

# Are There any Regular Variations in the Taiwan Stock Market: A Case Study of Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX)

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## Abstract

This study explores whether there is any regular effect in the Taiwan Stock Market based on the January Effect in US stock market and the December Effect in Chinese money market funds. The large cap closing index and large cap turnover data from a database of Taiwan Economic Journal (TEJ) for the period from January 2000 to December 2013 were used to verify whether there are any seasonal effects on Taiwan Stock Market using a simple Ordinary Least Squares (OLS) regression model in SPSS 20, with daily large cap index and turnover data of the Taiwan Stock Market as variables. The verification results showed there is a seasonal effect in the Taiwan Stock Market, especially in Winter, in which the effect is most significant. The research yields useful reference information for investors, scholars and government authorities in their decision-making process for more profits.

**Keywords:** Effect, Stock market and OLS

JEL Codes: C2, G1

## 1. Foreword

In recent years, with Taiwan's economy establishing more and more free trade and becoming more globalization-oriented, a lot of financial institutions get involved in merger and acquisitions as a result of the loosening of the originally rigorous control on M & A to facilitate the increasingly frequent transactions between countries. The business operations of Taiwan's financial system cover banking, securities, life insurance, property insurance, finance bills, securities financing, investment trust, investment consulting, and assets management. According to Financial Holding Company Act and relevant regulations on the organization of financial holding companies, the financial industry can be divided into three major sectors, i.e. banking, securities, and insurance. With the intensifying trend of M & A, companies in the banking, securities, and insurance sectors become increasingly mutually dependent. As a result, the pattern of world financial business is experiencing significant change. As a part of the financial market, money market mainly provides a place for the transaction of short-term financial instruments. Such instruments include treasury bonds, negotiable certificates of time deposit, commercial promissory notes and banker's acceptance. In addition to short-term finance bill market, money market also serves the role of call-money market and repo-style transaction market. The stock market is the place where stocks are issued and circulated. In other words, issued stocks are bought, sold, and assigned here. Stocks are marketable securities, with which listed companies raise money. In the Taiwan Stock Market, the turnover rate of stocks is high and stocks are traded frequently among investors. Most of the traded stocks are electronic stocks, because the electronic technology industry has been developing rapidly in the past twenty years and has become a mainstay industry of Taiwan.

In recent years, the prices of daily commodities in Taiwan have been soaring and people have to live beyond their income because their remuneration simply fails to catch up. Common people find it hard to, or, in the best cases,

simply manage to make their ends meet. Against this backdrop, nowadays, many people resort to investments for extra profits to cover their daily expenses, hoping that they can even become a stock wizard like Buffett. However, the stock market is simply too whimsical for investors to predict and most of the time, stock prices fluctuate unexpectedly, whether rising or falling. As a result, new investors in the stock market are apt to fall victim to investment blunders and lose not only their money but also their confidence in investments. As can be inferred from Fig. 1, the closing price of Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX) fluctuated drastically during the period from January 2000 to December 2013. For example, in January 2000, TAIEX was at 9000 points, but later dived to about 4800 points in September 2000 under the impact of the Internet bubble burst in Hong Kong, then rallied a little to 6000 points in October 2000, and in a month's time, dropped slightly to 5800 points. It gives one the impression that, the stock market is as unpredictable as one's own life; you do not know what will happen tomorrow. In light of this, investors might be in need of reference investment strategies with which they can take part in stock trade more confidently.

All investors want to make profits from their investment in the stock market, but are at a loss as to when they should buy in and how they should make a correct investment. Every investor wants to find out whether there are any data or strategies with which they can make investments more confidently. In light of this, this research aims to find out whether there is any regularity in the variation of TAIEX available as reference for investors.



Figure 1. TAIEX closing price trend chart (January 2000 to December 2013)

Note:

1. The study covers the period from January 2000 to December 2013
2. Data source: Taiwan Economic Journal (TEJ).

## 2. Literature Review

In Taiwan, farmers plough their land in Spring, cultivate crops in Summer, harvest in Fall, and enjoy the stored harvest in Winter. This study aims to determine whether there is any seasonal effect on the Taiwan Stock Market and discuss whether there is any clue foreboding the rise and fall of the stock market based on the following literature on effects existing in the stock market, money market, and fund market. The following effects on stock market, money market, and fund market had been identified in literature:

### 2.1 Weekend effect

Weekend effect, also called day-of-the-week effect, refers to the behavior that investors would sell or buy stocks on Friday based on their prediction on what will happen in the weekend. As a result, the closing price on Friday may either soar (in the case of good expectation) or dive (in the case of bad expectation). Keim and Hawawini (1995) stock market performance on Mondays are poor globally: the ROI on this weekday is lower than zero, not only in the US stock market, but in the stock markets of Canada, UK, Germany, France, Japan, Korea and Singapore as well.

Li (2009) Seasonal Regularities and Information Transmissions: Evidences from the U.S. and Chinese Commodity Futures Markets, included six frequently traded commodity futures, i.e. copper, aluminum, soybean, corn, cotton and wheat, as subjects of her research on day-of-the-week effect. Empirical results show that higher ROI mainly happens on Mondays or Fridays in the US commodity futures market. In commodity futures market in mainland China,

however, higher ROI consistently happens on Mondays. This suggests the existence of day-of-the-week effect. But the effect takes on distinctly different patterns in these two countries. Weekend effect is also found in the US market and the mainland China market. Although its manifesting weekday is obviously different in the two countries, weekend effect evidently has impact on the demand for materials furnished by suppliers. Knowing this would be helpful for us to know how to make the maximum profit and get the most interest from commodity futures market, which plays an important role in finance market.

### *2.2 January Effect*

January Effect was first identified in the United States. According to the tax laws of the United States, losses incurred in stock investment can be used to offset income tax. Therefore, many investors would sell out their small cap stocks before the end of a year, which have incurred much loss to them in order to reduce their tax payable, and may repurchase them in the following January. As a result, the US stock market usually demonstrates a significant downside trend towards the end of a year. But in the following January, when investors repurchase stocks, the backflow of money would make the ROI of January higher than other months of the year.

Rogalski and Tinic (1986) stocks were grouped into 20 investment portfolios according to their market values and the correlation between the ROI in January and company scale, either without being subject to adjustment in light of risks or after risk adjustment in accordance with a single market segmentation model, was surveyed. The study covered the period from 1963 to 1982, and samples used for the study were stocks of companies listed in NYSE and AMEX. The study came to the conclusion that when judging from data that had not been subject to risk adjustment, the ROI in January is conspicuously higher than that in other months, almost 4 times higher than that in the month which had the second highest ROI. As regards to Scale Effect, it was found only in January and February. The stock portfolio of small cap companies displayed higher risk in January than any other months of the year, whether judged by overall risk or systematic risk. In light of this, the high ROI might come from the compensation for high risk. Risk adjusted ROI demonstrated distinct seasonal effect, with January still being the month that had the highest ROI. Therefore, January and February had the most significant Scale Effect.

Chen (1996) the January Effect on ROI (excluding dividend) of advanced, intermediate, and speculative special stocks during the period from 1927 to 1991 was experimentally investigated by OLS and Kruskal-Wallis test. According to the results, January Effect was found in all special stocks, regardless of their grade. This was different from the Scale Effect of common stocks or corporation bonds, which was found only in small cap stocks or low rating bonds. The ROI in January was higher than the sum ROI of the other eleven months of the year, and would increase with the decrease of the rating of the special stocks. According to Siegel (1994), the first one who noticed January Effect was Don Keim, who came to the discovery that the performance of small cap stocks was far more superior to that of large cap stocks in January. In fact, in the past 70 years, the only month in which small cap stocks yielded a total ROI greater than large cap stocks was January. Take the period from 1925 to 1997 as an example, the average ROI of Standard & Poor's 500 in January was 1.6%, while the average ROI of small cap stocks in January was 6.2%. This surplus ROI of 4.8% yielded by small cap stocks in January is greater than the total difference of ROI between large cap stocks and small cap stock in a whole year. Chuang (2007) indicates that industries such as banking, construction, and paper-making all present January Effects no matter whether Asian Financial Crisis happened or not. Thus, Asian Financial Crisis made no impact on these three industries mentioned above. Besides, although general stock market presented January Effect after the Asian Financial Crisis, there were over half of the industries (4 exactly) that have had the January Effect before the Asian Financial Crisis' breaking out. Therefore, it can be concluded that the Asian Financial Crisis has no effect on the January Effect. On the other hand, Chinese Lunar New Year Effect was an obvious feature among stock market and industries for banking, food, electrical engineering, and cement before the Asian Financial Crisis.

It can be inferred from the above-mentioned scholars' discussions that, up til now, the best point in time to make profits from keeping small cap stocks is January. In this sense the January Effect is of reference value to investors. But as to why it takes so long for investors or financial economists to notice this effect, the main reason might be that, take the United States as an example, people tend to evaluate the fluctuation of stock markets by large cap stocks based indices, such as Dow Jones Industrial Average Index and Standard & Poor's 500. Indeed, large cap stocks have yielded satisfying performances in January, especially in foreign stock markets, with the exception of the US stock markets, where the performance of large cap stocks is not the best in January. Moreover, the frequency of small cap stocks yielding results inferior to large cap stocks in January gets higher and higher in recent years, and as a result the January Effect sinks into oblivion. As to the reasons why January Effect comes into existence, there are many explanations. For example, investors may have extra money in their pocket, such as dividend from their

company, or the income from selling their stocks in order to avoid tax loss. The cash may be used to buy a lot of stocks in the first week of January, mostly in the first few days at the commencement of a year, by ordinary investors, making the buying order to selling order ratio increase substantially. Moreover, small cap stocks also take up a very large proportion in all of their stocks. Hsieh (2011) came to the discovery of January Effect, i.e. the investment made in January is usually larger than other months of the year; the effect is more evident in small cap stocks than in large cap stocks.

As can be seen in Officer (1975)'s study, up-leg gains of stock market may be affected by interest difference of specific month(s). According to Rogalski and Tinic (1986) and Chen (1996), the ROI of stocks in January can be much higher than that in other months of the year. Siegel (1994) and Hsieh (2011) argued that there must be a January Effect. Based on the above-mentioned references, it is believed in this study that there is a January Effect in the stock market and the effect is a global one, which boost the ROI of stock market to a level higher than that in other months of the year.

### *2.3 December Effect*

December Effect, as implied by its name, refers to a periodic effect seen in every December. In China's money funds market, the ROI of money funds in December is much higher than that in any other months of the year. The underlying cause for this phenomenon lies in that the demand for money exceeds the supply at the end of every year because the country's major commercial banks are subject to annual year-end accounting settlement and compliance monitoring on loan to deposit ratio, which generates huge demand for money. As a result the interest rate level on money market rises, and so does money funds.

Fan (2010), however, argued in his paper that the proportion of transaction volume in Taiwan Stock Market taken by juristic persons has been gradually increasing. Based on literature on the impact of transaction volume of three major juristic persons on TAIEX, he suggested in the paper that there is a January Effect or Long Vacation Effect in the stock market evidenced by the phenomenon that the ROI in every January or after the long vacation tends to be abnormal compared to that in other months of the year. Keim (1983)'s study results revealed that the average ROI of NYSE and AMEX in January was higher than that in other months of the year from 1963 to 1976. Tong (1992) pointed out based on empirical results that there was a January Effect in the Taiwan Stock Market in the 1980s. Weng Hong-lin, Lin Quan-yuan pointed out that abnormal negative ROI was observed in December in a bull market.

According to Lee (1992), abnormal ROI related to the January Effect was found not only in the United States but in other countries as well. However, other scholar(s) used Tax Loss Selling Hypothesis to prove that the above argument was faulty and conducted a research on five major Asian countries, which revealed that for countries/regions like Hong Kong, Taiwan, Singapore and Japan, the ROI in other months of the year was significantly lower than that in January.

These countries, however, levy no capital profit tax. It is thus evident that Tax Loss Selling Hypothesis applies only to countries that levy capital profit tax, like the United States. And indeed this hypothesis applies only to countries that levy capital profit tax, where there are sufficient incentives to induce investors to sell off down leg stocks for the purpose of tax avoidance.

Therefore, it can be inferred from the above-mentioned two references that December Effect does exist in the stock market. However, the effect may suffer from time lag depending on the region in which the stock market is located, and may give rise to the abnormal rise or fall of the ROI of stocks.

### *2.4 Seasonal Effect*

December Effect refers to the phenomenon that the ROI of money funds in every December would significantly be better than other months of the year, and the substantial increase of ROI in December would boost money funds to a high point.

According to Sina (2012), December Effect in Mainland China is mainly caused by unbalanced funds supply and demand in the money market by the end of a year; to be more specific, by a demand for money exceeding the supply. In China, inter-bank market is where inter-bank borrowing, repurchase, and short-term financing bills transactions take place and major sources of funds supply are big commercial banks. Banks that are subject to compliance assessment of loan-deposit ratio may actively solicit deposits at the end of a year in order to meet a rigid requirement, a loan-deposit ratio of 75%. Therefore, the supply of money on the market would rapidly shrink at the end of a year compared to ordinary days. In the meantime, the demand for money at the end of the year is vigorous. The end of a year is also the time for annual accounting, and all enterprises are confronted with the pressure of financial settlement and year-end expenditure. For these reasons, the demand for short-term capital is naturally strong. The

demand over supply of money would boost the interest rate level on money market, and as a result the ROI of money funds would also be rising correspondingly.

Furthermore, according to MBAlib (2012), the January Effect seen in the US stock market refers to the phenomenon that the average ROI in January is significantly higher than that in other months of the year.

Bei (2012) identifies a seasonal effect on stocks in the agricultural sector because it knows when spring plough begins in 2012, a year in which the cultivation of many grain crops goes out of the shadow of 2011 under the incentives of high prices and low inventories of these crops as well as higher demand for US grains, including corn and wheat. A bumpy harvest is expected in China after the sowing of seeds in March and April. The market witnesses the substantial increase of demand for seeds and fertilizers, foreboding that relevant industries will operate well and make good profits. Spring is a good time for making investment in upstream agriculture.

To sum up, since it is found in our literature review of the above-mentioned studies that most of these studies adopted simple Ordinary Least Squares (OLS) regression for verifying their subjects of research and identifying different region-dependent regular variations, such as January Effect in the US stock market and the December Effect in China's money funds market, we decided to use simple Ordinary Least Squares(OLS) regression for the verification of our research methods, too.

### 3. Description of data and research methods

In this study, the closing index and large cap turnover data from a Taiwan Economic Journal database was used to explore whether during the period from January 2000 to December 2013 there was any seasonal effect on Taiwan Stock Market. We use large cap index data for the study because these data can reflect the trend and situation of Taiwan stock market, making them ideal for use in this study. The large cap index refers to Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX), not the total of the market values of all stocks. TAIEX is calculated by totalization of the multiplication results of the base of every stock and its weight in the total market value of Taiwan Stock Market.

#### 3.1 Description of variables

This study explores whether or not there is any seasonal effect on the Taiwan Stock Market. The data used in the study come from a Taiwan Economic Journal (TEJ) database and cover large cap index closing price and large cap turnover data over a time span from January 2000 to December 2013. We use the following formulae (I) and (II) for the analysis of the ROI of daily large cap and the ROI of daily large cap turnover data:

$$SR_t = \frac{S_t - S_{t-1}}{S_{t-1}} \times 100 \quad (1)$$

Where  $SR_t$  = ROI of large cap index on day(t);  $S_t$  = Large cap index on day(t);  $S_{t-1}$  = Large cap index on day(t - 1).

$$VR_t = \frac{V_t - V_{t-1}}{V_{t-1}} \times 100 \quad (2)$$

Where  $VR_t$  = Daily stock market turnover and ROI (t);  $V_t$  = Turnover and ROI on day (t);  $V_{t-1}$  = Turnover and ROI on day (t - 1).

#### 3.2 Methodology

The method used in this monograph is designed mainly for exploring whether or not there is any seasonal effect on Taiwan Stock Market and for finding out whether or not there is any significant difference among the daily average ROI. Therefore daily data are collected for calculation of daily ROI of stocks and daily ROI of turnover. In the study, formula (III) is used to verify whether or not there is any seasonal effect on Taiwan Stock Market.

$$SRT = \beta_0 + \beta_1 VR_t + \beta_2 D_S + \varepsilon_t, \quad t = 1, 2, 3, 4 \dots, n \quad (3)$$

Where  $SRT$ : ROI of stock market large cap index on day(t);  $VR_t$ : ROI of stock market turnover on day(t);  $D_S$ : virtual variable of ROI of stock market turnover in the four seasons (Spring, Summer, Fall, Winter);  $\beta_0, \beta_1$  and  $\beta_2$  coefficients of independent variables;  $t$ : number of observation values.

### 4. Empirical Analysis

In this chapter, formula (III) will be used to verify whether or not there is any seasonal effect on Taiwan Stock Market. In Chen (2012) the four seasons in Taiwan was defined as follows: Spring March/1 to May/15; Plum Rain Season May/16 to June/15; Summer June/16 to August/31; Fall September/1 to November/30; and, Winter December/1 to February of the next year. In this paper, seasons are basically defined on the basis of Chen's paper. However, since the Taiwan Stock Market and international stock market operate on the western calendar in which a

year is divided into four seasons consisting of three months, and considering that stock market operation will not be affected by plum rain season and typhoon season, we evenly divide the plum rain season and assign its days to the seasons of Spring and Summer, respectively, while the typhoon season has already been contained in the seasons of Fall and Winter. The data used in the study come from Taiwan Economic Journal, covering a time span from January 2000 to December 2013. ROI of daily large cap index serves as a dependent variable, while ROI of Taiwan stock market turnover serves as an independent variable. The study uses a simple regression model and SPSS 20.

#### 4.1 Definition of seasons

Chen (2012) the four seasons in Taiwan was defined as follows: Spring March/1 to May/15; Plum Rain Season May/16 to June/15; Summer June/16 to August/31; Fall September/1 to November/30; and, Winter December/1 to February of the next year. In consideration that Taiwan is an island of subtropical climate located between Eurasia and the Pacific Ocean, where east Asian monsoon prevails, and taking into account that the island's hydrological high-water period and low-water period and its distribution of precipitation which is significantly affected by seasons and typhoons formed in northwestern Pacific Ocean during Summer and Fall, a typhoon season (from July/1 to October/1) is added to reflect the impact of typhoon on Taiwan. This monograph explores whether there is any seasonal effect on the Taiwan Stock Market over the span of time from January 2000 to December 2013. However, since the Taiwan Stock Market and international stock market operate on the western calendar, in which a year is divided into four seasons consisting of three months, and considering that stock market operation will not be affected by plum rain season and typhoon season, we evenly divide the plum rain season and assign its days to the seasons of Spring and Summer, respectively, while the typhoon season has already been contained in the seasons of Fall and Winter. Therefore the plum rain season and typhoon season are not listed in Table 1 as reference.

#### 4.2 Descriptive Statistics

In this study, daily ROI and turnover data over the time period from January 2000 to December 2013 are summarized and subject to SPSS 20 for calculation of maximum value, minimum value, mean value and standard deviation of these data. The study results demonstrate significant difference among the data, with correlation

Table 1. Division of seasons and allocation of days to these seasons

Season	Date	Days
Spring	3/1~5/31	92
Summer	6/1~8/31	92
Fall	9/1~11/30	91
Winter	12/1~2/28 or 2/29	90 or 91

Note: Data Source: Chen Teng-ching (2012) and this study maximum value, minimum value, mean value and standard deviation of these data. The study results demonstrate significant difference among the data, with correlation coefficients between variables all less than 1. The value of 0.23 is sufficient to demonstrate that the correlation between variables is low and the variables will not interfere with each other. The calculated results are as shown in Table 2.

Table 2. Descriptive statistics of seasonal effects on Taiwan Stock Market

Year\Variable 2000-2013	Max.	Min.	Mean	Standard Deviation
SR	6.7422	-6.6789	0.010487	1.4802185
VR	350	-73	2.04	21.770

Note:

- 1.SR means daily ROI of large cap index, VR indicates daily ROI of large cap turnover.
- 2.A total of 3497 samples from a time span from January 2000 to December2013 are used in the study.

#### 4.3 Regression Analysis

In the study, SPSS 20 is used for the identification of a Winter Effect on Taiwan Stock Market with formula(III). The empirical results are as shown in Table 3.

Table 3. Regression analysis of seasonal effect on Taiwan Stock Market

No.	1	2	3	4
Volume rate of change				
VR(D_spring)	0.028 (0.056)			
VR(D_summer)		-0.072 (0.055)		
VR(D_fall)			-0.092 (0.056)	
VR(D_winter)				0.148** (0.058)
R-Squared	0.056	0.056	0.057	0.058
Observation	3497	3497	3497	3497

Note:

1. VR(D\_spring) means volume rate of change in Spring; VR(D\_summer) means volume rate of change in Summer; VR(D\_fall) means volume rate of change in Fall, VR(D\_winter) means volume rate of change in Winter.
2. Dependent variable is daily ROI of large-cap Index, \*, \*\*, \*\*\*, represent the significance levels of 10%, 5% and 1%, respectively.
3. A total of 3497 samples from a time span from January 2000 to December 2013 are used in the study.

## 5. Conclusion and Suggestions

After an analysis of the data in SPSS 20 with formula (III) for any seasonal effect on the Taiwan Stock Market, it can be inferred from Table 4-3 that a Winter Effect does exist for the Taiwan Stock Market over the period from the year 2000 to the year 2013. The underlying reason for this effect might be that, the Spring Festival, a holiday to which the Taiwanese attach much importance, comes in Winter and most companies that prepare their employees' year-end bonus in this season, and families and individuals who need money for the Spring Festival would resort to the stock market for raising money. Against this backdrop, the stock market would experience a short-term funding gap in the very week before the Spring Festival when money is in the most urgent need. Then during the holiday, money is reallocated by means of gambling and traveling and may gradually flow back to the stock market after the reopening of the stock market. By that time money available to the stock market will be more abundant than before, and investors can boost the stock market and give rise to a significant upward trend.

It is confirmed by the verification results that there is a consistent regular variation of the Taiwan Stock Market, i.e. the Winter Effect. The ROI of the stock market is most significant when the market is under the influence of this effect. The underlying reason might be that the backflow of money after the Spring Festival lends an upward momentum to the prices of stocks. Therefore, investors are advised to make investments in the stock market during Winter. However, careful attention must be paid to the flexibility of investment strategies and prevention of investment blunders. It is also hoped that this conclusion may provide investors, scholars and government authorities with useful information with which they can make correct investment decisions and get more profits.

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