectively.

Φ: Significantly different from 1.

Interestingly, Tables 5, 6, and 7 show similar significance and signs for the standardized test statistics and statistics estimated by dummy variable approach. The significance of standardized squared test statistics (except post-event of 6/3) just confirms that the related standardized test statistics and statistics estimated by dummy variable approach are significant no matter how their signs are. But the portfolio test statistics show much different results. Except those for post-event cumulative abnormal returns (in Table 7), the test results of portfolio test statistics (in Tables 5 and 6) are not consistent with the other three measures (except that for the event date of 2/20).

The above comparisons indicate that our test results are robust when using standardized test statistics and statistics estimated by dummy variable approach. This also raises a concern about the appropriateness of using the portfolio test statistic in typical market-based studies.[4]

[4] The inconsistent results among the test statistics might be attributable to the relatively small sample size in this study.

4. Sensitivity Analysis and Discussions

Long event windows may detect early information leaks or longer post-announcement drifts. But overlapping of pre-event and post-event windows for some event dates is a problem. Those events that can be tested for long windows are pre-event (post-event) windows of 2/20 and 6/3(3/2 and 6/23). Table 8 shows the cumulative pre-event five-day and ten-day abnormal returns of 2/20 and 6/3.

Table 8 Cumulative Five-day and Ten-day Abnormal Returns ($CAAR_{t_S,t_E}$), Standardized Abnormal Returns ($SCAAR_{t_S,t_E}$), and Standardized Squared Abnormal Returns (AU_{t_S,t_E}) <u>before</u> Each Event Date

Event Date	Five-day Pre-event			Ten-day Pre-event		
	$CAAR_{t_S,t_E}$	$SCAAR_{t_S,t_E}$	AU_{t_S,t_E}	$CAAR_{t_S,t_E}$	$SCAAR_{t_S,t_E}$	AU_{t_S,t_E}
2/20	0.0435	2.8958	6.1347	0.0147	1.1404	6.9296
	(2.37)**	(7.66)***	(21.37)***	(0.57)	(2.13)**	(24.67)###
6/2	0.0146	1.0372	2.6366	-0.0440	-2.7112	4.9575
	(0.79)	(2.74)***	(6.81)###	(-1.70)*	(-5.07)***	(16.47)###

The first row in the data cell is the test statistic of abnormal returns and the second its t-value (or z-value). Please see the Appendix for details of the test statistics.

(*), (**), and (***): Statistically different from zero at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

(#), (##), and (###): Statistically different from 1 at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

Referring to Table 3 and Table 8, it shows that the market positively reacted to the event of 2/20 even 10 days before, whereas the pre-event abnormal returns of 6/3 turned from negative to positive at least from 5 days before the event.

Table 9 exhibits the cumulative post-event five-day and ten-day abnormal returns of 3/2 and 6/23. It shows similar patterns with those shown on Table 3 (cumulative post-event two-day abnormal returns). That is, the post-event abnormal returns of 3/2 are positive, whereas 6/23 negative. Investors may think "no good news any more."

Table 9 Cumulative Five-day and Ten-day Abnormal Returns ($CAAR_{t_S,t_E}$), Standardized Abnormal Returns ($SCAAR_{t_S,t_E}$), and Standardized Squared Abnormal Returns (AU_{t_S,t_E}) <u>after</u> Each Event Date

Event Date	Five-day Post-event			Ten-day Post-event		
	$CAAR_{t_S,t_E}$	$SCAAR_{t_S,t_E}$	AU_{t_S,t_E}	$CAAR_{t_S,t_E}$	$SCAAR_{t_S,t_E}$	AU_{t_S,t_E}
3/2	0.0465 (2.54)**	3.2062 (8.48)***	10.8248 (40.88)$^{\#\#\#}$	0.0244 (0.94)	1.8537 (3.47)***	9.9188 (36.69)$^{\#\#\#}$
6/23	-0.0571 (-3.12)	-3.6046 (-9.54)***	4.1375 (13.60)$^{\#\#\#}$	-0.0680 (-2.63)***	-4.3242 (-8.09)***	4.7545 (15.62)$^{\#\#\#}$

The first row in the data cell is the test statistic of abnormal returns and the second its t-value (or z-value). Please see the Appendix for details of the test statistics.

(*), (**), and (***): Statistically different from zero at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

($^{\#}$), ($^{\#\#}$), and ($^{\#\#\#}$): Statistically different from 1 at (0.10), (0.05), and (0.01) level for a two-tailed test, respectively.

Conclusions and Suggestions

This paper reports empirical findings on the impacts of the Bank Business Tax Reduction Act on the security returns and the change in volatility of security returns. The whole enactment process took five months in the first half of 1999 with five major events. A multiperiod event approach is adopted to test the impacts of the five events before, on, and after each event date. The abnormal returns are examined individually and jointly. The individual test takes two different statistics (portfolio test statistic and standardized test statistic), while the joint test a dummy variable approach. The change in volatility of security returns is tested by the standardized squared test statistic.

The results show that, as expected, the stock market welcomed and reacted to the Act with significantly positive abnormal returns on each event date except 6/17. The two-day and five-day cumulative abnormal returns before 2/20 and 6/3 are significantly positive, pointing to a possibility of information leaks or information searches by investors. The tests on the post-event drifts show that the cumulative two-day abnormal returns are significantly positive after 2/20 and 3/2 but significantly negative after 6/3 and 6/23. For longer event windows, the cumulative five-day and ten-day abnormal returns continue to be positive (negative) for 3/2 (6/23). It seems that, in the early stage of the enactment process, investors took time to figure out the full impacts of the Act and the probability of its final enactment, or the results may be due to the regulated 7% market fluctuations. Although the cumulative two-day abnormal returns after 6/17 (the same as those before 6/23) are in general insignificant, the variances do increase. Investors therefore have been influenced by the Act in terms of the increase in volatility of stock returns.

The comparisons among the different methods used in the study indicate that our test results are robust using the standardized test statistic and the statistic estimated by the dummy variable approach. Yet, the result is not consistent when the portfolio test statistic is used. This finding raises a concern about the appropriateness of the portfolio test statistic for typical market-based studies. Whether the inconsistency among the test statistics could be attributable to the relatively small sample size in this study deserves further investigation.

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Appendix

1. Portfolio Test Statistics

The average abnormal returns of each event date and of every day within its event window are calculated as follows (Dodd et al., 1984; Holthausen and Leftwich, 1986; Jang, 1994; and Khurana and Loudder, 1994):

$$AAR_t = 1/N_t \sum_{i=1}^{N_t} AR_{it} \tag{7}$$

Where N_t is the number of sample firms on day *t*.

The standard deviation is first calculated based on the AAR_t 's of the estimation period.

$$\sigma_{AAR} = [\frac{1}{290} \sum_{t=-302}^{-11} (AAR_t - \overline{AAR})]^{1/2} \tag{8}$$

Where $\overline{AAR}$ is the average AAR_t for the estimation period (291 days). The significance of AAR_t is then tested by:

$$t = AAR_t / \sigma_{AAR} \tag{9}$$

The cumulative abnormal returns for each window is calculated as follows (Fama et al., 1969):

$$CAAR_{t_S,t_E} = \sum_{t=S}^{E} AAR_t \tag{10}$$

Where S = the beginning day of the event window,

E = the ending day of the event window.

The calculation of $CAAR_{t_S,t_E}$ is based on the assumption that the portfolio will be rebalanced every period to give an equal weighting in each security (Strong, 1992). While the operation of this kind of portfolio might violate the investment practice, the test statistics of the $CAAR_{t_S,t_E}$ were well developed and used by Patell (1976) and other researchers.[5]

[5] Ball and Brown (1968) proposed the Abnormal Performance Index (API). The API is calculated

The $CAAR_{t_S,t_E}$ is tested as follows (Dodd et al., 1984; Holthausen and Leftwich, 1986; Jang, 1994; and Khurana and Loudder, 1994):

$$t = CAAR_{t_S,t_E} / [\sqrt{D} \cdot \sigma_{AAR}] \tag{11}$$

Where D = total days from S to E,

σ_{AAR} = the same as (8).

2. Standardized Test Statistics

As the AR_{it} of each event date and its event window is out of the estimation period, its variance might be different from that in the estimation period. Patell (1976) suggested that the AR_{it} be standardized before testing. The parameter used is:

$$\ddot{\sigma}_{it} = \left[\sigma_i^2 \left(1 + \frac{1}{T_i} + \frac{\left(R_{mt} - \overline{R}_m\right)^2}{\sum_{\tau=1}^{T_i} \left(R_{m\tau} - \overline{R}_m\right)^2} \right) \right]^{1/2} \tag{12}$$

Where σ_i^2 = the variance of the residual term from the market model for stock i (calculated from day -302 to day -11 relative to the event date),

T_i = the number of days in the estimation period of for stock i,

$\overline{R}_m$ = the average market returns for the estimation period,

R_{mt} = the market returns on day t.

The standardized abnormal return (SAR_{it}) for security i on day t would be:

$$SAR_{it} = AR_{it} / \ddot{\sigma}_{it} \sim t(T_i - 2) \tag{13}$$

The average standardized abnormal returns for each event date and every day of its window can be calculated as:

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under the assumption that in discrete time an equally weighted portfolio is invested and then held over the cumulative period. Henderson, Jr. (1990) suggested that the API was not truly a test statistic. Teoh and Wong (1993) constructed an abnormal return statistic in continuous time also under the assumption of buy and hold strategy, but its significance had not been tested and was only used in a regression model as a dependent variable. In general, the API and the continuous time *CAR* do not have mature statistics to test their significance.

$$SAAR_t = \frac{1}{N_t}\sum_{t=1}^{N_t} SAR_{it} \tag{14}$$

The significance of $SAAR_t$ can then be tested using the following statistic.

$$Z_{SAAR_t} = SAAR_t \cdot \sqrt{N_t} \sim N(0,1) \tag{15}$$

The cumulative abnormal returns for each event window are calculated as:

$$CSAAR_{t_S,t_E} = \sum_{t=S}^{E} SAAR_t \tag{16}$$

The significance of $CSAAR_{t_S,t_E}$ is then tested as follows (Dodd et al., 1984):

$$Z_{CSAAR_{t_S,t_E}} = \sum_{t=S}^{E} Z_{SAAR_t} / \sqrt{D} \sim N(0,1) \tag{17}$$

3. Standardized Squared Abnormal Returns Test Statistics

Another method for testing the abnormal returns is the U statistic. The U statistic can also be used to test whether the variance of returns changes. The U statistic is derived from (13).

$$SAR_{it} = AR_{it} / \ddot{\sigma}_{it} \sim t(T_i - 2) \tag{13}$$

Where $E(AR_{it}) = 0$ (18a)

$$Cov(AR_{it}, AR_{iw}) = \begin{Bmatrix} 0, & t \neq w \\ \ddot{\sigma}_{it}^{\ 2}, & t = w \end{Bmatrix} \tag{18b}$$

Squaring (13) produces an F statistic:

$$\frac{AR_{it}^2}{\ddot{\sigma}_{it}^2} \sim F(1, T_i - 2) \tag{19}$$

The expected value of (19) would be $(T_i - 2) / (T_i - 4)$ as follows (Patell, 1976):

$$E\left[\frac{AR_{it}^2}{\ddot{\sigma}_{it}^2}\right] = \frac{T_i - 2}{T_i - 4} > 1 \tag{20}$$

$$U_{it} = \frac{AR_{it}^2}{\ddot{\sigma}_{it}^2} \cdot \frac{T_i - 4}{T_i - 2} \tag{21}$$

$$E[U_{it}] = 1 \tag{22a}$$

$$Var[U_{it}] = \frac{2(T_i - 3)}{(T_i - 6)} \tag{22b}$$

The average U_{it} is then calculated as:

$$\mathrm{AU_t} = \sum_{i=1}^{N_t} U_{it} \Big/ N_t \tag{23}$$

The significance of the AU_t can be tested as:

$$Z_{AU_t} = \left[\sum_{i=1}^{N_t} (U_{it} - 1)\right] \Big/ \left[\sum_{i=1}^{N_t} \frac{2(T_i - 3)}{(T_i - 6)}\right]^{1/2} \sim N(0,1) \tag{24}$$

Dodd et al(1984) extended Patell's (1976) inference to measure the cumulative U statistic for stock i as follows.

$$U_{it_S,t_E} = \frac{\sum_{t=S}^{E} \frac{AR_{it}^2}{\ddot{\sigma}_{it}^2}}{\sqrt{D}} \cdot \frac{T_i - 4}{T_i - 2} \tag{25}$$

The average cumulative U statistic over the sample firms is then calculated as:

$$AU_{t_S,t_E} = \left(\sum_{i=1}^{N_t} U_{it_S,t_E}\right) \Big/ N_t \tag{26}$$

Its significance is then tested as:

$$Z_{AU_{it_S,t_E}} = \left[\sum_{i=1}^{N_t} (U_{it_S,t_E} - 1)\right] \Big/ \left[\sum_{i=1}^{N_t} \frac{2(T_i - 3)}{(T_i - 6)}\right]^{1/2} \sim N(0,1) \tag{27}$$

Z_{AU_t} and $Z_{AU_{it_S,t_E}}$ are then used to test if $\mathrm{AU_t}$ and AU_{t_S,t_E} are significantly different from 1, respectively.