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ORIGINAL PAPER

Selecting the portfolio investment strategy under political structure change in United States

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Abstract This paper investigated whether stock market returns and volatilities were induced by change of long-term political structure. The empirical study finds that the political change is a crucial variable to DJIA and S&P 500 stock returns, but is insignificant to volatilities. But after the 1987 Crash, the political change has a positive effect on DJIA stock returns, and reduced the risk of DJIA and S&P 500. When political structure change, significant economic policies must submit to political realities and those proposed by previous governments often do not get implemented, resulting in market confusion. But following the increasing the consummation of market structure during post-1987 crash, hence, the political change effect increased DJIA stock returns, and reduced the risk of DJIA and S&P 500, and therefore the investors might be able to make a profit when they took active portfolio positions of DJIA.

Keywords Conditional heteroskedasticity · GJR-GARCH-M · Long-term political structure · Portfolio investment strategy · Volatility asymmetry

1 Introduction

Exploring complicated relationship between stock market and political behavior using statistical methods is one of most exciting issues for academicians and investors. Politics and that economy are inextricably linked; that is, they have significant influence on each other, and cannot be separated (Chandiok 1996; Bratsiotis 2000; Cover and VanHoose 2000; Harms 2002; Chiu et al. 2005; Lin and Wang 2007). The economy has its own cycles in which market volatility can generate economic depression and uncertainty. Hence, whether political factors affect the economy has been an important area of analysis (Nordhaus 1975; Soh 1986; Milas

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2000). The US is a democracy with a two-party system. The public can, via voting, affirm the ruling party's candidate, policies, and achievements. The voting public however also has the power to not vote for the ruling or incumbent party, voters vote for who they like as a means for a new party to bring in reforms and improvements (Gemmill 1992; Gwilym and Buckle 1994; Steeley 2003; Brüggelambert 2004). The effect of the economic condition on the US presidential election is glaringly evident (Niederhofer et al. 1970; Allivine and O'Neil 1980; Huang 1985; Foerster 1994; Foerster and Schmitz 1997; Santa-Clara and Valkanov 2003). While a prosperous domestic economy cannot guarantee a victory for the ruling party, an economic decline is frequently a catalyst for party change. Hence, whether or not the major political behavior is strongly correlated to the return and volatility of the stock market is one motivation behind this study.

Soon after World War II the United States successfully positioned itself as the leader in the global economy. In the 1980s, President Reagan advocated a policy of supply-side economics, and, at the same time, instituted measures that reduced each citizen's tax burden, promoted and rewarded business research and development, reexamined laws and regulations, reformed the monetary system, and aggressively established market sectors. These reforms however did not generate quick results. But as the country entered the 1990s, reforms instituted during the 1980s gradually took effect. With technology and the Internet as its principal driving force, the US economy surpassed the limitations of the former growth model. Not only did the economic growth rate increase, government coffers registered a surplus. The country had low inflation and low unemployment rates, thereby establishing a pattern for a prosperous and booming "new economy".

However, political change also affects national performance. Aside from developing an organization's vision, the organizational manager will, by utilizing an organization's resources, establish a strategic management system that increases the organization's performance and effectiveness. If organizational performance is poor, then the manager will typically be replaced. However, changing an organization's manager can influence organizational performance. In the related literature, the manager turnover and corporate performance has become a topic of broad attention and can be classified into the common-sense theory (Davidson III et al. 1990; Borokhovich et al. 1996; Lausten 2002), the vicious cycle theory (Denis and Denis 1995; Conyon 1998; Farrell and Whidbee 2002) and the ritual scapegoating theory (Kaplan 1994; Kang and Shivdasani 1995; Nelson 2005).

The US is a presidential governmental system, with the president as the executive power, head of state, and the chief executive. The president can propose bills to congress, implement federal laws, sign treaties with foreign countries after their confirmation by the Senate, appoint federal judges, ambassadors, and high-level administrative officers. Thus, the US president acts as the highest-level manager responsible for performance of the ruling party team and, in turn, this performance is reflected in movement and volatility of stock market prices. When the performance of a ruling or incumbent party is poor, then the ruling party will typically be ousted, resulting in political change. Therefore, it is necessary to have an in-depth understanding of the effect of political change on the movement and volatility of US stock prices.

Specifically, this study investigates the response of the DJIA and S&P 500 stock market to change of the ruling party in US Employing a univariate GJR-GARCH, this study utilizes stock return volatility as an indicator to measure the impact of ruling party change and explore the dynamic relationship between financial market reactions and political behavior in the US. Second, as the president is responsible cabinet performance, and stock market will reflect his performance, by applying the theory of organizational effectiveness, which focuses on the succession of leaders, this study seeks to determine whether the succession of presidents

affects the performance of capital markets. This paper is organized as follows. Section 2 presents the asymmetric GARCH modeling of financial returns. Next, Sect. 3 describes the data and preliminary analysis. Moreover, Sect. 4 presents empirical evidence. Finally, Sect. 5 discusses the results and presents conclusions.

2 Methodology

In this study a comprehensive data set including the United States major stock market closing price indices is used. Daily S&P 500 Composite Index (S&P 500) and Dow Jones Industrial Average index (DJIA) collected from AREMOS of the Ministry of Education, Taiwan are used from November 22, 1963 to January 19, 2005. Daily stock returns were calculated as the difference in the logarithms of daily stock prices multiplied by 100. In the course of the study, the United States has held nine presidential elections, and with Kennedy's assassination and Nixon's Watergate scandal, there had been 11 presidents who have been voted into the White House. The US presidential data was obtained from *World Political Leaders*. This study uses the political party of the president as a basis to examine whether or not there was a rotation in political party and the date of the president's assumption of the presidency as the starting date for the study.

During the last two decades, economists and financial analysts have developed a broad class of conditional heteroskedasticity models for capturing systematic patterns of variance over time (Engle 1982; Bollerslev 1986). Subsequently, there is a large body of literature presented univariate models capture the asymmetric volatility. Motivated by the existing empirical literature about the market volatility, we assume here that second order moments fit to an GJR-GARCH (1,1) process, introduced by Glosten et al. (1993). Unlike GARCH, the GJR-GARCH model imposes no positive constraints on estimated parameters and explicitly accounts for asymmetry in market return volatility, thereby avoiding possible misspecification in the volatility process.

$$y_t = x_t b + \varepsilon_t \tag{1}$$

$$\varepsilon_t | \Omega_{t-1} \sim N(0, h_t) \tag{2}$$

$$h_t = \tau_0 + \sum_{j=1}^{q} \beta_j h_{t-i} + \sum_{i=1}^{p} \alpha_{1i} \varepsilon_{t-i}^2 + \alpha_2 S_{t-1}^{-} \varepsilon_{t-1}^2 \tag{3}$$

where $S_{t-1}^{-} = 1$ if $\varepsilon_{t-1} < 0$ and $S_{t-1}^{-} = 0$ if $\varepsilon_{t-1} \geq 0$. We denote this model asymmetric GARCH, or for short GJR GARCH, hence, it captures an asymmetric response when the process is well-defined if the conditions $p \geq 0, q \geq 0, \tau_0 > 0, \alpha_i > 0, i = 1, 2, 3, \ldots, p, \beta_j > 0, j = 1, 2, 3, \ldots, q$.

The early studies about GARCH specification of stock market return assumed that it does admit a conditionally normal distribution. However, Stock market returns have thicker tails than conditional normal distributions would imply. The initial GARCH specification assumes that the distribution of stock market return comes from a central t distribution (Bollerslev 1986). The central t distribution permits thicker tails, but various investigations reveal that it does not admit symmetric distribution (Harvey and Siddique 1999; Friedmann and Sanddorf-Köhle 2002; Prakash et al. 2003; León et al. 2005). Hence, this study assumes that the stock returns have a non-central conditional t distribution to estimate the effect of political change on the stock market behavior. Furthermore, to allow for sufficient flexibility in

the estimation, we allow the squared root of the conditional variance to enter the mean return equation, leading to GJR-GARCH-in-mean (GJR-GARCH-M) to obtain parsimonious estimations. Accordingly, the dummies are embedded in the GJR-GARCH-M (1, 1) as follows:

$$R_t = a_0 + \sum_{i=1}^{2} b_i R_{t-i} + c\sqrt{h_t} + a_1 D_1 + a_2 D_2 + a_3 D_3 + \varepsilon_t \tag{4}$$

$$\varepsilon_t \,|\Omega_{t-1} \sim \mathrm{T}\,(0, h_t) \tag{5}$$

$$h_t = \tau_0 + \sum_{j=1}^{q} \beta_j h_{t-i} + \sum_{i=1}^{p} \alpha_{1i} \varepsilon_{t-i}^2 + \alpha_2 S_{t-1}^{-} \varepsilon_{t-1}^2 + \tau_1 D_1 + \tau_2 D_2 + \tau_3 D_3 \tag{6}$$

D_1 denotes the dummy of political change whose value is one when a transition in the ruling party and value is zero when an incumbent win an election and keep the ruling power. Moreover, it is well known that international stock markets are marked by high volatility during whole sample period, and the high volatility are found to be related with important events, the October 1987 crash, is the only global event in the last decade that significantly increased volatility in several markets (Roll 1989; Pantel and Sarkar 1998, Gopikrishnan et al. 2000; Andersen and Sornette 2004), so that changes of stock return volatility before and after 1987 crash may be investigated. Therefore, the sample period is further broken into a pre-1987 crash period and a post-1987 crash period, D_2 represents the dummy of the October 1987 crash, D_2 equals 1 during post-1987 crash, and otherwise equals 0. Finally, the interactive dummy, $D_3 = D_1 \times D_2$, denotes the interaction between political change and 1987 crash.

The parameters of the mean and time-varying conditional variance–covariance are jointly determined using the maximum likelihood estimation method. Since the log likelihood function is a nonlinear function of the parameters, the BHHH algorithm, proposed by Berndt et al. (1974), is used to obtain the maximum likelihood estimates of the parameters in this investigation.

3 Preliminary analysis

This section presents a preliminary analysis of DJIA and S&P 500 stock market. The trend of daily DJIA and S&P 500 stock index are shown as Figs. 1 and 2, and the trend of both stock

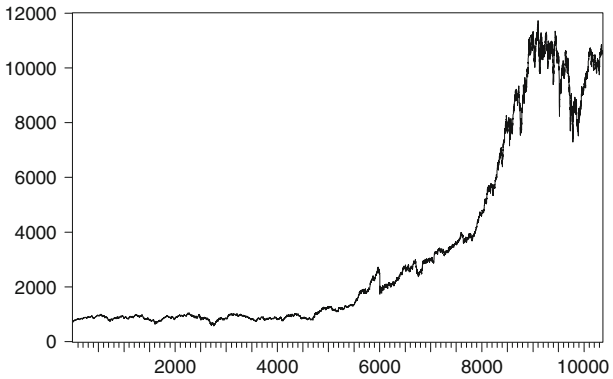

Fig. 1 The trend graph of DJIA index

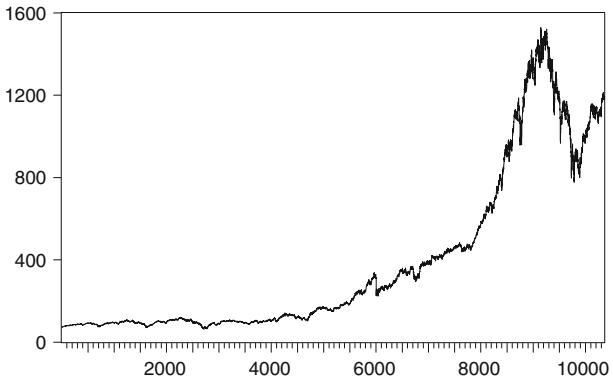

Fig. 2 The trend graph of S&P 500index

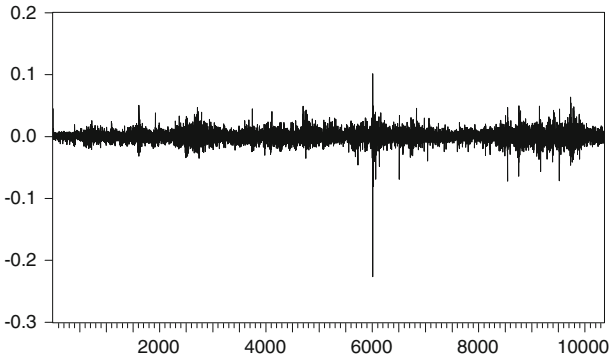

Fig. 3 The trend graph of DJIA stock returns

returns are shown as Figs. 3 and 4, respectively. Table 1 lists the basic statistics of daily DJIA and S&P 500 stock market during the all sample period. The statistics include the sample size, mean return, standard deviation, skewness, kurtosis, the median, minimum, maximum returns, Jarque–Bera test statistic and Ljung–Box Q test statistics.

First, the sample period is broken into pre-1987 and post-1987 crash period. The mean of DJIA and S&P 500 returns are significantly different from 0 at the 5% level. The skewness of DJIA and S&P 500 returns series are significantly skewed to the left at 5% significance level in the all sample period and post-1987 crash period, but they skewed to the right in pre-1987 crash period. Moreover, no matter when the sample period, the kurtosis of DJIA and S&P 500 returns series are also significantly excess kurtosis at the 5% level. Therefore, the skewness and kurtosis measurements are highly significant revealing departures from normality. Likewise, the Jarque–Bera statistic for DJIA and S&P 500 returns series reject significantly the assumption of the normality at the 5% level.

Regarding the shape parameters of the distribution of DJIA and S&P 500 returns, this study concludes that the distributions are clearly non-normal. The rejection of normality can be partially attributed to intertemporal dependencies in the moments of the series, which is strongly supported by Jarque–Bera statistic of the returns and squared returns. The Ljung–Box Q statistics of DJIA and S&P 500 returns and squared returns for 6 and 12 lags are statistically significant at the 5% level, revealing the presence of linear interdependence.

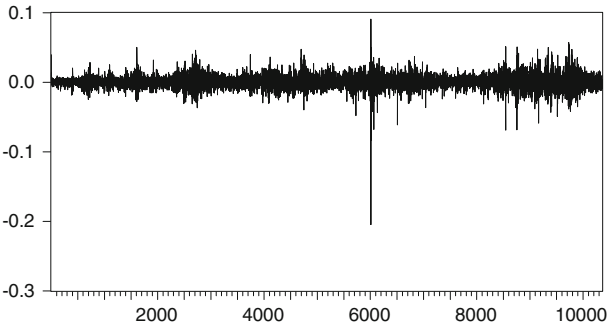

Fig. 4 The trend graph of S&P 500 stock returns

Table 1 Basic statistics for American stock returns

Statistics	*DJIA*			*S&P 500*		
	All	Pre-1987 crash	Post-1987 crash	All	Pre-1987 crash	Post-1987crash
Mean	0.0260**	0.0191	0.0414**	0.0274**	0.0233**	0.0382**
Std. Dev.	0.9842	0.8645	1.0597	0.9544	0.8191	1.0590
Maximum	9.6692	4.9454	9.6692	8.7089	4.9003	8.7089
Minimum	−8.3848	−4.7171	−8.3848	−22.8997	−5.2976	−8.6418
Skewness	−1.7316**	0.2200**	−0.2293**	−1.3969**	0.0983**	−0.1852**
Kurtosis	49.1003*	5.2968**	10.0184**	36.5668**	2.6309**	8.8415**
$Q^2(6)$	521.2031**	885.3817**	17.0665**	708.2433**	893.7649**	1125.5315**
$Q^2(12)$	568.2129**	1591.4949**	34.3166**	780.3426**	1635.0835**	1580.4909**
ADF test	−59.5607**	−34.3048**	−31.2297**	−59.3749**	−33.6479**	−31.9226**
P–P test	−95.3492**	−66.4595**	−66.3335**	−94.1304**	−63.7692**	−66.8502**
J–B	10452.9867**	1368.4740**	8968.2826**	18964.2522**	6212.6296**	6212.6296**

** (*) Denotes statistical significance at 1% (5%) level. Normal test is checked by the Jarque-Bera test and are asymptotically chi-square distributed with 2 degree of freedom. Q2(6) (Q2(12)) is the Liung-Box Q statistic for the squared returns lagged 6 (12) trading days and its critical value at 5% significant level is 12.5916 and 21.026. The ADF and the P-P tests are under the hypothesis (H0: unit root) which its critical value is decided on the critical value table of MacKinnon (1991)

The results of the ADF and P–P tests for the unit root test, DJIA and S&P 500 returns are stationary and the lag interval is 2, which is determined based on the minimum values of AIC and SBC (Akaike 1973; Schwarz 1978). Based on Lagrange Multiplier test (Engle 1982), the volatilities of DJIA and S&P 500 returns exhibit conditional heterscedastical phenomenon. In Table 2, the diagnostic test to find out if the conditional heteroskedasticity has any asymmetric effect (Engle and Ng 1993). Based on the above examination, the volatilities of DJIA and S&P 500 returns exhibit conditional asymmetry (Chuang and Huang 2002).

4 Empirical results

4.1 Model diagnosis

Panel B of Table 3 shows model diagnosing, the Liung and Box statistics of DJIA (S&P 500) given $Q(6) = 3.9637(3.4006)$ and $Q(12) = 10.7257(9.3773)$ for the standardized residual process and $Q(6) = 6.2482(4.9643)$ and $Q(12) = 15.5025(9.4320)$ for the square

Table 2 Volatility asymmetry test

Statistics	*DJIA*			*S&P 500*		
	All	Pre-1987 crash	Post-1987 crash	All	Pre-1987 crash	Post-1987 crash
Sign bias	1.7452	0.0575	0.2352*	2.4034*	0.0741*	0.2677**
Negative size bias	−13.3810**	−0.2344**	−0.5849**	−15.9593**	−0.2963**	−0.6431**
Positive size bias	2.0185*	0.1606**	0.0309*	2.3815*	0.1187**	0.0503*
Joint test	431.9685**	1188.4000**	568.8038**	587.4849**	1135.5945**	635.0472**

** (*) Denotes statistical significance at 1% (5%) level

Table 3 Empirical results of long-term political behavior

	DJIA	S&P 500
Panel A		
a_0	−0.0029	0.0073
a_1	−0.0418*	−0.0284*
a_2	−0.0017	−0.0056
a_3	0.0616*	0.0360
τ_0	0.0176**	0.0155**
τ_1	0.0053	0.0064
τ_2	0.0082*	0.0112**
τ_3	−0.0111*	−0.0117*
β	0.9825**	0.9836**
α	−0.4169**	−0.5037**
θ	0.1360**	0.1426**
b_1	0.0920**	0.1170**
b_2	−0.0174	−0.0171
c	0.0459	0.0386
Panel B		
Model diagnosis		
$Q(6)$	3.9637	3.4006
$Q(12)$	10.7257	9.3773
$Q^2(6)$	6.2482	4.9643
$Q^2(12)$	15.5025	9.4320

** (*) Denotes statistical significance at 1%(5%) level and Numbers in parentheses are asymptotic standard error. $Q(6)(Q^2(6))$ is the Ljung -Box Q statistic for the returns (the squared returns) lagged 6 trading days and its critical value at 5% significant level is 12.5916. $Q(12)(Q^2(12))$ is the Ljung–Box Q statistic for the returns (the squared returns) lagged 12 trading days and its critical value at 5% significant level is 21.0261

process. Therefore, there is no correlation or conditional heteroscedasticity in the standardized residuals of the fitted model and the above GJR-GARCH-M model is adequate in DJIA and S&P 500.

4.2 The effect of 1987 crash

The dummy of 1987 Crash, a_2, shows that DJIA and S&P 500 stock returns are insignificantly at the 5% level. In reality, on October 19, Monday, DJIA plummeted 508 points, losing 22.6% of market value, and S&P 500 dropped 20.4%, the biggest drop in history on a single trading day. Fortunately, the US economy did not enter depression. Greenspan quickly extended the currency to prevent market panic and economic instability. In addition, DJIA and S&P 500 stock volatility, τ_2 is significantly positively related at the 5% level to the 1987 stock market crash, and the empirical findings herein are the same as those of Schwert (1990) stock volatility increased extensively after the 1987 crash.

4.3 The effect of political change

Table 3 reveals that the coefficient of political change in all sample period, a_1, is significantly negative at 5% significant level on DJIA and S&P 500 stock returns. But the insignificant coefficient, τ_1, indicates that the political change effect in United States is not a crucial variable to DJIA and S&P 500 stock volatility. The United States has two political parties: the Democratic Party and the Republican Party. Both parties exhibit totally different ideologies when it comes to economic policies. The Democratic Party, since Kennedy's term in 1962, had followed Keynesian Economics, which from the 1930s has been gaining popular ground, as the main school of thought for the Democratic Party's economic policies. The party has also used this to expand the rights of the government in intervening in the state economy. On the other hand, Republicans advocated minimal government intervention on the economy so that the market can unleash its potential in building a prosperous society. Because different political parties have different economic agendas, this has led to frequent modification of existing economics policies. As a result, long-term government policies cannot be fully implemented and leads to a confusion in the market. Therefore, market participator would hold a conservative position to hedge against the investors expected.

For a long time, analytical results support the vicious cycle theory in that a change of a high-level manager negatively affects organizational performance. The US market anticipates the policies of a newly elected president. Prior to 1987 crash, political realities distorted economic principles. Faced with a simultaneous change in government, economic and finance policies are frequently unable to get ride of the baggage of political party consciousness and thinking. Consequently, policies typically become muddled and the market enters a state of uncertainty. Added to this is the clash and conflicts in policies in Congress and the slow performance in executing policies. These factors have negative influences on and create uncertainties for the US economy. Poor performance of the ruling party is a catalyst for political change, and the vicious cycle continues.

For academicians and practitioners, concentrating the political change effect that post 1987 crash is the most interesting issue. Furthermore, our findings documented that the political change effect on DJIA stock returns (a_3) after the 1987 stock market crash significantly exceed those prior to the 1987 stock market crash, but exhibited a insignificantly correlated with S&P 500 stock returns. Moreover, DJIA and S&P 500 stock volatilities (τ_3) displayed significantly drop that were induced by political change effect. Initially it was unavoidable that transition of ruling party would create difficulties in policy continuity but after the 1987 stock market crash, with the increasing the consummation of market structure and maturity of US democratic politics, as more specialists and economists participated in government policy-making, drafting scholarly, professional, brief, yet effective finance and economic policies for the US legislation, and with the strict surveillance of the opposition party who have also proposed alternative finance and economic policies, the ruling party had become more cautious and fearful, working harder to show a good performance so that they can remain in office. Hence, after the US stock market crash, the political change has a positive effect on stock returns in DJIA, and reduced the risk of DJIA and S&P 500. Therefore, our research tend to support the common-sense theory that it existed positive organizational performance–manager turnover relationship.

5 Conclusions

This study determined that the phenomenon of political change resulting from a change in the US presidency has an inverse relationship with DJIA and S&P 500 stock returns.

Therefore, under a democratic system government, different political parties have different economic viewpoints, and economic perspective often have difficulty escaping the ideological framework of political parties. Hence, when political parties change, significant economic policies must submit to political realities and those proposed by previous governments often do not get implemented, resulting in market confusion.

But, following the increasing the consummation of market structure and maturity of US politics, the political change effect increased the stock returns of DJIA stock market, and reduced the risk of DJIA and S&P 500. Having detailed estimated the effect of major political behavior and its implications on stock markets and investments, it is then fundamental to be able to make a judgment concerning the asset or portfolio allocation. Based on the result of this study, we suggest that the investors might be able to make a profit when they took active portfolio positions of DJIA.

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